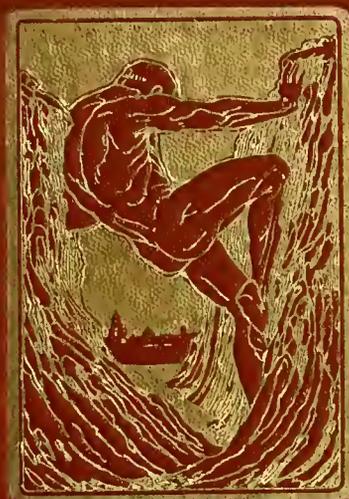


THE STORY OF THE EXPOSITION



FRANK MORTON TODD

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SCULPTURE BY ANNA COLEMAN LADD

“WIND AND SPRAY”

THE STORY OF THE EXPOSITION

BEING THE OFFICIAL HISTORY OF THE INTERNATIONAL CELEBRATION
HELD AT SAN FRANCISCO IN 1915 TO COMMEMORATE THE
DISCOVERY OF THE PACIFIC OCEAN AND
THE CONSTRUCTION OF THE
PANAMA CANAL



BY
FRANK MORTON TODD

WITH 600 ILLUSTRATIONS, INCLUDING 61 PLATES IN COLOR

IN FIVE VOLUMES
VOLUME FOUR

PUBLISHED FOR
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THE STORY OF THE EXPOSITION

CHAPTER I

A SINGLE-HANDED CLOCK, AND BOILING EGGS

A MAN thought he had a pretty good device for timing boiled eggs, and inasmuch as, in 1915, there were still people that could afford to eat eggs, he took a small booth in the Palace of Food Products, and began to exhibit his invention. It consisted of a sort of one-armed alarm clock that could be trusted to ring you up within half a minute, or a minute and a half, or any other small part of an hour from the time you had set it. The man thought that by giving away cook-books he might get orders for quite a number of clocks, from housewives that did not like to over-boil their husband's eggs or burn up the biscuits while they were reading the Sunday supplement. Hence his location in the Food Palace. We might give his name, but prefer to de-personalize him here because his case is a mere illustration of what was going on, in less picturesque aspect perhaps, all through the exhibit palaces. *Hoping for Customers*

Before he had been exhibiting long he had an order for a hundred clocks from the superintending physician of a large London hospital, who wanted them, not to boil eggs with, but to warn the nurses when they had kept the surgical instruments in the sterilizer long enough; and for purposes in the sick-room. Then some mechanical engineers came along, and offered a good price for some special timers, refined to the proper precision and reduced to pocket size, for timing shaft revolutions. Some boot-and-shoe manufacturers explained to him that the production of shoes is, in parts of the work, accurately timed, and the little egg-boiler was just what they had been looking for. Representatives of a belting concern tried to buy a large stock of the clocks because in their particular field of manufacture if a two-thousand-dollar belt remained two minutes too long in a certain pickle, that belt was ruined; and the substitution of a reliable mechanical device for the fallible memory of a man with a stop-watch seemed like good economy and sound insurance. And the representative of the operating department of a

railroad said: "That would be a fine thing to hang in an engine cab. When the engineer had orders to stop at a certain siding in 54 minutes and wait for another train he could set it for 52 minutes, and he couldn't help remembering." Canneries wanted it, hotel men wanted it, bankers wanted it.

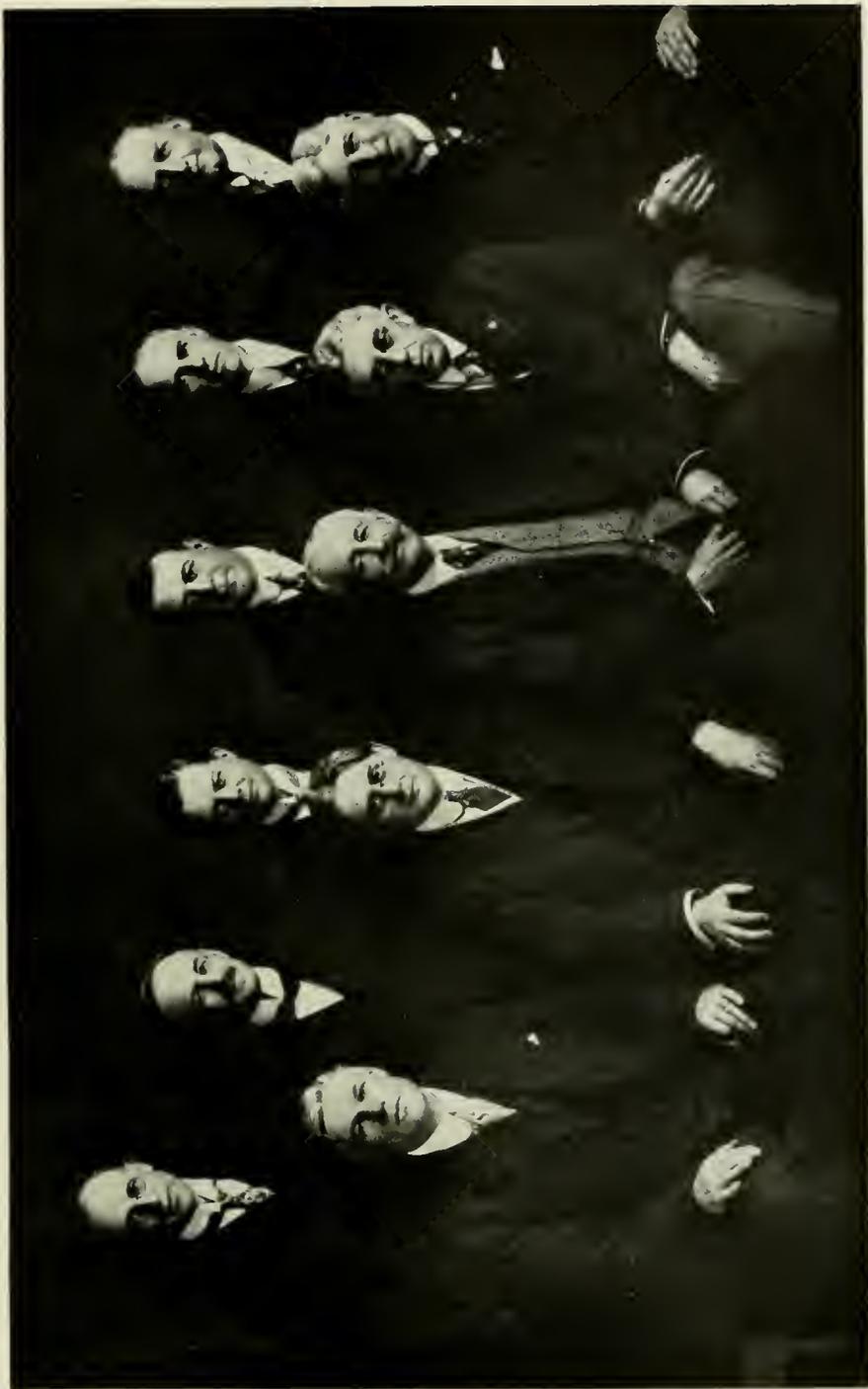
The visitors found the timing machine, and the timing machine found them. The inventor discovered in a few weeks what it might have taken him years to learn by the ordinary processes of manufacturing and advertising and selling, if he ever could have learned it that way—which is not certain. And the discoveries came right there to his booth and forced themselves in on him. He couldn't keep them out.

*They Found
the Way* Supposing the device to be properly manufactured and efficiently marketed, it was no longer a matter of boiling eggs and baking biscuits, but of conserving large values, and saving life itself. Because of the Exposition that had brought men of all occupations together from all over the world to see exhibits that had been brought together from all over the world, humanity was going to be served better, earlier; and the world was going to become a safer and more comfortable place in which to live.

As for the inventor, he said he wouldn't have taken \$10,000 for the vision of usefulness it had given him, and the field it had opened for his invention. He was passing through the usual precarious infancy of manufacturing. He wanted to know what the selling prospects were, and they swamped him. He accumulated 41,000 orders in a few months, and had to close his order books because he had not yet begun to produce, and couldn't undertake to make so many deliveries. Those orders were from Germany, France, England, Ireland, Scotland, Chile, Argentina, Australia, New Zealand, the Philippines, Java, China, Japan, Korea, Mexico, and Canada, besides the United States—not from commissioners at the Exposition, but from travelers the Exposition had attracted to one center from all over the world.

He received more than orders. Experienced manufacturers told him he would never be able to begin without a larger amount of capital for machinery than he could hope to command. He was going to need at least seven machines that would cost from \$2,500 to \$3,000 apiece. He wished to keep control of his invention and reap the profits himself, naturally; and the thing looked impossible just when its possibilities should have appeared brightest. But within the Exposition he found machines that would do the work, one for \$300 and another for \$500, and others at like amounts, all well within his reach.

His field was before him and the way was clear. It was a fine, big field, far larger than the soft-boiled-egg business he had seen at first. Eggs, in



DIRECTOR OF THE EXHIBITS DIVISION, AND CHIEFS OF EXHIBIT DEPARTMENTS

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Transportation

fact, looked very small, and he almost forgot them. In order to develop the invention, he had mortgaged everything he owned except one building lot, and he felt so grateful to the Exposition that he do-
nated that as one of the prizes for San Francisco Day. True, it was easier than giving cash; but on the other hand he did not have to give either. He complained bitterly that nobody had started a fund to make the Exposition perpetual—the exhibits part of it; he wanted to subscribe.

*Practical
Gratitude*

Such knowledge is not contained in books nor taught in schools. It can only be learned in expositions; for expositions, and they alone, assemble it, classify it, and organize it. They so multiply it and propagate it, from such small germs, that they may almost be said to create it.

And aside from its effect commercially, and economically, important sociological and historical inductions inevitably follow upon so comprehensive a vision of the interdependence of human effort.

Mutual understanding is the miracle-worker of all time. Through that, expositions are the swift, efficient organizers of the industry of the world. They help the world find itself. They show it what it has, what it thinks, what it is doing. And they show it what it needs, and how it can get it. Their service in raising human efficiency is invaluable. They make history over. And they do it right in the exhibit palaces, where one art helps another. That organizing process went on at San Francisco for 288 days, with what effect, in its entirety, we shall never know, because that effect in its entirety is too large for us ever to see. It is broadening out all about us to-day, and will go on broadening out until its farthest ripples are merged and lost in the ocean of human activity. This is the significance of the Exhibits.

CHAPTER II

CHARACTER AND CLASSIFICATION OF THE EXHIBITS

IN trying to find out what was the matter with the world, and how such an attractive planet had been so spoiled as a place of residence, a number of people had begun, by the opening of the twentieth century, albeit dimly in most cases and as a minor item of a large subject, to perceive that some of the trouble is due to making things for sale instead of for use; whereas service, and not private profit, ought to be regarded as the real purpose and social function of industry. With the spread of that idea, conscience began to assert itself in production. "Business is Business" was still true, and always will be, but in practice it began to be true that Business is also Service.

Now, the exhibits of an exposition are an epitome of its times, and nothing could have represented more faithfully the times in which the Panama Canal was constructed than the spirit shown straight through the exhibit palaces at San Francisco. It was neither by accident nor *Forced by the Times* arbitrary decree that in 1915 the underlying thought of the Exposition was Service, rather than Art, or even Education itself. The theme was in the air. It was the spirit of the times, the spirit of the Canal, one thing for which the Canal was built, the one thing by and through which its building was made possible.

The influence of that example was vast. Although forced by the necessity of defense, the Canal was also a stupendous national enterprise to promote the welfare of humanity, and in spite of contemporary war in Europe it flung a radiance over the thoughts of men. It tended toward altruism, and altruism got into the ideas of exhibitors, so that all through the palaces they were showing, with their service to society as producers, their immediate service to their employees and their service to the public in promoting sanitation and safety, concurrently with output.

The extent to which this effort went showed that exhibitors generally were animated by motives beyond mere advertising and selling; although advertising and selling are good and serviceable activities, too, for they help spread welfare. The product, the clean processes of its production, and the

considerate conditions under which the labor employed on it worked and was enabled to live, were shown together, by moving pictures, charts and models. Provision of fine lavatory systems, playgrounds, employees' club rooms, and the encouragement of employees' associations, were illustrated not once but many times over by some of the largest corporations in the country. No exposition before ever showed so much of just this active principle. It breathed a spirit new to such affairs, and raised it far above the ordinary commercial plane; or, better yet, the Exposition helped raise the commercial plane itself.

The exhibitors responded to the art stimulus of the Exposition, manifested in the harmony of its composition and the glory of its architecture, by building better and far more artistic booths than exhibitors had at any exposition before. Some were very costly and sumptuous, some were chaste and restrained, over 40 had moving picture theaters, many showed beautiful dioramas; some, like a great oil corporation exhibit in the Palace of Mines and Metallurgy, were embellished with animal sculptures or other sculptural forms in the highest art. Almost all were beautiful, and such installations as those of a certain tapestry weaving concern, and a large silver plate company in the Palace of Varied Industries, were pictures to remain long in memory. Nor can any one that saw them forget the wonderful panoramas of continental highways, mountain and river scenery, and exquisite landscapes that surrounded, high above the floor, the various sections of the automobile exhibits in the Palace of Transportation.

*Influence
of its Art*

For an explanation of these excellences, one must look farther and deeper than the mere operation of commercial competition. That, we have had with us since expositions were, and long before the day of mercantile fairs. Hundreds of thousands of dollars were expended in the exhibit palaces at San Francisco in ways that by no possibility could have produced any direct or indirect financial returns: expended to teach, to enlighten, to spread a knowledge, among the public and among possible competitors, of the best, cleanest, safest ways to live, to do the world's work and to treat the people that were concerned in the doing of it.

There was little of the land-show spirit in evidence; no exploiting of mining ventures and farm land speculations. The Exposition refused large sums of money for concessions to itinerant vendors to sell certain articles that should be distributed only by reputable specialists and experts. The main principle throughout the work of an exhibit department chief was to select and collect exhibits of a character that would show the world the contribution the manufacturer was making to the welfare of society.

Refinement of product and of the processes of production, labor-saving and life-saving devices side by side; these things were more in evidence at San Francisco than at any other exposition ever held. It was nothing less than the manifestation of a growing and conscious desire to improve the world.

*Social
Benefits*

The eleven exhibit departments at San Francisco were a contraction from the sixteen at St. Louis in 1904, although the number of classes was almost as large. It will be seen that the gamut began with Fine Arts and ended, not with Mines and Mining, but with Mines and Metallurgy; for it is through metallurgy that the output of the metal mine is brought into its service relationship to the necessities of Man.

There was no Department of Physical Culture, for it was considered that the interest of the majority of people had by this time passed beyond the subject of Man as an individual animal and was beginning to center in his moral, social, and industrial welfare. There was no Department of Anthropology, for much the same reason. Nor was there a Department of Fisheries, edible fish being treated as food, and exhibited in the Palace of Food Products; while Forestry, as representative of the products of the soil, was assigned to the Department of Agriculture. And there was no Department of Electricity, because electricity had become common to so many other things. The Committee on Exhibits at one time discussed the suggestion that there be a Department of Discoveries and Maritime Development in the Pacific Area; but, brilliant as the conception was, and apparently suitable to the occasion to be celebrated, it was abandoned as outside the proper limits of the activity of an exposition, whose field is the industrial rather than the academic department of education.

*Significant
Omissions*

It will be observed that the departments determined upon and organized were definite and mutually exclusive—so much so that they were built up by different and independent chiefs, whose responsibilities were defined in the official classification, and whose jurisdictions were in most cases delimited by their several palace walls. Food Products, however, were regarded broadly as refined products of Agriculture, and given a separate palace, under direction of the Chief of Agriculture. Varied Industries might have been in the Palace of Manufactures, and Food Products in that of Agriculture, and the palaces in these cases might have been twice the size, to accommodate the exhibits. But by constructing separate buildings, twice the number of entrances and of center aisles were provided for the convenience of exhibitors and the circulation of visitors.

The Departments of Education and of Social Economy were housed in one palace. It was a bit small for the purpose and caused an overflow of



BY A. PHIMINSTER PROCTOR

PHOTO BY GABRIEL MOULIN

"AMERICAN BISON"

some Social Economy exhibits into the Palace of Mines and Metallurgy. The Machinery Palace contained some exhibits that belonged to the Department of Liberal Arts, such as the great color printing press, which was noisy and required power and so could not well be put into the Liberal Arts Palace. But these were minor exceptions. On the whole, the classification was adhered to, and the name of a palace indicated the general class of article shown in it. That was very necessary, to avoid a destructive confusion. An exposition full of unclassified exhibits, thrown *First Law is Order* helter-skelter into the palaces, or into foreign and State pavilions, without other relation than common points of origin, would be "a tale told by an idiot, full of sound and fury, signifying nothing." For this reason exhibits in pavilions of foreign and State governments are not encouraged by exposition experts, and are not commonly reviewed for award.

There were exceptions at San Francisco, brought about by the exigencies the war created. For example, Australia had its appropriation cut in two by the necessity of sending aid to the Allies, and for awhile it looked as though there could not be any Australian participation. But a great deal of work had been done, and by the time the movement was again under weigh, with a moiety of the original appropriation, the space in the palaces had all been taken by other exhibitors. It was not considered fair to exclude Australia from review for award under such circumstances. Greece, Guatemala, and Honduras, owing to financial pressure brought about by the war, were also late, and were admitted to the same exception.

To serve any useful object the exhibits of an exposition must tell a continuous story; they must be mutually relevant; all these palaces must read like open books, like volumes of the same great, living encyclopedia of the thought and work of man. To make them do so is an art in itself, and a good classification is recognized as a work of scholarship.

In so vast a collection, the reference quality is the first important feature. It enables the student to coördinate and compare his impressions. The man that seeks a power pump, seeks the best power pump for his purpose. It would not be helping him help the world, to have some pumps in a foreign pavilion and others in the California Building half a mile away. He needs them grouped, under one roof, and in some relation to their uses, so that he can compare different types and select the one best adapted to his needs.

When he has found that, it is likely that he will wish to see motors. And the deep-sea fisherman and the man interested in auxiliary schooners are interested in one class of motor, too. These things *Like a Book* have relevancy in use, and should have in the classification.

Tractors may seem like instruments of Transportation—but their greater

use, for the present at least, is in Agriculture, and they must go where the farmer will be, and not be dispersed among the buildings of different States where they may happen to be produced.

To get the value of an exposition, a visitor not only needs to have the objects of his study so grouped and displayed that he may apply himself directly to the examination of them, without having to assemble them mentally and by memory from different parts of the grounds, but he needs to have them segregated, and among articles of their general type, instead of having scattered about them a lot of irrelevant material that distracts his attention from a just comparison.

The classification, therefore, almost determines the degree of an exposition's effectiveness.

And the classification must be modernized for every exposition. Preparing the classification for the Panama-Pacific took eight months; eight months of study by the Director-in-Chief of Foreign and Domestic Participation, through consultation with experts connected with the universities and with bureaus of the Government, with editors of technical journals, leaders in important industries, and exposition authorities in foreign countries. It was worth such care, for in the contemporary university of the Exposition, it was the curriculum. The effort was to present as far as possible a scientific alignment of the latest and highest achievements of the world. The eleven Departments finally comprised 156 groups divided into 800 classes, representing all modern phases of the world's industrial development.

The classification was recommended by the Exhibits Committee and approved by the President in April, 1913, and was immediately promulgated to the world.

No article manufactured prior to 1904, the date of the St. Louis Exposition, and no longer commercially produced, could be shown for award; for this was to be a contemporaneous exposition, celebrating in the main an achievement of its own year.

Three motives are present in a classification: 1, the announcement of the Exposition's scope; 2, the provision of a plan of installation; and 3, the laying of a foundation for the organization of the System of Awards. These were all subserved in the Panama-Pacific classification.

Throughout that classification, as throughout the Exposition, the keynote of Service was so strongly emphasized, that the system of awards was largely based on the amount of benefit an exhibitor had conferred on society by his activities, and hence a material consideration in making an award was the age, and extent of operations, of

Volume
Important

the particular enterprise the exhibit represented. For example, an inventor that had done something quite original and remarkable and had produced one sample of his invention and stopped there, was not regarded, from an Exposition standpoint, as having contributed greatly to human happiness. Volume of output and length of public service through production was an element of great importance in the assignment of awards.

In reviewing the more significant of the thousands of exhibits let us follow the classification and begin with the Palace of Fine Arts.

CHAPTER III

ASSEMBLING A GREAT ART EXHIBITION

THE exhibition of Fine Arts at the Panama-Pacific International Exposition was more than a gathering together of great paintings and sculptures. It was a school wherein a person with a serious interest in the subject could learn something of the evolution of art, and especially of American art, as an expression of genius and an adornment of life, and wherein he could see something of the latest phases this evolution had assumed. And the people of San Francisco, and the strangers in the city, went to that school by the hundreds of thousands, not merely to acquire “culture” but to enjoy. Throughout the community it was the subject of more discussion than any other department. A count kept on several different days showed that 55 or 56 per cent of all entrants to the Exposition resorted to it; and it was estimated that during the season it attracted not less than 10,000,000 visits.

*Art to be
Enjoyed*

The head of this Department was J. E. D. Trask, and his theory of its function was that it should serve to promote cultural advancement, and help inform every visitor to the Exposition no matter what that visitor's intellectual attainments might be. To do that he drew on the collections of museums and of individuals all over the world, and then so classified the various items that they should stand in logical and sequential relation to one another. He took charge of his Department toward the end of 1912, and laid out a general plan of the stupendous work before him; in which he was assisted by his broad knowledge of the field, his acquaintance with collectors, and his experience as an art museum manager.

The first labor was the classification, worked out in conjunction with the Director-in-Chief of Foreign and Domestic Participation and the Director of the Division. It excluded copies produced by industrial-mechanical processes, pictures, drawings, and engravings not framed; works of sculpture in unbaked clay or any form of modeling wax; and architectural ornaments except such as might be included under group 3. The classification was brief enough to recite here as a matter of interest, and a possible guide to some future exposition. It read:



BY EDWARD BERGE

PHOTO BY E. O. JELLINEK

“MUSE FINDING THE HEAD OF ORPHEUS”

CLASSIFICATION

FINE ARTS

Group 1

PAINTINGS AND DRAWINGS

- Class 1. Paintings on canvas, wood or metal, by all direct methods in oil, wax, tempera or other media; enamels; paintings on porcelain, faience and on various preparations, of purely pictorial intent; mural paintings in any medium.
- Class 2. Paintings and drawings in water color, pastel, chalk, charcoal, pencil and other media, on any material. Miniatures on ivory or ivory substitutes.

Group 2

- Class 3. Etchings, engravings and block prints in one or more colors. Auto-lithographs with pencil, crayon or brush.

Group 3

SCULPTURE

- Class 4. Works in the round, high and low relief; busts, single figures and groups in marble, bronze or other metal; in terra cotta, plaster, wood, ivory, or other materials.
- Class 5. Models in plaster and terra cotta.
- Class 6. Medals, plaques, engravings on gems; cameos and intaglios.
- Class 7. Carvings in stone, wood, ivory or other materials.

Group 4

LOAN COLLECTION

Selections of especially interesting art works of various kinds, from institutions and private collections.

The following will not be admitted to the Fine Arts Department:

1. Copies; works resulting from industrial-mechanical processes.
2. Pictures, drawings or engravings not framed.
3. Works of sculpture in unbaked clay, or any form of modeling wax.
4. Architectural ornaments except such as may be included in Group 3.

As finally completed, the collection was a very broad exhibit of the graphic and plastic arts in spite of the fact that it showed nothing in the industrial arts, and nothing in the Arts and Crafts, and left wholesale reproductions of stock statuary to the Palace of Manufactures, where they made a very beautiful display, and where thousands of dollars' worth of

them were sold by the Italian dealers. And not all the fine arts were represented in the Palace, for architecture was lacking. This was because the Exposition itself was the grandest and most beautiful exemplification of architecture ever seen in this country, and one of the most beautiful ever seen in the world, and no further effort to exhibit architecture would have been effective.

In this work of establishing and conducting one of the great departments of the Exposition the Chief needed the assistance of an able staff, and had it—Robert B. Harshe, Assistant Chief; Charles Francis Browne, Superintendent of the United States Section; Jane de Maranville, the Department's Secretary; John G. Dunlap and Helen Wright, Sales Manager and Assistant Sales Manager; Will J. Hyatt, John M. Bateman, and William G. Merchant, who assisted the very critical work of installation, both of pictures and statuary; and Eugene Pirard, Gallery Superintendent; with quite a roll of office and gallery assistants.

Soon after taking charge, Trask made a trip through the East on an extended survey of the field to find what was new and available. In the Fall of 1913 he went to Europe and remained until the end of the year. Here he formed several advisory committees with headquarters at London and Paris, visited American artists abroad and enlisted their support, discussed space assignments and details of hanging with foreign commissioners of countries that had accepted the invitation to participate, and labored to promote the participation of more. On this mission he visited France, Belgium, Holland, Denmark, Sweden, Italy, Austria, Hungary, and England.

*Wide Field
to Cover*

Had it not been for the war there would have been a strong British representation in the Palace of Fine Arts and an unofficial German participation amounting to 400 paintings. In fact, a German Committee was formed, composed of some of the foremost artists and art authorities in Germany and including the American painter Gari Melchers, instructor in painting in the school at Weimar. Prof. Carl von Marr of Munich was appointed to take charge of the German exhibition at San Francisco. The war ended it, as far as that sort of representation was concerned.

There were 39 German paintings in the International Section, but they got there as a result of the chance-medley of the world conflict, for they had been shown at the Carnegie Institute in Pittsburg in the Spring of 1914, started home on a German ship, were captured by a British cruiser, passed upon by a British prize-court, and returned to the Institute; whose President and Board of Directors saw that they were exhibited at San Francisco for the Exposition period.

Trask returned to San Francisco in December, 1914; and, the war having spoiled the fairest prospects in the European field, he devoted himself to building up the United States Section. In the meantime J. Nilsen Laurvik, a Norwegian authority in this subject, had been credentialed to Norway, where he did the effective work that led to the formation of the fine Norwegian exhibit. He was then sent to Venice, where he secured much of value that had been shown in the Venice Exposition of 1914 and that could not be returned to its owners on account of war conditions. Thence he visited Vienna and Budapest, and the result of his labors under the unpropitious conditions of the time, but aided by the safe transportation of the "Jason," was the filling out of the International Section with a most noteworthy display.

*Ranging
Europe*

Strong support was found in the advisory committees organized to assist the Department. There was a National Advisory Committee, one for New England, one for New York, one for Pennsylvania and the South Atlantic States, one for the West and another for the Middle West, one for Great Britain, and one for Europe in general. On these committees were such men as John S. Sargent, Walter McEwen, Edmund C. Tarbell, John W. Alexander, Edward W. Redfield, Frank Duveneck, and Eugen Neuhaus.

In building up the United States Section, the Chief of the Department either visited in person, or caused to be visited and reported upon by some member of an Advisory Committee, every exhibition of painting and sculpture of any importance held in the United States during 1914. He spent the last three months of the year interviewing artists throughout the country. Charles Francis Browne, Superintendent of the United States Section, put in the last seven months of the year on the same sort of work. An office was opened in New York, from which all the great collectors in the country could be reached. It was open during the last three months of 1914 and could have accomplished more had it been opened three months earlier. As it was, the Department listed as available about ten times as many paintings as it was able to borrow, and the loan collection served well as an index to the various schools of modern painting.

*From Many
Schools*

Some 9,000 copies of the general invitation to exhibit were circulated among artists and art institutions; and juries made up from the advisory committees met in London, Paris, Boston, New York, Philadelphia, Cincinnati, Chicago, St. Louis, and San Francisco to pass upon the offerings.

Artists with works for sale had a direct financial interest in exhibiting, although some were reluctant to remove those works from the field of frequently recurrent Eastern exhibitions. But it was no easy task, even for the Chief of the Fine Arts Department, to persuade collectors to lend him

their choicest treasures, things for which they had not only paid large sums of money but that never could be replaced if they should be destroyed, to be transported across the continent, unpacked amid the rush of preparation for an exposition, handled and hung by somebody they had never heard of, in a building they had never seen, exposed to no one knew what risk and changes of exposition policy and management for nearly a year, and repacked and returned by unknown persons at the end of that time. Some of the deepest of human interests were involved—the desire to aid a great Exposition in its vocation of service to humanity, and fear for the fate of objects as near the heart, perhaps, as anything inanimate ever gets. It took personal influence and standing in the art world to secure the loan of the many great exemplars of painting that formed part of the loan collection.

And sometimes such influence and standing failed. The son of a noted millionaire, who was asked to use his influence with his father to help obtain certain examples of a particular school, had to decline in this rather pathetic statement:

“My mother is dead. My father is a lonely old man, and his work in the world is done. He may not live out the year. His sole remaining interest in life is centered in his paintings. If he permits any of them to go to San Francisco he may never see them again. I cannot ask him to.” And the son’s caution was prophetic. The owner of that collection died before the end of the Exposition season, still in possession of his art treasures. So an exposition reaches into human life.

The United States Section was under the direct management of the Department, but each foreign section was given, as far as possible, full freedom in its installation. In ten galleries of the United States Section there were cases around the walls in which were displayed most interesting and beautiful collections of miniatures, medals, and prints. The Department arranged for the receipt of prints from the artists unframed, under a plan by which the artists paid a nominal fee for the framing. It worked well, and secured uniformity of setting.

The publication of the Fine Arts catalogues was a concession, and proved a very lucrative one to the concessionaire; and while the Exposition received its percentage the work had to be carefully supervised by the Department in order to have any value, and so the Exposition might have had the entire return from the publication. At least, such was the Chief’s opinion.

To show the nature and tendencies of the various schools of painting in the United States in the most comprehensive way the limitations of the space at command would permit, it was determined to set aside a certain number of galleries for certain representatives of these schools.



BY EDITH BARETTO PARSONS

PHOTO BY GABRIEL MOULIN

“THE DUCK BABY”

In accordance with the educational purpose of the Exposition, efforts were made to extend the influence of its Department of Fine Arts, and scores of lectures were delivered throughout the country by Trask and his assistants. These lectures were the best sort of publicity, for they served to whet the popular anticipation and desire. Harshe compiled a "Reader's Guide to Modern Art" which stimulated interest. After the opening of the galleries, three docents were installed, whose duties were to conduct visitors through the palace for a small fee, giving them information about the exhibits and exhibitors, which it was far pleasanter to receive in this way than to dig out of a book. They were no expense to the Department, and from an educational point of view their services were of great value—and they attracted attendance. Those serving in this capacity were Mrs. Melville J. Johnston, Dr. Elizabeth Denio, and Mrs. Rose V. S. Berry.

In conformity with exposition practice, a large part of the collection was for sale, for the exhibiting artists. But a method new to expositions was put into effect, on suggestion of the Chief of the Department, who recommended that the sales should be handled by the Department itself through salesmen on salaries, the Exposition to deduct 15 per cent to reimburse itself. Dunlap was appointed sales manager, with Helen Wright of the Congressional Library at Washington as his assistant, Miss Wright being an expert on prints.

Not only did the sales during and for a short while after the Exposition season total more than four times as many as were made from the Department of Art at the St. Louis Exposition, but they distributed an amazing number of fine paintings and art works over the West and Middle West—a fact likely to have a continuing influence on the cultural development of those parts of the country for generations to come. Sixteen hundred and eleven sales were made for \$227,123. On this business *Many Sales are Made* the Exposition drew commissions of over \$34,000, of which \$21,462 was net profit from the sales activity. Of the sales, 188 were made after the close of the Exposition. The commissions would have been larger, but for the fact that in certain cases where some museum needed a particular piece and could not raise enough money to cover the commission, and where investigation showed that the sale would have fallen through if the commission were insisted upon, the Exposition felt that it would be losing nothing, and serving the general cause of art and incidentally the artist, if it waived its fifteen per cent.

Practically all the sales were for delivery after the Exposition period, and this fact, in addition to the work of returning loans, necessitated a considerable expansion of force in the Department for packing and shipping, and some increase in the accounts for freight.

From the United States Section alone, 1,083 exhibits were sold, comprising 182 paintings, 128 pieces of sculpture and 773 prints. Four hundred and eighty-six foreign exhibits were sold, which included 125 paintings. More items were purchased for delivery in California than in any other State: 83 American paintings, 82 pieces of American sculpture, and 513 American prints; 52 foreign paintings, 6 pieces of foreign sculpture, 170 foreign prints and 57 miscellaneous foreign objects. The next largest list went to New York. The purchases went into 34 States, and Canada.

We have elsewhere recounted that in response to large popular petitions the Directors decided to keep the Fine Arts Palace open after Closing Day until May 1, 1916, in order to give opportunity to certain public spirited persons to make it a permanent art gallery. This made it necessary for the Chief of the Department to undertake the arduous task of getting extensions of all the loans he could and then filling the places of those exhibits that had to be returned promptly after December 4. Exhibitors were circularized for this purpose, and Trask went east to persuade more of them; accompanied and greatly assisted by Francis McComas, President of the San Francisco

*Extending
the Term* Society of Artists, a man whose service to the art interests of San Francisco can hardly be overstated. They made an extended tour, and after a short closing period the rearranged galleries were opened to the public for the post-Exposition period on January 1, 1916.

The whole exhibition was rehung by the middle of February. Pictures were brought over from the Annex to the main building. Through the coöperation of the National Sculpture Society, and the very generous action of the Albright Art Gallery of Buffalo, where the Society had arranged a great exhibition, practically the whole sculpture exhibit was retained. Sales in the post-Exposition period amounted to \$33,607.

The Fine Arts Department differs fundamentally from that of any other in an exposition. One important point of difference is the fact that the exhibits are in many cases unaccompanied by their owners or even by their owners' special representatives. The Department must represent the exhibitor in the majority of cases, and be responsible for the safe keeping of treasures that are irreplaceable, and to that extent uninsurable. The nature of art insurance for an exposition we have endeavored to indicate in the chapter headed "Insuring an Exposition," and the reader may infer from it that such insurance would be very unsatisfactory to have to collect. For the safe keeping of works that are precious to the world, the Department Chief and through him the Exposition itself is morally responsible, in an even larger degree than in the case of other exhibits, and cannot hire a

member of Lloyd's, or anybody else, to take that responsibility in any more than a commercial way.

For these reasons it was the opinion of the Chief of the Fine Arts Department that the building and its guardianship should have been under his control or at least under that of the Division of Exhibits. For example, wheel chairs were a menace, and in his opinion should have been permitted in this palace only when occupied by persons unable to walk. But the Chief could not keep any of them out as long as the Guards had orders to let all of them in, and so wheel chairs with healthy members of society, and baby carriages with twins, were daily pushed about, amid priceless cloisonnés and other fragile things.

*Question
of Control*

The Palace of Fine Arts with its Annex, cost \$631,929 to build, and afforded some 148,558 square feet of space; but comparison with other exhibit palaces is difficult because the Fine Arts exhibits were both inside and outside the buildings, and on walls.

Ordinary exhibit palace space is not difficult to divide and assign; but in a collection of the fine arts there may be important reasons for desiring special structural arrangements. Says the Chief: "For the benefit of future expositions I suggest that it would be wise if, in the Fine Arts Department especially, the person having charge of the organization of exhibits and their installation should have some voice in regard to the plant in which the installation is to take place—a voice at least equal to the builders of that plant." Such considerations raise organization problems that history may properly indicate, but not attempt to solve.

CHAPTER IV
IN A PALACE GARDEN

REMOTE as it seemed, unearthly and dreamlike, you could actually enter the precincts of the Palace of Fine Arts. Across the Lagoon the penetralia of the Temple of Sculpture invited you, through the strange open peristyle with the women on its top weeping over their mysterious coffers.

The way led through the Gallery of Sculptures—a gallery that was merely this peristyle along the curving rim of the Lagoon, a copse here and there, a canopy of foliage, and a setting of grasses and acanthus and flowering myrtles between the giant columns.

The Loggia was more a temple to the glory of Sculpture than it was a shelter; shelter was not needed in the California climate, and most of the figures had none but the turquoise sky, or that cool, silver shroud of fog that enwrapped them on a summer morning. Every position, on sward, or amid pittosporum, eucalyptus, cypress, willow, or plumed clumps of pampas grass, had been especially sought out. Some of the statues stood in little fountain basins, under a continuous rain from delicate jets. Every pedestal was a separate study and all of them reproduced some detail of the architecture, thus drawing the statuary into unity with it.

The architect was in some terror during construction days lest a plan should be put into effect to make the Fine Arts Palace more accessible by constructing causeways over the Lagoon. He had his way, for he told Connick about it, and Connick conveniently found it impossible to get hold of any money for the causeways, and so the Palace remained properly detached and aloof from the main body of exhibit buildings, with its own *locale* and atmosphere. You had to approach it by going around an end of the little lake, in which gulls and ducks had their feeding grounds; and if you went around the north end you came upon Bela L. Pratt's "Whaleman," the dramatic figure of a boat-steerer, standing in the bow of a whale-boat with iron poised to strike. You came upon it in a clump of shrubbery, and the foliage helped abstract the figure most effectively, while the water behind gave a marine setting.



IN THE GALLERY OF THE NEW ART



BY GEORGE H. BELLOWS

PHOTO BY GABRIEL MOULIN

“RIVER FRONT”

A little farther on, through a clump of cypress and pepper trees, was a huge "Dying Lion" by Paul Wayland Bartlett: a mammoth figure of might in agony, writhing there in a bit of natural jungle. A lion might wish to die so if he had any comprehension of the matter, and thus it looked quite suitable for such a tragedy.

A Nymph is about what you would expect to find next, and you did; by Edmond T. Quinn. Then you came on Lorado Taft's fragment of the "Fountain of Time," a group of six or eight colossal struggling figures, rolling upward in two waves—from a copse of pittosporum under a clump of eucalyptus.

Some fine things got your attention at the entrance to the colonnade. Here was a little oval pool about fifteen feet long, with three groups by Anna Coleman Ladd: a pair of "Triton Babies" playing in the pool at one end, an "Apollo Slaying Python" at the other, and in the center two water sprites doing a sort of tumbling turn in the most graceful and water-sprightly manner. Fine jets spouted from each group, and seemed to put them all in motion. Nearby, a "Daughter of Pan," a half-goat figure playing on pipes under trees on the margin of the Lagoon, seemed a very natural part of the scene. The seated figure of Chief Justice Marshall, by Herbert Adams, in the large bay near it, was very imposing, but probably would have looked better in a hall.

If you entered the crescent from the South, near the Danish Building, you caught one of the finest vistas anywhere about the grounds, in the view northward from the southerly end of the Lagoon to the solid pile of the California Building, with just enough of the dome and colonnade of the Fine Arts Palace showing from behind the curtain of trees to suggest illimitable grandeurs. Here was an "Indian Scout" sitting his pony with perfect grace and looking off toward the city. It was by Cyrus Edward Dallin, with whom the horse and Indian are intimate acquaintances and prime favorites. To the left was a mature and lovely "Diana," by Haig Patigian, set high in a thicket, whence she had loosed an arrow.

Just before you, in the water, was Anna Coleman Ladd's lightsome group of five figures in bronze, about four feet high, entitled "Wind and Spray," a delicate conception of dancing life and movement, with a half dozen fountain jets, from which "falling ever mistily, the sparkling drops kept tune." This was in a sharp little bay of the Lagoon, framed in shrubbery, and bordered with buttercups and calla lilies. Beyond swam gulls and ducks, and beyond them were trees and more shrubs and beyond them loomed the giant bulk of the California Building. To the left were the colossal columns of the Loggia, and to the right, above the trees,

*Set in
the Water*

the open vaults and greenish blue domes of the other palaces, across the Lagoon.

As you went on into the colonnade you passed between two huge "American Bison," by A. Phimister Proctor, which stared at you disconcertingly from their coverts, in a typically bovine fashion. They had just the look of limitless power and imbecile indecision that characterizes these cumbrous beasts, so that you didn't know whether they would charge, or bolt, or permit you freely to pass. They finally did the last thing, but their eyes followed you with stupid suspicion all the way in.

These were original plaster casts of the bronzes made by Proctor for the United States Government, to stand in the city of Washington, and any other exhibition of them in the open air had been expressly prohibited. It was necessary for Trask to obtain special permission to install them for the Panama-Pacific International Exposition, and he only obtained it on the condition that they would not be exhibited after the Exposition was over. In accordance with that understanding, the casts were broken up at the end of the season. And it drew upon the Chief's devoted head all sorts of harsh comment from people that did not understand the necessity of the case, nor stop to inquire about it. A great deal of criticism is like that.

In two alcoves forming a sort of vestibule were a St. Gaudens "Lincoln," sitting; and, opposite, a standing figure of "Henry Ward Beecher" by John Adams Ward—that Beecher who was part of the Nation's fame a generation back, and who, with his powerful, steadfast countenance and shaggy mane seemed, at least superficially, to have something of the nearby bison about him. These, too, were original plaster casts, as well as the Chief Justice Marshall statue at the other end of the colonnade.

These were in the leafy vestibule of the peristyle. Flanking the inner entrance were two portrait busts that had a place of high sentimental interest in the Exposition development. One was of former President William H. Taft, and facing it was one of the late Halsey C. Ives, who had been at the head of the Fine Arts Departments at Chicago and St. Louis.

Beyond this you saw, beneath a thin, bent tree framed in a square of columns, Edward Berge's marble, the "Muse Finding the Head of Orpheus." It seemed to suggest all the sad finalities of art, and probably that is why it was there. It had much attention, especially from the amateur photographers, for it was a beautiful thing, in a poignant sort of way that got right hold of you and softened your mood from too much accord with bisons and Beechers and other strenuous things. Yet there was some gentle humor here, too: the "Piping Pan," by Louis St. Gaudens, and the "Flying Cupid," by Janet Scudder, were placed between the great

*A Note
of Sorrow*

columns rising to the wondrous architrave that was dented and paneled and fretted and colored in soft green and blue overhead.

Within the crescent, inside the colonnade that was roofless like the ruins of Karnak, you moved between statues in marble and bronze standing in tiny fountain basins or on pedestals rising out of little thickets of myrtle and heliotrope and wild sweet pea and honeysuckle. There was Janet Scudder's "Young Pan," playing double pipes, with one foot on a crab—an elfish wight with a pointed upper lip, a round and prominent "bread basket," and a bit of a tail, like a rabbit. Isodore Konti's marble "Wood Nymph" stood opposite. Furio Piccirilli showed a "Young Mother with Child" in marble. And just across from this, was the pert little bronze figure with a poppy on its head, that Helen Keller "saw" with her finger tips and loved, the "Wild Flower," by Edward Berge.

They were all along on both sides, too many for individual mention. One that arrested the attention of every passer was Attilio Piccirilli's colossal marble the "Outcast." To relieve its grim impression, there was, a little farther on, a bronze baby, by Bela Pratt, standing on the back of a terrapin and putting up an awful struggle with a young pike, or salmon, or muskellunge he had ambitiously captured. Across, John J. Boyle showed a savage "Hunter" in bronze, bringing back the spoil of his flint *Comedy and Tragedy* spear. "L'Amour," a marble group by Evelyn Beatrice Longman, stood in a pitted copse just opposite. In a fountain basin near by, a couple of boys fought for a spouting rock cod, and acquired a valuable chalybeate deposit during their year-long bout. This group was by Janet Scudder.

Edith Woodman Burroughs showed a "Garden Figure," an infant with a ball, and near it was "Youth," by Victor D. Salvatore.

Finally came a row of stressful drama in bronze—Paul Noquet's "Soldier of Marathon," Olga Popoff Muller's "Primitive Man," and Edward Berge's "The Scalp." They showed death, savage victory, and spoil of the chase. Emerging at the south vestibule, you saw "Apollo Hunting" by Haig Patigian, a "Marble Faun," making his scanty toilet, by Attilio Piccirilli, and the "Duck Baby" by Edith Parsons, a grinning little devil with a pair of downy ducks he has just dragged from the pond. This last was the subject of some immensely popular verses by Leo S. Robinson, Controller of the State Commission. Finally (although we cannot here catalogue them all), there was the "Maiden of the Roman Campagna," by Albin Polasek.

Grander in theme but no more beautiful, was the statuary grouped beneath the great Sculpture Loggia, the Fine Arts Rotunda. Here in the center, on a high pedestal beneath the canopy glorified by Reid's murals,

Paul Wayland Bartlett's "Lafayette," mounted and armed, raised aloft the sword he had drawn for Liberty. Horse and rider were victorious and commanding. This was a cast made in Paris, where the original stands, from the original moulds, under direct supervision of the sculptor, as a courtesy to the Exposition, and brought to San Francisco in the "Jason." Just back of "Lafayette" was John J. Boyle's "Commodore Barry," and

*National
Figures*

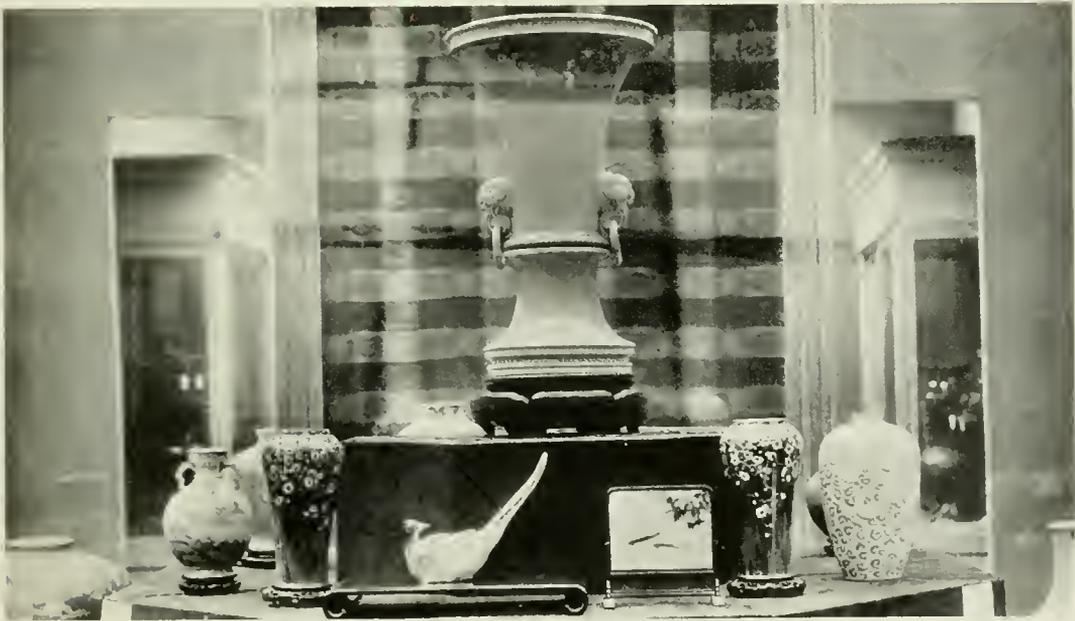
under the arches opening toward the Lagoon were a standing figure of "Lincoln," by Daniel Chester French, French's "Princeton Student," and a "Young Franklin," by Robert Tait McKenzie. At the entrances to the Loggia were figures of "William Cullen Bryant" by Herbert Adams, and of "Thomas Jefferson" by Karl Bitter. Small sculptures were exhibited in cases, inside the Fine Arts Palace itself.

One of the humorous things that had been shown in the crescent early in the season was taken to the rear when the Annex was completed, to lend adornment to the open space between the Annex and the main building of the Palace. This was Clement J. Barnhorn's "Boy Pan with Frog." The frog was very attentive while the boy stood on a rock with his great-toes crossed, and piped to it on a reed. Here, too, was a "Young Diana" by Janet Scudder; the huntress standing on a globe supported by three sitting hounds. And Edward Berge had here a sundial, with the awful legend "There is no time like the present."

These figures, starting at you from niches of foliage, or from behind curtains of flowering vines, or standing under trees and scrutinizing you with their steady, level eyes, had a most lifelike and convincing effect. The sculptors that sent their works to the Panama-Pacific International Exposition could have commanded such a setting nowhere else.



IN THE SWEDISH SECTION



AN EXHIBIT OF JAPANESE PORCELAIN AND CLOISONNÉ

CHAPTER V

WITHIN THE PALACE OF FINE ARTS

IN the Fine Arts exhibition more than a thousand years were represented, and over 11,400 works were gathered, in spite of the war, from the whole round world. Not only European art, but ancient Chinese and Japanese were exemplified, and South American. The Scandinavian countries were strong—probably the most distinctive foreign feature.

The main building of the Palace was divided into 120 exhibit galleries, apportioned ten to Japan, eight to France, five to Italy, one to Cuba, one to Uruguay, four to Holland, one to Argentina, three to Portugal, nine to Sweden, four to China, one to the Philippine Islands, one to a part of the International exhibit, and 72 to the United States. The latter occupied between 65 and 70 per cent of the whole building. The International Section occupied 23 galleries in the Annex, and the Norwegian seven. The works, inclusive of painting, sculptures, engravings, and other objects, were listed by countries as follows:

Argentina	75
Cuba	33
China	44 ²
France	460
International	1,179
Italy	156
Japan	244
Netherlands	188
Norway	333
Philippine Islands	36
Portugal	157
Sweden	440
Uruguay	69
United States	<u>7,591</u>
Total	11,403

Of the collection as a whole, the Department Jury of Awards, comprising men eminent in their own fields, many of them of international reputation,

reported to the Superior Jury that in their opinion it was the best exhibition of painting, engraving, and sculpture ever held in the United States, and "should have a far-reaching effect on the appreciation and understanding of art."

A considerable part of the popular interest centered at first in those amazing manifestations of esthetic rebellion housed in the Annex, a separate structure that had to be erected westward of the main Palace to accommodate an unexpected overflow. Whether they would "live" and increase, or pass early to oblivion, were questions to which the public devoted itself with vigor, and which acted on the community in general as an intellectual tonic. And, whatever the answer, they did help illustrate the times.

*Cubism and
Futurism*

By the year of the Panama-Pacific International Exposition painting had been liberated from the painful prunes-and-prisms precision that had characterized it about the middle of the nineteenth century, and popular taste was in part redeemed from its adoration of story-telling pictures and mere prettiness. The foremost painters seemed to find it no longer worth while to tell nice little domestic stories with photographic fidelity, nor even great Biblical and Roman tragedies about Jeroboam and Virginius; nor were they doing much in pears, bananas, and bowls of gold-fish. Rather they sought to convey states of mind and feeling, indefinable moods, aspects of nature and of man's relation to it, that were not to be defined verbally, for that is a different art. How far and valuably these impulses progressed it is not for a mere historian to say. They certainly embodied the essential element of progress, which is, innovation.

Technique was more free and masterful—had reached the spotted, or dappled, brushwork stage, the "divided touch," and in some cases the results may have looked as though they had been accomplished nonchalantly with the thumb. A forceful realism had entered into painting, expressive in part of a spirit of revolt. Some of the forces of that revolt gathered, concentrated, and burst on the world in the forms of "cubism" and "futurism," and their highly colored examples were on view in the International Section of the Fine Arts exhibition, housed, appropriately, in the cubical Annex.

How hard people studied those blue and purple fields of slashed wall-paper, and how earnestly they strove to decipher cabalistic portents from such sculptural abstractions as "Muscles in Motion"! They read books about the matter, and discussed it in paper-clubs, and were mentally aroused, excited, and rejuvenated. It gave them a new point of view, and helped them enjoy certain other manifestations of modernity hanging

about. They understood, better, artistic impatience with the endless repetition of what had been done, and done again and done to death. They might not care for "cubism" or "futurism" but at least it gave them a fresh topic of debate on the street car or the ferry boat. *Hard Study*

In short, it appeared that, having mastered all phases of composition, painting and sculpture had now to progress through decomposition. To illuminate this matter, interest in which will probably return again and again, we can do no better than cite a bit of explication by Umberto Boccioni of the futurist group at Milan:

"The simultaneousness of states of mind in the work of art; that is the intoxicating aim of our art. Let us explain again by examples. In painting a person on a balcony seen from inside the room, we do not limit the scene to what the square frame of the window renders visible; but we try to render the sum total of visual sensations which the person on the balcony has experienced; the sun-bathed throng in the street, the double row of houses which stretch to right and left, the beflowered balconies, etc. This implies the simultaneousness of the ambient, and, therefore, the dislocation and dismemberment of objects, the scattering and fusion of details, freed from accepted logic and independent of one another. . . . This decomposition is not governed by fixed laws, but it varies according to the characteristic personality of the object and the emotions of the onlooker."

Yes, that is it.

This art movement was destined to take on tremendous import to humanity in the last field where one would expect to meet it. Its processes were admirably adapted to making a thing look what it was not; its professors were the profoundest students of their time of the optical effects of shade and color; and their technique and in many cases their personal services became the basis of modern camouflage on the battlefields of Europe. *Helped Save the World*

In the region of the more conventional evolution, however—the sort of painting more nearly related to what people had been accustomed to—painters had attacked with fresh vigor and from new angles a trying phase of representation, and that was the portrayal of the effects of light. It distinctly characterized their efforts in the year of the Exposition. In the United States section the Grand Prize went to Frederic Carl Frieseke for his group of pictures, of which the most important was a painting of a nude in an orchard, entitled "Summer"; a painting in which the light played brokenly through the leaves in a quite remarkable manner. Perhaps it went a bit too far; for the lady, flecked with shadows and with bright spots that were

very lucent and seemed quite motile, had a somewhat glassy and brittle appearance, suggesting, at least to the writer, a bottle that had just turned into a woman. Despite which, there is no doubt that it was a very great painting in the modern manner, and quite beautiful to those that appreciated the difficulties of producing its luminous tones.

The entrance to the Fine Arts Palace led directly into a broad and open space, in the center of which was the large fountain by Gertrude Vanderbilt Whitney, a marble basin supported by three male figures of heroic size. Thence the galleries stretched away on either side through the long arc of the building.

There were separate rooms given over in accordance with the educational plan of the department to William M. Chase, Alson Skinner Clark, Frank Duveneck, John McLure Hamilton, Childe Hassam, William Keith, Gari Melchers, Francis McComas and Arthur F. Matthews, Joseph Pennell, Edward W. Redfield, John S. Sargent, Edmund C. Tarbell, John M. Twachtman, James McNeill Whistler (two rooms, one for etchings and lithographs and the other for paintings), and Howard Pyle. These were not in competition for award.

Besides the separate rooms given over to individual painters, there were galleries devoted largely to the work of illustrators: Stuart Davis, John Sloan, Boardman Robinson, Henry Reuterdaahl, N. C. Wyeth, Henry McCarter, Frank Walter Taylor, Thornton Oakley, Elizabeth Shippen Green Elliott, Anna Wheelan Betts, Ethel Betts Bain, and many more.

For the twelve foreign sections, the respective national commissions were responsible, and they produced some wonderful results under the circumstances—great contributions to the exhibition and the delight of its visitors. The foreign sections were of the utmost value as demonstrations of artistic aims and the character of national genius throughout the world. Among them the Norwegians and the Swedes displayed a bold advancement. Swedish studies of marine life and of winter scenes were of a compelling beauty. And the wild scenery of Norway, under the blue arctic night, came in for special treatment and attracted much attention.

But the greatest emphasis was laid on the Americans, not merely because this was a contemporaneous Exposition, but because in 1915 the standard of painting was, in the opinion of the Chief of the Department, actually higher here than it was anywhere else in the world, and was everywhere recognized to be so except in these fairly well United States. So the thing was laid out to show the American descent from West and Stuart and Copley—and perhaps Copley's predecessor and preceptor, the English-



IN THE AMERICAN SECTION, PALACE OF FINE ARTS
(FRIESEKE'S "SUMMER" ON LOWER CENTER OF LEFT WALL)



PHOTO BY HANS BERGE, CHRISTIANIA

IN THE NORWEGIAN SECTION

American Blackburn—contemporaries of the British Romney, Reynolds, and Raeburn. Of this lineage from Revolutionary days and before, and of its offspring of to-day, there were nearly 250 examples, including five by that unique genius of Washington's time, Gilbert Stuart. Hence it appeared to the discerning mind, from this exhibition, that art in America, far from being a new and rudimentary thing, had run about as long a term of development as it had in the modern form in England, where there is little that is modern which owes its character to other influences than the British painters mentioned.

*Art in
America*

Art touches life at many points, and illustrates more things than battles and the amours of the Greek pantheon. The poet did not write

Listen, my children, and you shall hear
Of the midnight ride of the well-known Boston engraver
And etcher, Paul Revere,

but he might have done so with as much truth as poetry, and the Palace of Fine Arts held several prints by the celebrated night rider.

The gossips of his day have failed to tell us that "Samuel F. B. Morse, after all the time he has spent working at the art business, will never become a sculptor of any account, because he has laid aside his chisel and gone to fooling with a new-fangled game of tick-tack-toe which he thinks he can play at a distance by means of an electrical current." Yet the Palace had in it three creditable portraits by the inventor of the electric telegraph. The versatile Charles Wilson Peale, watchmaker, taxidermist, dentist, and portrait painter, was represented. The collection contained the first process print ever made in the United States.

From these types of modernity the scope ran back, though not, of course, unbrokenly, to the only piece of sixteenth-century fresco in the country, that of Luini, and to an altar piece by Guido of Sienna dating from about the year 1235. These indicated the earlier general influences; but the direct lineage and art derivation of American painting was shown by the arrangement we have indicated above.

There was even some effort to express geographical relations. There was the art of Whistler, who painted in England, and of Twachtman, who painted in Connecticut, and of Keith and McComas and Arthur Matthews who painted in California, so that you could get a notion of the environment in which these men had worked, and as much explanation of them as environment could give. Chronologically, you could get cross sections of American art in Revolutionary times; in the years

*Time
and Place*

1815 to 1820; in the period of about 1840; in the days after the Civil War, and of American art to-day—from Copley right down to Redfield of the realistic landscapes.

The Japanese set up a reference room in which the evolution of Japanese art could be traced from copies of antiques 1,200 years old. They illustrated the first appearance of a typically Japanese style, about 800 years ago. Here was a copy of Amitabha and Bodhisattva coming to meet the spirits of the blessed, painted by Yoshin Sodsu in 965 A.D. The original belongs to the Koyassan Temple near Kyoto, and is the most celebrated Japanese Buddhist picture in existence. From a time a little later, about 800 years ago, came a "Resurrection of Buddha," from the Chohiji Temple collection. The artist was unknown, but the study showed the beginnings of Japanese portraiture. There were beautiful screens of the Kano school, beginning about 350 years back, and temple masks of carved wood (originals) used in Shinto ceremonies, over 800 years old.

It was most interesting to see nature in tree, flower, bird, and trellised vine, and to see junks, sampans, dainty little houses, and people, through the window of the Japanese soul—the temperamental interpretation of a nation of artists. At their deft hands, embroidery justified itself. The large wave screen, exhibited by Iida Shinhichi, and the lioness screen, also embroidered, seemed done in a better medium for such studies than any pigment. The work was as fluent as art could have made it, the subjects seemed luminous and alive. The wave screen was the work of Seizaburo Kajimoto, with three assistant embroiderers, and represented eight months of continuous labor.

When it came to painting, the "Moving Clouds" of Ranshu Dan disclosed a romantic power in landscape interpretation that produced superlative beauty. You might think it difficult to emphasize a mountain, but this scene did it—showed mountains really mountain high, emphasized by a few huts huddled together on the bank of a stream, thus giving that appealing quality in landscape pictures, wherein the sublimity of nature is brought into intimate relation with man. This painting showed how effectively the unpainted part did its work in the picture, inasmuch as the clouds were portrayed by not painting them. It is a very important practice in Japanese painting to leave a part, often the greater part, blank, and let that blank portion perform a function, and the practice was exemplified in this picture.

There were tapestries, some great wood carvings, bold and strong, and an ivory piece about three feet high depicting an old man and his pet rabbit, as human and animal and as quaintly humorous with the essential sympathy

of real humor, as anything could be. Of lacquer there were some exquisite examples, as there were of porcelain and cloisonné. But perhaps the most interesting exemplification of the Japanese artist's impulse to deal in difficult material was the iron statuary: a pup, and a storm king, or devil, hollow, and hammered from within, until the exterior gave an effect of the utmost fluency, although the medium was as difficult as could well be imagined, tending to grow too thin and breach through, when the whole work would have to be started over. These were by Chozabur Yomada, and excited much interest, for they were a searching test of craftsman's skill.

*Iron
Sculpture*

And all through these Japanese galleries, by means of porcelain, silken strand, ink, and pigments, or cloisonné, the eye and fancy were regaled with the charm of Japan and the visions of its nature that appealed to its people—the carp suspended in the invisible water, the eagle or the raven perched on the long-leaved pine, the cloud rack flowing through fairy mountain summits—all infused with the rarest spiritual grace. Many of these treasures were loaned by the Imperial Household.

The Chinese Section showed a rare collection of Chinese scrolls, brought over by Mr. Liu Sung Fu, of Shanghai, a collector. There were about 300 of them, and some were very old. They hung in two galleries, about 100 at a time, and were often changed. Their venerable owner was in regular attendance and in his rich Chinese costume added an Oriental dignity.

Besides the paintings, the Chinese Section showed some curious as well as beautiful objects. There was a large gold-fish kong or pot, for example, made of porcelain, and the porcelain had a landscape carved on it after baking. There were tiny bottles, two or three inches long, with narrow necks through which landscapes had been painted on the inner surface of the glass. Big cloisonné lions, blue enameled, we are perhaps accustomed to, but lacquer on linen, producing vases and jars that looked as if made of bronze and that turned out to be, by contrast, almost imponderable, were a rarity. The red lacquer furniture displayed was of the most sumptuous character. On the frames as many as 200 coats of lacquer would be laid, and then carved deeply and intricately, so that the whole chair or chest or sofa frame looked as though it had been built of red coral. There were boxes and cabinets on which had been placed lacquers in different colored layers so that they could be carved like huge, intricate cameos.

*Chinese
Lacquer*

There were fruit stones with long poems carved on them; and screens with trees, flowers, and birds made of carved pink quartz, red coral, and green

jade; and other screens in which panels decorated with carved ivory were set in rich teak frames. The works in cloisonné were especially fine.

Of carved ivories, jades, and crystals there was an abundance, but the transition affecting all things Chinese appeared in the growing rarity of those typically Oriental ornaments, the pierced ivory spheres with other spheres free inside them. There were one or two in the exhibition, but they were said to be growing scarce because there were no young men left in China practicing this time-consuming craft.

The art of Argentina was represented by paintings and sculptures to the extent of 75 pieces, many of them loaned by the Museum of Buenos Aires. It was largely Italian in spirit, but bore the seeds of strong development on its own lines. Cuba was represented by a number of paintings and drawings. France made an especially strong art display in her Pavilion, but she also managed to fill eight galleries in the Fine Arts Palace with exemplifications of contemporaneous painting, most of which, according to Neuhaus, expressed "an astounding versatility, always accompanied by technical excellence." Italy filled five galleries with paintings and drawings. Here also was the piece of sculpture, "Proximus Tuus," by Achille d'Orsi, described as the "Man with the Hoe Sitting Down"; a spent laborer, thin and underfed, with the dulled look of habitual exhaustion. This figure arrested everybody's attention, and was the subject of many new chapters in the age-old discussion about the object of art and the nature of beauty.

*Art from
Abroad*

The critics seemed agreed that the three galleries occupied by the works of Portuguese painters showed much technical mastery and gave promise of further power in the field of design, although at present showing a bit too much of photographic fidelity to the subject. "The Pilgrimage," by Senhor Adriano de Sousa Lopes, Portuguese Commissioner of Fine Arts, received much attention.

Holland filled three galleries with paintings and sculpture, and one with etchings, wood cuts, and mezzotints. Here one saw those quiet and familiar Dutch scenes, of formal neatness and harmony, that characterize the art of The Netherlands; a revelation in the use of homely material for art subjects.

The Uruguayan Section occupied a gallery, with works of promise from some of her young men who had profited by shrewd governmental patronage in the form of certain European art scholarships. The gallery was dominated by the equestrian portrait of General Galarza, by Pedro Blanes Viale.

The Philippine Islands were represented by a gallery of paintings and drawings, distinguished for the proofs they gave of the recent assimilation of European art.



CHINESE CLOISONNE, AND SCREEN



IN THE FRENCH SECTION

In the International Section, Finland was represented by the work of Axel Gallen-Kallela. It was big and masterful, and of dominating individuality.

Some of the national sections did not open until the year was well along, and then the event was made the subject of interesting ceremonies, in which addresses on the art of the different nations figured.

It is impossible in such a work as this to follow far or more in detail the masterpieces of this grand exhibition. They have been listed completely, and well presented, in the Illustrated Official Catalogue issued by the Wahlgreen Company and in the "Catalogue de Luxe of the Department of Fine Arts of the Panama-Pacific International Exposition," edited by John E. D. Trask and J. Nilsen Laurvik, and published by Paul Elder & Co., of San Francisco; and the galleries were reviewed at length by Eugen Neuhaus of the faculty of the University of California. A fine illustrated catalogue for the post-Exposition period was published by the San Francisco Art Association, and there was a brief guide by Michael Williams. It was a very great and a very beautiful exhibition, and its educational potency was the grandest and finest impulse of the sort ever felt in the West.

The writer has been quite highly complimented by the Chief of Fine Arts for this chapter. The Chief says the best thing about it is its convincing internal evidence of having been written by somebody that knew nothing whatever about art. With which encouragement we shall proceed gayly to destruction by way of a description of radio apparatus, Pelton water wheels, gas engines, high-voltage transmission, structural steel work, mines and mining, locomotives, and a few such other simple things.

CHAPTER VI
THE ART OF LIVING

SAID Pope, Chief of the Departments of Education and Social Economy: "The death rate for hogs in the United States during the first year is five per cent, for sheep three, for calves one. For babies it is 12. Every day 3,000,000 people are ill in this country, involving a loss of \$500,000,000 annually in working power, and as much more in costs of attendance and treatment; a total of a billion a year for illness, much of it preventable.

"To meet such a condition, Social Economics arises. It would cut down these vital losses to a minimum."

The Department of Social Economy was a comparatively new phase of expositions. Its function was, in general, to improve the art of living, to teach the public the scientific conservation of life and time and human values. Within its field of presentation were such ameliorating agencies as hygiene, insurance, industrial-welfare work, banking and methods of exchange, public parks, play grounds, gymnasia, swimming pools and other things that go to keep, cleanse, and energize the body and clear the mind; the things that tend to conserve the moral and the physical attributes of the citizen; without trenching on general athletics on the one hand or on general education on the other—although, theoretically, education would be a branch of Social Economy. Education was recognized in expositions before Social Economy, but the two departments embrace a vast number of subjects relating to direct betterment and advancement, individually and collectively.

After it was decided to give such recognition to Social Economy as to assign it a department, Dr. Frank A. Wolff of the United States Bureau of Standards at Washington, was put at the head of it, but he resigned and was succeeded by Alvin E. Pope, who, later, also succeeded James A. Barr as Chief of the Department of Education.

The combining of these two departments under one head was fortunate, not only because the talents and experience of the Chief in educational, corrective, and institutional work fitted him to handle them together, but

also because, while the distinction between them was clear and logical, they were so intimately related that when their subjects were presented in exhibits, those of one department added force and impressiveness to those of the other; and the public did not have to bother about the difference, and neither will this history.

Both departments occupied the Palace of Education, although physically it was not possible to get all the Social Economy exhibits into it. Most of the United States Government's exhibits in Social Economy went into the Palace of Liberal Arts. Banking, insurance, and industrial-welfare exhibits went into the Palace of Mines and Metallurgy, and the tremendously impressive exhibits of the municipality of New ^{*Crowded Out*} York went into the structure erected among the State buildings by that city. Those of the more significant of these that space permits us to mention we shall describe in connection with the other exhibits in the palaces in which they were installed.

Few of the exhibitors in Education and Social Economy had anything to sell. Nobody was taking orders for so many units of knowledge or for new systems of developing the human young. Here and there methods of bodily conservation were clinically demonstrated. Educational processes, also, were demonstrated; but, what was far more practical, the visitor could acquire a special education here himself, for things were being taught, things of recent discovery or analysis, which had not yet made their way into the curricula of the schools.

It might have been called, instead of the Palace of Education, the Palace of the New Knowledge. Through lectures, moving pictures, transparencies, stereomotorgraphs, charts, pamphlets, personal instruction, models, topographical maps, every conceivable sort of visual representation, the exhibits gave people the latest views on practical affairs of life; on child welfare, on health conservation, on hygiene, on social relations, and economic tendencies. It was like a university that had sprung into being overnight, without traditions or precedent. It would have suited an ancient Greek, filled with the originating impulses of the dawn of Western ideas, and free from hampering preconceptions. Could a man of the Middle Ages have returned to study it he would have found just about as much meaning in it as a Congo savage, so strange to him would it have been in matter and in spirit. But a man of the Renaissance would have felt a curious affinity with the determination everywhere in evidence to cast off the repressive opinions of the past, and test everything by its utilitarian value for the people of the present and the future.

There were eight moving-picture theaters in the Palace. At intervals

great educators, leaders in this main concern of a democracy, education, lectured in them. Helen Keller spoke. Examinations of children went on daily at the Children's Bureau booth and elsewhere, so that mothers might know whether or not they were pursuing the proper course with their little ones or should adopt some other. At the Race Betterment booth, Dr. A. J. Read lectured daily on eugenics and allied topics. There were conferences on problems that were pressing themselves on the attention of altruists. In the exhibit of the National Child Labor Committee, the "high cost of child labor" in what it takes out of the industrial efficiency of the worker when he reaches adult years was shown in a manner so distinct no one could leave in uncertainty about it.

*What You
could Get*

In one of the theaters of the Palace there was a story-telling hour for children, once a week, conducted by Miss Grace Miner of the National Story Tellers' League. This was to give the children not merely wholesome entertainment, but a taste for good literature. A series of lectures on Mental Deviation was delivered by J. Harold Williams of the Buckel Foundation of Stanford University.

There was a class in lip reading for the deaf. There was a school for the blind. There was a demonstration class for the courses in the Montessori method of infant development. There were illustrated lectures of the California Association for the Study and Prevention of Tuberculosis. There was a free, open, dental clinic, where visitors were instructed in mouth hygiene, and told what repairs or corrections of their dental equipment they needed, and why. There were several exhibits in which children were taught to play; for most of this educational and conservational work began quite properly with the child.

There was a fully equipped and thoroughly operated commercial school, the first one ever conducted by an exposition, in which the teaching did not proceed in timeworn ruts, but was based on what business men had advised the department they needed in their assistants. There was an exhibit devoted to social hygiene and sex education. There was another in which a great medical association taught people the contents of the injurious brands of patent medicine. There was a demonstrating class in sewing. There were lectures on the Indian in the Rodman Wanamaker Expeditions to the Indians exhibit, describing the condition and treatment of the aborigines. There was a demonstration of the open-air school, and the methods employed in it.

In short a whole education in education, and in the physical conduct of life, could be obtained in the Palace, painlessly. Humanity could come here and learn how to take care of itself and train itself—which, in the light



BY JANET SCUDDER, SCULPTOR

AUTOCHROME BY CHARLES J. BELDEN

"YOUNG PAN"

of all this teaching, were things great masses of people did not seem to know much about. To pass through the Palace of Education with your eyes open was to come under influences that were broadening and enlightening, and to come out better educated than you went in.

The United States Department of Agriculture showed remarkable demonstrations of the new agricultural education; and you got most vivid exemplifications of the centralized method of State control of public schools by the State of New York, of State-aided vocational schools by Massachusetts, of modern rural schools by Oregon, of scientific research by the Carnegie Institution, of the higher education of women by Smith College, of open-air schools by the Elizabeth McCormick Memorial Fund, of school museums by St. Louis, of museum-extension work among the schools by the N. W. Harris Public School Extension of the Field Museum of Chicago, of out-door education and suitable school architecture by the State of California, of school music by Oakland, of a city public-school system by Los Angeles, and of the development of dramatic art in schools by the city of Berkeley. To some of these things we shall recur later. They were all shown with such force and clearness that anyone interested in methods of education could here learn what it would have taken him half a lifetime to glean from books, and then he would be without facilities for comparative observation, and study of relative results.

*Work of
Government*

Usually it is well to have an aim. The Department of Social Economy had one, and so did the Department of Education. The former embodied the hope that the Exposition would be followed by great improvements in the habits of living, and by national and international movements along all lines of social service. Whether such movements will follow we cannot yet say, the world just at this writing being too busy spreading death to think sufficiently about helping life.

The hope of the Department of Education was that through the display of the most successful methods of teaching, the waste of time, energy, and money caused by duplication of experimental work might be avoided, and youth be better educated. Each exhibitor—State, municipality, organization, or institution—was asked to confine its exhibit to the portrayal of some specialty in which it excelled, or to the teaching of one or two principles. So, each would represent the whole country as far as that particular specialty was concerned. This introduced the invaluable element of emulation.

In Educational exhibits the world had outgrown the old-style display of pupils' papers showing how much like the copy book little Johnny and little Mary could write, and what long words they could spell at the age of seven

years without getting blots on the paper; for, people were beginning to see that the best spellers did not always turn out to be the best sellers. Moreover, with hard enough drill on the teacher's part it sometimes happened that a blotless prodigy in a most inferior school surpassed the best product of the good institutions. Such exhibits showed nothing valuable, and the public had found it out.

*Papers
not Wanted*

So with collections of examination papers. Tons of wood pulp had gone into these exhibits in the past, without raising educational standards perceptibly, or making education worth a bit more. Hence exhibitors were advised that such exhibits would not be acceptable, but that they were to select specialties in which they excelled, or lessons they were capable of teaching others, things that would show the public fundamental educational principles, how to make useful citizens, how certain types of school and methods of education were benefiting individuals and communities and helping to make men more effective and life on this old earth a better experience.

Inasmuch as the Chief of the combined Departments of Education and Social Economy had very definite ideas about what he wished his departments to convey, no circular letters of invitation were sent out by him; the invitations were particular. The advantages of such selection in advance of space commitments are clear. But it calls for an executive that knows what he wants.

With one or two exceptions, the attendants in the various booths were experts in the subjects they were there to portray. The inquiring visitor felt directly that he had applied for information to a person that knew what he was talking about—a fine experience, worth repeating at the next booth and following up next day.

The Palace of Education covered 396 feet by 526 and cost about \$300,000 to build. It had one distinguishing feature of construction—the floors of booths were level with the floors of the aisles, instead of being four or five inches above. This added to convenience and to the chance of the exhibits being inspected, and reduced the risk of Potts's fractures.

Besides the United States these countries were officially or unofficially represented in the Palace: Argentina, China, Cuba, France, Japan, the Philippines, and Uruguay.

CHAPTER VII

REFORMING THE ENVIRONMENT

THE days when bilious ascetics taught the public to abhor the body as a peril to the soul were, happily, gone for most of us, and people were thinking more about certified milk and uncontaminated water supplies and how much benzoate of soda they could stand in the ketchup than about the minutiae of theological doctrine. There was a wide and an intense interest in everything that could make this life more secure and comfortable, either for those that were living it or for the descendants and dependents of those that would soon cease to live it. Much of it centered in the improvement of the body and much of it in the subject of insurance.

The Department of Social Economy illustrated insurance and industrial welfare by such exhibits as that of the United States Steel Corporation, and the safety devices shown by the Ætna Life Insurance Company's casualty department. It illustrated profit sharing by the Ford Motor Company, fire prevention by the Hartford Fire Insurance Company, the education of policy holders in preventive medicine and the medical service rendered to policy holders and employees by the Metropolitan Life Insurance Company of New York, agricultural extension work by the International Harvester Company, health conditions by the Prudential Insurance Company of America; and a collective exhibit on all phases of insurance by the "Insurance Field."

Most of these exhibits were placed in the Palace of Mines and Metallurgy. The Palace of Education, itself, seemed like some great college. The temper of the crowds was serious. People went there to study, not to be amused, and they went in masses. Men of influence from foreign countries, not merely the commissioners to the Exposition, but unofficial travelers, received light on problems of human betterment they might never have acquired elsewhere, and they took that light home and spread it. Dr. Ernesto Nelson, Director General of Secondary Industrial and Commercial Education of Buenos Aires, a member of the Argentine Commission, put in months of study in this Palace, personally photographing every

chart of importance and almost every exhibit, and he was but one of many who seized this extraordinary opportunity.

And all contributed. To return to the case of Argentina; she made a representation of her normal language schools, wherein the courses are taught in several languages, so that a pupil intending to specialize in any one of them pursues his studies in that tongue. The "copa de leche," the glass of milk for the pupil, the cost of which is borne by parent-teacher associations, as much an institution in the Argentine schools as the textbook, was depicted and its effect on the health, stamina, and mental powers of the student was set out. Argentina showed her care of weakling children in open-air schools, her industrial education of women, her progress in agricultural education and in university methods through the new universities at La Plata and Tucuman, and her rapidly expanding building-and-loan transactions.

A striking feature of the Argentine exhibits in Education was a picture the "Christ of the Andes," cast in bronze from melted cannon that would have served in a war with Chile had not the differences between those two countries been arbitrated. It showed sincere efforts for peace, and the joy in both countries over the success of those efforts.

Uruguay depicted its methods of conducting open-air schools and of handling its charities, Guatemala its special education in agriculture, Japan its special education in the Fine Arts, and so on.

Of the individual exhibits of these departments we can mention here but a few of the more striking.

One of the exhibits that caught the eye of every visitor to the Palace of Education was the Race Betterment booth, representing the eugenics movement in the thought of the time. Here were large plaster casts of Atlas, and Venus, and of Apollo, Belvedere type, to advertise the human race at its best, and get that race interested in its glorious past and possible future. As for its present, that was represented by four "live" people, although not always nor for long the same four, who sat in vibrating chairs and were agitated physically by electric motor, and usually looked resentful of the past and careless of the future, and as though they thoroughly needed the good shaking they were getting. You could hardly pass such an exhibit without stopping to see what it was about, or how much shaking these subjects could stand without becoming addled.

On the wall were pictures of the promoters of the first Race Betterment Conference, held in January, 1914, at Battle Creek, Michigan, where the breakfast food comes from: Dr. Stephen Smith of New York, Prof. Irving Fisher of Yale, Dr. Charles W. Eliot of

*How it
Started*



PHOTO BY CARDINELL-VINCENT COMPANY

AN ENTRANCE TO THE PALACE OF EDUCATION

Harvard, Sir Horace Plunkett, the Hon. Gifford Pinchot, and Judge Ben Lindsey of Denver. This booth was so admirably arranged with placards and charts that you didn't have to ask many questions; all you had to do was just to look, to see the necessity for its work. The Race Betterment Foundation put in the exhibit, and Dr. A. J. Read, its Director, was in almost constant attendance to give information and advice.

Its announced purpose was "To present the evidence of race deterioration, to show the possibility of race improvement, to emphasize the importance of personal hygiene and race hygiene, or eugenics, as methods of race improvement." "The Race Betterment movement aims to create a new and superior race through euthenics, or personal and public hygiene, and eugenics, or race hygiene." "A thorough application of public and personal hygiene will save our nation annually 1,000,000 premature deaths, 2,000,000 lives rendered perpetually useless by sickness, and 200,000 infant lives."

Another chart inquired: "Is our race dying at the top?" and cited these centenarian figures: Bulgaria, one centenarian to 1000 population, United States one to 25,000, Spain one to 40,000, England one to 200,000 and Germany one to 700,000; although no reason was given why anyone should have wished to live a hundred years in any of these countries. Some figures were given on the death rate from cancer: in man, living on mixed diet, it was given as 5 per cent, in the dog, who lives on meat exclusively, as 8, in the sheep, vegetarian, .0015, and in the ape nothing at all. United States census reports were quoted to show that the average length of life is 15 years more in the country than in the city—although nothing was said statistically as to quality, which is where the statistical method of inquiry falls down.

*Living
Longer*

Encouragement to consider these matters and brace up the individual and the race was offered by examples of what man has done, through selection and breeding, to improve the dahlia, the cactus, corn, and various kinds of animal.

A horrible example of what the race might become if its development is not tempered by common sense was offered by a small exhibit in an obscure corner of the Palace, where a swarm of bees devoted every waking hour to toil, without the least notion why. They flew in and out a small chink in the wall, gathering nectar from the acres of flower beds, more than they would ever need, and you could see them storing it in glass-front hives inside the Palace. They worked incessantly, they never played, they never stopped to enjoy the beauty all about them; the flowers they plundered were, to them, merely repositories of glucose; and so they formed a most impressive warning against the deadening effects of intemperate in-

dustry, and its fixation as a racial vice. The Race Betterment movement aimed "to create a new and superior race through personal and public hygiene." The bees showed it wasn't going to be worth doing if that superior race was to abandon itself to excessive indulgence in work.

Fifty wall charts supplemented by models, pictures, and illustrated albums dealing with the medical, educational, religious, and legal phases of social hygiene constituted the American Social Hygiene Association's exhibit. Intelligence had been sharply focused on this question not long before the Exposition opened by the publication of a translation of Brieux's "Damaged Goods" and by the dramatization of that common-sense tract, so the Association had some basis of tolerant interest on which to build. Yet it was not making a campaign for sex instruction alone, but in behalf of a far broader purpose—the handing down of unblemished physical and mental inheritance from generation to generation. Its propaganda included sex education, the establishment of the single standard of morality, and the suppression of prostitution and its associated evils.

In this Palace a certain collection of charts exhibited the early condition of what promises to become an important factor in education: the actual measurement, by fixed standards, of mental ability. The charts showed the Binet-Simon scale and the Yerkes-Bridges scale, and the subject suggested limitless possibilities.

Amid the clangor of arms resounding through the world in 1915, Japan's exhibit of Red Cross work in the Palace of Education tended to impress people with a feeling of gratitude for what civilization was left. The displays were very effective. There were life-size wax figures of surgeons, nurses, and patients, and models of field telephones used for communicating with chief surgeons, hospital-supply bases, and base hospitals. The dressing of wounds was demonstrated. All surgical instruments, dressings, sterilizing apparatus and every other form of equipment, were exhibited, down to the electro-magnets used for extracting shell splinters. Army hygiene, in the field, was illustrated here, and the efficiency of Japanese preparedness shone out in a very striking manner.

The weazened American dyspeptic, going to the cupboard for a dose of his favorite "bitters," was a familiar figure on the American comedy stage a generation ago. Americans were known the world around as a dyspeptic nation—owing, perhaps, to our vaunted "home cooking"—and they dosed themselves for it. That made a field where fortunes could grow from patent-medicine bottles—bottles about whose contents and therapeutic effects the users knew nothing. The American Medi-

*Social
Hygiene*

*What's
in Them?*

cal Association had been telling about them for some time, with general good results, and seized on the Exposition as an opportunity to carry the propaganda to a larger number of people than it had been able to reach before.

This organization presented its testimony in the form of samples of books, and pamphlets (copies of which could be obtained for mailing a postal card), and by some striking cartoons showing the effects of promiscuous drug taking. The testimony offered was bold and daring. Some of the most respectable family remedies had their insides mercilessly exposed. Wall charts showed the results of chemical analyses of some highly advertised and universally respected members of the patent-medicine group. The thing went farther. Certain brands of tobacco were taken apart, chemically and statistically, and the world was shown just what percentage of alfalfa went to their composition. So the users of some of the patent-medicines had reason to believe they were being poisoned more than they should have been, and the users of certain brands of tobacco saw that they were not being poisoned as much as they had paid for. The value of this exhibit in enabling mankind to poison itself knowingly and just to its taste, or not at all if it did not wish to, must have been large.

The booth of the American Federation of Labor showed by charts and pictures the development of labor unions in America, and the history of the Federation. The literature of the Federation was displayed and distributed. A stereomotorgraph of 52 slides showed industrial scenes, and *fac similes* of union labels. There were bound volumes of the *Federationist*, and of the transactions of the annual conventions from 1881 to 1913.

France exhibited in this Palace, and the pity of it was that the charts and other published matter were not in English so that the average American visitor could have understood. For, the exhibit dealt in part with that wonderful system of French domestic economy in which the salary limits the budget and the budget determines the expenditures, and no fooling about it. A reference library was maintained, and there was a fine model of the Rothschild Foundation Hospital. You could also see "cut-open" models of railway coaches transformed for carrying wounded French soldiers. There were studies in insurance, on wall charts.

*Family
Budgets*

This was the first exposition at which woman suffragists ever exhibited. The booth of the Congressional Union for Woman Suffrage contained every argument that could be presented visually for this extension of the vote in the United States. It was decorated with flags; and, raised where all might see it, was a banner bearing the words of the Susan B. Anthony Amendment,

which demanded that the right of citizens of the United States to vote should not be denied by the United States or by any State. Above, so that it might be seen from a distance, was the record of votes cast on the Amendment by the 63d Congress.

At one side of the booth was a large portrait of the "mother of suffrage," Susan B. Anthony, surrounded by exhibits sent by different States. Suffrage conferences were held at this booth three times a week.

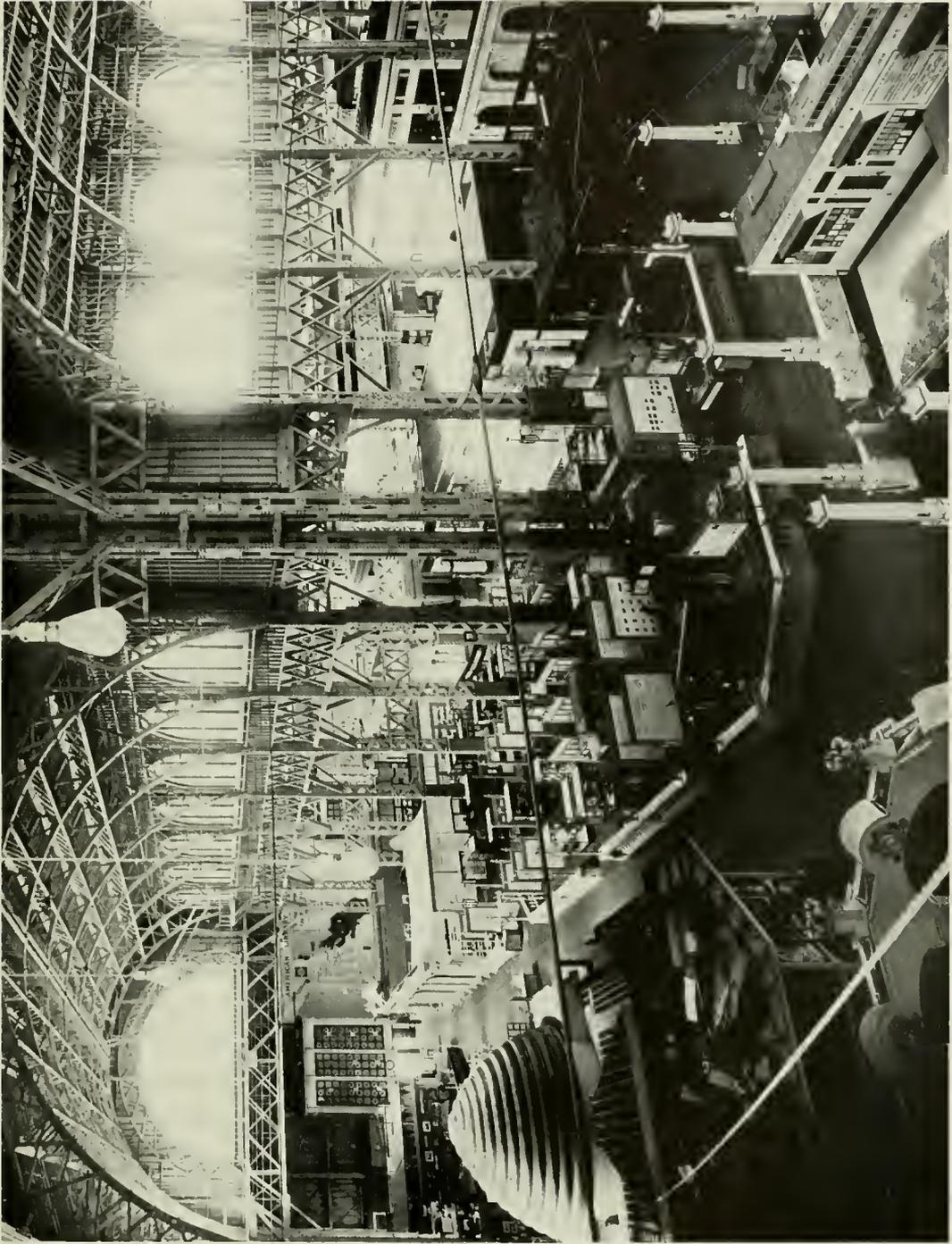
An important feature of the exhibit was the petition to Congress asking it to pass the amendment. Every visitor to the booth was asked to sign, and long before the close of the Exposition more than a half a million names were secured. On May 21, 1919, the amendment passed the House of Representatives, and on June 5, 1919, it passed the Senate; in both cases by large majorities. By November, 1920, national woman suffrage had become a reality.

In 1913, New York enacted a public health law that early became a model for some of the most progressive States in the Union. Under this law a Public Health Council was given the power to formulate a State-wide sanitary code, administrative power in sanitary matters was concentrated in the hands of a commissioner with a staff of division heads, and a practical plan of coördination with local authorities through a group of twenty district Sanitary Supervisors to act as intermediaries was provided for. The organization, to its smallest unit, was shown by an electric-flash, wall-panel diagram in the exhibit booth. It appeared as a remarkable administrative arm of government, including a large expert consulting staff, and a division of vital statistics, one of local registrars, one of laboratories and research, one of sanitary engineering, one of cold storage, one of child hygiene, and divisions on tuberculosis, publicity and education, communicable disease and public-health nursing; with the 1,249 local registrars and 1,250 local health officers.

New York's Health Code

This army proceeded to defend the vitality of the people of the State of New York; not that life was more menaced there than in other places, but because it shared the common risk. The necessity for such defense appeared in a moving model under glass, which showed that 26 out of 100 born perish before reaching the tenth year, three more before the 20th, six more before the 30th, six more before the 40th, seven more before the 50th, 10 more before the 60th, 15 more before the 70th, 16 more before the 80th, and nine more before the 90th, leaving but two in a hundred to pass the 90th year.

There was a model of a typical Infant Welfare Station, showing a dispensing room, with ice-box, and dispensing table, a consulting room



GENERAL VIEW IN THE PALACE OF EDUCATION

with a weighing table, supply cabinet and range, and apparatus for the demonstration of milk modification and general infant care. The latest laboratory appliances were shown. There were models representing the pollution of streams, and the sort of sewage disposal that prevents such pollution. A relief map under glass showed water supply and sewage-disposal plants. There was a model of the Albany filtration plant, which has greatly lowered the amount of typhoid fever in the capital of the Empire State.

Much instruction was given by means of pictures. In this way the Division of Communicable Diseases urged the prompt reporting of infectious disease, personal cleanliness, the necessity for the early administration of antitoxin, and the isolation of the sick. And it taught the wholesome lesson that "Persons in whom the germs are growing are more likely to be the agents of infection than are things on which the germs are dying." The motto of the New York State Department of Health was: "PUBLIC HEALTH IS PURCHASABLE. TWENTY-FIVE THOUSAND LIVES CAN BE SAVED IN NEW YORK STATE WITHIN THE NEXT FIVE YEARS."

*Health for
the Masses*

The New York State Department of Labor had an exhibit showing how it took care of the workers—not merely by factory inspection and by compelling proper construction, but by promoting conciliation and arbitration in labor conflicts. There were models of three factory buildings with fire walls, sprinkler systems, fire-proof stairways, protected machinery and other safety devices. All the great work of factory regulation that New York has had to undertake was represented, graphically and statistically.

The exhibit of the New York State Hospitals for the insane aroused great interest. The treatment of the baffling affliction of insanity was passing through some striking phases of development, and in addition to a beautiful model of a State Hospital plant, there was a large section of the exhibit devoted to hydrotherapy, with all the apparatus for it in operation: a steam cabinet, an electric-light cabinet, a sheet or blanket warmer, a prolonged or continuous flow bath, and a hydriatic-control table, with spray and shower baths. As there were water and electric connections, the demonstrations were clear and striking.

Perhaps the deepest and most serious interest the public evinced in the Palace of Education was aroused by the exhibit of the Children's Bureau of the Department of Labor. Since the last great international exposition in this country, scientific care of the human young had become a concern of the national Government, and the Children's Bureau had been established by Congress, with a staff of experts which in the year of the Exposition numbered 76. Nowhere did the function and the mission of Social

Economy, and the modern impulse toward human conservation, appear with greater promise than in this exhibit. It reached right out for the mothers and the babies. By lectures and by individual advice it sought to spread a proper knowledge of child care. Eminent physicians attending the conventions of the great medical associations were glad to assist by lecturing, under Bureau direction, on those specialties that applied to this particular phase of life conservation. Mothers were encouraged to bring their children and find out what was the matter with them, or if there were nothing the matter, then how their vital advantage might be increased and protected. Mothers' clubs were drawn into it, and delegated members to assist.

There were daily children's health conferences, with free medical examination of children under 15 years of age, gratuitous advice as to the removal of tonsils and adenoids, and directions about diet, so that prudent mothers might find out whether they were pursuing the best course or not. And they flocked to the booth, every day in the week except Sundays, and some from nearly every State in the Union, to learn about sanitation, ventilation, play, the right and the wrong kinds of toy, the preparation of those foods that would give the maximum of bone, muscle, and blood, and the wisdom of having their growing children medically overhauled once in a while; something better than the old soothing-syrup method.

In spite of its determination not to pass anybody into the grounds free, the Exposition management did permit five mothers and their children on two days a week to enter without pay in order that the children might be examined and benefited by this clinic. The exhibit was installed under direction of Dr. Anna Strong of the Children's Bureau. Her colleague, Dr. Frances S. Bradley of Atlanta, who had been in charge of various "baby conservation" conventions and exhibits in the Southern States, met the mothers and examined the babies. White-clad nurses from local hospitals were in attendance.

Through models, illustrations, and stereomotorgraphs the lessons were taught, as well as orally and by demonstrations with the real babies brought in for examination. There was a model of a good and of a bad dairy, made by pupils of the Pasadena High School. In a number of glass cases were trays containing models, or samples, of proper diet for children of one, two, three, four, and five years, with instruction as to the right way to balance the feeding so as to introduce the needed elements into the food. Every Wednesday and Friday there were illustrated milk tests and lessons in preparing baby foods. It would hardly do for history to record just what those foods were; the doctors might change their minds. But at least,

the conclusions of medical science on this matter in the year 1915 were indicated.

Placards on the wall told prospective mothers how to care for themselves so that their coming babies would have no just cause of complaint after they arrived. Women in remote mining camps and other distant places were sent literature from the exhibit when they could not come themselves. In the corner of the booth was a small, model playground, where tame children set a good example to the wild.

One of the striking objects in this exhibit was the mortality model, from North Carolina. There were a hundred tiny card houses on a platform. In each house a light showed a newborn baby. Then a light flickered and died, and another and another until twelve homes were dark. That represented the first year of life. A nearby chart showed why they died. Milk tests were conducted by the Bureau at this booth two or three times a week, forming part of the lectures on nourishment. *Infant Mortality* Wednesday mornings there was a demonstration clinic of the Women's Collegiate Alumnae of California, to which, under supervision of the Associated Charities, dozens of babies were brought and weighed, examined and prescribed for. Most of these were foundlings, and foster children of charitable families. Medicines and certified milk were provided free where they were needed. Feeding and care were under direction of the Baby Hygiene Committee of the Women's Collegiate Alumnae, and some of the most eminent specialists and surgeons of the city gave their time and help gratuitously.

The week beginning June 28, as the convention of the American Medical Association was closing, was made Child Welfare Week by the Children's Bureau, and visiting delegates to the medical convention were drafted into the service and induced to stay over and lecture on various phases of the work of saving babies and rearing them to strong manhood and womanhood. In one of the moving picture theaters of the Palace of Education some of the country's leading authorities on subjects relevant to child welfare discussed all phases of the problem before an earnest and intensely interested Children's Conference. Hundreds of babies were examined, and comparatively scored on "points," and their care and feeding were scientifically directed to an extent that will form a valuable aid to the health of the rising generation in California—which, of course, benefited most by the proximity of the Bureau.

Here, too, was an exhibit of one of the grand practical philanthropies of the country, the Forsyth Dental Infirmary of Boston, instituted by John Hamilton and Thomas Alexander Forsyth to provide free dental treatment

for poor children that could not afford to pay for it. The institution has a foundation of three and a half million dollars and was then the only thing of the kind in the world, although by this time the exhibit may have operated as an effective suggestion to other philanthropists.

So the work of applying science to humanity's most promising possession, its own young, went on throughout the Exposition season, expanding and becoming more popular as the year drew on. It was said that in one week over a thousand mothers, anxious to do their best with the opportunity motherhood meant to them, visited the Children's Bureau exhibit seeking help, and they got it. That was a better form of activity than expositions are usually able to set in motion.



IMPROVING THE HUMAN BREED



JAPAN'S RED CROSS EXHIBIT

CHAPTER VIII

ASPECTS OF FOREIGN, DOMESTIC, AND COLONIAL EDUCATION

IN the method and subject matter of education, greater changes had taken place during the decade closed by the Exposition year than during three decades before. To this evolution certain alterations of physical environment had contributed results entirely unforeseen. Gone was the Hoosier School Master. The little red school house was doomed. Good roads, bicycles, automobiles, and telephones had broadened the mental outlook and drawn the world together. Throughout vast regions of the United States, the union high school and the rural consolidated school, made possible through the larger financial power of consolidated districts, equipped with fine libraries and laboratories and gymnasias and assembly halls, and modernized in administration so that they were themselves exemplifications of improved plans and methods, were becoming the aspiration of more and larger sections, and were being realized with great rapidity. *A School Revolution*

Vocational training was growing into better repute. Conservative people might deplore it but they could not stop it. A larger community consciousness was coming from it, a broadening of the social understanding, a more distinct realization of the possibilities of life.

You could see it nowhere better than in the exhibit built under the direction of Charles A. Greathouse, Superintendent of Public Instruction of Indiana. It showed only the rural consolidated school, but it showed that well. Educators from every State in the Union, and from Canada and Europe gave it serious study. One room showed a plaster topographical model of a typical Indiana township, supported by two scenes showing the general improvement brought about in the aspect of homes, and farms, and the countryside in general by the example of the consolidated school. The handiwork of the children appeared to be equal in these country institutions to that of pupils in the best-equipped technical schools in the city. In another booth, stereomotorgraphs showed colored pictures illustrative of the same development.

Indiana is a good "sample State"—centrally situated, typical of American conditions. In the Exposition year it had 290 consolidated elementary schools, 36 consolidated high schools, and 330 consolidated elementary and high schools. Every generation lives in its own world. The day of the little red school house was passing.

Every generation lives in its own age, and this was the age in which education through some form of vocational training sought to prepare men and women for citizenship and active, properly rewarded service of their fellows, instead of leading too many of them into lives of cultured poverty and im-

potence, and activities rather ornamental than useful. All through the Palace of Education this departure was apparent.

*Effective
Citizenship*

The exhibits were practical and utilitarian. They showed what pupils could be taught to do that would be valuable to humanity, and they also taught the public directly the things it should, perhaps, have been taught in an earlier age in school; matters of cleanliness, hygiene, economic efficiency, and things tending toward an understanding of nature in a modern way and a modern sense. The old "humanities" suffered a little, but new ones would take their place.

The United States had something to show the world in colonial education, and showed it in the exhibit of the Philippine Islands. The whole American spirit of dealing with a dependency was in it: the islands for the people of the islands, the schools for their interests, primarily. So this was an exhibit in the science of government, as well as in education.

There was a centralized management of the Philippine schools, and a curriculum that embraced industrial work as well as academic training and physical culture. The natural resources of each community were the study of the schools of that neighborhood. The teachers had found practical use for over fifty vegetable fibres hitherto supposed to be of no value, and new uses for nearly 200 well-known and already utilized fibres. They had designed articles in which these fibres could be used, and they taught the manufacture of the articles using them: baskets, hats, laces, textiles. Better than that, there was practical application of commercial methods in marketing. Advanced pupils, after graduation, went into the rural districts as agents, collecting the finished articles and encouraging the students to do home work. Thus, in short, the schools developed commerce instead of following it.

At Manila or some other trade center where fairs were organized by the management, the goods were sold. The school received a profit on the raw material it had furnished, the pupil that made the articles got a manufacturer's return, and the jobber's commission went to the graduate that collected the goods. The retail profit

*Learning
by Doing*

paid for the selling, and yielded the school about 20 per cent besides. Thus all factors got a taste of blood, commercially speaking; a notion of the work of the manufacturer and the merchant and the rewards that come from the proper doing of that work.

It was nothing less than the development of industrial and commercial initiative among a people. Agriculture was not neglected. School gardens were established, and they even went so far as sea gardening, wherein the pupil got an idea of the products of the sea and their values, from sponge to pearl. And with it the academic courses went on, and the "humanities," so that the system made for culture and its best manifestation, effective citizenship.

The Philippines exhibit was the largest in the Palace of Education. It was situated north of the west portal of the Palace, and was installed in booths of great beauty of design, with palm stems that looked like turned mahogany, supporting a frieze of *tindalo* wood, which framed the little square sash set with small translucent shells of which windows are made in the islands. Frank L. Crone, Director of Education for the Philippines, was in charge. Here were looms, and weaving operations, manufactures of furniture from the beautiful island hardwoods; lathes and lathe work, bamboo hats and bamboo basketry, and about all that is commercially valuable that can be made from bamboo. There were mattings whose texture and design were adapted by the schools from Philippine sleeping mats, there were slippers of woven grass, and many other products not merely of the Philippines but of Philippine public school education under the American régime. Over \$100,000 worth of goods made by pupils was on sale here and in the Philippine Building.

With these things went enough charted statistical and descriptive matter to instruct the visitor in what had been going on to elevate life in the islands since the United States took control, and thus the exhibit was a contribution of the utmost significance to the history of colonial administration.

Pictures and diagrams set forth those things which could not be shown by the model or the concrete object. They showed the marvelous growth in school attendance as well as the alteration in the ideals of education, from aristocratic to democratic standards. They showed such facts as these:

The total attendance at school in the Philippine Islands in the years from 1860 to 1896 was estimated at 125,000. The small schoolboy in the diagram representing this attendance was accompanied by a servant to carry his books. Education was a thing for the rich and powerful, who

were thus taught in infancy that some servant must always wait on them.

Then And it was carried on in Spanish. The United States stepped
and Now in. The diagrammatic schoolboy grew. His sister went to
school with him, and the book-carrying servant disappeared.

The attendance in 1906 was 375,000; in 1910 it was 430,000; in 1914 it had increased to 490,000; and 23,000 were turned away for lack of room.

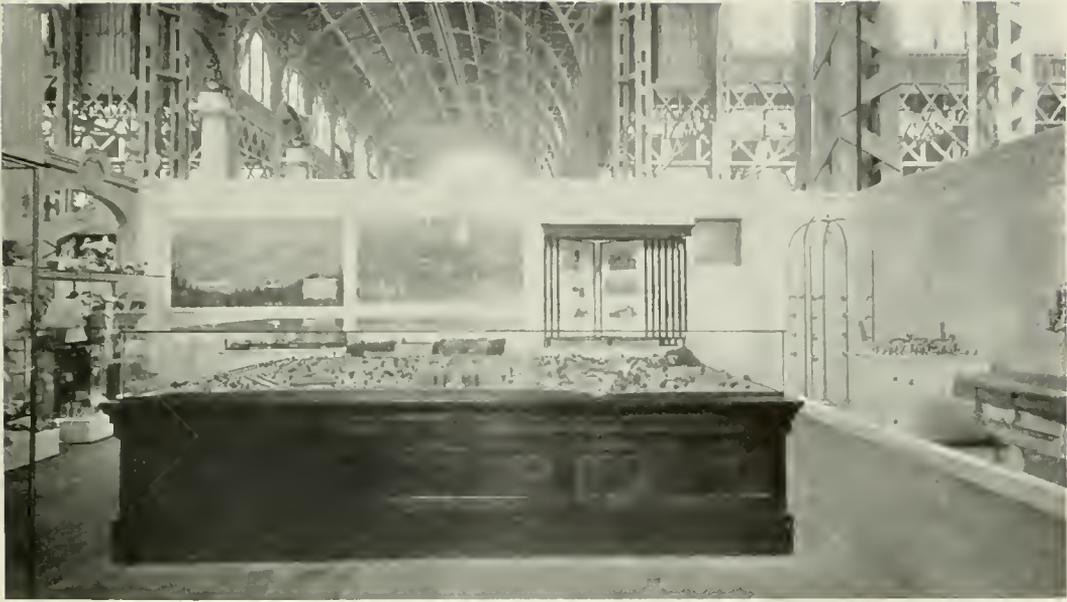
English had become the language of the schools, yet the object was not to Americanize or Anglicize the population, but to give it access to a mighty literature embodying the world's best intellectual strength. The object was a system adapted to the needs of the Philippine people. This worked itself out in five main phases: in the primary grade, first year; the purpose was to make a literate worker; in the next four years, to make an efficient worker and citizen; through three intermediate years, to produce a trained craftsman and a person socially fit to be a local leader among his people; in four years of secondary education, to produce the professional man with a strong personality; and in the university course to equip for national leadership. Such ideals might be classified as educational, political, economic, sociological, historical, ethical—anything you like; they carried a stimulating message of human progress.

In education, Massachusetts' name has so long "led all the rest" that under the old style of educational exhibit a great and dry display could have been made of her leadership among the universities and advanced technical institutes. She was invited however to show a specialty, and prepared an exhibit of her State-aided vocational system, her textile schools, and her nautical school, which was one of the most significant and impressive displays in the whole Exposition.

The booth was a large, two-story structure, occupying 2,000 square feet of space on the ground floor, and quite handsomely built. Here the old Bay State showed, not the educational growth from her centuries of labor in the higher academic field, where her fame is established too surely to need advertising or promotion, but her recent contributions to the modern education for work.

A great deal of demonstrating was done with films and slides, with which the exhibit was abundantly supplied. There was a daily program of 2,000 feet of film illustrating the work of State institutions, and there were nearly 1,500 slides picturing the work of the vocational and textile schools. These latter were arranged in a twin slide system, one giving the picture and the other a legend, or "caption."

Exhaustive Exhibits In the State-aided vocational school schedule there were 402 pictures and legends for the agricultural schools, 339 for the industrial schools for boys,



NEW YORK SHOWS HER TREATMENT FOR INSANITY



TEACHING THE CARE OF THE TEETH

169 for the industrial and home-making schools for girls, 117 of the evening trade-extension and evening home-making schools, and 104 of the continuation schools; and there were 184 slides for the textile schools and 52 for the Nautical Training school, making a total of 1,367. Besides these there was a daily exhibit of 104 slides descriptive of the buildings and work of the State Commission for the Blind and the Perkins Institute for the Blind.

Massachusetts, in establishing State-aided vocational education (the movement for which began in 1905) sought to provide courses for the industrial training of youth between the ages of fourteen and twenty-five, in preparation for entering a trade, and to offer instruction in trade extension and home-making to the adult skilled worker. It authorized schools for the benefit of minors between fourteen and sixteen years of age that were regularly employed not less than six hours a day.

The State-aided vocational schools included agricultural, industrial, and home-making education for youths, trade-extension schools for men and women, and home-making schools for women. There were Full-Time Day Schools, Full-Time Coöperative Day Schools, Part-Time Day Schools and Evening Schools.

In 1914 there were 75 schools of these types, and 15,575 pupils. The State reimbursed cities and towns each year for one-half the net maintenance of these schools, the total reimbursement for 1914 being \$245,046.

The exhibit included 120 charts in large multiplex frames, which described in a comprehensive and systematic way origins of interest in vocational education in Massachusetts, beginnings in the establishment of schools, legislation, growth of schools, local administration, State supervision, expenditures, courses of study and methods of work and teacher-training. A limited amount of product for illustrative purposes from home-making industrial schools, and of examples of related school work, was exhibited in large glass cases. There was a complete exhibit of all State reports, documents, and administrative forms for vocational education.

*The Whole
Evolution*

The movement towards the establishment of textile schools in Massachusetts began about 1888. In accordance with legislation passed in 1895, three schools were established in important textile manufacturing districts: the Lowell Textile School in 1897, the New Bedford Textile School in 1899, and the Bradford Textile School of Fall River in 1904.

These schools aimed to meet the needs of two distinct classes of student: young men in day classes who desired to fit themselves to fill the higher positions in the industry by obtaining a good foundation in the theory and practice relating to it; and those already employed in the mills, who

wished to acquire through shorter courses in evening classes greater skill in their work, and to get a knowledge of other branches of the industry than that upon which they were engaged in their daily occupations.

The Massachusetts Nautical School was established by an act of the Legislature on June 11, 1891, and is maintained by the Commonwealth in the interest of the Merchant Marine. Three Commissioners appointed by the Governor are in control. The U. S. S. "Ranger" has been loaned by the Federal Government for the use of this institution. The exhibit included a large glass case showing course of study, routine of work in Summer and Winter terms, cruising charts, photographs, and data regarding the growth and success of the institution. There were one hundred stereomograph slides and wall pictures.

The Massachusetts educational exhibit was an attractive as well as an impressive one. Seventy-two large transparencies represented nearly every phase of vocational school work, and added much to the exhibit. The cases contained photographs, products, and descriptive matter.

The United Shoe Machinery Company had an exhibit in Social Economy on the second story of this booth, illustrating work and play in a typical Massachusetts industry. "The Making of a Shoe" was shown by motion pictures. The development of footwear could be traced from the time of primitive man to the present. There were over 500 samples and colored plates, and you could see what Cleopatra used to complain of on a warm day in Egypt, with primitive clogs, sandals, moccasins, the enormous jack-boots, Dick Turpin style, that used to weight down and wear down horsemen in the olden wars, and the comfortable footwear worn in the trenches of Europe in 1915.

How visual education was being carried into the public schools of Chicago so that no child could escape it was demonstrated by the exhibit of the N. W. Harris Public School Extension of the Field Museum of Natural History. Here was a plan by which nature was sent into the schoolroom to instruct pupils that could not go to nature, and who, even when they visited a museum, took it inevitably and humanly as a holiday, and derived little other benefit from it.

The Field Museum of Natural History, inaugurated in Chicago at the close of the Columbian Exposition in 1893, had become, under the direction of Dr. Frederick J. V. Skiff, one of the great educational museums of the world. But the Doctor noticed that a very small percentage of the children of the Chicago schools ever visited it: a good deal less than ten per cent of them in a year. Mr. N. W. Harris of Chicago and Pasadena offered to coöperate in any solution of this problem that could be found, and finally

devoted a quarter of a million dollars to the establishment of a system of traveling exhibits that was unique.

Collections of birds, rocks, minerals, and small animals, as they occur or as they live in nature, were put into portable cases, and delivered by automobile to the Chicago schools, where they stayed two weeks at a time before giving way to others, and thus the pupils could see examples of the subject of their studies. And these collections, arriving at intervals, had the additional interest of "something new." The blue jay on a bough, the squirrel, with his fine gray brush, approaching his nest, the black bass at the bottom of a lake, were all there so that the children could have no misconceptions of them, but a lively and truthful image to carry through life. Comprehensive labels were attached, and longer descriptive articles were prepared and sent along for the use of the teacher.

*Nature Goes
to the Child*

The exhibit, under direction of Dr. S. C. Simms, Curator, showed the whole process, and it excited the liveliest interest. This form of school extension had a deeper purpose than mere instruction in facts. It was the belief of Mr. Harris that if a scheme could be devised to give the textbook life, so that the younger minds of society would have attractive fields in which to extend their reason and imagination, they would contract the habit of acquiring knowledge, and would find delight in it; and better citizenship would develop in the community than comes from the too often penitential drudgery of the classroom.

The St. Louis exhibit showed materials and methods somewhat similar to the N. W. Harris Public School Extension, owned by the Board of Education, and operated in conjunction with a library. The moving picture and the phonograph were used to support the charts, wall maps, and specimens, and relieve the pupil's mind from the tedium of the printed book.

Among the great exhibits in the Palace of Education were those of the State of New York. Centralized, unit control of education in the State was illuminated, literally, and presented to the gaze of the least observant by means of a huge *papier maché* relief map of the State, 27 by 36 feet in area, on which glowed thousands of electric lights of various colors, showing the different classes of school under the jurisdiction of the New York Department of Education. Probably no exhibit in the Palace excited more interest and curiosity than this.

To many, the map itself had an adventitious interest arising from the fact that it was made of 300 pounds of paper currency discarded by the United States Treasury. Added to this curious fact were all the lights, in

13 colors: 11,642 white lights showed the elementary schools, 948 red lights indicated the high schools and academies, 34 ruby lights located the colleges, technical institutes and universities, 34 orange lights showed the professional schools, 136 green lights identified the nurses' training schools, 11 violet lights showed the fine arts schools, 10 yellow lights the normal schools, 7 pink lights the Indian schools, 136 canary-colored lights the training schools, 10 purple lights the schools for defectives, 21 amber-colored lights the publicly maintained business schools, and 65 frosted lights the vocational schools. In addition there were 513 blue lights, by which the location of the public libraries of the State could be identified. It took over a year to make the maps and set the lights.

Apart from the big contour map, with these flashing lamps, there was a large architectural model of the State Education Building at Albany, whence the public educational work of the entire State is directed. This model, seven by sixteen feet in size, gave the visitor an idea of the magnitude of the work of caring for education in a State which numbers more than 1,500,000 pupils of school age. The interior of this model was lighted by electricity.

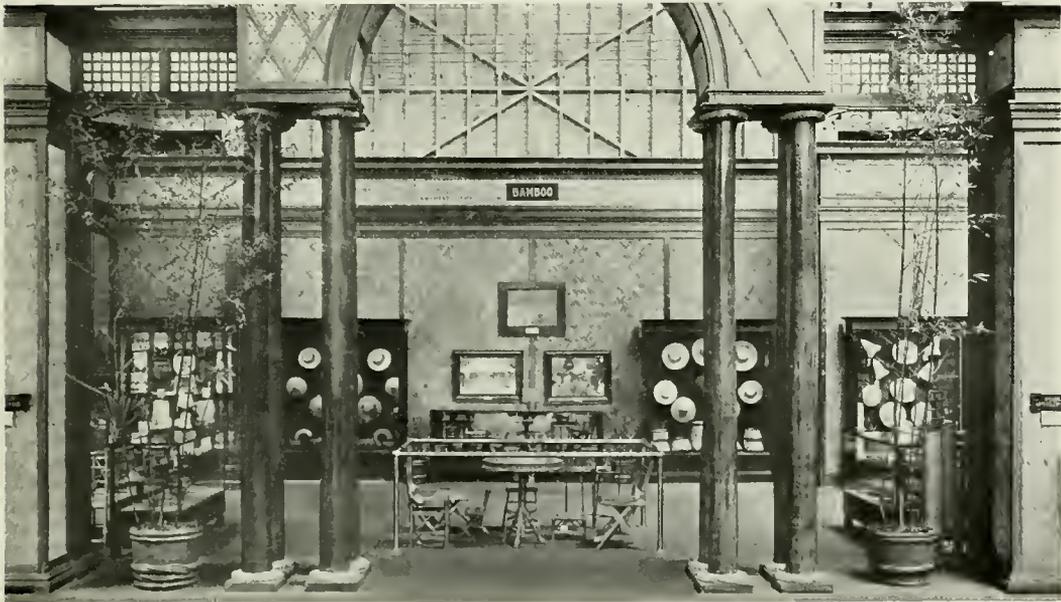
Ranging along one side of the space devoted to the educational exhibit were placed eight stereomotorgraphs, which were in continuous action during the hours the Exposition was open to the public, and which displayed the educational buildings situated in the various sections of New York, ranging from the great universities to the primary school.

One exhibit in this Palace was of great interest to Americans, and served to remind both Americans and Japanese of an old bond between them. It was a collection of beautiful Japanese water colors commemorating the mission of Commodore Perry to Japan in 1853, that mission as a result of which Japan emerged from the seclusion into which she had retired in the days of the great Shogun Iyeyasu, and took her place in the international family. The portraits of Commodore Perry, and of Townsend Harris who was the American consul in Japan at the time of the memorable visit, and a number of drawings and paintings showing how the visitors were received, were arranged in chronological order, and with them were records of the first Japanese party to visit this country.

Among others were pictures representing Commodore Perry's first landing at Kurihama, and the monument there commemorating it, the landing at Yokohama, the entertainment given by Perry to the Japanese Commissioners aboard his flagship the "Powhatan," and the reception given by



THE ARGENTINE BOOTH



A PHILIPPINE EDUCATIONAL EXHIBIT

the Japanese Commissioners to Perry and his officers. Exact data prepared by the Department of Education regarding the 48 schools in Japan established or supported by Americans attracted much attention.

A system of education was comprehensively shown from elementary schools to universities, representing normal, commercial, agricultural, industrial, technical, and art schools. Such interesting exhibits as those represented by the Tokyo Higher School of Technology, the Fine Art School of Tokyo and of Kyoto, the Commercial School of Nagoya, the Agricultural School of Aichi, the Marine School of Niigata, the Girls' Art School of Tokyo, the Deaf and Blind School, and the Sericultural School were very instructive.

The excellent examples of students' work in lacquer, porcelain, dyeing textiles, and bronze, stood out prominently. Comments were often made upon the infinite pains devoted to the preparation of these exhibits. Some of the articles showed a capacity for endless patience and painstaking labor.

No article exhibited this better than a woman's dress with wave designs, such as was used in the Genroku era, which was designed by Director Isono of the Girls' Art School of Tokyo and made by the students, under the supervision of instructor Kiyohara. All details of the intricate pattern were worked out in different pieces of cloth cut to suit the design and sewed together. In all 6,520 pieces, representing 55 different colors, were used. Counting the cutting, pasting or sewing together of one small piece as one process, the whole dress involved 53,555 operations for its completion, and the work on it was said to represent 120,000 hours of labor by one person.

Nothing opened the eyes of the people more to the scope of the Japanese educational system than a table showing the school attendance of children in Japan. In 1913 the attendance of those of *Educating* school-attending age (for there is a compulsory education law) *Them All* was 98.8% for boys and 97.62% for girls, showing an average of 98.21%.

There was brought into the United States that year, through the Exposition, what was probably the most remarkable collection of models of Chinese pagodas ever seen in the West, as part of an exhibit by the Roman Catholic Mission of Nanking Province and the Zi-ka-wei Orphanage of Shanghai. There were 56 of them, and they constituted a wonderful exhibit of ethnology. In fact most of them were purchased for the Field Museum of Natural History and went to Chicago, to remain—a fine addition to the museum treasures of the United States.

The models demonstrated the handicraft of the orphans and made an impressive showing of the training they had received. Standing several

feet high, they were not only delicately carved and painted, but were faithful copies in every detail of the originals scattered throughout China.

Inasmuch as congregational worship is unknown to the Chinese religions the pagoda may not be usable as a place of congregation, but in other respects it constitutes, figuratively speaking, the cathedral of the Chinese. The building of it is an act of merit and brings prosperity to the region. The act of merit once accomplished, there is not likely to be any reserve of

*Chinese
Pagodas* money or energy for maintenance, so the pagoda yields to the universal tendency to fall into ruins. The carved and painted wooden models showed with photographic fidelity the condition of the subjects, where signs of decay had begun to appear: broken lintels, crumbled arches, traces of missing ornament, which gave great romantic interest to this exhibit.

The making of the models depended on the assembling of minute information and descriptions from all parts of the Chinese Empire, the taking of hundreds of photographs and the coöperation of all the Jesuit missions, in the gathering of historic data. This data, handled by the boys of the orphanage, reappeared in these beautiful exemplars of Chinese art and architecture. They were but part of this interesting exhibit, however, the first exhibit ever made by the newer Chinese educational system, and a remarkable showing of the growth of vocational training. The entrance gate to the space was a carved copy of the gate into the Forbidden City of Peking which it had taken 60 boys two years to make. The carving was intricate and beautiful, for the Chinese are among the greatest wood-carvers in the world, and the boys had been carefully instructed in the vital practices of the art. There was a copy of the back of the Imperial Throne, done in teak and inlaid with the curious *lanete* wood, which turns with age to a sort of vegetable ivory. Then there were the large Coromandel lacquer screens, hundreds of years old. These were not made by the orphanage boys, but were put on sale by one of the interior missions whose revenues had failed because of the war. They showed wonderfully carved and colored scenes from Chinese life. There was statuary in wood carving by students of the orphanage, and a fine collection of antique bells, from old Buddhist temples.

Schools of sericulture showed all the processes taught in this ancient art, and schools of fishery exhibited models of nets, boats, and apparatus for fish propagation, all made by pupils.

Besides these exhibits, various Chinese provinces displayed the work of their pupils, with normal schools and girls' schools much in evidence.

These "outward and visible signs" were China's announcement to the world, of the greatest educational revolution through which any country

had ever passed in a like interval of time. Down to the end of the nineteenth century, Chinese education had been restricted to drilling the *litterati* in the classics. It was said that no such schools any longer exist in China. Western science and art are being propagated through Western methods by the Ministry of Education, all over the Flowery Kingdom, which now has thousands of grammar schools, middle schools, high schools, and colleges, supplemented by vocational and technical institutions.

*Another
Revolution*

In this development the citizens of the United States have good cause for pride. With part of the remitted indemnity due this country for its share in putting down the Boxer rebellion of 1900, there was founded, in 1909, the now famous Tsing Wha College, of Tsing Wha Yuan, near Peking. Here students from the provincial schools of China are admitted, and here they are trained by American and Chinese teachers until they are qualified to enter an American university or technical college. Tsing Wha College made an exhibit of its system and results that formed one of the most interesting studies in the whole Palace of Education.

After all, in spite of cinematographs and stereomotorgraphs and models and various types of physical apparatus, school must come back to the book as its main instrument of torture. Ginn & Company's exhibit showed people things about the making of textbooks that they had never thought of before—the extreme care with which they have to be compiled and printed, the expert and costly intellectual labor that goes to their composition and proofreading and revision and re-revision, the author's painstaking corrections and interlineations; for nothing authoritative can be done carelessly, and to many a man the authority of his life is the little old textbook he studied at school.

A number of glass cases showed, side by side, the schoolbooks used a century ago and those used to-day, and they were in remarkable contrast. And a lighted cabinet displayed, without comment, the comparative expenditures of the American people (priding themselves on the universality of education in this democracy) for schoolbooks and for tobacco: \$12,000,000 a year for the former, \$410,000,000 a year for the latter. But then, of course, a schoolbook can be read over and over and handed down in the family, while a cigar can be smoked but once.

*Tobacco
and Books*

If there were any such thing as an average youngster, and this youngster were to quit school and go to work for less than \$9 a day he would be losing money, although he might not "make the loss" just then. This was the argument of the statistical charts in the exhibit of the United States Bureau of Education, and it proceeded thus:

Unskilled or uneducated labor averages \$500 a year throughout a working lifetime of 40 years, or \$20,000.

High school graduates earn, on an average, \$1,000 a year throughout a working career of 40 years, or \$40,000.

To go to school twelve years, for 180 days a year, consumes 2,160 days of childhood.

Since the educated man earns in his lifetime twice as much as the uneducated man, or \$20,000 more, his daily earning power in the future with reference to his school days is \$20,000 divided by 2,160, or \$9.21.

Of course, the moral was, "Stay in school." But the greater moral and terrible warning should have been: "Don't be an average person, even an educated average person, or you will not make more than \$1,000 a year—which is not much better than poverty."

Wisconsin's exhibits in the Department of Education were of a sort to interest every person with the welfare of society at heart, for they showed a direct grasp on the necessities of a democracy. Here university extension as developed under President Van Hise of the University of Wisconsin means more than esthetic culture for the few. It reaches after the many that have had small opportunity, and it follows them right into the factory.

In Wisconsin, children of school age are required to get a definite amount of education, if there is any such thing as a definite amount of education; and if circumstances make it necessary for them to go to work before they have obtained it in school, they receive it from "continuation teachers," with whom they must put in a certain number of hours a week. Sometimes instruction is received in the assembly room of the plant where the pupils are at work; and the practice of putting lecture rooms in industrial plants for the benefit of the employees is growing in Wisconsin, as elsewhere. In addition, university extension follows the young mechanic, and, through the extension corps of the University, teaches him the theory and the scientific aspects of what he is doing.

A feature of extension work consisted of the operation of the "package library." Any group or school district could combine with the "package library" department and have a small collection of books shipped to it treating both sides of any subject of study.

Considered in connection with the statistics of the United States Bureau of Education cited above, the Wisconsin system would seem to promise a great deal for the personal values of the future citizens of that State.



ENTRANCE TO THE CHINESE EDUCATIONAL EXHIBIT



PAGODAS AND CARVED SCREENS

CHAPTER IX

FIGHTING DISEASE

THE Philippines once enjoyed the usual run of tropical diseases, propagated and spread by all the usual methods of tropical insanitation. The Philippine Public Health Service had an exhibit in the Palace of Education that showed the large measure of recent improvement—models of old houses and streets in Manila, for example, side by side with models of modern houses and equipment; sanitary toilets, and wells; and copies of bulletins issued to the people telling them how wells ought to be protected and how to dispose of their sewage. Drs. J. E. Snodgrass and J. A. Austen, who had been in the thick of the fight for better conditions in the islands for a dozen years, were in charge of the exhibit, and ready to explain it.

Vaccination, and such methods of living as the exhibit indicated, had rescued large parts of the population, and the younger generation was taking quite kindly to this sort of life-saving on the part of its step-Uncle Sam. Most of the methods of fever control are an old story since Panama, except for their application, but one exhibit that was quite striking was that of the old and modern markets; the old, in which exposed food was handled in the dirtiest ways; and the modern, in which there were cement floors and running water and inspectors to see that things were done properly. Even the old moat of Manila, the handiest place in the city to throw things, had to reform and become a park.

Charts and illuminated pictures showed the hospital work—and from them you learned that over 18,000,000 vaccinations had been performed in the islands during the previous decade. The cholera maps showed the victory over cholera, since 1902 when 80,632 persons died of this malady, to 1912 when there was not a single death from it. An epidemic that started in 1914 was smothered after 551 had fallen victim. The views of the General Hospital in Manila, the Southern Islands Hospital in Cebu, and the Baguio Hospital, showed institutions that were among the finest of their kind. Charts exhibited the increase of artesian wells, from two in 1905 to thousands in 1915. Children's funerals, once of amazing frequency,

had become far less numerous. There was an illustration of the Health Bureau's exhibition railway coach that goes about teaching sanitation with moving pictures, and lectures in native dialects.

Health conservation was one of the leading subjects in the Department of Social Economy, and to find the beginnings of the sort of sanitation shown in the Philippines health exhibit you could profitably visit the small booth of the Republic of Cuba. For here you could see a portrait of Dr. Carlos J. Finlay, who as long ago as 1881 contended that yellow fever is transmitted from a fever sufferer to a fresh victim by the bite of a mosquito.

Here, too, was a fine sanitation exhibit, with a model of the Department of Public Health and Charities at Havana; Cuba being the only country to have in its cabinet a Secretary of Public Health and Charities. There was a map showing branches of the department, distributed all over the island; there were pictures of clean vaccine and serum production in the central vaccine laboratory of the Republic, and most effective demonstrations of malaria, tuberculosis, bubonic plague, filariasis, typhus, and typhoid transmission and prevention.

There were portraits, with Finlay's, of Reed, Carroll, Lazear, and Agramonte, and a picture of Lazear Camp, "where were realized the first observations of the transmission of yellow fever by the mosquito in order to prove the theory of Finlay." So, with Finlay as the discoverer of the criminality of the mosquito, and Lazear as the martyr who sacrificed his life to prove the discovery, with the other devoted men that had risked their lives in the same way, you had in the Cuban booth vivid mementoes of one of the grandest strides of science.

There were models of Las Animas Hospital and La Esperanza Sanatorium for the treatment and cure of tuberculosis; both modern, well-appointed institutions. Mortality tables showed Cuba to be one of the healthiest countries in the world—something no miracle could have explained to our grandfathers.

"The varied industries on which we depend for our comfort, the wealth which enables us to enjoy them, and the arts of civilization which adorn and diversify our lives, are but the fruitage of the tree whose root is health." This from Dr. Samuel G. Dixon, renowned bacteriologist and Pennsylvania's first and only Commissioner of Health, adorned the booth of the

Methods in Pennsylvania Pennsylvania Department of Health exhibit. Here all the main divisions of departmental activity in this field were depicted, in models, charts, and diagrams—the work in school hygiene, in the branch dealing with typhoid fever and sanitary engineering, and in the cure and prevention of tuberculosis.

Pennsylvania was making medical inspection of approximately 400,000 country school children a year, and was the only State that had undertaken this work on anywhere near so vast a scale. Statistical charts showed the percentages of disease revealed. School sanitation had been well developed. Life-size models of pupils using that venerable adjunct of superficial cleanliness illustrated the dangers of the common roller towel. Modern, sanitary, well-lighted and aired school buildings, proper seating arrangements, screened outhouses and sanitary drinking fountains, instead of the old tin dipper that once floated about among the skippers on the surface of the spring up back of the schoolhouse, were all depicted either by models or by transparencies.

A large part of the section was devoted to models illustrating the spread of typhoid fever. And there were other and very beautiful models showing the Pennsylvania institutions for the care and cure of tuberculosis. There were transparencies showing the work of the new Bureau of Housing, and of the bacteriological and pathological laboratories. The exhibit demonstrated the high rank Pennsylvania had taken in this most important field of administration.

Hardly anything could have had more practical value educationally and economically than a spread of the knowledge of disease, and of its propagation. The hookworm exhibit in the Hygiene section of the Department of Social Economy was a typical illustration of the way this work was done in the Palace of Education, and the way it affected the visitors and promised to affect the world.

This exhibit became famous through discussion of its thoroughly convincing features. Its fascinating ugliness attracted people of all classes and instructed them in very many ways. For, taking it visually, the hookworm exhibit was revoltingly ugly, but if you considered its significance in human welfare it was one of the most beautiful and hope-inspiring manifestations in the whole Exposition. Men had been learning that their worst enemies, physically, are not the lions and tigers and sharks, large forms of terror that kill them singly, and are themselves easy targets, but the little things one can hardly see or cannot see at all, microscopic organisms, mainly, that wipe out people by tribes and cities. To those that lacked the imagination to picture the destructive work of a microbe, the hookworm exhibit was a good rough illustration of the results of infection. Its social and industrial devastation were vividly portrayed—the ruin of families and of large sections of the country and the world.

And this disease was curable for seven cents a head and a little intelligence; and preventable, as to recurrence, by the wearing of shoes and the

*Fighting
Hookworm*

general adoption of sanitary plumbing. Persons that read the newspapers and the magazines understood these things long before the Exposition opened. The tragedy of human affairs, recurring with the generations, lies in the vast numbers that die without transmitting such information as this, and the corresponding vast numbers it never reaches from any source.

The International Health Commission of the Rockefeller Foundation assembled the materials and pictures for the hookworm exhibit, and put experts in charge of the booth that could demonstrate every obscure point and properly impress the skeptic (if there were any skeptics after the exhibit had been examined) by the consistency of the demonstrations and explanations. There were large models of hookworm eggs, of the larvæ, of the male and female hookworm, and of a cross section of the human skin, showing the manner in which hookworms made their entrance—usually by way of bare feet. Models of portions of the body such as hands and feet, showed the pathological effect of the entrance of hookworms, and a portion of the small intestine exhibited fully developed worms attached to the intestine's inner wall. Life-size and life-like models of children were made, showing different stages of the disease, its effect in stunting growth, and symptoms such as pallor of skin, enlarged abdomen, and "angel-wing" shoulders. A typical home, before and after the occupants were cured, was represented in models, and the contrast was dramatic. To all these things were added maps, photographs, charts, lantern slides, and motion picture reels, most of which interpreted different phases of the hookworm lesson.

*Spreading
Knowledge*

World-wide benefits followed. The Australian Commission at the Exposition organized a movement to eradicate the hookworm from Australia. New Zealand, China, and other countries started investigations. The Pan-American republics were interested. It was the sharpest attack in force ever made against this slow plague, and only an exposition could have offered the opportunity for it.

The Federal Government's Department of Labor, the Museum of Safety cooperating, showed by means of charts, and by wax and plaster models the occupational diseases and injuries against which society has begun to guard its workers. Lead poisoning among painters and paint factory employees, the effects of coal mine dust upon the lungs, and of hot lime fumes on the eye-balls, the results of potassium, wood alcohol, and carbon monoxide poisoning, were indicated in their fruitage of disease, incapacity, and waste of national energies. The charts showed the percentages affected out of those employed, and suggested the protection and remedial measures necessary for dealing with the evil. It was the first time any adequate pre-



CONSERVATION OF HUMAN VALUES



FIGHTING HOOKWORM

sentation of the subject of industrial safety had been made at a great Exposition.

The onslaught society was making against its ancient foe, the "white plague" had a striking representation in the exhibit of the California and the San Francisco Associations for the Study and Prevention of Tuberculosis. The teachings of modern science on this fateful riddle were set out by charts, maps, diagrams, slides, pictures, models, radiographs showing diseased lung tissue; and all of it was interpreted and driven home by daily lectures. There was abundant statistical matter relevant to the subject, showing its frequency of occurrence, its public cost, its death rate under different conditions of life and treatment. There were models of open air tents and beds, and of hospitals, and there were photographs from the Cutter Laboratory in Berkeley showing the production of tubercule.

*Attack on
Tuberculosis*

On either side of the booth, in front, were two electrically lighted red crosses, the symbol of the Associations, surmounting panels that set forth the objects of each. The announced aims of the California Association were:

"1st. To disseminate knowledge concerning the cause, prevention, and treatment of tuberculosis in every town in California.

"2d. To secure needed legislation for the relief and prevention of tuberculosis.

"3d. To establish visiting nurses, open air schools, and clinics wherever needed.

"4th. To urge the construction of proper sanatoria in every county of the State.

"5th. To coöperate with its local associations, State and local Boards of Health, in all matters pertaining to tuberculosis.

"6th. The State Association stands for service to the people of California, to aid them in every way in matters relating to the White Plague, either directly or indirectly."

The aims announced by the San Francisco Association were:

"1st. To make housing and living conditions such as will prevent tuberculosis.

"2d. To that end, to show people how to live.

"3d. To locate every case of tuberculosis.

"4th. When located, to insure the cure while there is still time."

The San Francisco Association contributed a series of lectures.

The attendance at this exhibit during July, August, and September was over 42,000.

And when misfortune came to the woman wage earner in the form of tuberculosis, there was the Arequipa Sanatorium for her near Fairfax, California, where she could have the best sort of care at a dollar a day, and learn to earn it making the beautiful pottery, specimens of which were on exhibition in the Arequipa booth. The patient in the early stages became self-supporting after a brief apprenticeship, and with mind at rest and hands usefully employed she had a grand chance of recovery. There was a model of the sanatorium, and there were charts showing the improvement made by the patients, both workers and non-workers. Orders were taken for the pottery and a great deal of it was sold. The Exposition collected no percentage on these sales.

CHAPTER X

SOME NEW STYLES OF SCHOOL

ONCE, all the pupils in the same school had to learn the same things. That seemed to be the ideal of pedagogy. It was not a very good training for life work. You thumbed the same old Swinton's Word Book or some other word book, and learned how horribly English words were spelled, and you spelled them that way. It was the same with arithmetic and geography. Mentally you had to be just as much like everybody else in that school as the teacher could make you. If you had a thought or an impulse of your own, you were not approximating the standard of perfection, and moreover you were a nuisance and were interfering with the routine or the discipline or the deportment, or whatever else the holy old thing was; and there was grave danger that you would not be able to pass the sacred examinations, and your parents could not come and sit proudly in their stiff new clothes and see you "graduate from the grammar school." You grew in this pedagogical straight-jacket like a Chinese woman's foot, or one of those unfortunates the monster-makers raise in a vase for exhibition. The intellect of the country to-day ought to suit the "efficiency" peddlers, for it has been atrociously standardized.

*Iron
Pedagogy*

Col. Roosevelt found there was nothing sacred about Johnsonian orthography as exhibited by Swinton, or even Noah Webster, and he proceeded to smash it with his club. He spread the knowledge that you could spell through *t, h, r, o*; if you wished to. Some did. Fortunately he omitted to improve the multiplication table. In attacking orthographic orthodoxy the Colonel was, and not for the first occasion, a voice of his times. Thoughtful people were tired of rigid formularies and standardized mentality, and longed for a return of those conditions of intellectual freedom and even outlawry that had exercised the blazing geniuses of the Renaissance.

What could have been more fitting than to have had help in practical, effective form come from the land of the Renaissance itself? So Madame Dr. Maria Montessori's methods flashed on the world from Rome. She took the foremost place of her time in kindergarten work. She seemed to begin at the beginning. Perhaps her method could be best briefly defined

as specialization to fit the individual case. The old-fashioned system of making every child learn the same things, in just the same way, and conform to the same mythical standard of perfection, was, under her plan, relegated to pre-medieval darkness. Every child was to be encouraged to develop spontaneously, through natural expression.

Montessori Methods Her method had an immense vogue. Her book was translated into Japanese, as well as into most of the tongues of Europe, and teachers from all civilized lands visited her to learn the secret of her success with infants. She was urged to visit schools all over the world. She chose the Exposition as the best method of conveying her message to the largest number of interested people in the shortest space of time, and on August 1 she opened a training course of four months in the Department of Education.

An advisory committee of eminent educators acted as patrons, and no event connected with the Department of Education attracted more attention from a wider circle of specialists. The first material requisite consisted of children. About 35 tots of three to six years, unspoiled by machine pedagogy, were admitted to the little glass-walled school room, outside which sat dozens of fascinated parents and other spectators like tourists at an aquarium, watching to see whether any visible effects would break out.

The children were set at various tasks, but not crowded at them. They were given lacing, color matching, outlines to fill with colored crayons, letters to learn in groups by sight and feeling, numerical relations to master by rods of different lengths, cloths to lay across tables, articles to dispose upon them, cloths with rows of buttons to be persuaded into their corresponding buttonholes, and all sorts of small odd jobs to put through. These things helped that careful training of the senses which was a foundation-stone of the system. Sometimes the buttons and buttonholes refused to come out even, and the puzzled kiddy was not shown the mistake but was urged to try it again until they did. So critical self-judgment grew.

There was a delightful absence of compulsion, and especially a delightful absence of repression. Some natural battlers of three or four years had to be diverted from the objects of their hate, but the method of doing it seemed to be that of the Spanish bull-fighter—the young lady attendant showed them something else, thus leaving the natural endowment of pugnacity unimpaired, to be brought under control by the child himself when he had learned that its explosion didn't usually pay. Otherwise, from 9 o'clock to 12, things went peacefully enough and the children did their own work, work chosen by themselves, pretty much in their own way—the purpose apparently being to develop persons of initia-



AUTOCHROME BY CHARLES J. BELDEN

WESTERN ENTRANCE, COURT OF THE UNIVERSE

tive, the only persons in a community that ever have a value much in excess of their immediate personal requirements. Miss Helen Parkhurst, of the Wisconsin State Normal School at Stevens Point, who had studied under Dr. Montessori at Rome, conducted the school for the Dottoressa, who had not yet mastered sufficient English.

Coördination, control, judgment were evolved. At the end of 36 days, many of the children were writing and composing words. Unruly children took on a business-like air of occupation. For long stretches they hardly noticed the spectators, so well were their wits concentrated on their work. The glass-enclosed school room was beautified with flowers and green things, but they were probably bait for sentimental mothers; they did not seem to be a very vital part of the apparatus, which was designed for a more serious purpose than the cult of prettiness.

Inasmuch as the Montessori method promised to supplant a great deal that had long been accepted in kindergarten practice, and to make its way, at least in general principle, into the higher grades, some brief statement of its character may not be amiss here, especially as its more general introduction into the United States will date, in the main, from the Exposition.

It was intended to produce, not a repressed and standardized child governed from above, but an individual child, self-governed.

It was meant to give full play to the individual's initiative; as long as he kept the peace.

There were no collective lessons, but short individual ones, so that the teacher could start the child on a long task, which he could finish for himself. The teacher did not do much, restraining herself by violent effort from interference or assistance.

The apparatus, the "didactic material," of the Montessori system, was designed to do this work, after experiment to determine just what sort of thing would do it. It was a matter of a designed environmental factor for a definite purpose.

Within the classroom, and among this material, the child was free. What he did was spontaneous, not by command of the teacher. Only the most necessary orders were given. *Bossing*
Themselves Commands were not part of system; except self-command, which the child developed as the result of having a desire to accomplish something that required it and thus brought it into practice.

Dissipation of attention is the result of tedium and boredom. Concentration results from interest in the job. Dissipation results, also, from the child being incessantly amused and kept at play. The Montessori method was essentially a method of teaching by work. But the child worked by his

own will, and unconsciously practiced and developed that orderly conduct which alone makes people free and socially serviceable and worth while. The good old domestic Peck method, which consisted in pecking at the infant from morning to night, was not much in evidence—in fact not at all, shocking though it might seem to some conscientious parents.

From work under such conditions the idea was that the child would derive a fine excitement of faculty and an added, because exercised, power of mental concentration. The writer's personal observation would seem to confirm that theory. Practical teachers declared that with a few months of it, self-discipline appeared in marked degree, that the children become orderly, their obedience coming from free choice and recognition of its necessity, like the self-discipline of intelligent and well-disposed citizens.

A training-school of two large classes in the Montessori system was conducted by the Dottressa, through an interpreter, in the Nevada Building, after August 1, lasting until December. Some of the other State buildings were used for some of the lectures, but the Nevada Building was the main

Olden "college." From this school teachers went forth to introduce
Truths the new ideas and methods into the schools of California and other States. Yet those ideas, fundamentally, are hardly new. They have been lurking in the minds of the English speaking races in some dim, uncertain and unorganized way, since the days of King Edward Longshanks, and before, sometimes getting into a Declaration of Independence, or a Constitution or some such little thing, and helping preserve the English, and American, taste for individualism and private initiative, and liberty; and warring by instinct on paternalistic systems and old repressive tyrannies of whatever sort.

From the Children's Bureau activities, one could properly infer that the Departments of Education and Social Economy did not content themselves with still exhibits. Things in that Palace were always working, and people were always learning, not merely about advanced methods of pedagogy, but things of practical value, whether they were teachers and school board members or not.

One of the busiest hives about the place was the Standard Commercial School. This was a unique exhibit, a complete business college, "under glass," where over forty pupils selected for their especial promise, received the instruction of a valuable commercial course at no expense except the sacrifice of their Saturday holidays and their Summer vacation—for the school opened in March and ran until September. It was, by the way, the first time such a thing had been done in an exposition.

The idea of a live educational exhibit germinated at a gathering of school

men late in 1914. A number of the teachers present being in the field of commercial education, the discussion centered on the possibility of a commercial school wherein the pupils should be equipped to meet modern business requirements. Mr. David Lever, former high school teacher and at one time business manager of the Sierra Educational News, undertook the enterprise and carried it through to a grand-prize success. The equipment, of the latest types, was furnished by firms that had something to contribute to commercial education—such houses as the Gregg Publishing Company, the A. N. Palmer Company, the Southwestern Publishing Company, the Remington Typewriter Company, the Yawman & Erbe Company and the C. F. Weber Company. Mr. John Robert Gregg, of the Gregg Publishing Company, became convinced of the value of the plan, and assumed the financial responsibilities, so that the other companies participating made their contributions through him.

*Supplying
a Demand*

To obtain pupils it was announced in the high schools of San Francisco and the nearby cities that certain students capable of qualifying could obtain a commercial education and admittance to the Exposition without cost. A date was set for examinations and the successful applicants were enrolled.

The courses included stenography, penmanship, typing, bookkeeping, business English, commercial arithmetic, office practice and public speaking, with lectures on commercial law. But in preparation for the teaching of these things, many business men were consulted as to just what they required of their office assistants, and what should be taught to give them direct value in a business organization.

A gallery overhung the main classroom, to which visitors could ascend and whence they could watch the instruction in the Palmer method of penmanship, or the Gregg system of shorthand, or see how rapidly typing can be mastered under competent instruction. The pupils were very much in earnest, and in their uniform white sweaters were an animated and an animating feature of the Palace of Education throughout the Summer. In all branches taught, very satisfactory results were obtained, according to experts, and in shorthand and typing the progress of the class was said to be quite remarkable; "uncommonly high for the time the class has been at work." Such was a judgment pronounced after six weeks of the "term." The progress was "the more notable since the work has been done amid the necessarily distracting surroundings and influences incidental to a great public Exposition."

The school held a real college commencement, with 43 students in the graduating class, in the Court of Abundance on August 30. Manager Lever

was in charge. Miss Margaret Gustavson delivered the valedictory. Pope, Chief of the Department of Education, presented an Exposition medal to the President of the student body, Ernest Wilkins, President *ex officio* of the first Alumni Association an exposition ever started. And Clyde E. Blanchard, the principal of the school, presented a medal to Mrs. F. E. Raymond, who had been largely instrumental in establishing this unique institution.

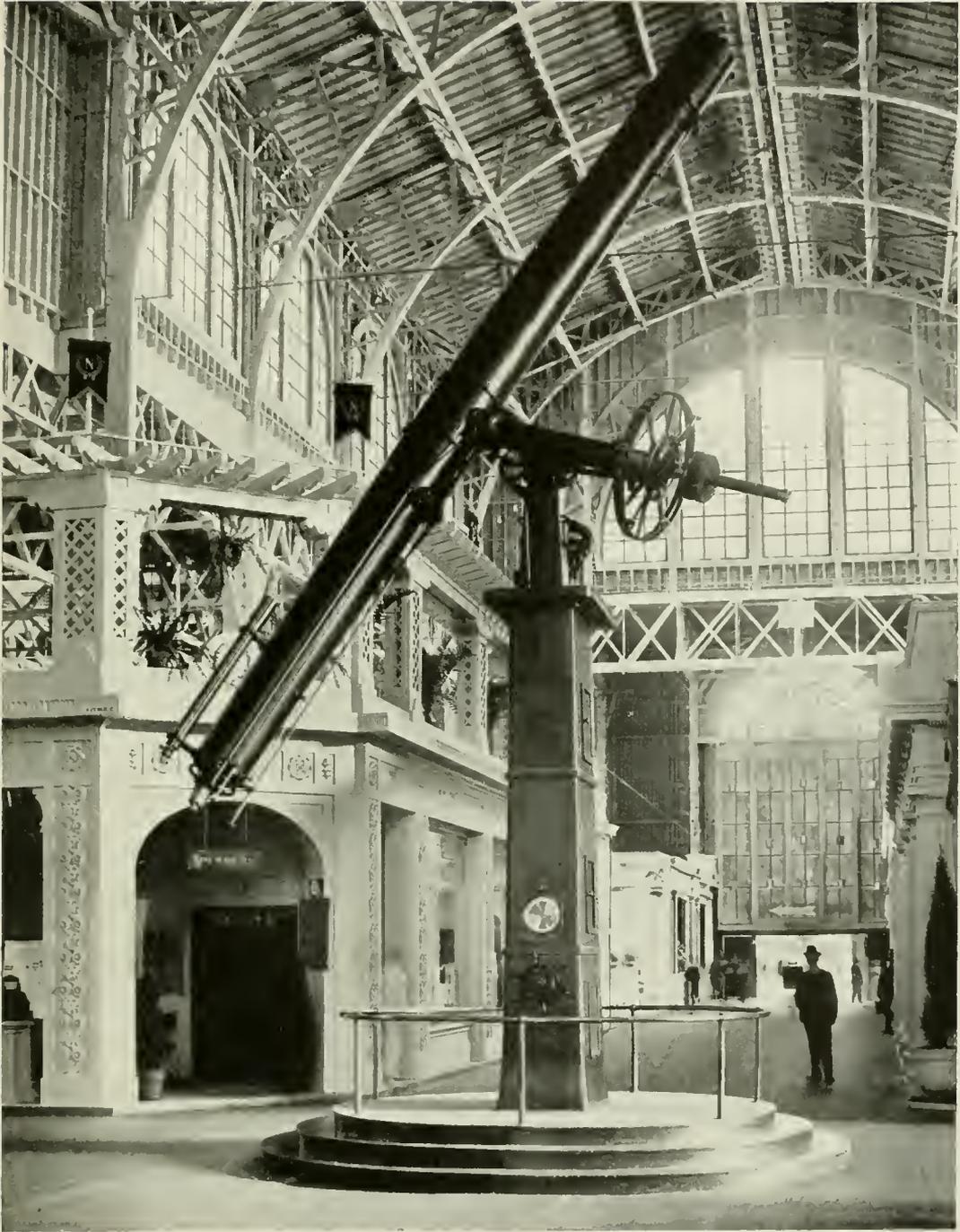
The latest phase of art teaching, that is, applied art, was demonstrated in the exhibit of Fine, Applied and Manual Arts in the Palace of Education. Representative work in all lines was selected, so that there was little or no repetition in the large and beautiful collection of objects brought together here.

On the walls, in the cases, and in the model rooms, you saw the work of primary, grammar, intermediate and high school pupils. Perhaps the deepest interest was in the model rooms, for these indicated the relation of art to domestic life in such compositions as the colonial sitting room of the Springfield High School, and the dining room shown by Oakland, Cal. The room of the Los Angeles High School was very fine, although more a show room than any particular unit of a house, and the same thing was true of the room put in by the San Francisco schools.

The San José Normal School put in a child's play room, in modern Viennese style, and the California School of Arts and Crafts was represented by an ideal studio. The Pratt Institute had an excellent wall exhibit of graphic art, and Newcomb College showed pottery, embroidery, and jewelry. Book-binding, metal work, drawing and modeling, embroidery, and leather work were much in evidence, in the bold, free, modern forms. Harvard University was represented by a display of plans for landscape gardening, and the Chicago Art Institute by paintings and drawings. Some sculptures from different art schools, with murals from the Chicago Academy of Fine Arts and from the California School of Arts and Crafts, added interest. The exhibit was collected by Robert Harshe, Assistant Chief of the Department of Fine Arts, and Superintendent of Fine, Applied and Manual Art Education in the Exposition's Department of Education. It was installed by Prof. F. H. Meyer, of the California School of Arts and Crafts in Berkeley.

California's educational exhibit was a remarkable demonstration of what can be done by the cinema film to depict the development of such a constantly growing institution as a great educational system, for through it were shown all the late phases of school life, and visitors were enabled to inspect the whole school system of California from their opera chairs. Some striking features disclosed were the technical equipment in high schools, now grown common, whereas ten years

*System
of a State*



CENTRAL EXHIBIT, PALACE OF LIBERAL ARTS

before there was only one polytechnic high school in the State. Other phases were, modern school buildings in country districts, the consolidation of country districts, playgrounds with apparatus for physical development, and the settlement work through which a knowledge of sanitation, domestic science, and care of the children were extended to immigrants that in many cases had not yet learned English.

There is not space in this book, and there would not be in twenty books to set forth all the significant features of all the exhibits in the palaces, so we have selected those that seemed best to indicate the nature and influence of the Exposition itself. But besides those mentioned above there were in the Palace of Education many that were important as illustrations of the infinite variety of the human mind and the wide range of subjects about which it worries. Many new forms of religion, of reformatory propaganda, and of proprietary philosophy, appeared in the booths and invited the attention of the serious or the merely curious. In some inexplicable way the more speculative of these new phases of intellectuality and the moral urge found themselves near-neighbors along a certain aisle which became known to the frivolous as "Nut Alley." History cannot approve so dubious a title; it is lacking in dignity and even in respect. But the fact that this particular section of the Palace was so known may properly be recorded, for it shows what a grand, free forum the Exposition was for the presentation of every aspect of human thought.

CHAPTER XI

THE PALACE OF WONDERS

THE ingenuity of Man in getting his own way despite the limitations of nature, his modification of his environment to bring himself comfort, or, what amounts to the same thing and gives it grander scale, to sell comfort to others, the fruits of his creative and beneficent cupidity, and the stage he had reached by the year 1915 in this sort of meddling with mundane design, appeared more distinctly in the Palace of Liberal Arts than in any other building or department of the Exposition.

The Craft of Men Great developments, magnificent examples of industrial evolution, were exhibited in the Palace of Mines, and in the Palaces of Transportation, of Agriculture, and of Manufactures; but in the Palace of Liberal Arts you saw the exemplifications of inventive genius a great exposition gathers together, even more distinctly than in the other palaces.

In this palace, Kipling might have written his great poem of modern romance "The Miracles." It was full of wonders. You went wondering through its aisles, from one wonder to another, until amazement became a sustained mood. You might have wondered before how any man could ever have learned to play the violin, and closed with the conviction that no man would ever invent a machine that could so delicately agitate those strings and make them sing that way. Yet here in a little booth was the machine that did it. And the violin was synchronized with an automatic piano, making the Violano-Virtuoso, a world wonder.

You might have recovered from your early astonishment at the telephone, and become patronizing about it, and might have said:

"Oh, yes, it's well enough in its way, for gossiping around town and transacting local business, and giving orders to the grocer. But real long distance—that's different—have to telegraph."

Well, you could sit in the cozy auditorium of the American Telephone and Telegraph Company, in a comfortable opera chair, and hear "New York talking" over a transcontinental line, as distinctly as you could hear Oakland, or Berkeley, or Alameda.

As for telegraphing, here were exhibits of apparatus that made trans-continental telegraphy practicable without any wires. And you may remember that they opened the Exposition by "wireless," from Washington.

And phonographs—they were all about, the most effective and delicate sound producers, in the most beautiful cabinets, for it seemed that the more they cost, the more people bought and the bigger the business grew; and for those that could not afford the expensive kinds, creative cupidity again had supplied a good talking machine for \$12, and that fact was an economic wonder.

But these machines reproduced sounds previously recorded on discs or cylinders in grooves in which a needle traveled, so that inasmuch as the needle required a little room, and the groove had to have some width, there was a limit to the length of composition it was practicable to register. The twelve-inch disc was about the largest size, running about four minutes, roughly speaking, and thus limiting a reproduction to compositions of that duration. Pretty soon you stumbled on the Telegraphone, an invention of Vladimir Poulsen of Copenhagen, which recorded sounds on an electrically magnetized iron plate, and reproduced from it—a plate on which nothing could be seen, or felt, and from which, at your pleasure, all record, or just a word or two, could be erased. You could attach this apparatus to your telephone when you left your office, and when you came back you could switch a key and hear what your correspondent had been saying to you when you were out, an hour or so, or a week or so, before. Or you could record letters on it, and use it as a dictaphone is used. And, as if the magnetized iron plate were not enough, the apparatus would take a record on a magnetized wire, so that you might have a whole opera reeled on a spool, and you could reel it off to another spool and listen to it for two or three hours.

*Records
on Wire*

Synthetic chemistry? In its infancy. The chemist's kernel would not sprout. Complex organic compounds could be taken apart in the laboratory, but it was hard, in some cases impossible, and in most cases financially wasteful, to put them together again in imitation of nature. Yet here was a large, hollow chunk of camphor, as big as a bucket, shaped like an old-fashioned boarding-house napkin ring, not distilled from leaves, twigs and gum by ancient Oriental processes but wrested by a wizard chemistry from coal tar, a substance as unlike it as night is unlike day; and it was cheaper and stronger than the natural sort. In other respects it was identical, and now reposes in the museum of the University of California, authenticated and certified by the head of the Department of Chemistry. It was the product of the Chemische Fabrik auf Actien, vormal Schering, of Berlin, and was exhibited by Schering & Glatz of New York.

The Palace of Liberal Arts embodied the spirit of modernity. Not only did it illustrate the stage that man had reached mechanically and scientifically and commercially, but it bore a bit on the change in his mental state and his theological opinions. Not many years ago it would have been a sinful spot—say, in the days when the old fellow in Scott refused to winnow his wheat by machinery because God had produced wind for that purpose.

Besides the wonders it displayed, its exhibits of commercial product had a wide range of interest; from the musical instruments of such makers as Conn of Elkhart, Indiana, and Monzino & Son of Milan, to the diving suits of A. Schrader's Son, of London, New York, and Chicago.



THE TRANSCONTINENTAL TELEPHONE THEATER

CHAPTER XII

FILLING AN EXHIBIT PALACE

THE methods by which the equipment of the Exposition's emergency hospital was accomplished (which, by the way, was carried out largely under the direction of the Department of Liberal Arts), form a fair example of the way in which the Liberal Arts exhibits were brought together; but there was this difference between the two, that while the exhibits that equipped the hospital were all within a certain definite field, those of the Department of Liberal Arts were drawn from a large number of different fields.

The practice involved was more akin to that of a business house with something to sell than in the Departments of Education and Social Economy, because most of the negotiations were with firms and corporations organized for profit and accustomed to considering anything but direct and material gains as beyond their limitations, whereas in the other departments named, a larger percentage of the institutions dealt with were altruistic in character, and could see in the Exposition the best opportunity of serving their purposes. Yet the invitations had to be selective of the best in each field. And the methods of the Liberal Arts Department may stand as roughly representative of those employed in most other sections of the Exhibits Division, excluding, of course, that of Fine Arts.

The classification for this Department comprised fifteen great groups of arts and products: typography and printing processes, books and publications and book binding, maps, paper manufacture, photography, instruments of precision, philosophical apparatus, coins and medals, medicine and surgery, the chemical and pharmacal arts, musical instruments, theatrical appliances and equipment, electrical methods of communication, civil and military engineering, models and plans and designs for public works, architecture, and finally architectural engineering. These groups were subdivided again into 121 classes of the results of man's skill, ingenuity, and learning.

Experience in other expositions suggested to the Chief of Liberal Arts, Theodore Hardee, about where and how to begin. It was necessary to

survey, in effect, the whole kingdom of productive energy defined by the classification. Trade journals were searched and catalogues were collected, scientific organizations as well as industrial concerns were listed, and lists of manufacturers in the lines sought were obtained from a large New York addressograph house. Correspondence was opened with these organizations and firms, beginning with such a letter as the following:

“The Panama-Pacific International Exposition at San Francisco in 1915 will display in a most comprehensive manner the achievements and activities of mankind during the last decade. Live, working exhibits are especially desirable, showing not only actual products, but also models in operation to illustrate the apparatus and methods employed in arriving at the finished article. In the domain of Liberal Arts the exhibits will be notably interesting and significant.

“The display of GRAPHIC ARTS will be complete and characteristic, embracing the whole range of this broad field. The equipment and various processes of printing, engraving, and lithography, newspapers, magazines, books, and book-binding, maps, typewriters, multigraphs, advertising, etc., will be shown at their highest point of development in 1915. Journalism, the prime factor in moulding public opinion, will be fully illustrated.

“These exhibits will be housed in the Palace of Liberal Arts. The exhibits must of necessity be selective in character because of the comparative limitation of space which, by reason of wider participation and the world’s more extended productivity, will be more restricted than at previous International Expositions. This will emphasize the advisability of applying for exhibit space as soon as possible.

“We should be pleased to know that you will give serious consideration to the advisability of your participation. In this connection permit me to call your attention to the keen interest manifested by both American exhibitors and foreign governments, which assures an Exposition of the most representative international character. Latin America and the Orient will take very prominent parts. Twenty-six foreign countries have already accepted the invitation of the President of the United States to participate, and thirty-five States have also accepted.

“The opening of the Panama Canal means the development of entirely new avenues of commerce, the extent of which it is impossible to overestimate. The Orient and Latin America should prove large and profitable markets for the GRAPHIC ARTS, and the Universal Exposition at San Francisco in 1915 will afford a rare opportunity to bring your products to their particular notice. Blank applications for space, the exhibits classification and other information prepared for the guidance of exhibitors, will be forwarded on request.

“Yours very truly,

“(Signed) Theodore Hardee

“Chief of Liberal Arts.”

So, selected concerns in all the fields it was sought to reach were invited; beginning early in 1913. Subsequent letters carried the interest further, still later ones described the development of the Exposition as a whole, emphasized its importance, presented its attractions, accentuated the advantages to be derived from participation in it. The ruin of stamps and stationery was tremendous. Thousands of letters went out, variously composed to meet changing requirements as the Exposition activity developed, and as the developments were individually followed up and the "prospects" either exhausted or laboriously brought to consummation.

*Working
the Mails*

In the mere exploitation or advertising of the Department the numbers of form letters used was very large. From State commissions to pipe organ manufacturers, the whole scale was run. When the applications for space began to come in, they involved continual adjustments of requirements, efforts to satisfy the exhibitor that he would have things to his liking, meeting of some of the most ingenious and apparently impossible conditions the human mind could evolve.

The general difficulties were common to all the Exposition. There was a universal tightening of the money market in 1913, which resulted in retrenchment, and curtailed the designs of many a business house. When you need cash you can hardly afford to invest in the chance of benefits remote and indirect. What we now know to have been the strain of coming war began to make itself felt in Exposition affairs long before actual war was evident. Then it came, and in the Palace of Liberal Arts alone it caused the cancellation of applications for 97,173 square feet of exhibit space before the end of 1914; and over 8,600 feet of Liberal Arts space in the Machinery Palace. This had to be laboriously filled again.

After applications for space began to arrive, location plans had to be arranged, and the applicants enlisted in a general movement for good booth construction. Blue prints were prepared for this purpose. The general scheme contemplated the locating of commercial and scientific exhibits from the United States in "industrial" groups corresponding to the official classification for this Department. Foreign exhibits, greatly reduced by the war, were grouped by nationalities. The domestic section occupied the southern half of the Palace, and the upper part of the northeast quarter. The foreign groups were located in the northeast quarter. And the northwest quarter was filled with the United States Government exhibits. Printing presses, linotype machines, road rollers, and similar heavy products, some noisy in operation and requiring power, went into the Palace of Machinery, but still belonged in the Liberal

*Grouping
the Exhibits*

Arts Department. No noisy exhibits were permitted in the Palace of Liberal Arts.

Every effort was made to have booth construction and exhibit installation completed a week before Opening Day. Booth construction, here as elsewhere, finished in an awful hurly-burly. Contractors took work they could not possibly execute, not because they could not get labor but because they could not give their attention to more than two or three booths at once. So disappointments were many. Because of tardiness in the completion of booths, cases of exhibit material piled up amid the rubbish and building debris, and confused and delayed the already delayed work. It was hard to get good emergency men, in spite of the fact that labor in general was plentiful. Space cancellations came in, up to the last week, and added to the confusion. Floor superintendents of installation worked day and night. The night before Opening Day nobody on the Department staff went to bed, and if anybody slept he did it standing up and answering questions or giving orders. Considering all these things the result was most creditable; the installation was almost, but not quite, complete. Said the Chief of the Department:

“If I had this to do over I should prepare to double the entire force during this period and make at least three eight-hour shifts. I should be guarded against contractors who promised to do things and could not live up to their promises. I should get in closer touch with the shippers’ end, the railroads and the transportation companies.

“I would particularly warn against procrastination by managers in charge of exhibits who feel positive in most cases that they can finish on time, whereas we found very few of them who were able to judge the time it would take.”

This place of great invention, which bore so directly on human life that it was one of the most popular of the palaces and was constantly thronged, was 470 by 585 feet in largest extent, and cost \$325,447 to build.



SETS FOR WIRELESS TELEPHONY



EDISON SHOWING HENRY FORD THE FATHER OF PERFORATING RECORDERS

CHAPTER XIII

DRAWING THE WORLD TOGETHER

GREAT strides in the communication of intelligence that had been accomplished in the Exposition year, had their exemplification in the Palace of Liberal Arts. Transcontinental telephony occurred for the first time on January 25, 1915 between New York and San Francisco. On that date Alexander Graham Bell, inventor of the telephone, which in its feeble infancy had been exhibited at the Centennial Exposition at Philadelphia in 1876, sat in the New York office of the American Telephone & Telegraph Company and talked to Thomas A. Watson in San Francisco—the same Watson who had been on the receiving end in Boston on the 10th of March, 1876, when the first spoken words went over a wire.

That line was a short bit between two rooms in the same house. The transcontinental line of less than forty years after stretched 3,400 miles and formed part of a system comprising 9,000,000 instruments connected by 21,000,000 miles of wire.

And then they did it without the wire. On September 29, 1915, Theodore N. Vail, President of the American Telephone & Telegraph Company, talked over a wire from New York to Arlington, just outside of Washington, D. C., where the Government's great radio towers are, and from these towers the impulses went out, without wires, through the imponderable ether to John J. Carty, chief engineer of the company, at Mare Island on one of the upper reaches of San Francisco Bay, and the words of Mr. Vail were distinctly heard by Lloyd Espenshied, one of the company's engineers, at Pearl Harbor, near Honolulu, over 2,000 miles out in the Pacific—a total distance of 4,900 miles.

In the Palace of Liberal Arts the telephone company built a large booth containing a handsome auditorium, and the public was invited to sit here and "listen to New York," over the transcontinental wire line. Every seat was equipped with a pair of receivers, and with these at your ears you could hear, at 11 a.m., 1:30, 2:30, 3:30 and 4:30 p.m., any day of the Exposition season, readings of head-lines from the New York evening papers of that

date, phonograph music, and the waves of the Atlantic Ocean breaking on Rockaway Beach. At times, personal conversations across the continent were arranged for distinguished visitors; such as Governor Whitman of New York, who listened to the rebellious proclamations of his three-months-old baby boy 3,400 miles away.

The thing did not stop with the demonstration of its possibility. In the domain of the physical, few things are of value to humanity until they have been "commercialized"—word hated of the reds and long-hairs, but representing the most effective and economical method we have yet evolved of getting things into general use; or are likely to evolve. A few weeks after the opening of the Exposition, the telephone company opened the

For Public Service transcontinental wire line to public service. The person-to-person rate between San Francisco and New York was \$20.70 for the first three minutes, and \$6.60 for each additional. At this writing several calls a day go over it. For important business conferences it is declared by some to be superior to the telegraph, because business men with critical matters to arrange have an opportunity for discussion and for deliberation during discussion such as they can hardly accomplish when responses are delayed. In war, its importance would be vast. No such use as yet is being made of wireless telephony.

Many causes contributed to these miracles: political solidarity of a great continental country, consolidation of local telephone systems into a continental unit, extensive public patronage and support, organization of technical experts, the American energy to string wires over deserts and mountain chains, the big, far-seeing American vision that is satisfied to sacrifice small present gains for the chance of ultimate grand results.

Altogether there were so many obstacles, and so many causes of success, that the company could make the statement: "In all the 3,400 miles of the line there is no one spot where a man may point his finger and say: 'Here is the secret of the transcontinental line; here is what makes it possible to telephone from New York to San Francisco.'" It was not merely a question of stringing wires on poles. The difficulties led into some of the refinements of physics as understood in the early part of the twentieth century, and involved all the subtleties of electrical transmission in its most delicate form. It is not possible here to discuss, even were we competent, the baffling phenomena of lagging, crowding, inductance, and other caprices of this mysterious and slippery form of energy, nor the various loading coils and relays devised by the technical men to "speed it up" and make it do its work. There was one device exhibited in the Palace of Liberal Arts, however, and thus germane to our task, that illustrated the extreme subtlety of

technique that had been reached at this date by inventors in the electrical field. This was the audion amplifier of Lee De Forest. The De Forest Radio Telephone-Telegraph Company exhibited some notable radio apparatus, among the rest a set that had been used in wireless telephony on the Lackawanna Railroad, in 1914. It showed wireless telegraph and telephone apparatus with the audion amplifier, audion detector and ultraudion, combined detector and amplifier: devices for reenergizing the voice impulses, or others, whether they came by wire or not. *Adding
Electricity*

Inasmuch as the audion amplifier was a step forward in the development of radiography, it seems worth while to record a description of it here. We quote in part the exhibiting company's description:

"The audion amplifier consists of a small incandescent lamp bulb exhausted of air, containing in addition to the usual filament two thin plates of nickel about an eighth of an inch from the filament, on either side. Between the filament and the plates are two pieces of nickel wire bent grid-shaped. . . . The incoming current, to be repeated and amplified, is connected to the 'grid' wire. The outgoing line is connected, one terminal to the plates, the other to the filament. In this circuit is found a battery. A separate battery lights the filament to incandescence. The heated gas becomes then a conductor of the local current from the battery, which can pass from the cold plates to the hot filament. . . . The current changes produced in the outgoing, or plate, circuit are exactly similar to those current changes or electrical charges, upon the 'grid' wires which produced them. But the changes in current thus produced are many times the changes in current which caused them. . . . The one most essential and completely novel element in the whole strange device is the 'grid' member, interposed across the path of the traveling ions (wanderers, as their Greek name implies)."

The audion amplifier, it was said, intensified telephone and telegraph signals from ten to 1,000 times. The claim was made that it had been an essential element of transcontinental telephony but whether this was or was not the fact is not a matter for adjudication here.

In their evolution the detector preceded the amplifier. Its use made possible the receipt of a wireless message from Nauen, Germany, at the De Forest booth in the Palace of Liberal Arts, caught on antennæ hanging from the Tower of Jewels. The ultraudion detector caught wireless signals, and at times persons in the booth could hear wireless telephone conversations from wireless phones about the bay. The instrument was not yet domesticated, and it was still, in 1915, cheaper to use the wire system.

In those days of highly developed office organization the working exhibit of the Turner Interconversing System, put into the office of the Department of Liberal Arts by the General Acoustic Company of New York, was of much interest. By it the president or general manager of a corporation could converse with as many departments under his jurisdiction as desired, all together or at different times. For the instantaneous transmission of a general order it was like getting all the department heads into one room. And if any were not concerned with the order, his office could be cut out at will, by a switch. Departments could also cut off their own lines. The same company exhibited a detective dictaphone, such as you read of in the detective stories of the day. We are glad to be able to support in this way the possibility of some good but improbable short stories. The machine would catch the utterance of a person 20 or 30 feet away and transmit it to an adjoining room. All you had to do was to get the villain to talk in his sleep and you had him.

*All Offices
Made One*

The Aero Fire Alarm Company had a working exhibit, with its central station in the Palace of Liberal Arts, where it attracted general notice. The Exposition buildings were equipped with this device, which constituted part of its noteworthy fire protection scheme. In this system the mechanism giving the alarm was actuated by the expansion of air in long, thin tubes, when the tubes became heated in case of fire. They ran all about the buildings, and because of their extremely small calibre the air in them would operate from a very slight rise of temperature.

The fire alarm stations and police telephones throughout the grounds were a working exhibit of the Star Electric Company, which showed, in the Palace of Liberal Arts, a fire alarm and police telephone exchange.

The booth of the Western Union Telegraph Company was equipped as a modern telegraph office, and offered a complete exhibition of telegraph service by wire, as far as an office could. There were stock-market tickers, a commercial wire, a complete ocean cable outfit, and various demonstrating machines. Visitors were handed dated copies of this telegram:

"This message was sent over a Western Union wire equipped with the new multiplex automatic system by which eight telegrams may be transmitted independently over a single wire and all printed simultaneously."

The company exhibited a relic of a great recent event: the telegraph instrument with which President Wilson, on October 10, 1913, blew up the Gamboa Dike from Washington and let the water of Gatun Lake into the Culebra Cut. Although this act did not complete the Canal, it destroyed the last barrier in it. The Western Union booth contained another exhibit of fascinating historical interest, for it was the



MOVING-PICTURE MACHINES



THE MAMMOTH TYPEWRITER

grandfather of the typewriter. Some description of it will be found in the next chapter.

Telegraphing with a typewriter key-board by a method that reproduced messages "in Morse" at the other end of the wire, was shown by the exhibit of the Piersen Telegraph Transmitter Company of Topeka, Kansas. A person ignorant of the Morse code could send messages by this instrument; and it had a humane quality, for it promised to save the weary operator nerve and muscle strain and prevent that terror of the telegrapher, "glass arm." The machine embodied a "storage cylinder" which enabled the operator to store from one to 71 characters before releasing them on the wire, so that certain irregularities in sending were obviated. Coupled with the storage mechanism was an erasure key, which would remove a "misprint." The transmitter also spaced between characters and between words. It was claimed that an operator that could write 40 words a minute on a typewriter could telegraph as rapidly with this instrument. And the receiving end could "take" as fast as it came.

*Typing
Telegraphy*

NOTE—At the time of printing this history, 1920, the service had so expanded that there were three telephone circuits working between San Francisco and eastern points, and they were kept so busy during peak-load hours that the company contemplated additions even to these facilities.

CHAPTER XIV

MARKS OF MATERIAL PROGRESS

THE visitor could always tell when he was inside the Palace of Liberal Arts, by the great telescope slanting upward on its tall pedestal under the central dome. It was a 20-inch equatorial made for the Chabot Observatory in Oakland by the Warner & Swasey Company of Cleveland. This was said to be the seventh largest refracting telescope. It weighed nearly ten tons, and if pointed vertically, its upper end would have been 38 feet from the floor; so it made quite an indoor landmark for a Palace filled with bewildering ranks of booths. The new development it signaled was the use of Jena glass for the object lens—a recently discovered optical glass, of superior qualities for its purpose. The optical parts of the instrument were made by the John A. Brashear Company, Ltd., of Pittsburg, Penn., whose head and founder was probably the country's greatest genius in the production of instruments of precision.

*Better
Lenses*

The exhibiting company, the Warner & Swasey firm, had an exhibit of some other optical and astronomical instruments in a large booth, where it showed several telescopes, a chronograph, a model of a 72-inch reflecting telescope for the Dominion Astronomical Observatory at Victoria, and a drawing of a 60-inch reflecting telescope for the *Astronomico Observatorio de la Nacion Argentina*, Cordoba, Argentina. In conjunction, there were some other exhibits by the Brashear Company.

And it was in this Palace that you saw how the knowledge of optics that had developed since the telescope was invented, had been turned to the production of the evil eye of the world, that sinister thing which has made the submarine the world's worst instrument of destruction. Without the periscope no submarine could operate with enough effect to pay for building her. Without the periscope the "Lusitania" would not have been sunk, the war would have been pretty much localized, and probably it would have ended much sooner than it did; although it might not have ended to the satisfaction of the nation placing most reliance on it. An instrument of such potency over the affairs of man is worth examination.

*The Real
Evil Eye*

A specimen shown here was part of the exhibit of Keuffel & Esser of Hoboken, manufacturers of surveying instruments, telescopic sights, periscopes, drawing instruments and slide rules.

The periscope originally had a very limited view, and the tube was short. In the decade preceding the Exposition however, it had been developed, through the introduction of more lenses and prisms, to make it a double telescope, one of which received the image reflected downwards from the upper prism, but reduced it, while the other took this reduced image and magnified it again to proper size. An ordinary periscope as used in 1915 was between 16 and 22 feet long, or tall. The one on exhibition was 17 feet. Looking into its eye piece and rotating it, you had a good view of the palace, above the walls of the booth. This firm also showed a photographic theodolite for topographical surveying, the first one ever made in this country, to be combined with a transit and camera.

Bausch & Lomb of Rochester, New York, also showed a persicope, and in addition a range finder, that gave binocular vision between "eyes" several feet apart. This firm exhibited parabolic searchlight mirrors up to 60-inch diameter, balopticons for opaque and transparent projection, and a photo-micro-graphic stand and equipment for taking pictures through a microscope. The installation was striking, and the display of lenses had a beauty of its own.

When you saw the crowds gathered about a huge model of an Underwood typewriter that weighed 14 tons or so, and yet was operated by one young woman, printing news bulletins on a web of print paper the size of one of those rolls used in the Pancoast color press, you felt how curious it was that so many people were interested in superlatives of size and wanted to stare at the "Biggest" typewriter in the world. Yet it was possible that their interest was not in the size of the machine but the vigor of enterprise that built it for exhibition purposes. Whatever the cause, it received a great deal of attention. It could not have broken any speed records; the keys were too heavy. They rose and fell like giant iron legs, and about as stiffly, under motor impulses from an electrically connected key-board. But their action was a fascinating sight, and the thing itself was a great advertisement. Behind the model some beautiful dissolving views showed clerical work from the days of the old Cruikshank clerk with a quill pen and tail-coat, laboring at his books in a dimly lighted office full of dingy ledgers, to the spruce, young, intensely feminine thing operating a modern writing machine at a handsome desk with a vase of roses on it, transcribing her notes as best she could for thinking who was going to take her to Tait's that evening.

*A Giant
Typewriter*

All about were the real writing machines of this company, constituting a Progress Show in the evolution of typewriting. There were late models of calculating and bookkeeping machines, some of them extremely costly, yet immensely more valuable than their cost, in the disposal of business. One was a combined writing and adding machine, in itself an advanced step in office efficiency.

Even more interesting in a historical sense was the exhibit of the Remington Typewriter Company in the Palace of Liberal Arts. It was a clattery sort of place because there was an electric motor attached to a Remington machine which kept writing the same thing over and over again many thousand times, perhaps millions of times, as an endurance demonstration; wrote the same message for 300 days, seven hours a day, and was oiled only five times. But better yet was the demonstration of the endurance of the typewriter idea, for here you saw the very first typewriter ever exhibited at an exposition: a Remington that had been at the Centennial at Philadelphia. It sat on an ancient sewing machine table with legs of curly cast iron, from the age of American art when beauty was supposed to dwell in curves, and in curves alone. The whole exhibit was reproduced just as it was at the Centennial, with the operator dressed in the costume of the period. The human typewriter was, however, a comparatively new one of a very attractive model.

With this display were facsimiles of the first typewriter catalogue, a wonderful composition, embracing illustrations of sewing machines, rifles, and plows. There was a picture of a keyboard for the instruction of those that wished to approach this thing cautiously, and make sure they could operate it before investing their money in it. The arrangement of the letters and "points" was very like the modern one, but it wrote only in "upper case." There was the tempting bait of early salesmanship, and some thrilling testimonials. The revolutionary document was headed:

Antique
"Ad"

"THE TYPEWRITER! A Machine to Supersede the Pen. Manufactured by E. Remington & Sons, Ilion, N. Y. Sold by Remington Sewing Machine Company, Price \$125. Ministers, lawyers, authors, and all who desire to escape the drudgery of the pen, are cordially invited to call at our office and learn to use the Type-Writer. Use of machines, paper, and instructions, FREE."

Some of the other inducements to dally with this new temptation read: "The work is as plain as the plainest print. No pen-writing can com-



PHOTO BY CARDINELL-VINCENT COMPANY

A GRAND PRIZE BOOTH

pete with Type-Writing either in speed, legibility, or price. Stenographers can come to our office and dictate to operators, from their shorthand notes, and thus save the labor of transcription. Dramatic writers will see the benefit of our manifold copying in the fact that we can furnish at the one writing a complete cast for every actor.

“THE TYPEWRITER in size and appearance, somewhat resembles the family sewing machine.” “It is graceful and ornamental, a beautiful piece of furniture for an office, study or parlor.” “Persons traveling by sea can write with it when pen writing would be impossible. The same is true of persons traveling by rail.” “No lawyer can afford to be without one of these machines as all legal papers can be copied by the office boy.” Finally, Mark Twain wrote the Company, asking that his use of the typewriter be kept secret because it excited too much curiosity; Oliver Optic, friend of our boyhood, had had one for ten days and testified that he could already write two-thirds as fast as he could with a pen and hoped to write much faster some day; and S. N. D. North, then editor of the Utica Morning Herald, declared that the Type-Writer relieved newspaper work of the severe physical strain that was “gradually killing off our best editors.” That last might be a recommendation and might not; it depends.

In short, that old Remington-Sholes was some machine, and its effect during the intervening years has been to introduce into office work some very attractive features. The name of the machine has changed—dropped its hyphen and become a regular citizen of the Republic of American Letters.

By this time the typewriter is becoming a household implement, like the phonograph and the mechanical piano player, so that chirography is threatened, and soon a person that writes a fine hand will seem to possess a curious antique distinction. To this domestication of the typewriter, the portable forms of it have contributed heavily. The Remington Company showed a small portable machine, and so did the Corona Typewriter Company.

Vestiges of the typewriter's early development appeared in the exhibit of the Western Union Telegraph Company, where you could see the second machine ever produced for sending telegraphic messages by means of perforated paper. It was a key-board machine, said to have been elaborated by Thomas A. Edison and Charles L. Sholes. This ^{Typewriter's} _{Ancestor} use of perforated paper was probably the precursor of the check protector, the automatic piano player, and any device in which paper would receive a record and actuate a machine—even the Monotype machine from which this type is cast. For some curious reason, automatic telegraphy has not been much in use. But one day Edison went back to his old idea of the

paper record as an actuating device, and from his practical brain the talking machine as we now know and enjoy it leaped into being—after innumerable unsuccessful efforts on the part of other inventors to reproduce human speech by imitating the vocal organs. And Sholes, it was said, developed the typewriter from the keyboard end of this old automatic telegraphing mechanism.

Other office appliances than the typewriter were a notable feature of the Liberal Arts exhibits; so many and various in plan and use, and apparently so essential to business that you wondered how in the world old Jacob Fugger and the Medici family ever made any money at all.

There was the Egry Register, which would make three full identical copies of a transaction, two of which were discharged from the machine, while the third remained under lock and key until removed by the person in charge. The same company exhibited a roll-out manifold to make either duplicate or triplicate copies at one writing. There was the Dupligraph which issued two copies from the register; and the Memophone for recording telephone messages, or orders at the desk; and the Total Summary Register, which retained under lock and key a tabulated record of transactions.

The H. S. Crocker Company showed the Addressograph, the Dick Dupli-
Office Helps cator that reproduced drawings, diagrams, designs and the like without plates; an envelope sealer made by the Acorn Brass Manufacturing Company that had an electric feed and moistened and sealed envelopes very rapidly; and, to serve a vast expansion of correspondence in recent times, perhaps induced by the development of the typewriter, there was a mechanical letter cutter for opening envelopes in wholesale quantities.

There was a clever check-protector shown by the Peerless Check Protecting Company, in which the letters were written in vertical shredding, heavily inked. It could be operated with great facility and speed. The G. W. Todd Company showed its well-known line of protectors. The Automatic Bookkeeping Register Company showed a machine that would record and total the details of all credit, cash, and many supplementary transactions, and could be turned into a perfect listing machine.

Then there was the young but vigorously growing family of computing machines, apparati that would perform computations without error—provided the manipulator performed the manipulations without error. All they lacked was something to insure that. The Felt & Tarrant Company featured the “Comptometer” among its many adding and calculating machines. Exhibition models showed the evolution of such instruments from their first rudimentary appearance with a keyboard in 1884.

The Burroughs Adding Machine Company showed its long line of adding, subtracting and calculating devices, and so did the Dalton Company. The Marchant Calculating Machine Company, Inc., had a quite magical sort of instrument on which you could do all sorts of arithmetic up to and including square root, and you could operate it either by hand or electric motor.

The Angldile Computing Scale Company exhibited scales of very handsome appearance, that enabled the tradesman to compute his profits without other bookkeeping. The "Toledo" scales exhibit was replete with modern devices.

The National Cash Register Company occupied a conspicuous location in the center of the Palace, where it exhibited its famous devices for the "control" of sales and the care of cash, with its recently invented automatic registering attachments, showing the manufacture of a cash register through the assembling of all its parts. What was of far greater social significance was that it was able to display, and considered it worth while displaying, some very extensive and scientific welfare work undertaken for the benefit of its employees. It had an attractive auditorium built in its booth, where you saw moving pictures of these things, and heard them explained by entertaining lectures.

*Welfare
Work*

The United Autograph Register Company showed a register on which sales checks were entered autographically, with duplicate copies, thus protecting the merchant against loss in the sales room.

For swift change-making in public entertainment places, railway stations and the like, the Coin Machine Manufacturing Company exhibited mechanical change makers that would enable you, on pressure of the right keys, to produce in a flash the proper change for any coin or bill offered. This was, we believe, the invention of Potter who developed the turn-stiles used by the Exposition. It supplied about everything necessary to a correct result except the brains to press the right keys.

Among the instruments of precision were those of W. & L. E. Gurley, who put in a complete line of surveyors' and civil engineers' instruments, standard weights and measures, and finely graded thermometers.

The A. Lietz Company showed a long line of nautical and surveying instruments.

There was a notable collection of medical and surgical appliances, too many for full recital here; but we may mention the exhibit of the De Zeng-Standard Company of Camden, N. J., which showed the latest examples of diagnostic equipment, and electrically lighted eye, ear, nose, and throat diagnostic helps. The Bristol Company showed blood pressure gauges and similar refined appliances for the detection of disease.

Not spectacular, but of great scientific significance, was the radium-mesothorium exhibit of Dr. Richard Sthamer of Hamburg, exhibited by Hugo Lieber. The radio-activity of certain mineral substances had attracted the attention of the scientific world during the preceding few years, and by 1915 there had been much research in this field. Application of the knowledge of the phenomenon to the cure of disease was the next step of development, and something of what was being done in this department of applied science was what the booth in part represented. The exhibit covered all stages of the production of radium-mesothorium and other radio-active substances. It contained some of the original specimens produced by Mme. Curie, whose researches, together with those of her husband, had first disclosed this unsuspected manifestation of nature, and by Profs. Marckwald, Kasch, Schmidt, and others. Some of the specimens represented the various experimentations and tests of the investigators; and there were reproductions of the experiments made with the Lieber slides, coatings, and tubes.

*A Radium
Exhibit*

There were radio-tellurium materials. There were wax models showing the physiological and metabolistic effects of the application of radio-active substances on diseased tissues; and a very complete collection of the appliances through which radium had been used for microscopical, biological, pharmacological and medicinal purposes and experimentation. The booth contained a library on the subject. Much was said at the time on the vast values represented by the substances collected here, but there was probably no way of appraising them definitely, and cost in money would be a poor measure of their importance. Physicians and physicists were intensely interested in this exhibit, which was complete, unique, and would have been impossible to duplicate at that time.

The Radium Therapy Corporation of New York exhibited porous *terracotta* rods and tablets for charging radium emanations to produce radio-active waters of uniform strength for the treatment of rheumatism and gout.

The Solvay Process Company of Syracuse had an important exhibit of alkali products. This was one of the largest companies in its field.

The West Disinfecting Company of New York showed disinfectants and insecticides, and a full line of apparatus for their use.

There was an interesting and commercially important showing of toilet specialities by various manufacturing drug houses. An exhibit of especial local and intrinsic interest was the perfumery exhibit of Paul Rieger & Company, of San Francisco, perfumers, who showed a complete and beautifully labeled line of California scents.



A TALKING-MACHINE THEATER



THE NEW YORK BARGE CANAL

CHAPTER XV

BOOKS, MUSIC, AND ART

THE Palace of Liberal Arts held treasure to fascinate the bibliophile. Paul Elder & Company exhibited some beautiful bindings, standard works, and a long list of books on California. Rare volumes, leaflets, cards, and brochures from Elder & Company's shop down town, one of the most artistic in the country, charmed the visitor that delighted in the element of beauty in book production. The booth suggested a Gothic cloister, and produced the perfect bookish atmosphere.

John Howell, importer and merchant of old and rare books, made the largest exhibition of them ever shown at any exposition, and did it in an old book shop that looked as though it had been transplanted bodily from the London of Ben Jonson's day. A large part of this exhibit was borrowed from some of the important private libraries of the State, and in this way was gathered such a collection as no one library in the country possessed, for there was none that had all the items exhibited. To mention but a few of the treasures, there was a first folio Shakespeare, from the collection of Mrs. William H. Crocker; a first edition "Don Quixote" and a first edition "Vicar of Wakefield" from the same collection; there was an illuminated "Book of Hours" of the fifteenth century, from the collection of Mrs. Francis Carolan; a first folio edition of Beaumont and Fletcher, of 1647, and a first edition of Burton's "Anatomy of Melancholy," of 1621, from the library of Charles W. Clark; Mr. Templeton Crocker's first collated edition of Shakespeare's poems, from 1640; some interesting books from the library of Napoleon, and some documents signed by him, from the collection of Mrs. W. L. Duff; a first edition of the "San Francisco Directory," 1850, and a Reed's City Dispatch postage stamp, very rare, loaned by Miss Alice Hager.

*Some Rare
Volumes*

You could not have found in the British Museum a Ptolemy's Geography with the first map of America in it, but you could see it in the Howell exhibit; loaned by Dr. J. W. Robertson. With it was a first edition Nuremburg "Chronicle" of 1493, and a Caxton's "Doctrine of Sapyence," of 1489, one of the first books printed in England. Even older were some Buddhist

sermons loaned by Mrs. Anson S. Blake. "Jean Grolier—His Life and His Library," came from the collection of Morgan Gunst. Judge Harry A. Melvin contributed an original manuscript of Abraham Lincoln's lecture on "Discoveries and Inventions." There were many beautiful illuminated manuscripts that ante-dated the art of printing in Europe. The books fit the shop; the shop was just the sort in which such books had been sold when they were part of the ordinary "book trade" of London.

Next door was the open booth of the San Francisco "Chronicle," where there was an interesting demonstration of the modern processes of printing a newspaper, including original drawings from the art department, and exemplifications of the manner in which they are made ready for reproduction. Here were half tone plates, matrices, cast cylinder plates, and plates for color printing. You could see a copy of the "Dramatic Chronicle," of 1867, from which the San Francisco Chronicle of to-day sprang. *Early Journalism* It carried an advertisement of the Metropolitan Theater announcing the "Japanese Jongleurs," accompanied by musical and dancing girls—indicating the ancient attraction of the girl-show for the tired business man. Maguire's Opera House and the Martinelli Family were advertised.

A facsimile of a copy of the "Dramatic Chronicle," as published in 1867 was distributed, from the advertisements in which one could learn the amusement resources of the San Francisco of the past—could learn that at Hayes Valley, for example, "the fashionable and popular place of resort," a grand ball would be given every Sunday, and here you could see the Lima Sheep, the Alpaca, the Vicuna and the American Eagle. Dan Setchell was playing "The Babes in the Woods" at Maguire's, while Bianchi's Great Italian Opera Troupe was holding forth at the Metropolitan in Montgomery Street, in a superb performance of "Lucia Di Lammermoor." At the same time the Academy of Music in Pine Street announced Maguire's Italian Opera Troupe in "Rigoletto." A "powerful chorus" would appear. San Francisco always was fond of opera. Will & Finck were dealing in cutlery at 613 Jackson Street, and Bradley & Rulofson had a photograph gallery at the corner of Sacramento and Montgomery.

One of the great exhibits in the Department of Liberal Arts was in the Palace of Machinery. It would have been in the Palace of Liberal Arts if it had not been of a noise-producing breed of machine, and if it had not required power. This was the largest color press in the world; *A Modern Color Press* said to be the greatest printing press of modern times; invented, as to many of its vital processes and performances, by George E. Pancoast, for several years mechanical superintendent of the Hearst

publications. It was built by R. Hoe & Co., of New York City, shipped, through the Panama Canal, the first of all presses to travel that way, and exhibited in the Department of Liberal Arts by the San Francisco "Examiner" and its builders.

It was an enormous thing, where it throbbed and rumbled in the north-east corner of the Machinery Palace; nine feet wide and 48 feet long, with two man-high stories, demarked by a staging like that in a boiler room, and these stories in turn divided by rectangular sections of the frame, so that it looked like a cut-open model of a boarding house inhabited by wheels and equipped with rollers for endless roller-towels. Through the wheels and over the spindles ran mile after mile of paper which emerged covered with printing in black and in colors—colored Sunday supplements, which were perhaps the distinguishing physical feature of American journalism in the year of which we are writing, and had been for a few years preceding.

In fact, this was the largest color press in the world in 1915, and so, in the interest of the history of printing, some more particular record of it may well be entered here.

The designing of it began September 5, 1914, and the press was completed on January 5, 1915. It arrived at the Exposition one month later and was all ready for work in a week. As erected, there were 130 tons of it.

If run at full capacity and top speed on work in one color, this press could print 1,728,000 newspaper pages an hour, folded. It did not run so at the Exposition, for instead of being equipped with 96 plates it had but 74, and these in different colors: 12 yellow, 12 red, 8 blue, two orange and 40 black. It used four rolls of paper at a time, one of them 66 inches wide, which was practically a double roll, and which was split by the "slitter," so that half made the comic section and half the outer pages of the magazine section. And its normal consumption of paper, for the colored sections of a Sunday issue, came to 110 rolls, 28 of which were 66 inches wide, and each of which was over $3\frac{1}{2}$ miles long. Figure out the rest of it yourself, but this much is already figured: An edition of the Sunday "Examiner," of 80 pages, 250,000 copies, required more than 3,400 miles of paper a page wide, or enough to reach across the continent and float quite a way out to sea. From the point where it entered the press to the point of emergence was a distance, on the "web," of 104 feet, and it issued, printed, at the rate of 340 feet a minute as run during the Exposition, and could have beaten that badly, under other conditions.

*A River
of Papers*

The Universal Pancoast Unit Press could handle eight colors in one run. Two days a week were devoted to press "make-ready," an interesting and

expert process involving great care. The other five days, the public could watch the long stream of white paper flow in, circulate through the mechanism, and come out ready for breakfast. This press was one of the most fascinating exhibits in the whole Machinery Palace, and was almost always surrounded by a solid bank of spectators. Many of the developments it embodied were suggested or invented by San Franciscans connected with the press room of the "Examiner."

Another Liberal Arts Exhibit was that of the American Automatic Press Company, which showed the latest improved Hoag Automatic Printing Press. This was an innovation, which would feed, print, deliver and automatically fold in one operation. It was a machine capable of much economy of labor. The Lisenby Manufacturing Company exhibited the *Three Colors at Once* Multicolor Press, which printed three different colors as the public commonly supposes they are printed: at one time, or in one run. Heretofore the public has been wrong about it, for ordinary color work requires a different impression for each color, and two or more to make one blended tint.

The Mergenthaler Linotype Company showed the development of Mergenthaler's revolutionary invention. The George Russell Reed Company formed a collective exhibit of all kinds of printing machinery—binders, typesetters, rollers, and printers' requisites.

This printing machinery and material was in the Palace of Machinery, although classified and entered in the Liberal Arts Department.

To return to the Palace of Liberal Arts: all the processes of making and binding a book, from the time it leaves the anxious author's hands until it is ready for sale, were illustrated by the Methodist Book Concern, which also exhibited periodicals, charts, Sunday school publications, new editions, and fine bindings.

The Encyclopedia Britannica exhibited new and old examples of this gigantic work, then in its eleventh edition. There were samples of every edition thus far issued. Bindings, stampings, and paper products were illustrated, and both the Encyclopedia and the Century Dictionary were shown on India paper.

The G. & C. Merriam exhibit showed editions of "Webster's Dictionary," from 1806 to 1915, with pictorial representation of its making, from the stock room to the dealer's shelf. It led you to the conclusion that even dictionaries must grow or die, for this fine work had been kept abreast of progress by many rigorous revisions.

A noted scholar once remarked that the great improvement the Americans had made in dictionaries was their illustration; the pictures were the



ENTERING THE GRAND COURT

largest imaginable aid to definition, and exhibited the subject itself. Funk & Wagnalls made an exceptionally complete exhibit of the processes of reproducing the pictures in their "Standard Dictionary." *Dictionary Pictures* This firm exemplified also the making of the "Standard" from the manuscript, through the editorial rooms to the finished book.

Collier & Son exhibited the Harvard Classics, Dr. Eliot's five foot shelf of books containing the essentials of modern education, and a collection of cover designs from Collier's Weekly.

Lithography was well illustrated in the exhibit of the Schmidt Lithograph Company. The number of its uses in bill-heads, letter-heads, circulars, cartons, folders, booklets, calendars, and all kinds of decorative and illustrative work on paper was bewildering.

The "Oakland Tribune" Publishing Company had a fine exhibit of newspapers and binding work. The "Sunset Magazine" showed, through prints and illustrations, much of the modern life of the Pacific Slope.

The Grolier Society exhibited the "Book of Knowledge," the children's encyclopedia, a noble effort to answer the inquiries of the childish mind.

Photography in its modern phases, which have put it within the power of nearly every one to practice the art wherever and whenever he will, and can get his friends to stand still long enough, was strikingly demonstrated as one of the pervasive developments of modern life. Every variety of Kodak ever conceived in the dreams of the wildest Kodaker was on exhibition, and in a booth so beautiful that it looked like some Renaissance temple done in travertine; one of the handsomest things in any of the exhibit palaces. *Photography for All* Latest developments in color photography were exemplified here. The line of Kodachrome pictures, in color plates illuminated from behind, was very beautiful.

The Ansco Company showed some of the most attractive possibilities of the camera, in a wall exhibit of American beauties. It exhibited tripods, fine lenses, shutters, and all sorts of photographic supplies.

In a rustic sort of booth, Kathryn Hopkins exhibited some most artistic and effective character portraiture.

E. N. Sewell, showed a large collection of landscape photographs, most of which were of the beautiful scenes to be found in and about San Francisco. W. E. Worden's collection of landscape photographs in the same neighborhood was in every way worthy of note. The Sprague-Hathaway Studios of Boston had a very beautiful exhibit of portraiture and of sepia enlargements, which are a highly developed speciality of this firm. Norman T. A. Munder & Company exhibited paintings, statuary, frescoes, etchings, and photographs of nature and of architecture. There were many attractive subjects

of decorative and educational value by old and modern masters, and various examples of typogravure.

A whole collection of pictorial photography by amateurs and professionals was assembled by the Department of Liberal Arts, and it made a beautiful gallery of pictures. Among those that exhibited were Henrietta E. Kibbe, of Portland, Laura Adams Armer of Berkeley, Maud Jay Wilson of Palo Alto, Bessie L. Meiser of Richmond, Indiana, Edward H. Weston of Tropico, California, Bianca Conti of San Francisco, Miss Imogen Cunningham of Seattle, Francis Brugiere of San Francisco, Anne Brigman of San Francisco, W. E. Dassonville of San Francisco, George H. Seeley of Stockbridge, Massachusetts, Dwight A. Davis of Worcester, Massachusetts, Jeanne E. Bennett of Baltimore, Charles H. Barnard, Clarence H. White, Dr. Amasa Day Chaffee, Karl Struss, Dr. D. J. Ruzika, William G. Shields, and Arthur D. Chapman of New York, Angelo Romano of Philadelphia, H. A. Latimer of Boston.

*Camera
Artists*

Even moving pictures had been brought within the field of the amateur, and the Simplex Photo Products Company showed a small moving-picture camera with materials, projectors, printing, and developing outfits, enlarging lamps and apparatus for taking at night. At \$35, the camera was within reach of almost anyone that could go in for photography at all. The Precision Machine Company showed the latest inventions in moving picture projecting apparatus.

*Movies
at Home*

A great many talking machine companies exhibited in this Palace. Close to the big telescope in the center of the building the Victor Talking Machine Company had a beautiful auditorium, in which people could sit and hear the most exquisite music from handsome Victrolas on the stage. This company also engaged Mlle. Le Gai with her troupe to give classic dances in the Court of Palms at stated times to the accompaniment of the Victrola.

The Sonora Phonograph company showed talking machines in all styles of cabinet, and with five different types of motor. A special feature was its multi-playing jewel needle, good for three months without removing, it was claimed.

An exhibition of much interest to musicians was that of the Cheney Talking Machine Company, which showed an attachment for reproducing the perfect singing scale. Another was the exhibit of the Columbia Graphophone Company, which in addition to showing its fine musical reproducers, demonstrated its methods for teaching languages. The Edison Talking Machine was exhibited by the Eilers Music House, and showed the use of the diamond-tipped needle. The corrugations that reproduced the music were

in the bottom instead of on the sides of the grooves, and the needle was mechanically fed toward the center as the record revolved instead of being drawn toward it by the side of the groove itself. In the Eilers auditorium, the organ accompanied solo records and gave delightful entertainment to hundreds of people daily. How record rolls for automatic pianos can be made was demonstrated at the Eilers exhibit booth by the Master-roll Perforating Machine. People were always crowded about to see how the trick was done. Here, too, you could see a harpsichord supposed to have been played by Liszt.

*Making
Piano Rolls*

The exhibiting firm represented the American Piano Company, Auto-piano Company, Chickering & Sons, the W. W. Kimball Company, the Peerless Piano Player Company, the Marshall & Wendell Piano Company, and the Auto-pneumatic Action Company.

People were about ready for a new sensation in popular music at the time of the Exposition, and the sweet voices of the Hawaiians raised in those haunting minor melodies you heard at the Hawaiian Building and the Palace of Horticulture were enough to start another musical vogue. To this the exhibit of Jonah Kumalae of Honolulu ministered, for he showed Hawaiian ukuleles and taro-patch fiddles. In addition he had card trays, napkins rings, small calabashes and jewel boxes made from Koa wood, the mahogany of the islands.

*Hawaiian
Pianos*

Galezzi & Sons had on exhibition a full line of accordions and of stringed instruments, and a magical sort of device in the shape of a transposing organ, on which it was possible, by the setting of a dial, to play a melody in one key and have the organ produce it in another.

E. H. Cary & Sons showed a line of drums and musical accessories, and a very fine one it was. This was a California concern.

Among the musical instruments entered in this Department was the great 40,000-dollar organ in Festival Hall, which was transferred after the close of the Exposition to the Exposition Auditorium in the Civic Center. This was an exhibit in Liberal Arts, obtained by the Liberal Arts Department and was one of the grandest and finest of the world's great organs. It was made by the Austin Organ Company of Hartford, Conn., and is described elsewhere in this history.

Byron Mauzy, San Francisco piano manufacturer, specialized in piano parts, making what was to musicians a most interesting demonstration of piano production.

When the world was flat and nobody knew much geography, it was easy to map, but as soon as it was discovered to be "round, like an orange," the cartographers were in trouble. When we contemplate the desperate shifts

to which they have resorted, from Mercator down, we are forced to conclude that the old thing was not made to be mapped on a flat surface. Mercator did it—but he had to tell some whoppers to make it fit. He spread the meridians apart, top and bottom, and then because one falsification leads to another he had to do the same thing to the parallels of latitude, and so stretched Greenland out in both directions until it looks five times the size of India, whereas it is about of the same area; and our children save themselves from the deception only by paying no attention to what they are taught. True, teacher might explain it to them, but in most cases she doesn't understand it herself, so she keeps still.

A great many "projections" have been tried, to get around the illusions of Mercator's, but they all embody illusions of their own. A recent attempt at truthful representation of the world, on a plane surface, was that of B. J. S. Cahill, F.R.G.S., one of San Francisco's well known architects, who thought if it was "round like an orange" he would just split it open like one: and he did, into four parts, carrying the splits pretty well through the seas, or through land areas that didn't matter, and in this way producing what he termed the Butterfly Map. This was exhibited in the Department of Liberal Arts, and attracted much attention. People asked what it had to be done that way for, and what was the matter with the old map, and for the first time became skeptical of their early learning, which is a great educational gain. The Butterfly Map preserved the convergence of all the meridians that counted, by making wide separations between those that did not, and thus it presented both the relative sizes and the shapes of the tracts of low-grade real estate lying around the poles. In this way it satisfied that mad desire for precision and truth which has done so much for the comfort and service of man, and made the modern world such a dry place in which to live.

Mr. Cahill's effort had strong endorsements from eminent men of letters and of science. Ernst Haeckel said: "Your excellent Butterfly Map shows the true relations of the continents much better than the older attempts of cartographers." Ambrose Bierce declared: "Cahill's Projection is undoubtedly the right one." And said Dr. Max Groll of Berlin: "The development is exceedingly original—the map represents the surface of the earth with but little distortion." The indorsements were exhibited with their subject, and altogether made a display that was mentally stimulating to a great many people.

In the group of architectural design, a large plaster model of the Woolworth building in New York was much admired as an example of the beauty it is possible to produce in the construction of that most utilitarian thing, the



FILIPINO CRAFTSMEN



EXHIBIT OF THE GOVERNMENT BUREAU OF STANDARDS

modern office building. The Woolworth has the majesty of old cathedrals, and, externally at least, Cass Gilbert's masterpiece is Gothic; an adaptation that contributes importantly to the art of modern building. It was, in 1915, the tallest building in the world, rising 46 stories, 750 feet above the curb.

A conspicuous exhibit in the group of Models, Plans, and Designs for Public Works was the topographical map and model entered by the State of New York, showing the New York Barge Canal, a fine showing of water transportation facilities from Lake Erie to the Hudson.

Transfusion of blood, transplanting of tissue, repair of severed nerves, had become commonplaces of surgery in 1915, but as yet no surgeon could make a new limb grow in place of a lost one. Artificial limbs, however, had reached a remarkable stage of development, which was demonstrated in the booth of the Carnes Artificial Limb Company. This firm exhibited arms and hands made of willow fiber, actuated in a remarkable manner by rawhide cords attached to supports stretched across the back, to furnish tension. Visitors were astonished at the way these devices could be made to work.

Perhaps when we get beyond our interest in all the other Liberal Arts we shall still be interested in the production of artificial teeth. Those made until very recent times have advertised themselves all too loudly. Though it was a matter of interest mainly to their owners and operators, they have screamed their artificiality to an inquisitive world. It was not so much that they clacked in use, but that they asserted an unnatural regularity and a uniformity of pearly beauty that few people in this country of tooth brushes and good dentists display before the age of fifty years. It had long been felt by the judicious that this was all wrong, and if artificial teeth could be made with more carelessness and abandon, and then set a bit staggered in their coral rubber foundations, they would deceive more people, and fewer children would demand to be shown them in public. By the time of the Exposition much had been done in this field of moral uplift, and some of the best results were exhibited by the Columbus Dental Manufacturing Company and the Dentists' Supply Company of New York. The samples were very realistic, and encouraged the hope that it would not be long before rubberset teeth would fool everybody but their owners, except when actually separated from them.

CHAPTER XVI

THE GOVERNMENT IN LIBERAL ARTS

IN the Palace of Liberal Arts you could bend a bar of solid steel five inches thick and four feet long with your fingers, and see how much you had bent it; and you did not have to be a giant, nor possess any magic spectacles other than those supplied by the United States Bureau of Standards. Of course, you couldn't bend it much, nor permanently, and if any one needed a five-inch bar of steel bent there were better ways of doing it. But comparatively few people are aware that any such little job can be done by hand at all.

It was in a small dark room of the United States Section of the Palace. A mirror was fixed to the center of the bar, and a glass was attached to a steel girder above, which rested upon supports at the ends of the bar. The reflecting surfaces of glass and mirror were a 32nd of an inch apart. Light of a single color (yellow rays from an electrical discharge through helium), partly reflected from the upper glass, and partly from the mirror, "interfered," the waves colliding and neutralizing one another at some distances and coinciding at others, thus forming concentric light and dark fringes, "Newton's rings," when seen through an eye-piece.

*Juggling
Light*

Where the distance between the reflecting surfaces was an odd number of half-wave lengths there was a dark band, and where it was an even number there was a bright one. So, a change of half a wave-length would turn the dark bands light and the light bands dark. The wave-length of the yellow light being about 23 millionths of an inch, it required a change of but half 23 millionths, or $11\frac{1}{2}$ millionths, of an inch in the distance between the reflecting surfaces, or between the center of the bar and the girder above it, to produce beautiful coalescences, and transformations of the light rings into dark and the dark into light; so the arrangement formed a most sensitive microscopic detector of the deflection of the bar. You could see the formation of the new circles as you lifted with your fingers from below, and the reappearance of the old ones as you released the pressure, like ripples from a stone flung into a pool.

There were other wonders in the same booth. By a similar device you

were enabled to perceive how much the warmth of your finger tips had caused the surface of a pane of glass to expand into lumps just where the fingers had been applied. Here, too, was a thermopile so sensitive it would measure the radiation from the faintest visible stars. *Star
Detectors*

The McMichael device for measuring the viscosity of liquids was exhibited in this section, and aroused much comment on the part of engineers and other practical scientists.

Probably the exhibit of this Bureau will be remembered by most visitors as the place where they had the false weights and measures, confiscated by the United States Government and the State governments in various parts of the country. This section of the exhibit was very popular, for it touched that part of the Bureau's activity which appeals to the pocket of the average citizen. Under the direction of Dr. S. W. Stratton, who was a member of the Government Exhibit Board of the Exposition, the Bureau of Standards has become one of the show places of Washington, and a fine photograph at the exhibit showed the Bureau's buildings as they stood surrounded by beautiful grounds and overlooking the Capitol. The exhibit at San Francisco contained models of the standard kilogram and meter, and standards of candle power, temperature, electricity, and other things. To keep all the original standards correct, as the material of them changes with the years, requires the services of hundreds of scientists. A big temperature chart, an exhibition which gave the temperatures of many things, from boiling helium, 450 degrees below zero, to that of the stars, say 60,000 degrees above, took years of investigation and research to compile.

Here, too, were twisted and distorted beams and columns of concrete and steel, tested to failure in a 10,000,000-pound machine, so that engineers might know just how much reliance could be placed on similar beams and columns when used in bridge or other building. There were railroad rails that had failed in service and caused loss of life. In fact, the technical requirements of modern construction were extremely well illustrated. Scientists and engineers haunted this booth from the first, and with laymen it increased its interest as time went on, and ultimately became very popular. At a rough guess we should say there was enough material in it to repay two months' study and suggest twenty years' more. *Museum
of Physics*

The whole United States Section in the Palace of Liberal Arts was most imposing and important. It occupied 55,000 square feet, nearly a quarter of the building, and with its handsome installation, in open areas behind balustrades bearing bright banners on fasces, surmounted by the eagle, it

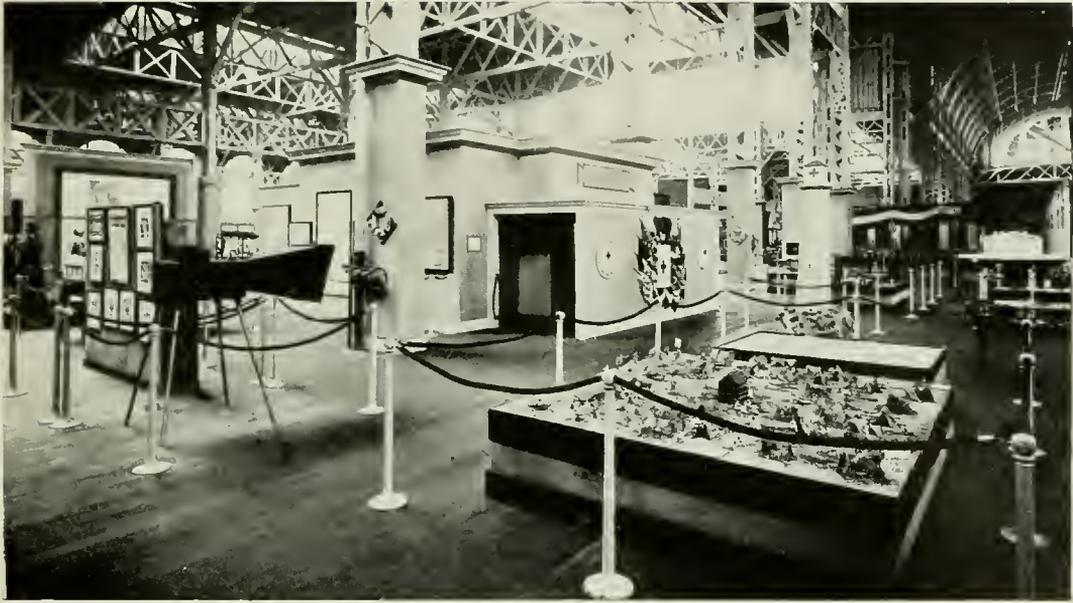
attracted general attention, and held it. The exhibits were strikingly impressive in range and scope, and of fascinating interest, but in large part too technical for full description here. We can, however, refer (E. and O. E.), to a few items as illustrations of the stage of certain arts in the year 1915.

One of the most attractive features was the exhibit of the Panama Canal. There was a large topographical model of the Zone, on a horizontal scale of 1 to 5,000 and a vertical of 1 to 2,500, which depicted all main features; and there were detail models for those that escaped the larger one. Models of dredges, rock breakers, unloaders, track shifters and locomotives were shown. Detail drawings of many parts of the work were available for those especially interested. A sanitary exhibit included a model of a Zone hospital, and the appliances for exterminating mosquitoes, with pathological specimens. The large model cost \$15,000 to construct. A detail model of Gaillard Cut cost \$4,000. There was a complete set of Canal Records, and of the annual reports of the Commission. Physicians found great interest in the sanitary exhibit.

The Library of Congress sent out some matter of interest to dwellers on this Coast, and especially in California. There were some ancient maps of America, displayed on screens. One was Arnolfo di Arnolfini's, done in 1562, and very fair as a representation of the general features of the continent. Another was a Mercator map of 1595. Then there was a map of California by J. Tattonus, on which Point Reyes appears in Lower California, and which contains other information equally valuable. There was a *Wild Cartography* map of the world, made by N. Geilekerck in 1618. Geilekerck got the Mediterranean Sea in about the right place, as they had had that a long time, but thought Mexico was in Canada. He had a couple of railroads running across the world, which he probably meant for the equator and the ecliptic.

Seller's map of 1626 showed California as a fine, large island, starting with Cape Blanco, about opposite the Island of Vancouver, and extending to Cape San Lucas. San Francisco he obligingly took off the island of California, and located on the west coast of Newe Granada, where Utah now is. He omitted the Great Lakes. But what are a few little things like the Great Lakes to a mapologist like Seller? San Francisco was lucky to get on the map at all, at that early date.

In 1663, N. Visscher shifted San Francisco back to California Island, and put the name "Draco" under it. He accomplished this change without any great disturbance of realty values, because the name San Francisco at that time merely designated what we now know as the Gulf of the Farallones.



THE AMERICAN RED CROSS EXHIBIT



A RED CROSS RELIEF CAMP

But California herself was drifting dangerously about, in sore need of better discovery and anchorage. In 1664, Du Val tried to get San Francisco ashore again by bending back the continent, and almost broke it, but was unsuccessful. In 1713, Gueudeville showed Capes Blanco and Mendocino and the Port of Sir Francis Drake, but the wanderings of San Francisco he settled by pitching it off the Island of California altogether. In 1720, according to Delisle, California had grown fast to the mainland; and he had Hudson's Bay and the Great Lakes and a few other little decorations of that sort, including Capes Blanco, Mendocino, and San Lucas, and a small stub end of the Santa Fé railway, or something that looked just like it; but San Francisco had been mislaid again.

It was discouraging. And, correspondingly, it was a relief to turn to the "Facsimile of the Articles of Association of the First Continental Congress, 1774, October 20, with Signatures of the Members." Here was something definite. Their penmanship was painful, but at least they didn't try to make maps. There were some proceedings of the *Historic Documents* Annapolis Convention of 1786, which called the Constitutional Convention at Philadelphia in 1787, and thenceforth everything is all right historically, and well cared for.

The exhibit of the Library of Congress was designed to instruct the public in the Library's resources, scope, and coöperation with other libraries. The inter-library loan feature, whereby books could be obtained from the Library of Congress through the medium of a local library, was the link that brought the national library in touch with the people, and this feature was explained by the attendant and outlined in a publication that could be read at the booth.

The State Department exhibited important State papers. The first draft of the Declaration of Independence appeared in the handwriting of Thomas Jefferson, with corrections thought to have been made by John Adams and Benjamin Franklin.

What bright little boy in school ever stops to think where the originals of those great instruments of liberty, the Declaration and the Constitution, may be? Not one. The printed catalogue of the State Department exhibit told. The Declaration, engrossed on parchment and signed by all members of Congress present on August 2, 1776, was, in 1894, after having suffered some deterioration, hermetically sealed between sheets of glass, and put in a steel cabinet, with the original signed copy of the Constitution, and neither is shown except on direct order of the Secretary of State.

Some important treaties were exhibited. There were exhibits of designs for the Great Seal of the United States. Forms of diplomatic correspondence were illustrated; and passports and commissions.

The vast compilations of the Bureau of the Census were exemplified by exhibits of those diabolically clever contrivances whereby 90,000,000 to 100,000,000 personal-fact cards are almost literally ground into statistical tables by machinery.

The original material turned in by United States marshals taking the census for the first time in 1790, was on exhibition; queer old books of various sizes, without uniformity or thought of standardization for wholesale handling. Only five points of information were then sought: the number of white males over 16, the number under 16, the number of females, of all other free persons, and of slaves. Those were happy days.

To-day about 30 questions are put. Perforated cards show the answers, and the machine makes electrical contacts through the perforations, and thus registers the various items of information. A card-punching machine will handle 3,000 cards in seven hours. A sorting machine actuated by electricity and compressed air will sort cards for any desired item of information, and give totals—age, race, or any other kind of fact embraced in the inquiries of the Census Bureau.

*Magical
Machines* These uncanny things were shown in operation, and one of the most uncanny powers displayed was the ability of one of them to reject inconsistencies that might have crept into the work of the enumerators. Let us say for example, that a person was listed as two years old and the father of a family. Such statements are often turned in, and it is not a violent assumption that they are not correct. The skeptical machine, busy as it was tabulating some millions of orderly and consistent facts at the rate of 150,000 cards a day, would detect that inconsistency and spew the statement out of its metal mouth. Mr. Burns couldn't beat it. The devices were the property of the Census Bureau, and were designed and built by Census Bureau employees. In the style exhibited, they first came into use for the compilation of vital and population statistics in the census of 1910.

Of much interest to navigators, and to surveyors and engineers, was the exhibit of the United States Coast and Geodetic Survey. Here were a model and picture of the drag that finds sunken rocks in channels. It consisted of a suspended wire that would travel in a practically horizontal position at any desired depth, like a mine sweep, and snare the offending obstacle. It had been in use about three years. There was a rack of publications of interest to navigators, with tide tables and route information. There was a large collection of harbor charts. Refined instruments to assist navigation were shown: the magnetometer, for example, for measuring the horizontal intensity of the earth's magnetism and determining the direction of that shifty institution, the magnetic meridian.

Then, there was the Precise Level. With this instrument 148 miles of double-leveled lines had been run in a month with a maximum discrepancy of less than $\frac{1}{5}$ of an inch between two measurements of any section a mile long. There was an electric tide indicator, connected with a float and sending-set at the tide house on the Government wharf. The collection of surveying and nautical instruments and apparatus was very large.

The Department of Commerce "staged" a small commercial museum—just a sample of what might be done to instruct the American manufacturer and merchant in the kinds of product needed and bought abroad. There were glass cases full of the sort of stuff that is sold in the bazaars of India, articles formerly purchased in certain parts of Europe, but which might be made here. The Bureau of Foreign and Domestic Commerce exhibited a map of the world showing the locations of American representatives abroad, including Ambassadors, Consuls and Consular Agents of the Department of State, and Commercial Attachés and Traveling Commercial Agents of the Department of Commerce, charged with the task of gathering and forwarding to the Department all the commercial information they can acquire.

*Path of
Commerce*

The Government Printing Office, the largest printing office in the world, in addition to showing photographs and samples of printing and binding, issued through the Superintendent of Documents a booklet on the Government publications, describing how they have been made available at nominal prices, and the methods of procuring them through the mails. The United States Government, more than that of any other country, engages in presenting the results of scientific investigation in popular printed form for the instruction and use of the people. The price lists, however, are the only publications that are supplied free. The volume of work in the office of the Superintendent of Documents was shown statistically as follows:

Average daily letter mail, about	1,000
Average monthly sale of documents, over	200,000
Average monthly shipments of documents, including shipments of departments, about	3,500,000
Increase of business of 1914 over that of 1913 was about	33 per cent
<i>Totals for year:</i>	
Letters received and handled, about	300,000
Documents sold, over	2,000,000
Documents handled, including distribution for departments over	42,000,000

The exhibit of the United States Public Health Service in the Palace of Liberal Arts made one feel that the Government of Uncle Sam was still facing the facts about disease and doing its best to save us from ignorance and neglect. Everything in the exhibit was carefully labeled, but it was found that a large percentage of visitors to an exposition do not take the trouble to read labels, or do not understand them, so demonstrators were in attendance to indicate just what was meant.

The most realistic models imaginable showed bubonic rats at work burrowing through a dwelling and feasting in its neglected, open garbage can. Other models showed how to rat-proof a house by running strips of galvanized sheet iron under partition walls, extending wire netting between double floors, concreting the basement, covering the garbage can, and in other relatively inexpensive ways insulating the inhabitants from their dangerous animal neighbors. These were not pleasant sights, but they were a great deal pleasanter than an epidemic of bubonic plague.

Much use had been made of models in wax and glass, and some of them were marvelous in their power to depict healthy and diseased human tissues and the insects and bacteria that produce disease. The progress of vaccination was shown in this way—the cleanliness of modern methods of producing vaccine, and its safety in use. And close by were wax models of human

*Suppressing
Small-Pox* hands and feet and faces ravaged by the most loathsome disease we know anything about except leprosy and syphilis—the small-pox. The contrast was impressive. No sensible person would hesitate in his choice. A chart that spoke as loudly as any model, showed the deaths from small-pox per million in countries that had compulsory vaccination, compared with those that did not. Those that enjoyed compulsory vaccination were Sweden, with one death from small-pox per million; Ireland, with one per million; Scotland, with three per million; Germany, with 3.5 per million, and England with 16 per million: the cases probably being due to evasions of the law. In those countries where vaccination was merely voluntary the deaths per million from small-pox were represented to be: in Switzerland, 18.5 per million; Belgium, 161; Russia, 231; Austria, 510; Italy, 536; Spain, 963.

In another model, an allegorical dragon representing four preventable diseases was taking money out of the pocket of an allegorical Uncle Sam at these rates per annum: Tuberculosis, \$2,272,488,988; Typhoid Fever, \$325,534,355; Syphilis, \$185,404,474; Malaria, \$178,965,208; Total, \$2,982,393,025 a year for what might, by intelligent coöperation of all the people and their local governments, be prevented.

Enlarged models of the various insect transmitters of disease, such as the



ARGENTINA'S EXHIBIT IN LIBERAL ARTS



CHINESE SACRED MUSICAL INSTRUMENTS

fly, mosquito, flea, tick, and louse attracted much attention, and no doubt gave thousands of people a clearer conception of the rôle played by these small enemies in spreading incapacity and death. The blown-glass models of microscopic organisms were of especial interest to physicians and biologists, particularly the "planktons." They were very beautiful, sinister though their subjects were.

There were other models, too, and many of them. The old well out by the barn, that supplied the neighborhood with its typhoid fever, was faithfully portrayed, and charts showed how, the disease once contracted, the most respectable habits of personal proximity helped to distribute it. The agency of the house fly in this work was exposed. Statistical matter represented the economic effects, and showed also that where there were good, preventive measures against typhoid, other diseases too were far less prevalent. Contact infection in spreading typhoid was illustrated by a model of a boarding house, in which the husband, who had contracted the disease, was nursed by his wife, who went from the sick room to the dining room and kitchen to serve the boarders. A descriptive label showed how infection of several of the boarders could have been avoided by sending the patient to a hospital, which is organized to handle that sort of thing.

*Typhoid
Distributors*

So, by models and charts, and transparencies and labels and mounted specimens, the lesson was taught, in relation to the contagious whose cause and means of spread are understood. There was a model of a house fly, 32 times natural size, and a large number of small vials were prepared in which were fastened fly eggs, larvæ, pupæ, and adult flies. These vials were distributed to health officers and physicians as souvenirs, and formed a vest-pocket exhibit of the life cycle of the fly.

There was an exhibit of a portable hypochlorite plant for the treatment of contaminated water supplies. It was designed by the Minnesota State Board of Health, for immediate shipment to localities suffering from water-borne epidemics, and was capable of treating supplies of 1,000,000 gallons a day. Proper sewage disposal was well expounded. The malarial mosquito was exposed in all his hideous aspects and perilous habits; and methods of destroying him were depicted.

Let us pass to more beautiful (but not more necessary), work. The Reclamation Service of the Government exhibited a diorama of an irrigated plain—the Shoshone irrigation project in Park and Bighorn counties, Wyoming. The dam was 328 feet high, and there were in the picture 280 miles of canals, irrigating 42,000 acres of a valley that was 4,500 feet above sea level. Transparencies gave scores of views of reclamation projects and irrigation scenes.

The main exhibit of the War Department was in the Palace of Machinery, but the Palace of Liberal Arts housed a very fine supplement to it. There was a pavilion whose exterior was composed to represent the architecture of the United States Military Academy at West Point, and which represented, within, the accommodations for cadets—the plain, little Spartan rooms in which the scientific and efficient United States Army officer is developed from the raw material of the congressional districts. Pictures of great American military figures in the cadet stage hung about the walls of the entresol—such men as Grant and Meade—and with them one James A. McNeill Whistler.

Photographs depicted the growth of recruits into soldiers, and a painting and some figures showed what manner of person the American enlisted man was in 1915, compositely: 30.9 years of age, weighing 147.09 pounds, standing 67.4 inches high, measuring 34.07 inches about the chest at expiration of the breath. Other photographs showed the work of the Medical and Hospital Department of the Army—the eradication of hookworm in Porto Rico, inoculation against typhoid fever, samples of typhoid vaccine, and the various kinds of rice that were studied in connection with the labors of stamping out *beriberi* in the Philippines. Army rations were illustrated.

All about were cut-open models of big guns and their charges; from old smooth-bores throwing huge, round, and solid shot, to modern rifles with their shells lying snugly in the rifling. These were part of the exhibit of the Navy Department, which included a model of the Annapolis Naval Academy, and models of ships of great historic interest: the frigates “Constitution,” “North Carolina,” and “St. Lawrence,” and of the “Maine,” sunk in Havana harbor in 1898. And there was a large oil painting of the “Oregon” as she steamed into the Santiago fight. Another souvenir of the Spanish War was the bow ornament of the “Olympia,” Admiral Dewey’s flagship at Manila Bay. Then there was the figurehead of the “Constitution”; with other historic relics. Some six-pounder rifles stood about, and there were some very interesting specimens of knotting and splicing and weaving by midshipmen of the Navy and apprentices of the training stations.

In the presence of this war material, man’s aspiration to be compassionate and helpful shone with the greater brilliance in the exhibit of the American Red Cross, under Government supervision since the act of January 5, 1905; the expression of a hope; the demonstration that in spite of appearances men really are, in part, somewhat better than the brutes: some men. The original purpose of the Red Cross societies under the Geneva Convention was to supplement the medical

*Work of
the
Red Cross*

services of armies in war time. But war is not the only disaster that befalls the featherless bipeds trying to maintain a foothold on the capricious surface of the earth, and many of the Red Cross societies extended their functions to include relief operations in time of peace.

Some of the items of the exhibit were of philosophical importance as pictures of what nature sometimes does to helpless men, women, and children. Here was a wonderful diorama of Messina, after the Italian earthquake of 1908, with one of two villages of 2,400 houses built by the American Red Cross to shelter those made homeless by the disaster. The other village was erected on the mainland of Calabria. Toward this work of relief Congress appropriated \$800,000 and the American public contributed over a million.

Since 1905 the American people have contributed through their National Red Cross about \$12,000,000 for the relief of suffering, and it took maps of all the continents to show where this relief had been rendered. There was a picture of a flood refugee camp in China, with its hordes of people saved from starvation. The men were given work repairing the levees, and were paid by the Red Cross in grain. A map of the great flood and famine district along the Huai River in North Kiangsu and North Anhui showed the plan of proposed work to prevent a recurrence of these disasters.

You did not have to go to China for floods. There was a reproduction of the havoc wrought in Chillicothe, Ohio, by the flood of 1913, and some demonstrations of relief work there. There was also a reproduction of Refugee Camp No. 5, in Golden Gate Park, San Francisco, after the earthquake and fire of 1906, showing the arrangement and the methods of living.

There was a model of the St. Paul coal mine at Cherry, Ill., illustrating the mine fire of November, 1909, when 256 men, half the male population of the town, lost their lives. The model showed how it happened—a load of hay for the mules coming into contact with a torch, which was being used because of a temporary stoppage in the supply of electric current. Relief work was done for the widows and orphans of the men that lost their lives, and pensions are still being paid in the cases of some of the very young children.

Some of the instructive items, from a practical standpoint, were the models of houses built for refugees after disaster had destroyed their own. Following a great forest fire in Michigan, houses were built at Red Cross expense for material, on the "building bee" plan: neighbors building for each of the group in turn. In this way 62 families were furnished with dwellings at a cash cost of \$50 each. First aid to the injured was shown by transparencies and by exhibits of model first-aid materials. Panoramas illustrated the work done by the nursing service.

*Restoring
Shelter*

Altogether it was a most impressive exhibit of what a little money and a good organization will do to mitigate the severities of fate.

The Smithsonian Institution, through its various bureaus, entered exhibits of fascinating interest—especially the large glass cases of the National Museum, showing primitive families of the Caribs of British Guiana, the Dyaks of Borneo, South African Zulus and the Alaskan Eskimo. Four glass cases illustrated the evolution of tools. Of greatest modern significance, however, was the Smithsonian's model of the Langley experimental aeroplane, which in 1896 made the first flight of a heavier than air machine; and photographs of the Langley man-carrying gasoline-driven aeroplane, which was launched unsuccessfully in 1903, and after lying neglected, as a mere curiosity, in the Smithsonian laboratory for over ten years, was successfully flown by Glenn Curtis at Hammondsport in 1914: a mournful tragedy of invention, for poor Langley was dead.

Perhaps the most valuable thing the Smithsonian showed was the International Catalogue of Scientific Literature, a classified index, of which about 180 volumes have been issued, of the scientific literature of the world. The great undertaking is now carried on in 33 countries, the Smithsonian doing the work for the United States.

Here you saw the Government in action, for it had its main lecture room and motion-picture theater in the Palace of Liberal Arts. Pictures were displayed and lectures delivered daily, except Mondays. (Experience demonstrated that Sunday was the best day of all for the Government exhibits). At 10:30 this theater was opened and pictures were thrown on the screen relating to subjects to be discussed in the afternoon lectures. At

*Government
in Movies* 1 P.M., there would be a lecture on the "Progress of the Indian," by Mrs. E. B. Hutchison, special agent of the United States Indian Office. At 1:35 there would be another on "Road Building" by George D. Marshall, Superintendent of Road Construction, United States Office of Public Roads and Rural Engineering. This would be followed by a talk on "What the Geological Survey Does," by R. W. Stone, Assistant Geologist, United States Geological Survey. At 3:15 C. J. Blanchard, Statistician of the Reclamation Service, would tell about "Uncle Sam's Free Irrigated Farms." And then Don Carlos Ellis, in charge of educational co-operation for the Forest Service, would describe "Fighting a Forest Fire."

Thousands of people heard these lectures during the season, and many of them took away with them an entirely new conception of the nature and work of their Government.



URUGUAY'S EXHIBIT IN LIBERAL ARTS



JAPANESE LIBERAL ARTS EXHIBIT

CHAPTER XVII

LIBERAL ARTS IN OTHER LANDS

SOMETHING of an index to world progress in the applied sciences appeared in the Palace of Liberal Arts. The Philippine Islands again illustrated their general advancement, through their exhibits in this Department, especially in the group relating to typography and cartography. The Bureau of Forestry and the Bureau of Science at Manila put in some beautifully executed maps and models. There were fine examples of *papier maché* work and raw paper pulp, besides the finished product, exhibited by the Mercantile College of Manila, the Bureau of Agriculture and the Bureau of Forestry. Excellent samples of photography were exhibited by various government bureaus and the University of Santo Tomas. Perfumes were shown under the chemical and pharmacial group. The exhibit of musical instruments was large and interesting, especially in the strings. There were striking photographs and models illustrating sanitation in the islands.

Argentina exhibited some very fine work in typography and book publication, and showed remarkable recent progress in artistic photography and in the graphic arts applied to commercial purposes. Advertising posters were bold and well-colored. But the most striking of her exhibits in this Palace was what she showed in models, plans, and designs for public works, the development of ports and improvement of river beds carried out by the Argentine Government, and a photograph of the fascinating city of Buenos Aires, taken from a balloon. Perhaps her best exhibits here, from the standpoint of finish of execution, were the sheets of topographic maps of the country, as worked out by the Third Division of the Argentine Army. And there were some very instructive exemplifications of the work of the National Department of Railroads, an office under the Department of the Interior, whose function it is to protect the interests both of the public and of the railroad companies which are thus brought under government inspection. Journalism has had a great development in the Argentine, and copies of "La Prensa" and "La Nacion," with their admirable foreign-news services, were on exhibition. For a number of years,

*The Modern
Philippines*

*Charting
the Stars*

Argentina has been contributing to astronomical science the vast labor of mapping the stars of the southern hemisphere, and the fruits of this work were shown in charts of the southern skies.

China's exhibit in Liberal Arts was strong in samples of fine paper—gold dust, glass, mulberry skin, bamboo, and other artistic productions in this field of manufacture. What she showed in architecture had peculiar and haunting historical significance. There was a model of the temple dedicated to Confucius in Kirin, and another of the famous Lukao Bridge, known to Europeans as the Marco Polo Bridge, with its thirteen semicircular marble arches. There was a model of the White Tower Pagoda of the Winter Palace at Peking, and one of a section of the Great Wall. Music was represented by a case of antique instruments side by side with the latest inventions of the modern music master. There were sacred antique harps, flutes, and other instruments that were in use centuries ago. A Chinese compass *An Ancient Compass* 5,000 years old, was represented by a model. There were old sundials, and weights and measures and surveying instruments. Photographs of famous scenes, and of pagodas, were shown. There were old robes of state, with gorgeous golden embroideries and brocades. A red sedan-chair suggested the ride of the Chinese bride. There were priestly robes for the temple service, and a Tientsin firm engaged in supplying theatrical materials exhibited stage costumes, including some representations of ancient armor.

Germany, in addition to her typographical exhibits, which were very fine, showed some of the miracles of her chemistry—the synthetic camphor to which we have alluded above, the radium and mesothorium exhibit, and the Assur colors from coal tar for coloring photographs and for other delicate uses. Theatrical appliances and equipment were exhibited by Leichner of Berlin, and musical instruments by Hohner of Trossingen. Eight concerns exhibited in chemicals and pharmaceutical material. The Permutit Company of Berlin and New York showed a new water-softening process. The German exhibits were not official but represented a voluntary movement among commercial firms, promoted by the Exhibits Division of the Exposition.

Italian paper, exceptional in quality and color, was exhibited by four Italian firms. Large cases of musical instruments by Italian makers were shown, and there were good examples of photography. Chemicals, soaps, and perfumes were on exhibition in most attractive form.

Here as elsewhere the Japanese exhibits were interesting and were displayed with fine effect. To illustrate typography and printing processes the Department of Communication exhibited a collection of postage stamps. In paper manufacture the Japanese exhibits showed remarkable mastery

of the paper-making art. Seismological recorders, the work of Japanese geologists, were made on ingenious plans for the detection and location of distant earthquakes. The Department of Communication exhibited wireless apparatus, and the Department of Civil and Military Engineering showed a most interesting model of Osaka Castle, by the Osaka municipality. The cities of Osaka, Kobe, Yokohama, and Tokyo had models of various public works on view. The exquisite models of the shrines at Nikko, exhibited in the Japanese Pavilion were entered as an exhibit in the Liberal Arts Department. Printing by the wood-block method has been highly developed in Japan, and some beautiful exemplifications of it appeared in the Palace of Liberal Arts. Masterpieces by Japanese painters were faithfully reproduced in the original colors, sometimes as many as 300 blocks being used for the reproduction of a single picture. The violin and cello exhibit by Suzuki of Nagoya attracted much attention for delicacy of workmanship at a small price. This maker's family for generations had produced Japanese musical instruments, and after the outbreak of the European war its representative had a large demand for Japanese-made violins. An interesting exhibit to farmers was that of the Tohoku University, which illustrated the improvement that has been made in strains of Japanese horses by the introduction of American stock. There were extensive exhibits of matches, fireworks, insect powders, models of animal organisms, gymnastic apparatus, and chemicals. The Formosa Government made a fine showing of camphor.

*Japanese
Prints*

The Netherlands exhibited in the Palace of Liberal Arts some magnificent specimens of prints and types from the firm of Enschede & Sons, and there was a great exhibit of surgical instruments, bandages, and first-aid appliances, from Uetermohlen & Company. Mouton & Company, of The Hague, showed some fine examples of bookbindings. The exhibit of maps and marine charts was very comprehensive. The booth in which these exhibits were made was beautifully designed.

The Liberal Arts Palace contained the only exhibit from Peru: a collection of colored photographs by Vargas Hnos.

Spain exhibited here books, and magazines, chemicals, and musical instruments.

Uruguay made an exhibit of interesting albums of impressions and monographs, with political publications, bulletins, reviews, and reports, besides many fine books. The Bureau of Standard Weights and Measures at Montevideo put in an exhibit. Four exhibitors showed maps, graphic charts, and publications.

CHAPTER XVIII

“THE COIN OUTLASTS THE THRONE”

THE varied types of mind they enlist and present to one another and the public—the student, the traveler, the teacher, the technical man, the specialist, the explorer in new fields of science—would alone make international expositions great agencies of advancement. Thor-darson, the Icelander, with his bold assault on the rebelliousness of high voltages was an instance. Lee De Forest, master of radiography, was another. There were Burbank and Brashear and Edison. And another was Farran Zerbe, who illustrates the point better than most.

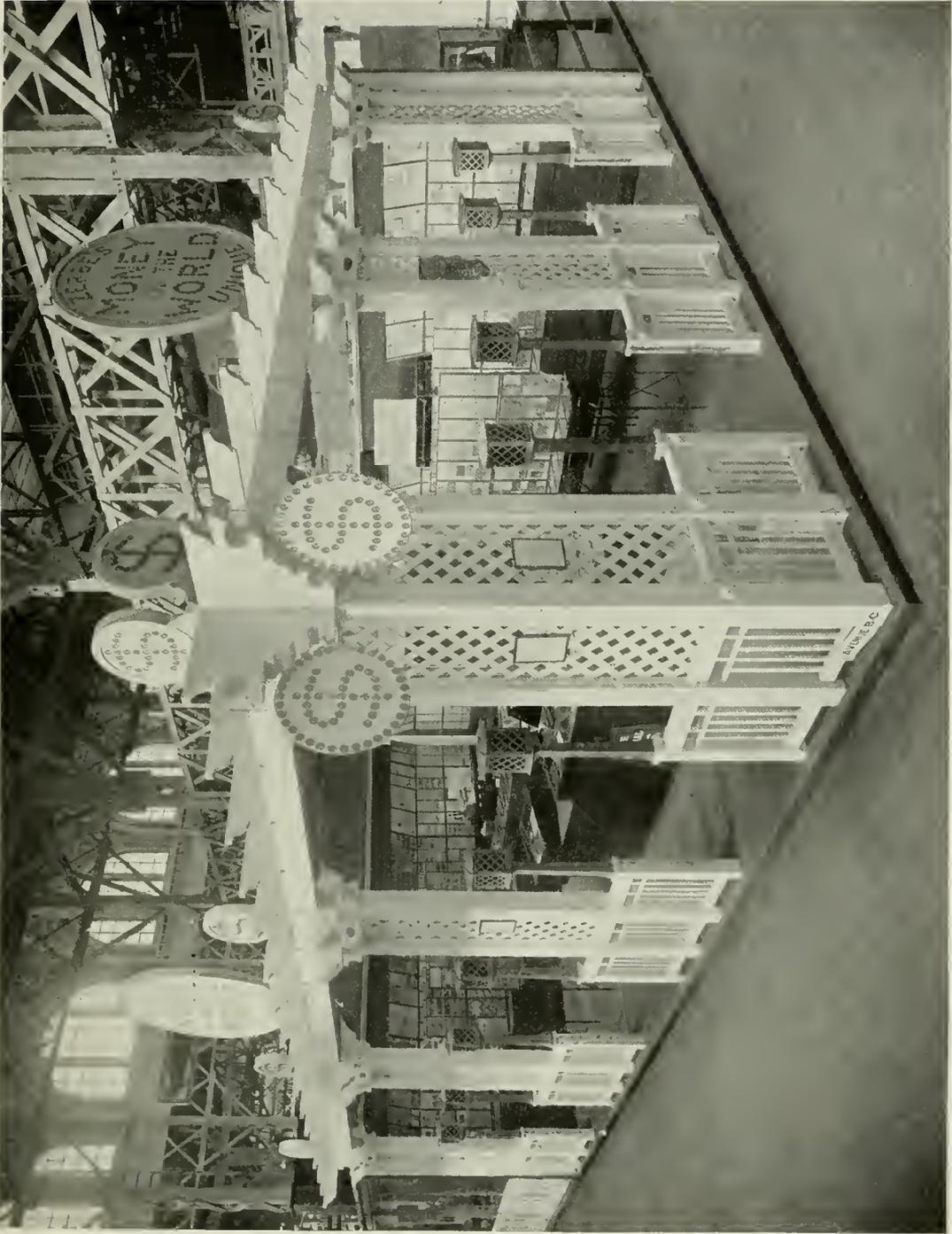
Zerbe was once a newsboy in Tyrone, Pa. He had a bank account. He was very proud of it, and proud also of the accuracy with which he made out his deposit slips and conducted his other small transactions. One day he took in change a queer piece of money. It was a silver coin about the size of a dime, and it bore odd, misspelled words, which to the gimlet-eyed newsboy meant nothing. There was upon it, however, the legend “50 cent.” So it was a half dollar, although a bit stunted in its growth, and he counted it for a half dollar and tried to deposit it for a half dollar. But the cashier said:

*A Fateful
Coin*

“What are you trying on us, Farran? You’re fifty cents short. And you’ve got a piece of French money here. That’s no good in this country.”

Farran Zerbe was a numismatist, but he didn’t know it yet—wouldn’t have known the difference between a numismatist and a counterfeiter. That was the first time it had come to his attention that there were more kinds of money than Uncle Sam made, and he was a bit incredulous. If there had been any other kinds, of importance, people would have known about them and they would have circulated on the streets of Tyrone, Pa.; but he had never heard of any. Yet there was his troublesome dime, marked “50 cent.” when it wasn’t. He had an itching curiosity to know how it had come about.

He began to ask questions. The cashier was glad to answer them. Then Zerbe began to read everything he could get hold of about coins and medals and the strange things people had used in primitive stages of civilization as



THE WORLD'S VARIETIES OF MONEY

media of exchange. He got acquainted with those people, ancient and modern. Being a numismatist involved a great deal he had never contemplated. It was worse, really, than being a philatelist. It led him into strange fields. He could never read Old Sleuth like the other boys; he was sleuthing through a translated Hesiod, trying to find out what the ancient Greeks used for money, and why they did.

Being a numismatist he became a geographer, an anthropologist, an archæologist, an historian, an economist, a student of governments, and political systems, and religions, and mythology, and symbolism, and heraldry, and art. He collected coins, currency, medals. He corresponded with scholars, and societies of scholars. He became President of the American Numismatic Association, a member of the United States Assay Commission, publisher of the “Numismatist.”

For Farran Zerbe, that 50-centime piece was the gateway into a broad and liberal intellectual life, a life of absorbing, unending interest; and money in general became, not riches, nor especially a thing to buy luxuries or liquidate debts, nor yet a thing to propagate, but a documentary record of the progress of man and the stages of his civilization at different epochs. Coins were imperishable metal documents, and types of art indicative of the refinement and mental energy of the nations producing them. The money of civilized peoples became a chain reaching back, unbroken, 3,000 years, correcting history and contributing to it; and reaching back with some breaks and interruptions not yet linked up, for 2,000 years more.

Zerbe never cared to acquire a coin or a medal for its rarity, but only for what it could tell. In spite of that limitation his collection grew very large. Because of that limitation it became one of the notable collections of the world. He could tell you things about coins and medals you never thought of before: trifling things that might become clues to lost episodes in the lives of nations, economically fundamental things about the essential nature of a medium of exchange, the persistent element of popular valuation found in all media of exchange from the plough-beasts of Ulysses to California “slugs.” He knew the mint marks and the marks of the great coin designers. He knew the delight the scholar derives from getting hold of a contemporary portrait of Cæsar or of Alexander, passed by the sifter and stamped by the government; and how when such a portrait is a good piece of art it authenticates the genius of a people that could breed artists capable of such work.

He added some notable borrowings to his collection and brought them all to San Francisco. The exhibit was installed in the Palace of Liberal Arts, in which Department it belonged under the classification, making as a whole

*Links with
the Past*

the greatest index to money ever collectively displayed, and the most noteworthy numismatic exhibit ever seen at an American exposition.

There were about 20,000 original specimens of what man at the main stages of his evolution and in all known countries has used as money, and the whole collection represented a one-time value of at least \$50,000,000. Examples of many shapes and fabrics told the story of the instruments of commerce, which means the distribution of goods, for three thousand years, with some items attributed to dates two thousand earlier than that.

There were clay tablets of accounts from Nippur, constituting a record of values measured in labor, live stock, and grain. There were implement-shaped metal pieces from China, meant to be the fixed price of the article represented, for even in ancient times people befuddled themselves with the supposition that government could fix prices permanently—a knife-shaped coin, for example, standing for the price of a razor, but without *Price* power to enlarge or diminish itself in response to the ever-changing *Fixing* relation of razor supply and demand. A similar idea and use of such original token money was found among the Aztecs, indicating either some early connection between the peoples of the two continents or else a mere, common coincidence of fallacious ideas.

There were “plugs” of brick tea, stamped by the Russian Government, notched so they could be broken into small change, and circulating among the people of Thibet; long black strips of licorice-soaked tobacco, pierced so they could be strung for necklaces, made in Petersburg, Va., and circulating as money in certain South Pacific Islands, where they would buy more than anything else you could take there; a slab of copper two feet long, a foot wide and an inch or so thick, which was once eight dollars in Sweden; and gold coins of some Indian State that were no larger than a pinhead. There was leather money, paper money, shells, wampum of all descriptions, rubber money, condensed-milk money, bone, fiber, clay, coal, glass, cloth, and pasteboard, and there were linen notes, and iron coins in the shape of fish hooks and musket balls. There were Russian platinum coins minted when platinum was so little valued it was thought only good to make jitneys with. There was every kind of wildcat note, including the money of John

Checks
and Notes Law and his Mississippi Bubble. There were interesting historical and financial documents—checks of many presidents, from Washington to Lincoln. There was a check for half a cent, and a photograph of the Government voucher for \$40,000,000 in payment for the French interests in the Panama Canal. There were notes redeemable in rum. And there were private coinages such as the 50-dollar slugs of California, beaver coins of Oregon, Mormon issues of Utah, and Bechtler coins of the South.

There were coins here that showed something about the art, architecture, mythology, religion, sports, and pleasures of every period of Greece in her glory, and Rome to her fall. The deterioration that followed the universal tragedy of a dead empire was reflected in the barbarous crudities of the coins of the Dark Ages. There was siege money in all its variety; the devices of besieged cities to carry on business in spite of war. It told sometimes of lost causes, of nations going down; it suggested civilizations destroyed and forgotten.

The collection aroused great interest in the subject of numismatics, and well it might. It was one of the most definite educational factors of the Exposition.

CHAPTER XIX

THE EXPOSITION COINS AND MEDALS

ON a basis of Federal legislation providing for an Exposition memorial coinage, the Exposition instituted an official Coin and Medal Department, and put it under the direction of Farran Zerbe. The Act of Congress provided that a series of commemorative coins, a souvenir medal, the award medal, and the diplomas, were to be produced by the Government and delivered to the Exposition at par for the coins, and cost for the other items. There were to be not over three thousand gold coins of the denomination of \$50 each, ten thousand of the denomination of \$2.50 each, 25,000 gold dollars, and 200,000 silver fifty-cent pieces. They were to be of standard weight and fineness. Half the 50-dollar pieces were to be octagonal, like the "slugs" privately coined in San Francisco before the local branch of the Mint was established. The 50-cent pieces and the souvenir medal might be coined by the machinery installed as part of the Government exhibit. The Secretary of the Treasury was authorized to obtain suitable designs; but the Exposition had no voice in the selection of them, and did not know what the coins would look like when they were finally delivered.

*Slugs of
Our Daddies*

Owing to the lateness of the date on which the Act of Congress was passed—it was not approved until January 16, 1915—it was impossible to have any of the coins produced until about three months after the opening of the Exposition. In order to have them then, dies for the gold dollar were made by a private concern at the Exposition's expense, and they were probably the first United States coin dies to be made by other than Government employees since the practical organization of the Mint; the San Francisco octagonal and some oblong coinage before that event having been, as we have indicated above, due to private enterprise, and accepted by business as a relief from the too great uncertainties of dealing with nuggets and "dust."

In spite of this handicap, the Coinage Department took in \$179,506 in the Exposition period, and \$51,966 in the post-Exposition period. The whole net return of the Exposition's coin and medal business after deducting

PANAMA-PACIFIC INTERNATIONAL EXPOSITION

1915 - SAN FRANCISCO - U. S. A.

COMMEMORATIVE COINS

AUTHORIZED BY ACT OF CONGRESS

STRUCK AT SAN FRANCISCO MINT



ONE DOLLAR GOLD—Designs by Charles Keck

Issue limited to 25,000 pieces.

OBVERSE: Head representing Labor through whose efforts the Panama Canal became a reality. UNITED STATES OF AMERICA * 1915
REVERSE: Two Dolphins indicating the meeting of the two oceans. ONE DOLLAR * PANAMA-PACIFIC EXPOSITION * SAN FRANCISCO



QUINTUPLE EAGLE (\$50) GOLD

ROUND AND OCTAGONAL

DESIGNS BY ROBERT AITKEN

The first Fifty Dollar Gold Pieces to be issued under the authority of the United States. Total issue limited to 5,000 pieces.

The motives used in these designs were selected by the sculptor because of their simple dignity and far-reaching significance, as well as for their decorative pattern.



QUARTER EAGLE (\$2 1/2) GOLD—Designs by Charles E. Barber

Issue limited to 10,000 pieces.

OBVERSE: Columbia seated in the middle of the World, Columbia with the Goddess, the symbols of Trade and Commerce, fertilizing the soil of the world to run the sea way from Ocean to Ocean. PANAMA-PACIFIC EXPOSITION * 1915
REVERSE: American Eagle on a globe bearing the motto E PLURIBUS UNUM * UNITED STATES OF AMERICA * 1915



HALF DOLLAR SILVER

DESIGNS BY CHARLES E. BARBER

Issue limited to 200,000 pieces.

OBVERSE: Columbia, carrying a banner, stands with her wings, to signify the hand that reaches of the West. Background, Golden Gate illumined by the rays of the setting sun. PANAMA-PACIFIC EXPOSITION * 1915
REVERSE: United States of America, States surrounded by American Eagle and supported on the one side by a branch of oak, emblem of strength and stability, and on the other side by the olive branch of peace. UNITED STATES OF AMERICA * HALF DOLLAR * IN GOD WE TRUST



OBVERSE: Minerva, the Goddess of Wisdom, Skill, Contemplation, Science, Writing and of Agriculture and Manufacture. UNITED STATES OF AMERICA * FIFTY DOLLARS * M C M X V In Gold * IN GOD * WE TRUST

REVERSE: Owl, known to Minerva, the sacred symbol of Wisdom, perched upon a branch of western pine. * PANAMA-PACIFIC * EXPOSITION * SAN FRANCISCO * In Gold * E * PLURIBUS * UNUM * The Designer's initials, R. A. * Dolphins, suggesting as they encircle the central Gold, uninterrupted water routes made possible, by the Panama Canal, occupy the angles of the octagonal coin.

cost of material and all administration expense came to \$65,555.09. This table accounts for the coins handled:

	<i>Half Dollars</i>	<i>Dollars</i>	<i>Two-and-one- Half Dollars</i>	<i>Fifty Dollars Octagonal</i>	<i>Fifty Dollars Round</i>
Coined	60,000	25,034	10,017	1,509	1,510
Used for Assay	34	34	17	9	10
Available	59,966	25,000	10,000	1,500	1,500
Sold	27,100	25,000	6,750	646	483
Destroyed at Mint	32,866		3,250	854	1,017

The production of the souvenir medals, which were sold about the grounds, began with the opening of the Exposition. Robert I. Aitken's design was very artistic and beautiful, and its symbolism was thus interpreted:

"The obverse shows a winged Mercury, the Messenger of Heaven, the first of inventors, the furtherer of industry and of commerce, opening the locks of the Canal through which passes the Argo, symbol of navigation. Upon her canvas the setting sun is reflected as she sails for the west.

"The quotation 'On! Sail On!' from Joaquin Miller's poem to Columbus, is used as a suggestion of the uninterrupted voyage made possible by the Canal. There is also the inscription, 'To commemorate the opening of the Panama Canal, MCMXV.'

"Upon the reverse is shown the central motive, The Earth, around which are entwined two female forms suggesting the two hemispheres, holding in their hands cornucopias typifying abundance. These are so arranged in the design as to become one, the idea being that the Canal brings together the wealth of the world.

"Below these flying forms is shown the sea-gull, the bird of the Canal Zone. The inscription upon this side reads, 'The Panama-Pacific International Exposition, San Francisco, California, MCMXV.'"

Beautiful and expressive as the design was, it had an unfortunate and unforeseen defect, from the commercial point of view. The artist had presented Mercury just as that pilfering messenger used to flit about among the gods on Olympus, looking ready for his bath, so that many well-conducted persons, not sufficiently inured to the manners of Olympian deities, hesitated to buy the medals for home use. They were cheap enough for such beautiful things: 25 cents for the bronze in fancy finish, and \$1 for the silver. On special days the bronze were sold at ten cents. And they were thicker and larger in diameter, and the silver ones were of a better grade of silver, than had been the case at any exposition before.

*Unexpected
Obstacle*

Yet the Department of Coins and Medals, coming into contact with the public through its sales agents about the grounds, found that particular feature of the design to which we have alluded an obstacle to many sales.

These medals were produced as a coining demonstration in the Government exhibit in the Palace of Mines and Metallurgy, and in the process every step from the melting of the crude bullion to the turning out of the finished piece was shown.

All of the commemorative Exposition coins were struck at the San Francisco Mint and bear the local Mint's mark—the letter "s." They were the first special coins struck in the United States, by the Government, outside the Philadelphia Mint. The Treasury Department did not consider it practical to coin the half-dollars at its exhibit on the grounds, as permitted by the bill, because of the lack of the safeguards that should have surrounded an exclusive Government building. The large number of pieces authorized, 200,000, was to provide ample demonstration for the public, had the coins been struck on the grounds. Sixty thousand were coined.

For the coining of the \$50 gold pieces, a special hydraulic press weighing fourteen tons, with a striking power of four hundred and fifty tons, ordinarily used at the Philadelphia Mint for striking medals, was delivered to the San Francisco Mint.

The striking of the first octagonal 50-dollar gold piece, the largest coin ever authorized by the Government, and the first of any other shape than circular, was made a notable occasion at the Mint, as the passage of the act authorizing it was a rare tribute to California and the Exposition. The Superintendent Mr. T. W. H. Shanahan, extended invitations to representatives of the Government, the State, and the city, to officers of the Exposition, representatives of foreign governments, and members of the American Numismatic Association, to be present at eleven o'clock on the morning of June 21, 1915, when the first of these coins was struck. The Treasury Department was represented by Dr. F. P. Dewey, Acting Director of the Mint, Washington, D. C.

Superintendent Shanahan produced the first piece, saying he was about to strike the first 50-dollar coin ever issued under authority of law in the United States, and that it should be of particular interest to all Californians, as it not only commemorated the greatest of world expositions, but the historic 50-dollar slug of pioneer days. He then pulled the lever and handed the resultant coin to President Moore for inspection. President Moore operated the lever for the second piece, and other members of the party took their turns at making money, keeping up the delightful exercise until lunch time. In all, 1,500 of each shape were coined.

*Pleasant
Labors*

Designs for the silver half-dollar and the gold $2\frac{1}{2}$ -dollar piece were by Charles E. Barber of the United States Mint. The half-dollar was one of the most beautiful coins ever made in this country. The gold dollar was designed by Charles Keck, a New York sculptor. The designs for the 50-dollar pieces were by Robert I. Aitken, formerly of San Francisco, and were practically the same for both shapes, the round and the octagonal. Of the gold $2\frac{1}{2}$ -dollar pieces, 10,000 were coined.

The gold dollar was very popular. It bore on the obverse side an ideal head of Labor, through whose efforts the Panama Canal became a reality: the first time Labor had been so honored on the coinage of the country. Of this piece, 25,000 were coined and sold.

The coins were in good demand, the advance orders amounting to a sales value of \$40,000.

Prices were: half-dollar, silver, \$1 each, or 6 for \$5; one dollar, gold, \$2 each, or 6 for \$10; two-and-one-half-dollars, gold, \$4 each, or 6 for \$20; fifty dollars, gold, round and octagonal, \$100 each. Complete sets mounted in metal frames or leather cases sold for \$200. That both shapes of the fifty-dollar pieces were of the same design was a disappointment and in many instances limited the sale to one coin. On this account, towards the close of the Exposition, sets with choice of one fifty-dollar piece were sold at \$100 each.

Many sales were made to banks throughout the country. Usually these were of sets, mounted in metal frames. There was a by-product of thousands of columns of publicity for the Exposition from this part of the business, for the banks put the coins on view, and the local newspapers wrote complimentary articles about them. Although the number of coins sold at San Francisco was smaller than at some of the other expositions, the sale as a whole was successful beyond any other, inasmuch as it produced the largest net revenue.

With the close of the Exposition this exhibit was moved to the Palace of Fine Arts, where it looked very much at home, and continued as a sales agency for the Exposition coins over the post-Exposition period to May 1, 1916. The Department was continued on a mail-order basis down to November 1, 1916; when, at the request of the Exposition and by authority of the Secretary of the Treasury, the coins remaining unsold were returned to the Mint and destroyed.

CHAPTER XX

WEALTH OF THE PEOPLE

IF the royal shade of the richest king that sat on any throne a century ago—even old Cræsus himself, who was somewhat more antique than that—could have returned to visit the Palaces of Manufactures and Varied Industries he would have had to admit that he was born too soon, and that he would have had more solid comfort in life if he had postponed it and entered the twentieth century as an ordinary American citizen earning a fair salary, or just good wages.

Our royal and hypothetical spook would have learned some surprising things. We can imagine his inspecting hundreds of articles of beauty and use that ministered to the comfort of life at hundreds of points where he had been, in the flesh, decidedly uncomfortable, and envying the royal personages and millionaires of the present for whom these things had been made.

*Fit for
a King* And we can imagine his shock of surprise, and his indignant incredulity, when informed by one of the gray-uniformed Exposition guides, that carpenters, and bookkeepers, and reporters, and physicians, and janitors, and stevedores, and lawyers, and school teachers—plain, ordinary folk like that—could possess and enjoy many of these perfectly finished and beautiful wares that he had never seen before, and had been unable to come at through any use of money and power whatever.

Here was the wealth of the many. It was scattered all through the Exposition, of course, but especially it was here in the Palaces of Manufactures and Varied Industries; beautifully finished stuff to meet competition and to express the artistic impulse of the manufacturer when he had that impulse, and much of it cheap, to meet the market. For there was more money in working for the modern market than for the ancient king, more in serving the people; and better goods could be made doing it, and had to be made; better every year, better, as a rule, by machinery than by hand, better and in the long run cheaper in hundred-thousand lots for hundreds of thousands of consumers than in handmade unique articles for a single sale. Industry for the people, real comfort for the people, wealth produced for the people by the organizers of industry; that was the tremendous lesson of the Depart-



“THE FOUNTAIN”

FROM THE MURAL BY FRANK BRANGWYN FOR THE COURT OF ABUNDANCE

ment of Manufactures and Varied Industries, and deeply it impressed itself. If old Adam Smith could have come out of his Canongate grave and met Edison and gone about those Palaces with him and observed the aspects of modern commercialism he would have seen a new economic heaven and a new economic earth, and he would have liked them.

*Life
Enriched*

The Palaces of Manufactures and of Varied Industries housed one department under a single chief, Mr. Charles H. Green. Those affairs of the Palace of Varied Industries that required immediate attention were looked after by Mr. Walter T. Sweatt, who was appointed on April 1, 1914 to a position in this Department, and who spent several months thereafter at the New York headquarters of the Exposition where he was successful in interesting a large number of manufacturers and producers. Later he became Superintendent of Varied Industries.

Mr. Green's wide knowledge of the manufacturing field and his pertinacity in interesting and attracting producers resulted in bringing together at San Francisco one of the most remarkable exhibitions of manufactured products ever seen. The examples were selected for their merit and significance, their installations were effective and complete in almost all cases, and their number was very large: in the two palaces there were over 1,000 domestic exhibitors, and an astounding variety of exhibits from 30 foreign countries.

The Palace of Manufactures was 470 by 552 feet in largest extent (but with three large corners cut out by courts) and cost \$317,436; and it was full to the doors with things that people need and that make life more livable. It was not confined to the crassly utilitarian, for it was to this place that the English sent their matchless potteries and the Italian dealers brought their beautiful marble statuary, copies of classic art turned out in vast quantity for the embellishment of numberless homes. And here the Japanese exhibited their culture pearls, "manufactured" by a surgical operation on the oyster.

The classification assigned to this Department such things as carpet, tapestries, upholsterers' decorations, hunting equipment, clocks, silver-smiths' and goldsmiths' wares, brushes, leather articles, basketwork, cutlery, stationery, travelers' articles, rubber and gutta-percha products, cast- and wrought-iron objects, fishing equipment, toys, hardware, and wooden ware, electro-thermal apparatus, ceramics, equipment and processes used in the manufacture of textiles and of wearing apparel of various kinds, threads, silk, and its products, leather and leather goods, safety appliances, gas manufacture and distribution, and the exemplifications of many other arts. The

exhibitors included representatives of Japan, Italy, France, Great Britain, and Persia. The exquisite products of the "Pearl of Asia" glorified the place.

Kings never did have to bother much about the housework; the Queen, we understand, frying for breakfast any of the pudding left over from the night before—or so, at any rate, it was in good King Arthur's day. The exhibit of the General Electric Company, the "Home Electrical," made it look as if in a short time nobody else would have to bother much about the housework, either. As an exhibition of the number of domestic uses to

*A Tractable
Servant* which electricity has been harnessed it was a revelation. A handsome little Spanish-California bungalow was built in a corner of the Palace, and equipped with every known device that could be used in a home and actuated by electricity. It was lighted, heated, and cooled by the industrious fluid. There was apparatus to take care of the work of the butler, the maid, the cook, the masseur, the valet, the iceman, the laundress, the furnace-tender, the coal man and the music teacher. You could almost afford to go home and discharge them all. The rooms had plenty of sockets for the insertion of the connecting plugs, because transmission of the current still depended on wires; some day it may not. Every room was completely furnished and decorated. There was a delightful absence of tricks and stunts. The sound purpose of the exhibit was to show what electricity could do to lighten household drudgery.

In the bathroom was a drying apparatus that made the exertion of toweling your hair unnecessary; a blast of hot air did the work, and perhaps saved you a cold in the head. There were patent ventilating mechanisms in the bedrooms that changed the air without making a draft. In the living room were an electric grate and an electric piano. The dining room contained handy little cooking devices for light repasts. In the butler's pantry was an electric plate-warmer that made things hot for you if you were late to dinner, a disc stove for making sauces, and an electric buffer for polishing the silver. The kitchen was highly electrified. Besides the electric stove, just coming into use but not yet generally adopted, the dishwasher, refrigerator and ice-cream freezer all worked by the current. In the sewing room the machine could be driven all day for a few cents, and electric irons were handy. Throughout the house there ran an intercommunicating telephone system, and there were facilities for vacuum-cleaning by electricity. The whole

*Of Interest
to Thousands* place was beautifully lighted in the latest mode, and in case of burglary a master switch at the bed head illuminated every room. The "Home Electrical" and its life-size rooms were constantly thronged, not by the merely curious but by people that had a serious interest in this latest phase of the material side of domestic life. A quarter

of a million copies of the floor plan of the house, with the necessary outlets and switches indicated, were distributed, to show architects, owners, and builders how to plan for these conveniences. Inasmuch as many visitors failed to get them, it is likely that the attendance here was far above this number.

In connection with the Home Electrical, there was an electric garage, workshop, and small creamery. And in the courtyard of the little bungalow was the "Mazda service" research laboratory, where the public could see the successive steps in the development of the Mazda lamp from its earliest stages; and there were entertaining talks by experts on the manufacture of these articles.

Mounted on special display boards in this section of the exhibit were raw materials, parts in process of construction, and finished parts, tungsten ore, ground ore, oxide metal and wire, tungsten contacts, tungsten block, rods, and wire; molybdenum sheet, rods, and wire; various types of brush and contact, copper-coated iron wire, aluminum coated copper wire, alumina dies, calorized samples, molded compounds, tungsten tubes, binel metal, sheath wire, iron crystals, section of a sheath-wire unit, therm-enamel-coated copper wire, Coolidge tubes, X-ray targets, a tungsten steel tool and a typical shaving turned off with it, a compensator lamp, a carbon lamp, a gem lamp, a Mazda tungsten lamp, and a gas-filled compensator lamp.

There was an apparatus to show the strength of tungsten wire; another to show the magnified image of a lamp filament; a spark interrupter, to show tungsten contacts in operation; a Coolidge X-ray tube and battery, to show the filament in the tube lighted; lamp mounts, to show the flexibility of Mazda lamp filaments; copper castings and X-ray photographs, to show the value of the X-ray tube for discovering imperfections in castings; a photometer, to show how the candle power of lamps may be determined; various insulation materials; apparatus to show the tone of iron and tungsten wire; nitrogen apparatus, to show a typical nitrogen-purifying installation; argon apparatus in miniature, to show how argon is manufactured; samples of pure metallic boron and a boron regulator; a lamp outfit used particularly to regulate car lighting; large incandescent lamps, to show the maximum amount of light in a minimum-sized bulb; and a "lightning bug" display, for scientists were still striving to approach the efficiency of the firefly in producing "cold light" with the proper color for an illuminant. The commercial incandescent-lamp exhibit was arranged in an Italian pergola at the left of the research exhibit. The exhibit of the General Electric Company was a great exemplification of the wondrous arts the development of the use of electricity has added and is continually adding to that sum of all the arts, the art of living.

The Western Electric Company made a general exhibition of electrical goods and appliances, particularly telephones, in a most attractive booth, a central enclosure in a classic style, flanked by two pergolas, the whole 100 feet long. The main display feature was a desk telephone made of wood, iron, and staff, 15 times the size of the ordinary phone. On the frieze above was the inscription "Manufacturers of the 8,000,000 Bell Telephones." On the back wall of the booth two flattened hemispheres, painted to represent the eastern and western halves of the globe, showed the

*Production
of Phones*

49 cities throughout the world in which the Western Electric and its allied interests maintained offices. The cities were indicated by small electric lamps, which flashed simultaneously every 12 seconds, that being the rate at which a telephone was completed at the company's main factory. Underneath the two hemispheres a set of pictures showed the evolution of the modern form of desk instrument.

Electrical apparatus was exhibited here in a bewildering diversity. The concern is a heavy manufacturer of lamps and other electrical goods. On either side the entrance to the booth was a Western Electric reel of 200-pair, lead-covered telephone cable—so heavy that special supports were necessary to keep it from going through the floor.

One of the interesting exhibits was a farm-lighting outfit consisting of a Western Electric generator, switchboard, and 30-volt storage battery, all on a single base, ready to belt to a gas engine or any other "prime mover" that can be found on a farm. The battery was charged, in the exhibit, by a Standard gas engine, and used to light a bank of 15 Mazda lamps. Then, there was an interesting line of Western Electric Household Helps, which included vacuum-cleaners, washing machines, dishwashers, heating devices, sewing-machine motors, electric ranges, fans. The general exhibit was very complete and even went into a showing of the timber used for line poles. In fact, it was a small electrical exposition in itself, within the scope of ordinary use. The 1,400-line, 18-position telephone switchboard used by the Exposition telephone system, and all the equipment, including some 77,247 feet of telephone cable, were made and furnished by this company.



ELECTRICAL RESEARCH APPARATUS



JAPAN EXHIBITS HER MANUFACTURES

CHAPTER XXI

MANUFACTURES OF EUROPE AND ASIA

IN extent and beauty, and in attractiveness of presentation, one of the most magnificent exhibits in the Palace of Manufactures was that of Japan.

We neither qualify nor apologize for the use of the word magnificent. San Francisco is accustomed to the finest displays of Oriental art goods, Chinese and Japanese, in the shops of her Oriental and American merchants, that can be seen in the world, but the exhibit in the Palace of Manufactures was one to astonish even the San Franciscans.

Japan had the largest section in the Palace of Manufactures, occupying almost a fifth of the floor space; and this section was the largest she filled in any of the nine palaces in which she exhibited. The objects were mainly those of Japanese trade and commerce, drawn from the special localities that produced the best examples, so that a detailed study of them would have involved a general survey of the development of the island Empire and the condition of its industry in 1915. For such a study we have, of course, no room here, "more's the pity." There was a wealth of cloisonné, of rich and delicate enameling, of damascene, and of marvelous, embroidered landscape screens, by such producers as Takashimaya, Nishimura, and Tanaka; of brocades, cut velvets, mattings, lacquer, jewelry, toys and works in metal, wood, and bamboo, with leather goods and furniture.

*Wares
of Japan*

Nature has given us few materials of more exquisite beauty than tortoise-shell, and the Japanese are masters of the art of shaping it. In this exhibit was an eagle standing five feet high, on a rock, with a four-foot spread of wing, composed entirely of this amber-like substance. The plumage was made in plates of it, and the power depicted in the poise of the royal bird of prey was expressed with as much force and fluency as it could have been in any material. With the eagle was a beautiful exhibit of boxes, paper knives, hair ornaments, and fans, in shell; and a vase of it, inlaid with gold, silver, and abalone. These works were shown by Ezaki.

Porcelains in beautiful sets to conform to western ideas were exhibited by the Nippon factory at Nagoya, the largest in the Empire.

Another attractive part of the Japanese exhibit in Manufactures was the collection of culture pearls; real pearls formed by the oyster, after treatment. The production of the gems in this manner had been extensively developed in the decade preceding the Exposition, and the Mikimoto

*Making
Pearls* Company made a large, almost a sumptuous, display, which included a copy of an Imperial Japanese war fan. This exquisite object, a sort of field marshal's baton, was 23-inches long and 12 wide, embroidered in gold threads on antique lilac silk, and embellished with over 800 pearls. Handle and stem were of gold. The original had been brought from Korea 300 years before by Taiko Toyotomi, a great warrior, and is now kept among the Imperial treasures. All the culture pearls in this exhibit were very beautiful, being grown upon the shell of the oyster by introducing a bit of mother-of-pearl or coral, on which the nacreous matter is deposited. A small piece of pink coral thus inserted would tint the whole gem, and other colors could be obtained by a similar process.

The famous potters of Seto, and of Kyoto, such as Shimizu and Kinkozan, showed some of their finest wares. The ivory carvers had outdone themselves. No small object in this Palace caused more comment than the carving in ivory of a half-peeled banana. Its creamy and delicate tint made it look good enough to eat.

There was a large collection of elaborate carved and gilded household shrines, in which images of Buddha and tablets for the dead are kept.

Japan's exhibit was easily the dominating feature of this Palace (if we omit the official Persian section,) not merely on account of its extent, but for the beauty and the astonishing variety of the articles displayed, and the pleasing atmosphere of art as an essential part of life, that surrounded it.

Probably next in interest in this Palace were the commercial exhibits from Italy: conspicuously, the Italian marbles, the bronzes, the Venetian laces, the copies of Pompeian antiques, the Neapolitan and Genoese jewelry, the Florentine embroideries. The exhibits were put in by such firms as

*Arts
of Italy* Pietro Cattadori of Venice, by Romanelli Brothers, by Frilli of Ferrara, Carlotta Scarlatti of Genoa, and Pochini, Battigli, Volterra, Coloni, and Vichi of Florence, by Mellilo of Naples, and Chiurazzi of Naples, and Morelli of Torre del Greco, and many more. They crowded a considerable section of the Palace of Manufactures with the largest and most beautiful collection of marble statuary ever brought together in one place—the sort of thing people go to Europe to buy and probably the finest reproductions from the antique to be found in the world.

Here you could see reproductions of the Winged Victory in the Louvre, of the Crouching Venus of the Vatican, of Canova's Three Graces, and

Cupid and Psyche, the Venus de Medici, and the Wrestlers from the Uffizi—and some queer juxtapositions, historically and socially: Cleopatra and Washington, and Semiramis and Lincoln side by side. There were many modern subjects in colored marbles. Some famous modern Italian sculptors were represented. Besides the marbles there were reproductions of bronzes in the Naples Museum, and copies of Pompeian and Renaissance jewelry. There were mosaics, corals, furniture, and handsome specimens of antique bookbinding.

Marshall Cutler of Florence had an exhibit of handsome furniture. There were rare silk fabrics from Milan, and Como, and Treviglio, and Monza and Turin.

The Italian Section was most popular, and was constantly thronged, and many sales were made. Copies of popular subjects, usually sentimental or classical, were sold again and again, and the sale cards attached to the samples grew into long strings.

Without government help or encouragement of any sort, British merchants and manufacturers made a most interesting exhibit in the Palace of Manufactures. The British Government never receded from its decision not to participate in the Exposition, seeing, perhaps, the European conflict on the way, and needing to keep at home all the administrative talent it could command. Indeed, to such a degree did the war absorb the national energies that a committee of citizens appointed at the Mansion House, London, under the auspices of various commercial organizations to promote participation at San Francisco, had to disband because when the war came, the members were too busy to attend to anything else. And yet, about 70 British firms exhibited in the Exposition, and they represented the best in their respective lines of production. Even the Mersey Docks and Harbor Board was represented by an exhibit in the Transportation Palace, and there were good exhibits in the Palaces of Food Products, of Horticulture, and of Fine Arts.

Many a visitor to the Palace of Manufactures will recall with the greatest pleasure the collection of English ceramics, the Doulton ware, Vasco ware, the table sets in fine porcelain, the products of the celebrated potters of Staffordshire; of Adams, Williams & Company, of Baker & Company, of Birks, Rowlands & Company, of Gibson, or Fielding, or Goss, or Myott, or Plant, or Wilkinson, or the Booths, or Bernard Moore. They were all beautiful or interesting or quaint, and some were exquisite in form and coloring. There were dinner plates of royal Doulton worth hundreds of dollars apiece. Some of the vases and jugs of Bernard Moore were indescribable in their colorings—*sang-de-bœuf*, peachblow,

*English
Potteries*

haricot, *rouge flambé*, gold *flambé* and the lustres. Here you could understand the mammoth prices collectors have been willing to give in order to reduce some of these things to possession.

Near these beautiful objects stood the particularly utilitarian exhibit of the Gas Light & Coke Company of London, which operates at Beckton, England, the largest works in the world for the treatment of coal gas and coal-tar products. To name a few of the more common products shown, there was pitch, and refined tar, and carbolic acid, and ammoniacal liquor. And there was anhydrous ammonia, liquefied carbonic-acid gas, and liquefied sulphureted hydrogen in tubes. There was a long line of dyes and colors and a long list of valuable chemicals in the sulphur and cyanide groups; not forgetting toluol, the base of many fine dyes, and also of trinitrotoluol, probably the most energetic explosive known at that time, although it was said to have been transcended by the British before the war was over.

This exhibit was a rather persuasive demonstration of the English mastery over coal-tar chemistry, so it may be interesting to note some of the items of it. Besides those mentioned there were: benzol, nitro-benzine, aniline, aniline salt, solvent naphtha, heavy naphtha, miscible carbolic acid, salicylic acid, creosote in various forms, naphthaline in various forms, naphthaline scarlet, anthracine oil, green oil, alizarin, carbazol, prussiate of soda, and many beautiful colors such as cyanogen purple, English green, Hatchett's brown, cyanogen green and cyanogen yellow, and canarin. Many were for exhibit purposes only, and the company was not prepared to put them out commercially, but they were none the less interesting for that.

*Coal Tar
Products*

There was an object in the French section of the Palace of Manufactures that arrested general attention from every person passing near, and that was a French 75-millimeter gun, manufactured by Schneider & Cie, of Creusot; one of those that were doing and were to do such execution on the battlefields of Europe. It was before the year-long German drive at Verdun had started, and yet the fine-lined, slim-barreled thing had already become a figure in history, and this example had a group of admirers standing about it pretty continuously as long as the Palace doors were open. The ammunition was shown; and there were models of howitzers in a case.

France occupied a generous section of the Palace of Manufactures. One of the best of her exhibit lines was leather, of which her tanners produce a beautiful quality for upholstering, bookbinding, and the finer uses of the crafts. But besides this dainty material, dainty in finish and in color, there were some striking examples of sole-leather gears, cams and pulleys for heavy machinery.



ENGLISH POTTERY



FRENCH MANUFACTURES

In another case was a model of a Schneider submarine, as used in the navy of Greece, and a photograph showed a submarine entering a "Kanguroo" or mother ship that had a chamber for it in the hull.

One of the French exhibits in this section was a 300-horse-power high-speed vertical steam engine, exhibited by the *Société Anonyme des Anciens Établissements Delaunay-Belleville*, of Saint Denis. With it went a stationary boiler with superheater and economiser.

Liqueurs and cordials were exhibited in cases. There were models of passenger liners of the most modern appointment, while some of the hotels of the famous resorts and watering places of France added a booth fitted with dioramas of the scenery surrounding them. The French colonies in Africa, Madagascar, and Indo-China were represented by pictures and small wares and there was one very curious object that drew a good deal of attention—the throne of the King of Annam, gilded, heavily carved and, like most thrones, very uncomfortable.

CHAPTER XXII

THE PERSIAN SECTION

ONE of the most beautiful features of the entire Palace of Manufactures was the official Persian Section of 4,000 square feet, equipped and furnished through the energy and resources of Mirza Ali-Kuli Khan, Nabil-ed-Dovleh, Persian Chargé d'Affaires at Washington, appointed Persian Commissioner General at San Francisco by H. I. M. the Shah. Here the ancient arts and storied wealth of Persia were illustrated in pearls that "lay under Oman's green water," in diamonds that once adorned a crown, in rubies of great price, in tapestries like woven paintings, in gold brocades, rich embroideries and hand-loom velvets, in rugs of rare design and exquisite weave, in ancient pottery and strange mosaics, in miniatures, and old manuscripts and illuminated copies of the Koran and the Persian poets. Here were chests of treasure such as we came upon in childhood in the Arabian Nights, limitless in their possibilities, and haunted with the mysterious atmosphere and elusive odors of the Orient. Persia did not erect a pavilion, as its government had intended, owing to disturbances incident to the European war and the transition to a constitutional régime at home, but made her official representation in this Palace.

*Oriental
Riches*

The Persian section contained that most delightful spot to every discriminating visitor, the "Shah's Room," representing one of the chambers in the Museum Palace at Teheran. Here, with exotic treasures and art works all about, it became credible that in the sixth century, while the ancestors of most Americans were a lot of gibbering savages, a Sassanian king had paid the equivalent of three quarters of a million dollars for a single carpet. All the walls of the section were covered with the rarest textiles done in the rug provinces of Persia sometimes as far back as the twelfth century; but the Shah's Room contained the gems of furniture, of weaving and painting and calligraphy; and, in glass cases, the famous royal crown piece of two green diamonds weighing about 70 carats, strings of shimmering pearls, a great turquoise from Nashapur, and a ten-carat Badakshan ruby which had come into possession of Nadir Shah when he conquered

Persia in the seventeenth century. Here was a little diamond rose bush made by Persian artisans over 300 years ago, a necklace of 95 rubies, diamonds, and pearls said to have been presented two centuries ago by an Indian queen to a Persian princess; and a Kirman rug on which successive Shahs had stood while giving audience.

A catalogue of this collection would occupy a great deal of space and convey little sense of its richness and beauty, but a few items should be recorded.

There was a copy of the Koran written on a scroll of about twelve yards of silk paper $2\frac{1}{2}$ -inches wide, to be worn in a curious little lacquered case as part of a bracelet—a sort of theological wrist watch. Another specimen of artistic calligraphy was a copy of the *Bustan of Saadi*, the work of Mir Emad, chief calligrapher of the court of Shah Abbas, and *Beauty in Manuscripts* said to be the only complete book in existence by his hand. Such work has a peculiar æsthetic value to an Oriental; to a Westerner it looks like a perfume written on parchment.

There was a rosary of pure black amber, some armor from the early Mohammedan period, some wonderful glazings in the antique pottery exhumed at Rhages, and some remarkable amulets of Yemen agates, exquisitely wrought by Persian engravers, with verses from the Koran. One plaque excavated from the ruins at Ecbatana portrayed the early Persian conception of the Deity; Ahuramazda enfolded in great wings symbolizing divine power, his head adorned with the sacred fire. In the woven scenes of the tapestries, and in the delicate miniature paintings and lacquers you met old Bible characters as known to the East. One sixteenth-century bit of pen-and-ink work depicted Job sitting on his favorite dunghill scraping himself with a potsherd. Another showed Joseph in prison, and another Daniel in the lions' den trying to spoil the largest lion's appetite by stuffing him with a large loaf of bread. And a creamy-white velvet tapestry of Kashan showed Adam and Eve in Eden, with apples in both hands, while a line of seated male figures represented mystic Sufis engaged in contemplation—probably of what was going to happen to Adam and Eve. Adam and Eve were not dressed yet, but the raiment of the Sufis was in what was known as the "lost color," a shade of red said to have been unattainable through any ordinary dye for centuries.

Many of the Persian Government exhibits failed to reach San Francisco on account of the European War, which broke out while they were in transit, so that they had to be recalled at the frontier. Yet the rugs which the energetic Commissioner General collected were said to have been the finest and most valuable collection ever publicly exhibited in America; and doubtless the same could be said of the pottery collection.

The Persian Section was opened to the public on July 28, and the opening was celebrated with appropriate ceremonies in a beautifully decorated corner of the Court of the Universe. H. I. M. Sultan Ahmad Shah Kadjar, the Shah of Persia, sent a cablegram of congratulation to Mirza Ali-Kuli Khan, and there were appreciative addresses by Judge Lamar the *Persia's* National Exposition Commissioner, Mr. M. H. de Young, a Vice-*Opening* President of the Exposition, who presented the bronze testimonial to the Commissioner General, by State Commissioner Arthur Arlett, representing the Governor of California, by Mr. Edward Rainey, representing Mayor Rolph, by Mirza Ali-Kuli Khan in response, and by several others. H. A. van Coenen Torchiana presided. A most enjoyable reception was held at the Persian Section, which became the scene of similar events weekly thereafter, when lectures on the art of Persia were given by that accomplished Orientalist the Commissioner General. The exhibit attracted great multitudes throughout the remainder of the season.

The Persian Commission consisted of Mirza Ali-Kuli Khan, Commissioner General; Mme. Ali-Kuli Khan Moraveh-es-Sultaneh, official hostess of the Persian Section; Miss Mahin-Banou Behjates-Sultaneh; Hon. Harry Thornton Moore, Persian Consul at San Francisco and Resident Commissioner; Mrs. Harry Thornton Moore; Amir Mozaffar-ed-Din Khan; Mohammed Ameen Khan; Mirza Borzorgdاده E. Khan; Abbas Kuli-Khan; Allah Kuli-Khan; Mirza Zaheeral Memalek; and Mirza Davoud Benzaria.



FLORENTINE FURNITURE



ITALIAN MARBLES

CHAPTER XXIII

CONVENIENCES OF LIFE AND INDUSTRY

SOME idea of the abundance and miscellaneous character of product exhibited in the Palace of Manufactures may be derived from the fact that there were eleven different exhibitors of brushes and fine leather articles; nineteen of office and household furniture; seven of articles for traveling and camping; five of hunting equipment; twenty-four of hardware and wooden ware; four of electro-thermal apparatus; fifteen of apparatus and processes for heating and ventilating; seven of equipment and processes used in sewing and making wearing apparel; sixteen of furs and skins, boots and shoes; eight of safety appliances; and there were many other large and varied groups.

It was not all beautiful. Some of the exhibits were simply downright useful. People not only need the higher life of the spirit, but they have to cook and eat, and it was a comfort to find plenty of stoves and ranges, and kitchen cutlery, hardware and tools, and such a very domestic array as that of the collective gas exhibit, with its heaters, broilers, percolators, and chafing dishes.

Paintings, pastels, etchings, and embroideries were shown in the Palace of Fine Arts. The Palace of Manufactures had a picture done in hardware. It was 48 feet long and 32 high, and contained over 10,000 pieces of hardware and 2000 feet of chain. It showed a clock tower, a waterfall of rotating auger bits, a fountain of chain. It belonged definitely in the "stunt" category, but was large and curious and full of moving parts, and so attracted considerable attention. It was built, or perhaps we should say composed, for the Simmons Hardware Company by William J. Britt. An illustration of his versatility and mastery of media was to be found in the composition of the Burne-Jones angels that occupied the spandrels of the proscenium arch. The hair of these angels was made of brass chain, their armllets were of brass butts and furniture nails, the draperies were limned in flowing lines of jack-chain, the trumpets were made of bit extensions and spoke pointers, and the wings, great pinions of rushing power, were feathered with case knives, butcher knives, and soup spoons. How this picture escaped Mr. Trask was a problem.

*A Hard
Picture*

As a servant of manufacturing in general, autogenic soldering, or welding by the oxy-acetylene flame, was exhibited by the Davis-Bournonville Company. A tiny flame of pencil-point concentration and intense heat was directed on a joint of metal, and the edges were fused together; and that was all—but it was comparatively new, and the apparatus necessary had not been long in existence. Things moved rapidly in the twentieth century, however, and by the time of the Exposition this method was being used for pipe, tube, and barrel welding, in car building, for making and patching metal automobile bodies, for welding boilers and tanks, and in the construction of steel sash, doors, and furniture. As this matter goes to press, experiments are being made toward joining structural steel for bridges by this method instead of riveting.

How cork is made and who puts the little holes in it are questions that have worried the curious for a long time. Some people "always knew" it was the bark of a tree that grew in Portugal or Spain or some such place, while others supposed it came from the sea, like the sponges, and others again merely looked upon it as an obstruction to be removed as quickly as possible. There was a fine cork exhibit in the Palace of Manufactures, by the Armstrong Cork Company and the Armstrong Cork & Insulation Company of Pittsburg, Pa., and small and very readable pamphlets were distributed so that the public might know all about it. This informative feature characterized almost all the exhibits, to the exclusion of mere stunts and tricks, so that throughout the exhibit Palaces the effect was educational in a high degree.

This cork exhibit, for example, showed the oak from which the bark is stripped—a specimen consisting of the entire bark of a real trunk, with branches. Many objects into which cork is made besides bottle stoppers were displayed, and the literature and pictures explained the intervening steps.

From these illustrations you might well infer that cork culture is not a get-rich-quick business, and that any promoter that promises to sow the stoppers of homeopathic pill bottles this Fall and reap a crop of Veuve Cliquot corks about the time the radishes are ripe in the Spring is too optimistic. Cork is worse than a box hedge. You must have your grandfather plant the trees when he is a young man. If he was too busy putting in a tobacco crop or doctoring a sick horse, no amount of hustling on your part will make up for his neglect, and if you want a bearing cork orchard you will have to buy it, and the owner will charge you a great deal of money.

Cork was used by the Greeks and Romans 2000 years ago, and some use it yet. They used it for the stoppers of wine vessels, for floats and buoys,

*A Corking
Exhibit*

for insoles. Doubtless Socrates wore it in his sandals. In 25 B.C. Horace (the poet Horace, in that year—not B.C. Horace) told a friend that he was going to take the cork out of a jar of good old material that had ripened on some Sabine hillside about 70 B.C., and he had better drop around. This is an important record of cork and poetry.

Modern life makes every use of cork that ancient life did, and many more: heat insulation, linoleum, even paving bricks. The United States imports about \$5,000,000 worth of it annually, mainly from Spain and Portugal. Nature does not seem to have intended that the covering of *quercus suber* should be used in these ways, for the first stripping of it when the tree is about twenty years old is the knurliest and most unpromising stuff known except the skin on an African wart-hog. *Mowing
the Crop* Its removal improves the tree's complexion, however, and in about ten years another layer can be taken off that is more even and of better grade. If the cork farmer can wait around now for about nine years, or until the tree is about 40 years old, a good layer can be stripped from it, and after that it will produce its crops at the astonishing speed of one in nine years or so and keep it up for about 100 years. So that if the trees were planted long before you were born they will be productive for some time after you die. But it takes patience. This may in part, and by analogy, explain why so many of the boys leave the farm. Perhaps the most astonishing thing about cork is that after all these years of such cultivation no very good substitute for it has been found, or at least brought into general use.

The city of Waltham, Massachusetts, had a collective exhibit in which displays were made by some of the foremost American manufacturers, especially in the lines of linoleum, carpet, and textiles.

The Brunswick-Balke-Collender Company made a handsome showing of bar and cigar store fixtures, and equipment for billiard rooms and bowling alleys. One of these products is less important now. On the green table in this booth many good billiard matches were played, and the attention they attracted suggested that this sport might be better developed by the next exposition. The booth was ornamented by the skull of a Zanzibar elephant with a pair of fine tusks.

The United States Leather Company had a good exhibit of hides in several styles of tanning. Kullman, Salz & Company, of Benicia and San Francisco, made an impressive showing of California tanned hides as well as California tan bark, the latter said to be the best known. In fact the leather industry, from saddles to shoes, was well and thoroughly exploited in this Palace.

Here, too, was a visual feast for the gun cranks. The Fox Gun Company, of Philadelphia, made a fine showing of shot guns, the Savage Arms Company, of Utica, N. Y., the Remington Arms-Union Metallic Cartridge Company, of Ilion, N. Y., and Bridgeport, Conn., the Winchester Repeating Arms Company, of New Haven, Conn., exhibited the latest improvements in repeating and automatic rifles. The Winchester was especially good, with its cut-open barrels and exposed lock mechanisms. The Savage Company showed its new automatic pistol, and the Remington featured ammunition, besides making a most satisfying exhibit of repeaters and self-loaders, so exposed that you could handle them, operate them, and try their weight, balance and pull.

*American
Rifles*

The American Laundry Machinery Company demonstrated to what a great extent even the washing of clothing has become a matter of machinery. Here were machines for washing and then drying in wholesale lots, great cylinders that could handle the soiled linen output of large hotels; and other machines for ironing collars into that cast iron rigidity which slavery to convention seems to require, while others would press a shirt front until it was hard enough to turn a bullet. There was an ironer here that would iron 16 sheets a minute.

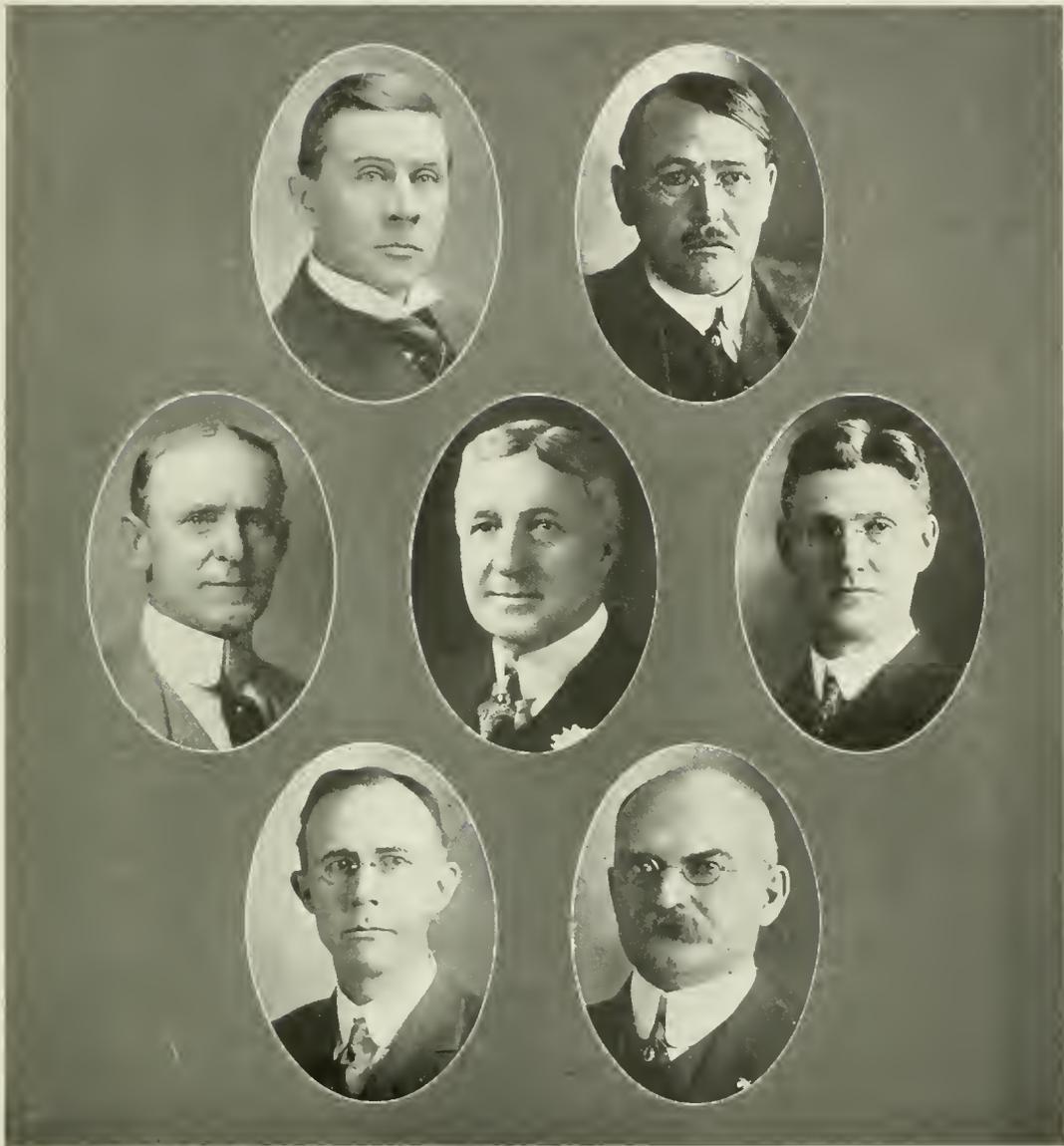
There were some good working exhibits in this Palace, and among them the one that probably received the most attention was that of the Bowers Rubber Works of San Francisco. Here, in a circular loom of whirling and bewildering parts, was woven the tubular cotton fabric for rubber-lined garden hose. Some rubber-working processes were shown. In a calender mill, for example, the gum was kneaded and mixed and rolled into sheets for all the uses to which sheets of this material can be put. And there were all kinds of rubber product here; conveyor belting, vanners for ore milling, piston packing, and the various forms and products of rubber goods.

The Levenson Company, of San Francisco, had a good-sized broom factory in full operation, turning out many styles of broom. This was a process that fascinated thousands of people.

Another remarkable working exhibit was that of Levi Strauss & Company, of San Francisco, demonstrating the large-scale manufacture of overalls. The material was laid out in 96 thicknesses at once, the pattern was

*Multiple
Methods*

marked on the top of the heap, and an electrically driven knife that made 3600 strokes a minute sawed the cloth into the right shapes. There was a great economy of cloth, of course, through taking the pocket pieces and gore pieces and other small parts from the angles in the larger design; but there was also much unavoidable waste, in such large operations; and, coming fresh from the rubber company's



SOME LEADING EXECUTIVES

A. H. MERRILL	J. NISSEN LAURVIK	ROBERT B. HARSHE	WILLIAM M. LOCKHART
	A. L. COWELL	EUGENE SHELBY	I. D. GRAHAM

exhibit, one wondered why it wouldn't have been cheaper to weave the "pants" on the garden hose loom or some modification of it.

Another interesting working exhibit was the power loom weaving "Crex" grass carpets, and still another the place where they packed chewing gum by machinery. There was a small glove factory operated by the Associated Glove Manufacturers of California, illustrating particularly well the use of cutting-dies.

The Helmet of Mambrino may have been good enough for the chin of royalty a century ago, or less. Not for the American working man of 1915. The Koken Barber Supplies Company, of St. Louis, showed every conceivable sort of barber's chair and chiropodist's chair, on swivels so that the operator could turn the customer about and get the right light on him, and with enameled leather seats, and enameled or nickle-plated arms and frames, the luxury of appointment that business has found it pays to give the American of to-day. There seemed to be enough hair tonics to grow fur on a whale. And the interesting information was conveyed by the advertising folder process that this firm conducted the world's largest strop factory, and that it took 14,400 selected hides to provide one year's output—all because hair persists in growing where it is not wanted instead of where it is.

There was a good showing in this Palace in trunks and traveling-bags by such firms as the Hartmann Trunk Company, of Racine, Wis., the Graton & Knight Manufacturing Company, of Worcester, Mass., Hirschfelder & Meaney, the Pacific Trunk & Bag Company, and C. A. Malm, of San Francisco, and the National Veneer Products Company, of Mishawaka, Indiana.

It was not so many years back, as history goes, that people in ordinary circumstances, that is, the "common people," had to live on dirt floors because whip-sawed lumber for flooring cost more than they could afford. Anyone that prefers warm and cleanly wooden floors should see great significance in the evolution of the saw. The saw exhibits of E. C. Atkins & Company, of Indianapolis, and Henry Disston & Sons, Inc., of Philadelphia, were very instructive. The Atkins exhibit was strong in band saws and showed the extremes of size. There was a 65-foot, 16-inch, 13-gauge band saw that had been thrown off the wheels in a British Columbia mill and curled into a 48-inch coil without sustaining a crack. There was a complete line of machine knives.

The Disston people showed a circular saw 84 inches in diameter with inserted teeth, the style of tooth having been patented as late as May, 1914. They showed an 18-inch band saw over 61 feet long. There were cupped saws for cutting the chine in barrels, there were meat slicers and choppers,

*Saws and
Civilization*

circular saws that would cut 20-inch armor plate, and rotary knives used for cutting cork. You learned a few things here—for example, that in order to offset the centrifugal strain in a rapidly rotating circular saw, the saw is forged full at the center, so that when it is still it buckles a bit, and when rotating stretches into a plane with the tension about equal throughout. To give it just the right fullness is a very delicate piece of arts-and-crafts work. And a piece of steel with colored bands in blue and straw shades demonstrated how the temper can be put into it in varying degrees of hardness at will by hot and cold dies. A novelty among the tools exhibited here was a hack saw shaped like a common hand saw, for jobs on which an ordinary hack saw could not be used.

Strange things can be done with rope. The Tubbs Cordage Company, of San Francisco, made a temple of it, and very attractive it was. The dome was of Manila hemp, and on the Ionic columns the material made good volutes. About the booth was every sort of line imaginable. In fact it was hard to imagine there were so many kinds. It ranged all the way from clothes line and the whale line for which the American whalers have long been famous, to the big 16-inch hawser that lay along the front of the booth and formed a step into it, and was a piece off one of the largest coils of rope ever made in the world—a tow rope 1,200 feet long, for a Union Oil tanker. There was wheel rope, and power transmission rope, and bolt rope, and life line, and lariat, and yacht line and hide rope, and sash cord—every form, apparently, that cordage has taken in the long ages that men have been tying things in a knot, and that has survived to our times. With it was a Manila hemp break, and a primitive Philippine carding and spinning machine for this material.

*Drawing
Power*

Hemp rope, however, will not serve all the audacities of modern man. He demands more strength for his assaults on nature, in forest and mine and skyscraper, than any vegetable fibre can give him, so he goes into twisted strands of wire. Probably the handsomest and most costly wire rope exhibit ever seen was that of the Broderick & Bascom Rope Company, of St. Louis, which adopted some unique methods of display for its attractive product. There was wire rope for logging, mining, and oil drilling; rope on an immense revolving reel; and rope made into the ornamental fence surrounding the booths—all of metal.

The Crane Company, of Chicago, made an exhibit of the latest and handsomest plumbing fixtures showing two bath-rooms fully equipped, with their nickel and their white enamel appointments. Plumbers' specialties were also shown by the Bridgeport Brass Company and the Glauber Brass Manufacturing Company, and others.

There are hats and hats, but the hat under which the "backward look" will always see the American cowboy, scout and pioneer, the man of the frontier that has disappeared, and the generation that in the year of the Canal was passing, is the old "Stetson," broad of brim, fine of texture, of a felt that stayed where it was put, whether pulled down to shade the wearer's eyes from the tell-tale beam of the poker-table lamp, or blown up in front by the rush of wind his careering broncho made. The miner and the mountaineer might wear any old wrecked headpiece, but the pride of the plainsman, next to his silver-mounted saddle, was his fawn-colored sombrero. Once a typical bit of American costume, it is disappearing, with its wearer, over the Great Divide—so that some genius of the Sunday supplement wrote, not so long after the Exposition: "Turn, in your ghost saddle, Buffalo Bill. Turn, and wave that rain-stained Stetson. Wave it farewell. For back here a little boy is waving farewell to you."

*Head
Covering*

The exhibit of the John B. Stetson Company showed no fading out with the subsidence of a fashion. It was modern, in every respect. And while most of its display was just hats, it served to remind visitors of the world-wide reach of this great American concern, which levies on the fur of the rabbit, the nutria, and the beaver, in whatever part of the world they may be found, from England to the Argentine, to work into fine felt and contribute to the output of high quality goods from the great manufacturing city of Philadelphia.

CHAPTER XXIV
IN THE TEMPLE OF TRADE

THE Palace of Varied Industries was the Exposition's real Temple of Mercury. It had a gross area of 219,453 square feet, and a net area of 152,909. In outer dimensions it was 414 feet wide and 541 long, and it cost \$296,554 to construct. Here trade received a plenteous devotion. The southeast corner was a bazaar of many nations, where Turkey, India, Bulgaria, the Duchy of Luxemburg, the Balkan States, Bethlehem, and Atlantic City were represented by a bewildering variety of merchandise. All over the building, triumphs of art and ingenuity were for sale. It was a great and busy mart.

There were beautiful brass lamps and lamp shades, fringed and perforated in strange forms. There were carvings from India, and swords from Damascus, and Florentine mosaic brooches that had got into the hands of Oriental dealers because they would sell; for, in these days of world-wide transportation and international exchange, things that will sell become, inevitably and regardless of origin, the stock-in-trade of those that can sell them. Every known trinket seemed to be there, and many that were new.

And some of the displays were very beautiful, especially those of rugs—royal Saruks, Kirmanshas, Bokharas, and lovely weavings from Tebriz, Herat, and Khorassan. The India section showed elaborately carved furniture and a plentiful assortment of Benares brass, with old *papier maché* articles bearing antique paintings. And all about that corner of the Palace hung the odor of attar of roses, without which no exposition Orientalism would ever have just the proper Levantine smell.

The diagonally opposite corner of this Palace expressed in strong contrast the utilitarian ingenuity of the real Connecticut Yankee. Here was a large section, in a booth of Corinthian treatment, exhibiting New Haven manufactures—power-driven hack saws, band saws for cutting steel, automatic screw-cutting machines, builders' hardware, cutting-dies for everything from envelopes to boots; lathe chucks, clocks, plumbers' tools and



WILLIAM B. FAVILLE, ARCHITECT

PHOTO BY CARDINELL-VINCENT COMPANY

ENTRANCE TO THE PALACE OF VARIED INDUSTRIES

plumbing goods. With one of the power hack saws a three-inch steel bar could be cut through in three minutes. It was a little exposition in itself, and had a wide range of products, from corsets to the Yale Bowl.

This last was shown by a model, and is worthy of attention as a significant feature of modern life—the great interest taken in intercollegiate athletics. It might be taken as a typical illustration of manners in the year of the Canal.

In the Exposition year the Yale "Bowl" was probably the nearest thing to the Flavian Amphitheater of ancient Rome, and there is hardly any physical object that could more sharply differentiate the two ages; both called civilized. The Flavian Amphitheater, or Colosseum, would seat about 87,000 people, and after the S.R.O. sign went up it would admit about 13,000 more; according to some authorities, while others put its capacity at much less. The Yale Bowl, according to the model and accompanying data, had normal seating accommodations for 61,000, which could be expanded to 70,000 by means of temporary benches.

The Colosseum was built of stone, by slave labor; although the ancient Romans were masters of concrete construction, and had some rudimentary notions of human freedom—for part of the community. The Yale Bowl was built of concrete, and so has a chance of lasting longer, for it is not likely to become a quarry as the Colosseum has been in part; and the Bowl was built by men that were free to work or not as they chose, and to quit when they wished. In the Flavian Amphitheater they held fatal gladiatorial functions, and fed human beings to the lions. The Yale Bowl was opened in November 1914, with a football game between Harvard and Yale Universities. In the twentieth century people still had to be amused and excited, but they could be amused intellectually by pictures and symbols, and excited by a mere representation of battle, such as a football game in which the contenders did not directly seek the death of their adversaries, but were satisfied if they could disable them without being seen by the referee. The Bowl had other uses than football, just as the Colosseum had other uses than festive homicide, but, in the year of the Panama-Pacific International Exposition, intercollegiate football was probably the most absorbing sport of the American people, at least in the Fall of the year.

With a large percentage of every population, however, the greatest sport in the world is trade, and its aids as well as its materials were well exemplified in the Palace of Varied Industries. Conspicuous among these aids were the exhibits of the Multiplex Display Fixture Company of St. Louis, which showed racks of hinged steel frames in which goods could be

so arranged that a customer could review almost the entire contents of a store by merely turning these leaves, like the pages of a large book, fixed to a wall or post; provided, of course, it were not a store dealing in pianos or automobiles, or other large objects. The device seemed to foreshadow a radical change in the method of selling goods at retail. These fixtures

*Showing
the Goods*

indicated a growing disposition on the merchant's part to rely on showing customers what he had, thus suggesting desirable conveniences to them or reminding them of their needs. It was a development of the picture-book idea for adults. There were octagonal display stands for transparencies, and cabinets of racks for the better and more systematic care of such fragile commodities as lantern slides; all made of pressed steel, with welded joints and neat enameling.

In line with this development, the Kawneer Company, of Chicago and many other places, showed some highly finished glass and metal store fronts, permitting attractive displays of goods.

CHAPTER XXV

WARES OF FOREIGN LANDS

AS to the Varied Industries, expressed in the materials of commerce, they were there from a great many lands. The Duchy of Luxemburg made a most creditable display considering the vicissitudes through which it had so recently passed, for it had been in the path of the German invasion of France in 1914. Unofficially, and by the enterprise of its merchants, it showed fine manufactures of laces, shawls, boots, rugs, jewelry, tapestries, plumes, and perfumes; such things as are demanded by the refinements of highly civilized life. Mr. A. de Hond was the Commissioner of Luxemburg.

Uruguay showed good examples of hides and leather, with some good hardware, and a folding ladder that jack-knifed itself together in the most ingenious Yankee fashion. By means of a stereopticon one had views of the beautiful city of Montevideo that were almost as good as a personal visit.

Spanish merchants had a large and varied stock of merchandise, among which some good lustre ware was conspicuous, and a few copies of the Alhambra Vase. And there were lace mantillas, such as you see, if you are so fortunate as to be there, about twilight in the streets of Seville.

The Balkan States Trading and Importing Company had an interesting assortment of manufactures, half Oriental in character, including many examples of hand-worked peasant costumes.

Russian wares included chandeliers of the most logical design and the cleverest workmanship, in black iron. There was a restraint in the decoration that placed them securely in the category of art—they were distinctly not of the gilded frying-pan order.

Germany was not officially represented at the Exposition, but some of her business houses had a large section in this Palace devoted to the display and sale of German wares. Here you saw the really wonderful exhibition pieces of the Henkels cutlery works at Solingen—large fancy swords, shears, “pocket” knives and razors, of gigantic size, finely damascened, or etched, or electroplated, or enameled in many colors,

*Steel
Beautified*

in most artistic designs—for purposes of commercial display, but achieving the merit of objects of art. Cutlery of all kinds appeared here in the best forms known to the trade, which is to say, to the life of the times. There were in the German Section fine Thuringian pottery and china, and embroidered linens from Stuttgart, and gold-encrusted glassware from Bavaria.

The Austrian Section was near the German, and here you saw fine linens and stamped goods, as well as art pottery and porcelains. The exhibit of Bohemian glass was very attractive and very large, and included models of a service made for King Alfonso of Spain. Here, too, was a lot of the beautiful ruby Karlsbad glass such as our grandmothers were proud to have on their sideboards. Deeply incised crystal vases were shown, with a style of etching developed within the year and never before exhibited at an international exposition.

Denmark showed a model of the twin-screw motorship "Fionia," built for the East Asiatic Company, of Copenhagen. But of more interest to art lovers were the displays of the Copenhagen Faience factory and the Royal Copenhagen Porcelain factory. They gave a delicate interpretation of Danish life. In the old Royal Porcelain works, founded in 1779, chemists and artists and furnace men, and men that were all three, labored together to express the artistic genius of Denmark. They made not merely plates and vases, but they modeled animals, birds, and fishes in ways peculiar to their native country. The trade mark, three blue wave marks, symbolizing the three Danish waterways, the Big Belt, the Little Belt, and the Sound, these artists made famous over the civilized world. Blue fluted porcelain, and blue Copenhagen flowers, are widely known and sought after. The motives for decoration are taken directly from Danish natural scenes—mystical soft tones of the northern sea, the shaded twilight, the half-lit nights, the friendly northern fauna and the delicate northern flora; all these were brought under contribution to express the heart of a people. Sea-birds recur, and tall-stemmed pines; and the wide-eared polar fox looking

*Danish
Potteries*

like a thievish but affectionate household pet, was much in evidence in these beautiful and perfect wares. In the figure work, Danish life and the Danish people were depicted by the Danish sculptor, Thomsen, in such bits as the "Girl with a Calf," and by Knud Kyhn in his "Faun with a Cat." True plastic art this, fit to give delight to everyone. For the children this factory has modeled characters from the fairy tales of the beloved Hans Christian Andersen.

The Copenhagen Faience factory was a later development, since 1863, but a worthy sister to the Royal Porcelain factory. At first producing only



A NETHERLANDS POTTERY EXHIBIT



THE EAST INDIAN SECTION, PALACE OF VARIED INDUSTRIES

articles for daily use, in 1900 it branched out into art work, and the Copenhagen faience became famous. It covered the whole range of jars, vases, plaques, and dinner services, and in richness of color and rarity of design stood on a footing with the porcelains. Here, too, was wonderful work by the Danish gold and silver smiths, that of the sculptor George Jensen being especially good.

Switzerland was represented by laces, embroideries, and trimmings from St. Gall, wood carvings from Berne, fancy articles from Lucerne, an aviary of cuckoo clocks from Meyringen, fine Swiss watches of the manufacture of Geneva and other centers of this art. In addition, there were shown in another quarter of the Palace two large embroidery looms such as are used in the embroidery industry in Switzerland, which made embroideries by drawing the threads through a net that defined the pattern, and then through the cloth that was being ornamented. These machines were of the newest type, great improvements over anything ever exhibited before, their work closely resembling the finest hand embroidery. They were exhibited by Joseph Barbisch of Mill Valley, California, and attracted much attention, so much that they had to be roped off from the crowds.

China took an entire block in the Varied Industries Palace and filled it with a most interesting display of antique bronze, porcelain, silks, embroideries, fans, tapestries, and fanciful wood carvings—a truly remarkable showing of Chinese art, with much that was new to Western eyes, even to those of the Pacific Coast, where the people have been in close touch with the Chinese and have known their art products for generations.

Argentina's section in this Palace was large in area, and filled with impressive exhibits of the progress of that marvelously progressive country. There was a collection of the very striking lithograph posters of the *Compania General de Fosforos*, and charts showing the growth of its industry from 80,000,000 boxes of matches in 1891 to 360,000,000 in 1914, with a daily output of 1,200,000. Then there were some valuable educational displays in South American natural history: a stuffed jaguar, fur-bearing river and deep water seals, some flamingoes, a huge armadillo, a dappled fox, the curious *carpincho*, like a bob-tailed ground squirrel the size of a large hog, and a tawny puma very like his brother in California. There were fine skins for upholstering.

*Argentine
Industries*

One of the interesting local arts shown in the Argentine Section consisted of a peculiar form of stained glass window; a "vitreous mosaic cloisonné," made by laying dams of wire on a pane, filling in with powdered glass of the desired colors, laying another pane atop of it, and fusing all together. It had a quite handsome, if somewhat sugary, effect. Tinted laces, shoes,

good tailoring, saddlery, and leather goods, carpenter's tools well made, as to their ligneous parts, of South American hardwoods, with calicoes, woolens, underwear, knit goods, and artificial plants and flowers, all of the highest workmanship, helped make up the rest of this exhibit. There were steel safes, and a model of a large treasure vault. It was an impressive showing of the arts and industries of the Argentine, especially in industries using wool, leather, chemicals, glass, wood, and building materials. Probably the best exhibit was that of work done in the workshops of the Department of War.

The Netherlands exhibit in this Palace contained fine old Dutch silver, in designs that showed the greatest talent in the management of this material. The porcelains and potteries showed rare designs, the Delft being especially interesting. Gouda ware, a porcelain whose favorite designs apparently were peacocks and gorgeous pheasants, received much praise. The firm of Stokvis exhibited beautifully designed lamps, chandeliers, and ornamental bronzes, and the jewelry of the firm of Begeer, including a large display of diamonds set in platinum, had a most distinguished air of grace and delicacy. There were five large rooms filled with The Netherlands exhibits in the Palace of Varied Industries.

India's exhibits formed a beautiful section. Some of the antique, hand-carved furniture artistically arranged around the booth had been made centuries ago, and a number of the pieces were at one time owned by famous native princes. There was a collection of valuable precious stones and some antique jewelry of curious design which visitors seemed never to tire of examining. The pierced- and hammered-brass lamps and lamp shades in this booth were richly ornamental and would have beautified any home. The carven furniture, labored, deeply wrought, pierced and perforated to a general porosity, could have come from nowhere else than the sumptuous East.

Industries of Turkey were represented in this Palace by exhibits of Constantinople jewelry, Damascus filigree, antique gems, tapestries, and fancy articles.

CHAPTER XXVI

“MANY INVENTIONS”

THERE were scores of inventions in the Palace of Varied Industries for making life easier and more enjoyable and its circumstances more convenient, such as the pinless clothesline and the household vacuum cleaner, and many things for the adornment of the home ; inventions so many there is no space here even to enumerate them. We can only review the more important and significant items.

While the Department of Education had an Arts and Crafts exhibit as an exemplification of the teaching of applied arts, the Palace of Varied Industries had a commercial exhibit of Arts and Crafts work. Without any solicitation, the Department of Manufactures and Varied Industries had been flooded with applications from individual craftsmen, and as this was a class of product that merited representation, it was decided to establish a domestic Arts and Crafts Section where they could all have space. Six thousand feet were assigned to this purpose, a façade Arts
and Crafts was erected and plate-glass show cases were put in. Charles Frank Ingerson of San Francisco was appointed Superintendent. A jury passed on the exhibits and admitted only those considered worthy, and those not admitted were returned to their owners before Opening Day.

The adjectives “rare” and “old” cannot properly be applied to the wares exhibited here, and perhaps they mean nothing in real values anyhow; but everything else of interest that can be said about pottery was justified in some degree by the ceramics on view. There was a fine collection of porcelains, the work of Adelaide Alsop Robineau, of Syracuse, N. Y., and more from Miss Mary B. Elling of Virginia City, Montana. Some fine dull clays came from the Van Briggie Pottery at Colorado Springs. Comparing favorably with any of these were the Arequipa potteries of California, and a California *faïence* made at Berkeley. In textiles there were good things done by Miss Laura Mattoon, of Chicago and San Francisco, in the way of block prints and brocades. A wonderful piece of linen work came from the looms of the Aquidneck Cottages of Newport, Rhode Island: an altar cloth, from the Memorial Chapel of the Blessed Sacrament

of St. John's Church at Newport. In this piece was a filet pattern of four figures. St. Mary and the Saviour, St. John and St. Joseph were worked in the threads of the linen.

Unique jewelry designs graced this exhibit, in the work of Mrs. Lucretia McM. Bush of Chestnut Hill, Mass. Among other things she showed a silver lavalier set with moonstones and sapphires, that was very beautiful and indicated new scope in woman's work. Fine parchment illuminations were shown by Miss Belle McMurtry, and by Robert Wilson Hyde, both of California. Indiana had a notable representation in the Arts and Crafts Section, with a collective exhibit to which nearly 100 exhibitors contributed.

The section was a very attractive part of the Palace, and the exhibits offered for sale found ready purchasers. The superintendent handled the business on a 25 per cent commission for the Exposition, which about paid the expense of the venture.

The Eaton, Crane & Pike Company, of Massachusetts, had a booth that drew large crowds, and deservedly, for it was an interesting working exhibit. This concern is engaged in the manufacture of fine stationery, and showed the method of its preparation for the market. The setting was handsome—a large corner, with a sort of back scene depicting in several panels the mills of the Company in the Berkshire hills, amid the streams that furnished its original waterpower. Operatives were brought from Pittsfield to demonstrate processes. The paper-making exhibit included a display of the material used, with a miniature beating machine, press, and dryer. The raw materials were worked up into sheets and given out as souvenirs. "Life-size" machinery was put in for making the finished stationery. There was a cutting press for cutting envelopes and paper, by means of heavy steel cutting-dies. The blank envelopes were laid out on a flat board and gummed by hand, and then the board with the wet gummed blanks on it was slipped under the discharge pipe of a fan blower that took heated air from an electric heater. Once dry, the envelopes went through a folding machine that was no less than an object of fascination, so regularly, perfectly, and industriously did it do its work. Everybody likes to see work being done in large volume by somebody else, and so the crowds hung spellbound about this monotonous operation. There was an imprinting machine, and an outfit for gold initial embossing, and there was a table for packing the boxed paper. Some 600 boxes of Highland linen a day were turned out, merely as a small-scale demonstration.

Jewelry, silverware, and allied products were well represented in this Palace. The Baldwin Jewelry Company, of San Francisco, hveryad two

*Postman's
Burden*



TAPESTRIES AND FURNITURE



URUGUAY'S EXHIBIT IN VARIED INDUSTRIES

fine booths, in one of which it showed precious stones, and in the other silver. The stocks it carried here were large and varied, and of the best type of goods.

The International Silver Company, of Meriden, Conn., and other places, exhibited a show piece that was very gratifying to local pride: its “Tribute to the Spirit of the West.” This was a magnificent allegorical group in silver, depicting Western scenes with a fidelity rare among Eastern artists; and its manufacture, and exhibition at the Panama-Pacific International Exposition, manifested a fine spirit of coöperation with San Francisco in the celebrating of the completion of the Canal.

The group stood nearly five feet high, was over seven feet in length, and was about three and a half feet wide; and was said to be the largest piece of statuary of the kind ever fashioned from precious metals. It showed, on an allegorical ship, symbols of the development of the West, from the days of the Indian. Etchings pictured the early life of the pioneers and their wild predecessors, beginning with the Indian council and the buffalo hunt, and including the “Forty-niners” with their prairie schooners. There were figures typifying commerce, shipping, and railroads, and images representing the three fundamental elements of Western wealth: stock raising, mining, and agriculture; with a few grizzly bears and buffaloes roaming the scene just to liven it up a bit. And all the figures were strong and real, as a person that knew such men and animals and things would have had them depicted.

One of the things the world needs to appreciate is the importance of plans, and whatever impresses that lesson on people is of educational value—perhaps of the highest educational value. It was impressed in a curious way by the demonstration of the business of a company that makes building plans for dresses: the Butterick Patterns, by the Butterick Publishing Company. This Company claimed to have issued, or that its founders or predecessors issued, in 1863, the first paper patterns ever made to be sold: a curious and typically American commercial invention, like the invention of ready-made clothing. The business has become an enormous one, apparently organized to the most effective degree. And the exhibit of the company in the Palace of Varied Industries was particularly striking. It was based upon the possession of some 64 wax dolls about 18 inches high that had been made by a New York sculptor for this purpose. The dolls were beautifully gowned, and each bore a pattern number. They made possible a very large display, for the costumes on about half of them were changed every month.

*Dress
Patterns*

Long antedating any gold rush to Alaska, a San Francisco house had

established trading and trapping posts in the far Arctic wilds, and lines of vessels connecting them with this city. More than one famous polar expedition has taken its ultimate departure for the deserts of ice and snow from these last links with civilization. From them, H. Liebes & Company drew the finest furs direct, and for fifty years before the Exposition the operations of this house, among others, made San Francisco one of the best places in the world in which to buy fur garments. The Liebes booth in the Palace of Varied Industries was a realistic Arctic scene, with shuddery icebergs and friendly seals and the most voracious-looking polar bears imaginable. With them were shown an Eskimo igloo, and Eskimo fishing gear. And here you saw some of the best products of the North, and of skilled tannage and garment-making in San Francisco.

D. J. Guccione, of New York, exhibited a beautiful collection of fur rugs and mounted specimens, like a petrified menagerie. There were stuffed tigers, lions, leopards, grizzly bears, and Russian wolves, with a rare snow leopard from Siberia.

The Singer Sewing Machine Company's exhibit was important. It was displayed partly in an enclosed pavilion with a dome, partly on the raised, balustraded terrace surrounding it. A pleasing feature consisted of the reproductions of pictures made on the sewing machines of this Company, ranging in subject all the way from Venice to the Old Faithful geyser in the Yellowstone. Another fine display in this booth was the costume study, showing the costumes of all nations, and as nearly as possible the personal types in over a score of countries. Figures and costumes were prepared in the countries they represented, the dresses being made on Singer machines; which, by the same token, appeared to be sold over quite a large part of the world. Some of these dresses brought a little of the interest that attaches to foreign travel. There was one of Little Russia, one of Burmah, an Irish peasant costume, the dress of a Parsee lady in India, the costumes of Mohammedan, Scot, Pole, and Boyar.

Some new devices were to be seen in operation—a machine for blind stitching, another operating four needles at once for stitching toe caps on shoes, a canvas-sewing machine that could make about 500 stitches a minute, a straw-braid machine that ran seven times as fast, and a sack-sewing equipment capable of almost human performance.

Rhode Island had a collective exhibit in the Palace of Varied Industries that served to call attention in a clear and decisive tone of voice to the large position in manufactures of that smallest State, territorially, in the Union. The great manufacturing jewelry industry of Providence was rep-

resented by hundreds of the latest designs in personal ornament, in cases, together with strings of the famous French La Tausca pearls, and some beautiful opal beads with a nacreous coating. In close proximity to these dainty products was the exhibit of the largest producer of horse shoes on earth, the R. I. Perkins Company. And there seemed to be about everything between horse shoes and pearls—paints, fish line, cylinder oil, hand-colored scenic photographs, a new type of automobile windshield to protect the occupants of the tonneau. Rest rooms were arranged in this section, to the great comfort of both men and women.

The booth of the Herter Looms was a beautiful spot of color and fine design. Everything here shown was in exquisite taste, the tapestries, the lamps, all the forms of interior decoration that went to make up the whole. Here was an exemplification of the production of American tapestry, an art commenced in this country but a few years before the Exposition, the looms and three workmen having come from France to start it.

The California Redwood Company, of San Francisco, showed what beautiful things for the adornment of the household could be produced from redwood burl: panels, bowls, calabashes, and table tops that looked like the finest bird's-eye maple, except that they were a rich, dark red.

The Pfister Knitting Company, of Berkeley, California, exhibited bathing suits in various forms and styles, attractively colored, and knit goods in cotton, wool, and silk.

The Gantner & Mattern Company, of San Francisco, showed a complete line of knit goods—sweaters, hose, and bathing suits—and put living models in a gallery, dressed for the beaches, to show off the last-named goods. This was a very attractive exhibit.

The William Carter Company, of Springfield, Massachusetts, exhibited a line of knit underwear.

In no field of production has the practical nature of American mechanical genius appeared more distinctly than in the development of watch making by machinery, except, perhaps in shoe making by machinery. The Waltham Watch Company claimed to be the originator of this mode of producing pocket timepieces, and it exhibited in the Varied Industries Palace many of its machines, demonstrating their use by expert young women operatives from Massachusetts. It began to perfect the industry in the eighteen fifties, and by '62 had demonstrated what could be done. At the Centennial Exposition at Philadelphia in 1876 it showed the first watch-making machinery and the first machine-made watch. The exhibit demonstrated a remarkable command of operations on a diminutive scale. At Seattle the company had exhibited a ladies'

*Machine
Watches*

watch the size of a 25-cent piece. For San Francisco it had reduced the size until the works could be covered by a dime.

The Waltham Company showed in this booth a common thimble half full of screws so small that if the thimble had been full there would have been over 23,000 of them. They looked like grains of sand. But not much factory room was saved by it, for the visitor was told that a complete watch plant took about four miles of benches. The machine for making these screws was on display.

Another fine watch exhibit was that of the Hamilton Watch Company, of Lancaster, Pa., which showed watches and parts in five sizes and 30 models.

The Varied Industries Palace offered an apparent solution of the problem of sericulture in California, which is to say in the United States. The answer to this long-standing question, if it was answered, was in the form of the silk filature machine imported from Italy by the Ladies' Silk Culture Society of California; the first machine of the kind ever brought into the United States and one which, with the accompanying testing apparatus and the processes demonstrated in connection with it, seemed to be the missing link for which this industry had waited.

Mulberry trees, the home and food supply of the silkworm, grow well in about thirty counties of California, and for more than a generation silk worms had been bred in large numbers in Alameda County, and at the town of Rutherford in Napa County, north of San Francisco Bay. But in thirty years sericulture had done little more than pass the experimental stage.

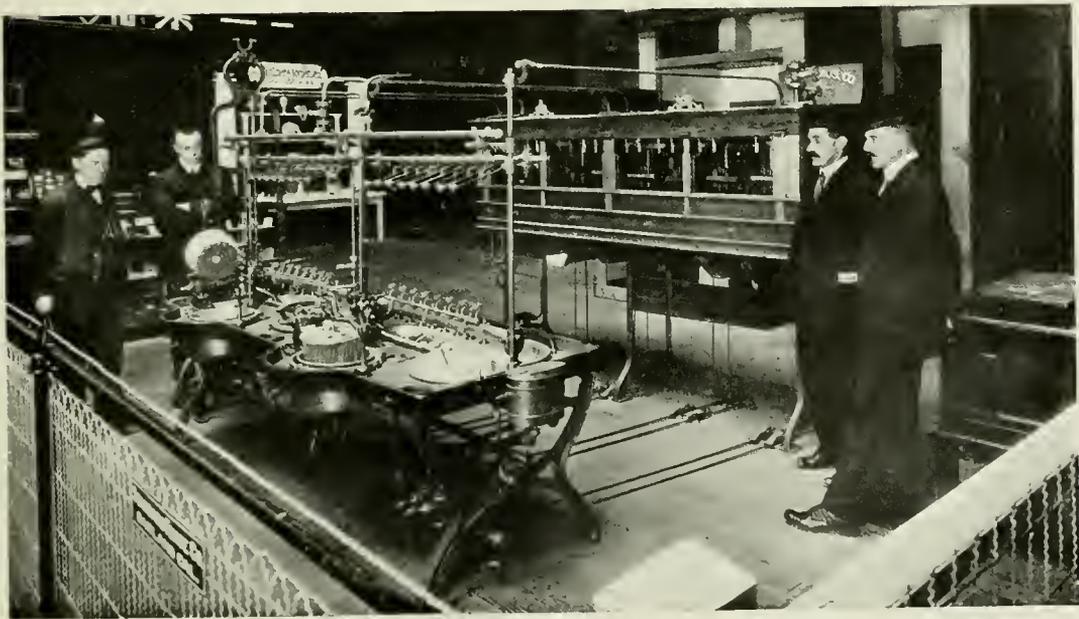
Provided he has an even climate and plenty of his favorite breakfast food, the silkworm is a willing performer up to the point of producing good cocoons. Beyond that, however, he takes no interest in his work, and the rest has to be done by human hands. A silk filature consists of five or six gossamers reeled from as many cocoons, and when the spinning is a bit haphazard the raw silk is uneven in size, or shows, both under the microscope and to experts without the microscope, little nubs where the filaments have been badly joined, split places, cork-screw formations where a taut filament has pulled the slack ones around it, and other imperfections that make it worth, let us say, \$2.50 or \$2 a pound when it should be worth \$4.

So the Italians laid the world under one more obligation and got up the filature machine, equipped with hot-water basins for starting the unwinding, and little glass journals for the almost invisible filaments to run upon, and a spinning apparatus, and glass-enclosed reels to take up

*How Silk
is Made*



SILVERWARE AND ART JEWELRY



ITALIAN SILK SPINNING MACHINERY

the spun product; making the process as mechanical and so as regular and dependable as possible.

The worm's output is of larger diameter when he first begins to spin it, and diminishes toward the center of the cocoon, as he grows tired of the job. There was a testing apparatus with the machine, on which a bell would ring when exactly 100 meters of silk had been reeled on it. Every little while 100 meters were reeled off and weighed on gold-scales or their equivalent, and if the thread ran heavier or lighter than standard the operator would substitute a new cocoon for an old one, or one half unreeled for a new one, or two for three or three for two, or by some other combination keep the weight and hence the diameter of that filature almost uniform; on guard the while against kinks and corkscrews and lumpy places and slack spinning.

The machine was operated by skilled Italian workers under the direction of the Society's superintendent, Mr. S. R. Bellamy, who had acquired this art in Northern Italy. Crowds watched all day the selection of the cocoons, the delicate handling of the precious and almost invisible gossamers, the testing and weighing of the result, the production of the golden hanks representing such concentrated values that when a China steamer docks at San Francisco the first thing out of her is the silk, to be rushed across continent ahead of any passenger.

As this is being written, capitalists are contemplating the establishment of sericulture on a commercial basis, as a result of the Exposition. If that should come about, all credit for the initiative, and for pertinacity in the pursuit of a fine ideal, would be due to the Ladies' Silk Culture Society of California.

Belding Brothers & Company, of Petaluma, showed how the silk is spun into thread. They exhibited long ranks of spools ceaselessly revolving, and reeling in the different colors from winder, doubler, and spinner—a striking and an attractive display. The Anderson Brothers Silk Company, of Paterson, N. J., showed broad silks and silk ^{Thread} _{and Neckties} novelties. Harry Bauer, of Lawrence, showed silk textile novelties, Smith & Kaufmann, of New York, showed ribbons, and the Johnson-Cowden Company, of New York, installed an enormous loom on which a nine-inch silk ribbon could be produced, with the state flowers of 32 States woven in it in their natural colors.

Among articles of personal adornment the Cawston Ostrich Farm of Pasadena and San Francisco exhibited some of the most beautiful plumes ever produced—the result of one of the most romantic ventures of modern commerce in getting the birds out of Africa and rearing them in California.

The California Cotton Mills of Oakland had a working exhibit, showing the manufacture of towels, seine line, and other cotton products.

The exhibit of the Standard Felt Company, of West Alhambra, California, was a revelation of the extent to which felt has become a feature of modern life. There were not only billiard table cloth, and saddle pads, and piano hammers, and slippers, but smoking jackets and blankets of this material. There was a large slab of felt, an inch and a half thick, that could be sheared into any desired shape.

It was in this Palace that the Gorham Company, of Providence and New York, made its wonderfully artistic exhibit. The gates at the eastern end of its booth were copies of the famous Napoleon doors of the Louvre, and were made of nickel, while those at the western end were bronze copies from the Morgan Memorial Library. The Gorham Company exhibited wares of sterling silver and of 14- and 18-karat gold, and much fine brass ecclesiastical work—large lecterns, standing six to eight feet high, one fine piece in the form of an angel. There was much good statuary, and there were some very fine stained-glass windows, and there was an ornate wood and ivory inlaid desk. The booth cost between \$30,000 and \$35,000 and the stock displayed in it was said to have approximated half a million dollars in value.

Across the aisle, the San Francisco firm of Shreve & Company maintained its high traditions with a display of Tiffany favrile glass, Rookwood pottery, Sinclair hand-engraved glass, and Patek Philippe watches. One of these latter objects, about the size of a 25-cent piece, was supposed to be the smallest minute-repeater ever produced. But the firm's proudest exhibit was a toilet set of transparent enamel on 14-karat gold, in a delicate Louis XVI pattern, of local design.

The National Terra Cotta Society, composed of a large number of manufacturers of brick and of architectural terra cotta, erected a handsome booth of the latter material, with great twisted columns and an ornate frieze, which it hung with scores of photographs of churches, homes, and commercial buildings, to show the extent to which this material has begun to enter into modern construction.

In the making of shoes there is hardly an important process left that is not performed more accurately, rapidly, and economically by machinery than is possible by hand. A most valuable illustration was arranged in the Palace of Varied Industries by the United Shoe Machinery Company of Boston. Most of the principal machines used in the production of footgear were shown. It was standing still, inasmuch as the actual processes of manufacture would have been very costly to reproduce,

*Shoe
Machinery*

but power could be applied to it all, to show prospective customers. The company considered itself justified in making the exhibit in order to inform people about the industry, and the character of its necessary equipment. Probably the Goodyear welt is the underlying method of the best shoe and boot manufacture in the modern sense, and this machinery exemplified its use in production.

The progress of this ancient industry had been most rapid within the first fifteen years of the twentieth century. The old-fashioned boot-maker who lived by hand processes, was giving way to the modern shoe factory, clean, well-lighted, and under expert corporation management. Under the new conditions a little group of workmen could produce in a few hours a quantity of shoes that the old-time boot-maker, working single-handed all day long, could not hope to equal in a year of labor. A Goodyear welt shoe passes through 209 different pairs of hands and must conform to the requirements of 160 different machines. Not all were shown at San Francisco, but the main ones were. There were skiving machines, eyeletting machines, and machines for punching the caps. And there were complete sets of repair machinery, as revolutionary in its way as the devices for original manufacture.

A Vermont marble company showed its various products in this Palace. The Oregon City Woolen Mills wove Indian blankets on a power loom, as well as ladies' coats, and Tam O'Shanter caps. The Biltmore Estate Industries, the fruit of a great philanthropy, privately patronized and developed, exhibited some remarkable hand-made, carved furniture.

CHAPTER XXVII

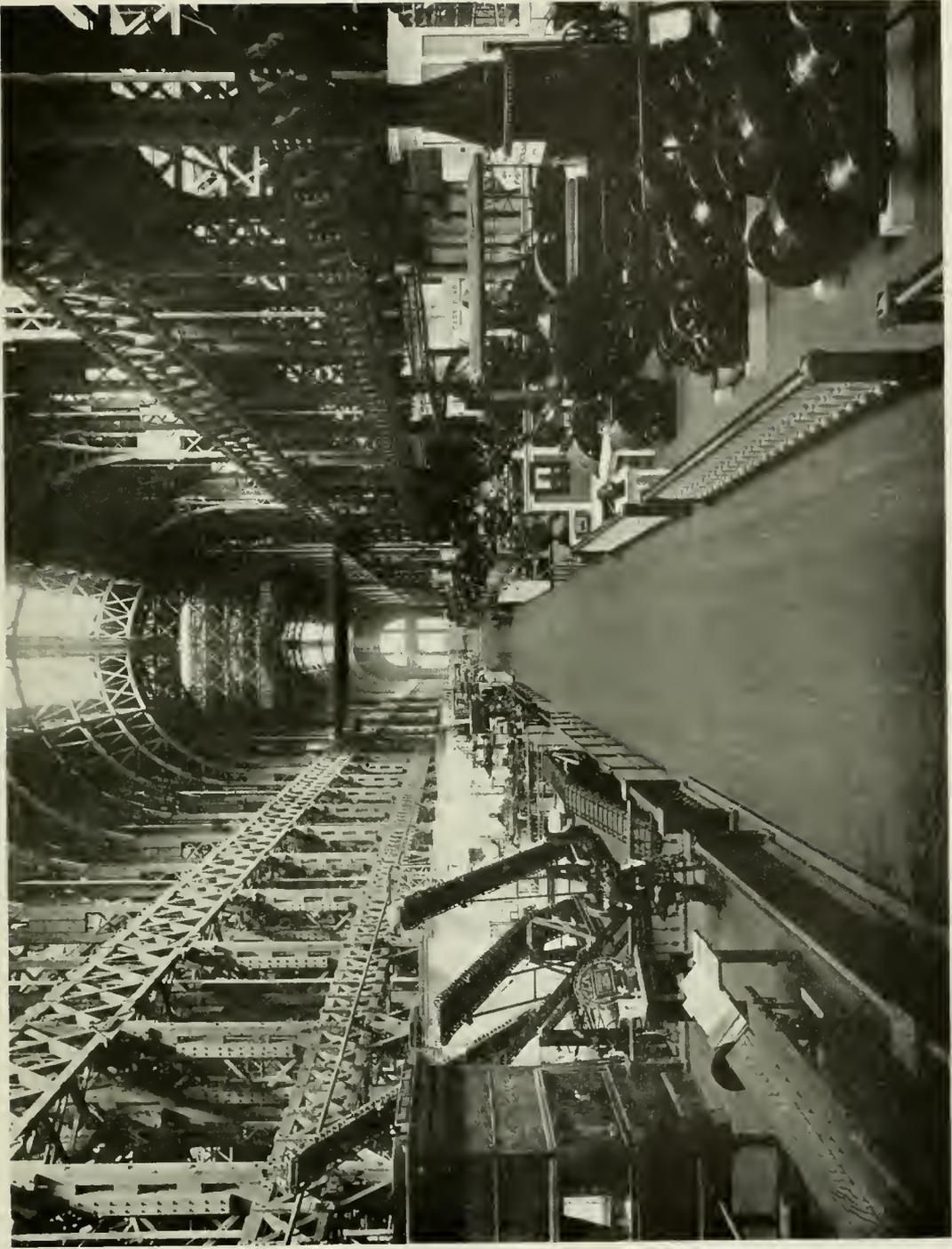
TOOLS OF THE WORLD

BY the year of the completion of the Panama Canal, the art of generating and distributing electricity had advanced so far that it was possible to "pipe" energy, on wires, in almost any desired quantity almost anywhere you wanted it; and some small motor on the floor, which a waste basket might cover, would actuate a machine of considerable magnitude.

As a result, the Palace of Machinery, while a vast spread of nearly eight and a half acres of wonderful mechanical devices, presented an appearance altogether different from that of the machinery building at any other exposition.

The colossal steam engine had disappeared. There was no gigantic Corliss, rotating a long line of shafting from which all the moving machinery in the place was turned by belts. The world apparently was passing the period of those vast mechanical forms, with great revolving wheels and walking-beams and reciprocating arms, that had excited the astonishment of visitors to the Centennial or the Columbian Exposition; and had reached the more amazing but less spectacular method of delivering hundreds of horse-power that gave no visible sign of its transmission, by means of little copper wires sheathed in black.

The production of hydro-electric energy in California, and its delivery at great distances, enabled the Exposition not only to dispense with a steam-power plant, but with an operating electric generating plant as well (although a Diesel engine on exhibition supplied some current), and even enabled it to get along without a sub-station for the distribution of electric energy from the outside. It made the Palace of Machinery less astonishing in aspect, but more interesting in contemplation. It spelled a new chapter in man's growing control of the forces of nature. Steam was still his obedient giant, ready and reliable. But it was being broken to turning dynamos, through turbine wheels. And it did not enjoy a monopoly of that, even where there was no water-power to dispossess it, for the internal combustion engine had arrived, and more dynamos every day were being turned by gas explosions, started inside cylinders by electric sparks; or by fuel-oil



CENTRAL AISLE, PALACE OF MACHINERY

sprays ignited by the heat from compressed air in the cylinders. Edison had even tried gun-cotton explosions, but was over-successful.

The Corliss engine at the Centennial Exposition at Philadelphia was 39 feet high and had a fly-wheel 30 feet in diameter. It had 27-foot walking-beams nine feet deep in the center, and weighed 1,400,000 pounds; and it turned up some 1,400 horse-power. It stood on a platform 59 feet in diameter, necessitated by the extension of the ladders built against it to enable the engineers and wipers to ascend to the upper story; and some of the shafting it rotated was 350 feet long.

*A Real
Old Timer*

The ladies standing about it, according to the pictures of that day, wore enormous bustles, and flounces on their overskirts, and were dutifully, submissively attentive, and appreciative, and grateful, while their solemn husbands in hot frock-coats and "stove-pipe" hats pointed out its perfectly obvious magnitude and made owlish observations on it that no one could contradict.

A 1,400-horse-power turbo-generator of 1915 was about 17 feet long and seven high, and weighed 44,000 pounds instead of 1,400,000. On the platform of the Centennial Corliss it wouldn't have come half-way up to the hub of the fly-wheel. No ladies, with or without bustles, stood about it and hung with flattering suspense on the omniscient remarks of their males. If any all-wise male had dragged his wife in to admire it, she would have shown him up by asking what made it go, and if he couldn't have told it all in ten words she would have sprinkled his humiliation with mocking laughter and gone back to the Palace of Varied Industries where the Turks were peddling something worth while. Other things than machinery had changed.

The concentration of exhibits near a power source was no longer necessary, so a great many machines were classified, not under machinery, but in relation to the arts they served. On the other hand, electricity, instead of being a separate and curious phenomenon had now become the mechanical maid-of-all-work, a very general motive power of machinery, and so was consolidated with it in the classification. There was no Palace of Electricity, and no more need for it than there would have been for a Palace of Coal in the days when the old steam engine dominated machinery exhibits.

Some large and heavy objects that belonged in other classifications got into the Machinery Palace, partly because of the noise they made in operation and partly because of the peculiar facilities for handling them. The day of skids, rollers, crowbars, and tackle for moving heavy exhibits was gone. There were overhead traveling cranes that ran virtually the length of the building: two 30-ton cranes with 5-ton auxiliary hoists in

the vast central nave, and a 20-ton crane in each of the larger side aisles; and there was a railroad track across the building, so that a heavy piece of machinery could be picked up from a car in any one of the three large aisles and carried to any point in it. Furthermore the floor could be opened almost anywhere and pile foundations driven for heavy exhibits, and the Chief of the Department, Mr. Danforth, had arranged with a contractor, after taking competitive bids, to do this work for exhibitors at a stated rate.

*Handling
Exhibits*

In spite of the fact that there was no immense generating machinery, and no electric sub-station within the building, the Machinery Palace contained a most significant and important collection of exhibits, constituting an index to the condition of a great basic activity of society in 1915. There was a fine boiler exhibit, and a steam turbine, cut open for illustration. The internal combustion engine exhibit was very broad in its showing of different types and uses. The modern form of water wheel as a prime mover appeared in its latest and largest development, and there was a bewildering display of steam fittings, power-plant equipment and accessories. There were the latest forms of machine tools and shop appliances, machines for working sheet metal, presses for drop forging and examples of their work, abrasives and grinding materials and machines for their exact use, testing apparatus for tools and structural material, lumbering and logging equipment, trenching machines and well-drilling apparatus, every sort of pump that can be imagined in modern form, electrical and mechanical indicating and recording instruments, hoisting, conveying, and power transmitting equipment in all phases, oils for lubricating and for fuel, filters and hydraulic presses for food products. The electrical appliances included a full line of equipment for generating, transforming, handling, measuring, storing, and utilizing electric current, with many forms of electrical apparatus for industrial and household use.

There was a large amount of apparatus for use in the home, household conveniences as well as necessities, such as fire extinguishers, temperature recorders, oil-burning systems for heating, dwelling-house elevators, gas generators for all household uses, isolated electric light and water-works plants; to say nothing of plumbing materials and accessories. There were can-making machines, and a big gang drill for structural steel fabrication.

*Home
Machinery*

A number of improved lines of exhibit showed a marked advance over the last decade. These included power-transmission equipment, lubricants, deep well-drilling machinery, water meters, and water-works equipment, lifting, hoisting, and conveying machinery, cement mixers and

other contractors' machinery, road-making machinery, and giant ditch diggers.

Among the developments in special fields were burners for heavy petroleum; a remarkable collection of instruments for all manner of indicating and recording; and a grand collection of new machines for testing the strength of all sorts of building construction materials, tools, and equipment.

The better grades of iron, steel, and alloys produced by improved methods during the past decade had made possible a number of very useful metal-shaping and handling machines. These exhibits included machine tools of many automatic types, and powerful tools for cutting; tools for bending light and heavy sheet metals; hydraulic presses for forcing car wheels on their axles; machines for making tin cans of all kinds, and for pressing sheet metals into a vast variety of shapes; bolt-making machinery; and a great diversity of bench and hand tools for all conceivable purposes. Wood-working exhibits included those showing modern methods of lumbering, saw milling, and wood finishing. There were box nailing machines, and a mechanical "shingle weaver."

Through all these devices the principle of safety in operation was most noticeable. Machine after machine showed gear guards and chain casings and other appliances to protect human life and limb.

Nor, if one were looking for mere size, was there any lack of scale. A Diesel engine of 500 horse power, a water-wheel that will turn up 20,000 horse power and more through a dynamo, a monster color press such as we have described among the exhibits of the Liberal Arts Department although it occupied the northeast corner of the Palace of Machinery, are not small objects in themselves, and they suggest larger operations at less cost than were possible to any of the power plants of old. The building itself was tremendous, the largest all-wooden frame building ever constructed, 967 feet long and 367 wide, with a gross area of 369,562 square feet. Seven and a half million feet of lumber went into it, and 1,447 tons of tie rods, bolts, washers, nuts, and lag-screws. Over 45,000 feet of piling had to be driven for it. The cost of this gigantic structure was over \$655,000. It was divided, for installation purposes, on a rectangular plan, with blocks the longest of which ran 111 feet, separated by 12-foot aisles. Spaces were generally 31½ feet deep, although along the smaller side aisles they were less.

*Modern
Plants*

The classification of exhibits in the Department of Machinery included steam generators and motors using steam, with accessories; internal combustion motors, hydraulic motors, weight handling appliances, conveying machinery, power transmission devices, apparatus for handling water and

other liquids, fire engines, air and gas compressors, brick- and tile-making machinery, dredging and excavating machinery, refrigerating machinery, packing, insulation, lubricants, and bearing metals, hand tools, power tools, lathes, wood-working machinery and metal-working machinery, and special machinery not otherwise classified. In addition there was a large electrical section classified as commutating apparatus, synchronous apparatus, stationary and inducting apparatus, rotary induction, unipolar, rectifying, luminous, measuring, indicating and recording apparatus, electro-chemical apparatus, and apparatus for the protection of apparatus.



“PRIMITIVE FIRE”

FROM THE MURAL BY FRANK BRANGWYN FOR THE COURT OF ABUNDANCE

CHAPTER XXVIII

OIL, GAS, AND STEAM

THE Busch-Sulzer Bros.-Diesel Engine Company, of St. Louis, installed the first exhibit in the Exposition, breaking ground in the Palace of Machinery on May 27, 1914, by driving the first of 27 piles needed for the foundation; to the accompaniment of some very pleasing initiatory ceremonies. There were addresses by Capt. Baker, Director of the Division of Exhibits, by George W. Danforth, Chief of the Department of Machinery, by Lieut. Com. Clark Howell Woodward, who recounted the progress of the Diesel engine in the Navy, and by W. S. Heger, local representative of the exhibiting company. Miss Mary Lea Heger, daughter of the last named, started the pile driver.

The engine itself was started by wireless. By means of a connected relay that released a heavy weight and freed 600 pounds of starting-air, the engine began to turn at twelve o'clock on Opening Day, when President Wilson touched the button at Washington. After that it was only necessary to turn on the regular fuel. Two minutes later, the current this engine generated was running the great Pancoast color press in the northeast corner of the Palace, which Mayor Rolph had started in the presence of William Randolph Hearst, and George E. Pancoast its inventor. Throughout the Exposition year the Diesel engine continued to supply current when needed for this and other purposes, until the ceremonies at 3:45 on Closing Day. Then President Moore, standing on the speaker's platform, pressed a key closing a circuit from the giant Thordarson transformer, and with the high-tension sparks flying in all directions, the engine trip was thrown, and the 10-ton flywheel came gradually to rest. From the engine's platform the "Town Crier" of that occasion delivered the official proclamation commanding that the Palace be closed, two marines sounded "taps," and the five attendants of the exhibit waved good-bye to the crowd.

This exhibit, during the season, aroused much interest. The engine ran silently and clean, actuating a 335 K. W. direct current generator, and the attendants, in snug white uniforms, looked like guests aboard a yacht. The

*The Main
Generator*

booth was trimmed with Oriental rugs and finished in fine hard-woods, so that the thing had more the appearance of a parlor ornament than an engine. To be specific, this was of the four-cylinder, single-acting, four-stroke-cycle, enclosed crank-case, medium-speed, vertical type. The speed varied from 196 to 204 revolutions per minute and the engine was said to obtain 33 per cent of the heat value in energy. It weighed 100 tons. The casing could be readily removed to give access to the crank-shaft and bearings. The three-stage air compressor, cast integrally with the engine and looking like a fifth cylinder, was driven from the crank-shaft, and the air was used for fuel injection. Operation was largely automatic, for the governor controlled the lift of the needle of the fuel valve, regulated the amount of oil delivered by the fuel pump to the various cylinders, and controlled the amount of air compressed. There was a lever for each cylinder

so each could be separately regulated by hand if necessary. A
Ever system of forced lubrication both oiled and cooled the bearings.
Westward

The engine stood on a concrete foundation atop of the piles, and its base was some distance below the Palace floor. The Corliss engine exhibited at the Centennial, in 1876, was built in New England. There is historic significance in the fact that this Diesel, exhibited only 39 years later, was built on the western "shore" of the Mississippi River.

The McIntosh & Seymour Corporation, of New York, showed a 500 horse-power Diesel engine (made under license from the Swedish Diesel Engine Company), direct-connected to a 350 Kilowatt General Electric direct current generator; and a 290 horse-power engine direct connected to a Crocker-Wheeler 200 K.V.A. three phase, 60-cycle, alternating current generator. This engine was said to have a peculiarly effective atomizer, or pulverizer, insuring complete vaporization and combustion of the heaviest crude oils, thus extending its range of usefulness, and saving wear and tear on the working parts. The fuel supply was controlled direct from the governor to the eccentric driving the fuel pumps (one to each cylinder) and varying the strokes of the pumps in automatic response to load changes. These Diesel engines were much alike, the essential working principle being the same.

The motor-boat enthusiast could find a great deal to interest him in this Palace, for there were marine motors here in abundance, set in finely built hulls of various types. A propeller exhibit drew the motor-boatists like flies to honey.

Could you see any romance in so hard, practical and mechanical a thing as a gas engine? It was illuminated by that rosy glamour. The gas engine had reached a high degree of development in San Francisco as an

economizer of room and labor and because of our distance from anthracite and proximity to great fields of fuel oil. The first exhibitor that applied for space in an Exposition Palace was the Standard Gas Engine Company of San Francisco, and it got in its application the day the House of Representatives passed the resolution assigning the Exposition to that city. Its exhibit in the Machinery Palace was a large, comprehensive, and important showing of the use of the internal combustion principle as applied in this form to irrigation, mining, hoisting, pumping, and similar operations, but especially to marine propulsion.

*Gasoline
Romance*

For, largely under the enterprise of this company, the gas engine had worked its way out into the vastness of Balboa's ocean, and in many a far-away reach of the Pacific it formed the essential means of navigation, the only link between isolated peoples and the outer world. Motor boats equipped as marine hospitals went about from island to island under gas power. When the steamer "Æon" was wrecked on Christmas Island it was a lifeboat driven by a gas engine that enabled a volunteer crew to make a dash over the open ocean for help, and get it. Gas engines, made in San Francisco, carried the mail from Auckland, or Sydney, with letters from home, market quotations for the copra or mother-of-pearl trader that hoped to make his fortune soon and go back to civilization, or bits of news from the "world well lost," for men that had turned their backs on Piccadilly for Piccadilly's good. And sometimes to some far coral beach under the cocoanut trees the gas engine brought the missionary and the marriage book to regularize things a bit and make Eden more secure. Romance in this queer huddle of blinking brass and green paint and bobbing pistons in the Palace of Machinery? As much as in the sail. Beyond Boone's Trace, across the Missouri, at the end of the prairie schooner's long road, the gas engine had become the Wings of Adventure.

There were several types, by other exhibitors, so that the industry was well represented: the two-stroke cycle type shown by the Bessemer Gas Engine Company, the exhibits of the Gas Engine & Power Company and Charles L. Seabury Company, consolidated, of Morris Heights, N. Y., the Buffalo Gasoline Motor Company, the Imperial and the Union of San Francisco, the Doak of Oakland, the Western Gas Engine Corporation of Los Angeles, and many more, including several exhibits of small Diesels.

The Henry C. Hyde Company, of San Francisco, exhibitors for the Gas Engine & Power Company and Charles L. Seabury Company, made a collective exhibit of marine engines, water tube boilers, Diesel type oil engines, and gasoline-electric lighting systems.

August Mietz, of New York, exhibited the Mietz & Weiss oil and gas

engine in several types—a 200 horse-power, four cylinder, reversible marine engine, for one example, which was new, never having been exhibited before 1914. Reversing gears and reversing gear models were shown with the engines.

But, when all is said and done, said McAndrews: “Gi’e me the power o’ steam!” As far as we can see ahead, boilers there will always have to be. The Babcock & Wilcox Company showed the identical old boiler it had exhibited at the Centennial Exposition in Philadelphia in 1876, and the principles of its design were the same as those on which they were building boilers nearly forty years later. Construction had changed in some details, but essentials were the same. Cast iron drum heads with their manifolds had given way to wrought steel drum heads, and cross boxes beneath the drum. While the boiler of 1876 consisted largely of castings, the Babcock & Wilcox of the Exposition year was of wrought steel construction throughout. But this was more a change in metallurgy than in boiler construction, a substitution of material to make better what was essentially the same thing, because it required no change.

Besides this souvenir of the past, which the company had sold and bought back after it had been 35 years in service, the boiler exhibit was peculiarly complete. It consisted in the main of full size sectional models of the different boilers of this company’s manufacture, of which there were said to be in use throughout the world enough to generate more than 17,700,000 horse power.

Sections of the following boilers were exhibited:

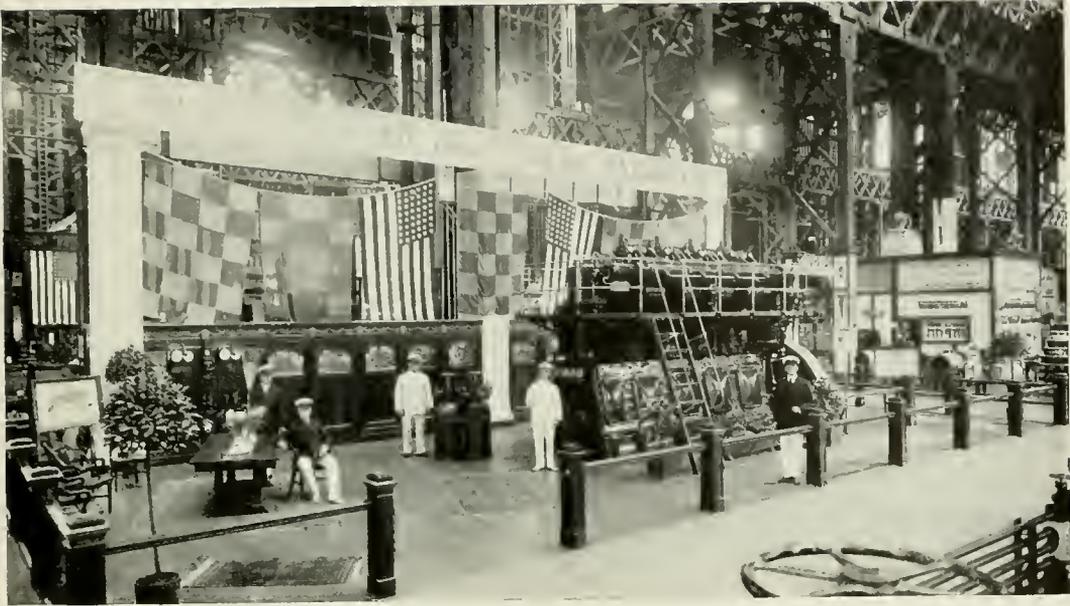
A wrought-steel, longitudinal drum Babcock & Wilcox boiler equipped with a superheater. This, constructed entirely of wrought steel, may be said to have represented the highest state of the boiler manufacturer’s art as it existed in 1915.

A Stirling water tube boiler, equipped with a superheater.

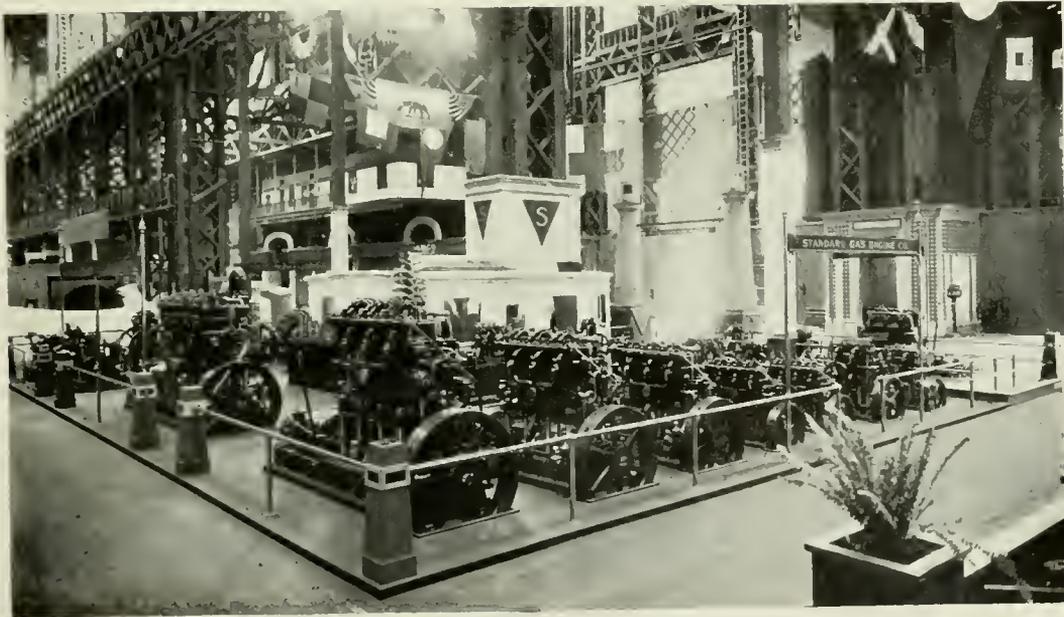
A Rust vertical water tube boiler, equipped with a superheater. In this model the patented pressed tube sheets were of particular interest.

A Babcock & Wilcox all wrought-steel marine type of boiler, equipped with superheater. This held the same place in marine practice that the longitudinal drum Babcock & Wilcox boiler held in stationary practice.

Owing to the prevalence of the use of oil fuel throughout the region in which the Exposition was held, the Babcock & Wilcox stationary and Stirling boilers were shown equipped with Peabody patented oil-burning furnaces and Peabody oil burners. The Rust, and Babcock & Wilcox, marine boilers were shown equipped with stationary hand-fired grates.



ONE OF THE DIESEL ENGINES



GAS ENGINES

CHAPTER XXIX

IN FACTORY AND FIELD

IT has been observed that this is the age of accuracy, and nowhere is it more important than in manufacturing processes. Testing and recording machines to keep track of the performances and relative efficiency of other machines, of the life and service of tools and of materials, have become vital. In this field the Tinius Olsen Testing Machine Company, of Philadelphia, had proved itself most valuable, and its exhibit in the Palace of Machinery demonstrated much that it was essential to engineers and manufacturers to know. This was said to have been the greatest display of the sort ever made.

Perhaps you did not know that metal gets tired, but there was a machine in this exhibit for testing the "fatigue" of steel. There were machines for testing tools and tool-steel, and other engineering materials, for determining the "life" of automobile springs, and for finding the relative lubricating values of different oils. Delicacy of measurement and accuracy of record had been attained in ever higher degree, through devices of the finest design and workmanship. There were 26 of these machines on exhibition, besides a large assortment of accessories.

In addition to the Universal Testing Machine of this company it showed a special torsion testing apparatus with a capacity of 230,000 inch-pounds, capable of testing to destruction a steel shafting up to $2\frac{1}{2}$ inches in diameter. An autographic device recorded the amount of twist and torsional load for every instant of the test. These tests are invaluable for designing such members of machines as automobile crank-shafts, where there must be a maximum of strength and a minimum of weight. There were machines for testing cement, concrete, and road materials; one a hydraulic compression machine, hand operated and portable. There was a machine for testing the fabric of automobile tires, the metal of bearings, the tensile strength of wire, the hardness of metals, by the minutely measured penetration of a steel ball under finely graduated pressure.

Various tool-steels must be operated at various definite speeds for maxi-

imum efficiency. There were machines for finding out what those speeds should be, so that the machine could be adapted to the tool or the tool to the machine. One of these machines showed the difference in the quality of files, and so helped save that most valuable commodity there is around any plant, Time; for Time is interest, and may mean the difference, as it often has, between prosperity and ruin. Altogether this exhibit was a most definite and beautiful reflection of the refinements of modern manufacturing.

*Keeping
Close Tab* One of the important exhibits in the Palace of Machinery was the combined showing made by the Westinghouse Pacific Coast Brake Company, the Westinghouse Airbrake Company, the Westinghouse Traction Brake Company, the National Brake and Electric Company, and the United Pump & Power Company. They took half a block and made an instructive display of brakes and air compressors and air pumps, a new feature being the application of electricity to the operation of compressed air devices; especially the electro-pneumatic brake, which threw the brakes on the whole train simultaneously and instantaneously.

In the center of the front of the pavilion that dominated the exhibit was a large operating electric sign, so arranged with mechanical devices as to show in colored lights deceleration curves of trains stopping from a speed of sixty miles an hour using the old type of pneumatic brake, and trains equipped with the electro-pneumatic brake; indicating the difference in the stopping distance between trains equipped with both types of apparatus. This chart also showed the time in seconds required to stop a train from a speed of sixty miles per hour, and the speed at which the train with the old style of brake would be moving after the train equipped with the new style brake had stopped.

The Westinghouse Airbrake Company showed different types of steam driven air compressors, compound and single acting, for locomotives and general industrial work. A number had various valve chambers and cylinders sectioned and then connected in tandem with operating compressors, so that they moved together and visitors could see just how they acted.

There was a working model of a deep water well pump built of glass so that the operation could be watched.

The old air brake hose, to couple which a man had to go between cars and run the risk of injury, was threatened by the Westinghouse car and air coupler, represented by a model. It provided in one coupling head for connecting the cars and making the air connections as well.

There were pneumatic water pumps for homes and farms. The exhibit contained governors for compressors, and improved types of brake valve

for electric cars; and a complete unit, consisting of an air compressor, storage tanks and control equipment, mounted on a truck, to make a compact and portable pneumatic plant.

Man has to know what he is doing in the field of mechanics, or he can't tell whether he is going forward or back; and he will go to great lengths to find out just what effect he is getting out of his various contrivances; how far was well shown in the exhibit of the Bristol Company, of Waterbury, Conn., which put in a remarkable display of recording pressure and vacuum gauges, thermometers, volt meters, ammeters, tachometers, flow meters, water level gauges and the like. This was a display of the utmost importance to engineers, and they gave it much study.

*Intelligence
Machinery*

The Foxboro Company, of Foxboro, Mass., also put in a line of recording and testing instruments, gauges, orifice meters for measuring the flow of natural gas, apparatus for the automatic control of the temperature of water in tanks, and the "tapalog," a multi-record recording pyrometer that would measure heat from plus 75 Fahrenheit up to 2200, for taking the temperatures of annealing furnaces, gas retorts and kilns.

Our old friend the water meter was there in numbers. The National Meter Company installed what was said to have been the largest exhibit of the sort ever made. It illustrated progress in this line of manufacture by showing vestiges, and modern meters that had, in an age of attempted fair dealing, straight reading registers and simplified recorders.

The Neptune Meter Company's display of "Trident" meters was very full and interesting. About 700 were used in the Exposition grounds, passing about a million and a half gallons of water daily, and the cost of upkeep was practically nothing.

A great labor saving device, one that probably saved the orange growers of California about \$50,000 a year, was the box nailing machine, made by the Parker Machine Works, of Riverside, and exhibited by George D. Parker. This machine appeared in two forms, the Automatic, which had been on the market about ten years and was a well-known part of packing-house equipment, and the Universal, which had been out but a short while. The Parker Automatic probably made 70 per cent of the orange boxes used in California, and when an output of from six to ten cars of 400 boxes of oranges a day is going East, boxes have to be made at a pretty lively rate to keep up and not delay the operation. At the top of the machine were two nail holders from which the nails were fed 18 at a time, the shooks being fed into hoppers. The machine assembled the shooks and when they were in position, squeezed the nails into them and threw out the finished box, center partition and all. The other and larger and later

*The Box
Nailer*

machine, the Universal, would make boxes of any size, for apples, canned goods, and other products, driving 26 nails into the three sides of the box in one operation. It would handle almost any sort of shoo, and would turn out 1,000 boxes an hour, the work of twenty men.

In the large line of pumps exhibited in the Machinery Palace we may mention the deep well centrifugals of the Krogh Manufacturing Company of San Francisco. These were said to be automatically water balanced so that they could not get out of balance no matter how the service condition varied. They were used in the Exposition's own water supply system, in and near the west end of Golden Gate Park.

Another pump exhibit that received much attention was that of the Layne & Bowler Corporation, of Los Angeles, which supplied the pleasant spectacle of streams of water flowing down a large cascade. This company showed the Layne patent multistage centrifugal, so constructed that it would pass freely inside pit or casing varying from 9 $\frac{3}{8}$ inches diameter to 30 inches. The runners could be adjusted from the surface.

The exhibit of the E. W. Bliss Company, of Brooklyn, N. Y., might have been entitled "War or Peace." There was a large torpedo, the product of this concern's metal pressing machinery, by which it manufactures the Bliss-Leavitt Automobile Torpedo, but if you had no use for that lethal instrument you might have been interested in the long lines of tin cans for the packing of the peaceful tomato or the amiable asparagus. They were emerging from a machine in active operation, and they came in great variety—cans for fruit, for baking powder, for talcum powder, coming at the rate of 150 a minute. There were can ends produced by one machine and threaded talcum powder can tops from another. The exhibit showed a high degree of development in sheet metal working machinery.

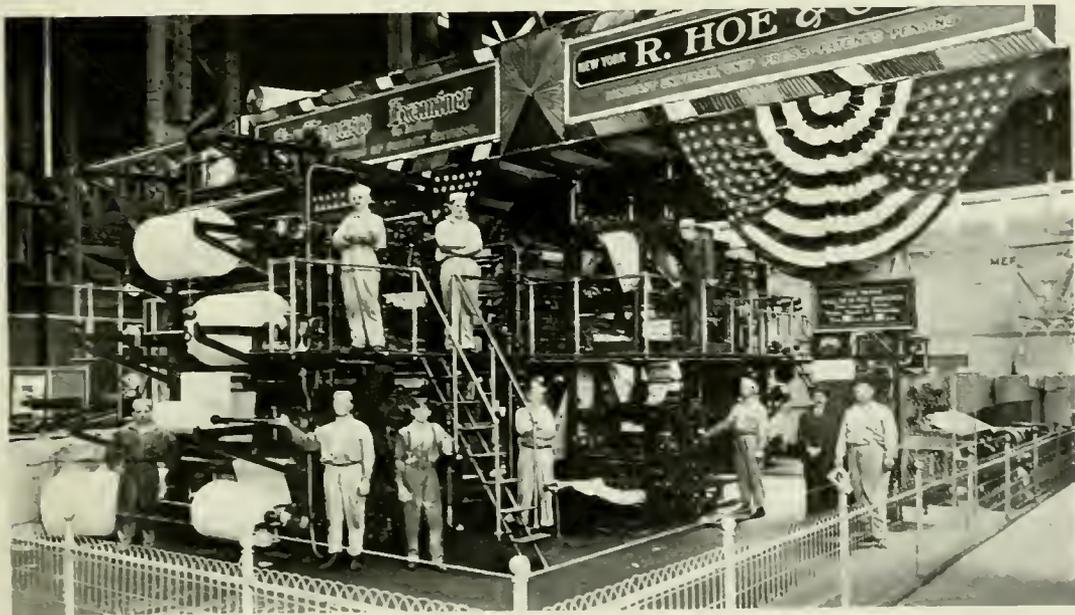
*Torpedoes
or Tomatoes*

The control of water lines, and of steam, gas, oil, and air, was illustrated by the Crane Company's exhibit. This firm is one of the world's leading manufacturers of plumbing supplies, and just to show what a valve might be, it installed one 33 feet high—a 72-inch wedge gate valve, with a 10-inch by-pass, operated by hydraulic cylinders, the whole weighing some 28 tons. It was necessary to build a concrete foundation for it, beneath the floor of the Machinery Palace. With this little faucet were shown a motor-operated gate valve of respectable size, steam headers, nozzle headers, expansion U bends, drainage fittings, refrigerating plant equipment, and a wide diversity of bronze valves and fittings.

Speaking generally, no better method of getting true surfaces had developed in machine-shop practice by 1915, than grinding. For a long



A LARGE VALVE



THE GREAT COLOR PRESS

time it had been regarded as very expensive, and it had been, and we all helped pay the expense, but during the ten years preceding the Exposition it had been coming more and more into use because in general it gave the best results. Concurrently, and naturally, there had been great advances in abrasives and grinding machines, and this progress was illustrated at San Francisco in the exhibit of the Carborundum Company, of Niagara Falls. In fact carborundum had had a great deal to do with this evolution of practice.

The arresting object in the center of the space was a fountain made of amethystine crystals of carborundum, created in all their gem-like beauty by mixing sawdust, sand, coke, and salt and melting them in an electric furnace with a temperature of 7,000 degrees, produced by current from Niagara Falls. When you reflect that steel begins to weaken at a little over 2,000 degrees, that is indicative of some torridity. It is said the discoverer was trying to make diamonds when he got the now well-known result—not diamonds, of which there are more than plenty in the world, but something infinitely more valuable, an abrasive harder and sharper than emery, and capable of being compressed into any desirable form. About the fountain were grouped every imaginable sort of grinding wheel, of this material. There was marble coping that had been cut by it, and glass cut and delicately etched by means of it. Aloxite wheels as well were shown here for treating leather. There were carborundum and aloxite paper and cloth for giving a high finish in the machine shop.

*A Happy
Failure*

In the next space was an exhibit of heavy "Landis" grinding machinery, on which such wheels could be used. One machine would impart to a wheel a speed of 18,000 revolutions per minute. This was part of the exhibit of Harron, Rickard and McCone.

The International Acheson Graphite Company exhibited some monster electrodes, of interest in California where electric smelting of iron ores had made some progress. These electrodes were 14 by 14 inches in section, and 80 inches long. Their current-capacity was 150 amperes per square inch of section, so that they could carry a total of 29,400 amperes. This company had developed the production of graphite artificially and on a large scale, and it exhibited one of the electric furnaces in which the process took place; furnaces capable of a heat so intense that it could break up carborundum, or metamorphose any carbonaceous material into graphitic carbon, or pure, solid graphite. Thus graphite for its many uses, from "lead" pencils to electrodes and crucibles, could be derived from coal and coke, and needed no costly purification, like the natural kind. Graphite, combined with greases and oils, for lubricants, was shown in this booth.

The National Carbon Company exhibited a large assortment of carbons for arc lamps, enclosed, open, or flame arc type; of searchlight carbons, projector carbons for moving-picture machines, carbons for miniature arc lamps, and carbons for use in photography.

A useful device shown in this Palace for shifting heavy objects in office buildings, warehouses, wholesale, and retail stores and the like, was the "transveyor" system of trucking, shown by the Cowan Truck Company, of Holyoke, Mass. There were a number of chassis equipped with a hydraulic lifting device and a series of movable platforms. The ordinary transveyor of this system, however, which was in general use in the Exposition, consisted of a four-wheeled hand truck used in connection with a separate platform. The truck was backed under the loaded platform, and the latter was lifted clear of the floor by a lever which, as one engineer said, was "manipulated by foot."

*Easy
Movers*

Eastern visitors accustomed to the sort of growing timber that the Californian remarked could be scooped up before breakfast with a mowing machine, opened their eyes and believed a few things about Pacific Coast lumber when they saw the skids under the logging engine of the Smith and Watson Iron Works, of Portland, Ore. These were the biggest cut timbers to be found in the Exposition: 34 inches wide, 42 inches thick, and 54 feet long. At intervals of six feet the skids were joined by six-foot lengths of similar sticks, and the forward ends of the main members were cut up like sled runners so that the 900-horse-power logging engine on them, with its boiler and logging winch, could drag itself through the woods under its own power.

A sort of sand-box layout with a miniature forest illustrated this firm's line of logging equipment in a most effective way. There were long trolley lines strung through the trees with which the roughest and heaviest operations could be performed. It was one of the best bits of model making in the Exposition because it so clearly indicated the nature and conditions of the work to be done.

There were two fine exhibits of leather belting in the Machinery Palace, which served to inform people of the importance of this product as a method of transmitting energy. These were the exhibits of the Graton & Knight Manufacturing Company of Worcester, Mass., with its "Spartan" brand, and the Charles A. Schieren Company of New York with its "Duxbak" brand.

The former exhibit was especially valuable in an educational way for the lesson it conveyed in the multiform uses of leather and the vital value of that commodity. For, the belt manufacturers took the largest and best

parts of the hide for the belt; and the outer parts and flanks, and pieces too small for belting although they might be of the best of the hide, went into a vast diversity of other uses, all which were illustrated in swinging cases on the wall—straps, heel counters for shoes, welting, trunk handles, gaskets, discs, pump leathers, washers, leather aprons, all sorts of small and daily necessary articles, with bicycle seats, and automobile and motorcycle sundries.

Some large belts were shown, and the art of building them up from sections of leather could be studied, and admired, for it was a thing to admire when you considered that many of them would have to run in heat and steam, and flooded wheel pits, and that when they gave out or got full of cracks or the seams let go, the plant, no matter how much might be invested in it and how much interest had to be paid for the money borrowed on it, would have to shut down until another belt could be slipped into place.

Of course, it would be better always to have the belt made from one piece of hide; and on one occasion the professor in charge of the mechanical engineering section of a famous technical school refused to accept delivery of a twenty-foot belt because it was "pieced together." The factory representative offered to supply a belt in one piece if the professor could find him a steer long enough from neck to tail to furnish the hide. So, these belts were an exhibit, as well, in the art of using cements.

*One-Piece
Difficulties*

One of the features of this exhibit was the belt with a V section, made of small, riveted, V-shaped bits, for catching friction in small transmission spaces. Another consisted of two belts that ran through a heat chamber of 200 degrees, and then through a bath of oil and water. And there was lace-leather, and round, twisted, and built-up round belting, and belts running on all imaginable forms of drive; around corners, and over large and small taper pulleys.

The Chas. A. Schieren Company also showed belts on all sorts of drives, and one running continuously through water. The pavilion erected by this company was very attractive, and was constructed of heavy steel to eliminate vibration as far as possible. There was a fountain in the center and many belt drives were arranged on the four columns of the booth.

Belts suggest pulleys. The American Pulley Company showed one made of steel, 72 inches in diameter with a 36-inch face, that you could start revolving with an almost invisible silk thread; and it weighed three quarters of a ton. Even the air resistance of the spidery arms had been calculated and reduced to the minimum. And, typical of the times and their demand for accuracy, there was in the same booth an "Efficiency Indicator" that measured within $\frac{3}{1000}$ of a horse power the amount of energy necessary to

revolve a given pulley. This was the first time it was ever exhibited, and daily demonstrations were given for interested visitors.

The Meese & Gottfried Company, of San Francisco, had a beautifully installed and very large exhibit of the accessories to manufacturing in which this concern specializes. Material-handling hoists and conveyors were shown in many designs. There were bucket elevators, and slat, apron, pan, spiral scraper, and belt conveyors, besides many more devices for equip-

*Factory
Helpers*

ping factories and mills. All about were photographs of industrial plants in which the appliances of this company had shortened methods and produced effective economies in materials and labor. There was a bewildering variety of wooden pulleys, and there was one steel-rimmed pulley 108 inches in diameter revolving on ring-oiling bearings at considerable speed with no source of energy apparent.

A menace to pulleys is centrifugal force at high rim speeds. The Meese & Gottfried Company exhibited a Gilbert wood pulley in course of construction, which showed how the thousand-odd pieces of hard maple were interlocked to resist successfully this outward strain. The same firm showed a 24-inch conveyor belt running across its entire exhibit space and above it, working back and forth, a large automatic belt tripper for discharging the load and distributing it evenly along both sides into bins below. This was equipped with a variable speed transmission.

What made the skyscraper grow appeared in the very elaborate and expensive installation of the Otis Elevator exhibit in the Machinery Palace. The passenger elevators were an exhibit in the Department of Liberal Arts, but the freight-elevating feature was classified under the Department of Machinery. The entire exhibit was in the one Palace, of which it formed an important integral part, for it helped people ascend to the offices of the Department, built in a small second story. At the entrance to the cages there were very handsome illustrations, in the form of illuminated dioramas of cities "grown up to skyscrapers" so to speak—New York on one side and San Francisco on the other.

The exhibit was so arranged as to permit a close inspection of the actual machines from all sides. There were gearless traction-elevator machines with governor and controller, and an Otis worm-gear traction machine for alternating current circuits, with variable speed control, arranged for two-speed operation.

Two of the latest safety devices were shown. One was the oil buffer, put under the car and counterbalance, and designed to bring either one to a gradual stop from full speed in case either should descend at abnormal speed toward the bottom of the hatchway. The gradual arrest of motion was



ABRASIVES AND THEIR WORK



EXPERT BOXERS

accomplished by the displacement of oil in the buffer as it escaped from one chamber into another; an artillery device. The other safety appliance was an electro-mechanical one that gripped the guide rail in case of a free falling car. It would operate mechanically if the hoisting ropes broke, and electrically if only an abnormal speed was reached with the hoisting ropes intact. The elevator serving the offices of the Department of Machinery was of the automatic push-button type, so constructed that the machine and hatchway were an interesting exhibit.

The application of hydraulic power to mechanical processes for doing the world's work was demonstrated by the exhibit of the Hydraulic Press Manufacturing Company, of Mount Gilead, O. Here was a wide variety of presses and pumps. Of interest in California was a 550-ton hydraulic olive-oil press, applying modern mechanics to one of the most ancient of labors. There was another 550-ton press for getting the grease out of tallow scrap and the lard from hog cracklings—of peculiar interest to meat packers. Then there was a 150-ton cider, wine or tannage press, with a juice capacity of 250 barrels a day.

*Giant
Presses*

It was not merely for food and drink however that the hydraulic principle had been put into use by these manufacturers. The press for forcing car wheels on their axles had a resistance post and cylinder made of open-hearth steel with a guaranteed tensile strength of 65,000 pounds to the square inch. If the axle was bent in the process there was another press that would straighten it, exerting if necessary a pressure of 75 tons. It had a nine-foot bed; and a shaft, axle or bar with a maximum diameter of $4\frac{1}{2}$ inches could be bent with it on 30-inch centers.

There were hydraulic pumps, motor driven and steam, and a representative group of hydraulic valves and fittings was shown. The agents, the Berger & Carter Company, of San Francisco, made a collective exhibit of machinery and equipment for the food-preserving and allied industries. There were can-making machines, electric cranes and hoists for packing plants, grain cleaners, and motors suitable for use in these lines.

This firm showed some gas engines and a wide diversity of machine-shop tools—lathes, drills, grinders, and shapers, as well as water-handling devices, pumps, heaters, concrete mixers, rock crushers, wood-working machinery, hoists, jacks, pipe, and bolt-cutting machinery (some of the pipe-cutting devices would cut and thread extremely short nipples), well-drilling and prospecting machinery, tool steels and supplies. There were seven large machines in operation in this extensive space, in which there were also exhibited donkey engines, mine pumps, lever, and hydraulic jacks and other machinery needed about mines.

The Warner & Swasey Company showed some turret lathes that were of great interest to machinists—its universal Hollow Hexagon lathes especially for bar and chuck work, and its turret-screw machines, automatic boring and tapping machines, and a valve-milling machine. These were of fine design and superior workmanship, and had a wide range of application. They were shown in operation.

Saw filing by machinery was exhibited by the Hanchett Swage Works, of Big Rapids, Mich. This concern showed power saw-filing devices for handling every type of saw used in wood working.

Production of tools and other mechanical forms by drop forging had made much headway during the decade preceding the Exposition, and so the exhibit of the J. H. Williams Company, of Brooklyn and Buffalo, was of pretty wide interest. The actual method was illustrated by a hammer that formed part of the exhibit, and a cyclorama in the center of the booth, with a number of oak panels on which were mounted a great variety of tools and appliances. Some of the most delicate and intricate forms were displayed, ranging from automobile crank shafts to surgical instruments. The space was fenced with chain pipe wrenches, among which was a 16-inch wrench weighing 140 pounds, the chain of which had a breaking strain of 40,000.

The private water-supply of country places, and even of large city institutions, such as hotels, had been occupying much attention since the St. Louis Exposition, and certain phases of improvement had come into being that were of interest to the managers of large concerns and owners of farmhouses which they wished to put into modern condition. They found much that they were looking for in the exhibit of the Kewanee Private Utilities Company, of Kewanee, Ill. Through the methods developed by this concern, water pumped into an air-tight steel tank against the atmospheric contents of that tank would be forced out if the pressure were released by the opening of a tap, and would flow through a piping system as well as it would by gravity. With this system you would need no tank aloft on a tower, but could keep the water fresh, cool, and uncontaminated in a reservoir underground. To this device the company had added individual electric-lighting plants, vacuum cleaners, sewage-disposal systems, small refrigerating plants and other contrivances for promoting comfort and giving the householder command of his own supplies and operations. These things not only ministered to convenience but to independence, and so were a good thing socially and politically, as well as mechanically.

CHAPTER XXX

WATER AND ELECTRICITY

THE Palace of Machinery offered engineers a working laboratory of the best hydraulic practice, in at least part of their field, in the exhibit of the Pelton Water Wheel Company of San Francisco, and its co-exhibitors, the New London Ship and Engine Company, of New London, Conn., the Builders' Iron Foundry of Providence, R. I., the Falk Company, of Milwaukee, the General Electric Company, of Schenectady, and the Westinghouse Electric and Manufacturing Company of Pittsburg, Pa., and some others.

A whole block in the Palace of Machinery was occupied by hydraulic power apparatus and auxiliary equipment, and the exhibit comprised among even larger and more significant features, horizontal and vertical turbine pumps, hydraulic "giants," speed-increasing gears, water-measuring and recording apparatus, electric generators and motors, and electric measuring and recording instruments.

The exhibit so favorably impressed Dr. Lucke, of Columbia University, Chairman of the Jury of Awards of this section, that he brought it to the attention of two graduates of Columbia, with the result that, except those parts destined for immediate service, it was purchased outright for that institution and now forms a part of the laboratory equipment of Columbia's School of Mines; while the central feature, the great 20,000-horse-power turbine, has gone into service and proved itself a 25,000-horse-power unit.

California is a land of water power. It is also a land of gold. The miners used the water in their mining operations, and the art of handling it in long flumes and falling pipe lines and discharging it through "monitors" or "giants" to tear out auriferous gravel beds and canyon sides, grew into the great hydro-electric generating and transmitting arts that have made fundamental changes in industry in many parts of the world, and seem destined to make more of them wherever there is falling water in quantity.

*How it
Started*

Part of that development was the invention, by Lester Pelton, and the manufacture in San Francisco, of the Pelton tangential water wheel, whose

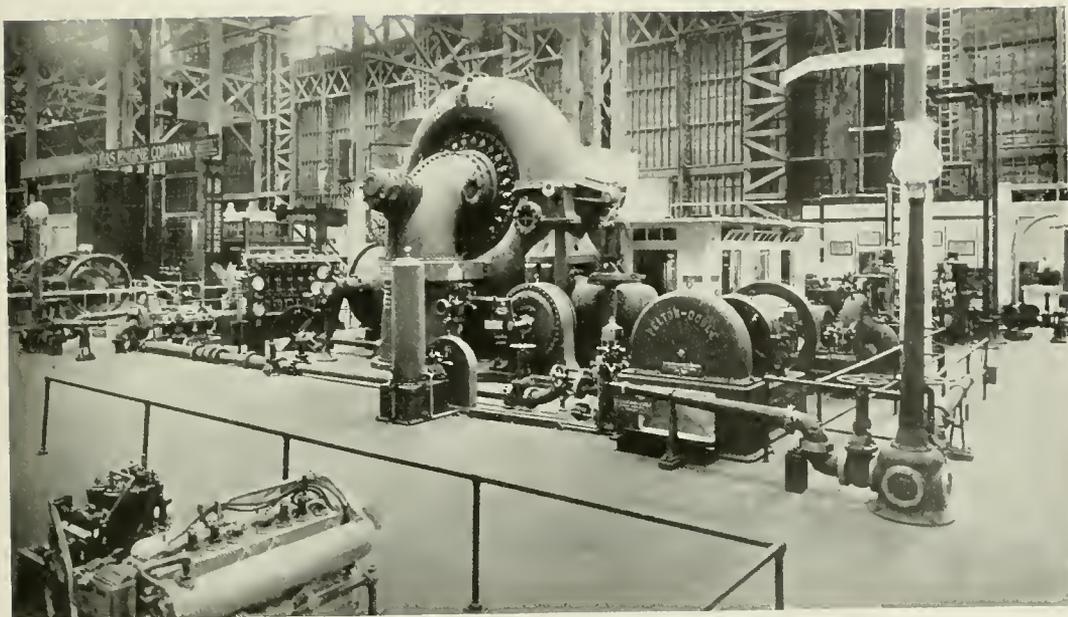
pairs of shallow double "buckets" with knife-edge divisions, make maximum utilization of the energy of the jet that strikes them. Another part was the invention, by J. B. Francis, of the Francis turbine, and its development by the Pelton people into the Pelton-Francis wheel. These wheels are now known all over the world and the quantity of energy generated by means of them sounds fabulous.

The Lake Spaulding project of the Pacific Gas & Electric Company, was, in 1915, one of the most remarkable undertakings for the utilization of water power ever conceived. The head waters of the whole south fork of the Yuba were backed up and carried across a divide to the water shed of the Bear, by means of an enormous dam, which formed Lake Spaulding. Before the water was turned over to the farmers in the valley below to grow crops with, it was to generate at various power houses on the line of its descent a total of 133,500 kilowatts of electrical energy. At the principal station, Drum Power House, it would generate 50,000 kilowatts, one of the wheels to do it

Taming Gravity being a Pelton-Francis turbine, with a rated capacity of 20,000 horse power. The wheel happened to be completed just in time for the Exposition and was installed in the Palace of Machinery, by the Pelton Water Wheel Company, on permission of the Pacific Gas & Electric Company; standing still, of course, because there was no way to supply it with a stream adequate to its operation in the Palace. The big wheel was designed to run at 360 revolutions per minute under a head of 500 feet. Its bronze "runner" was 74 inches in diameter, and the whole thing stood 26 feet high, from the floor level. In the year of the Exposition this turbine was the largest of its class.

The general exhibit in this space was a most effective demonstration of the instrumentalities of hydro-electric development where such development has led the world—in California. Even to a layman it was impressive. There seemed to be needle nozzles and nozzle needles all over the place. The needle was a shining steel object several sizes taller than a man; quite a needle. "Runners" of the tangential Pelton wheels with their bifurcated buckets were lying on the floor, and there was a "runner" of a Pelton-Francis turbine standing by to show how the water entered at the circumference and left at the center.

Besides the great 20,000 horse-power turbine, standing still, there was a Pelton tangential water wheel in operation under a head of 300 feet, pumped by a heavy-oil internal-combustion engine of the Diesel type made by the New London Ship and Engine Company and geared to the pump by a Falk gear that turned up the speed from 350 revolutions to 1,800 per minute and was said to work with an efficiency of 98½ per cent.



THE 20,000-HORSE-POWER TURBINE



STORAGE-BATTERY TRUCKS

The important thing about this wheel was that it was equipped with an oil-pressure governor and the latest pattern of water-economizing needle nozzle and relief valves; for two of the serious problems of the hydro-electric engineer were regulation of speed under fluctuating loads, and water economy under the same conditions without producing excessive pressure from surges.

The governor and needle-nozzle operation was shown in an electric-lighted case with windows in it so that you could see what was going on—the heavy gush of the jet as the load increased, the deflection of part of it as the load lightened, the turning of it back to the wheel again as more load came on, all working automatically. The wheel operated a 75-K.W. direct current generator made by the General Electric Company of Schenectady. An assembled nozzle was shown, standing still, designed to operate under a head of 1,450 feet and control a jet capable of generating 10,000 horse power. Near it were the tangential “runners” mentioned above, designed to take such jets, and built to go on each end of a shaft which would carry the revolving element of a 15,000-K. V.A. generator. *Mechanical Heart*

A Venturi meter was exhibited, of the type used to measure the water in-put for these operations. Pump efficiency was measured by Crosby indicating gauges.

There was a Pelton-Francis turbine engaged in turning a Westinghouse generator. The water was supplied by a vertical deep-well pump, run by a vertical-type Westinghouse motor.

There were many other vitally interesting things in this exhibit, one of the most important in the Palace, including some of the monitors used in hydraulic mining in California; and not the least interesting, from a popular point of view, was a Pelton-Doble standard water motor especially adapted to generating current for farmhouse lighting, and for churning and other work, provided the farmer has a small stream. There was another little wheel that could be set up in a wooden frame, especially suitable for shipping into comparatively inaccessible regions, where the wooden part could be built on the ground. In such a case the company supplied only the metal parts, and thousands of these little wheels have been sold for all sorts of uses, all over the globe.

We have been thus specific about this exhibit because it contained units not merely of the most improved pattern but of larger size than any other part of the world was accustomed to. No single unit greater than half the big turbine had been used in Europe, down to that time. The space was haunted every hour the Palace was open by civil engineers from all quarters

of the globe. And inasmuch as the company had the sagacity to keep men on duty there that understood its product, its business, and its policies (every day two or three of the executive officers were in attendance part of the time) the results were most valuable. About 500 inquiries were received by this one company from men able to buy this sort of equipment. And when you consider that many of its contracts exceed \$100,000 such a volume of inquiry from the "effective demand" may be understood to mean something.

The exhibit of the Westinghouse Electric and Manufacturing Company, in the Palace of Machinery, was, from dynamos to stoves, a great chapter in the incredible fairy tale of the subjection of electricity to human service. It occupied the largest space of any individual exhibit in the Palace, enclosing 8,672 square feet of floor area. The middle aisle of the Palace ran directly through the exhibit and the east and west fronts of the space bordered two main aisles.

The exhibits of electrical devices were most complete and diversified. In power-generating apparatus there was a Le Blanc jet condenser, a Westinghouse-Parsons steam turbine, complete, a 625 K.V.A. generator and a 15-K.W. exciter, all of which were "knocked down" to permit of careful inspection of the interior parts.

There was an operating model (one-eighth size), built to accurate dimensions, of the steam-turbine outfit with reduction gear which is used on the U. S. Collier "Neptune." Beside it was a small complete steam-turbine unit of only 1 K.W. capacity, like those used for small electric plants where lights and little motors are required—aboard yachts and other small vessels propelled by steam. The display of industrial motors and control was so complete that motors could be found here suitable for use in hundreds of industries. There were motors for operating huge steel mills, and for polishing silverware in the home, and to cover the whole range between.

The substitution of rolled or pressed steel for cast iron marked a new era in the manufacture of these things, having been first introduced by the Westinghouse Company about five years before the Exposition opened.

To the layman the electric motor is likely to be a thing of mystery. "What makes the wheels go around?" is a question he often asks. The primary of an induction motor connected in circuit was exhibited, in connection with various metal devices, which illustrated the principles of the rotating magnetic field in a simple and understandable manner.

There was a good showing of arc-welding equipment. Street-lighting systems were represented by means of six Westinghouse, ornamental pillar type, flame-arc lamps, operated from a constant current regulator, the

regulator being sufficiently sensitive to be used in connection with Mazda lamps. Mercury vapor and mechanical rectifiers and motor-generators for use in battery-charging and for motion pictures were shown in operation. The peculiar greenish light of the mercury vapor rectifier always served as an interesting diversion for the crowd, at least part of which must have wondered when the movies were going to begin.

*Current
Control*

The distribution of electric energy to homes, factories, farms, shops, stores, makes it necessary to reduce the voltage (quite high at the generator, for economy of copper wire), to one suitable for the service required. This is accomplished by distributing transformers, a number of which were on display in this exhibit, "knocked down" to permit their study and inspection by the visitor.

One quarter of the whole exhibit was devoted to the display of every conceivable electrical device used in the home. It included electric fans, ranges, heating devices of all kinds, ozonizers, small motors. More interest was shown by the general public in electric ranges than in any other device in the entire space; for it was generally felt that electric cooking was on the way, and everybody is interested in getting something to eat. In addition to the cleanliness, safety, and general desirability of cooking with current, the automatic type of range shown had the added advantage of saving considerable care on the part of the housewife, because both the timing and the temperature were controlled automatically. The range ovens utilized the fireless cooker heat-storage principle. The current brought the oven to the desired temperature, after which the cooking was carried on by the stored heat. The perfect results obtained in the prevailing types of gas range could be duplicated in these electric ranges owing to the improved internal ventilating system used. Surplus moisture was carried off, condensed, and deposited in a small reservoir provided for the purpose, but no heat was permitted to escape.

The first storage battery Lord Kelvin saw filled him with excitement and delight. Here was his dream come true, the baling up of energy so that it could be carted about and delivered anywhere, like flour or bricks. Yet the storage batteries of those days were heavy and clumsy things, so heavy and clumsy and relatively ineffective that for a long time Edison said the best one he knew of was a ton of coal.

Ultimately the great American genius of practical research gave his attention to the storage battery, and when Edison gave his attention to a subject something was quite likely to come of it. His device was on exhibition in the Palace of Machinery, a comparatively light and highly reliable thing,

by that time widely used. Its production involved one of the cleverest and most delicately refined processes in the whole range of manufacture. Years of experimentation to obtain reliable conductivity in the positive chamber, resulted in the adoption of flake nickel for this purpose—nickel so finely divided that it would carry current through the other substance, nickel hydrate, without interfering physically with the properties of the latter. It had to come as close to that impossibility of physics, penetration, as possible. Practically, it just about had to be there and not be there at the same time; or the nickel and the nickel hydrate had to occupy the same space at the same time—which “can’t be done.”

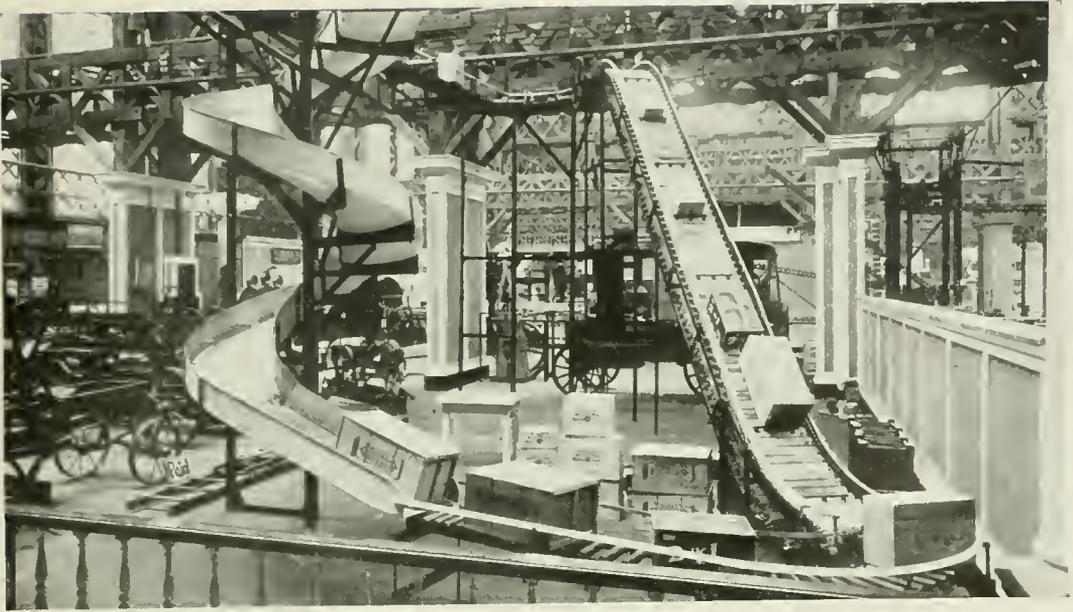
*A Hard
Problem*

But Edison came near doing it. He deposited on an electrode alternate layers of copper and nickel so thin that it took a hundred of each or two hundred of both to equal the thickness of a visiting card. Then he cut up the composite sheet into squares of about a sixteenth of an inch diameter and dissolved out the copper, leaving pure nickel flakes so thin they would float in the air like down.

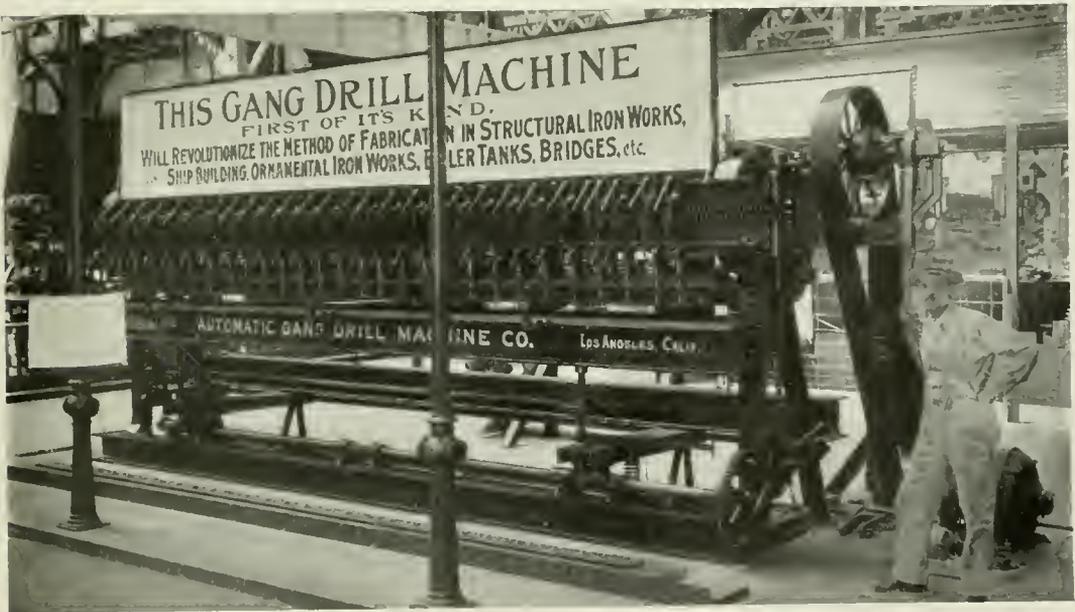
This was the miracle of the Edison storage battery shown at the Exposition—not a very spectacular thing in appearance, rather a drab, uninteresting object, like a lunch box full of plain food; but when we go back to Lord Kelvin’s point of view, and then come forward to Edison’s pertinacious hunt for an impalpable conductor and his craft in getting so close to it, it takes on an inspiring significance. These were the storage batteries that actuated the busy little one-ton trucks that ran about the aisles of the palaces bringing in exhibit material and delivering it from booth to booth.

In the development of electricity the meter played a vital part, for on an old flat-rate scale it would have been impossible ever to have set a price for current with any certainty or justice to producer or consumer, and the inevitable economic result of uncertainty would have followed—that the consumer would have had to pay enough to insure against loss, and the art would have languished under too heavy a price load. So exhibits of meters were of great interest to electrical engineers, as the general subject should have been to the public at large. And while meters are not new, nor very exciting, there was one application of them that was new and that demonstrated the growing refinements of economy in the electrical field. That was the street-railway ampere-hour meter of the Sangamon Electric Company, of Springfield, Illinois.

The factory of this company was devoted exclusively to the manufacture of electric meters and their accessories, and its display was very comprehensive, including many examples of transformers and shunts. The function of the street-railway meter was so broadly typical of the times, and touches



CONVEYER SYSTEM FOR A MODERN FACTORY



HOLES AT WHOLESALE

common experience so closely as to warrant attention. This device recorded the amount of current used to run a car, and its main service was to develop efficiency and economy among motormen, so that the power bill would not mount above the dividend line. *Conserving Energy*

That is matter of interest to everybody. When things are wasted somebody has to pay, and that somebody is usually the general dear public.

At the same time that it was checking current consumption by the motorman, this meter brought to light wasteful defects in the car, for the motorman had to have an "out" and he found it: tight brake-shoes, bad gear reductions, inefficient motors. On systems where these meters had been installed, savings amounting to as much as 20 per cent had been effected in power bills alone.

An electric indicator for locating underground mains and service pipes without digging up the pavement and all the surrounding scenery was exhibited by the A. P. Smith Manufacturing Company of East Orange, N. J. This firm showed everything for the water-man—tools for making connections under water pressure, for inserting valves in mains, cutting, drilling, and tapping water pipe, lead furnaces for jointing iron pipe, everything to delight the macadam-digger's heart.

The Standard Underground Cable Company made a meritorious exhibit of conductors for electric distribution showing the modern construction and that of 30 years ago. The later characteristic appeared in the use of paper, varnished cloth, and rubber for insulation. This company showed junction boxes, cable terminals, submarine, and underground power cables; and something new, in the shape of copper-clad steel wire that had a conductivity of 30 or 40 per cent of whole copper wire, with much more strength. Its braiding machines for putting the insulation around the conductor were shown in operation, doing their mechanical Maypole dance. It was a great exhibit, perhaps the greatest thus far made, of electrical conductors.

CHAPTER XXXI

THE MILLION-VOLT TRANSFORMER

THE Exposition spent nearly \$5,000, directly, for the advancement of science in the practical field of electrical transmission and distribution. This went into the construction of the special High Tension Research Pavilion, just east of the Palace of Machinery, in which C. H. Thordarson of Chicago installed his new million-volt transformer, and where he conducted some striking experimentation to test new types of insulator.

*Raising
the Limit* The work probably disclosed the existing limits of the practical in handling current at high voltages—and in addition aroused intense interest on the part of the public through the spectacular displays attending the experimentation. Incidentally, it was the first time in history that the public had been given a chance to play with charges from such a giant piece of apparatus.

Briefly stated, the practical purposes of Thordarson's recent experimentation had been to find a way to dampen surges, to eliminate the corona and corona losses, and to develop an insulator that would stand up under a load of current at a million volts. How far successful his researches were it is not possible at present to state, for they were not concluded at the end of the Exposition, but at this writing are still going on at his laboratory in Chicago. Their importance in Exposition history is that they became not merely an exhibit of the fruit of past invention, but an exploration of new fields, a forward step in science and the electrical art, which the Exposition aided.

Thordarson himself was a man of most interesting personality; a manufacturer of electrical instruments and material, with the youthful enthusiasm of the real inventor. He was an Icelander, who had come to Uncle Sam's land of opportunity and begun manufacturing on a modest scale, expanding his facilities as he progressed. In the rapidly developing field of electricity, he took as his point of scientific attack the problems of transmission, and the instrument that makes transmission over long distances commercially possible: the transformer. He had been trying to produce a better type of transformer, and then to handle the "stepped up" current without losing too

much of it in the air. Success would get the world ahead one more stride, and as that was what the Exposition was for, it was glad to assist by putting up the necessary building, inasmuch as there was no exhibit Palace in which this particular sort of "exhibit" would have been safe.

The Research Pavilion was a place of mystery to thousands of visitors during its construction. The electro-static stress was to be so high that no nails could be used in it, and it had to be put together with bolts running parallel with the wires. And the bolts had to go clear through the timbers so that both ends should be out in the open—not enclosed in the wood, which they might have ignited. As it was, they were quite irritable, and long, blue sparks could be teased from them with little provocation. The ends of the building were open like the hangar of a Zeppelin, so that the wires could have good clearance, for they were quite petulant too, and in darkness were disposed to grow angry beards of bluish light. Inside the building was a cement pit lined with sheet metal. The Exposition borrowed 225 barrels of high-grade oil from the Union Oil Company of California with which to fill this pit, in order that the transformer might be immersed in it for insulation.

*A Weird
Spectacle*

Thordarson himself had spent \$30,000 in the development of the transformer. Unfortunately the exhibit could not be made ready until late in the season, and it was not until September that the inventor, and A. S. Lindstrom, former Superintendent of the Electrical Section of the Department of Machinery, who had become his assistant, could get the apparatus installed.

No such transformer had ever been built before. The thing weighed about 30,000 pounds, was made up of 26,000 pieces of paper, fiber, aluminum, copper, steel, and iron, and was designed to handle 1,000 kilowatts, or a little over 1,300 horse power, at 60 cycles.

The design of the primary and secondary windings was a radical departure from the practice of the time, and was the main characteristic of the device. The method of coiling the conductors and insulating the coils was entirely new. There was no taping of coils and no covering of wires with cotton, silk, or paper. The coils consisted of flat, aluminum, 8 mil., one ampere conductor, and the turns were insulated from their neighbors by three papers two mils. thick. It took a year and a half of laboratory work to make and assemble the parts for 12 specially designed winding-machines, and conduct special research to determine the necessary materials.

Four hundred miles of paper, aluminum, and copper were used in the construction of the coils and paper tube; the million-volt coil involving 90 miles of aluminum and 270 miles of paper ribbon. The low-voltage side,

wound to receive 2,200 volts, was made up of 122 coils, every two coils being bridged across the 2,200-volt terminals. The center tap of each set of coils was wired to ground through the transformer frame. The paper tube that insulated the primary and secondary coils weighed over a ton. The million-volt side was made up of 190 coils, each coil being equally spaced and wound, and capable of developing 5,300 volts. All the coils were connected in series, with one end grounded. The bare edges of all the primary and secondary turns were exposed to the free oil and depended on it for insulation.

*Simple
to Build*

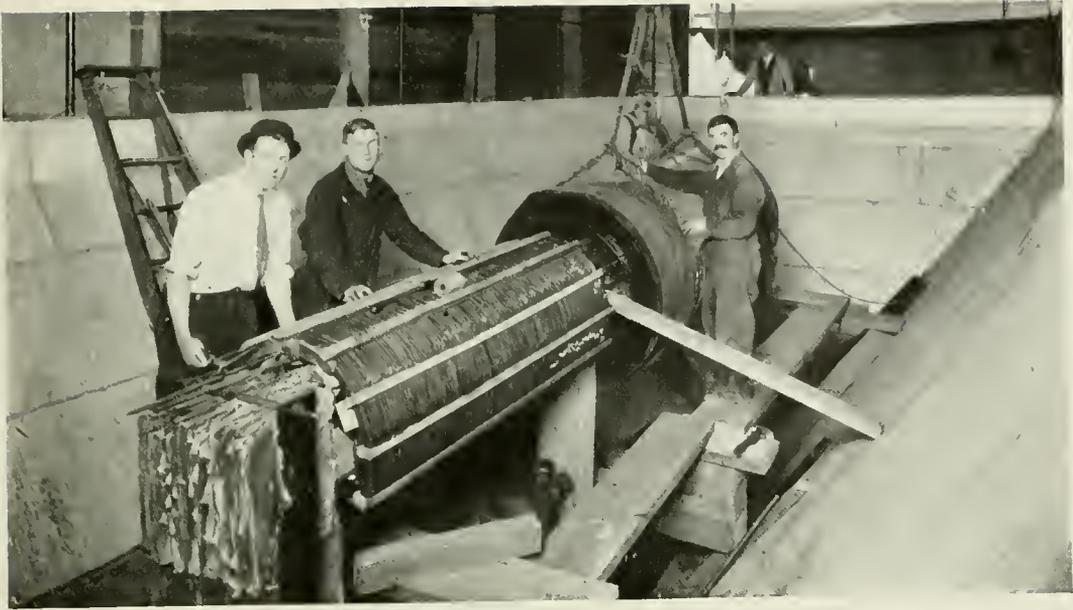
Heavy discharges that occurred between coils in the oil, from surges above a million volts, did not cause a short-circuiting of the windings. In some of the tests two million volts in surges arose, and when an arc did occur it was always repaired in less than a day, for owing to the open winding it was never necessary to take the transformer apart.

In contradiction to the general belief that the absorption of water from the air by the oil would lower its diëlectric strength and therefore necessitate having the transformer covered, the contrary appears to have been the case for the oil, as an insulator, improved, although exposed to fog and general humidity that entered through the open ends of the building.

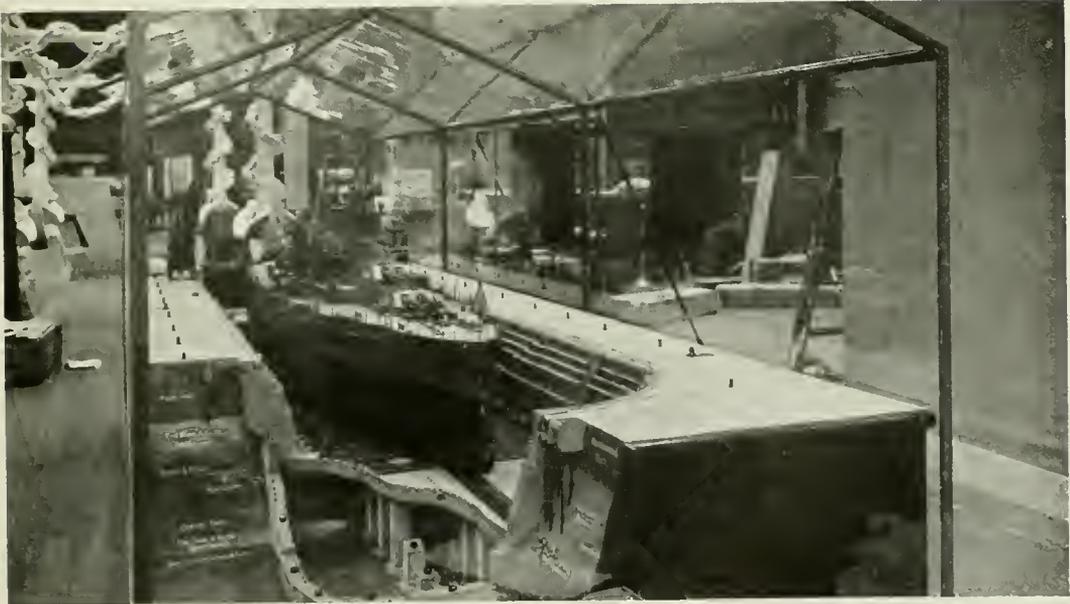
Outside the High Tension Pavilion, a number of demonstration appliances were suspended between 50-foot wooden poles. Two large horn gaps in the shape of three-quarter inch gas pipes were put in, one being suspended on the million-volt wire, the other hanging by an insulated rope, the end being permanently grounded through a stream of water 12 feet in length. This water jet became quite luminous when the transformer was in action.

A wire screen measuring 50 feet square was suspended 30 feet above the ground and connected to the transformer, with a safety net beneath. At a million-volt pressure it took 400 horse power to charge this large wire screen alone; and the energy was not from a high frequency source. Walking under the screen, one was curiously affected. The ends of the fingers glowed. If a hat were held up, angry little sparks would jump from the hat band to the fingers. A metal ball tossed in the air became a shooting star. Ladies' hat pins were highly charged. A sheet metal condenser supported on a tall wooden frame would spit little streaks of lighting four or five inches long at a piece of iron pipe pointed at it and keep it up until you got tired of the queer strain in your elbow. At night engineers and scientists were invited to tamper with the charge by means of helium and neon gas tubes. When the tubes were waved in the air the negative and positive ions could be readily detected, the negative showing a narrow bright line and the positive a sluggish, heavy, dim one.

*Toying with
Lightning*



THE THORDARSON TRANSFORMER



BATTLESHIP IN DRY-DOCK

Spectacular demonstrations under this wire screen were carried on nightly, with two to three thousand people in attendance, each trying out the effects of the electro-static charge in his own way. The voltage during these "stunts" rarely rose over half a million. A number of secondary wires 10 feet in length were suspended in the air on slender wooden pieces, each being insulated from the rest. All of the wires became highly charged, and electricity at a "pressure" of 75,000 volts would pass through the spectators' bodies when within a few inches of contact. There were no bad results from it because there was no energy from amperage within the secondary wires.

These stunts were well enough to amuse the crowds; but the real business, or part of it, was to test and exhibit the insulator that should support the wire and hold the current on it in such a highly nervous condition as a million volts. For this purpose nothing better had been found than plain hemp rope soaked with paraffin and then dipped in hot tar to keep the water out. But with it arose the difficulty that when the current did decide to travel on it, say in surges, it burned up. So it was passed, at the point of junction with the conductor, through wire baskets, looking a good deal like fern baskets, which spread out from the conductor over the rope, serving as electro-static insulators and distributing the strains equally, so that local circuits could not be set up at the point of contact between rope and wire.

There was no way to measure the corona loss, but the demonstrations indicated that at voltages of more than 500,000, air ceases to insulate, and some electrical engineers inferred that no great increase in present commercial working voltages could be expected until methods were found to prevent these losses. They were convinced, however, that a great step had been made in transformer design, particularly from the mechanical standpoint, and they were profoundly impressed by the transformer's capacity for punishment and the ease with which it could be repaired.

*Where the
Air Fails*

The Thordarson exhibit in the Machinery Palace itself contained a great many interesting electrical displays. A 40,000-volt laboratory transformer showed the phenomena of induction, transformation and repulsion. When it was connected at 2 volts people were permitted to hold pliers gripping charged copper wires, which were burnt in two while they held them, by the heavy flow of current. A number of interesting phenomena, such as the X-Ray and wireless were demonstrated to the public. This was one of the most fascinating places in the Palace of Machinery and not only entertained but instructed large crowds daily.

CHAPTER XXXII

THE FEDERAL GOVERNMENT IN THE MACHINERY PALACE

THE largest exhibitor in the Palace of Machinery was the United States, which filled 29,000 square feet with models of warships, transports, vehicles used in the Service, from the wagon that went with Sherman from Atlanta to the Sea to the Philippine carabao cart; and ammunition, from pistol cartridges to 16-inch steel shells nosed with lead to lubricate their way through a ship's armor. A complete plant for making small-arm cartridges came from the Frankford arsenal at Philadelphia, and ground out rifle ammunition and clips for it, during the season. There was a moving picture theater as part of the exhibit in this Palace for further visual education of the public in the nature and functions of the Government.

The School of Submarine Defense at Fort Monroe, Va., exhibited the processes involved in making the harbors of the United States inhospitable to undesirable guests, by planting mines. In a glass tank it showed these obstacles to hostile navigation sown rather thickly just under water. A miniature warship approached, passed several in safety, and then came into contact with one that was exploded from shore, when it turned turtle and sank. This exhibit seemed to have the utmost fascination for the schoolboys that came in classes. They could hardly be torn away. Teacher didn't see much in it, but the young savages she had undertaken to pilot through the exhibits watched open-mouthed the approach of the doomed vessel. Clearly seeing the mines it could not see, they hung on its progress to certain doom, and when the electric light simulated the explosion and the ship turned over and sank, burst into cheers, and demanded to be permitted to enjoy the catsatrophe again. It only occurred at stated intervals. At the edge of the tank a model of part of a fort showed how coast defense guns and mortars emphasized the welcome of the mines.

There was a slab of six-inch armor plate that had been shot full of shell holes. Four of the shells that had done the work had been recovered whole and were standing by: a five-inch that weighed 52 pounds, a six-inch that

weighed 94, an eight-inch at 285, and a ten-inch at 553. There were also some rather neat contrivances in the shell line for dropping on vessels' decks by high-angle fire, guaranteed to keep right on dropping until they exploded in the ward room, or the engine room if they could get in.

The United States exhibit in this Palace was made by the Army, the Navy, and the Department of Commerce. One of the attractive features of it consisted of a large turret with square port holes, through which you could look in and see a review by the panorama method of every sort of fighting craft the United States Navy has ever used—beautiful illuminated marine views, of the utmost interest historically. There was the “Bon Homme Richard,” of 1778, and the super-dreadnaught “California” of 1915, and every type between. Old double-deckers and apple-bowed frigates went sailing by, followed by the Monitor and the Merrimac types, and side-wheelers, rams, destroyers, and submarines. In addition to these illuminated pictures there was a large number of fine cruiser models and of first-class battleships. Marine corps uniforms and kits were shown. There was a recruiting station with cases of sporting goods on display, as an additional attraction.

The Bureau of Yards and Docks showed a model of Drydock 4 of the United States Navy Yard at New York—703 feet long—with a battleship in it. In a steel tank was a model of the United States floating dock at Cavite, Philippine Islands, a dock that measures 100 by 500 feet.

The first foghorn San Francisco ever had was a cannon, an old cast-iron smooth-bore that looked as though it had been a thousand years old when it first went into service at Point Bonita in 1855. Its carriage was so dilapidated the barrel had to be supported on a steel horse. It was not contemporaneous, but beside it was a 1,000-pound fog bell with an automatic striker, and the newest and hoarsest foghorns that ever desolated the night. The Bureau of Lighthouses, Department of Commerce, exhibited a steel model of the Fowey Rocks Light Station, off the coast of Florida; one of the newest and most effective stations in existence. The whole lighthouse exhibit was of much value. Here were great double lenses, compositions of curving prisms, rotated on ball bearings by clockwork. The lantern and lens, for the Galveston jetty were shown, and the old lens from Alcatraz, the first on the Coast, installed in 1854, and used until 1902. The lantern, lens, and watchroom for Cape St. Elias, Alaska, were on exhibition. The whole evolution of the lighthouse lamp was illustrated, the series concluding with an example of the newest fourth order lens, composed of circular concentric open prisms, which will

*Speaking
Foghorn*

take the light from a 600 candle-power lamp and magnify it, in the direction of the beam, to 80,000 candle-power.

Part of the War Department's exhibit were some remarkably instantaneous photographs of a twelve-inch shell leaving the muzzle of a coast defense gun. They were taken at Fort Monroe with what was said to be the fastest shutter ever manufactured, and they caught the shell halfway out of the gun, two feet from it, and at various distances after that. The balloon-like emission of gas appeared quite plainly, not following the shell in a gradually expanding jet, but bursting away at a right angle to the bore of the gun and forming an immense globe before it. It was said the exposure interval of the shutter with which these pictures were made was a five-thousandth of a second; a very short open season.

There was a display of old uniforms such as the various branches of the country's military service had worn in times happily gone by. Some of them were fearful to contemplate.

Old rifles, dating back to 1500 A.D., were exhibited in racks; a most interesting collection, including wheel locks, flint locks and cap-and-ball muskets. How often would you suppose two bullets fired from opposite sides would collide in a battle? Once in a thousand years of fighting? If they collided out in the open between the lines, of course there would be no way to find it out. But here were two bullets that had met inside a gun during a battle of the Civil War, a captured and preserved collision. They made quite a bulge. The barrel was subsequently cut open for about half its length to show this unusual coincidence. The old relic is probably much exhibited but will always be sure of a popular welcome for the rarity of the occurrence.

The Signal Corps and the Artillery exhibited some excellent stuffed mules, one with a complete wireless outfit on his back. Vital things were shown, such as the Army boot and the Army shoe as they had been worn from 1857 down to 1914. Some of the early ones would make the death agony welcome. There were signal corps phones, and switch boards. And all about were transparencies showing war scenes. There were some examples of ordnance—two three-inch rifles, and a six-inch howitzer with an oil recoil cylinder.

A series of 14 transparencies illustrated the military history of the country. There were scenes, sometimes consisting of reproductions of famous paintings, later of photographs colored, from the Revolutionary war, the War of 1812, the Mexican War, the Civil War, the Indian wars, the Spanish War, the Philippine Insurrection, and the Siege of the Legations at Peking.

Shortly before the opening of the Exposition the Life-Saving Service and



ARTHUR PUTNAM, SCULPTOR

THE MERMAID FOUNTAIN

the Revenue Cutter Service had been consolidated, and the names had been changed by act of Congress to the "United States Coast Guard," on January 28, 1915. So its exhibit in the Palace of Machinery was in a sense the first exhibit of the last named service. Its history and traditions, however, were those of the old services; and what the Coast Guard was for, appeared pretty plainly in a posted record covering the years 1904 to 1914. It ran:

VESSELS IN DISTRESS ASSISTED, 2,070.
 VALUE, INCLUDING CARGOES, \$92,934,435.
 PERSONS ON BOARD, 28,448.
 PERSONS CARED FOR ON CUTTERS, 4,429.
 LIVES SAVED FROM DROWNING, 1,169.
 VESSELS BOARDED AND EXAMINED, 198,693.
 VESSELS REPORTED FOR VIOLATIONS OF THE LAW, 6,196.
 FINES INCURRED BY VESSELS REPORTED, \$1,225,627.
 CONSERVATION, \$4.32 FOR EVERY DOLLAR EXPENDED.

The function and early activity of the Cutter Service was indicated by an old framed commission reading:

"GEORGE WASHINGTON, PRESIDENT OF THE UNITED STATES OF AMERICA, TO ALL WHO SHALL SEE THESE PRESENTS, GREETING. KNOW YE THAT REPOSING SPECIAL TRUST AND CONFIDENCE IN THE INTEGRITY, DILIGENCE AND GOOD CONDUCT OF HOPLEY YEATON OF NEW HAMPSHIRE, I DO APPOINT HIM MASTER OF A CUTTER IN THE SERVICE OF THE UNITED STATES FOR THE PROTECTION OF THE REVENUE."

The document was dated at Philadelphia, March 21, 1791.

Before the civil engineers there were the military engineers, and those of the United States Army keep their hands in during peace times by directing great public works. The Panama Canal is an instance of what they may do when they have a good field in which to operate. The Government exhibit in the Palace of Machinery contained a great many fascinating engineers' models of improvement projects, and the achievements of the Army engineers in execution of them, accompanied by complete data so the public might learn something of the nature of such activities.

*The Army
Engineers*

In this way were represented lock and dam, and flood control projects on the great rivers of the Middle Western States, especially in the case of the Mississippi. A brief history of the work of the Mississippi River Commis-

sion from 1879 to 1914 was illustrated by models showing the ways of dealing with caving banks, a model of a hydraulic grader at work, a model of a dredging-plant, a model of a spur dike, and two volumes of maps of the whole river from Minneapolis to the Gulf of Mexico. There were models of dredgers, and also of pontoon equipment for bridges in time of war.

From this part of the Government's space were distributed leaflets giving descriptions and brief histories of government projects such as the improvement of Los Angeles Harbor, the general project for the improvement of navigation and control of debris and floods in the Sacramento and Feather Rivers, the project for improving the entrance of New York Harbor, exemplified by a lot of models of ships showing the growing requirements of navigation as a result of the rapid increase in the size of vessels, the project for improving the bar at the mouth of the Columbia River, and the project for Galveston.

Ever stroll down the Appian Way and wonder how its ancient flagstones, with their chariot ruts, held their places so long, and how much the Romans really knew about road construction? The office of Public Roads, Department of Agriculture, had an exhibit in the Palace of Machinery that would tell you more about roads in a minute than any extant history of Rome we know of. There was a model of Rome's old Market Street showing just how road building was done by the Romans; and some *Gospel of Good Roads* 25 section models, about three and a half by five feet in size, illustrated the main general practices from that time down to the present. There were models of early French roads, of Tresauget paving, of Telford, of early Macadam, of bituminous Macadam, rock asphalt, asphalt block, brick, concrete, gravel, clay-sand, and plain old dirt. With the road models were others showing drainage and foundation work—most people never think a road needs a foundation—a roller, a quarry and rock-crushing plant, some culverts and bridges. An automatic projection machine showed a series of road pictures. The educational value of this display was high. The public takes its roads too much for granted, and has too little understanding of the expenditures necessary to have good systems of communication. The Romans knew it; and the Americans ought to begin learning it.

CHAPTER XXXIII

BRINGING IN THE MINING MEN

THE mining industry in the United States employs about two and a half million men directly, and in addition furnishes over 60 per cent of the total freight haul of the railroads. It is a great basic industry of the national life, second only to agriculture in volume and economic importance. A living picture of this industry, its processes, its needs and its products, was what Prof. Charles E. van Barneveld, Chief of this Department, aimed to make of the Palace of Mines and Metallurgy. Yet peculiar obstacles existed in the nature of the industry, which should be noticed here as a possible part of the problem of organizing the next exposition.

The foundation plan urged by van Barneveld, for every exhibit, was "the raw material and what is made from it." It taught the public a great deal, for the public had a great deal to learn; a great deal about economics in which it is vitally interested on the bread-and-butter side. It would be strange if this vast picture of a vital part of the machinery of production, a picture to which so many thoughtful people had given the closest study, had had no effect to reduce the reckless and promiscuous corporation-baiting proclivities that had been making themselves felt in American life in so sinister a manner during the two decades preceding this period.

*Needed
Knowledge*

Van Barneveld addressed the mining industry in general through mining journals of standing—such as the "Mining and Scientific Press," of San Francisco; the "Engineering and Mining Journal," of New York; the "Mining and Engineering World," of Chicago; the "Colliery Engineer," of Scranton, Pa.; "Mining Science," of Denver—calling attention to the scope and status of the Exposition, and the opportunity it offered to promote popular intelligence about mining, and the uses of minerals, as a large part of the basis of material civilization. Favorable editorial recommendations followed. Some of the great corporations that alone were competent to produce, with economy and advantage to the public, things the public vitally needed, had not been happy in the public confidence. In some quarters they were envied and suspected. Some of the great anthracite coal companies were just then

undergoing governmental investigation. "Trust busting" was in order, and picked out the most highly organized commercial institutions.

For the common welfare these needed to be understood and the public needed to understand them, so that it could see how it was being served. In a circular letter sent wide, to every mining engineer, metallurgist, mine owner, mine operator, and mine manager of importance in the country, van Barneveld said:

"When it comes to questions of legislation, Federal representation and support, litigation arising from disputes over smelter fumes, tailings disposal, and stream pollution, do the press and the general public sympathize with the mining industry? By no means. Their sympathies are usually with the other side."

The aim was to reach the mining engineer through his technical societies and his journals, and by personal contact; the State agencies for the promotion of settlement and exploitation in the various mining States; the chambers of commerce and promotion organizations in the mining counties, districts, and cities; the mining companies; the consumers of the raw material; the selling organizations; and the large manufacturers of specialties, mining supplies, mining machinery and accessories.

Such conventions as the meeting of the American Institute of Mining Engineers at Butte, in August, 1913, and the Lake Superior Institute of Mining Engineers at Duluth, the Chief attended in person. Always the basic idea he impressed on his auditors was that the Palace of Mines and Metallurgy was not to be made a museum of geology and mineralogy, nor a mining machinery warehouse, but an educational exhibit of the mining and metallurgical industries. The object was to give the public some conception of the coöperation necessary to the discovery, appropriation, development, and use of the hidden mineral wealth of the Nation, to bring out the dependence of civilization upon the mining industry, and to emphasize the fact that a country's economic position in the world is largely determined by the supply of the economic minerals it possesses or controls.

He received his own impressions of the possibilities of the field. At Washington he discussed the matter with Prof. Holmes, late Director of the United States Bureau of Mines, who had been Chief of the Mining Department at the St. Louis exposition, and was told that he must not depend on the materialization of more than 25 per cent of the promised exhibits, but must be prepared toward the opening date to fill in vacancies made by sudden and inexplicable cancellations.

To the ordinary difficulties that the financial stringency of 1913 and

*Showing
an Industry*



PHOTO BY CARDINELL-VINCENT COMPANY

DOUBLED SPLENDORS

1914 presented—difficulties that beset all the departments more or less—were added the great distance of San Francisco from industrial metal producing centers and its freight-raising effects on the heavy materials involved. In addition, the mining industry is largely monopolistic, non-competitive, and has no direct interest in stimulating wholesale or retail trade, so that there was a comparative lack of commercial incentive. Against this had to be set out the advantages to be derived from having the aims and problems and services of the industry better understood; and some commercial benefits to be expected from advertising the excellence and diversity of the output. This by no means balanced the handicaps. The gold miner is always likely to be refractory to an exposition appeal, for he has already what everybody else is trying to get, and his problem is not selling but spending. Then there was the pleasing device known to the politicians as “pairing.” It was deadly when a few red-hot competitors found out they were all about to exhibit, and decided to save a lot of trouble and expense by not doing it.

Operators felt that the industry should be exhibited by the United States Geological Survey and the United States Bureau of Mines. If a State wished to exhibit it wished to do so in its own building. The industry was largely syndicated. The machinery trade was in such condition that it offered little encouragement. The best avenues of approach were found to be through the technical men, the chemists and metallurgists and engineers, who realized the advantages of informing the world about the mining profession and thus having an intelligent sentiment to deal with. They could usually give the clew to the men of vision in the various organizations. Advertising, purchasing, and selling departments of the large organizations were generally, as a matter of policy and interest, unsympathetic.

*Helpful
Elements*

In spite of discouraging conditions the space in the Palace was all applied for by July 20, 1914, and 15,000 square feet more, and many applications were on file for locations in a special Metallurgical Building then under advisement. The outbreak of the European war had the same effect on this Department as on the others, perhaps accentuated by the interest of the metal trades. The excuse was too good for the reluctant and half-hearted to ignore, and cancellations came in flocks. Van Barneveld made another trip East (he made four in all), with the strong moral support of the Exposition's determination to open on time, war or no war, and succeeded in holding some of his exhibitors and enlisting more. But the cancellations of Australia, Canada, South Africa and some other foreign reservations, to be expected under the circumstances, vacated some 50,000 square feet. A

part of this was allotted to more or less related exhibits in Social Economy, such as safety, sanitation, and welfare work, workmen's compensation and insurance. And 10,000 feet were allotted to the Government for a model Post Office. By late November there were but 16,000 feet unassigned, and on Opening Day this had been cut down to 5,000. By March 1 the whole Palace was allotted.

The Palace of Mines and Metallurgy was 451 by 579.5 feet in outside dimensions, with very little out for courts. It cost \$338,549. The "Mine" occupied 10,000 square feet in the basement. Blocks of exhibit space ranged from 1,000 to 7,500 square feet, and a rough division was made into 75 per cent for domestic and 25 per cent for foreign exhibits.

The main policy of the Department of Mines and Metallurgy was to bring out the dependence of civilization upon the mining industry. It did better than that, for in the outcome it contained impressive visual lessons of the vital function of the expert in modern industry, and of the value of organization to produce the basic materials of civilization. The exhibit of the United States Steel Corporation, for example, was not only an exhibition of metallurgy, not only an exhibition of iron mining, but it was a great picture of the organization of modern industry and the interdependence of many parts to bring about a complete result.

*Study in
Organization* This sort of effect was the reward of a large intention. It would have been easy to make the Palace a raw material warehouse, with tons of broken rock on view, but nobody would have been much the gainer by visiting such a place. Exhibits were planned of the minerals of economic importance, metallic and non-metallic, from the natural state to the article sold to the consumer through the retail trade of the country. There was a consistent effort to present to the public the needs and conditions of the mining industry, as such. For this reason the Chief felt that plants in operation were to be preferred to cases full of specimens, if he could only get enough of them. And he has remarked:

"Had I been appointed a year earlier, in time to make the suggestion effectively, I would have said: 'Give the Mines Building to the Machinery Department. Give me 15 acres with a fence around it, and \$250,000 in cash, and I will put up a show that will open your eyes.' It is my firm conviction that just as certain industries must be fostered by special inducements, donations, and subsidies, so the mining industry, having little incentive to exhibit, must be financed."

CHAPTER XXXIV

OUR DAILY EXPLOSION

MOST of the people that visited the Palace of Mines and Metallurgy asked at once "Where's the Mine?" They might ask it in French or Bulgarian, or Japanese, but in some tongue they asked it. When they found out, they passed by all the oleaginous and metallic wonders of the collection, until they had been down in the shaft and through the long levels and into the stopes. It was estimated that more than 4,000,000 persons explored it during the season. On July 5, and again on November 2 (San Francisco Day), it had above 20,000 visitors.

It was not a miniature model, but a life-size one, built at great pains by the United States Bureau of Mines, of the Department of the Interior, with the help of the mining and allied industries. Everything was on the natural scale. Important mining companies of the country had contributed the "properties," as a theatrical man would call them, to the setting of an unusual, underground mimicry. There were hundreds of thousands of dollars worth of ore, timber, and machinery, which had cost \$14,000 to install. Ten men were employed about it, under a mine foreman. Twelve mining companies and about 20 manufacturers of machinery and appliances contributed \$21,000 for construction and maintenance.

*A Mine
to Order*

It gave reality instead of illusion, but it gave illusion as an introduction. You entered an elevator cage as you would to descend an actual shaft, and began what you were told was a descent of several hundred feet. The cage oscillated, scraped, bumped a little, passed rapidly rising rock-walls, and timbering, and cross cuts, and mouths of drifts; and the air rushed upward from the damp depths by the power of an electric fan under the floor, and after an adventurous descent that would have fooled any "Cousin Jack" from Cornwall, it came to a sudden halt at the bottom, and you got out the opposite side, not an inch lower for your journey than the floor of the Mines and Metallurgy Palace where you had entered. Then you made the real descent by stairs instead of the regulation ladder, which was the only concession of realism to convenience.

Here you were in the "Mine" itself, lighted by safety lamps, fitted with

mine telephones, equipped with 13 pieces of the most modern air and electricity driven machines, from rock drills to electric locomotives that had taken the place of the ancient mule for hauling ore cars about on the little railways. You were in "bad ground." There was typical mine timbering all about you, and it seemed drippy overhead.

You were actually six feet below the level of the Bay just outside, in a sort of pit excavated from the hydraulic fill in old Harbor View Cove, and if pumping had stopped for twenty-four hours the seepage would have flooded the place. The bottom of the "Mine" was floored with concrete five inches thick, and sub-drained by radial troughs leading to a central sump. The latest ventilating devices kept it supplied with pure air, although verisimilitude was materially assisted by a confection of underground odors; which it took a forced draught to prevent from becoming highly marine.

There were stopes and drifts and rooms, representing metal mines and coal mines, some of the most famous in the world, arranged through the coöperation of managers and owners. You saw types of the workings of gold, lead, copper, and iron mines, from Arizona to Minnesota. Then you entered coal mines in Pennsylvania, in Kentucky, in Wyoming, in Washington. If you had visited those places you would have seen little more, and nowhere could you have seen so much in one comfortable trip. All modern devices relating to the industry were illustrated, down to the fuse and powder rooms and the self-closing doors that assisted ventilation by preventing short circuits of air. Life-saving apparatus, and every sort of first-aid-to-the-injured device, was in its proper, handy place, and there was a room equipped for laying out an injured man and getting him into the best condition for removal to the hospital.

Of course there was a moving-picture room. But, better than that, realism was carried to the ultimate throughout by such painstaking arrangements as old timbering, shipped from mines where it had actually been in use, by walls of ore set in concrete and picked over, by haulage ways and tracks, under foot. In one case a miner's jacket hung on a nail with his lunch bucket, a local daily paper sticking out of one pocket, and a tin of tobacco out of another. Train loads of ore and coal had been contributed to build up side walls and strata. There were six booths for the exhibition of radium so that numbers of people could have a glimpse of the mystery without having to wait.

At two o'clock every afternoon the "Mine" blew up, with a terrific emphasis of coal dust, or fire damp, or whatever it is that explodes in mines, in spite of all the safety devices therein illustrated. Clouds of black smoke billowed to the dome of the Palace. Directly a specially equipped motor



A GOVERNMENT MINE RESCUE TRUCK



DOWN IN "THE MINE"

truck of the United States Bureau of Mines Rescue Corps started down the Avenue of Progress from a point near the Fillmore Street entrance, swept around the corner into the Esplanade, and dashed up to the north entrance of the Palace of Mines and Metallurgy, where the crew of five jumped off smartly and proceeded to get into goggles and self-contained breathing apparatus, and then illustrate how far organized society has progressed in conserving the lives of those that minister to it; at least in the mining trade.

The crew, with a stretcher, rushed into the mine and brought out an asphyxiated miner with a broken leg and a scalp wound. The victim was laid out on a raised platform where everybody could see him, and while the rescuers worked on him with artificial respiration methods, and a lung motor, and bound his broken leg and dressed his cut, just as they would have done in the mine itself under actual explosion conditions, Superintendent Steidle explained through a megaphone that it would be bad practice to wash the scalp wound, as it might become infected from the cleanest-looking water, that the broken leg must be securely splinted with pieces of broken boxes wrapped in bandages so that on the long, rough journey to the outer air and the hospital the splintered bone would not cut through and make a compound fracture, that there were a number of points on the body where a simple tourniquet would tie off an artery temporarily and stop a hemorrhage—and gave other reasons for all the operations of the crew.

*Saving
a Life*

They made a stretcher from two drill steels run through the arms of two jumpers turned inside out and buttoned, picked up the patient and placed him on it, and delivered him over to the nearby model hospital booth of the United States Public Health Service, just across the aisle, where Dr. C. C. Pierce, detailed by the United States Public Health Service as Sanitary Officer of the Exposition, explained the subsequent treatment, and told what the functions of the Public Health Service were.

The little drama was worked out with far more realism and fidelity to detail than most presentations on the stage. People crowded about the platform and the hospital half an hour ahead to see it, and never failed to thrill and gasp at the climax when the lung motor arrived, just as though a human life had been really in danger. They learned many things it is of the greatest value to have the public understand, and that is the best service an exposition can do.

Visitors were treated to some illustrative statistics; were told that in 1913, 168,380 men were injured in mines and quarries in the United States alone, and 3,651 more were killed; that in the preceding five years nearly 25,000 men had been schooled in mine rescue and first-aid-to-the-injured

work, so that miners could help their injured comrades while the more expert rescue crews were coming, or get them to the hospital in condition to be saved; that 90 men had been rescued by the Bureau of Mines Corps, since it was instituted, and 680 others had been rescued by volunteers, many of whom had been trained in the ways described; that in addition to the 25,000 schooled in this work, lectures had been given at demonstrations in the different mine fields of the country to 150,000 persons, mostly miners, so that they should know what to do to take care of themselves and their fellow workers and the property of their employers. The positions of six rescue stations of the Bureau were shown on a map, and the whereabouts were indicated of the eight rescue cars then in operation in their visits to various mines to make demonstrations and perform rescue work.

*Extending
the Work*

As an exhibit, the "Mine" presented mining as an industry, which accorded with the policy of this Department, and it showed the relation of the Federal Government and modern medical science to that industry.

The designing and construction of the demonstration mine were in charge of the following managing committee, which had charge of operation:

Herbert M. Wilson, Bureau of Mines, Pittsburgh, Pa., Chairman, representing the Bureau of Mines.

Chas. E. van Barneveld, Chief, Department of Mines and Metallurgy, Panama-Pacific International Exposition, San Francisco.

Wm. C. Coffin, Jones & Laughlin Steel Co., Pittsburgh, Pa., representing the mining industry.

Frank Harrison, Westinghouse Electric and Manufacturing Co., East Pittsburgh, Pa., representing manufacturers of mining machinery and appliances.

H. M. Wolfen, 407 Underwood Building, San Francisco, Cal., representing the California Industrial Accident Commission.

The superintendent of the demonstration mine was Edward Steidle, and the foreman was A. A. Krogdahl, both of the Bureau of Mines. The preparation of all preliminary plans, estimates, and designs for construction was under the direction of Lauson Stone, of the Bureau of Mines; the final plans and contracts were amended and verified by the Department of Mines and Metallurgy and by the Division of Works of the Exposition. Mr. Wilson, Chairman of the above committee, was of the greatest possible assistance.

This is not a history of exhibitors, nor even of the exhibits, but of the Exposition as a whole. Nevertheless, this "Mine" feature was so notable a success that it justifies presenting the names of the concerns that contributed

funds or apparatus and materials, or made exhibits that contributed to the general effect. They were the:

American Blower Company, Detroit; mine fans.

American Mine Door Company, Canton, O.; automatic mine doors, manway doors and plain swinging doors.

Asbestos Protected Metal Company, Pittsburg, Pa., asbestos—protected walls, floors, and roofs.

Baltimore Enamel and Novelty Company, Baltimore; enamel signs.

Bucyrus Company, South Milwaukee, Wis.; motion pictures of mining with steam shovels and dredges.

Bunker Hill & Sullivan Mining and Concentrating Company, Kellogg, Idaho; stope in typical lead-silver mine, with ore cars and stoping, sinking, and drifting drills and tools.

Byron Jackson Iron Works, San Francisco; centrifugal-mine pump and winze pump.

Coal Age and Engineering and Mining Journal, New York; technical journals.

Coast Manufacturing and Supply Company, Livermore, Cal.; safety fuse.

Colorado Fuel and Iron Company, Denver; all rails.

Concordia Safety Lamp Company, Pittsburgh, Pa.; electric mine lamps.

Consolidated Coal Company, Jenkins, Ky.; working-room with turret coal cutting machine, electric coal auger, mine car, steel ties, and electric pump on truck.

Consolidation Coal Company, Baltimore; a Kentucky by-product and gas coal mine.

Copper Queen Consolidated Mining Company, Bisbee, Ariz.; a copper mine.

Cyclone Drill Company, Orrville, O.; working model in connection with exhibit of the Coast Manufacturing and Supply Company.

Denver Engineering Works, Denver, Colo.; head-frame and electric hoist.

Denver Rock Drill Manufacturing Company; stoping, sinking, and drifting drills.

Draeger Oxygen Apparatus Company, Pittsburgh, Pa.; three sets of artificial breathing apparatus and an oxygen pump.

Dunham, Carrigan & Hayden Company, San Francisco; wheelbarrows, picks, and shovels.

Edison, Thomas A., West Orange, N. J.; electric mine lamp.

Ensign-Bickford Company, Simsbury, Conn.; Cordeau-Bickford safety fuse.

Fairmont Mining Machinery Company, Fairmont, W. Va.; portable electric pump, steel ties, coal auger, and models.

Fuller, W. P. & Company, San Francisco; plate glass for smoke room.

General Machinery and Supply Company, San Francisco; single stage air compressor and receiver; Word Bros. drill sharpener.

Goldfield Consolidated Mines Company, Goldfield, Nevada; working stope in a gold mine, with stoping drill, piston drill, and column drill, ventilation fan, ore, and tool for working.

Goodyear Tire and Rubber Company, Akron, O.; air and water hose.

Gould Manufacturing Company, San Francisco; New Deluge electric ditch pump.

Gulf Refining Company, Pittsburgh, Pa.; oil and gasoline for auto rescue-truck.

Hendrie & Botholf Manufacturing and Supply Company, Denver, Colo.; Leadville drill column hoist.

Hill Publishing Company, New York; technical publications.

Hockensmith Wheel and Mine Car Company, Penn Station, Pa.; Coal mine cars.

Hercules Powder Company, Wilmington, Del.; motion pictures of methods in large quarry blasts.

Homestake Mining Company, Lead, South Dakota; gold-quartz mining shown by model, with equipment and sample cases of ore.

Indiana Limestone Quarrymen's Association, Bedford and Bloomington, Ind.; motion pictures of quarrying and cutting limestone.

Ingersoll-Rand Company, New York and San Francisco; jackhammers, stoping drills, water-feed hammer drills, piston drills, stretcher bar hoist, drill sharpener, and oil fired forge.

Jeffery Manufacturing Company, Columbus, O.; breast turret coal mining machine, and truck and turret coal cutting machine.

John Simmons Company, New York; carbide hand and cap lamps.

Jones & Laughlin Steel Company, Pittsburgh, Pa.; scene from Lincoln iron mine, Mesabe range, Minnesota, with ore car, piston rock drill, jackhammer drill, and ore.

Joshua Hendy Iron Works, San Francisco; safety mine cage.

Koehler Manufacturing Company, Marlboro, Mass.; safety lamps for detecting explosive gas.

Lehigh Coal and Navigation Company, Landford, Pa.; scene illustrating the mining of a thick anthracite vein on a steep pitch; gangway and chutes.

Linde Air Products Company, New York; oxygen for rescue demonstrations.

Life Saving Devices Company, Chicago; artificial respiratory apparatus.

Mining Press, San Francisco; technical journals and books.

Mine Safety Appliances Company, Pittsburgh, Pa.; artificial breathing apparatus, safety lamp testing box, recording volumeter, recording hydro air pressure gauge for fan, and first aid materials for the demonstrations.

Nevada Consolidated Copper Company, New York; motion pictures of surface mining, and milling and smelting of copper ores.

Nicholas Power Company, New York; Power's No. 6A cameragraph.

Pacific Coast Coal Company, Seattle; steeply pitching seam, with chute, post puncher, radial axe shearing and undercutting machine, and jackhammer drill.

Pocahontas Fuel Company, New York; scene from a Virginia coal mine, with turret coal mining machine, truck, and track jack.

Pyrene Manufacturing Company, New York; fire extinguishers.

Riverside Portland Cement Company, Los Angeles; cement for floor and walls.

Southern Wyoming Mine Operators' Association, Cheyenne, Wyo.; Rocky Mountain coal mine scene.

Sullivan Machinery Company, Spokane, Wash.; post puncher.

Superior Oxygen Company, Pittsburgh, Pa.; oxygen for rescue demonstrations.

United States Public Health Service, Washington, D. C.; surgical equipment and attendants.

Utah Copper Company, Salt Lake City; motion pictures of surface mining, milling, and smelting.

Western Electric Company, New York; mine telephone system and portable mine rescue telephone.

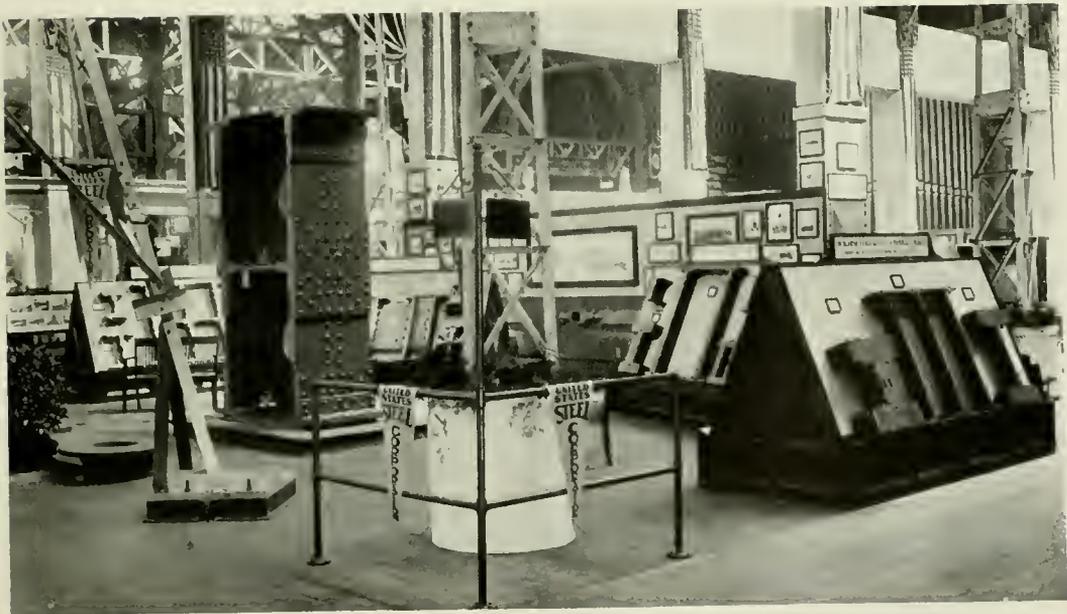
Westinghouse Electric and Manufacturing Company, Pittsburgh, Pa.; storage battery mine locomotive, trolley-gathering locomotive, motors for various purposes, Sirocco for ventilation.

White Company, Cleveland, O.; mine-rescue auto truck.

Worthington, Henry R., San Francisco; special vertical direct-connected sump pump.



STAGING A MINE RESCUE



SECTION OF HELLGATE ARCH

The "Mine" was but part of the Government exhibit in Mines and Metallurgy, and it was the first time the mining and metallurgical industries had ever been officially represented among Government exhibits at an American exposition; the Bureau of Mines having been established after the preceding one. Certain exhibits showed what the Bureau of Mines was doing, and certain others what was going on in the Experimental Metallurgical Laboratory operated by the Bureau. Lantern slides and short descriptive lectures supported the educational effect of the exhibits. Mr. F. G. Cottrell of San Francisco, Chief Physical Chemist of the Bureau, did valuable work in promoting the exhibit.

Three sets of artificial breathing apparatus were shown: the Fleuss, the Draeger, and the Westphalia types, all loaned by the makers. These could be tested in a gas-proof smoke room, which was entered by men wearing the apparatus before descending the "mine" to bring out the victims of the daily explosion. Nearby was an exhibit of various types of safety lamp. The manufacture of explosives was illustrated in part by an exhibit of the materials available. There was a welfare exhibit consisting of a model industrial village and in it was a model of a wash and change house where the men could change from street clothes to working clothes and wash up after work.

The war in Europe, and its interference with trade, gave importance to projects of coal tar manufacture in this country, and the Bureau exhibited some interesting things about coke, coking coal, and some of the by-products with models and charts showing the possibilities at hand in the United States for the development of the production of chemicals from this source. These included Pittsburgh coal as a standard, and also Western and Alaskan coals. There was a Government motion-picture booth in this space. Some of the reels showed mine rescue work, the operation of the rescue car, first aid to the injured, and similar subjects.

*Chemical
Supplies*

The Metallurgical Laboratory exhibit was in two divisions, to represent hydro-metallurgy and pyro-metallurgy, or smelting. In the latter division the abatement of smelter fumes was being studied and demonstrated. Working models represented the latest devices employed by the smelting companies for the recovery of the visible constituents of the fumes. There was a model assay laboratory. In the hydro-metallurgical exhibit was a small cyanide plant in operation.

Besides the exhibits of the United States Bureau of Mines, there were in this Palace exhibits of the Mint, the Post Office, and the Geological Survey. The last named was in a measure responsible for the Alaskan exhibit, which flanked it.

The exhibit of the Geological Survey itself was an impressive showing of governmental activity in enabling the people to work the country's internal resources.

The central feature was a booth with two dioramas, cleverly done to give an illusion of reality, or at least of representing real landscapes. The first depicted an undeveloped district in the arid West. Topographers were at work, geologists had stripped a bed of coal, and other topographers were sampling the rocks. A gauger was measuring the stream, and his findings would determine the plans of the hydro-electric plant which appeared in the second scene, showing the district under development, and of the irrigation system for the floor of the little valley. In the second scene the coal bed was being mined on one side, and in another part of the picture an oil field was under development. A sand-stone bed was being quarried, and mining and milling were going on in the mountains. A town had sprung up and highways and railroads were being developed in every serviceable direction.

*Developing
a Country*

Behind the scenes, in the same booth but facing the ends, were recessed screens, on one of which were shown pictures illustrating the different kinds of survey work and the part they play in the development of the country.

At one end of the space was shown the per capita production of minerals in the United States, first in 1850, next about the time of the Centennial Exposition, and in 1913. The exhibit consisted of one 48-millionth of the actual production of each mineral in 1880 and one 97-millionth of the production in 1913.

The space along one of the outer aisles was devoted to a series of cases, illustrating what our common things are made of, what the raw material looks like as it is obtained from the earth, and where it occurs in the United States. Many of the familiar household articles were there, such as an aluminum sauce-pan, an electric-bulb filament, and a fountain-pen point; and above each article was shown the mineral from which it is made, traced back to the ore, and then a map of the United States showing where the ores occur. At the west end of the space was an exhibit of the power and fuel resources of the United States, including maps showing the distribution of the black shale from which oil is derived, and the apparatus used in the field in determining the shales that are worth studying.

CHAPTER XXXV

THE DAY OF STEEL.

THE United States Steel Corporation showed it all, from coke to harps—one of the mightiest of industries, with an organization like an army, conducting operations on the scale of a small government; and with ramifications of service into and through other trades and industries that the casual observer of current affairs would not appreciate until he had seen displayed such exhibits as the peculiar commodity, “flat wire,” and all the manufactured articles made therefrom—together with the corporation’s various steel products, its manganese-steel car-track crossings, its cross-sections of the huge, built-up columns of some of the world’s tallest buildings and girders of the greatest bridges, its pressed steel automobile hubs, uncrackable; its sheets, smooth as glass, on which colored pictures were lithographed, its “Circassian walnut” bedsteads and “mahogany” chairs, of steel, its seamless pipe and tubing, its steel ties and rolled car-wheels—or had heard one of its charming harp and organ recitals, given daily in the Palace of Mines and Metallurgy, at about the noon hour, just to make people realize that from ore beds in Minnesota or Michigan, by docks and fleets and furnaces and mills, it served even the finest of the arts, through the noblest of instruments. The exhibit came near epitomizing modern civilization, and did epitomize a considerable material part of it. In times of such lightning change it showed at least the Day of Steel, if not the Age of Steel.

*A Vast
Industry*

Nor was it merely a display of samples of products, though these were stupendous, especially in the case of the column section of the Woolworth building, a structure 750 feet high. In its 42,000 square feet of space along the south side of the Palace of Mines and Metallurgy it made the first systematic effort to show the whole industry, collectively. By means of pictures still and moving, charts, maps of properties, models of plant, samples of raw materials and finished products, and every possible graphic representation of the conditions of life among its army of operatives, it sought to tell the story of steel; from the dirty ore beds where iron oxides had lain for ages, a mere nuisance to the *voyageur* and pioneer, to the

*The Story
of Steel*

blooms and billets and slabs and sheets, the I-beams and angle bars that were the materials of other industries on industries; down even to the Portland cement made from the furnace slag, that went into concrete to clothe and fire-proof the steel itself; and to make the foundation of the roads along which it was hauled.

You could trace it all, throughout almost a continental scope. Here was a map of the Lake Superior country and of ore fields in Minnesota, Wisconsin, Michigan, and Alabama. Nearby was a model under glass showing surface and section of the ore beds, as they underlay the country soil, and as they were stripped open with steam shovels, and as trains of cars on railroads operated by the corporation for the purpose, transported the ore to gigantic docks at such ports as Duluth.

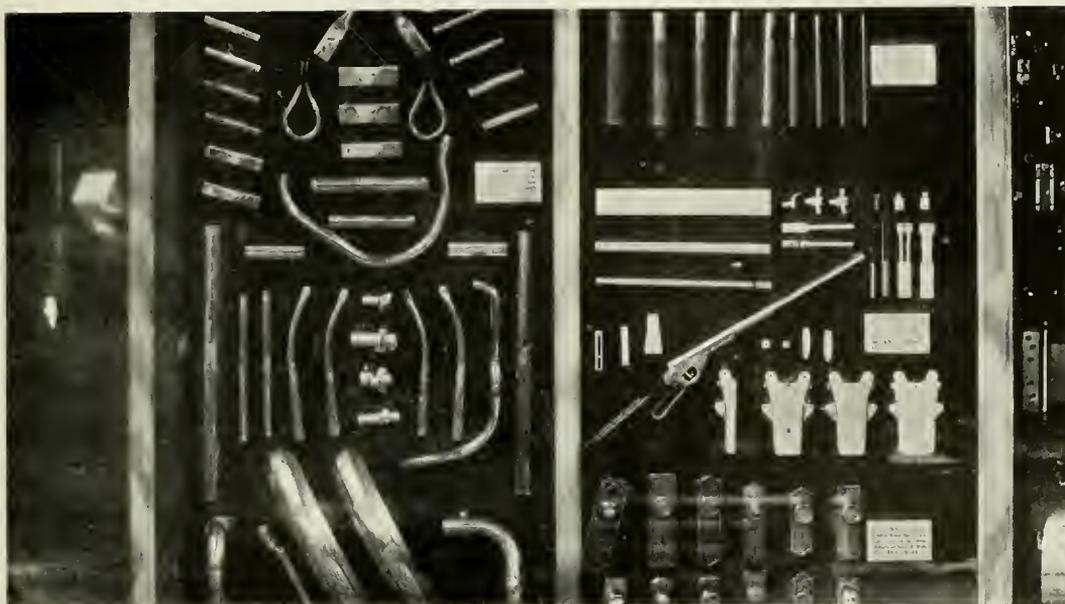
Here were the ore docks: a model made up of over 25,000 pieces, it was said, showing ranks of bunkers into which the ore was dumped from trains, and out of which it was shot through long tiers of chutes into the holds of ore boats, through rows of hatches that occupied the entire deck space. The boats were five or six hundred feet long and would carry twelve or thirteen thousand tons of ore. There was a fleet of them on the Great Lakes. And for a record, one had been unloaded by the grab-bucket method in 25 minutes.

Pictures showed these boats discharging at such specialized industrial ports as Gary, Indiana. The Frick coke plant was represented by a model. Every process of rolling and cutting was shown in "movies."

The United States Steel Corporation was the father of a large family, as a list of the subsidiary organizations contributing to this great exhibit will indicate: the American Bridge Company, American Sheet and Tinplate Company, American Steel & Wire, Carnegie Steel, Illinois Steel, Lorain Steel, Minnesota Steel, National Tube, Shelby Steel Tube, Tennessee Coal, Iron & Railroad, Universal Portland Cement, United States Steel Products, Bunsen Coal, H. C. Frick Coke, National Mining, Oliver Iron Mining, United States Coal & Coke, Bessemer & Lake Erie Railroad, Birmingham Southern Railroad, Duluth & Iron Range Railroad, Duluth, Missabe & Northern Railway, Elgin, Joliet & Eastern Railway, Newburgh & South Shore Railway, Pittsburgh & Conneaut Dock, Pittsburgh Steamship, Union Railroad.

A mere mention of these names of railroad and steamship lines, and iron, coal, and coke companies, is in itself an exhibit of the stage industrial organization had reached in the United States in 1915. Devoted by centralized direction to one end, the production of steel in almost all forms useful to men, they represented a vast economy in the creation of wealth.

*Members of
the Family*



PRODUCTS OF FLAT WIRE



STEEL BEAMS AND SHEET PILING

You could ascend to a second story roof garden, near the center of the space, and look out over a sort of microcosm of the World of Steel. You could sit in the corporation's moving-picture theater and see a portrayal of all the processes involved, on films aggregating 25,000 feet in length that it took over six hours to run. Or you could visit the cozy demonstration hall and hear a recital upon the Wurlitzer Unit Orchestra which formed part of the Wire Products exhibit, the organist being accompanied by a harpist. You could look over the guide provided for you by the corporation and learn that it employed, with its subsidiary companies, 228,906 people, with a combined pay roll of \$207,206,176 for the year 1913; that it was quite a taxpayer, and in city, State, and Federal taxes contributed some \$13,225,882 that year; that it operated 125 blast furnaces, and 298 open hearth furnaces, and 33 Bessemer converters; that it owned nine ocean steamers, and chartered 40 more, operated 101 steamers, barges, and tug boats on the Great Lakes, and two steamers and 102 barges on the Ohio River, and 1,036 miles of railroad track and sidings, with 1,231 locomotives and 49,267 cars; that its 150 steel works and other plants extended across country from ocean to ocean and from Minnesota to Alabama, that it had 176 branch offices and agencies in 46 foreign countries, and that in a single year it mined 28,738,451 tons of iron ore, quarried 6,338,509 tons of limestone, manufactured 16,663,480 tons of coke, and produced 16,656,361 tons of steel ingots and 11,197,000 barrels of cement. If the dryness of the figures made you thirsty there were sanitary drinking fountains all about the space.

*Breadth of
the Field*

It would be tedious to enumerate here all the items in this exhibit. The corporation itself put out a printed description that made a 56-page booklet, and the matter was very succinct at that. To assist memory we may recall, however, the steel fencing about some of the subdivisions, made of sections of sheet piling, the stacks of blooms and billets and car axles, the pyramid of I-beams, beginning with a foundation section of a beam 27 inches deep and weighing 83 pounds to the foot, the railway rails, switches, frogs, joints, junctions, and connections of the Lorain Steel Company (the track department of the institution), the contorted pipes and tubing of the National Tube Company, the wire fencing, some of which was in use in the Live Stock Section of the Exposition, and finally the sample of the tremendous bottom chord of the steel arch of Hellgate Bridge, the largest work of the kind in the country; illustrated by a three-foot section which showed the fabrication of the various steel elements to form the main member.

The application of galvanized sheet steel to the construction of farm buildings and farm engineering works was exemplified by a model of a typi-

cal farm, with barns, outbuildings, silos, windmills, storage bins, tanks, culverts, and irrigation flumes. The model was lighted by an overhead decorative fixture of sheet metal, containing additional illustrations in the form of illuminated photographs.

Sheet metal was entering more and more into modern life, which is almost as much as to say that it was making things cheaper and life on the whole easier, for there are few things which, like the electric light, succeed at higher prices than the things they supplant. An example was the growth of the use of sheet metal in automobile manufacture, which we choose not because it is a necessity but because its requirements are exacting. Here sheet steel was being substituted for cast iron, forged iron, copper, brass, aluminum, and wood, and every reduction in the total number of parts, every rivet or seam avoided, every pound of metal saved, every increase in strength without additional weight, meant a saving in cost and an increase in service. And every new thing made from sheet steel developed the art of working it. Models showed the application of the material and the methods of producing and shaping it, for railroad cars, houses, household utensils, boats, furniture, food containers, and innumerable other objects.

Work and Growth The general exhibit was visited by large groups of students, and of teachers and professors from the universities and technical schools. Representatives from competing steel concerns were received with every courtesy. Consulting engineers, structural engineers, railroad men, came to learn the relative merits of alloy steels, heat treatment, the latest developments in steel wheels, gears, pistons, crossties, permanent way for steam and electric roads, all the forms of wire from that used in pianos to that of suspension-bridge cables; and cement. The Story of Steel in the moving-picture theater was of deep interest, and it was estimated that between 75,000 and 100,000 persons saw it.

It was said that it had taken fifty cars to bring this material to San Francisco. It was the most wonderful and comprehensive exhibit of the steel industry ever presented to the public, and one the like of which could not have been made in Europe at that time, for Europe had not yet evolved such units nor their organization into such a perfectly coördinated producing machine. In its presentation of the scope and gigantic organization of industry in America and its proofs of what that organization could accomplish for the common good, it was of far higher educational value than the largest collection of ores and "specimens" ever seen at an exposition.

CHAPTER XXXVI

RESURRECTING A LOST ART

IN the decade that had elapsed since the preceding great international exposition in America, the American Rolling Mill Company of Middletown, Ohio, had given the modern world another important commodity—iron said to be 99.84 per cent pure, and some better than that, produced in large commercial quantities at prices very little higher than steel, and considerably lower than those of Norway or Swedish iron. The development appears to have been founded on a close study of the ancient Asiatic practices, which had produced such triumphs as the rustless iron pillar of Delhi, made, it is supposed, in 415 A.D., standing exposed to the weather ever since, and showing no signs of corrosion yet.

Investigations of corrosion had led to the belief that a high degree of purity made iron more resistant to it. Old-fashioned puddled iron was nearly pure, but a main trouble with it was the limitation of output, for the old-fashioned furnace could hardly turn out more than 300 pounds at a time, which meant high cost and limited use, so it had to go out of business. R. B. Carnahan, Jr., of the American Rolling Mill Company, appears to have led the way to the manufacture of the same high-purity iron on a modern commercial scale.

*Romance of
Production*

The value of such iron in the complex and multiform requirements of modern life is far greater than in the restricted uses the ancients had for it. Monumental iron pillars may be beautiful, and as exemplifications of lost arts they undoubtedly possess high value, but it is far more important now to have chicken wire and farm fencing that won't rust out in a few seasons and throw an added financial burden for replacement on the farmer that is trying to produce our food for us; better that we have cheap and rustless iron culverts, and durable roofing, and sheets, and plates, that will serve us longer in the manifold forms into which they are wrought for our benefit.

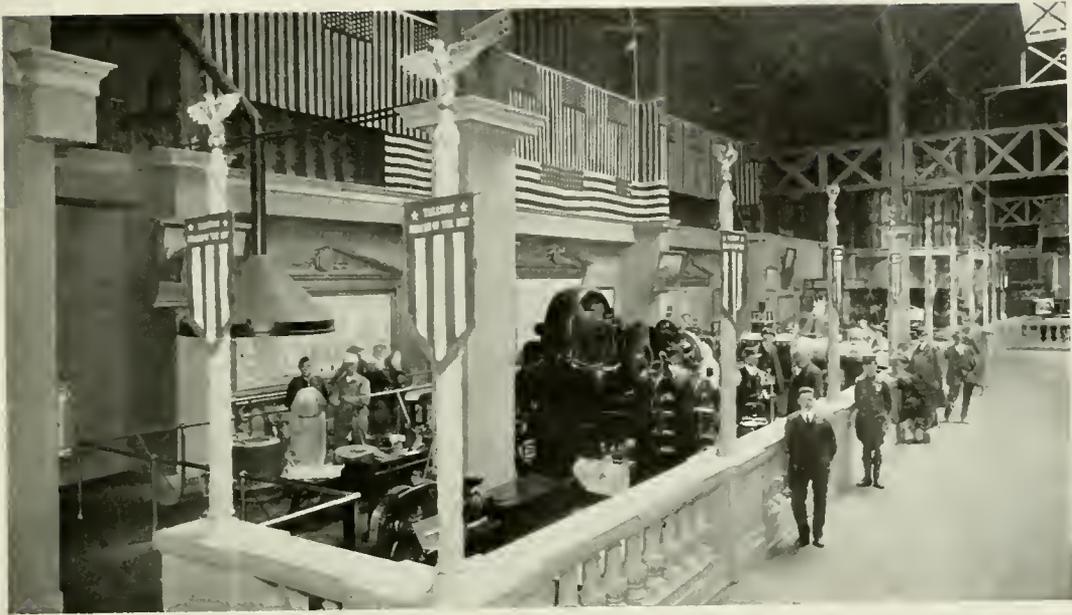
It was claimed that the output of the American Rolling Mill's peculiar open-hearth furnace practices, "Armco iron," exhibited in various forms in the Palace of Mines and Metallurgy by the Rolling Mill Company and the National Corrugated Culvert Manufacturing Company, had great

purity, rust resistance, superior welding, enameling, and galvanizing properties, high electrical conductivity and low residual magnetism. It was probably the purest iron ever made on so large a scale, or the first *Matter of Quantity* iron ever made on a large scale that was so pure, whichever way you wish to take it. The essential thing about it was that it restored to the modern arts properties of iron that had practically been passed by in steel manufacture as of less interest than large economies.

The quest for this iron, in commercial quantities, had been beset with troubles that gave the story the true modern epic flavor. It appears to have begun in the demand of the culvert manufacturers for a metal more durable than steel in that service, and it led through metallurgical and chemical investigations of such objects as the Delhi pillar mentioned above, and several more monumental Indian works like it, with a number of seventeenth-century Indian guns; of Ceylonese and Cingalese irons; of the links of the Newburyport, Mass., bridge, built in 1789, and one of the first suspension bridges ever built; even of nails from the coffin of a man buried in 1792 and disinterred a century later.

Carnahan was superintendent of the American Rolling Mill Company and he sought purity, beginning with the old puddled-iron process. But the output was too small, and he determined to obtain the commodity from a high-power furnace under modern conditions. He had the valuable aid of Orley H. Moles, and a large staff of practical furnace experts and metallurgists. Progress was slow, and not always free from *Encouraged by Obstacles* danger. There were disasters. But patience and pertinacity won. The plant now produces this commodity in units of 50 to 80 tons, of a purity that is said to have averaged as high as 99.877. Some claim it is the closest approach to *Ferrum*, or chemically pure iron, ever made.

The process involves points of interest. Far higher temperatures are dealt with than in steel production. The raw material is kept for a long time at 3,100 degrees Fahrenheit, until it is thoroughly superoxidized, or "burned," a state steel men avoid, and one in which the iron goes wild and tries to ramp all over the shop. But the heat burns out all the impurities, and deoxidizing agents take out all the oxygen, leaving almost nothing but iron, a rare thing, soft, malleable, ductile, and durable, practically without copper or manganese or other foreign matter, and in no danger of any internal electrolysis. It was the recovery of a lost art, on a scale of modern magnitude; a romance of commercialism. Perhaps all the lost arts could be recovered if they could only be made to pay; and if they continued to pay we may be sure they would not get lost again.



WORKING EXHIBIT OF THE UNITED STATES MINT



MODERN PURE IRON

CHAPTER XXXVII

PAINT, PETROLEUM, JEWELS, AND TAR

METAL tools one thinks of as a product of mining, naturally enough, but it struck thousands with surprise to see a great paint exhibit in the Palace of Mines and Metallurgy; until they walked about it and found the lead mill in operation producing the raw material. This beautiful Moorish exhibit temple, with its Mooresque decoration, its dome like the Mosque of Omar in miniature supported on slender Moorish columns, and its mirrored exhibit booths showing through horseshoe arches, was one of the most beautiful and popular attractions in any exhibit palace. It cost W. P. Fuller & Company of San Francisco a great deal of money to install it and the working exhibit that went with it, but its advertising value must have been large, for it caught the public attention. The public could not have missed it, so effectively did Mullgardt design it. The color scheme offered an opportunity to display paints in plenty, and the lead mill showed how the paint was made, illustrating the successive steps from the casting machine to the use of the finished product. In a dozen smaller booths about the central domed structure were displays of various brands of paint, and varnish, and specimens of finished work.

*Mining
for Paint*

Even after seeing this paint exhibit few people, comparatively speaking, realized that varnish is a product of mining. The Standard Varnish Works of New York, London, Chicago, and San Francisco made a very instructive exhibit of varnish fossil gums, the Kauri resins, a beautiful material resembling amber in appearance. One specimen had been carved by some ambitious sculptor into a portrait bust of Tomati Waka Neue, a famous New Zealand chief of the Maoris.

In precious, semi-precious and gem stones there was a beautiful and wonderful exhibit by Tiffany and Company of New York. It was like a glimpse into a corner of some Rajah's treasure house. Here were Burmese and Afghan rubies, great fire opals from Mexico, azurite and malachite from Arizona, Ceylon sapphires pink and yellow as well as blue, Australian opals and opal matrix, wondrous agates, black, blue, and white, in large and satisfying sizes; Siberian jaspers, Tulare

*Gems of
the World*

County chrysoptase, Indian mocha stone with markings like a tree-calf binding.

There was a square yard of amethyst crystals from Brazil, and over a foot by six inches of opal deposit on a chunk of sandstone. There was beautiful pink Kunzite, recently classified, from San Diego County; there was Russian rhodonite, chalcedony, and a bit of Alaskan jade over a foot and a half long, from six inches to a foot in width, and perhaps six inches thick; but it was dwarfed by a jade boulder four feet long and a yard thick, that weighed 1,500 pounds.

The exhibit included the finest collection of tourmalines in California, immense crystals of smoky quartz and amazon stone. The sapphire series was very splendid, and there were specimens of emerald, aquamarine, golden beryl, and morganite, and zircon, some of them the largest gems of their class ever found. It was an unusually complete series of all known forms of precious stone, and represented over ten years of gathering and reserving the finest of their kinds in the various modes of their occurrence, and their manipulation into objects of adornment and beauty. It was highly instructive and was made more so by the many exhibits of special styles of cutting. And in addition, there was a case of illustrated books on gems, from the library of Dr. George F. Kunz of New York.

Two great petroleum exhibits besides the peg model of the Sunset-Midway oil fields mentioned elsewhere, were made by the Standard Oil Company and the Union Oil Company.

The booth of the latter was one of the show places of the Palace. It was in the form of a small pavilion in which a diorama was exhibited; and over its cornice crawled four enormous dinosaurs, 45 feet high, denizens of the earth in the ages when the oil was forming. These ancient inhabitants were, in their modern form, the work of F. G. R. Roth, the animal sculptor, some of whose creations appeared in the great groups above the *Oldest Families* Arches of the Rising and of the Setting Sun. Around the pavilion was a frieze of relatives of the dinosaurs, and it must be said that they were an interesting but a severely plain family. You would have had to visit Alligator Joe's place on the Zone to find anything less pulchritudinous; yet they were supposed to have been present in person at the close of the Cretaceous period, and should have known a great deal about oil.

The object of the exhibit was to enable the spectator to understand the general characteristics of the California oil industry, as far as they could be seen from pictorial representation and exhibition of products. The diorama inside the reptilian pavilion represented a typical California oil field, with all its desert color in the dry season—very beautiful as land-

scape viewed in this manner. The picture was a composite, no one field being represented. There were wells and derricks, tanks, and pumping plants, a typical oil-field town and a refinery on tidewater, with wharves and docks, and a train running back and forth. A great gusher was shown in action, its derrick reflected in the lake of oil it had created.

There were geological specimens in glass cases; fossils and other things reminiscent of long past geologic time. There was a bit of a joint of an ichthyosaurus, a sort of submarine dinosaur; and other remains by which geologists endeavor to determine the best place to sink a well. Tubes and jars on tables showed the manifold uses of the products of petroleum, and standing near were two quite large pyramids of asphalt.

The Standard Oil Company of California endeavored to show the work in an oil field by models. A reproduction of the famous Section 36 in the Midway fields of California represented the strata to a depth of 3,000 feet, while on the surface appeared pumps, tanks, sumps, and employees' quarters. There was a panoramic reproduction of the field near Taft, Cal., in operation. Oil transportation was illustrated by means of models of a tank steamer, a tank car, and motor- and horse-drawn trucks. *Working an Oil Field*
The exhibits of product included asphalt, lubricating and illuminating oils, candles and paraffine products, floor polishes, lamps, and stoves. The space was surrounded by models of oil derricks bearing placards that showed the production of various sections of the field.

The growing use of wood-stave pipe in mining was illustrated by the exhibit of the Pacific Tank & Pipe Company of San Francisco, which showed a model cyanide plant, a section of large wood-stave pipe, and several kinds of water tank of wood stave.

What can be done with coal in this country, besides extracting its energy in the form of steam or electricity, was demonstrated by the exhibits of the American Coal Products Company and the Barrett Manufacturing Company of New York. They were especially instructive as to the accomplishments in this field during the previous twenty years, during which the by-product coke oven had been in use instead of the old, wasteful "bee-hive" type. On entering the space you saw a large block of soft coal and leading from it examples of coke, crude ammonia, coal tar, and benzol.

As derivatives of the crude ammonia, there were shown the household article sal ammoniac, with ammonium nitrate, ammonium bicarbonate, and ammonium sulphate, the last named coming into use as a soil-nitrifying agent. An impressive demonstration of its effectiveness as a fertilizer was present in the form of growing plants of wheat, oats, barley, and rye, all doing well.

There were aniline oils and other dyeing materials, and toluol, basis of one of the modern high explosives, with phenol, or carbolic acid, the naphthalines, and various oils and solvents and bactericides. The Barrett Company showed prepared roofing, into the manufacture of which tar had entered, sections of "tarvia" pavement, and examples of water and damp proofing in construction, made possible by coal tar. Models indicated the advantages of coal-tar pitch as a binder for wood-block, granite or brick pavement.

*Some Uses
of Tar*

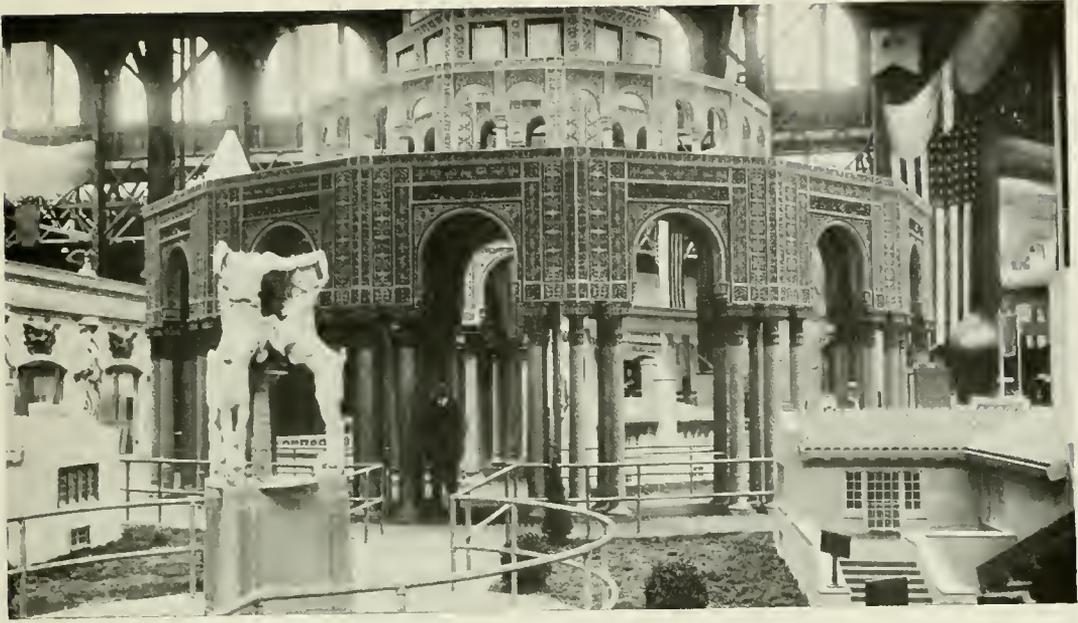
The Pacific Refining & Roofing Company of San Francisco built a handsome little bungalow as its booth, and exhibited roofing, roofing and building papers, "Amiwud" wall board, stop-leak paint, tar-treated felts for building purposes, insulating tape and asphaltum.

The L. C. Trent Engineering Company of Los Angeles exhibited a ten-ton working model of the equipment for the Trent Combined Agitating, Settling and Thickening Process, a recent invention that greatly reduces the bulk and cost of equipment and the cost of operation in one of the essential steps in the continuous cyanide process. It was said that the machine was destined to play an important part in gold recovery as it made for cheaper extraction and therefore would make lower-grade ores and tailing dumps available.

In addition to the exhibits in the Palace there was an exhibit of brick and other clay products for building purposes in the grounds west of the Maryland Building. This consisted of a well-built brick dwelling of six rooms, on the most modern plan, with plenty of closet and storage space, a model "labor-saving" kitchen, and a sleeping porch, at that time considered a valuable aid to the health of the occupants.

*A Clay
Product*

The building was erected by a little group of men interested in burnt-clay products, who associated themselves as the Panama-Pacific Clay Products Association, and they intended to furnish the home and make it a rendezvous for architects, contractors, and manufacturers, but conditions in their various lines were such around Opening Day that they had to abandon that part of the plan, and the house was furnished by Miss Louise Brigham, with examples of her furniture made from boxes. She took possession about September 9, 1915, and after that it is estimated that over 65,000 people visited the brick house and were duly impressed, let us hope, with the necessity and wisdom of attaining durability, safety, and fire resistance in dwelling-house construction.



THE TEMPLE OF PAINT



ANCIENT OIL BARONS

CHAPTER XXXVIII

FOREIGN MINING AND METAL WORKING

AFRICA speaks of gold, not in pennyweights, like the jeweler, but in tons, like the coal-man. The once dark continent was represented by the exhibit of the Transvaal Chamber of Mines. The method of illustrating output by a large gilded object was pursued; perhaps as good as any if what you wish to represent is mere volume. The central feature was a gilded obelisk 60 feet high, divided into sections showing the relation of the Rand gold output to that of the world. Taking the world's output for 1913 as \$452,133,440, the Transvaal produced, from some 51 mines, \$180,812,720—about nine times the California production. Some interesting statistics were available at the booth, showing that to keep this pace required a consumption of 52 tons of explosives a day, 17 tons of drill steel a day, and the drilling of 46 miles of holes a day. In the years 1887 to 1913 inclusive, the production of gold on the Witwatersrand had come to 3,090 tons. And it had paid \$466,405,089 in dividends during those years. The average yield was \$6.66 per ton, and 32 per cent of the metal had been recovered by the cyanide process.

*A World's
Desire*

Flanking the obelisk were gilded spheres indicating by relative size the output of the Transvaal and the world for 1913. Before it was a glass case enclosing a model of one of the newest mines on the Rand, showing modern treatment of ores in amalgamating and cyanide plants. On a table was a large cube of Transvaal gold-bearing rock—a queer, gray block of conglomerate containing light-gray quartz pebbles in a darker siliceous matrix which carried the pyrites. The cube weighed a ton, and a small gold die on top of it exhibited the average yield of such rock for 1913, which came to 6.84 dwts. Large albums of photographs showed Rand mining scenes, and there were two stereoscope stands of views.

One of the most valuable and complete of Japan's exhibits was installed in the Palace of Mines and Metallurgy, arranged with the usual Japanese taste and effectiveness. The showing of fossils, rock, ore, and other minerals found throughout the Empire seemed very complete. The status of mining was demonstrated by wall maps and diagrams. But perhaps the

most interesting object on display here was the model of the Imperial Steel Works at Chikuzen. It was like having an aeroplane view of it without the smoke, and it made a deep and most vivid impression of the extensive organization of modern industry in that country. Diagrams and tables nearby showed an astonishing growth of the mining industry, especially—from a total of 3,974,328 yen in coal, copper, iron, gold, silver, and petroleum in 1878, to 175,960,033 yen in 1913. A chart in colors showed the distribution of minerals in Japan.

In the study of volcanic phenomena and earthquakes the Japanese have long been leaders. Models of volcanoes were part of the exhibit; one, a model of the great mountain Sakurajima, which had recently erupted. Topography before and after this event was depicted by means of two maps, one in section and the other in relief. Accompanying these maps were translations of treatises bearing on the eruption. Similar reliefs and cross sections of another Japanese volcano, the Aso, were part of the exhibit.

One pretty and interesting feature of the Japanese exhibit consisted of the copper rolls by which calico is printed—the “positive” designs appearing with all the beauty of a metal brocade. The mineral specimens included a grand piece of chalcopryite, or copper pyrites.

The Chinese exhibit was prophetic of important mineral development for China, as soon as conditions became more propitious. In fact the scale of the mineral industries in that country had been expanding toward a condition of high economic effectiveness. The exhibit showed control of productive processes, from coal and pig iron to steel rails, and gave promise of large operations in the near future. In the center of the section was a model of the famous Chinese lead mine of Sui Kow Shang in Hunan province demonstrating modern activities even in that far-away region. All sorts of rich ores were exhibited, containing almost all the industrial metals, out of a mineralization of the country so extensive and rich that it will undoubtedly suffice for centuries of consumption. A mere fragment of a catalogue of these specimens will show an astounding diversity, for there were cinnabar, antimony, stibnite, galena, pyrrhotite, arsenopyrite, malachite, chalcopryite, sphalerite, magnetite, cervantite, flourite, asbestos—right down the list to volcanic ash. The section also contained a number of photographs showing mine workings, and the Han Yeh Ping Iron, Steel and Coal Company of Hanyang-Hankow, then beginning to develop on a commercial scale. It may be said that this was more an exhibit of resources than of industry; but one could imagine no limits to the industry that would develop from such resources, given only time.

Argentina showed crude oil from the coast of the Comodoro Rivadavia district, and points at Salta, Jujuy and Mendoza. There was a good showing of building stone, including specimens of onyx marble. There was mica from the Sierra of Cordoba. The exhibit embraced many valuable minerals, such as cassiterite or tin ore, wolframite and other tungsten ores. There were geological-survey maps and others showing petroleum deposits.

Bolivia made an impressive showing of natural mineral wealth, mainly in the form of tin-ore specimens. These were of large size and great apparent richness. There were lumps of ferruginous cassiterite containing very high percentages of tin, and there were crystals of cassiterite that looked as though they were almost all tin. These, in addition to other ores in cases, silver, copper, wolframite, bismuth, and some gold quartz, with large wall photographs of the region of Potosi, made an exhibit that convinced one of the vast mineral richness of this mountain country and that received much interested attention.

*A Mineral
Treasury*

Uruguay showed copper ores, galena, marble, porphyry, talc, and granite.

CHAPTER XXXIX

STATE MINING EXHIBITS

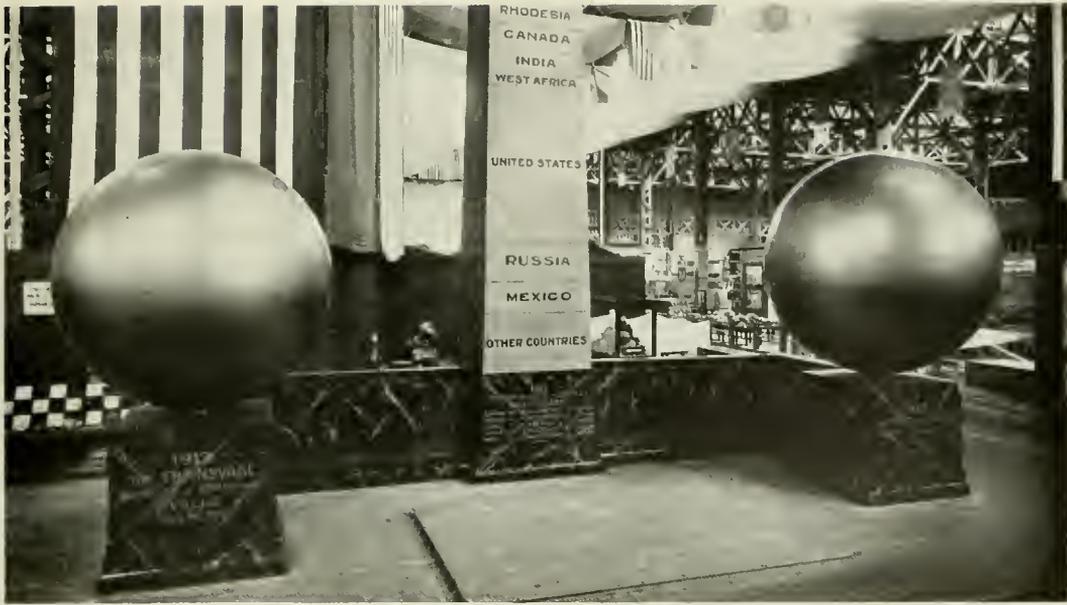
THE California State Commission and the State Mining Bureau assembled a most instructive exhibit of the California mining industry in its modern aspects. No exhibit that could be assembled could ever do justice to the State's mining industry in its historical aspects—that prodigality of natural resource, followed by the boldest and most ingenious exploitation, which produced the world's best mining machinery and some of its greatest mining engineers, and sent representatives of both over the world, from South Africa to the Urals. The latest fruit of that ingenuity, however, was shown in the form of a model of a steel-built gold dredge, the largest in the world, exhibited by the Yuba Construction Company; one of those huge and monstrous mechanisms that turn the surface of a landscape upside down and leave it a waste of cobbles and boulders, in order to snatch from the crevices the metal that has washed into the valleys from the foothill placers.

*Mining in
California*

Near the dredge was a hydraulic “giant” or “monitor”; the counter-weighted iron nozzle, like a cannon, with which the miners ripped down canyon sides and swept the gravel into sluice boxes where the riffles caught the gold. It was pointed at a beautiful model of a placer mine, one of the auriferous gravel deposits, in which miniature “giants” connected to miniature pipe lines were at work directing tiny streams of water against the banks. A ten-stamp circular-battery mill and a five-stamp mill were shown in operation.

A leading feature of this exhibit was the glass model of the Mammoth Mine, showing the drifts and winzes and stopes, all the workings, by means of paint on parallel panes close enough together so that you could see the exact position of every part.

Another was a most interesting illustration by means of what is called a “peg model,” of the Sunset-Midway oil fields. This was in a gallery built above the State Mining Bureau office and mineral exhibit, of which the model was a part. It is not easy for the imagination to depict the conditions underground which give rise to successful oil-drilling operations. This model



GOLD PRODUCTION OF THE TRANSVAAL



MINING EXHIBIT OF ARGENTINA

showed in a remarkable manner what those conditions probably were in that particular field, as far as oil is concerned. It began with a map of the region, 16 by 45 feet in size, from which projected vertical aluminum rods at the position of every oil well, their tops representing the ground surface over an area of $5\frac{1}{2}$ by 15 miles. From the logs of these wells was derived the knowledge of the conditions encountered when they were being sunk. The wells were so numerous that the rods representing them stood very close together, and when these rods were connected at different levels by threads of different colors, you had what was probably a pretty accurate picture of the way in which the water-bearing and the oil-bearing sands were distributed. Sea level was marked on them, and below it the undulations of the strata appeared. The model was installed by the Kern County Oil Protective Association and was the largest of the sort ever built.

*Under
the Surface*

Again, a late phase of mining and metallurgy in California was an exhibit of the first pig iron obtained by the Noble Electric Steel Company. This came from Heroult-on-the-Pitt, in Shasta County, where there was an abundance of iron ore, and where, during the previous decade, progress had been made toward the smelting of ores on a commercial scale by electricity. The output was of superior quality, and the process sometimes produced a fine grade of steel from the retort.

Nor should we forget the gems, especially the beautiful tourmalines, bloodstones, and chalcedony, from Death Valley, and the fine specimens of Kunzite.

California is the leader among the Nation's gold-producing States, turning out about \$20,000,000 of this metal every year. As for petroleum, this State led in that liquid mineral in 1915, with 40 per cent of the American production, or 25 per cent of the world's production, its output exceeding by over 40 per cent that of all Russia, the heaviest producer among foreign countries.

An impressive exhibit of the mining industry of a State was that of Missouri. It was well-devised and well-installed, and very instructive as to the importance of zinc and its associated ores. One side represented a lead-mine face, and the other a zinc-mine face, and before the booth was a railing made of spelter pigs, calcide crystals and zinc ore, with a cornice of the finished spelter. Something of the industrial range of this material was indicated in the familiar armor of the washboard, solid zinc nails, and other commodities. There was a great deal of pig lead on display, and of barytes, in which Missouri leads. Mining was illustrated by charts, models, and photographs; ore treatment shown by a

*Mining
in Missouri*

working model of a Joplin mill, with zinc concentrates and ingots. This mill bore statistics and information on mining in Missouri tending to make it appear about as exciting as a game of checkers. "The burro is extinct in Missouri because the prospectors and miners go to their work in railroad trains, interurban street cars or automobiles." Again, "Missouri mines more tons of crude lead and zinc ores than the combined tonnage of lead, zinc, copper, gold, and silver of any other State in the Union."

Though comparisons are perilous, this was without doubt the best lead and zinc exhibit in the building. There were also clay products, an attractive feature being a large American flag in colored tiles.

Idaho had a fairly complete exhibit of the lead and silver ores, zinc ores, and ores of copper, gold, tungsten, nickle, nickle cobalt, molybdenite, and antimony, shown against a representation of mountain scenery with exposed veins. There was great diversity shown, from coal, iron, and phosphate rock to fine kaolin. Every sample was accompanied by the enclosing wall rocks. There were photographs, flow sheets, and mine maps, but as it was mainly an exhibit of ores, without explication, it did not succeed in telling much about the mining industry in that State. However, it was a great exhibit for the mining man, and many mining men evinced much interest in it.

Montana was represented by the valuable and striking educational exhibit of the Anaconda Copper Mining Company, so planned that the visitor could follow the various steps in the production of the metal. This was a very coppery place. There were heavy ornamental copper rails about it, copper balls on the posts, and a central structure like a little house, with copper mold board, copper door jambs, copper lintels and copper cornices.

The geology was shown by maps and mine models. There was a wonderful wooden stope model of the Leonard Mine, which looked as though they had undermined the world. The square-set timbering excited the enthusiasm of old miners. The association of minerals in the Butte ores was shown by large blocks with the actual metal contents. Mining methods were depicted by photographs and models, smelting by its successive products, and by photographs and models, and finally the refining methods were illustrated

*From Ore
to Consumer*

by the refined product. Such exhibits in this booth were logically complete. You saw a ton of second-class crushed ore, a smaller cube of the concentrate, a smaller one of the matte formed by smelting a ton of the concentrate, and finally about a 5½-inch cube of the copper from it; eloquent of the number of tons of ore it must have taken to fence and otherwise decorate the booth itself, for there was about a ton of copper tubing in the railing. The cube of ore was 31 inches in diameter, and

it made a $21\frac{1}{2}$ -inch cube of the concentrate, which in turn became a $9\frac{1}{2}$ -inch cube of matte, on its way to becoming the $5\frac{1}{2}$ -inch cube of metal. Great anodes of copper, ruddy cakes and ingots of it, lay out on tables, with starting sheets and cathodes. Ultimately the exhibit cubes went, by gift, to the College of Mines, University of California.

So a great industry was represented, from the bowels of the earth to bicycle pumps and other brass products, shown, at this point in the story, by the American Brass Company and the Bridgeport Brass Company, all beautifully complete.

Two hundred and forty-four million dollars in gold would make a cube $8\frac{1}{2}$ feet in diameter; and a cube of that size, gilded, represented Alaska's output for the years 1880 to 1914. The Alaskan exhibit was made by the Government, and so included other things than mining displays, yet the mining displays were the most pronounced and impressive feature. Dredging and ground-slucing methods were illustrated and there was a large exhibit of ores. The mineral wealth of the region was demonstrated by copper ores from Kaasan, Ketchikan, Prince of Wales Island, Woewodsky Island, Cordova, the Copper River Valley, Sitka, Fairbanks, and the Nome region. Gold nuggets and gold ores were merely commonplace. There were specimens of bituminous coal from the Matanuska fields, of semi-anthracite from the Bering River fields, and of lignite from the Cook's Inlet fields. There was marble from Orr's Island, oil from Kutulla, and antimony, gypsum, and graphite from other sections, all testifying to the treasure hidden away in the Far North.

And when the needs of man shall have exhausted it, the population that mined it and the descendants of that population will in the main continue to inhabit that country just as the Native Son and the Native Daughter inhabit this, and the Government exhibited the means of their subsistence: products of an intelligent agriculture conducted on an amazingly fertile soil: red clover, rhubarb, rye, oats, wheat, barley, potatoes, cabbage, beans, peas, tomatoes, berries, and small fruits. Forestry products also were shown—one a seven-foot section of a spruce that a notice informed the visitor was 180 feet high when it was at home, where there were lots more like it.

Although Utah had her best mining industry exhibit in her own building, she showed in the Palace an obelisk of Utah coal 30 feet high, weighing 26,265 pounds, bearing the reassuring announcement "Utah coal fields cover 15,200 square miles, and contain 197 billion tons, equal to the United States demand for 386 years."

Nevada has been the most spectacular mining State in the Union, not excepting California. The Comstock Mines awoke the attention of the

world, and the world had hardly recovered before Nevada did it again with the Goldfield, Tonopah, Manhattan, and Bullfrog fields. Marvelous has been the output of her gold and silver treasuries, magical and romantic beyond the telling the effect of them on the fortunes of men. San Francisco knows that story well, for its most dramatic episodes were enacted on her stock exchanges. Economically, financially, historically, Nevada and California are almost one; and in the minds of local people more of sentimental interest attached to the mineral exhibit of Nevada than to that of any other State. Independent of such considerations, it was a fine exhibit from a prodigious, we had almost said an inexhaustible, store; well-planned, well-balanced, showing not only the mineral resources but the mineral industry of the region. Not many of the State exhibits accomplished that. It was not merely a display of rich and diversified minerals, but by means of samples, charts, photographs, models, flow sheets, the visitor was given a comprehensive and most enlightening view of the ways in which those minerals had been made available.

*The Home
of Silver*

Mine timbering was illustrated at the entrance to the booth by a piece of old pine, 12 or 14 inches in diameter, that had been longitudinally compressed and distorted like a column of putty by the tremendous compression in some drift perhaps thousands of feet under ground. Timbering sets were exhibited, square and diamond. There were maps and charts and two glass models of mines (the charts showing mineral production since the mines were worked), and columns of figures illustrating the output of the different "camps" in gold, silver, lead, copper, and zinc, from the latest available data. One of the first air drills ever used in mining was part of the exhibit; it dated from 1872. The showing of rich rock, in cases, was most abundant. There were gold nuggets, copper ores, and ores of tungsten, molybdenum, antimony, zinc, graphite, lead. You felt surrounded by bullion; caught, at least temporarily, in all the magic of world-renowned bonanzas.

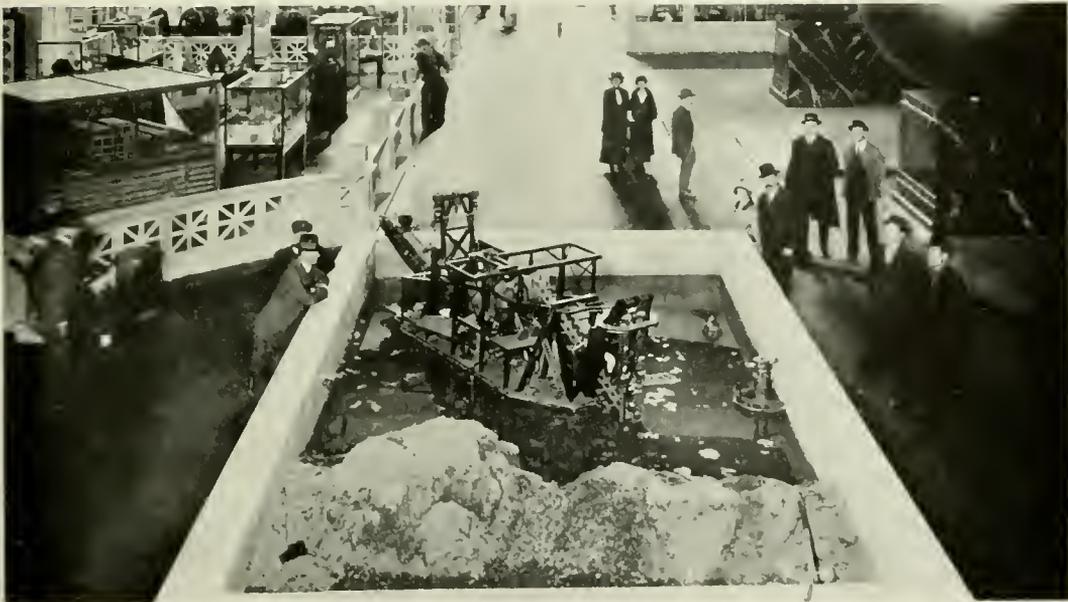
The mines and metallurgy exhibits of the State of New York were of particular interest to Californians because they consisted largely of non-metallic mineral substances, such as graphite, talc, paint pigments, feldspar, roofing slate, building stone, garnets for abrasives, and that great synthetic mineral, carborundum.

One of the principal features was the Worcester Manufacturing Company's salt-mine model. A brine salt plant was shown in operation, with the surface works, and a cross section representing the geological formation down to the rock-salt bed. The pumping and evaporating processes were demonstrated—the method of extraction being to admit fresh water, pump it out as brine, and then evaporate it

*Salt
Mining*



RICHES OF NEVADA



A CALIFORNIA GOLD DREDGE

from the salt. There were samples of iron ores, metallic silicon, pyrites from which sulphuric acid was produced, and there was a 22-foot panorama showing the old iron mines at Mineville in the Adirondacks.

Another model, exhibited by the Sterling Salt Company, showed the direct operation of mining for rock salt as though it were coal.

A jet of water served to illustrate the mineral output of High Rock Spring, at Saratoga.

For a long time New York held a leading place in the production of iron, largely through the contribution of the Adirondacks. The industry was put on a permanent basis about the year 1750, and materially assisted the cause of American independence during the Revolutionary War. It would not be regarded by a western metal miner as much of a mining State today, and yet its mineral industries yield something over \$42,000,000 a year in crude materials. Not so bad, when we consider that California's gold yield is about \$20,000,000 a year and her whole mineral yield, including petroleum comes to something like \$91,000,000.

Placer platinum was perhaps the most significant feature of the exhibit made by the Oregon Bureau of Mines. Besides this there were gold ores and nuggets, lead-silver ores, building stones, marbles, coal, gems, and a fine collection of photographs arranged about a central relief map of the State.

Louisiana was represented in this Department by specimen cubes of Avery Island rock salt, and ground salt in commercial grades for dairy, packers' and domestic uses; and also by lignite, limestone, sulphur, petroleum, sand, gravel, and shell.

CHAPTER XL

TAKING CARE OF THE WORKMEN

THE Palace of Mines and Metallurgy contained a number of exhibits that were classified under the Department of Social Economy, but were related to the mining and metallurgical industries because of their bearing on the lives of the labor employed in those fields. And there were a few banking exhibits here, because banking means thrift and thrift is vital to welfare—whether you work in a mine or a rolling mill or a factory, or work directing one of those institutions.

The United States Steel Corporation had endeavored to centralize more or less disconnected social work, under the direction of its Corporation Committee on Safety, and as a result possessed a highly organized (everything about the Corporation seemed to be highly organized) Bureau of Safety, Sanitation, and Welfare, which at the time of the Exposition had been in operation about three years. Since the inception of the centralized effort, in 1906, the corporation had expended about \$5,000,000 in this line of endeavor. The Bureau acted as a central station in obtaining information and disseminating it among the subsidiary companies, making studies of the risk element as well as of sanitation, and teaching the latest methods of preventing accidents.

Safety and Welfare By motion pictures and lantern slides at meetings of employees, the causes of accidents were depicted. Monthly prizes were given for safety records, and prizes were offered for safety suggestions. Safety precepts were printed on pay envelopes, and displayed in signs about the various works. There was a constant suggestion of care to keep down accidents. And first aid to the injured was taught, to minimize damage when accidents did occur. All the features of this work that could be shown visually were exhibited by the corporation in its welfare booth, and by the films in the moving-picture theater next door.

Results of its profit-sharing plan were shown through photographs and models by the Ford Motor Company in its sociological exhibit. There were working models of the Ford factories at Detroit and at Ford, Ontario, showing well-appointed buildings designed not only to produce motor cars but to

produce them under comfortable conditions for the laborers. Placard statements showed the growth of the workman's bank account since the profit-sharing plan went into effect. That plan as it existed in this institution in 1915 may be described briefly thus:

The Ford Motor Company paid, for eight hours work, approximately 5% more than the same skill commanded in the local market for ten hours work. There was added to the wages of each man each day a portion of the profits, yielding him on pay day, altogether, for each full day worked, either 5, 6 or 7 dollars per diem. Those men in the factory that were getting as much as 38 cents per hour came under the five-dollar rating, *Sharing Profits* those that were getting from 38 to 48 cents per hour, got six dollars per day, and those getting from 48 cents upward got seven dollars per day. On this basis, if a man's wages were \$2.75 per day, there would be added for a full day's work \$2.25, as his share in the profits, which would be paid him, were he eligible under the plan, in cash when pay day came.

This was the foundation for the report that the minimum wage in the Ford plants was \$5 a day.

How would the workman use this money? There was no compulsion about it, but the exhibit showed some interesting facts on that point, by the good old before-and-after-taking method. Illustrations of the before-taking condition showed a foreign boarding house as found by the Ford social investigator. It contained 12 rooms crowded with beds, and it sheltered 65 men, women, and children. Another picture showed a basement occupied by a workman with a family of six, and the beds were elevated on tin cans to keep them out of the water. Another family of six lived in a two-room shack and kept the coal in the bathtub.

Within a year after the profit-sharing plan was put into operation the percentage of employees living in such undesirable conditions had declined from 23 to two. The bank accounts of employees increased from \$996,000 to \$3,830,000, and the value of homes contracted for rose from \$3,440,000 to \$8,380,000. An interesting feature of the exhibit was the showing that the 20,000 Ford employees included men of 53 nationalities.

Insurance in various forms is a closely allied subject, and an essential element in social welfare. There were most interesting and important exhibits in this Palace, by the Prudential Insurance Company of America, the Metropolitan Life Insurance Company of America, the Ætna Life, the Modern Woodmen of America, the Royal Neighbors of America, and others.

The Prudential illustrated the underlying principles of insurance and its relation to human welfare by 320 charts compiled by its statistician.

The Metropolitan exhibited actual welfare work designed to keep people

healthy and prolong their lives. It illustrated its free visiting-nurse service, its organization of Health and Happiness Leagues among children that were policyholders, and its coöperation with health departments of cities and States, and other civic and social agencies. There was a model of its sanatorium at Mt. McGregor, in the foothills of the Adirondacks, for the care of the tuberculous among its own employees.

The Ætna Life sought to impress the lesson of accident prevention. The exhibit included a model of a factory, on a scale of an inch to the foot, wherein appeared machinery, guarded and unguarded, and working conditions that were unsafe alongside similar conditions reformed. On the reformed side the stairways were built at a proper angle to a platform half-way down, and were railed and toe boarded. On the other side *Safe Equipment* the stairway had a steep pitch, no handrails or toe boards, and ran from floor to floor without platform interruption. On the model side all machines were guarded with angle-iron and wire-mesh guards. The main overhead belts were guarded and the motors enclosed in wire screens or equipped with rails and toe boards. There was a first-aid room, and a sprinkler system, and the whole was whitewashed. The bad side was dark and all the machinery open. Charts showed the reduction in accidents through the use of safety devices.

This exhibit was very effective, and many of the larger manufacturing concerns in California sent their superintendents and shop foremen to the Palace to study it.

In addition to these individual exhibits there was a collective Insurance and Universal Safety exhibit, to emphasize the service performed by all classes of insurance, in prevention as well as protection—protection meaning in this case the indemnity paid for loss. It sought to impress on the visitor a sense of the national disgrace of permitting 160,000 buildings to be destroyed by fire in the United States each year; and in other ways endeavored to promote the conservation of life, health, and property. This exhibit was under the general direction of the Insurance Field Company, of Louisville, Ky., and the Safety Press Company, of New York.

A conspicuous object in this quarter of the Palace was a model 50 feet high, in white plaster, of the Bankers' Trust Company building, at the corner of Wall and Nassau Streets, New York. With this exhibit was an office in which visiting bankers could make their headquarters.



THE TIFFANY GEM EXHIBIT



COPPER FOR THE WORLD

CHAPTER XLI
TRANSPORTATION

WHEN the interests of primitive man were at all scattered, say between the creek where he caught his catfish, the woods where he killed his bear, and the cave where his wife chewed the fleshing off the pelt and made the bearskin into an Inverness to keep him warm and tolerably good-natured, he had little opportunity to cultivate the higher life of the mind and spirit, because he had to put in most of his time hiking from the cave to the creek and the creek to the woods and the woods back to the cave. If he forgot his club he couldn't telephone his wife to bring it on the next car, like the family umbrella; he had to go all the way back afoot, sometimes with the game gaining on him. Those were indeed the times of the high cost of living. The contrasts of to-day would seem to justify a few kind words about Transportation.

*Early
Travel*

Things—most things—cannot be made where they are used, nor used where they are made. We need too many. To get a thing from the place where it is made to the place where it is used is to put into it a large part of its value—often almost all of it. Certainly if the freight of the country never became freight, but had to stay where it was produced, the whole of it, if it were produced at all, would be worth very little. If we all had to stay where we were born we couldn't have Congress.

Transportation cheapens things, and provides reliable supplies. Far later than the primitive time we have so faithfully depicted above, when a crop failed in one locality the people had to starve there because no means existed of getting large quantities of food to them rapidly, from another locality, or getting them in numbers to the place where the food had been produced. In 1914 and '15 transportation saved a European people from extinction after their land had been desolated by war. And there was not only swift steam and electric, land, and water, and aerial transportation, of tangible commodities and of people, but instantaneous transmission of thoughts, ideas, orders, offers, acceptances, obligations, contracts. Through electricity and "the power o'steam," and of gasoline, the work of the world served millions where once all that could be done hardly sufficed to keep a

few thousands in wretchedness. Transportation in its most recent development was certainly worth a palace.

In that Palace appeared some of the most effective instrumentalities of this benign and wealth-creative activity: the finest locomotives ever built, urban trolley cars of the most economical and efficient type, models of the most luxurious steamships, with life-size reproductions of their decks and cabins and staterooms and cooking galleys; the best in automobiles and automobile appliances. There were no submarines—they lay at anchor outside—but suspended overhead were aeroplanes: Beachey's, and the one in which Fowler made the first aeroplane transit of the route of the Panama Canal. The classification was very complete and included carriages, wheelright's work, automobiles and bicycles, saddlery and harness, railways, material and equipment used in the mercantile marine, in the naval service and in aerial navigation; naval and military ordnance; dirigibles, spherical balloons, equipment for military ballooning, aeroplanes, motors; and the literature of the whole subject.

*Modern
Travel*

The Palace of Transportation stood just west of the Palace of Mines and Metallurgy. It was one of the larger exhibit Palaces, being 574 by 614 feet in largest dimensions, with two considerable angles taken out for courts. It was made additionally expensive to construct (it cost \$451,500) on account of the thirteen railroad tracks and the great transfer table connecting with them, all which had to have pile foundations, as we have elsewhere indicated. The trackage in the Palace came to 3,348 linear feet. And unless you knew about that transfer table, floored over for the operating season, you could no more tell how those giant locomotives got into the building than how the ship model got into the bottle.

Captain Asher Carter Baker was the first Chief of the Department of Transportation of this Exposition, and brought in as exhibitors the Pennsylvania System, the Westinghouse Electric & Manufacturing Company, and some other large concerns. When he became Director of the Division of Exhibits, Blythe H. Henderson became Chief of the Department, and carried on the work throughout the season. His Superintendent of Installation and later of Exhibits was John Henry Scanlon.

The automobile was a leading feature of transportation in the Exposition decade. The Automobile Association of California arranged a grand parade for July 15, 1914, in connection with the dedication of the Automobile Section in the Palace of Transportation. Over 52,000 invitations to participate were sent to owners in and about the Bay region and the result was the largest parade of machines ever held in the city. Sub-Director Sesnon was asked to act as Grand Marshal and Master of Ceremonies at the build-

ing. About 5000 automobiles, auto trucks and auto-cycles participated. Mayor Rolph, Capt. Baker, and Chester N. Weaver were the speakers at the ceremonies. The occasion aroused great interest and secured much support from the factories, which ultimately took 75,000 square feet of space in the Palace, or about 30 per cent of the available exhibit area.

No charge was made for exhibit space in any of the palaces, but after the automobile entries began to multiply, a movement was started among the manufacturers through which they contributed \$1.50 a square foot occupied by their exhibits, for extraordinary installation. This took the form of the most beautiful and effective decoration to be seen in any of the Palaces. All about and through the space occupied by the automobile exhibits there was carried overhead, on the columns and girders of the building, dividing this section into great bays aloft, a sort of pictorial frieze, of modeling and painting after the fashion of the cyclorama, depicting scenery along the Lincoln Highway, the Columbia River, and other great routes of automobile travel. It advertised the automobile most effectively, for what the purchaser of a car buys is not just some wheels, upholstering and an engine, but access to the beauties of the landscape and the grandeurs of a continent.

*Beautiful
Installation*

And these things were exhibited in the most attractive way. The spaces available were large and free like all outdoors, and the representation was carried out on a grand scale. The foreground topographical modeling was deep and interesting, the painting of the modeling and the canvas into which it merged was in oil and made a beautiful color study. The panoramic map of the Lincoln Highway, from New York to San Francisco, was 365 feet long, and with the modeled foreground was 25 feet deep, and it suggested most vividly the character of all the intervening country: the Prairie States, the Rockies, the tinted desert, the Sierra, the long sweep down their western flank to San Francisco and the terminus in Lincoln Park overlooking the Golden Gate. In addition, at the map's east end were shown the automobile roads along the Atlantic seaboard, reaching from New York down to Atlanta, and at the west the roads from San Francisco to San Diego.

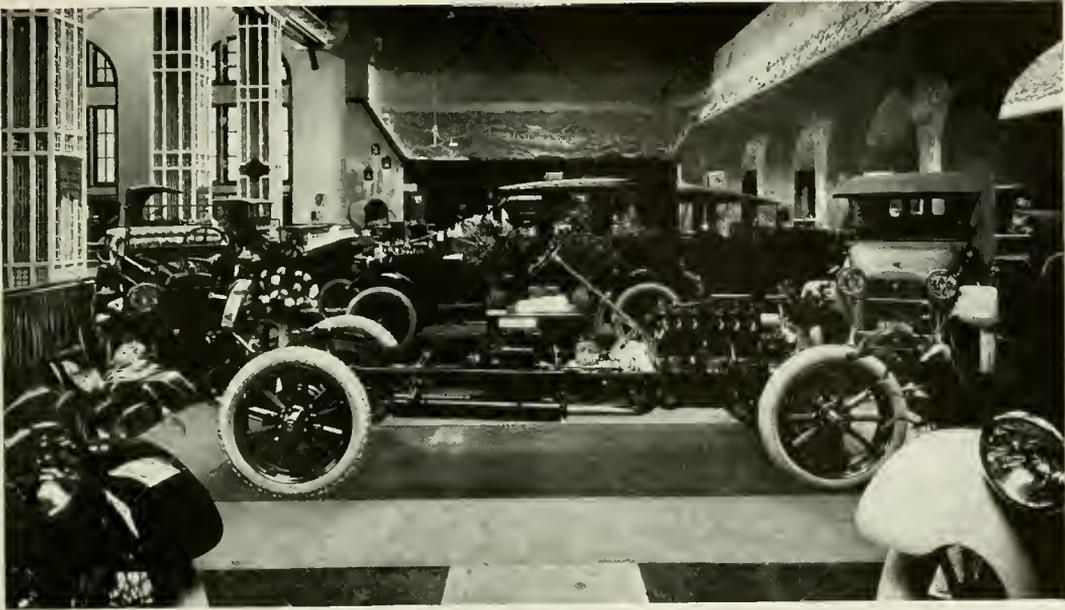
Another panoramic map 300 feet long showed the Pacific Coast roads and scenery from Lower California to Vancouver, B. C. The State of Oregon, proud of its Columbia River Highway, contributed canvases extending approximately 200 linear feet in the same manner. A third panorama showed the highly developed road system in the State of Washington. A flat painting about 250 feet long showed the roads leading from Galveston north to Winnipeg. The Ocean Boulevard of San Francisco looking south

from the Golden Gate was the subject of a painting nearly 100 feet in length. Another painting 108 feet long showed the Panama Canal. Four hundred and fifty linear feet of such painting showed the missions of California. Other smaller paintings and colored photographs depicted in detail separate points of interest and beauty along some of these routes.

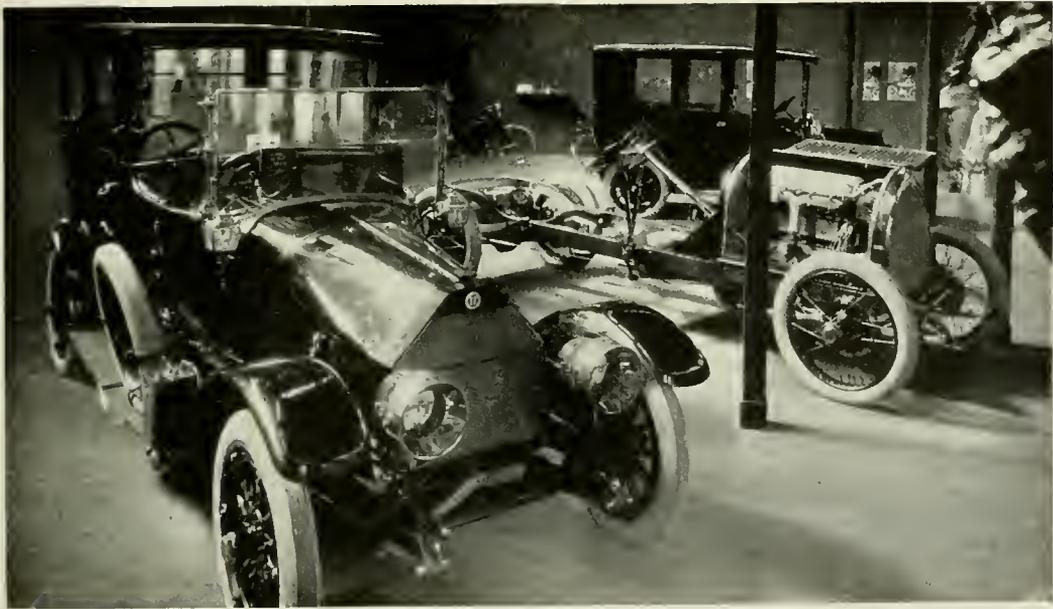
Only in an exposition could such a decoration have been carried out in so effective a manner. It was, in execution, the work of W. E. Benton and quite a staff of artists, under the general direction of the Division of Exhibits, with the advice of a committee of automobile men consisting of W. L.

*In Aid of
Good Roads* Hughson, Chester N. Weaver, and J. I. McMullin, and it made the best setting for automobile display ever seen in the country up to that time. The work began in October, 1914, and through the labor of large squads of staff modelers and artists was completed by Opening Day.

It may be said that the original inspiration of the scheme was to stimulate the growing interest in good roads, and especially to help the development of the Lincoln Highway, at that time laid out from ocean to ocean but not yet entirely complete. The completion of the first transcontinental tour over it from New York to San Francisco, we have recited in one of the chapters dealing with the events of the Exposition year. It occurred on August 25, 1915.



PART OF THE AUTOMOBILE SHOW



ITALIAN MOTOR CARS

CHAPTER XLII

ELECTRIC PROPULSION

THE most conspicuous object in the Palace of Transportation, and one of the most conspicuous in the whole Exposition, was a huge, black, double-ender giant of blinking metal that revolved in a majestic and elemental way just under the central dome: the electric locomotive of the Westinghouse Electric & Manufacturing Company, built for the Pennsylvania Railroad's New York terminal system, and embodying the best ideas of the engineers of both corporations. It was poised 12 feet above the floor. You saw no way by which it could have got up there, nor sustain itself when it did. But there it turned and turned and never tired, with the deliberation of all time and as though the energy of a small world were in it; whereas it was being swung about by a mere little ten-horse-power motor.

*Electric
Locomotive*

This was the largest locomotive of its kind ever built. It weighed 156 tons, was 65 feet long, had driving wheels 72 inches in diameter, had a capacity of 4,000 horse power, could exert a tractive effort of 79,200 pounds, and its normal speed with a full train behind it was 60 miles an hour. It represented the first side-rod, gearless, electric locomotive in this country. In November, 1914, 33 of this type had been in use over four years, and the one exhibited had traveled over 120,000 miles hauling trains in and out of the Pennsylvania terminal at New York City. It operated by the third-rail contact method, running through the tunnel under the Hudson River, and was smokeless, clean, safe, and swift.

Grouped about it were the other exhibits of the Westinghouse Company, of which it formed the central feature; diversified types of railway motors and control systems, including equipment designed for use on the highest direct-current potential that had ever been employed in commercial service down to that date: 5,000 volts. And it had been successfully operated on potentials as high as 7,200 volts. There were working exhibits of electric starting, lighting, and ignition outfits for gasoline cars, there were motors and controllers for electric cars, and all sorts of accessories used in the generation and transmission of electricity.

A new general feature was the use of pressed-steel frames for much of the apparatus. A recent innovation was a pressed-steel frame railway motor with a rating of 36 kilowatts at 600 volts, weighing 2,110 pounds, which was said to be several hundred pounds lighter than any previous motor of equal rating.

One unit of a three-pole oil circuit-breaker, the largest ever made, was part of this exhibit. The complete apparatus was designed for carrying 300 amperes at 165,000 volts. A section was cut out of the tank, which permitted you to enter and see the construction; and the thing was large enough to admit several people. Very instructive in electricity was a number of partly wound motors in this exhibit. There were rectifiers, gears, trolley-line material, meters, insulating stuff. This was a very complete and comprehensive display, and its management throughout the season, the courtesy extended visitors, and the intelligent and patient effort to inform all that sought information, reflected credit on the company and on its representative in the Palace, Mr. H. W. Cope.

*A Large
Breaker*

Another significant exhibit in this Palace was that of the General Electric Company which had much to show in the way of electric-railway equipment. In fact its exhibit in this Department was one of the largest and most complete displays of electric-railway devices ever shown. There was a whole group of locomotives; among them the huge Butte, Anaconda & Pacific engine of the type designed to haul 4,600-ton train loads of copper ore—an example of the high-voltage, direct-current system that seemed destined to do transcontinental duty before the next international exposition in this country. These were the first direct-current electric locomotives for operation at 2,400 volts ever built. Then there was a 60-ton electric locomotive for freight service, a 16-ton one for industrial yard switching, a 20-ton trolley type, and a 6-ton storage battery one for use in mines.

A very instructive General Electric exhibit consisted of the working parts of an electric car. Motors and control were shown in operation, with an illuminated diagram to illustrate the various changes in the current as it did its work. There was a complete line of this company's ventilated railway motors, a battery truck crane and a comprehensive showing of railway supplies and signal accessories.

The exhibit of the General Electric Company in the Transportation Palace occupied about 9,000 square feet of space. Several hundred stereomotorgraph views showed the whole range of modern electric-traction development. Here, too, you saw a model of the "electric mule" that does duty at Panama hauling ships through the Canal, much as the old hide-and-hoofs type of hay-burner once hauled boats on the Erie. The model was built on the scale

of half an inch to the foot. The "mules" themselves are 32 feet long and weigh 86,000 pounds. Braking is accomplished automatically by solenoid brakes powerful enough to stop them in two revolutions of the wheels.

One of the effective transportation conveniences shown by the General Electric Company was the battery truck crane, a short, heavy, storage-battery vehicle with a swinging crane mounted in front, the hook of which could be raised by a one-ton hoist operated from the vehicle battery. It was a most serviceable little go-cart, that could be used for hoisting or carrying on the hook, or for towing trailers, and was of value in unloading cars. It could be used for spotting freight cars, as it had a drawbar pull of about 2,000 pounds.

By means of photographs and drawings of the United States Naval Collier "Jupiter," this company exhibited modern electric propulsion for vessels, in the development of which it was a leader. The advantages of the electric drive for vessels were pronounced in the case of warships where it was necessary to make high speed at times, and at other times to cruise economically at low speed. And in vessels of all types it meant wiring instead of steam-piping. The "Jupiter" was propelled by one turbine generating unit with an induction motor coupled to each of the propeller shafts. The generator was of the three-phase type, designed for about 5,000 kilowatts at about 2,300 volts, and was quite similar in design and construction to the machines generally used ashore for lighting and power. Inasmuch as the "Jupiter" could not be navigated into the Transportation Palace and anchored there, the exhibit was accepted as eligible for review in the manner indicated above.

*Marine
Drive*

No exhibition in the transportation field of this age would have been complete without examples of electric cars, and the St. Louis Car Company showed what were probably the latest types. One was a duplicate of the standard design used on the Los Angeles trolley lines. It had semi-steel bottom framing, with wooden superstructure, and had a center entrance on each side. There was an emergency door to the right of the motorman's position at either end. The central part was enclosed and there were open sections at the ends. It would seat 50 passengers, and 50 more could stand. Mechanical control of entrance and exit doors on both these styles had practically eliminated car-step accidents.

CHAPTER XLIII

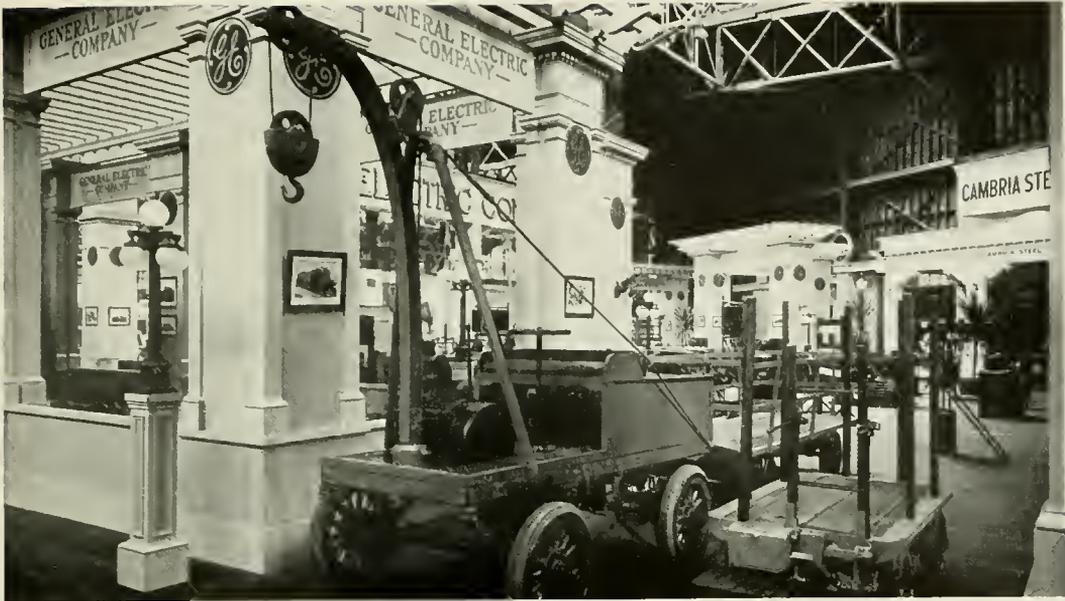
STEAM LOCOMOTIVES IN 1915

SOME of the locomotives exhibited in the Palace of Transportation were so colossal in scale as to excite fears on the part of sundry skeptical visitors that they were being imposed upon. Occasionally one would rap furtively on a cylinder or a drive wheel with a knife or a key to make sure it was not *papier maché*. "They do such things at these expositions a feller has to watch out; neighbor o' mine went to St. Lewis on the Santa Fee railroad and got a bad quarter shoved on him—just carelessness."

Since the days of old Matthias W. Baldwin, locomotives have grown larger and larger, rails heavier, and tracks better built and ballasted to support them. To-day, locomotives are great, self-propelled power plants. Economy has been found in size—all-compelling economy. The heaviest train loads must be handled that physical conditions will permit, for it saves train movements. So bridges have to be stiffened and grades reduced, and curves enlarged or eliminated. Superheated steam comes in, doing more work on the same fuel. Oil burners are used. And for coal burners there is the mechanical stoker.

*Mechanical
Development* The largest locomotive shown by the Baldwin Locomotive Works had one: the Street. The coal was passed through a 2½-inch screen before being loaded on the tank; whence it was literally screwed into the locomotive by a helical conveyor operating under a long slot in the floor. Thence it was elevated by a conveyor belt of small buckets to a point above the fire door, was sent through three-inch tubes, and then driven into the firebox by steam jets. The device was operated by a small steam engine on the boiler head which took steam direct. This engine was controlled by the fireman by means of one small lever.

And the machine not only fed coal to the locomotive; in itself it was a powerful element of mechanical evolution, for it made it possible to build larger locomotives than firemen had been able to feed with shovels; locomotives that would burn six or seven tons of coal an hour and keep it up as long as the fuel held out, whereas the human fireman at his best could handle only two or three tons an hour and was soon exhausted.



ELECTRIC CRANE AND TRAILER



ELECTRIC LOCOMOTIVE OF 1015

The locomotive on which this system was shown was very large—for that day; the largest and most efficient single-expansion freight engine. It was of the 2-10-2 type, built for the Chicago, Burlington & Quincy Railway, and some of its dimensions were: cylinders, 30-inch diameter; stroke, 32 inches; diameter of boiler 88½ inches; firebox 132 inches with 272 square feet of heating surface; drive wheels 60-inches diameter; length over all, engine and tender, 84 feet 10 inches; height, 15 feet 10 inches; total weight of engine and tender about 565,000 pounds. The tractive force of this engine was 71,500 pounds.

*A Large
Engine*

Steel passenger coaches greatly increased the weight of trains and made necessary a type of locomotive that would start a tremendous load and keep it moving with speed. These requirements were met by the Mikado type, an example of which, built for the Southern Pacific passenger service, was exhibited. This was an oil burner, not quite so long as the one described above, but with larger drive wheels—63-inch diameter. Other dimensions were slightly smaller, and the tractive force was 51,000 pounds.

Then there was a Pacific type, built for the Atchison, Topeka & Santa Fé, which had drive wheels 73 inches in diameter, standing higher than a six-foot man, and was “omnivorous,” for a few slight changes would turn it from an oil to a coal burner. And there was a Mikado type built for the San Pedro, Los Angeles & Salt Lake Railroad Company, and another Mikado for logging service, which was shown by the McCloud River Railroad. The Baldwin Works exhibited electric motor trucks, designed both for light city service and for heavy, high-speed interurban: two very different types.

The exhibit of the American Locomotive Company consisted of four locomotives, of which the most interesting to the general observer was a huge 2-8-2 Mikado-type freight engine built for the Pekin-Kalgan Railway of China. This came to the Exposition on its own “legs.” There was a Mikado type for logging service, and two locomotives of the O-4-O-T type representing this company’s latest designs for contractors, quarries, mines, and for other special industrial services. These last had all the weight on the two pair of drivers, whereas the logging type had it distributed over four pair so it could step easy on light rails and poor roadbed. The locomotive built for China was designed for heavy trains at high speed, but was flexibly suited for fast freight one day and slow the next, as might well occur in a newly developing country.

Other equipment had to keep up with train and locomotive evolution, and the latest types of brake shoe were illustrated by the exhibit of the American Brake Shoe and Foundry Company. It showed flanged and

unflanged reinforced brake shoes, locomotive-driver brake shoes, electric-railway brake shoes and brake heads, and shoes with non-metallic filling, which reduces noise.

In 1915 it was considered salutary to have the public understand the organization, economic relations, and services, of the railroads, and the Pennsylvania System decided that it should have a conclusive demonstration at San Francisco of the nature of such an institution. The Pennsylvania's space in the Palace of Transportation was a magnificent spread of railroading exhibits, reinforced by moving pictures in its unique little theater. And the Pennsylvania could do it. This was one of the great systems of the country, consisting of the Pennsylvania Railroad, the Pennsylvania Lines west of Pittsburgh, and their affiliations, operating in fifteen States. It was 11,730 miles long, had 26,200 miles of track, employed in the ordinary course of the day's work some 220,000 men, and ran more than 7,500 locomotives and 281,500 freight cars to say nothing of 6,884 passenger coaches in which it transported more than half a million people a day. Its signal system alone cost over \$23,000,000.

All the attendants about the Pennsylvania's space were uniformed, which gave it quite an official railroad air. They were men temporarily detached from regular duties to represent the different branches of the service, and they knew what they were talking about—quite an improvement over the attendants at some of the commercial exhibits. The affair was in charge of H. T. Wilkins.

The extent of the system was shown by one of the greatest maps ever made—a topographical relief model, 26 feet wide and 42 feet long, the largest of its kind down to that date, giving at a glance the topographical features of the country, on a scale of about 2 miles to the inch, from the Great Lakes to Kentucky and Virginia, and from the Atlantic Ocean to the Mississippi River. On it the larger cities were indicated by electric lamps showing their names and population; State capitals and important historical places by small flags; and State boundary lines by strips of bright paint.

There was also a model of New York City, 26 feet square, with a model of the Pennsylvania Station in its midst, and there was a model of Hellgate Bridge, on the Pennsylvania's main line. There was a model of the proposed Union Station at Chicago which would be about three years building, and another of the Union Station at Washington, D. C.

Hellgate Bridge, spanning an arm of the East River between Ward's Island and Long Island City was one of the greatest engineering undertakings of the country down to that time. It was the largest arch in the

world and contained more steel than the Woolworth building. We have seen a typical section of one of its main members in the exhibit of the United States Steel Corporation in the Palace of Mines and Metallurgy. It was the longest single-span, four-track railroad bridge ever constructed, and provided a direct rail entrance into New England, through New York, from the Middle States and the South. The great arch had a span of 1,000 feet and rose 300 feet above the water, leaving a clear way 140 feet high under the railroad tracks. The towers from which it sprang were 120 by 140 feet at base, rose 240 feet from the ground, and contained 3,000,000 cubic feet of masonry and concrete. The bridge was 93 feet wide over all—a stupendous work, and a mark of modern civilization just as the Pyramids were of ancient. It was put in service March 1, 1917.

*A Modern
Wonder*

The moving-picture theater of the Pennsylvania exhibit was unique among all the picture places in the Exposition. It consisted of two all-steel passenger coaches built at the company's shops at a cost of \$13,000 each. These were put on rails in the Palace of Transportation side by side, their adjacent sides were cut away, their floors were bridged across, and they were fitted with the plush upholstered seats of first-class passenger coaches. It took three days to show all the reels with which this theater was equipped, and it attracted over 137,000 people. The number was known because souvenir tickets of admission were distributed, both at the exhibit space and from ticket offices along the line to people coming west, and then a coupon was detached by the "conductor" at the entrance—all which helped the physical metaphor of going on a journey by cinematograph.

In addition to its beautiful pavilion on the Avenue of Progress, an important contribution to the Exposition's life and beauty, the Southern Pacific Company made an exhibit in the Palace of Transportation that was most impressive and valuable. You could learn a great deal about modern means of transportation from this exhibit. Besides that, the company sought to show the high standard of efficiency with which its property was maintained and operated, and the great care it took to secure the safety of its passengers.

It laid down a stretch of about 200 feet of the latest type of standard track, with the ballast retained at the ends by plate glass so that you could see a perfect section of the work. Along this stretch were operative block signals, and upon it was a small, eight-wheel locomotive of other days, the "C. P. Huntington," a relic, the first locomotive over the Rocky Mountains. Nearby was a locomotive of the year of the Panama Canal—a Mallet articulated compound, burning oil, with 16 drivers 57 inches in diameter, a maximum tractive power of 94,880 pounds

*The Old
Pioneer*

and a hauling ability on a level tangent of 16,940 tons at ten miles an hour. The contrast with the days of the "sixties" could hardly have been made more vivid.

The Southern Pacific also showed a cut-open, or cross-sectioned, engine so that you could see just how the steam entered, did its work and left. From it a good many people drew their first understanding of the mystery of steam. It showed shop products in great variety, from steel springs to headlights, indicating a large manufacturing ability; it seemed able to produce in its own shops anything it needed except rails.

Many types of passenger and freight car were shown, indicative of the progress of the decade in the construction of traffic-carrying units. The steel coach, steel street car, United States mail car and steel motor coach demonstrated the safety and comfort attained in Southern Pacific construction. There was a great safety exhibit in the shape of the various devices for signaling, and for stopping trains automatically that would otherwise run into danger.

But perhaps the most significant part of this exhibit was the first steel passenger coach ever built in the United States—and it was built in the Company's shops at Sacramento in 1905. Since that time the construction of wooden passenger equipment has been discontinued by this company.

The joint exhibit of the Western Pacific, Denver & Rio Grande, Missouri Pacific, and St. Louis, Iron Mountain & Southern Railway lines was a striking and beautiful piece of display advertising that cost about \$50,000 to build and equip. The exterior was a hemisphere 52 feet in diameter, standing 44 feet high, strikingly decorated with sculptured figures in plaster, representing the prospector, the farmer, the fisherman, the brakeman, the track walker; and with locomotives in relief. On the face of the globe was a relief map of the country with the exhibiting lines conspicuously indicated; and every 22 seconds a miniature train of little electric lights left the San Francisco end and went through to St. Louis; the principal cities and towns on the line lighting up as it passed.

Inside the globe and in the vestibules approaching it were 24 dioramas, very beautiful illuminated pictures of the Great Salt Lake, the Royal Gorge and other scenic grandeurs along the lines; while the inner vault above showed a blue-black night sky gemmed with winking stars. In a room beneath was the apparatus that operated these stars and the electric train overhead. For the latter it had been necessary to run 1,500 wires from the miniature "track" to a drum on which a revolving arm made and broke the circuits.

In the field of traffic promotion this was one of the most effective things



WEST END, COURT OF THE UNIVERSE

done in the whole Exposition, and reflected great credit on the railroads that could carry out so artistic and striking a conception.

Through the unwritten epic of the West, that story of adventurous migration and settlement that has never yet been fully told, runs the thread of express service in the days before the railway; and since those days, in the remote places the rails have not yet reached. It was a service that carried intelligence, treasure, and merchandise; contracts and tidings; the foundations of business and the means and products of industry, the stuff of commerce; and to any development beyond the veriest primitive, it was as necessary as food. In the day of the railway, commerce relies on steam, but once it depended on the Pony Express and the old "Concord thoroughbrace wagon," and for safety of property entrusted to it there was the "messenger," with his long-barreled six-shooter and short-barreled shot-gun.

Illustrating those times and men, the Wells Fargo Express Company made a typical exhibit in the Palace of Transportation, and no institution of the country had a better right. There was a working model express office, and there were samples of the company's package chests and strong boxes, and exemplifications of its methods of transporting merchandise of all kinds, from dried fruits to draft horses. There was a little moving-picture theater, where visitors could rest and be most comfortably entertained, and there were samples of the company's private stamps, affixed to letters in early days in addition to the Government postage by people that placed more reliance on the express company than they did on the Government, as far as transportation went.

*Romance
of the Road*

But more interesting was the old "thoroughbrace" in a corner, as perhaps it once ran on the Hangtown Grade, with a broken express box telling its story of the "road agent"; and more interesting still was a case of personal relics with bits of history attached: a pair of old blue overalls riddled with buckshot from an ambush, a six-shooter wrecked on the hip of the messenger by a highwayman's bullet, "Big Jim" Miller's great silver watch, the reward of bravery; Truesdell's ice mallet with which he brained one robber, and the rifle he took from him to shoot the other—all witnesses to valor, to trusts discharged in lonely battles where there was no shoulder-to-shoulder support of comrades, no Red Cross ambulance to succor the wounded, but the unseen and unaided personal heroism of the individual. The exhibit in these particulars, was not "contemporaneous," but it was significant of deeper and finer things than many that were.

The contemporaneous features illustrated all the modern services of the company, too well known to need description here, and included a moving picture projected in the little theater, which depicted the travels of a vase

despatched by a lover to his sweetheart, "by Wells Fargo"; so that in addition to all its other functions, the company did the parts of Mars and Cupid too.

Two thousand, three hundred and forty-five pounds of pig iron hanging by a slender thread of steel an eighth of an inch in diameter was displayed by the Pennsylvania and Maryland Steel Companies as part of their exhibit in the Palace of Transportation. It was shown here because the little bar that sustained all that load was what was left in the middle of a one-
A Thread of Steel and-an-eighth-inch Mayari steel frog bolt, turned down in a lathe for the purpose. The load hung under a canopy and it hung free, so that within narrow limits set by the proximity of the canopy pillars you could swing it about, bending the steel slightly, and breaking it if you could. But you couldn't. It stayed there throughout the season, while the canopy sagged over and got out of plumb with the weight; but it did not break.

Here was a showing of railroad materials such as frogs and switches, special track work, steel castings, steam- and street-car rails, marine models and shop pictures; but the exhibit centered about Mayari steel, a natural alloy from Cuban ores that contained the alloying elements quite evenly distributed so that they gave a uniform product at moderate cost. It was entering into automobile manufacture to a considerable degree, and so was serving transportation in another form than railroading.

The Cambria Steel Company joined in this exhibit and showed some remarkable samples of car axles tightly twisted, and bent into hairpin turns, without cracking; with rails, frogs, joints, tools, and wire fencing.

There was a device shown in the Palace of Transportation by means of which a running train could pick up a dozen eggs when it was going at full speed, and drop them off at destination, and not only do it in such a manner that not an egg was cracked, but so that every egg would hatch out a good and serviceable chick that would grow into a staid old hen in total
Made Safe for Eggs ignorance of the rapid pace at which she had traveled before she came into the world. It would operate equally well with honey in the comb, or with any other fragile and perishable commodity.

This was the Hupp Automatic Mail Exchange System, meant to revolutionize the taking up of mail by moving trains. It opened and closed the car door by a mechanism geared to the axle and tripped from the track, delivered the mail pouch at the station and took up another into the car, at any speed required; and did it with safety to the contents.

The skeleton frame of a mail car was on exhibition with a set of the apparatus, and beside it the long station trough that was part of the system. A pouch discharged from the car by this means dropped gently into the

trough and slid along it as far as the momentum imparted by the car's speed would take it, coming to rest without the slightest jar. Hence the possibility of the system as to eggs and comb honey. The device had just been put into use on the Chicago & Alton railroad.

The McCloud River Lumber Company exhibited a logging train loaded with saw logs that must have been a source of wonder to people from parts of the country less favored with great forest growth than California. There were sugar-pine and white-pine logs, three on a car, in 16-foot cuts, one of which contained 2,025 board feet and another 2,181. This was the train that was drawn by the Mikado-type Baldwin locomotive.

The air brake was a great invention, we understand, but compressed air was not quick enough if anything quicker could be devised, or if any way could be found to speed that up. The latter thing was found in the Electro-Pneumatic Brake of the New York Air Brake Company, through which the air brakes could be set on every car of a train at once, and far more quickly than had ever been possible before. Its action seemed practically instantaneous. This company installed a working model in the shape of a rack representing a train of 12 cars, with locomotive and tender. It was in constant operation, made the mischief of a racket in the Palace, and was a convincing demonstration of mechanical efficiency. The brake was suitable for steam or electric service. With it the shortest possible stops could be made without the shocks or train surges so uncomfortable and so fatiguing to passengers.

*Down
Brakes*

The United States Post Office car in this Palace was part of the Government exhibit.

The Flannery Bolt Company made a large and important exhibit of the Tate flexible staybolt for building locomotive boilers, illustrating its use in the several stages of building a boiler, and exhibiting the tools with which to apply it. The Rail Joint Company, of New York, showed the latest thing in rail joints.

The German American Car Company of Chicago had an exhibit of tank cars for the conveyance of wine, mineral water, and similar commodities. These cars were lined with cork.

The California Dispatch Line of San Francisco showed a wine-tank car of a type in which over 20,000,000 gallons of California wine were transported during the year 1914.

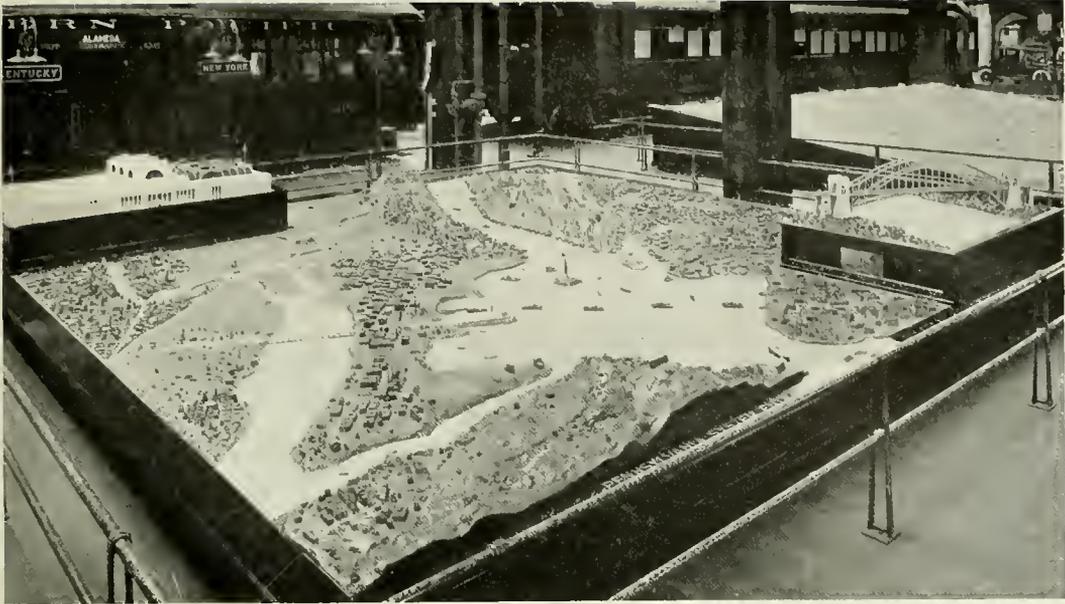
"We care not who builds the railroads of a country as long as we can oil them," might well become the watchword of the Galena-Signal Oil Company, which for 46 years had been supplying a large part of the lubricant for American roads. It exhibited samples of lubricant for every conceivable

purpose connected with railroading, all manufactured at Franklin, Pa., from Pennsylvania crude petroleum. This company's oil keeps the wheels turning on railroads all over the world, and its contract with the Union Pacific, made in 1869, was still working in 1915.

A large number of those wheels were made by the Griffin Wheel Company, of Chicago. Its exhibit showed the latest patterns in steam-road, street-railroad, mine-car and industrial wheels. There were chilled iron wheels weighing 940 pounds each and from these there were wheels of all sizes down to the little ones used on the tenders of the Overfair Railway, weighing 35 pounds. There were two pair of United Railroad veterans that had run over 130,000 miles. They were 33 inches in diameter when they began that long journey, and when shown at the Exposition they had been worn down to 31; a rim an inch thick had been ground from them by rolling friction on the rails. The double-flanged crane wheel in this exhibit was of interest as a difficult casting to make.

*Supplying
the Wheels*

Of much interest to railroad men, in the line of equipment, was the exhibit of the National Malleable Castings Company, which showed a complete line of automatic couplers, journal boxes, hand brake and air brake equipment castings, cast steel draft gear yokes and coupler pockets, rail braces, tie plates, and a large assortment of open hearth steel and malleable iron castings. The Sharon coupler was a leading feature of the exhibit. Representatives of this concern claimed that it was the largest manufacturer of car couplers in existence.



NEW YORK HARBOR AND HELLGATE BRIDGE



THE GLOBE

CHAPTER XLIV

“DOWN TO THE SEA IN SHIPS”

YOU'VE heard of landlocked salmon? Well, we have landlocked people in this country, lots of them, people that have to live in the interior and that think of the sea and of the ships upon it only in the figures they get from books, or in terms of canal boats and river packets. Liberating to the imagination of the landlocked were the marine exhibits in the Palace of Transportation. They covered the field of ocean traffic in a complete and fascinating manner by means of some of the most beautiful exhibits in the whole Exposition, from the large steamship models of the International Mercantile Marine, to the jewel-like silver figure of a modern battleship in the Japanese section, and the rich and splendid bronze and lacquer reproductions of historic Japanese war junks. All the luxury of modern ocean travel appeared. In life-size models of parts of ocean palaces you could sit on deck, go into staterooms, invade cooking galleys; learn, in short, just how you can be accommodated at sea when you are fortunate enough to travel. It had a tendency to awaken the *wanderlust* and was doubtless designed to do exactly that.

*Stationary
Voyaging*

The combined exhibit of the Alaska Steamship Company and the Copper River & Northwestern Railway was composed mainly of enlarged and colored photographs of Alaskan scenery; with various preserved Alaskan vegetables and fruits, typical productions of Alaskan gardens, mounted specimens of game, and some relief maps showing the character of the Alaskan coast as far up as Cook's Inlet. It was an interesting and a persuasive exhibit. At this time the Copper River & Northwestern was the only operating standard gauge railroad in Alaska. Its line was 160 miles long, from Cordova to Kennecot, and it ran through some notable scenery, crossing the Copper River on an immense steel trestle between two living glaciers.

A real section of Alaskan life as a visitor would see it, and as a visitor would be interested in seeing it, was staged by the Pacific Coast Steamship Company, in a booth that was made headquarters for the Alaska Cruise Club. This corner of the Palace possessed great fascination, because it gave so vivid an illustration of what you would be likely to enjoy in the

Far North. Here you saw a painting of the Muir Glacier, grand and beautiful, with a steamer cruising past its face, and a foreground made of driftwood, gravel and moss to give the realistic appearance of an Alaskan beach. The beach came forward into the booth, and on it a little group of Alaskan Indians worked throughout the season, in costume, carving totem poles, making baskets, moccasins, and scrimshaws, and doing other things of importance to an Indian. Show cases all about were filled with such work and with carved walrus ivory, and specimens of copper, and gold nuggets. There was a life-size copy of the totem pole at Wrangel.

*A Northern
Beach*

Just how you could reach this land of mystical Arctic charm was depicted in a most tempting way. There was a large panorama, 25 by 71 feet, representing the skyline of San Francisco, and the water front extending westward to include the Exposition grounds and palaces, the Presidio and the Golden Gate. And as though outbound for the North there was a section of a steamer, complete to the smallest detail, bedroom, sitting-room, and bath-room, furnished; opening off a bit of deck where you could stand and readily imagine yourself committed to the pleasant venture. Thousands of visitors made this booth a resting place, and sat and wrote notes at the little desk in the stateroom.

The Holland-American Line built in the Palace an exact copy of parts of the new triple-screw turbine steamer "Statendam"—a first cabin suite, regular first cabin, second cabin, and third-class staterooms, and third-class dining-room and pantry. The "Statendam" was at that time under construction at Belfast, and was to be a vessel of 45,000 tons displacement—so the exhibit was strictly contemporaneous. The first cabin suite was finished in Empire style dark mahogany, the bedroom in white enamel, with gold panels in silk, and with carpets to match. It had a private bath adjoining; and it represented 32 such suites on the steamer.

After you had enjoyed these steamers' cabins erected in various parts of the Palace and had examined the character of accommodation the liners offered, you could see representations of the liners themselves, in the enclosure of the International Mercantile Marine. Here were ten large models of vessels, in glass cases, the finest models ever made, of some of the greatest passenger lines; models that cost thousands of dollars, and were almost as carefully constructed as their floating prototypes, and so arranged that you were compelled to note the progress made in ocean transportation in recent years. It was said to be the finest collection of ship models ever shown at any exposition.

*Excellent
Models*

For this exhibit 6,500 square feet of space was enclosed in ship's railing, and a lieutenant of the British Naval Reserve was put in charge. There was

a compass, chronometer, and engine telegraph, and a ship's bell that tolled ship's time, to the confusion of some of the visitors that tried to set their watches by it. And for the weary there were inviting steamer chairs scattered all about.

The bell had traveled over 1,300,000 miles on the old White Star liner “Britannic,” a vessel of 5,004 tons, 455 feet long, and 55 feet wide, which had been in service from 1874 to 1899. There was a model of her about ten feet long in a glass case. Nearby, illustrating the advance that had been made in the size of ships, was a model of the new “Britannic,” a triple screw steamer of 48,158 tons, 887 feet long, and 94 feet wide, that had superseded the other vessel of that name. Her model, exhibited in this booth, was about 20 feet in length. In the Fall of the following year the magnificent vessel herself was sunk in the Ægean Sea while in service as a hospital ship for the British Admiralty.

These models were large and beautiful objects. The smaller had cost \$5,000 and the larger \$15,000. Every detail of a ship visible from without appeared to be represented, and you could compare the new with the old. There were models of other vessels of this line: the “Teutonic,” the “Oceanic,” and the “Celtic,” each having been in its day a crack liner of this company. Side by side were two models of the Red Star Line, the first “Belgenland” and the new “Belgenland.” There was a beautiful model of the American Line twin steamers “St. Paul” and “St. Louis,” one that had been exhibited at a number of foreign expositions and had taken many medals and ribbons; and a model of the “Westernland” of this line. And there was a model of the Panama-Pacific Line steamers “Finland” and “Kroonland.” The American Line was represented by a 10-foot model of the interior views of the “Britannic.” The columns that rose from this space were lettered with the names of the various *Associated Companies* lines comprising the International Mercantile Marine: the American Line, the Atlantic Transport Line, the Dominion, Leyland, Red Star, White Star, and White Star-Dominion. Altogether it was an instructive showing of the development of modern shipping. This exhibit and that of the Holland-American were under the direction of T. H. Larke of San Francisco, Pacific Coast Passenger Agent of the exhibiting companies. Lieut. Gordon was in charge.

The American-Hawaiian Steamship Company gave the public a reproduction of the midship deck and deck houses of one of its big freight steamers, with a great many appliances installed. There was in addition a reproduction of the entrance to the company's terminal situated on the Embarcadero of San Francisco.

CHAPTER XLV

INDIVIDUAL TRANSPORTATION

IN 1876 one Pyott, of the Baldwin Locomotive Works, made a steam automobile (with a steering wheel quite like a modern one but the others strangely different) with which he intended to carry passengers about the grounds of the Centennial Exposition at Philadelphia. For some reason unknown to the writer they wouldn't let him in; probably too dangerous.

In the Louisiana Purchase Exposition at St. Louis in 1904 there was a large and very fine exhibit of roadsters, runabouts, surreys, broughams, victorias, landaus, and other vehicles meant to be drawn by the deliberate, domesticated horse. A short time after the Panama-Pacific International Exposition, a once fashionable livery stable down the Peninsula sold out at auction in order to become a garage, and a lot of these venerable traffic-blockers went for two and three dollars apiece.

No transition of similar importance ever took place with such rapidity, except as a phase of war. An exhibit of horse-drawn vehicles at San Francisco would have looked like a hangover from the days of Rip Van Winkle. Instead we had the automobile in its glory and almost in its ultimate design, for designs were perceptibly approaching a common type of simplicity. It was the first exhibit of the kind ever held in connection with an international exposition, and by far the finest ever seen on the Pacific Coast. In fact it led to the annual automobile show that is now held in the Exposition Auditorium, one of the three great motor vehicle shows of the country.

We have described the setting in the Transportation Palace in which this exhibit or collection of exhibits was held. Upward of 60 of the leading manufacturers of American automobiles ultimately participated; and in addition to their exhibits, there were English and Italian makes, although in other parts of the Palace. Some of the most beautiful cars ever built were on display. Every conceivable device was employed to make plain the mechanism and manufacturing methods involved. There were cut-open models of vital parts, of gears and differentials, engines turning in glass



A BIT OF ALASKA



INTERNATIONAL MERCANTILE MARINE EXHIBIT

cases fitted with mirrors so you could see all sides of them at once, and accessories and fittings and furnishings of all possible sorts.

The writer was in the office of the Assistant Director of Works one day early in the season, fondly hoping to extort a little information with which to illuminate this narrative when one of the engineers came in and said:

“There’s a lot of automobiles running around the grounds loose, without official pennants. They’ve got no business in here, have they?”

“They have not. Get some Guards and pinch ’em, or run ’em out, or find out who they are and how they got in, or do something to ’em. That thing’s got to stop profanely quick.” Exposition engineers don’t always blue-print what they do; sometimes they just do it and make blue-prints afterward. In this case there was nothing to be done. Investigation showed that automobiles were being born inside the grounds faster than they could be tagged. The Ford assembling plant in the northeast corner of the Palace of Transportation was turning them out at the rate of a car every ten minutes for three hours every afternoon except Sunday.

*Growing
Family*

This plant was one of the main show places of the Exposition. Every afternoon hundreds of visitors lined up along the guard rail and watched the process as though life depended on it. They saw a chassis start down a long pair of skids, moving at the rate of 15 inches a minute, and, under the skilled hands of operatives that worked deliberately but never made a waste motion, accumulate springs, wheels, transmission shaft, a tonneau, the requisite cushions, an engine, a top, a windshield, a gasoline tank with a little gasoline, and everything else it needed, and then, under its own power, glide out into the court where the big Neptune’s Daughter was standing on a fish.

Within four minutes after the Exposition opened, this plant sent out the first car. After that it assembled 18 cars a working day throughout the season, practically speaking. It may have missed a few, or assembled a few less cars sometimes, but it turned out a total of 4,338, all of which were taken immediately by the distributors. They were spoken for, weeks in advance. Some went directly to China on the steamers from San Francisco. There were from 40 to 45 men in attendance. The material came into the grounds in trucks after 11 o’clock at night, and the work began at 1:40 in the afternoon, and continued until 4:40.

The general automobile section occupied 75,000 square feet of space, floored with linoleum and decorated overhead with the beautiful views of scenery and transcontinental highways we have attempted to describe in a preceding chapter. Although the automobile was approaching a standard

design it had not yet reached it, and there was still room for minor changes in the models. That had its influence on the question of exhibiting, for a manufacturer could not hope to sell a car that had been standing eight months on the floor of an exhibit palace at the Exposition. It would not be the latest model. So, contrary to usage in the case of other exhibits, exhibitors of automobiles had to be permitted to sell and remove them so they could keep their stock turning. The Exposition opened with a fine showing of 1915 models, and in spite of withdrawals of individual cars for sale, the exhibits kept growing. In April there were 41 exhibitors. In May there were 56 and in July there were 64.

*Moving
Business*

The lines of accessories were numerous and important to the trade, and to the investors in cars. From direct observation of the articles themselves a great deal could be learned about self-starters, magnetos, radiators, spark plugs, tires, car bodies, axles, differentials, transmission, storage batteries, all the heavy parts, the methods of handling lubrication, lubricants themselves, horns, windshields, airless tires, and specialties of all sorts.

It was the age of the medium-priced car. Under pressure of competition the factories were in process of standardizing their practices and output. The ordinary medium price in that year for a five-seat, four-cylinder, 30 to 35 horse-power car was about \$1,200. You could pay as much as you liked unless you liked to pay too much, and you could get some cars that were known to be good, for the service that was in them, for very much less. There were cars from \$420 up to \$10,000 in price. And some people contended that for the work they had to do the 420-dollar sort were among the best obtainable.

Automobile trucks and farm tractors were coming in. The writer saw in the Vaca Valley that year a farmer ploughing an orchard with a tractor; and their use grew very rapidly after the Exposition. When the United States entered the European War, tractors did the work of thousands of boys that went to the front.

It would be useless to attempt to enumerate all the cars exhibited, but a few may be selected as notable for some phase of development. There was a very beautiful Packard in a glass case, exhibiting what the expensive advertisements of this class of goods call "the latest refinements of design." It was painted in cream white, with gold leaf trimmings, on a black chassis, and it had white wheels and black upholstery and was altogether a sumptuous and handsome object, illustrative of the luxury of modern life. Here, too, was the first car of this make, a veritable horseless horse-and-buggy. In June the first 12-cylinder motor car that ever crossed the continent, a Packard twin-six with V-shaped engine, came

*Twin Six
Arrives*

into the grounds under its own power. It was driven by Henry B. Joy, President of the Lincoln Highway Association and also of the Packard Company, and he had made the 2,800 miles from Detroit in about three weeks. The car was shipped home.

Some other recent improvements of design were exhibited by the Thomas B. Jeffery Company in the tragic fashion of the day—armored, turreted, fitted with a Colt machine rifle, and engined for the four-wheel drive so that it could go forward or back at equal speed, or get traction with one pair of wheels if the other happened to be mired. This machine was a product of war conditions and was not evolved early enough to go on exhibition until about mid-season.

The V-shaped motor had just arrived in the restless evolution of the automobile, and the Cadillac Company exhibited it in an eight-cylinder car; four cylinders on a side. This company also entered as a working exhibit the two fine motor ambulances connected with the Exposition's Emergency Hospital.

The Maxwell Company showed a convertible sleeping car for camping trips.

Quite a number of automobile trucks were shown, and they were objects of general interest, whether people had anything to haul or not, for they were recognized as a certain coming development that would in time produce horseless streets and make the conveyance of goods both cheaper and cleaner. There were the Packard, the Sterling, the White, the Federal, the Kissel, the General of Detroit, the Bessemer, the Bacon dump wagon, made in San Francisco, the Commerce, and the Moreland, *Trucks
Beginning* the last named being a California-built truck, made in Los Angeles and burning distillate. One was a four-wheel drive truck, the "T. W. D." made in Clintonville, Wisconsin. And in addition there was the Smith Form-a-Truck made by converting the engine and transmission of a Ford into a one-ton truck, on heavier rear axle and solid rear tires; and there were the Electric trucks of the Automatic Transportation Company of Buffalo, operating by means of Edison storage batteries.

The Rolls-Royce, an English car, attracted much attention, and so did the Italian cars in their section: the Isotta Fraschini and the Italia-Bianchi. Exhibits of foreign automobiles, however, were almost entirely prevented by the war.

Among the other exhibitors in the automobile section of the Palace of Transportation was the Hendee Manufacturing Company, with a large and attractive display of motorcycles. The Davis Sewing Machine Company showed Dayton motorcycles as well as a complete line of motorcycle fire apparatus.

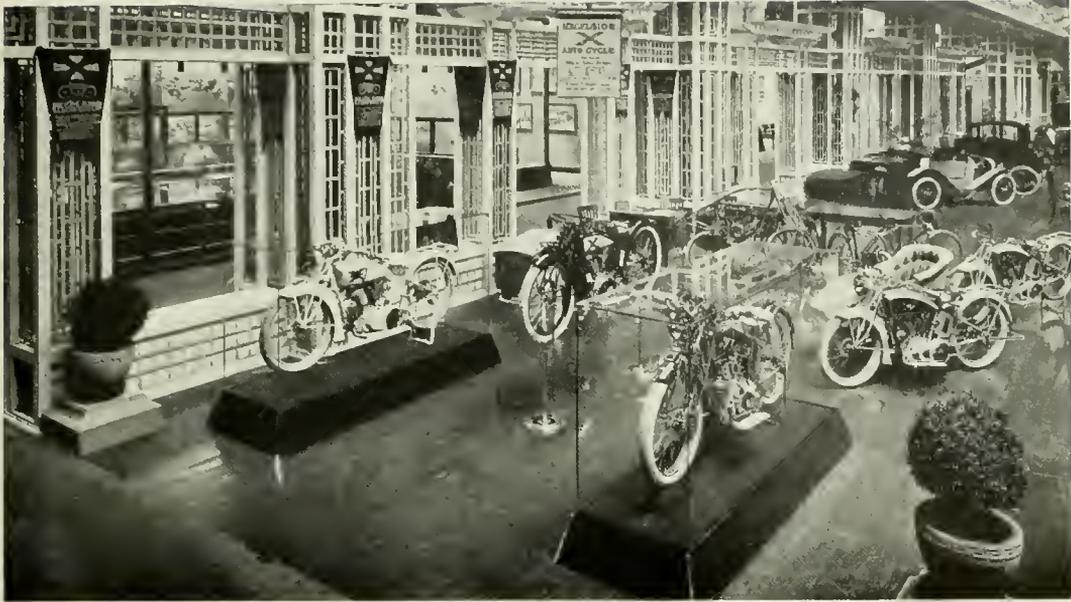
S. F. Bowser & Company, Incorporated, had a large block where there were daily demonstrations of their line of oil handling devices. The booth was fitted up as a service station, and included in its equipment apparatus for the selling of oil and gasoline. There was a complete filtration plant.

The Splitdorf Electric Company, the Apple Electric Company and the Sumter Electric Company had a joint display of magnetos, coils, spark plugs, ammeters, storage batteries, and starting and lighting systems.

Thomas A. Edison had a large exhibit illustrating the various types of storage battery and other motoring devices turned out in the Edison plant.

The Standard Oil Company had a demonstrating display of its oils, polishes, and Zeroline. In the demonstrations a Ford and a Studebaker were used. There was a cut-open differential to show lubrication, and other parts were sectioned.

The National Carbon Company and the American Everready Company had a joint display of batteries, lamps and the other accessories manufactured by them.



MOTORCYCLES IN 1915



AN AUTOMOBILE ASSEMBLING PLANT

CHAPTER XLVI

FOREIGN TRANSPORTATION

IF you had been searching the Palace of Transportation for the most significant development in that particular field at the time of the completion of the Panama Canal, it is the writer's notion that you might have found it not in the exhibits of the great transcontinental systems of America, but in the Chinese booth. And not in the models of ships and cars, and photographs of steel mills turning out railway equipment shown there, remarkable as those things were, but in a dull-looking blue map on the wall. For if you had interrogated the young Chinese students and engineers in attendance you would have learned that the map bore a prophecy of one of the greatest railway developments that had thus far been dreamed. It pointed to the possibility of direct *China and Europe* and continuous rail transportation across China, from the Yellow Sea to the Mediterranean—a connected system from Pekin to Constantinople.

It may seem a far stretch of the imagination westward across those wild uplands, but progress teaches us to expect more progress. There was a time when the Pacific Railroad was a vision and a dream, and another when the Trans-Siberian was an even wilder one. At this writing a Russian railway reaches eastward from the Caspian Sea a thousand miles to Tashkend, pulling at the Chinese railhead like a huge electro-magnet.

When we were little boys in school we were carefully taught that railways could not be built in China because they would desecrate the graves and annoy the dead. This gave us a feeling that China was a large Lone Mountain Cemetery, where the people had to walk discreetly or they would bump the tombstones. Later, some of us learned the demonstration that electricity could never come into general use for dwelling-house lighting, and the geological reasons why California could never produce paying quantities of petroleum.

Progress has been made on both sides of the Pacific since then. Belief in the impracticability of railways in China survived the other teachings, because the electric lights and the California petroleum arrived "in our midst." But if there had been no other intelligence on the subject, the

Chinese exhibit in the Transportation Palace would have shaken down the barriers to a belief in the development of Chinese railways.

For, there were models of fine stations, and of steel bridges engineered with scientific precision in hundred-foot spans across the Yellow River, and of the finest types of locomotive, drawing trains of day coaches and sleeping cars. There were pictures and models of a whole railway line built entirely by Chinese engineers and workmen. And all about the walls of the booth were photographs of scenes along the Canton-Kowloon line, or the Shanghai-Nanking line, or the Peking-Moukden line, with a freight train passing close to the Great Wall; or the Tombs of the Mings, and the temple of Confucius and the temple of his first disciple, "featured" as tourist attractions, quite in the approved American (and English and French) fashion.

Statistical tables showed that China had about 3,500 miles of government railroad in operation and about 6,000 miles building—about, because the tables also showed that China had got a good start in her engineering measurements on the metric system, and more "progressive" peoples could translate those measurements into thirds of yards and twelfths of feet as laboriously and painfully as they wished to. The concessions railways in operation were about 4,250 kilometers in extent. The balance sheet for the Chinese government railways for 1915 showed a profit of over \$8,000,000 on receipts of a little more than \$56,000,000.

China had been a republic about five years. This was the first international exposition in which she had ever participated officially. She had no experienced exposition commission to "exploit" her resources and industries for the world to see. Yet she showed these quite remarkable evidences of her modern progress, and more—rails rolled in Chinese rolling mills, models of fine steel ships, with every feature of improved equipment, built in Chinese shipyards. With her photographs and statistical tables and practical young Chinese engineers to point out the meaning of these things to visitors, it was a thought-compelling exhibition.

In the Palace of Transportation the Japanese again showed themselves masters of the art of display, for their models of ships were things of exquisite beauty. A cruiser was shown in silver, perhaps three feet in length, every detail as faithful as art could make it. There was a silver model of a locomotive, the original of which was built for the Government at the Kawasaki Dock Yard. But rarer and richer and in every way the finest things of their kind to be found in the whole Exposition were the large bronze and lacquer models of old war galleys, intricate fabrics of ebony and

vermilion and gold, strange in form like fairy barges, things never to be seen in the world again except in some such wonderful copies. They were of generous dimensions, not miniatures in any sense except by comparison with the originals; there were two among them each of which was perhaps twelve feet long. Some had banks of oars like the galleys of ancient Rome. The original of one had taken part in the Korean expedition of 1592, that of another had been built in 1630, and that of another had been built in 1823. All were sumptuous and beautiful, as much works of art as paintings are. These were exhibited by the Japanese Navy Department.

*Fairy
War Boats*

Besides these rare objects there was a large map and mirror, showing the route of the Toyo Kisen Kaisha steamship line, and there was a model of one of its steamers. There was a model of a house erected by the South Manchuria railway, in which were shown the products forming the principal exports of Dairen, and a topographical map showed the harbor of Dairen and means of communication thereabouts.

Considerable attention was attracted by a map of Japan made from an actual survey by Ino Tadataka about 125 years ago. By means of enlarged photographs the manners and customs of the people, and the aspect of noted places throughout Japan were made familiar to the visitor. Japanese railway development from 1893 to 1913 was exhibited statistically on charts, showing an increase in gross receipts of 110,000,000 yen, or about \$55,000,000. Charts, relief maps, photographs and panoramic views exhibited the different phases of land and marine transportation.

In The Netherlands, transportation is so far dependent on canals that the track walker of western railways is represented by the dredge, which was appropriately exhibited in the Palace of Transportation by several models of rotary, suction and bucket dredges of the most advanced type. These were shown by Werf Conrad, Ltd., of Haarlem. Other forms of floating machinery, serviceable in transportation, were represented by models: a coal-bunkering vessel, some 100-ton floating cranes, and, while they were about it, a tin dredger, to do the work in the Far East that gold dredgers do in California. There were all sorts of barges equipped with every conceivable device for facilitating loading and discharge. The effect was to make the visitor feel that a good many things about dredging and spoil-disposal might well be learned from the Dutch, but not much could be taught them about it.

*Holland
Canals*

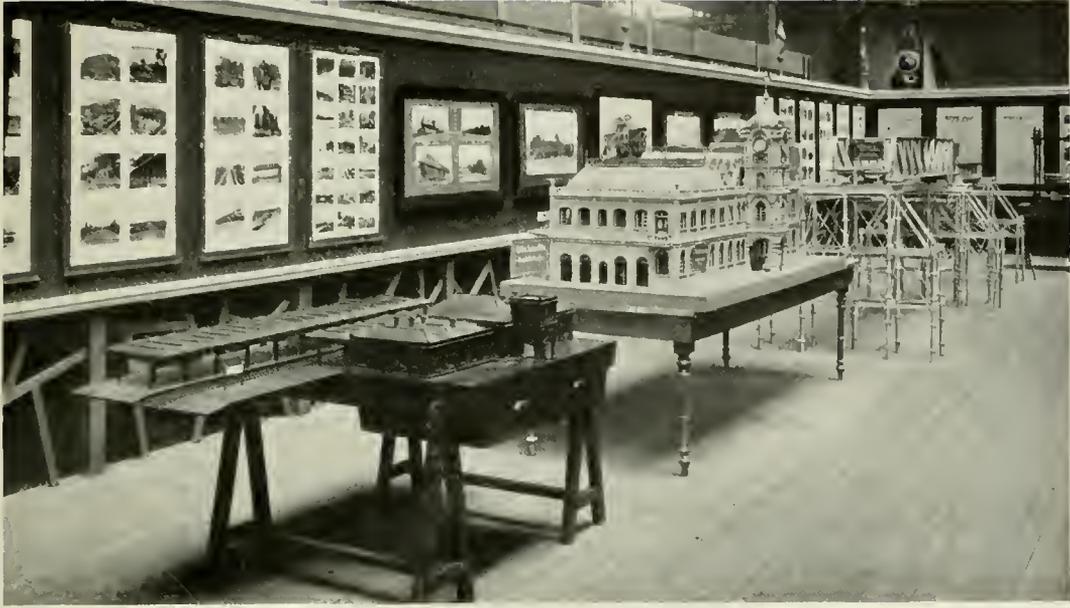
Photographs showed Diesel motors for ships, from the great factory at Werkspoor. Some maps in this booth were of much interest, Amsterdam and the North Sea Canal being shown in detail. The Netherlands East

India Commission exhibited a model of a lighthouse as used in the East Indian colonies, with a map showing the coast lights and other equipment for lighting channels and harbors in The Netherlands archipelago.

Then there were models of a Royal Dutch India mail steamer, and of a steel bridge on a government railway in Java, serving to remind you of the magnitude of Holland's colonial interests and the efficiency with which her colonial affairs are administered. These things were shown in close proximity to the exhibit of the Holland-American Line, which we have mentioned above in connection with the marine display.

There were other British exhibits than that of the Rolls-Royce automobile mentioned above. The Coventry Chain Company, Ltd., showed automobile accessories, and "noiseless" drive chains for transmission. Riordan & Company of London exhibited life-saving appliances, and Thomas Cook & Son its wonderfully developed travel facilities.

In spite of the fact that the European war had about killed the tourist business in those parts of the world where it mainly flourished, Thomas Cook & Son made a creditable demonstration of the methods and services it has devised to take the worst of his or her burdens off the traveler. The exhibit would have been better had there been no war, but so would everything else. It was made mainly by pictures, which showed the steamers and dahabeahs this agency operates on the Nile, the railway up Vesuvius, built and rebuilt by this firm, the head office at Ludgate Circus, London; from *Pleasant Traveling* which you might get a notion of the magnitude and ramifications of the business of assisting travel through the fact that this office alone houses some 1,300 clerks, and that there are 159 other offices scattered throughout the world. The exhibit appeared to include every sort of map and guide book that could be of any use to a tourist; and full descriptions were distributed of this admirable system of conducting tours and supplying banking facilities for foreign journeys. The business was established in 1841. A large appropriation was made for an exhibit at San Francisco, and much was done in advance by this concern to advertise the Exposition, but on account of the war and the havoc it played with the volume of travel for pleasure and culture, it was not possible to make the sort of exhibit the firm desired or had planned. Still, these travel pictures were very alluring, not the worst thing about them being their demonstration of passenger transportation facilities the exhibitor had been forced to develop in order to take care of travelers properly.



ILLUSTRATIONS OF CHINESE RAILWAY DEVELOPMENT



ANCIENT JAPANESE WARSHIPS

CHAPTER XLVII

A PICTURE OF MODERN AGRICULTURE

THE agricultural exhibits at San Francisco showed, among the conspicuous features of agriculture in 1915, the application of gasoline and electric energy to farm work, the rapidly growing use of the silo, and the advent of the mechanical milker. To say that farming was becoming more scientific would but emphasize the obvious; but it may be observed that there was a noticeable tendency to rely more on the findings and advice of agricultural schools, and for the farmer to send his boy to college to learn how to farm better than he could be taught at home. Evidences of this tendency were all about.

*The New
Farmer*

In such a survey as we are trying to present, mere exhibits of produce mean little. There were large and striking displays of that nature, interesting to those that made them, and significant of the farming superiority of one district of the country over another, but such deductions are of little moment in the broad view of an exposition, and we shall give them short shrift as far as this narrative is concerned.

The Chief of the Department of Agriculture, T. G. Stallsmith, was responsible for two Palaces, those of Agriculture and of Food Products. And there was this peculiarity of the classification under which he worked, that preserved, dried and pickled fruits were classified under Horticulture. This bore out the general plan of the Exposition, to tell the story of service. Forestry was treated as a part of Agriculture; and edible fish, and some that were not, were shown in the Food Palace.

The Palace of Agriculture was the largest of the exhibit Palaces except that of Machinery; it was 574 by 639 feet in its largest dimensions, and cost \$386,350. Owing to its relation to the plan of the courts, the amount taken out of it was less than the other palaces lost on this account. The Palace of Food Products was 423 by 579 feet in largest extent, and cost \$326,590.

The House of Hoo Hoo with its forestry exhibits, came under the sheltering wing of the Department of Agriculture. It was built by lumber interests in the fraternal Order of Hoo Hoo, and occupied about 46,000 square feet in the south Horticultural Gardens. The redwood interests of California

put up a handsome bungalow, and the white and sugar pine interests erected another to show their lumber products. In addition the Pacific Coast Condensed Milk Company, being unable to secure the space it desired in the Palace of Food Products, built the artistic little *Lumber and Milk* condensery where the Carnation Milk was made, near the southern entrance to the Palace of Fine Arts; a gem of a building that in spite of a commercial purpose detracted not at all from the aspect of the noblest palace of the Exposition. There were also some agricultural machinery exhibits in the Palace of Machinery.

In addition to the contents of the Palaces of Agriculture and of Food Products, parts of the equipment in the Live Stock Section were entered in the Department of Agriculture—ten silos, for example, five of them filled, demonstrating the value of corn ensilage as live stock fodder; and the equipment of stalls, stanchions, feed mangers, automatic waterers, feed and litter carriers, and sanitary milk coolers, which were furnished by the James Manufacturing Company of Fort Madison, Wisconsin, as a working exhibit, free of expense. On the exhibit basis, different manufacturers furnished wire fencing, galvanized iron and wire gates, wire stock pens, poultry fencing, trap nests, automatic poultry feeders and waterers, and artistic lawn fencing. The Fairbanks Morse Scale Company put in as exhibits the scales used in the Live Stock Section and elsewhere: railroad scales, for carload lots of live stock, platform scales for live animals, and other types in the various palaces.

Primary agricultural products, with farming machinery and equipment, were exhibited in the Palace of Agriculture. Agricultural products prepared for use as food were shown in the Palace of Food Products; where were also exhibited prepared things to drink; and things to smoke, as products of the soil made ready for use. Here too were shown machinery and many processes of food preparation and of preservation, except those relating to Horticulture. It may be said that the aggregate of exhibits in these two Palaces illustrated every important phase of modern intensive agriculture in the temperate zones (and some in the tropics), including many of its engineering aspects such as swamp reclamation, and modern irrigation and drainage.

The exhibition of farm equipment was the largest ever brought together under one roof. The Palace was a vast catalogue of implements and farm machinery, composite and comparative, because so many manufacturers were represented; a catalogue that put before you not pictures and descriptions, but the things themselves—implements for preparing the soil, for seeding, cultivating, harvesting and threshing, and sets for generating power to do the manifold odd jobs of farming. *Agricultural Machinery* And there were farm wagons and carts, ensilage cutters, feed grinders,

manure spreaders, cider mills, cotton gins, cotton and hay balers, horse clipping and sheep shearing machines, windmills, tanks, pumps, and all the rest of it. Many of the machines were in motion, demonstrating every detail of operation. The International Harvester Company had 93 different machines or implements moving all the time. The Holt Manufacturing Company showed several of its tractors in motion.

In fact the exhibition of internal combustion engines and tractors was revolutionary. No other industry has suffered so much from the lack of labor as modern agriculture. The internal combustion engine, sometimes hooked up to an electric generating set, took the place of many hired men. It did not wander off and get drunk when it was needed, nor smoke cigarettes in the hay. It had begun to save not only the labor of men but of horses, which meant that there was to be more in farming and more out of it. It would pump the water for the stock, milk the cow, separate the cream, churn the butter, saw the wood, light the house and barn with electricity, and haul the crops to market. The experiences of all four seasons of the year would be required to bring to the notice of the average man the manifold farm uses of the gasoline or distillate engine which he could see illustrated here in a few hours, and he didn't have to take the traveling salesman's word for it either. And then there was the wonder of the caterpillar engine, destined to play so dramatic a part on the battlefields of France and Flanders.

State and foreign exhibits of primary agricultural products were very comprehensive, ranging from Manila hemp to tropical hardwoods. And in the Food Palace, exhibitions of the manufactured products of tobacco were made on the largest scale ever known in this industry.

CHAPTER XLVIII
MACHINE FARMING

HAD there been no other exhibits of farm machinery and implements, the Exposition would still have had the greatest exhibition of such appliances ever made, in the space occupied by the International Harvester Company of America; some 26,700 square feet, where 17 carloads of machinery was shown. It was not merely a showing of agricultural implements either, but, like that of the United States Steel Corporation, it was a great exhibit of industrial organization. For here you saw not only reapers, but a twine factory to make the material with which the product of the reaping was handled, illustrating a tendency often manifested in present day industry to extend the activities of a manufacturing company to the production of its own supplies. There were pumps, cream separators, churns, washing machines, corn shellers, sprayer grinders, almost anything for farming, and internal combustion engines to run them. And there was a remarkable showing of tractors burning gasoline, kerosene, or distillate. It looked as though the whole life of the farm were embraced, and as though the only thing not shown as a product of the company was the soil on which the crops were to be grown.

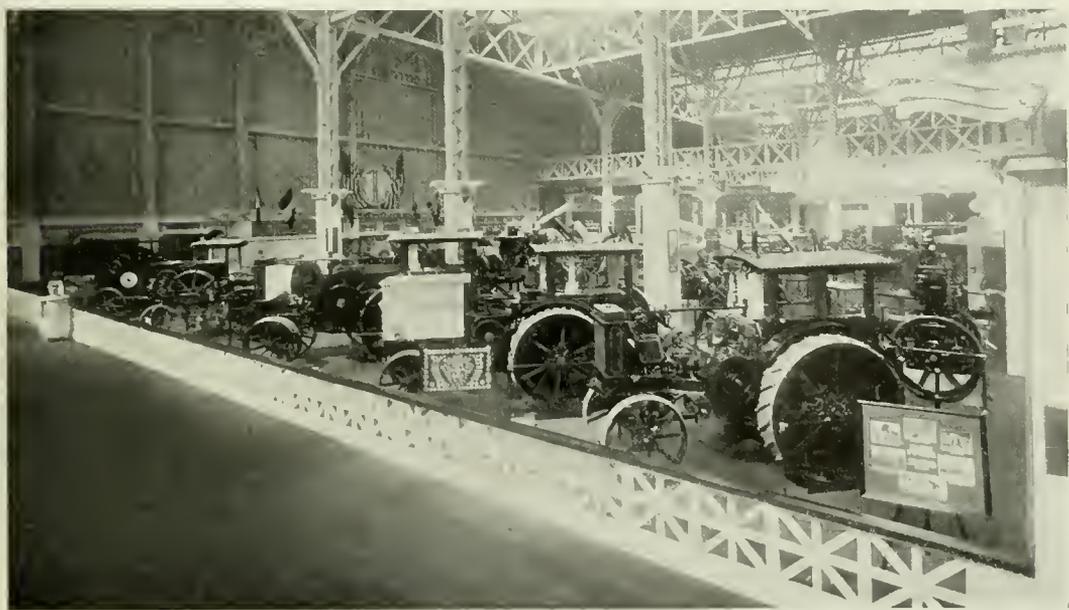
*Even to
the String*

The exhibit came near showing that, for its center piece was a structure containing four dioramas of a model farm, at the four seasons of the year, with all buildings and equipment complete, suggesting the operation of different implements at the different seasons. There was a comprehensive demonstration of the company's welfare work for its employees, and an exhibit illustrating its agricultural extension department, representing an appropriation of a million dollars and employing about twenty experts under the direction of Prof. P. G. Holden of Ames, Iowa, to make any tests or give any advice for which a farmer might ask.

This exhibit began at the beginning, with a relic almost as deserving of reverence as the Liberty Bell: a reaper of 1847, the invention of Cyrus H. McCormick, the one he exhibited at the first International Exposition, the Crystal Palace, in London, in 1851. The judges then viewing it left this record:



THE ORIGINAL MCCORMICK REAPER—AT LEFT



FARM TRACTORS

“THE McCORMICK REAPER IS THE MOST VALUABLE ARTICLE CONTRIBUTED TO THIS EXPOSITION, AND FOR ITS ORIGINALITY AND VALUE, AND FOR ITS PERFECT WORK IN THE FIELD, IT IS AWARDED THE COUNCIL MEDAL.”

American pride thrilled to the sight of it—an American invention, blessing humanity, releasing labor for other things while it cheapened the bread of the people of the world. This old reaper embodied all the essential working principles of the reaper of to-day, drawing its energy from the revolution of the main wheel as it traveled, which drove back and forward a bar of serrated teeth, playing through guards. All the reapers since have been but refinements of this, retaining the fundamental devices.

Nearby was an old print showing the scene at Steele's Tavern in Virginia in 1831, twenty years before the Crystal Palace Exposition, when the first reaper was tested. A bill on the fence announced:

“IN THIS FIELD, JULY 25, 1831, WILL BE TRIED A NEW PATENT GRAIN CUTTER, WORKED BY HORSE POWER, INVENTED BY C. H. McCORMICK.”

The shop where the first reaper was made, and the anvil, a stone, were depicted. The stone is now in front of the McCormick factory in Chicago; one of the world's best monuments.

In a series of 20 glass cases surrounding the center-piece appeared models of the harvesting devices through which man has sought to emancipate himself from the labor of his basic industry. First there was the well-known scythe. Then there was a grain stripper of ancient Gaul, a cart pushed by oxen, with wooden teeth projecting from the upper rim, *As Adam
Did It.* in which the grain heads were caught. (The rim of the cart, not the oxen.) An old Druid in a brown bath-robe walked alongside and dragged in the heads with a sort of *croupier's* rake—doubtless the original rake-off.

The McCormick reaper of 1831 appeared in another case, and in the words of Eddie Foy “the man is walking yet,” no place having been made for him on the machine.

In the model of 1843 the man that did the raking rode, but the driver walked, like an English carter. By 1847 the driver is on the machine. In the model of 1858 an automatic raker has released one man, and the driver still rides.

The 1861 models showed a combination of reaper and mower. There was an 1867 mower. In '72 we get a wire binder. In '74 appears the Marsh harvester which most nearly approaches the present-day binder, with two men binding alternate bundles by hand. Some of the older visitors could recall just how it felt. This was the forerunner of the present self-binder. The Gorham binding attachment is added on the model of 1875. In 1877

the mower is approaching the present type and has the cutting bar ahead of the driver. In the perfecting of this machine the inventions of McCormick, Marsh, and Osborne were all involved. These models were a striking historic review of a most important development in human affairs.

There is no space here for mention of all the inventions in farming machinery that were on display. There were said to have been over 200 of them. Many companies were combined in the International Harvester Company, and practically all of them, throughout the years since Cyrus McCormick exhibited "the most valuable article contributed" to the Crystal Palace Exposition, have held to the theory that public exhibition is a spur to excellence and a legitimate test of quality. That became a policy of the combined concerns. And so the Panama-Pacific International Exposition reflected the farm machine industry from its birth on that old stone anvil in Virginia to its full grown maturity: the most complete, comprehensive and amazingly interesting exhibition of agricultural implements and machines that had ever been made.

Yet we cannot forbear making record of some of the more significant items of this most significant display. We have mentioned the miniature twine factory. There was a part of a combined harvester that would take a loop of that twine and tie a knot in it. It never missed, never tangled a strand. The writer tied about a hundred knots with it, trying to rattle it or embarrass it, or otherwise get it off its balance, but it was fool-proof; the little steel fingers never tired, never slipped, never grew nervous, never failed to grip the twine and twist it just so, and turn it over at the right time and pull it fast. It was not new; to many it was a very old story, having been invented by a certain elementally patient George Appleby in 1879. But thousands had not yet seen or heard of it, especially in California, land of the combined harvester, and it will never cease to be a miracle.

There was a manure-spreader with two flanged revolving discs that would throw manure sidewise over a ten-foot swath and save a mile of hauling to the acre. It would go through an orchard and pitch manure under the trees, if that were where you wanted it.

There was a baling machine with a safety automatic force feed, instead of the farm-hand's feet, to push down the hay. It was motor driven and it should have been called a hay blocker instead of baler, for it jammed the hay into a block so hard a rat would rather gnaw through a pine sill than try to get into it. The bale came out just 17 by 22 inches in diameter. This machine was about four years old.

Among all imaginable sorts of seeding implements there was a corn planter equipped with a marker that might often save a missed row. There

was a big tractor disc harrow that would tear up a twelve foot swath. There were spring-tooth cultivators and six types of harvester and binder. There were many choices of gas engines and pumps for irrigation. There was a corn picker and husker—the first time one was ever shown at an international exposition. The ear was snapped from the stalk by a set of rollers, and carried to a second set that removed the husk, whence it was delivered to a wagon box. With five horses operating it this machine could harvest and shuck the corn on from seven to ten acres a day. It attracted much attention, especially of visitors from the corn States.

*Husking by
Machinery*

Another exposition novelty was a corn binder, with an elevator, and a cutter that cut the stalks, bound them, and elevated them to a rack on a wagon, whence they went to an ensilage cutter with an elevator 35 feet high—enough to fill any ordinary silo. Ear, stalk, leaves, and all were cut to lengths from three-eighths of an inch to an inch and three quarters. This had never been exhibited before.

There were push binders for large-scale harvesting operations, there were huskers and shredders, and mowers and dump rakes reinforced by loaders. There were side delivery rakes, sweep rakes, and stackers.

If these things were significant, the exhibit of tractors and oil engines and gasoline-driven trucks and farm wagons was tremendous in its importance. The array was 100 feet long, and the machines were mounted on pedestals, and were in motion, pumping water, and running sprays, saw rigs, and electric lighting plants for the house and barn.

Here was drawbar pull for plowing and harvesting, and belt power for air compressing, sawing wood, or any other purpose it could serve, and in portable form so that it could be taken right to the job. Some would generate 30 horse-power at the drawbar and 60 for the belt. There were big tractors for breaking up the prairie sod, and smaller ones for the established farm of medium requirements. There were motor trucks with capacities from 1,000 to 2,000 pounds, and speed controls limiting them to 17 miles an hour, which would discourage the hired man from joy-riding with them, and so lengthen the life of the machine. A small tractor for the medium farmer, that would generate 8 and 16 horse-power, could be had at this time. Two engines were sectioned so that you could see how they worked.

The International Harvester exhibit was in charge of an exposition expert, Mr. W. H. Town, who before the days of the International Harvester Company had represented the McCormick Company at expositions in Melbourne and Sydney. He understood installation and the smooth operation of the huge exhibit, and the Harvester Company's section became a rendezvous for agriculturists of every nationality.

Prophetic of a strange apparition on the battlefields of western Europe in the fall of 1916 was an exhibit of the Holt Manufacturing Company, of California, which had a factory at Stockton, Calif., and another in Peoria, Ill. This was a military wagon train of Holt Caterpillar trucks drawn by a Holt Caterpillar Tractor. Six European armies were already using these tractors for military transportation in the year of the Exposition, and had been since the early days of the war. But the following year appeared that weird and nightmare thing the "Tank," so-called by its English builders to fool the ubiquitous German spies: an armored car lumbering along on its self-laying track like a monster of the Cretaceous epoch, a monster able to cross shell craters, and wallow into trenches and out again, and break up machine-gun nests so that the Allies could advance here and there. It was said to have saved at least 25,000 lives for the Allies in the September advance of 1916; to say nothing of the gains of ground made possible by it. Late in 1917 it breached the Hindenburg line at Cambrai, in one of the grand assaults of the war, and it led the great counter-drive of the Allies in 1918.

The Holt Company did not build the "tanks" used by the Allies in the German war, but it did sell them large numbers of Caterpillars, which had been in war use as tractors about a year and a half when the "tanks" appeared. They were the most wonderful engine of offense the war produced, and seem to have been mainly the invention of Lieut. Col. E. D. Swinton, C. B., D. S. O., of the Royal Engineers, who built upon the Holt invention.

The characteristic feature of the device, the caterpillar tread, originated in California farming conditions through the ingenuity of a California manufacturer. In the bottom lands of the lower San Joaquin Valley the farmer sometimes lost his harvesting machinery—had it bog down so deep in the rich alluvium he couldn't haul it out. This brought out the first practical and commercially successful machine of the self-laying-track type, the invention of Benjamin Holt, of Stockton, Calif. A broad, endless belt of linked and corrugated plates passing forward and back over sprocket wheels gave a bearing that would support on soft ground the weight of heavy harvesting machinery. The one with the wagon train shown in the Holt exhibit space in the Palace of Agriculture weighed 22,300 pounds and would do the work of 38 horses. It was adapted to large ranching operations, and to freighting and highway work. This was the largest model, the "75," developing that much brake horse-power. Another "75" close at hand had parts of the motor and transmission cut away and plate glass inserted so that its operations could be studied. It was run by an electric motor every day throughout the Exposition.



INTERNATIONAL HARVESTER COMPANY'S MODEL FARM



A CATERPILLAR TRAIN

There was a Caterpillar "45" driven by an electric motor, with its steering gear set so that it turned continuously in a small circle to show how easily it could be handled. There was a small Caterpillar tractor for the farmer, an "18," so mounted as to show how it could work between the trees of an orchard.

And this brings us to the climax in harvesting machinery: the motor-driven combined harvester, which propels itself, and in one transit of the field cuts the grain, threshes it, recleans it, sacks it, and dumps the straw either in windrows or piles. This machine would enable four men to cut and thresh as much as 600 could with scythes and flails a century ago. Conditions peculiar to the West produced the combined harvester, for its best use was for grain that would stand until ripe without shelling out of the head, and that could be cut perfectly dry. The Holt Company had motor harvesters that would make 36-foot cuts through a field of grain, and one that would cut 54 feet. In the one exhibited, sections of the sides were glazed so the visitor could look into it.

*Wide
Swaths*

This exhibit included a handsome little English cottage for the offices and reception room, with a moving picture theater in the upper story, where you could see the operations of this sort of machinery in the fields. In addition to "caterpillars" the company exhibited plows, disc harrows, scrapers, land levelers, and sage-brush plows, and rakes for clearing tracts of still unoccupied sage-brush land.

The C. L. Best Company, of Oakland, California, exhibited a 75-horsepower all steel track-laying tractor, a smaller one of 30 horse-power for orchard work, and a round-wheel tractor for road work and any rough service where the ground was not so soft as to require the track-layer.

Somewhat similar to the Caterpillars was the Yuba Ball Tread Tractor, made by the Yuba Construction Company, of Marysville and San Francisco. This company showed a tractor that was shorter coupled, had ball-bearing treads independently reversible, and was a convenient thing to manœuver around an orchard, as it could turn in practically its own length. The ball-bearing tread was a distinctive feature of this machine, which was good for a great diversity of service, from pumping water to drawing a combined harvester.

The place the farm tractor was beginning to take in farming economy was indicated by a testimonial letter from a California orchardist to one of the manufacturing companies:

"I have only 25 acres, but find with this little tractor that I have no need of horses whatever, as it can be handled and got around the orchard as easy as one horse, and I still have the benefit of a twelve-horse team. It

is quite a relief not to have a bunch of horses to care for and to lay in a supply of feed for every year. And last, but not least, when one takes his vacation there are no horses home in the barn to worry over, or starving for water or feed. Lately I have used it to haul my crop of 'cots' to the station and I found it far superior to horses for hauling as well as for field work."

Clearly, in 1915, horseless farming was in sight—for most farms; although we still had the old fly-hatchers with us generally, and perhaps for steep work in vineyards and hillside orchards many of them would remain indefinitely.

CHAPTER XLIX

PRIDE OF THE STATES

AMONG the exhibit palaces, that of Agriculture was peculiarly the Palace of the States. Here they made severally some of their most imposing demonstrations, and here they dominated as units of basic production.

Iowa, Illinois, Kansas, and Missouri occupied the four corners made by the crossing of the central avenues under the big dome. These are great corn States, and one of the most striking objects in the building was Iowa's Horn of Plenty, forty-five feet high, appearing to pour corn inexhaustibly in a huge pyramid; golden ears and a few crimson ones, yield of the great grain and fodder plant that America has given for the enrichment of the world. Fruits were scattered over the surface of the heap. *The Horn of Corn*
Cases contained more corn, wheat, oats, barley, potatoes, and apples. Inside the pyramid were illuminated pictures illustrating the livestock resources of Iowa, with typical landscapes, and statistics showing the State's commanding position in the production of food.

Missouri made a grand exhibition of corn, ten ears of which, planted, ploughed, and picked by Mrs. Mabel Miller of Osceola, were of especial merit. The booth was decorated with some extraordinary designs worked out in seeds, grasses, and grains. There was a good showing of long-staple cotton from a half-dozen counties in the southeast corner of the State, which had produced the preceding year about 54,000 bales. And just to show that old Missouri had not forgotten that other long staple of the South, there was a 320-pound twist of pipe tobacco, about eleven feet long and two feet thick. Other products shown were cotton-seed hulls and meal, kaffir corn, sorghum, wheat, clover, alfalfa, cow peas, and soy beans. The great eagle in grains and seeds on the "battlement front" of the booth had a wing spread of 48 feet; and a large variety of seeds and grains went to the composition of the portrait of Governor Major.

Probably the greatest display of sorghum ever made was in the Kansas booth. It was in charge of a sorghum enthusiast, John Ferriter of Wichita. Ferriter felt that humanity would be wealthier for more of these prolific

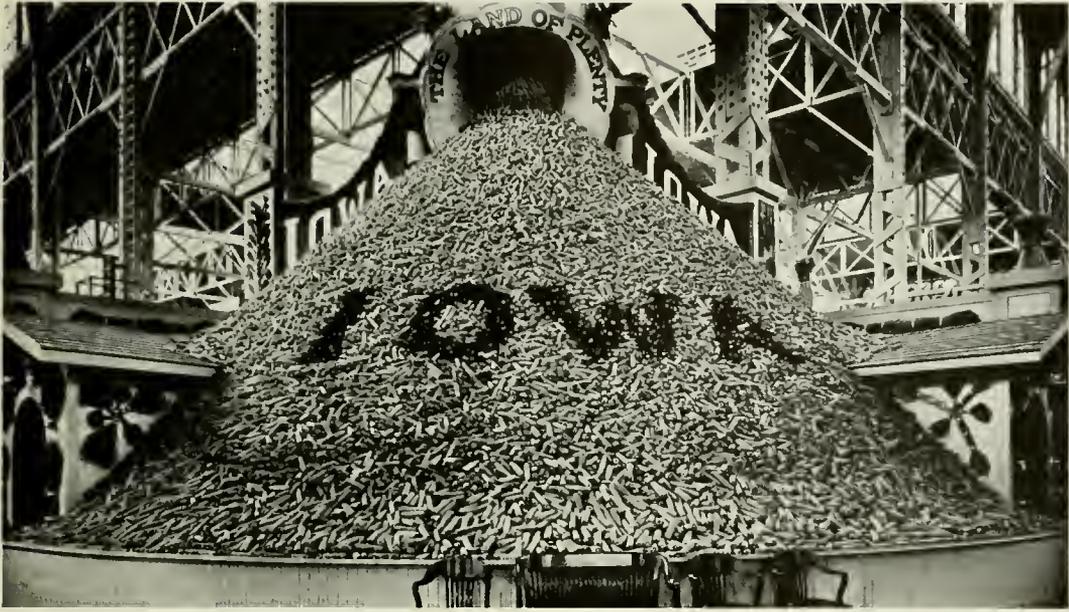
and nutritious grains; which would, properly treated, not only produce the hot cakes for a nation, but the molasses to go on them. The sorghums do well in Kansas, yielding an almost incredible number of bushels to the acre, and the stalks and leaves make good ensilage: a consideration growing in importance to farmers everywhere. In 1914, Kansas sold \$23,000,000 worth of the sorghum grains.

All in all, 124 different kinds of grain were shown in this booth, 46 varieties of grasses and several of fruit. The table display of apples was especially attractive. There were twenty varieties of corn, shelled, in the ear, and on the stalk. There were some tall cornstalks in the Kansas booth, with the first ear ten feet from the ground. Besides the Ben Davis apples, the Winesaps, the Black Bens and Black Twigs, the Missouri Pippins and Champions and Ganos, there were grapes, and peaches, and cherries, and pears, there were peas and beans, and there were mangoes in jars. The place was appropriately decorated with the sunflower; and Ceres, of course, presided over the main entrance, with a Horn of Plenty.

All these States in the center of the Palace emphasized the importance and great value of corn, but Illinois went a step ahead of any in showing what could be done with it. Its transmutations were marvelous. Oils and other derivatives appeared in dozens of commercially valuable forms. On two 20-foot tables, beside pyramids of the grain appeared some 40 jars containing its manufactured products—starches, sugars, oils, syrups, candy, and various distillates. The composition of a bushel of corn was shown in a series of jars. The first contained a bushel of kernels, weighing 56 pounds. The second contained the starch from a similar bushel, 39.4 pounds of it; the third showed the protein contained in gluten and horny starch, 5.8 pounds; the fourth the water, 6 pounds; the fifth, oil, 2.8 pounds; the sixth the fiber, 1.2 pounds; and the seventh the ash, 0.8 of a pound. If you will tot this up you will see that they got it all.

The oil goes into the manufacture of artificial shortening, and—shall we betray it?—of “olive oil.” But worse things than that have become “olive oil.” With the addition of sulphur, corn oil even became vulcanized rubber. Other corn products shown were hominy, corn flakes, corn germs, corn-oil cake rich in nitrogen for cattle feed, ensilage, cornstarch, refined grits for brewing, dextrine, corn sugar and corn candy. A box of candy of the sort used all over this broad land every Saturday night for the promotion of matrimony and the mitigation of the “movies,” a box containing marshmallows, candy figs, candy orange sections, gum drops, caramels and jelly beans, turned out to be nothing else than metamorphosed Illinois corn.

The hair of the dog, etc. There was corn whiskey, and right beside it



A REAL CORNUCOPIA



GRAIN, COTTON, TOBACCO

some samples of succinic acid, made from corn and used as a whiskey-habit cure. Corn, with a little juniper, made Eureka gin, and it went into other kinds as well—rye malt gin, dry gin, sloe gin; and finally kuemmel. Going or coming, you can't beat corn.

The results of ten years of corn breeding were demonstrated by means of samples in jars. The original strain showed an oil content of 2.68 pounds to the bushel, which was raised to 4.13 pounds and then reduced to 1.48. The protein content was juggled in the same way, from 6.12 up to 8 and down to 4.83. Another set of jars showed what corn takes out of the soil: the nitrogen, phosphorus, and potassium removed by the stalks, leaves, and kernels, which came to considerably less than wheat.

The Illinois booth was decorated with grasses, corn, and grains and its central feature was a pyramid of corn contributed by the Illinois Corn Growers' Association, with an Indian girl made of corn, corn husks and corn silk, standing on its summit.

One part of the exhibit that the ladies spent a good deal of time studying was a life-size colored chart, under glass, of a side of prime beef. There were 12 enlarged photographs showing the retail cuts, with the percentage of lean, fat, and bone in each, and the retail cost of the edible meat in each.

A statistical table put Illinois at the head of the corn States for volume and value, although its yield per acre was exceeded by Indiana and Ohio.

There were exhaustive tables of figures showing results of soil analysis in various parts of the State, made by the College of Agriculture of the State University. A table with corncribs and placards showed forcibly the effects of growing corn on the same land for 16 years, compared with the far more profitable practices of fertilizing, and of rotating crops. It was an effective way to teach the ever-needed lesson that no soil is permanently fertile.

Other regions might show the luxurious pomelo or the tropical avocado, but Massachusetts exhibited in jars the tonic cranberry of Cape Cod, Plymouth, Marshfield, and Scituate, garnishment of Puritan feasts in nipping November. Massachusetts showed some remarkable things in its agricultural exhibit. There were topographical maps indicating a surprising area of wild land for a State that had been so long settled. *Eastern Opportunity* The State Forester's office showed model fire-fighting apparatus, and its equipment for handling the gypsy moth, one of the most serious tree pests on the continent, and one from which Massachusetts is defending the rest of the country by her efforts to exterminate it at home, or at least in the home it had preëmpted.

Posters advertised the attractions of 100-dollar land in a State three quarters of which was within five miles of railroad, trolley or canal. Educa-

tional advantages were impressively presented. The information was posted that between 1900 and 1910 the people had increased 561,070, or 20 per cent, of which the urban population showed a gain of 17.8 per cent and the rural of but 1.17, while the farms had actually decreased 2.10 per cent in number, and 9.90 in improved acreage. The whole argument seemed to say: "Come East, young man, come East."

One of the most interesting exhibits in the whole Palace, because it contained such intimate relics of our colonial history, was in this booth, and consisted of old utensils from the Manning Manse at Billerica, Massachusetts. There was a "tin kitchen," much the sort of thing campers have for baking biscuits before the camp fire, which was used with those great open fireplaces that were the pride and comfort of our ancestors. There was a spit on which to roast the meat, a hetchell or rippling comb, some candle molds, an iron cooking pot, and a spider that told at a glance why a thing so unlike a spider ever should have been called one—for this spider still had its legs, so that it could stand up in the ashes with embers under it, and hence looked the part. There was a grub-hoe worse than the one Markham wrote his poem about, a wooden hay fork made from three branching limbs and polished with much use, a flail, a froh for riving shakes, a leather water bucket, and a number of articles for spinning, including an old wooden reel with a hand-cut worm gear. Finally there was a plow used on the farm of Daniel Webster at Marshfield, with the share built up of strips of metal riveted to a wooden back.

Louisiana had no State building at the Exposition. Under the hard conditions of the times and especially of the cotton market it was not possible for her to raise the money for an exhibit and a building too; and following the lead of her commissioners, J. E. Edmonds, Justin F. Denechaud and Louis N. Brueggerhoff, she decided it would be better to present a picture without a frame than a frame without a picture, and so she set up in the Palace of Agriculture a magnificent exemplification of her resources and abilities. The arrangement, by Robert Glenk, experienced in displaying just such products, was impressive. There was a rest room in the center of the space where you could see any of the Louisiana papers. W. D. Clayton was in charge as Superintendent, but should have been called host for his State, with so genial and inviting an air of hospitality did he invest this section of the Palace.

The exhibits here were most interesting to persons unfamiliar with the semi-tropical climate of Louisiana. They showed products almost antipodean to those Massachusetts cranberries. Cotton was shown growing. Sugar, rice, pecans, pralines, and perique awaken in the mind no shuddering

visions of frozen wintry wastes with Indians and Puritans hunting each other for Thanksgiving. Here you thought of the tawny river drawing slowly past the Picayune Tier like some Creole beauty that languorously stretches her limbs and decides to have her breakfast on a tray; of the old French city under the levee, where the streets are named from the poetry of life, where there is always plenty of time to live, and where the negro servants speak soft French instead of an American stage dialect; and of plantations of waving cane, and river packets whose white and gilded staterooms and hollow cabins recall the charm of days long gone.

Yet it was commercial enough to suit the most matter-of-fact individual, and demonstrated immense reserves of potential wealth. Here was sea-island cotton, long and fine in fiber, and a striking exhibit of huge slabs of long-leaf yellow-pine lumber, representing a great and growing industry. There were cypress panels 30 inches wide. There were fine grape fruit, equal to those of the Isle of Pines. Louisiana was going in for citrus-fruit culture more and more those days. Dr. Wiley had offered a cup to the person that propagated the best fruit, and it was won by Mr. Gordeau with a little sweet seedless orange of very fine flavor.

The cottonseed products were instructive in range. Here was a lard from the soil—in the form of cottolene. There was meal, oil cake, Wesson oil, and linters and hulls with a wide range of usefulness. There was salt from the largest salt mines in the country, and very pure—99.84 per cent sodium chloride.

There was much of interest in the way of hay. One of the best types was the lespedeza, or Japan clover, prolific and nutritious; and it came from a parish of the delectable name of West Feliciana. You were continually reminded here that the people of Louisiana live and bring forth the products of Louisiana in parishes and not in counties. Rice breeding has gone great lengths in the State of Creoles. Among the latest and best species were the Blue Rose, and La Pearl. Sol Wright of Crowley was the Burbank of rice in his State. There was a good display of spirits of turpentine, and of resins. A recent industry consisted in retorting the pine-forest waste for pyroligneous acids; and getting tar oil, turpentine, and pine tar, and other things that go into disinfectants and into naval stores. Great things were being done through the utilization of saw-mill waste.

In Louisiana they take the Spanish moss that hangs in such abundance from the trees, ret it and decorticate it, and get a wiry, springy core that makes good mattresses. There were bales of it on exhibition. There was a good showing of syrups. And there was the rich, black tobacco a little of

*Hay, Rice
Tobacco*

which so flavors a pipe-load that smokers hunger and thirst for it: the Louisiana Perique, which grows nowhere else in the world and which nobody in any other part of the world would know how to cure if they could grow it. And there was our old friend Tobasco, the little red bottle of red-hot sauce that tastes so interesting and feels like a spoonful of fresh-cooked lava.

Here, then, was Louisiana. The whole exhibit was typical and meant just that, unmistakably. The cotton was growing in Louisiana soil. There were ornamental boxes of that soil, black, friable, rich in humus, standing at the corners of the space so that you could take it up and feel it and smell it—and possibly believe it, but that was hard, it was so incredibly rich and good.

There were perfumes, candies, vegetables, cordials, liqueurs. *Turps and Terrapin* There were minerals, birds, game, oysters, and the live terrapin unconscious of their steep values and approaching death. Well-placed verbal statements drove home such facts as that "New Orleans is the largest sugar market in the United States"; "New Orleans has fifteen miles of water front, on which are situated the public docks, lined with steel sheds. Direct communication with public belt railroad serving all the great railroads and the steamship lines." The Board of Dock Commissioners contributed maps, photographs, and literature. The Sewerage and Water Board demonstrated the purity of New Orleans water. The Board of Trade, the Cotton Exchange, and the Association of Commerce sent exhibits and printed matter. There was broom corn, road metal, building brick, sugar cane, and prize corn in the ear from the Boys' Corn Club. There were forty big jars of oranges, and fine specimens of hickory nuts, walnuts, and Spanish peanuts besides the finest pecans you ever saw. The diversity of soil product was wonderful. The exhibit covered two entire blocks in the Palace of Agriculture, two blocks of Louisiana territory. More than in any other booth in the Palace you felt in this one that you had been taken out of time and space and transported to the scenes where these things had originated.

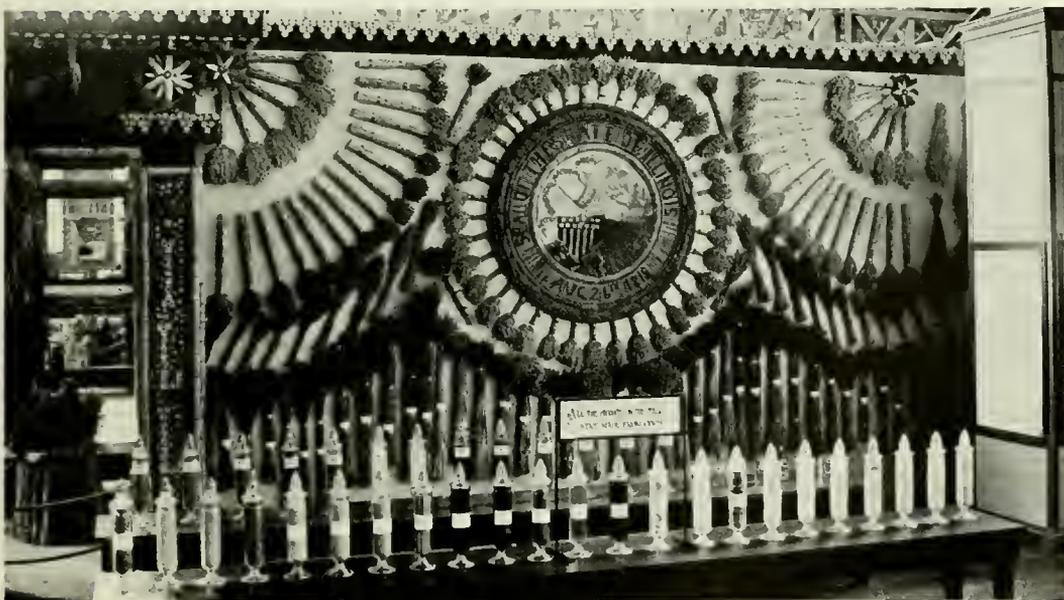
The most conspicuous and imposing feature of New York's exhibit in Agriculture succumbed to its own popularity. When warm weather came it so filled the Palace with odors so far superior to any ever heard of in Araby

the Blest that it had to be divided up and distributed among the ravenous throngs. It was the biggest single, solid, homogeneous, and self-supporting cheese ever built in the world, at that time.

A Seven Ton Cheese This hill of nutriment was $78\frac{1}{2}$ inches in diameter and stood four feet seven inches high from a pedestal of smaller cheeses. It weighed 15,000 pounds and contained the casein from 150,000 pounds of milk, the yield of 10,000 cows, the output of 25 factories for a morning. It contained 375 pounds of salt, and a gallon and a half of carrot coloring matter, and took five



KANSAS SORGHUMS



ILLINOIS CORN PRODUCTS

thicknesses of cheesecloth to hold it together. Speeches were made from the top of it. It was a rendezvous, of popularity. When the crowd couldn't stand it any more but stood hungrily glaring at it and wondering why it was made, and with watering mouths looked ready to mob it, the people in charge of the booth started to cut it up with piano wire and sell it to the cheese-hungry at 25 cents a pound, and in a few brief days it was not.

The cheese was made in Lewis County for the State of New York by H. A. Rees, instructor in cheesemaking at one of the State's agricultural schools. New York has had a big one in every exposition in which she has participated but this was the first one over 1,000 pounds in weight that could stand without hoops or bands. And it ripened better in the California climate than any cheese of the sort ever had ripened before; indicating that a combination of New York and California would be some State.

It was a lesson in the importance of the industry in New York. Watertown is said to be the largest cheese center in the world. Other centers of the industry were indicated on a large model of the State, showing cheese and butter factories; and sawmills, wood-pulp mills, railroads, and highways. There was a large exhibition refrigerator in this booth in which were displayed New York butter and certified-milk products. Thirty different kinds of cheese and 25 distinct varieties of potato were shown.

A large electric sign of 30 movable leaves indicated the preëminence of New York in fields where its preëminence had been forgotten by some people. One of these legends declared that the Empire State produced more apples than 22 States west of the Mississippi River combined. Only California among the States produces more grapes than New York. Corn, beans, peas, wheat, rye, oats, barley, buckwheat, and hops were displayed in miniature railroad cars with glass tops and fronts. There was a big pyramid of maple sugar. There was a great display of honey and of preserved fruits and vegetables. The New York State College of Agriculture at Cornell made an instructive exhibit of alfalfa roots, showing the remarkable depth to which they penetrate the soil. The College of Forestry at Syracuse supervised the making of models illustrating forestry work, and 14 large transparencies showed forestry and reforestation scenes. There was a motion-picture theater in the center of the booth, where the most practical pictures imaginable were shown several times a day: "Everyday Farming in the Empire State," "Fruit Scenes in New York," "The Summer School for Students of Forestry in the Catskills," "The Origin of Asphalt, and New York State Improved Highways," "The Production of Milk," "The Grape Industry." *A Farming
Empire*

It was said that about 50,000 copies of publications of the New York State Department of Agriculture were distributed at this booth. There were maps of soil surveys, and about 400 still pictures of State agricultural conditions. An accurate account was kept of the number of persons that visited the booth—not merely the passers-by, but people that stopped and examined it. The total came to 270,500.

Wisconsin, land of lakes and streams and broad pastures and rich farming land, and high grass and prize cattle, where progressive politics and progressive farming go hand in hand, was represented in the Palace of Agriculture by an exhibit that was nothing less than an epitome of the State's agricultural life. Wisconsin has an active Agricultural Experiment Association of over 2,000 members, largely resulting from the activity of Prof. R. A. Moore, State Agronomist, and under the patronage of this Association it had become the leading seed-selling State of the Union. The Association collected the exhibits that went into Wisconsin's space in the Palace of Agriculture. These things are the State's pride, for over 50 per cent of her population lives on farms or in small farm-supported communities.

The great work of the Wisconsin College of Agriculture was exemplified in a remarkably thorough way, especially in seed breeding. There were pedigreed seeds of many varieties, but perhaps as striking as any for purposes of illustration was the Oderbrucker barley, six rows to the head and 51 bushels to the acre. It began with 8½ per cent of protein and was bred up on the University farm for 16 years until the protein content had reached 15 per cent, before the seed was given to the farmer.

Wisconsin cans 40 per cent of all the peas canned in the United States, and also produces great crops of field peas. Corn had been bred for 16 years, and through the development of early and hardy varieties the corn

belt had been extended to the northern boundary of the State. *New Grains* There was a sample of 60-day oats. There was a white-flint corn that matured like a promissory note, in 90 days of growing weather and was pest-resistant to a higher degree than most of the tender species. There were in 1915 over 48,000 silos in Wisconsin, and 40 per cent of the corn went into ensilage. There was ginseng from Wausau, and there was a galvanized-iron tub of living cranberry sod with cranberries ripening in it. They do say that a good deal of "Havana" tobacco comes from Wisconsin, and that New York buys large quantities of cheese there; though we cannot certify to the truth of these statements.

The largest creamery in the world is situated in Richland County, Wisconsin, and has an intake of over 200,000 pounds of milk a day in Summer; while Green County turns out Swiss and Limburger cheese in large lots.

When it came to clover, alfalfa, and timothy, the specimens looked almost good enough for human food direct.

Mrs. Adda F. Howie was in charge of this booth and she was a contagiously enthusiastic farmer. She had built the Underwood barns at Wauwatosa for F. D. Underwood, President of the Erie Railway, barns that had procelain feed boxes, enameled walls and stalls, bronze hardware, a bathroom for the men, pictures on the walls and lace curtains and flowers at the barn windows. She was a successful cattle breeder herself, having begun with two cows and a heifer and built up a herd of a hundred head. She had their portraits and talked about them as though they were folks.

James Bellwood and his three sons, of South Richmond, put in the Virginia exhibit in this Palace. It was a one-farm exhibition and was a remarkable showing of diversified agriculture. The farm illustrated embraced about 1,500 acres, a thousand of which were cultivated. The produce ranged from giant peanuts to lumber. There were rice, giant red-top, soy beans, spike grass, Hungarian and German millet, beardless barley; and corn, both eating and pop. Ten ears that had taken the championship at the Richmond State Fair in 1914 were exhibited. There was an instructive showing of hardwoods: sassafras, walnut, yellow locust, dogwood, bitter hickory, beach, holly, and black oak.

*All On
One Farm*

With these objects, pertinent to peace, went a table display of relics of war, for the Battle of Drewry's Bluff was fought on the farm, and the plow had been turning up its scattered and buried souvenirs for almost two generations. There were sabers, there was a shell embedded in a tree where it reposed until the saw struck it, and then the mill ordered another saw; there were rifle and revolver balls, bits of shrapnel and other missiles. The Bellwood farm booth was a very attractive place and made a fine showing of the climatic and soil resources of the Old Dominion.

Idaho exhibited as her most conspicuous feature a maddening image of a gigantic baked potato, broken open across the center, with a slab of golden butter the size of a tombstone melting down into its warm, soft, starchy bosom; calling attention to the fact that the State shipped out 8,000 cars of potatoes in 1914. She also advertised the fact that she had plenty of fine land on which to grow more, by showing a panorama of the great Arrow-rock dam, 26 miles above Boise, the highest concrete dam in the world, and the area it would water. This dam is 351 feet high and 1,060 feet long on the crest, cost \$5,500,000, took the United States Reclamation Service four years to build, and was to irrigate 243,000 acres. It was completed late in the Exposition season. The exhibit showed pasture and forage plants, and a pasture capacity under irrigation better

*Potatoes
and Pasture*

than three animals to the acre for eight months in the year. There were samples of seven-headed wheat, and prize ears of corn with the kernels in long straight rows clear to the tip of the cob. Grain was put in open glass bins, where people could gratify their natural desire to spade into it with their hands and let it run through their fingers. The psychology of that was good—quite like a Montessori method for infant farmers. Another panorama showed the famous Shoshone Falls, with their great quantity of water power; a very beautiful Rocky Mountain scene.

The only exhibit of South Dakota was made in the Palace of Agriculture, by the Immigration Department of that State. It was an exceptionally fine showing of corn and grains, and of great potatoes. Placards advertised the cheapness of South Dakota lands, and also showed that since 1876 the Black Hills district had produced \$200,000,000 worth of gold.

Montana prided herself upon her grain, as well she might, and the desire of her Commissioners was to show a large amount in a large space. They did. Massiveness was the note of the Montana booth. There was a row of huge pillars covered with grains of wheat, supporting a frieze of upland cereals. Back of these columns, on the wall of the booth, were such fat sheaves as Montanans claim can be grown only on their soil, formed in huge circles around intermittently illuminated transparencies. Three arches gave entrance to the interior, where you were surrounded with typical examples of all the Montana crops. At one end was a panorama showing what a valley farm in this mountain State was like. And there was an imposing array of cups, medals, and other trophies that Montana had taken at agricultural exhibitions. The booth exhibited black-bearded macaroni wheat, and winter emmer, both of interest as valuable and somewhat unusual farm products. In addition there was nearly every variety of wheat and oats grown anywhere. Seeds and grains were used in the composition of decorated pictures; and altogether the exhibit was a very impressive one.

Adjacent to the large booth was a subsidiary exhibit of powerful appeal to the sportsman. Here the wild life of Montana was shown by the finest skill of the taxidermist. There were Rocky Mountain sheep, there were deer and antelope. Animals of the mountain, valley, and plain, were standing or lying in life-like postures, amid surroundings as natural as art could make them.

Nevada's fame as a mining State has been and remains world-wide. What the world outside of Nevada does not yet understand is that it offers magnificent opportunity to agriculturists. Her boundaries include millions of acres of the finest agricultural land in the world, and the possibilities of



WISCONSIN'S VARIETY



LOUISIANA'S LUXURIANCE

her diversified climate are magical. These propositions were demonstrated in Nevada's exhibit in the Palace of Agriculture with telling effect. She showed 85 varieties of nutritious native grass, the support of great flocks of sheep and herds of cattle and roving bands of wild horses. She showed fine commercial exhibits of wool, hay, mutton, honey, potatoes, dairy products, corn, beans, pumpkins, baled alfalfa, cucumbers, peanuts, fine pears and apples, nuts, garden truck, and beef unexcelled for quality, generally speaking, by those of any other State or any other part of the world. And the lands on which these things can be duplicated and multiplied to vast aggregate values are to-day virtually unsettled, and largely unknown, for the overland journey was mapped out to get people to California as soon as possible, not to show the best parts of the region it traversed. Besides, Nevada's great mineral wealth is hidden in her desert country, not in her broad and fertile valleys of artesian wells and alfalfa fields, and so vast numbers get their impressions of the State from mining scenes in the desert.

*Surprises
of Nevada*

Fourth in area among the States, Nevada can count but 80,000 population. These 80,000 cannot be said to occupy, but they do dwell among, some 71,000,000 acres of land, only 2,000,000 of which is under fence. There is but scant population to consume her products as yet, but the future such conditions indicate is most inviting.

The Nevada booth contained a large topographic map of the State, in order that visitors might think of some other parts of it than they saw from the car windows coming to San Francisco. This map was twelve feet long and nine feet wide, and it showed the principal water courses, the arable lands, watersheds, highways, cities, towns, railroads, names of the principal crops for each locality and a great deal of similarly valuable information. It was designed to give a graphic representation of the State's agricultural resources and opportunities, and to any observant person it did. This exhibit was particularly convincing of the vast possibilities of Nevada agriculture.

The State of Washington exhibited in the Palace of Agriculture both her agricultural and forestry resources. In the agricultural part of her space, there was a model of a combined harvester in a field of grain, showing the method of operation. Across the way from it was a miniature hay baler turning out bales of hay. A corn palace was an interesting part of the display. There was a comprehensive exhibit of grains and grasses, vegetables and various other agricultural products. The booth was constructed of great Douglas fir logs, the columns being covered with oat heads.

*Timber of
Washington*

The Washington forestry exhibit took the form of a house in the construction of which were used various timbers and finishes, including some very handsome Douglas fir veneer. There were shingles, planks of fir, cedar, and hemlock, photographs of big trees and forest scenes and tremendous sawmills in a region where lumbering is a leading industry, and has engaged large masses of labor and capital. And alongside the house were huge timbers of Douglas fir tested to failure, in close proximity to oak beams similarly tested to show the relative strength of each.

As one of the great corn States, Indiana emphasized her qualifications for the production of that staple, and gave abundant evidences of the fine quality of it she could turn out. The marketing advantages of her location were shown by a map on which was described a large circle, indicating that within 24 hours of Indiana was a market of 75,000,000 people. The production of milk and eggs was indicated statistically by means of charts and legends, and there were jars of seeds and grains. Colored slides in a little theater showed Indiana's agricultural industries. It was a good showing of the activities and resources of a great and typical agricultural State.

The Arkansas exhibit was largely individualistic, the exhibits being sent in by private exhibitors, but when they were all together they constituted an impressive showing of what this State could do in the production of cotton, rice, tobacco, oats, rye, wheat, and corn. An educational chart represented her cotton by-products and they were astonishing in their range. The Arkansas State Commission showed forage grasses and seeds. The main exhibit of Arkansas however, was in the Palace of Horticulture.

The Angora goat, Willamette Valley flax, and the great diversity of products that could be taken from a ten-acre "dry" farm, gave unusual interest to the agricultural exhibit of the State of Oregon. The booth was attractively rustic, and "woody," with benches and columns made from

Oregon's
Goat "Oregon pine" logs. A stuffed Angora with his long, bright, silken fleece, if fleece it could be called, showed where the mohair comes from for the plush in the Pullman car; Oregon being almost the sole source of this handsome commodity. There was a grand showing of sheaf grains, including the seven-headed wheat, and there were pictures of fine rural schools. A placard proclaimed that of her people 80 per cent have telephones, 75 per cent have access to public libraries, 70 per cent have access to high schools, 60 per cent receive a daily-mail service, and 63 per cent of the women belong to clubs. The whole exhibit was indicative of pioneer advantages without pioneer privations.

There was a great showing of Willamette Valley flax, for the development and utilization of which a 300,000-dollar corporation was being organized.

And if there was anything you were still reluctant to believe about the possibilities of the Oregon soil and climate there was the exhibit of F. M. Sherman of Lebanon County, who displayed some 341 specimens of produce, all different, from a ten-acre farm, just to show what could be done—from pumpkins to bamboo. The eastern Oregon section showed some wonderful apples and other fruits.

We do not ordinarily think of the State of Ohio as a promising locality for the pursuit of tropical agriculture, yet she showed sugar-cane specimens that were creditable. Her exhibit of tobacco was good, and some of her grains were of a high standard of excellence. Her agricultural experiment station exhibited fine samples of wood. But the most striking thing she showed was her long-staple wool, in combed samples of the utmost fineness and silkiness. One could better understand Ohio's position in the ranks of the Republican party after having seen this wool. In wall cases there were samples of cloth that contained bits of string or hemp with which the wool had been tied, and which had gone into the looms by mistake. This was to educate the farmer against carelessness in this regard, which might utterly ruin a bolt of fine cloth. The educational value of the exhibit did not stop here, but appeared in a great array of corn, wheat, rye, barley, potatoes, grasses, beet sugar, and maple syrup.

The California exhibits in the Palace of Agriculture would have brought ecstasy to the heart of a vegetarian, and doubtless did charm many a one, with their succulent array of ground-grown edibles, from horse-radish to barley. The principal agricultural products of California, however, were those shown in the California Building by the various counties, and those in the Palace of Horticulture, mentioned below. In the Palace of Agriculture the State made its best impression with forestry products—not so much for size of timber, as for variety, quality, and beauty, although a plank was shown that was 16 feet wide, and puzzled a great many eastern visitors to detect the longitudinal joint—which none did detect because it was not there. There were about 60 varieties of wood. Strange figures and pictures appeared in crosscuts of knots, and a two-minute lecture on the subject was delivered with much impressiveness by Thomas Hatch, who was in charge and had his own theory about it.

*Trees of
California*

Perhaps ten years before the Exposition, one Marcus Weinberger, being in California mountain country and needing a slab of wood for some purpose, took a saw and ripped one from the side of a yellow maple. He sawed straight and left a perfectly flat scar. The maple went on growing, its bole increasing in girth, and new wood, covered with bark, formed about the flat surface and began to roll in over its edges. Marcus Weinberger came

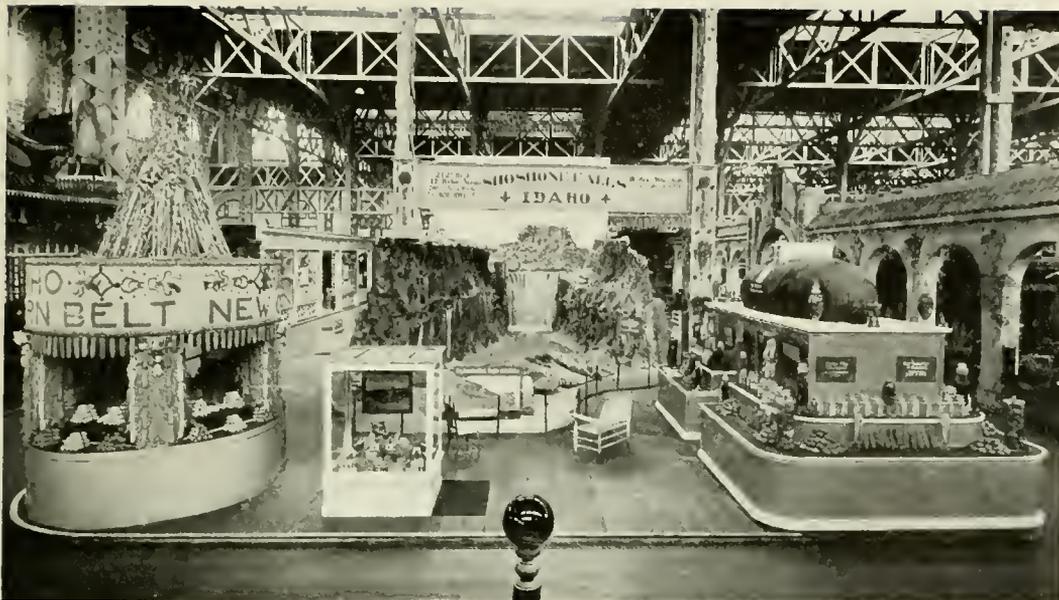
back in a few years, sawed out a section containing the old scar and the new growth, peeled the bark off the roll, polished up the old saw cut, and had a unique and beautiful table top with a rolled and convoluted rim about two inches high, which could not have been produced by any ordinary art. Fitted with rustic legs and exhibited in the California forestry booth, it was not merely curious, but a very instructive example of the way trees grow—by blind additions, striving to assert the tree form always.

The Eucalyptus Hardwood Association showed furniture, veneering, tool handles and a plow beam of eucalyptus. There were some new incubators. Among the other California exhibits were ginned and unginned cotton, cotton thread, cotton bolls, the Protean forms of cottonseed oil; hemp, hops, alfalfa, feterrita, sorghum, Egyptian corn; and grains, in the sheaf and threshed.

Near the forestry exhibit of California, the Pioneer Varnish Works of San Francisco showed varnishes, and samples of the gum from which they are made—damar, mombassa from Africa, Congo Copal, yellow benguela, red angola, and a long list besides.

There were some interesting exhibits representing the city of Stockton and its industries. There was a diorama of the South San Joaquin County irrigation project, there was a goodly showing of macaroni, and a large display of buhach, or pyrethrum powder, for insect destruction. And F. A. Gummer, a Stockton furniture dealer, put in a comfortable rest room, which was always a welcome thing to find in any booth.

Part of the forestry exhibits installed by California interests were the Redwood Bungalow, the Sugar Pine and White Pine Bungalow, and the House of Hoo Hoo, which we have mentioned above. In each of these buildings Pacific Coast lumber was shown; and especially in the House of Hoo Hoo was exemplified the new method of taking off veneers by the rotary cut. By revolving the log, panels ten or twelve feet wide could be taken from a comparatively small tree, and used for wall covering without showing a seam or joint. This would yield superior results where paneling was desired.



IDAHO'S FERTILITY



OUT OF ARKANSAS

CHAPTER L

THE GOVERNMENT AND AGRICULTURE

ANYBODY who cherished the notion that animals were immune from disease because they led the simple life, slept in drafts, and lived on vegetables, would have been undeceived in two looks at the exhibits of the United States Bureau of Animal Industry in the Palace of Agriculture. When you had studied its sixty-three specimens of parasites infecting animals, you would be glad of Government inspection of meats, or any other meat inspection that would inspect. They were very disagreeable; but like many disagreeable things, instructive. The parasites were mounted and shown in pieces of the meat they ravaged, and the natural color of the substances had been faithfully presented.

There were 130 preserved pathological specimens. Pictures above the cases wherein these things were displayed showed the inspection work of the Bureau; with types of insanitary slaughterhouses, and carcasses of meat showing inspection marks. A model of municipal slaughterhouse for small towns showed what the small town can do to get sanitary meat. Other models represented proper methods of dipping cattle and sheep to get rid of mange and ticks. There was a model of a sanitary dairy barn, and of concrete silo construction, and the latter was supported by a series of eighteen pictures on a screen, illustrating every necessary step. Butter and cheese making processes were represented on transparencies. Another series of pictures told the story of clean milk; and there were samples of Farmers' Bulletins issued by the Bureau, with directions for obtaining them.

The lessons in modern practice were equally succinct and definite in regard to poultry raising and egg handling for the market. This part of the exhibit went so far as to display ostrich feathers from Arizona. Wool was shown in the pelt, from various parts of the United States so that comparative study could be made of it. One screen showed the Bureau's work with goats and sheep, and another some of the types of stud that are relied on to improve American horses.

The Forestry Service exhibit was as practical as an old hoe, and showed

exactly what was being done by the forest patrols in the reservations to keep down the number of forest fires, and how the public could help. There was a model of a typical National Forest on a scale of an inch to twenty-five feet, showing a ranger station, a ranger nursery, a forest plantation, a lookout house, lookout tower, fire tool boxes, fire lines, roads, trails, bridges, mountain streams, a power dam, a flume, a power house, and transmission lines, a forest homestead, a hotel under permit, sheep and cattle grazing, a drift fence, a corral, a timber sale area being logged, and a mine. The right and wrong kinds of logging were illustrated. Here was the whole scene, and all the physical elements of the problem.

Besides, there was a life-size lookout house into which you could go and where you could see the equipment. The place was very popular with boys. A pair of binoculars stood at hand so that you could look out over the Palace and see just where some careless camper had left his embers and started the trouble. There were portable telephone and heliograph outfits, and the house was painted white to serve as a heliograph target. Nearby was a fire-fighting tool box.

A working erosion model showed the effects of deforestation on stream flow and surface formation. Two hills were built up on the rear of the model, of the ordinary clay found in parts of California. One of the hills was covered with moss and foliage to represent the forest cover and the humus soil beneath it; the other hill was bare of vegetation. A sprinkler arrangement sent a shower of water down both slopes. The water flowing on the bare slope washed off the surface directly, carrying soil with it, and deposited it in the stream bed and the lake at the front of the model. The water flowing on the protected hill was absorbed by the natural reservoir which the forest afforded, and seeped out regularly as clear water. The stream on this side of the model and the lake below were filled with it. Farm land below the forested slope was shown in good condition; below the deforested hill the river had overrun its banks and flooded the farm land. The model was convincing evidence of the way erosion from deforested slopes fills up storage reservoirs, power dams, and channels of rivers.

In short, there was a full and impressive demonstration of the work the Forest Service does both in conserving the National Forests and making their resources available under proper regulations. A series of models showed the progress of lumber from its stand in the forest to its place in the building, losing as waste 65 per cent of its bulk in the process. The utilization of this waste in various manufacturing lines was suggested. A relief map of the United States showed the situations of the National Forests.

The illustrations of the equipment of the Weather Bureau were beauti-

*Forestry
and Floods*

fully complete. There were examples of evaporation tanks and auto-recording rain gauges, and weather maps, and registers for sunshine duration, and anemometers, and barographs, and telethermoscopes for getting the temperature of distant points. Of special interest to California farmers and hydro-electric engineers was a snow density tube to measure the snow level in the mountains in spring so that the irrigator could ascertain the probable summer flow. This apparatus did not require the melting of the snow fall, but sampled it, weighed it, and gave the water content direct from the snow itself, and by it could be told how much snow was on the watershed. This was new. There was a model of a shielded seasonal snow gauge, also new, which would hold its share of a month's fall without permitting any of it to blow out.

*Measuring
the Snow*

There were models of tandem kites for getting an indication of conditions in the upper air, as high as three miles. A hydrogen balloon, a sample of which was exhibited, had gone up as high as 20 miles, where the temperature was 90 degrees below zero. The balloons ascended until they burst and the recording instruments came down by parachute. Records so taken indicated that at 6 miles from the earth the air begins to get a little warmer, the temperature is steady, and there is no humidity, and almost no wind. Down to the outbreak of the war, these balloons came from Russia. The records were made on a smoked aluminum sheet. An object of some local curiosity in this booth was the Bosch-Omori seismograph.

One of the most effective agencies of public deception operative in modern life is the fake advertisement—there is so much money to be made out of it. The United States Bureau of Chemistry set up signs and tokens that should have been, and probably were, of the utmost value in unsettling the faith of the public in certain nostrums and “treatments” for the cure of this, that, and the other real or imaginary ill, and in certain proprietary foods of dubious worth or none. There were 61 samples of “food” products illustrating adulteration and mis-branding through the use of color. There were 110 samples showing the chief ingredients of headache remedies. There was a large collection of medicinal preparations found to be adulterated or mis-branded under the law, comprising headache powders, beauty foods, drug-habit cures, cancer cures, epilepsy, rheumatism, asthma, and consumption cures, soothing syrups, and many other materials of the ancient flim-flam game. There were 75 samples of crude drugs and their most common adulterants.

Thirty samples demonstrated the difference between true and imitation lemon and vanilla extracts. There were 45 samples of spices and their adulterants. Even graham flour was imitated by some 35 kinds of mill

product. There were 36 samples illustrating the mis-branding of mineral and table waters. And there were microscopes with movable stages on each of which were mounted 20 specimens of starches, fibers, paper pulps, spices, fruits, and other substances in the composition of which the consuming public has an interest. In this booth you felt that life is permeated and environed by lies and liars. It was a revelation of the lie industry.

*The American
Business*

Then Uncle Sam got after the prairie dogs, and in the exhibit of the Biological Survey showed how they destroy vegetation and tear up the land. The economic value and the destructiveness of birds and animals were exhibited—how the barn owl keeps down the pest of small rodents, and how other birds eat up the various weevils and other destructive insects. There was a very handsome family of stuffed elk—father, mother and son—in winter setting, to call attention to the game preservation work.

The Bureau of Plant Industry had some very practical things to show. How to lose a cargo of corn by shipping it when it is not sufficiently dry was illustrated by a section model of a grain ship, with cargo exposed to heat from the boiler room and the engine shafts. Six drawings of sections of ships exhibited the conditions of different cargoes when they arrived in Europe. Two showed corn heating in transit and being cooled on arrival.

Poisonous plants and harmful weeds were displayed. There were 138 samples of tobacco, and some examples of American grown hemp, sisal, and flax, with the product. Fruit diseases and methods of combatting them were illustrated; and results of horticultural and pomological investigations. At one time 134 varieties of grapes grown in California were on exhibition.

The agency of the nitrogen-fixing bacteria in soil replenishment was demonstrated by means of root specimens in jars, showing the production of the nodules. Other specimens showed the types of swelling produced by the nematode worms. There were pictures of an inoculated and an uninoculated field, and charts and descriptive matter relating to soil bacteria. Cotton and rice breeding were exemplified; and there were some pictures of a few important fungus diseases of timber trees, with specimens showing the role of the lesser plants as hosts of such fungus.

All these things and many more that we have no space to enumerate here showed what sort of work the Department of Agriculture was doing for the public in the year 1915, and showed it very plainly and impressively.



FROM ONE VIRGINIA FARM



FROM ONE OREGON FARM

CHAPTER LI

FOREIGN FARMING

THE Palace of Agriculture contained the largest exhibition of Manila hemp ever made outside the Philippine Islands—an impressive lesson in the significance of cordage. The Philippines are the only region producing this commodity in commercial quantities and standard grades, and the value of the crop is about \$24,000,000 every year. The life and color of tropical agriculture were depicted in their curious and beautiful variety in the combined agriculture and forestry exhibit of the islands. Filipino artisans were working at typical handicrafts in a corner of the space, making musical instruments of the resonant island hardwoods, and weaving great coils of rattan into the large and graceful “peacock” chairs, which, for all their lightness, have somehow the dignity of native thrones. A nipa hut with a caraboa cart standing beside it, and domestic utensils scattered all about, gave the vivid local aspect we call atmosphere, for lack of a better term. Almost under its eaves were a hand-mill for cleaning rice, a stone corn mill, an old hand sugar mill, a cocoanut husker, a model of a tobacco press, a hemp cleaner and scraper, a wooden plow, a bamboo harrow with natural joints for teeth, and a sled for the rice fields. *An Island Scene*

The whole exhibit was enclosed in the characteristic and beautiful frame of the Philippine exhibits throughout the palaces—smooth, dark, *palma brava* columns supporting a frieze of translucent mollusc shell panes, between panels of woven bamboo. The whole space was handsomely floored in Philippine hard woods.

Rice was the central feature of the picture, about which all the other commodities were grouped; and that was appropriate enough, for its value leads them all, even hemp. The four other main crops were grouped about it: hemp, cocoanuts, sugar, and tobacco. The object of this large and wondrously diversified exhibit was to give an idea of the agricultural and forestry resources the islands offer to development, and it was thoroughly impressive both as to extent and variety. The rice was present in great quantity and many kinds. There were about 1,500 samples of the rough unhulled, and 100 sheaf samples, illustrating the efforts of the Government experiment

stations during the past six or seven years to select and breed a sort for any condition, low land or high land, wet or dry, and for all possible exposures.

The hemp, or abaca fibre, *Musa Textilis*, made an exhibit of great beauty. It was used to cover the walls of two pavilions connected by a pergola, in which were exhibited coils of excellent cordage. Various commercial houses in Manila contributed. About 909,000 acres are devoted to this crop in the Philippines, and the Government standardizes and inspects the output, for the good of the trade. There were samples here of 12 different grades of fiber, in bales and in other forms, all of which had been officially tagged, so that the purchaser could buy without uncertainty. Besides the cordage, there were such products from this material as cloth, handbags, slippers, and hats of Tagal braid. Then there was binder twine, and paper pulp of a high grade, made from hemp waste, said to compare favorably with linen for paper manufacture.

There were samples of palm sugar from Batangas province, where the production of it promised to grow into an important industry. There was crude cane sugar with small quantities of Philippine refined. Some of the crude was exhibited in *pilones* or earthen jars, and some in mats, or *bayones*.

*Sugar and
Cocoanuts* There was a pyramid of the latter, 16 feet in diameter at base and 18 feet high. There was another big pyramid, of cocoanuts, and an accompanying exhibit of their commercial products—oil, soap, coir fiber, and utensils made from the shell. Sun-dried, steam-dried, and smoke-dried copra was shown in jars.

Of Philippine tobacco there were bales, leaves, and manufactured products, consisting of cigars, cigarettes, and pipe tobacco, from 16 different factories, all working under sanitary regulations enforced by the Government through inspections every few days. The main display feature was a triangular pavilion covered with tobacco leaves.

Some of the displays under glass were of great interest. There was the *kapok*, or tree cotton, basis of a growing industry. The floss comes in a pod, and is used for upholstery and for making life preservers, but perhaps it has its greatest commercial value in mattresses. There were samples of "Para" rubber. There were chocolate beans and cocoa, and *pili* nuts, so rich in oil that they can be burned. There were cotton and fiber cloths in great variety, and glass cases of bamboo hats, showing some very fine weaves.

Side by side with the agricultural exhibits were those of forestry, and so important were the latter that an entire collection of 110 six-inch hardwood planks shown in the Palace of Agriculture, was purchased by the Smithsonian Institution, to go on permanent view at Washington. Of the wonderful variety of hardwoods in the islands, amounting to thousands of species, and

including far more than have yet been classified, there were some 433 samples exhibited, in various forms; some in planks, some in dimension timbers, some in great dug-out bowls or tubs for washing clothes, some in big table tops cut from the butts of huge tropical trees, some in cross and tangential section, some in the log, and some shown by the bark, leaf, and fruit.

The most highly prized furniture wood was the *narra*. The *batea* was worked up into the large washbowls. There were *yacal*, *biluang*, and *banawi* from Zamboanga, *tiga* and *oranga* from Tayabas, *lanete* from Mindoro. Products appeared in the form of gun stocks, bowling balls, and the island musical instruments. There was a handsome table top of polished red *lauan*, a single piece that measured nine feet seven inches in diameter. There were exhibits of *almaciga*, or gum copal, of which about 2,000,000 pounds a year is exported to Europe and America for the manufacture of varnish. There was gutta percha from large plantations in Mindanao. Rattan was shown in a large choice of diameter. There was a big export of this commodity to Germany before the war. Among the perfumes exhibited was the essence of *Ylang Ylang*, a product of the Philippines only.

*Beautiful
Hardwoods*

In the Palace of Agriculture, Argentina sought to present the evidences of her astounding agricultural development from a cultivation of 5,000,000 hectares in corn, wheat, flax, sugar cane, grasses, and other crops in 1895, to 24,000,000 in 1914; almost a five-fold expansion in 20 years. (A hectare comes to 2.471 acres). This growth was presented by statistical signs, and the present yield was illustrated by samples. Grains, threshed and in the head, were very attractively displayed in glazed metal drums. These were in addition to the good sheaf exhibits all about. There were some 2,000 samples carefully selected and scientifically classified, of grains, oil seeds, and seeds of fodder plants. The processed sugar cane in jars showed agricultural experiment station work, by means of some 90 varieties. Eighty varieties are grown in the State of Tucuman alone, and there was a model of the sugar factory of the Tucuman Saccharotechnic school. Some 2,121,559 tons of sugar were produced in the Argentine in 1913.

The *Sociedad Rural Argentina* made a fine showing, mainly by pictures, of horses, sheep, cattle, and swine. Three hundred fleeces carefully selected from the clip of about 120 of the leading sheep breeders showed the remarkable success attained toward producing a type that would yield at once abundant good mutton and fine wool—the Argentina Merino.

The exhibits of cotton demonstrated the success recently attained with that staple at Chaco. There were samples of ramie and hemp, and a few plumes of the domesticated ostrich. There were good exhibits of tobacco.

The exhibit of hardwoods was no less than imposing. The hardwood forests cover nearly a third of the territory of the Argentine, and out of such abundance were shown more than 1,000 pieces belonging to over 100 varieties. These were not merely in the form of boards but in logs in the bark, mitered, and with half of the miter polished down so that you could see how the timber looked on a fresh cut, and how well it would finish. Among the many specimens were some of *cedro*, very fine for interiors. There were wheels with felloes of *quebracho blanco*, and spokes of *incienso*; the wheel being a hard test of timber. One of the most beautiful of the woods shown was the *quebracho colorado*, a very durable sort, and another was the *ibira puyta*, for furniture, strong and capable of a high polish. But although there was much lumber exhibited, it showed little of the lumber industry, which would appear to be in its infancy.

*More
Hardwoods*

The weather reporting service of the Argentine appeared from the exhibits made in this Palace to be a very effective branch of the Government. There were photographs showing the equipment of the weather stations, including that of the ice-bound South Orkney Meteorological and Magnetic Station, in latitude 61 South.

Other models and photographs illustrated the work of the Hydrometric service in gauging the flow of all the principal streams and lake outlets throughout the republic, for the determination of the possibilities of irrigation and hydro-electric development. And still other models and photographs showed the work of the magnetic and solar observation service at Pilar, in the province of Cordoba for keeping track of sun spots and making spectroscopic analyses of the corona in times of solar eclipse. All these exhibits were most effective in giving the visitor an understanding of the advancement of the Argentine, and the opportunities still awaiting capital and industry in that favored part of the world.

The great diversity of Japan's agricultural products was shown in this Palace. Here were exhibited some articles that might properly have been placed in the Palace of Liberal Arts, but owing to space limitations there, were put with the Agricultural commodities. The Japanese fur industry was treated in several large exhibit cabinets containing specimens of many valuable and some of the commoner fur-bearing animals that are found in Japanese waters. Rice growing was shown in all its diversity and its wide range, and the culture and commercial uses of bamboo were exhibited. The lumber industry of Nippon was illustrated with particular reference to veneered and inlaid woods, hardwood manufactures, ceiling materials, and ornamentation.

Attention was called to the fruits of Japan: oranges, persimmons, apples,



COURTESY GENERAL ELECTRIC COMPANY

ILLUMINATION OF THE COURT OF PALMS

pears, prunes, peaches, and grapes. Of these fruits oranges led, persimmons came second, and prunes third. A product of seaweed, *kanten* or vegetable isinglass, was interesting because new to many Westerners.

This gelatinous substance was coming into general use as a material for confectioners, and gelatine and starch manufacturers, and as a general pasting and coagulating medium.

*Marine
Gelatine*

Japan is a land of farms and fisheries and also of forests—and of the last named to a greater extent than is generally supposed by people that have not seen it. In the Palace of Agriculture she endeavored to indicate her natural resources in these lines. About 78 per cent of the area of old Japan is covered with trees, and that surpasses in proportionate area even Sweden, the greatest forest country of Europe, where the area of wooded lands amounts to 52 per cent of the whole. Forests cover 56 per cent of Hokkaido, 98 per cent of Karafuto, and about 79 per cent of Formosa. These facts were represented by a model and some statistical charts, indicating the distribution of the forests and the annual output of lumber.

In Japan, the State owns 20.3 per cent of the forest area, the Imperial Household 2.6 per cent, municipalities 23.4 per cent, temples and shrines .8 per cent, and private individuals 52.9 per cent. It was natural that the Japanese booth in the Palace of Agriculture should contain notable exhibits of lumber, bamboo and other forest products. There were beautiful pieces of veneer and inlay work, examples of marquetry and some fine specimens of large furniture bamboo. Some of the bamboo plants, while passing through the moist tropical climate of Hawaii on the way to San Francisco sprouted, and sent up young shoots that grew to maturity, thus bringing the question of their nationality into dispute. Probably it was American bamboo born of Japanese parents.

About 60 per cent of the population of Japan, some 30,000,000 persons, are directly or indirectly involved in farming; and everybody eats; so a good deal of importance attached to the rice exhibits, as representative of the principal food stuff of the Nation. Nearly 73½ million acres of land is devoted to rice culture in Japan, producing some 246,000,000 bushels annually, unhulled. Both Government and people naturally try to increase the yield. Under the Department of Agriculture and Commerce, experiment stations have been established throughout the country, in addition to many instituted by the prefectures and by guilds of rice growers and merchants. On screens there were systematic displays of the many varieties produced, and the changes and improvements made by the scientific methods applied. These were not only of much interest to the rice growers of California, but to the agriculturists in general,

*Rice
Improvement*

for it was one more indication of what could be accomplished by seed selection and plant breeding.

Of inedible agricultural products Japan exhibited feathers and taro hemp. In preserved meat, fish, and vegetables she had cod liver oil, fish oil, and isinglass. There were many varieties of seaweed, and there were specimens of the snake gourd, the fiber of which makes an excellent artificial sponge. There was a large group of vegetable oils, and sorghum in variety.

To exhibit the agriculture of China is like trying to exhibit the agriculture of a world. Her diversity of soil and climate, her millions on millions of farmers, the intensive character of their efforts, the age-old craft they have inherited, go to make up an industry that seems all-embracing. Here must be products of the tropical regions of the south, the temperate region of the center, and the cold spheres of the north.

There were shown all sorts of grains and beans, especially from the northern sections—wheat, kaoling, and yellow and black beans, with ground nuts, and paddy. The beans were there in more than 200 varieties. From central and southern China came winter and summer rice, sago, white and black sesamum, red and white corn, varnish tree seeds, red and black peas, white lentils, and a bewildering variety of green and black teas from the various tea provinces. There was a model of a tea garden, with puppet figures picking, drying, sorting, tasting, and packing the delicate and comfort-giving leaves.

*Plenty
of Beans*

All sorts of cocoons came from the center of the trade at Canton. With them was filatured silk of many grades. There were specimens of Chinese cotton, and all sorts of vegetable tallow, seed oils, bamboo shoots, wool from sheep and from camels, and an abundance of flax and jute. There were specimens of Chinese bean cake of many kinds, some for fertilizer. Great irrigation systems were shown by means of models, and there were Chinese agricultural implements in variety.

Among the products that seemed curious to the western mind were the deer musks for perfumes—Nin Pee Kow, burning-musk, Mao and Nin Pee Mao, and much incense. Among the bean oils was the well-known castor, which needs no description here.

There were stuffed birds of great interest, and mounted insects, and butterflies. These, with dried mushrooms, almond seeds, ginseng, bamboo shoots, leaf tobacco, bristles, duck and heron feathers, seaweeds, and medicinal roots, silk worm eggs, beeswax, bamboo, and photographs of forestry scenes, candle wax from the tallow tree, lumber, charcoal, and wood oil helped make up an astounding list of products. One could hardly grasp

their significance, so much does China mean in history and in potential human values; and these things were of the heart of China—her soil.

New Zealand made a great showing of tinned refrigerated meats, and with it of butter and cheese. There were examples of New Zealand flax, *Formium Tenax*, growing, and an exhibit of the fiber taken from this plant—which is not at all like that of ordinary flax, but very like hemp or sisal. There was a good display of cordage made from it. There was a fine showing of woolen shawls and robes from the Mosgiel mills, ^{Meats} and ^{Cordage} samples of the best sort of Merino wool, and pictures of Merino sheep. The Department of Tourists and Health Resorts exhibited bottled mineral waters, and samples of radio-active mud from some of the hot springs in the island. There were large, polished chunks of the beautiful kauri gum, and there were gold and silver ores, cinnabar, and iron sand. Vessel models were exhibited by the Union Steamship Company. A curious device for getting over the snow was a sled on skis, with a bladed wheel aft like the stern wheel of a steamer, and a motor to propel it. Here was a large collection of portrait photography. The central object in this booth was a stuffed specimen of the Moa, the wingless bird of New Zealand, now extinct. This specimen was taller than a man and looked as though he had trousers to his knees and black leather boots from there down. He seemed very lonely and a long way from home.

Uruguay showed in the Palace of Agriculture interesting medicinal herbs, fertilizers, leaf tobacco, wool, cattle hair, plumes, and bones; together with agricultural photographs and books on various phases of the subject.

The only Mexican exhibit in any of the Palaces was in that of Agriculture, where the Mexican Development Company of Mazatlan showed a collective exhibit of agricultural products, disposed in panorama form before a background depicting a typical Mexican landscape. The scene was very realistic, and made the visitor regret that there could have been no more widely organized and official participation from a country that has so much of interest to exhibit.

CHAPTER LII

THE MECHANICAL MILKMAID, AND OTHER DEVICES

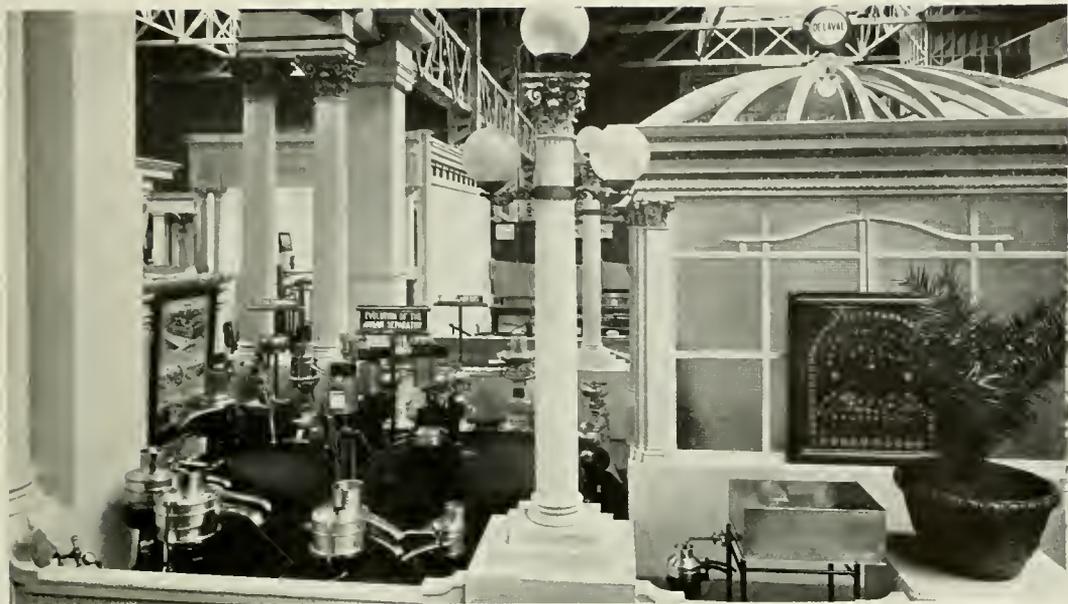
ONE of the radical departures in farming during the preceding decade was illustrated by the exhibit of the Calf-Way Milker. From this exhibit it looked as though mechanical milking had arrived at last, and the milkmaid would only survive for very small establishments and the musical comedy stage.

The exhibit booth showed plaster models of cows in sanitary stalls and a model of the milker in operation, actuated by a motor. The plaster cows were very patient, the motor milker very busy. The squeeze cups had glass tops so you could see exactly how they operated. The peculiarity of this milker was that no suction was applied to the teat; it was squeezed rythmically by a pressure that began at the udder and progressed to the tip. None of the milk was exposed to the air in the barn, but went directly into a covered container, just as it does in the calf. Out at the cow barns in the Live Stock Section, a herd of 125 Holsteins was milked twice a day throughout the season with this device by the Pacific Coast Condensed Milk Company, which owned the herd, for its Carnation Condensery near the south entrance to the Fine Arts Palace.

Like
Nature

The milk having been extracted from the cow, there remained the problem of extracting the cream from the milk. Here were centrifugal separators of the latest patterns, types of mechanical efficiency, that you could work by hand or gasoline or electric motor. Refinement of design had gone far in these devices since the previous international exposition in this country. In the machine exhibited by the Iowa Dairy Separator Company of Waterloo, Iowa, a curved disc thinned out the strata of milk in the "bowl" until the smallest globules of fat were forced out.

The original make of cream separator, the De Laval, invented in Sweden over a third of a century ago, had gone right on improving, and showed progress since the day of the old spindle bowl exhibited at St. Louis. The new bowl had a split wing device for delivering the milk without having to pass it through the cream line. It could be quickly detached with one twist of the wrench. The whole machine was automatically oiled.



CENTRIFUGALS



PRODUCTS OF ARGENTINE FORESTRY

These separators would handle the milk from one cow or from a thousand according to size. The largest De Laval would skim 6,000 pounds of milk an hour.

The centrifugal principle had been extended, and its object had even been reversed so that the method was made to work backward, for the De Laval mechanical family included a centrifugal emulsor for the production of cream from the component parts of milk, a process having valuable application in cheese making and ice cream production. There was a centrifugal milk clarifier, which, while leaving the milk whole, would remove any possible disease-breeding impurities. Nor ^{*Reversing*} _{*the Process*} was the centrifugal method confined to the lacteal fluid of the domestic cow. There was a centrifugal yeast separator, and a centrifugal clarifier and filter for clarifying varnishes, oils, certain medicines, fruit syrups and other liquid commodities.

The De Laval exhibit contained an old-faithful specimen that had been in use 17 years, during which the wooden handle of the crank had stuck, so that instead of turning on its spindle it turned in the farmer's horny hand, and had thus been rubbed away in service until there was little left of it but the ridges between the grooves in which his fingers traveled. The old veteran was in good condition still, and although hardly contemporaneous could almost have held its own with those that were.

For as long as man has fussed with that embodiment of primordial stupidity, the domesticated hen, for as long as he has hatched her, and brooded her, and kept her warm nights, and fed her fancy chicken feed, and given her a good roost and a soft nest, and cured her of the pip, and kept the coyotes and skunks away from her, there has been no improvement whatever in the shape of the hen's egg. It still comes without handles and of a form that will fit nothing else in the world, nor stack nor pack economically with others of its kind; and the hen doesn't care one scratch of her left foot. The eggs suit her and she is neither grateful nor ambitious.

Columbus had to break an egg to make it stand on end. He knew the other persons present on that occasion would not think of so radical a procedure, and he took advantage of their guilelessness. If any one of them had possessed a Wallace Egg Carrier just then Columbus would have lost, and it would have served him right. The Wallace Carrier was an egg container made of two straw-board discs with perforations that admitted the ends of the egg and then fitted into slots in a four-sided straw-board envelope, so that the whole thing would stand upright if necessary, and would pack in a box with its kind for shipment. It was the invention of a San Francisco man. The exhibit was interesting to farmers and egg con-

sumers alike, and almost everybody is either one or the other or both. The booth displayed a framed appeal to poultrymen from D. F. Houston, Secretary of Agriculture and A. D. Melvin, Chief of the Bureau of Animal Industry, to produce infertile eggs, as equal to the fertilized and better to keep. In other words, eat the cockerels and get a chance to sleep a little later in the morning—a practice which the appeal declared would save the farmers of the country \$15,000,000 a year.

*Eggs
that Keep*

It is interesting to note that shortly after the Exposition Mr. Wallace had his attention torn from his favorite eggs by a great manufacturing concern, and began to turn out a modification of his egg carrier by the million for the transportation of electric light bulbs.

That ancient and indispensable commodity, cooperage, embodying the principle of the arch doubled into a circle and sustaining and being held in place by the tension of the hoop and compression of the staves, was represented in the Palace of Agriculture by the exhibit of the California Barrel Company of San Francisco. During 1914, some 4,000,000 pounds of California table grapes went east in kegs of redwood sawdust. Such kegs were shown in the exhibit. There were hard fir barrels for oil, and oak barrels for brandy and wine, and spruce vinegar barrels, and packing tierces, and curly-redwood flower tubs, and wire bound sugar barrels, and pork and fish kegs and jelly pails, and pickle kegs and lard tubs. The significance of the exhibit was its lesson of the vast diversity of uses we have for the container made from hoops and staves.

The Victor Incubator Company of Decoto, California, exhibited a new type of incubator and brooder with a water-coil heater. Eggs were hatched in it, up to the end of June.

Some of the other significant exhibits in the Palace of Agriculture were the improved incubators; a beet topper from Idaho that would do the work of five men; steel water tanks, smoke houses, grain bins, and feed cookers for the farmer; a combined fertilizer and seeder that put the fertilizing material right into the soil with the seed; mechanical potato diggers and hydraulic cider presses, motor hay balers, improved metal silos, hydraulic presses for various farm uses, loggers' tools and appliances, axes that would cut nails without nicking, water elevators, portable saw mills, all sorts of pump, cleaning compounds for dairymen, all sorts of wire fencing, automatic stock waterers, drainage machinery equipment, stave pipe, stave tanks, and stave silos, windmills, kerosene engines, grain cleaning machines, electrically heated incubators, milk coolers, and a compound for inoculating alfalfa seed to stimulate the yield.

CHAPTER LIII

BREAD, MEAT, AND TRIMMINGS

BECAUSE from the time of the first pudding the proof of that commodity has been the eating of it, and because food can hardly be exhibited in any other way, the Palace of Food Products was a very popular place. Cooking and eating were going on all about, from the time the doors were opened until they closed, and odors filled the air that seemed to rob people of reason. Demonstrators were continually handing out samples of appetizing goods, and people were continually ingesting them. Probably there was not a second of the day throughout the Exposition season when somebody was not eating something in this Palace. It was like the unanimity with which the whole Mohammedan world falls to at the sound of the sunset gun in Ramadan—only this began in the morning and lasted all day.

It made the Palace of Food Products a very nutritious place and one of the most attractive resorts in the grounds. If the body is the temple of the soul this Palace was full of temple builders, who worked hard at it and had joy of their labor. It was filled not merely with food exhibits but with illustrations of processes used in the preparation of foods for the market and the table, from the making and baking of flour to the production of limitless canned salmon, and things were so clean, and exemplary in every respect, that Dr. Wiley would have been real pleased. All the known ways of preparing food among civilized people appeared to be represented. Such exhibits as those of Libby, McNeill & Libby of Chicago, with their prodigious array of meats and vegetables that could be taken anywhere a mule or a ship could go, to amplify the diet of the traveler or the explorer, the whalers in the northern ice, or the trading schooner in the southern seas, were instructive of the arts Man has developed in order to provide for himself and keep his health; and eat.

And his beverages were there in all varieties, from mineral water to the finest wines. Restaurants all about, at once served and advertised the teas and coffees of the world. The Chinese restaurant in this Palace really exhibited tea by selling delicious cups of it with whatever else you wanted

from the Chinese cuisine. As for coffee, there was the booth of M. J. Brandenstein & Company, the Guatemala Coffee Parlor, the Porto Rico Coffee Parlor, Hills Brothers' and many more.

After all is said and done, the menu is the main aim of agriculture. In the Food Products Palace a large booth was devoted to the exhibition of a collection of menus, a collection known as "Lehner's Universal Transportable Menu Gallery." It was an apotheosis of feasting, whether feasting needed it or not. Among these gastronomic reminiscences was the menu of a dinner "by Past and Present Officers of the Egyptian Army in Honor of General Viscount Kitchener of Khartoum, G. C. B, G. C. M. G." There was a menu of a "dinner of the Royal Navy Club of 1765 and 1785, at Whitehall rooms, Hotel Metropole, London, to Commemorate the Battle of the Nile and the Bombardment of Algiers, and to celebrate the birthday of H. R. H. the Prince of Wales." One even looked, from the cover decoration, like the menu of a banquet in honor of Adam and Eve.

Without doubt the most striking exhibit in the Palace was the mill built in it by the Sperry Flour Company, and the cooks of many nations that took the flour it made and baked it at electric stoves into the forms of bread peculiar to their respective countries.

This was not a model nor a toy, but a working mill with a capacity of 100 barrels a miller's day, and it actually milled an average of about 50 sacks daily through the Exposition season, under conditions that enabled you to see almost the whole process—as much as could be seen for the covered chutes and bins, for everything had to be dust-proof.

Good and reliable flour is largely a matter of proper blending. A complete chemical laboratory was installed to test the wheat before buying, and after, in order to keep the blend right. The chemist discovered the gluten content of different wheats, and prescribed the dose of each, like a doctor. The wheat was drawn from covered tanks and scoured, and the defective kernels were removed. The dust was drawn off by suction. An experimental loaf was made from the previous day's flour to test the tests of the chemist. When that final test was satisfactory the flour was ready for the bakers.

The bakers in the booth attracted much attention. You could hardly pass them casually. There was a Chinaman making *sesmum*, *yuksum*, olive and almond cakes, and a Mexican woman making *tortillas*, and an old southern Mammy of the broadest and most unmistakable type making southern hoe cake from corn meal, and a "sourdough" from Alaska baking himself the comestible from which he took his nickname. India was



A JAPANESE FORESTRY EXHIBIT

represented. You could get *matzos* and noodles and Japanese *sen pei*, and Russian *peroskey*. Some new uses for cereals were "demonstrated"—bread from germea, cakes of rolled oats, for example. Through having to use it, the Chinese chef became in time convinced that good noodles could really be made from fine white California flour instead of the dark stuff from which Chinese noodles had been made for so many years, and he so convinced his astonished countrymen. It widened the use of California flour, and new orders came from Hong Kong on this account.

The Sperry mills are an old California institution; and sunk in the floor of the entrance to the booth were some old mill stones that had done duty in Stockton in early days. It took about 26 people to conduct the exhibit. It was a fine enterprise and well deserved the attention it received.

An exemplification of mechanical bread making and baking was supplied by a model of the automatic bakery of Joseph Baker & Sons, Ltd., of Willesden Junction, England. All the operations were mechanical, and neither dough nor bread was touched with the hands. Mechanically the flour was blended, sifted, and weighed. Mechanically it went through a hopper and into a mixing machine, where it was mechanically kneaded, emerging as dough from which 50 to 80 loaves a minute could be mechanically weighed and cut. Mechanically this dough was fed into tins and put on shelves and pushed into ovens on a traveling conveyor; and it came out thoroughly done, and then went to the bread room to be mechanically wrapped. The process had been in use in the United States for about nine years. The model cost \$10,000 to construct, was very complete in detail, and not only furnished a convincing demonstration of the superiority of the mechanical handling of food, but must have helped a good many people understand that mechanical processes almost always give better result than hand work. For, in the "traveling oven," the baking was perfectly uniform—the first loaf in was always the first loaf out. Moreover, as the speed of the conveyor and the temperature of the oven were both under control the baking could be graduated to perfection.

The Marshall Continuous Oven, of the Middleby-Marshall line of ovens, was in use at the Sperry Flour Mill, and the Double Oven of this concern was used at the Fisher Flouring Mill exhibit, where it did great service baking scones for the hungry.

The original animal foods of man, fish and game, as they still exist in plenty in California, were displayed by the California Fish and Game Commission and the Academy of Sciences in a sort of composite jungle scene that grouped so many beautiful specimens together it was enough to drive a

sportsman entirely out of his head. They were not merely displayed on boards and hung on the wall, and set in glass cases; the habitat was reproduced, and the hunters' camp. The taxidermist, the landscape engineer, the artist, and the veteran hunter and woodsman combined their science to produce a scene of striking realism. And it was real as the soot on a frying pan: There was a tent, and a fir-bough bed, and the camp fire had just died down. A few empty cans, some vagrant cigarette papers, and a tobacco pouch were scattered about. Tall pines, underbrush, and rocks surrounded the place, and a mountain stream plunged over boulders in the background. Game hung all about—quail, grouse, tree squirrels, and ducks. The hunter approached, leading his horse, with a buck lashed across the saddle. There was a cougar's den, where two kittens were devouring a fawn. There was a bear cave, with a big black bear and two cubs. In a little open was a herd of deer, and on some crags were posed some desert big horn sheep, a sub-species of the Rocky Mountain sheep, from the San Jacinto Mountains. A placard announced that it was false that these sheep are in the habit of leaping from the crags and landing on their horns—in fact, the females have no horns, an excellent reason for their not doing it.

One of the most beautiful parts of this exhibit was the little aquarium tank containing from time to time living specimens of the Golden Trout of Volcano Creek, in the Mt. Whitney region. This is probably the most beautiful fish on the continent of North America, and only to be matched in the blended brilliance of its hues by some of the painted beauties of Hawaiian waters. It lives at an altitude of 10,000 to 11,000 feet, and it was necessary to renew the representatives of the family quite frequently, as they did not find the surroundings at sea level altogether to their liking.

Work and happiness depend on health, and health depends on digestion, and the pundits are telling us nowadays that digestion depends on good cooking (those that are not busy trying to make us believe it depends on bran) and so we get around to flavoring extracts, and the man that benefited his kind by putting them into 10-cent bottles so they could be sold over the counter cheaply and conveniently, and the housewife could get them promptly and depend on what she got, even when she sent the baby to the store for it. That was an important invention commercially, economically, gastronomically.

When C. F. Sauer, of Richmond, Va., was young, people that were of sufficiently resolute character to have flavoring extracts bought them in bulk at the drug store, which involved an investment and made quite an event of it. In too many cases it was easier to do without. Sauer began to

*Natural
Food*

*Selling
Taste*

put up the little ten-cent bottles, and the business in extracts for the pantry expanded rapidly. A company was organized to sell the new commodity, and had to take larger quarters four times within a few years. Its latest home was a brick-and-concrete building with 60,000 square feet of floor space, rest and recreation rooms for its employees, and a large garden. And the Sauer Company makes its own bottles, boxes, and display cases, and keeps 50 salesmen on the road.

It had a mahogany booth in the Palace of Food Products, with a diorama showing the growth of the business, the different factories it had occupied and outgrown, the bottle factory and other parts of the plant. The 36 flavors, and some of the Mexican "beans" used in making vanilla extract, were exhibited as well as such things can be exhibited in glass. In addition, this firm had another booth in the exhibit of the Westfield Products.

At the central crossways of the Palace of Food Products was a pyramid of canned and bottled condiments, reaching, like the Tower of Babel, towards heaven. There were sauces and pickles and vinegar and catsups for a nation of boarding houses, mounting in separate stages; each stage a condiment, each condiment one of 57 varieties. Need we say they represented the product of Mr. Heinz of Pittsburgh, Purveyor to His Majesty the American Citizen? Within the tower you saw in moving pictures processes of production, and something suggestive of its scope—
The Tower of Bottles
saw men planting tomato plants in vast fields by machinery, and saw great sheds of bottled catsup that looked like the output of a British shell factory. Cleanliness and wholesomeness were apparent in every stage of that progress.

Close by was the display of the Albers Milling Company, with a stained glass picture aloft of the well known prospector flipping his buckwheats. In the booth was a huge mush bowl surrounded by four large Kewpies pouring in endless streams of cream.

The manufacturers of Shredded Wheat biscuits installed machinery to illustrate the method of making their product. Into this apparatus went the steamed wheat, and it came out in long fine strips which wove back and forth the length of a tray, and were finally cross cut into the familiar breakfast dish.

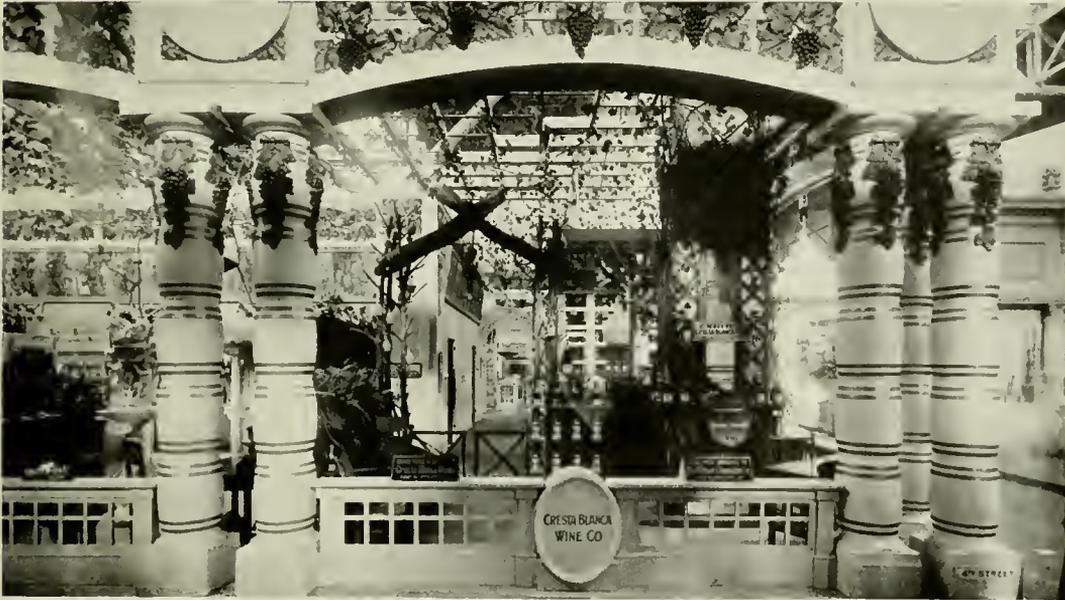
It was in the Palace of Food Products that P. S. Luttrell exhibited his Reminder Timer, or One Hand Automatic Clock, whereby you could set an alarm that would remind you when time was up for any small interval down to half a minute. We have given a sufficient account elsewhere of the manifold uses Luttrell discovered for his invention by exhibiting it at the Exposition.

Many very fine brands of food product were collected into one exhibit under the banner of the Westfield Standard, indicating that they conformed to high tests. Here, among others, was a booth of Sauer's Extracts, another of Lowney's Chocolates, another of Pompeian Olive Oil, another of Minute Tapioca, another of G. Washington Coffee, and there were exhibits of Dromedary Dates and Cocoanut, White Frost Refrigerators, and Carnation Milk. Perhaps the most attractive booth here was that in which were made the Golden State Butter flowers, by the California Central Creameries. Here were baskets and bouquets of California blossoms moulded in the most appetizing yellow butter, and when the flowers happened to be butter-colored one could hardly distinguish them from the real but far less nutritious thing.

One of the memorable features of this Palace was the booth where the Quaker Oats Company made puffed rice. It will not be, however, for that very interesting and explosive process that the booth will be longest remembered, but for the hot buttered scones with thick and drippy raspberry jam inside that could be bought here for a nickle each. The noon rush at this corner was dangerous to life and limb. The scone business appeared to have good possibilities, for the Fisher Fouring Mills Company also served scones and attracted the same sort of throng.



THE MODEL FLOUR MILL



IN DAYS OF OLD

CHAPTER LIV

SALMON, CLAMS, AND WINE

THE exhibit of food fish by the State of Washington was little short of the marvelous for variety and interest. There were stuffed fish, varnished fish, fish in glass jars, fish alive in tanks, and still livelier fish climbing fish ladders. All the tanks were filled with flowing water at just the right temperature, and to prevent its getting too warm there was refrigerating machinery close at hand. There were 12 large aquarium tanks with varieties of grown salmon, and over 200 jars of commercial and game fish, oysters, clams, crabs, and other varieties.

Without entirely wearing out this typewriter the historian could not begin to list all the curious fish shown here, under one condition or another. There were, to mention a few, sculpins, lumpsuckers, goeducks or giant clams a foot and a half long, herring, grunt fish, Dungeness crabs, surf smelt, lampreys, cuttle-fish, pink shrimps, young sting-rays, and a sample of the abhorrent Octopus Punctalus, or devil fish, lent by L. H. Darwin, State Fish Commissioner and Chief Game Warden. The State put in and operated a small hatchery.

*Meet the
Octopus*

There was no more instructive exhibit in natural history in the whole Exposition than the early life story of the salmon, as told in the Washington Section by means of bottled specimens of eggs and young fish. These were shown on the plan of a bottle a day. The eggs in the 43rd bottle, representing the 43rd day, showed a white streak, on the 60th day the eye had appeared and the eggs could be shipped, at 90 days the fish hatched, and at 150 days they were fit to turn out.

And in four years they had been to their mysterious home in the broad ocean and returned to the place of their birth fit to be canned, and the machinery and organization were ready, reinforced by that almost human contrivance the "Iron Chink," which in the salmon canneries took the place of many Chinamen. This engine would handle salmon of any size from two to 20 pounds—would take off the head, tail, fins, and scales, and take out the insides and blood, and do it at the rate of 60 fish a minute. What was left went to an automatic weighing machine,

*More
than Human*

and thence into the cans, at a temperature of 200 degrees. With the air forced out, the cans were headed and soldered and the commodity was ready for the market. The whole process was one of the most remarkable examples of food preparation on a wholesale scale that the Exposition had to show; and one of the cleanliest. With this exhibit was a picture of the largest fish cannery in the world.

The "Iron Chink" was a product of the Smith Cannery Machinery Company of Seattle, and just for versatility the same concern turned out an automatic candy making machine, a sample of which was on exhibition. With the right prescription of sugar, water, and flavoring, the Electric Sanitary Candy Maker would produce in one operation five different kinds of after-dinner wafer, "untouched by the human hand." In fact, the disfavor into which the poor old human hand had fallen after having prepared our food for us so many years and done it fairly well was noteworthy and somewhat pathetic throughout the Palace of Food Products.

The Alaska Packers' Association, representing the Pacific Coast fishing industry, made an imposing demonstration of this source of the Nation's food supply. Among other things connected with the industry it exhibited a model fish cannery, fully equipped, and a great display of fish-taking devices. Dainty salmon sandwiches and salads were dispensed to throngs of visitors.

Entirely independent of the exhibit of the Alaska Packers' Association was the demonstration exhibit of the Association of Pacific Fisheries, but the Alaska Packers' took care of it and conducted it. Here were fine models of the fishing craft and apparatus whose product was the delicious canned salmon served to visitors by the Association.

There were some striking exhibits of refrigeration plants for the preservation of foods. One was the "Penguin," a small machine for household use, which introduced the possibility of home-made artificial ice. It could be attached to any ice box or put in the basement and connected with the ice chamber by pipes. It was operated by gas, and any plumber could set it up. It worked by alternately heating a sealed vessel of ammonia and then cooling it by means of water, and the smallest machine had a refrigeration power equal to the melting of 150 pounds of ice a day. It was estimated that it would cost, to operate, about half the cost of an equal amount of ice.

Another refrigeration plant, but for use on a commercial scale, was the Larsen Ice Machine, which was at work in the Palace making ice cream. This machine was operated by ammonia compression and expansion, at about $\frac{1}{3}$ the cost of brine freezing, it was claimed. In the dry-hardening

*Cold
to Order*

cabinet for ice cream, it was said to have attained a temperature of 58 degrees below zero, a world's record for mechanical refrigeration by the ammonia method. The ice cream sold on the grounds was made at this plant, which was operated by the National Ice Cream Company.

During the years just preceding the Exposition, remarkable progress had been made at packing foods in glass, and some of the latest steps of the process were shown by the Anchor Cap & Closure Company of Brooklyn, N. Y. Thousands of glass packages sealed under this company's methods were shown, the majority closed under vacuum. Improved capping machines were included in the exhibit. From 3,000 to 6,000 glass packages an hour could be sealed by some of these devices, and it was estimated that the capacity of canneries had been increased 30 per cent by their use.

*Sealing
Edibles*

Of importance in the domestic canning of fruits, vegetables, fish, and meats was the exhibit of the Kerr Glass Manufacturing Company of Sand Springs, Oklahoma. Its wide-mouthed economy jar was self-sealing, airtight, and sanitary. In addition, this company showed a new cap and band for use on jars of a different make, embracing all the desirable features of the self-sealing economy cap.

Despite all such devices, a Californian might have been pardoned some skepticism as to the possibility of catching, and confining in a tin can, the subtle ambrosial flavor of the *tamale*, of his native State, had not the demonstration been furnished by the exhibit of the Workman Packing Company, which served this delectable viand and its warm-hearted cousin the *enchiluda* at a handsomely decorated booth in the Palace. This was a San Francisco food-packing concern with a large model plant in the city, and a collection of *tamale* recipes second in value only to the burned library of Alexandria.

It is easy to fall into the habit of using the word "comprehensive" in characterizing an exhibit. Most exhibits aim to be comprehensive, and at the Panama-Pacific International Exposition a great many were, such as those of the United States Steel Corporation, the International Harvester Company and those of some of the participating nations and States. But there was no exhibit that deserved the adjective more than that of the California Viticultural Exhibit Association. It epitomized the whole wine industry of the State, as far as that could ever be done under a roof.

The setting and framing were in character, with an enclosure like a trellis of vines supported by columns formed of casks painted white, with gilt hoops. Everywhere were garlanded casks and clambering vines, and famous old California wineries reproduced in miniature, with pictures of the

juicy berry, and processed examples of fifty of the leading varieties of grape used in wine making in California. There was an information bureau conducted under the auspices of the State Board of Viticultural Commissioners, where visitors could obtain accurate information on every phase of grape growing and wine making.

The outer part of the space was devoted to small booths of contributing members supporting the exhibit: the California Wine Association, C. Schilling & Company, the Italian Vineyard Company, A. Mattei, Beringer Brothers, the C. Krug Winery, F. Salmina & Company, the To Kalon Vineyard Company, B. Arnhold & Company, the Cresta Blanca Wine Company, the Theodore Gier Wine Company, William Hoelscher & Company, *The Dear* F. Korbel & Brothers, Lachman & Jacobi, the Gundlach-Bund- *Dead Days* schu Wine Company, A. Finke's Widow, the French-American Wine Company, the Sacramento Valley Winery, the Italian-Swiss Colony; and there were interesting exhibits, along the wall of the interior chamber, by the A. Repsold Company, P. F. Flint, Louis Kunde, Grau & Werner, La Questa Vineyard, Chauche & Bon, the J. L. da Rosa Estate, William Wehner, the Mt. Hamilton Vineyard, and Dresel & Company.

In the center of the booth was a moving-picture theater in which more than 100,000 people during the Exposition saw the beautiful wine country of California, with all the scenes of cultivation and the vintage. The working plant of every important firm was shown. Champagne making and the interesting process of "disgorging" were depicted. Scenes from the Vintage Festival at St. Helena added variety. Champagne making was illustrated in detail. About 15,000 feet of film was projected here. The cost and upkeep of the exhibit ran over \$75,000. This is history—closed by the Eighteenth Amendment.

Notwithstanding all the opportunities of eating, free and pay, there was hardly a more popular booth in the Food Palace than that of the Rainier Brewery, and not because of any dispensation of product. Here a large crowd was always watching the gyrations of a pretty girl in a barrel. By *Barrel* pressure of her slipped toes on the inside of the staves she *of Girl* revolved at will in a vertical plane, her position changing through all the degrees of the azimuth circle. She was as much at home upside down as right side up, which was probably not meant to symbolize any effects of the beverage she advertised, but which did excite much wonder. The illusion was exposed on Closing Day. Product and girl are but a memory now.

The Food Palace housed not merely food, but some of the finished products of agriculture, among which was tobacco manufactured for con-



A CHINESE RESTAURANT



HAVANA'S CHOICEST

sumption. There were extensive exhibits of this product by such firms as M. A. Gunst & Company, and the Liggett & Myers Tobacco Company. The exhibit of the latter was especially large and contained some of the most widely advertised brands of cigarettes, smoking and chewing tobacco sold in this country. At least two San Francisco cigar factories put in working exhibits, the Petri Italian-American Cigar Company, and Frankel & Gerdts, producers of the Natividad brand. Both operated small plants where the public could have optical evidence of the cleanliness of the processes employed. The Alhambra Cigar and Cigarette Company of Manila, and Cuesta, Ray & Company of Tampa, were among the other important exhibitors in this field.

CHAPTER LV

FOODS OF THE NATIONS

CHINA in the Palace of Food Products will be remembered mainly for the attractive Chinese restaurant where many an Occidental visitor had his first introduction to chop suey and noodles, and such other delicacies as we have enumerated in the chapter dealing with the restaurants of the Exposition. In addition there were exhibits of typical Chinese foods, such as sharks' fins, canned bamboo shoots, pumelo peel, egg soy, duck egg yolks, sesame oil, edible sea weeds, glutinous rice, and quite a list of flours made from substances we need to know about but have not yet grown accustomed to using in that way—water-chestnut flour, soy-bean flour, lily-root flour, green-pea flour, and potato flour. Much of the Chinese food was in tins and bottles, enough to indicate that the art of preserving foods in this manner was being widely practiced and was growing into an important industry in China. In Chinese wines and brandies there was a large showing. In tea, of course, the exhibit was particularly strong, and the soothing commodity came in tins and bottles as well as in the more familiar lacquer and wood packages.

*Chinese
Cookery*

The Cuban booth in this Palace was an attractive composition consisting of an elevated kiosk rising from a balustraded terrace, to which broad stairs mounted. It was very helpful to the effective display of cigars and cigarettes, and some of the most expensive "smokes" ever rolled were on view. The exhibit however, did not stop with cigars, but included chocolates, candies, cakes, sugar, preserves, condiments, wines and cordials, starch, mineral waters, pineapple juice attractively bottled, and alcohol.

Argentine exhibited in the Food Palace the high quality of her flour, and its products in the form of pastes and biscuits. There was a strong showing of Argentine wines and brandies, of peach wines and of unfermented grape juice. Vermouth and aperatives figured largely. Cheese, condensed milk, and Pasteurized milk showed the development of dairying in the Argentine. The fine quality of Argentine preserved fruits was much in evidence, and there were good displays of tobacco, manufactured into cigars and cigarettes.

Exhibits from Great Britain, in the Food Palace, included the automatic

bakery we have mentioned above, Dewar's whiskey shown in a copy of the cottage of the Fair Maid of Perth, Lipton's Teas and Gordon's dry gin, Gillon's whiskey, and Burnett's gin and Belfast aerated waters, ginger ale, and similar products.

Greece had an attractive display of Athens cheeses, of canned vegetables, and of wines and brandies from the Piræus.

Holland showed not only manufactured products of the mother country, such as cigars and smoking tobacco, chocolates, canned goods, and biscuits, but a magnificent exhibit of the raw products of her colonies.

The foods of Japan were displayed in most attractive forms. The principal exhibits were the products of agriculture, and showed a great variety of rice and other cereals, besides soy beans, ginger, peanuts, red pepper, sugar, vermicelli, buckwheat noodles, and tea.

The last named commodity was presented as it grows, in a pretty little reproduction of a tea garden before a Japanese home, with Japanese maidens picking the tender leaves from the tea plants. The house was of bamboo, the tea pickers were in native silk costume and the artificial tea trees were so real you feared they might die for lack of water. This charming scene was set in the Palace by the Japanese Central Tea Association.

Japan also showed the food products of the sea and the forest. There were tinned salmon, shrimps, crabs, lobsters, sardines, cod, and fish paste. The export business in these commodities amounts to millions yearly. From the forests came canned and dried mushrooms, canned bamboo shoots, and chestnuts. Pains were taken to make the display as far as possible educational to the extent of showing the preparation of the finished commodity from the original raw material. Combined exhibits were encouraged like that of the shoyo sauce, in which case the exhibitors were from widely separated places so that the exhibits showed something of the field of production. The same was true of the exhibits of *saké*, the Japanese national beverage distilled or brewed from rice, and the green-tea exhibits, where those of the Japan Central Tea Association and of the Formosa Tea Trading Association were placed in proximity.

In the Italian section of the Palace of Food Products there was not much that was new to San Francisco with its well-established Italian colony and its Italian groceries and restaurants. One interesting display was a case of live olive nursery stock that had been "inoculated" at the roots and had made remarkable growth in a short time. There were ventilated hives, of interest to bee-keepers, and there was a large and appetizing showing of Lucca oil, sausages, canned honey, Roman cheeses, mineral waters,

Italian wines and brandies, canned citron, pastes, including an antidiabetic sort, chocolates and confectionery, bottled celery, snails and other comestibles. These displays came from Genoa, Florence, Milan, Turin, Marsala, Piemonte, Rome, Torre del Greco and some of the Umbrian towns.

Portugal had an exhibit of bottled goods, and of cork; with canned tunny, anchovies, sardines, and mackerel in olive oil and other fish in pignut oil. There were cheeses and other relishes, and preserved vegetables, and pickled swallows. There was real Port from Oporto, claret from cintra, white wines and sweet wines from the vicinity of Lisbon, and real madeira from Funchal.

New Zealand exhibited a fine list of animal food products—cheese, butter, refrigerated meats, canned meats. Some confectionery was shown and creditable honey. There were wheat and oat products, even to biscuits.

Spanish wines and mineral waters and perfumes were exhibited in this Palace, and there was a Spanish candy kitchen. Here pretty Spanish girls armed with atomizers filled the air with scent.

It is the writer's individual notion that while the food fed to the multitude was really exhibited, a large part of the exhibits in this Palace were not exhibits of food at all, but of the exteriors of tins, tubs, bottles, and other containers, and the labels upon them. People could not see through a salmon tin and examine the salmon inside; the tin might as well have been empty; and perhaps was. Even if it had been glass they could not have tasted nor even smelled the contents. The only way food can be exhibited is for the exhibitor to have the exhibitee eat it. Mr. Workman did it, with his *tamales*, and achieved a great advertising success, and so did the Sperry Flour Company; but too many exhibitors showed the label and stopped there. It may be objected that really to exhibit food costs money. It need not. A small price will restrain to proper moderation the bird-like propensity of the public to be fed by someone else, and at the same time will compensate the exhibitor for his outlay. How the charge should be made is a matter of detail for individual ingenuity to settle, but all sorts of prize and coupon dodges could be used as added attractions. When you think of it, there are few things more important than food, and it is well to spread all possible knowledge of it. The next exposition could and should improve on the exhibits of food products by inducing all the exhibitors to distribute samples, at a nominal price. The proof of the pudding is not the sack in which it was boiled, nor even the tin in which it may be shipped.



THE TEA PICKERS



ARGENTINA'S FOOD PRODUCTS EXHIBIT

CHAPTER LVI

UNCLE SAM'S FISH

HOW the United States Government protects the public's fish-food interests was illustrated by a large and most interesting series of exhibits installed in the Palace of Food Products by the Bureau of Fisheries of the Department of Commerce. This was a very extensive display with an expensive plant, for it included an aquarium with thirty glass-front tanks in which there were maintained about a hundred species of marine and freshwater fish; besides which, there was a salmon hatchery in operation.

There were fine opportunities here for studying piscatorial life, and also for finding out how to take the various fish displayed, for there was a grand exhibit of tackle: dry flies, split-bamboo rods, wading nets, gaffs, landing nets, harpoons, lances, whale guns. And there were models of fishing schooners, dories, and other craft of all imaginable sorts, back to the old-style Marblehead cod schooners. Here were models of the "Albatross" and the "Fish Hawk," operated by the Bureau of Fisheries. The latter vessel showed a floating hatchery. Both were equipped with all sorts of deep-sea-sounding and trawling rigs for research work in oceanography.

*For the
Fish Crop*

Of course the largest interest, or at least the interest of the largest numbers of people, attached to the living exhibits in the tanks. The tanks themselves were made of cobbles set in cement, and were backed up with a plant for supplying salt water at just the proper temperatures for the finny inhabitants of cold and of tropic seas. Some of the rocks used were fossiliferous formations from the Potomac Valley.

Many of the exhibits came in a United States fish-distributing car, which was hauled into the grounds over the Exposition's own railroad before Opening Day. All the important varieties of trout of United States waters, except the Golden Trout of Volcano Creek in California, were shown. There were rainbows, steelhead, eastern brook, Dolly Vardens, cut-throat, grayling—enough kinds in their appetizing beauty to excite the strongest passions of the angler. Here you saw the salmon in his majesty and in many species;

and flounders, sculpins, the leopard shark, the horn shark, the shovel-nose, the grouper, the sheep's head, the spiny lobster, the blue crab, the skate, and viviparous perch which bear their young already hatched instead of merely laying eggs like most of the other fish. There were yellow bass from the Great Lakes, crawfish from Oregon, bullheads, catfish, "channel cats" and others too numerous to mention. Some leopard sharks were born in the Exposition.

The fur and salmon industries of Alaska are under Government supervision, and there was an exhibit of Alaska furs, seal, otter, fox, and beaver. Some furs of the blue and of the silver fox exhibited here were worth from \$1,000 to \$1,200. Seal skins were shown partly plucked of the long hairs to get down to the fine fur underneath.

Models showed the sponge industry as it is operated at Anclote Key, Florida, with the artificial propagation of sponges illustrated.

The salmon hatchery showed the methods of hatching the eggs and caring for the fry until they were able to care for themselves.

The central feature here was an open and circular tank containing 14 different species of fish. There were four kinds of sturgeon, a valuable food fish individually, for a full-grown female weighing from 250 to 300 pounds will sometimes have a value of \$125, the caviar alone selling at \$1.50 a pound, green. Here were gar pike, suckers, carp, and two lazy young alligators that spent most of their time on a little raised table in the center. Other tanks showed turtles and terrapin.

One of the valuable special industries of the country, one that sprang up over night and enriched hundreds of people, was the mussel-shell button industry, developed notably, we believe, on the rivers of Illinois. It was long known that the mussels yielded pearls, and it was suddenly discovered that their shells would yield much wealth in another form. Special machinery was devised for cutting and turning buttons; and the process was exemplified in connection with the fisheries exhibit of the Government. Examples were shown of the trephined shells, with the cut-out button blanks, and the drilled and finished product.

The marine shell industry was also illustrated. A large pearl-oyster shell was diagrammed for cutting, and the yield was shown in buttons, marquetry work, fan handles, a razor handle, a parasol handle, a table-knife handle, jewelry, and decorations of musical instruments and opera glasses.

Oyster beds were represented as planted, so the public could see where the oyster comes from and how it is grown. The oyster's enemies, other than man, were on view: starfish and sundry borers.

*Wonders
of the Deep*

*Shell
Buttons*

There were some interesting products of the fishing industry, such as the various oils, including that delicacy of our childhood days extracted from the liver of the cod. There was whale oil, sperm oil, isinglass and commercial fertilizer, and there was the baleen of the bowhead whale.

Altogether, the fisheries exhibit was one of the most popular and instructive of the many United States exhibits.

CHAPTER LVII

THE DEPARTMENT OF HORTICULTURE

A MAN of ancient Athens once tried to sell a house by showing a brick from it as a sample. His "prospects" looked on it as a fair-to-middling brick, but it didn't tell them much about the house. They wanted to know whether the atrium opened right into the pluvium or if you had to go around; if there was a good enameled bath tub or just one of the old Saturday-night, zinc-lined kind; if the hired girl could run the furnace or if she would have to have the help of a colored brother, and a lot of other things no brick could answer. Some super-skeptics said the brick didn't prove he had a house anyhow—he might have dropped in at the brick yard on his way up to the Pnyx that morning.

Down to the time of the Panama-Pacific International Exposition, horticultural exhibits had been a good deal like that. They had been exhibits of fruit, not demonstrations of the industries of growing and marketing fruit; and they had not even been reliable examples of the fruit they sought to represent. Five perfect apples on a plate tell you little or nothing at all about the rest of the apples in the orchard. If you are a very logical sort of reasoner they don't even convince you of the existence of an orchard, for they might have grown on a single tree in a garden, amid extremely propitious conditions impossible or unprofitable to reproduce on a commercial scale. Such an exhibit shows nothing about horticulture in its economic aspects, commercially, as the servant of human wants, and hence it is a matter of very limited interest, and no public importance.

The Exposition resolved to get as far away from the five-on-a-plate style of exhibit as it could. It was not possible to avoid it altogether, for it had in its favor too much the approval of time, and the support of habit, and the disposition of people to imitate rather than innovate. But in spite of the presence of many five-on-a-plate exhibits, Chief Dennison made a remarkable showing of the modern methods of horticulture, and of the ways in which its products were made available for consumption.

Commercially packed fruits were given higher rating than the plate



UNDER THE DOME, PALACE OF HORTICULTURE

specimens, which resulted in large exhibits of horticultural products in commercial form—that is to say, for distribution and use—maintained throughout the season; and the Palace contained spray pumps, refrigeration plants, insect enemies of fruit pests, and a large scientific cannery in full operation, which in the course of the season developed an improved process and thus contributed directly to the effectiveness and value of the industry.

This was the first international exposition to set up a separate and an independent Department of Horticulture; whereby it not only added a very great attraction to its many other attractions, but contributed to the public much solid instruction about a vital industry. There had been other horticultural exhibits, plenty of them, but this was the first time horticulture had received such signal recognition as to be made the field of a whole Department.

The classification was amplified and given greater scope than had been the custom, so that it included not only fruits, nuts, and flowers, but the tools, appliances, and machinery necessary to exhibit the complete transformation of the product from the tree or nursery to the shape in which it is put into the hands of the ultimate consumer. Herein it was in line with the thought and life of the day, for just before the exposition there had been, in connection with that *immortelle* of American politics, the tariff, a great deal of intelligent discussion throughout the country as to just what it was that the ultimate consumer, in the language of the day, had handed to him.

*To the
Consumer*

The groups of the classification were: appliances and methods of pomology, floriculture, and arboriculture; appliances, and methods of viticulture; pomology; preserved, dried, and pickled fruits; fruit culture, trees, shrubs, ornamental plants and flowers; and seeds, bulbs, cuttings, and plants for propagating.

The Department had three distinct sections: the out-door exhibits in the Horticultural Gardens, occupying about 9½ acres; the Conservatory, under the great dome, and in adjoining rooms; and the Economical Horticulture Section in the rectangular area westward of the domed part of the building.

The Palace was one of the distinctively beautiful features of the grounds, a magnificent structure involving some clever engineering, and of an architectural style that was rare and delightful. Its great dome of steel and glass, 152 feet in diameter, rising to a height of 185 feet from the ground, was probably the only one of the sort that had ever been built in the world, at least on any such scale. Extending toward the west was a rectangular frame structure 300 feet wide and 340 feet long, in which the economic and commercial exhibits were installed. The cost of construction came to \$352,600.

The exterior architectural ornament was lavish and festive, taking the form of garlanded columns and spires and cornices, with moulded fruit and flowers in profusion, and trellises that suggested illimitable gardens. The Palace was the composition of Bakewell & Brown, architects of San Francisco's City Hall, and was extremely successful.

Just how to treat the area under the dome so that the huge void should not look meaningless and vacant was at first a puzzle, especially as some features designed by the Chief of the Department for that purpose had to be pruned out of the estimates, for economy. But Cuba, eager to show her appreciation of the aid of the United States in her difficulties a few years back, applied for the space, and came forward with 14 carloads of trees and plants that turned it into an emerald jungle of strange, giant vegetable forms never seen in this region. There were cocoanut trees, and Royal and Cocos palms, lifting tall shafts from which they stretched their fronds over a billowy sea of ferns and tropical lilies. There was the curious *myrcocyclus*, a tree-fern a thousand years old. There were bamboo palms, breadfruit and banana trees, mangoes, guanabano, dates in bearing, and the finest specimens of crotons with their broad, variegated leaves, ever shown in this country. These strange and exotic things, all living under the huge glass bubble, thriving vigorously, and exhaling a moist, earthy tropical scent, established the sylvan atmosphere of the Palace and gave it a haunting and fairy-like charm.

In this section was what was called a "balanced aquarium," one in which water plants replenished the oxygen for the rare gold fish it contained, so that it would take care of itself automatically and keep the fish well without a change of water.

Under small angle domes about the large one, were housed exhibits equally striking. One was the 30,000-dollar collection of orchids put in by MacRorie & McLaren of San Mateo County. The luxuriant blossoms were in great variety, and they proved a sad temptation, for they were quite exposed, and according to the watchman many of them at first found their way into the possession of ladies that probably had never appropriated anything wrongfully before. The pool was filled with the finest and most beautiful Japanese gold fish. A corresponding room under one of the small domes was full of ferns, about a broad pond, in which floated some extraordinary water lilies—*Victoria Regias* and *Nymphæas*. Another of the rooms under the angle domes was devoted to the exploitation, at a small charge for service, of Hawaiian pineapple and Kona coffee, and the fourth was filled with horticultural machinery.

CHAPTER LVIII

A GARDEN OF EXHIBITS

THOSE broad and beautiful gardens that were the delight of flower lovers from all parts of the world, the outdoor exhibits of the Department of Horticulture, stretched across the southern expanse of the Palace and beyond, eastwardly, including the section where the House of Hoo Hoo and the Redwood and White Pine Bungalows stood. They contained growing exhibits from Massachusetts, from Japan, from Holland, and embraced the plats for the International Rose Contest. A floricultural expert was in charge as superintendent: Mr. Carl Purdy, the California authority on bulbs. And the system of seasonal judging in floriculture was probably the best ever maintained by an exposition. From May 1 until Closing Day, Mr. H. Plath and Mr. E. James scored the garden exhibits weekly, having as additional judges in that time Mr. J. R. Fotheringham, Mrs. Myrtle Shepherd Francis and Mr. Charles W. Johnson.

The Holland exhibit, at the westerly end, not only occupied the north-and-south depth of the space, but ran along Administration Avenue for over 800 feet, except for a gap to give access to the westerly entrance to the Palace. These beds were said to have contained at one time some 60,000 flowering bulbs. The Inside Inn overlooked them from across the avenue, and to thousands of people they were one of the main beauty spots of the Exposition grounds. The exhibit here was made by the Horticultural Federation of The Netherlands, was planned by the horticultural architect, Versteeg, of Holland, and was under the supervision of Delegate Commissioner P. M. Koster, who had for his superintendent Mr. A. van Vliet.

The material was collected by the Federation so that it represented the best Holland had to offer. There were all the famous Dutch bulbs in their seasons, flowering shrubs and trees, and an excellent display of conifers and trained boxwoods. Tulips, azaleas, camelias, and hyacinths in rare perfection made it a field of beautiful color, and the closing display of tuberous begonias was the largest and finest ever made in America.

The Massachusetts garden contained the exhibits of the growers of that

Commonwealth, was designed by Mr. Stephen A. Childs and Mr. Carl Purdy, and was maintained by the Massachusetts Commission. The exhibits of dahlias and flowering perennials were especially noteworthy.

The California garden was of great beauty, and showed, during the entire season, blossoming exhibits of rare excellence and interest. The gladioli display of the Metzner Floral Company contained the finest specimens ever shown; the Gill Nursery Company's showing of roses and the conifers of the California Nursery Company were exceptional, and the dahlia display was unusually fine.

The exhibits of the eastern growers were excellent, particularly the display of gladioli by Mr. John L. Childs, Mr. Arthur Cowee, and the Vaughan Seed Store, and the roses of Mr. Charles H. Totty.

It was left for a California concern to carry off the palm, however, and at no exposition has one firm made such a continuously beautiful display, covering such a wide variety of bloom, as was made in the C. C. Morse & Company's space. This firm produced three gardens during the season, each covering its entire area. The Spring garden was devoted to the flowering bulbs, the Summer garden to flowering annuals and the Fall garden to perennials and late flowering annuals. From Opening Day to Closing Day it was a beauty spot of great credit to the Exposition.

*Gardens in
Succession*

The International Rose Contest excited much interest by reason of the \$1,000 prize offered. Entries of many new seedling roses, hitherto unexhibited, were made by Hugh Dickson, Ltd., of Belfast, Ireland; S. Bide and Son, Ltd., of Farnham, England; Dobbie & Son of Edinburgh, Scotland; E. Pernet-Ducher of Lyons, France; Peter Lambert of Trier, Germany; E. G. Hill of Richmond, Indiana; the Brant-Hentz Company of Madison, New Jersey; Howard & Smith of Los Angeles, California; and Samuel McGredy & Son of Portadown, Ireland.

The jury covered the entire season in its scoring, making its decision in favor of Hugh Dickson Ltd's No. 1596, on November 27th, the week before Closing Day. This was a yellow rose with a long and very perfect bud. A condition of the contest was that the winning rose should be named by the Directors, and Director Hellman suggested the name "Lillian Moore" in honor of the wife of the President of the Exposition, which was directly adopted.

In passing, it is a pleasure to make mention of the splendid exhibit of perennials and flowering annuals made by Sutton & Sons, and Kelway & Son, of England, and the display of German roses by Peter Lambert.

The wonders and the beauties of the Horticultural Gardens perhaps did



POND LILIES



ORCHIDS

not reach their highest efflorescence until about the time of the Dahlia Show in September. At this time of year the planted and growing dahlias made the gardens a more wondrous miracle of color than they had been at any previous time.

A few years before the Exposition, great interest had begun to center in the dahlia, because of the profitable tendency of the seedlings to vary from the parent plants and so yield new and strange forms. Wonderful variations from the old hard-boiled pompoms of our grandmothers had been produced, and there was a bewildering variety of "singles," and "doubles," and "collarettes," and "peony" and "cactus" and "decoration" and "show" dahlias, in every imaginable shade and combination; the curious names of the new kinds indicating the confusion of nomenclature certain to follow when every fancier can produce some new form of his own. Such experimentation had been carried to great lengths in the vicinity of San Francisco, where soil and climate made a combination peculiarly suitable to this Mexican plant. In addition to the local growers many eastern experts planted them, so that it was said by competent observers that the display of growing dahlias in the Horticultural Garden at the Exposition had never been excelled.

*Flaming
Dahlias*

The exhibits were not confined to the California beds. They were in the Massachusetts and eastern sections, for the production of new dahlias had been going on all over the country. R. & J. Farquhar of Boston showed 102 varieties, Forbes & Keith of New Bedford, over 214, E. F. Dwyer & Sons of East Lynne, 28, W. W. Wilmore, Jr., of Wheatridge, Colorado, 16. There were 82 in all from Denver growers. But the local growers came out in great strength and made some startling exhibits. The Vallance Nursery of Oakland put in 80 varieties, C. S. Quick of Berkeley 200. The J. H. Willey Bulb Company of Santa Cruz, the Bessie Boston Dahlia Farm at San Mateo, the Metzner Company of Mountain View, and Ruth C. Gleadell, A. Twitchett, and Carl Beckstadt of San Francisco, were some of the many that maintained dahlia beds and grew therein such floral wonders as the Sumatra, a red with ivory tipped petals, the Gloire de Paris, a gorgeous red show flower, the great, pale lavender Seduction Peony; or the Eckford Century, with its curious white petals striped and splotched with red.

One could wander for hours in this thicket of gorgeous bloom, more colorful than any tropical jungle ever found by the foot of man, without tiring of the infinite variety that had been developed and preserved by the persevering fanciers.

The Metzner Floral Company of Mountain View, California, exhibited, in addition to its extraordinary seedling dahlias, seedling gladioli, and seed-

ling petunias, of types not before publicly shown. These were in the California garden. There were also some fine petunias by the Theodosia B. Shepherd Company of Ventura, California.

The California Nursery Company of Niles, California, made a wonderful exhibit of conifers in 93 varieties. This is one of the great orchard stock nurseries of the State, and its exhibits attracted much attention.

Leonard Coates of Morganhill, California, exhibited 40 varieties of eucalyptus, and 26 of acacia. A fine display of iris was made by the foremost iris grower in America, Bertrand H. Far, of Wyomissing, Pa. He had 263 varieties. Prof. and Mrs. Cockerell of Boulder, Colorado, had bred some red sunflowers, of which some curious specimens were exhibited.

CHAPTER LIX

PRESERVING A NATION'S FOOD

PROGRESS is made when the crude and sketchy methods of the family kitchen have to give way to the precision of the modern factory.

But the reader's prompt disagreement with the writer on this subject indicates how badly the public needs education about it. One of the highest points of value in the whole Exposition was reached in the working cannery installed in the Palace of Horticulture by the National Cannery Association, and operated by its food scientists, Dr. and Mrs. A. W. Bitting, practical chemists, bacteriologists, microscopists.

It not only taught, it untaught; a most valuable educational process—there is so much known that isn't so. A lady stopped to watch Mrs. Bitting make jam. "Now," she remarked "you're skimming off the impurities, aren't you?" "No," said the bacteriologist, "I shouldn't call it so. Call it coagulated protoplasm. You'd eat it in the whole fruit."

The art of canning food is about 100 years old, and is one of the greatest blessings mankind ever bestowed on itself. That canned food should be under any unjust suspicion is a loss, direct or indirect, to everybody that eats.

One of the easiest explanations of gastric or enteric trouble is "ptomaine poisoning." Sometimes it grows into a regular fashion. It used to be ascribed in a large number of instances to canned fruit or vegetables. Such reports have been for a number of years followed up by the National Cannery Association, as far as they can be investigated by its agents, and the results of the investigations are that only one case of ptomaine poisoning has ever been discovered that might even plausibly have been attributed to canned vegetables, and no authenticated case has been found arising from canned fruit—and the solitary case ascribed after investigation to a canned vegetable was never verified, and remains a mere suspicion with the probabilities against it. Sometimes the trails led into queer places and revealed some strange medieval doings in families, doings that had often to be brought to the attention of the District Attorney. That is a bit beyond our present province, however.

*The Nimble
Ptomaine*

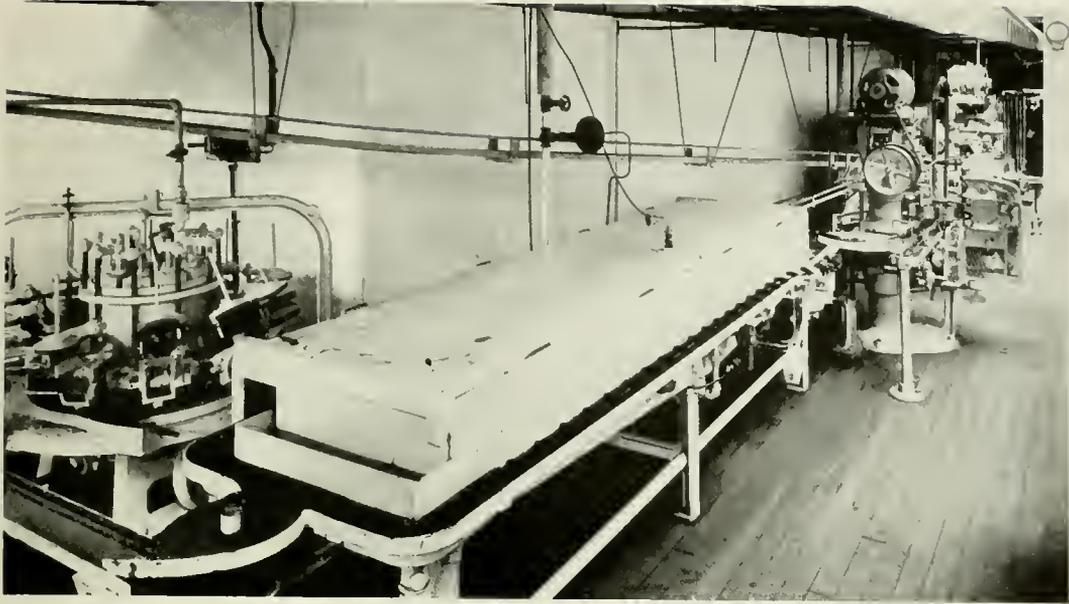
Lye peeling is supposed by some people to be a heinous device of greed. The peaches canned at this model cannery were all lye peeled, and the process was demonstrated to be, when properly applied, the cleanest and most wholesome and effective method of taking off the skin of the peach yet discovered.

The National Canners' Association, with headquarters at Washington, was in 1915 a comparatively recent organization of the progressive canners of all kinds of food throughout the United States. It represented the first effort to systematize the knowledge of canning. It endeavored to maintain among its members agreements on minimum standards of quality, to secure uniformity of pure food laws, and uniform factory sanitation. It maintained at Washington a bacteriological and chemical laboratory, which cost about \$30,000 to equip and a similar amount yearly to run, where tests of advanced processes are made and all the scientific problems of fruit preserving worked out as far as they can be. The results of this research are issued in bulletins from time to time so that the members may have the benefit of them.

When the Exposition developed, the National Canners' Association looked on it as a good opportunity to show the public through its experts how the best canneries are conducted, and what precautions are taken to produce ready and portable food, safely and economically and under better conditions than commonly prevail in the domestic kitchen. It was a departure; not a mere advertising stunt, because it was not undertaken by any particular cannery with a product to sell, but an effort to educate the public for the mutual and the common benefit. The complete process of handling and canning fresh fruit by the most improved sanitary methods was shown to the public daily. The loose fruit was received direct from the orchard, and the latest types of machine were employed in reducing it to the canned commodity, to be nailed up in the latest fashion of wire-bound packing case—a style of case that took only half the lumber in the old-fashioned box and so helped conserve the forests and the freight.

The public could advise here with the foremost authorities on the subject in the United States; and it could help itself to publications; bulletins with such pertinent titles as these: "Preliminary Bulletin on Canning"; "Methods Followed in the Commercial Canning of Foods"; "A Revolution in the Kitchen"; "Some Safety Measures in Canning Factories"; "Some Hints on Factory Sanitation"; "Tomato Pulp"; "Principles of Cost"; "Swells and Springers."

One or two things were found out by the experts in charge. One was



A MODEL CANNERY



HOLLAND BULBS

that it is not so much the bruise on the fruit that makes trouble, but the use of infected lug boxes in the orchard. Another was the improvement in the lye peeling process mentioned above; that promised to save California canners at least \$15,000 a year, only one eighth the lye commonly used being necessary.

The American Can Company contributed the cans for this exhibit, and the discerning visitor observed that the old style hole-and-cap can with a soldered edge wiped with hydrochloric acid had disappeared. In its place was a can with the entire top open to admit the whole fruit, a can that could more easily be washed clean. The tops were crimped on by machinery, to which the cans were carried in procession on long conveyer belts. This was but one of the machines at work giving clean and uniform results in the factory. There was a machine for grading the filled cans by weight, the "heavies" being thrown to one side, the "lights" to the other, while the "rights" went straight; a recent development that had not yet been used for fruit, but was in use for canned salmon. There was a syruping machine that measured the right quantity of sugar by a sacchymeter. There were conveyors to take the filled but still open cans to the steam box where the air was driven out of them by the heat. After the tops were crimped on, the cans went to a big chest where they were cooked, and there was a cooler to stop the cooking before the syrup should go brown. These shifts were made almost entirely by conveyer belts.

*Styles
in Cans*

Organisms in the fruit were easy to kill, but vegetables and meats had to go above the boiling temperature in a big retort. There was a row of open, pressure, and vacuum kettles for determining exactly the best temperature for jams and jellies. Everything was reduced to definite time and quantity; tasting and guessing and doing things by handfuls had no place here.

The Anderson-Barngrover Company, of San José, California, installed a most comprehensive working exhibit of cannery machinery, showing lye peach peelers, scalders, fruit slicers, peeled fruit graders, exhaust boxes for expelling air by heat before sealing cans, syruping machines, cooking kettles, pulping machines, tomato sorters, washers and scalders, cookers and coolers, prune dippers, even cap markers. There was machinery here for every imaginable service about a cannery—all sorts of conveyer belts and sanitary tables for handling the material and the product. This company owned patents on almost all its machinery, which had developed in California to meet typical California conditions.

CHAPTER LX

THE FULLNESS OF EARTH

CUBA did not stop with her exhibit under the dome. The tropical luxuriance of what Columbus called "the most beautiful isle that human eyes ever beheld" was exhibited in profusion in her attractive booth of terraces, stairways, and travertine balustrading at the western end of the Palace. Fruits, vegetables, and flowers were displayed in the handsomest forms, "processed" in glass jars that set them off to the best advantage. The avocados or "alligator pears," were exceptionally large; gigantic would be the justifiable adjective. So were the chirimoyas, and there were very large plantains and bananas; but potatoes, peanuts, and lima beans apparently had not found so congenial an environment. The pomegranates shown were not so large as they grow in Italy and California. On the other hand there were sweet limes almost the size of oranges, and the sugar cane was of exceptional diameter. The grape fruit and oranges exhibited were not extraordinary, but the showing of tropical fruits was bewildering in its abundance and variety, and much of it most interesting in the improved differentiation it showed from its kindred elsewhere.

*Cuban
Productivity*

The processed flowers were quite wonderful. There was the blossom of the sago palm and of the Royal palm, the rare and beautiful *Flor de Majagua*, and wild roses that were double and full like some fine cultivated variety. In fruits and vegetables there were the *icaco*, tapioca or manioc root, looking like small parsnips; red and yellow mamey, malanga, dates, breadfruit, mangoes, guayaba and dozens more, too many to name.

Worked out with all the native Japanese fidelity to detail was a large diorama illustrating the Japanese mandarin orange industry, one that had a value at this time approximating \$5,000,000 yearly. The scenery showed terraced hills overlooking a broad bay, dominated by the sacred mountain, Fujiyama. The terraces were set thick with orange trees apparently in the highest state of cultivation and thrift. The foreground contained lay figures packing the fruit, oranges from Wakayama-Ken, Shidzuoka-Ken, and Kanagawa-Ken Provinces. There

*Japanese
Oranges*

were dried persimmons, beans, and seeds, and the whole exhibit was handsome and effective. Overhead were three pictures showing the Satsuma orange market, the Horticultural Department Imperial Agricultural Experiment Station at Okitsu, and the process of fumigating Satsuma orange trees with hydrocyanic acid gas to kill pests.

In the Horticultural Gardens, Japan achieved some quite remarkable things, as well as in the Palace of Horticulture and in the gardens of her pavilion. Dwarfed trees shown by the Yokohama Nursery Company gave many visitors a new idea of the exquisitely decorative quality of these creations. The varieties of bamboo were most interesting.

First among the State exhibits in the Palace of Horticulture, came Oregon's big Spitzenberg apple, cut open to disclose a beautiful diorama painted and built inside. Here you saw the Hood River Valley, completely settled now, though but a few years ago you could have had a homestead there from the Government. It was a magnificent spread of apple orchards where they produce world-renowned fruit. In the foreground was the Columbia River; in the background, dominating the scene, the inspiring elevations of Mt. Hood. The apple was eight or ten feet in height, its outside a fine Spitzenberg red, its excavated inner walls showing pulpy and juicy as though you could smell the cider oozing from them. This booth contained many exhibits of superior fruit, among them one of *beurre bosc* pears, remarkable in their excellence.

*Oregon's
Big Apple*

Walla Walla, Washington, also had a large, open apple, not quite so large as the Oregon colossus, but still some apple, with fruit inside. Washington made a fine showing in onions and potatoes, and the State College of Agriculture put in an exhibit of insect pests that was of much practical value to the orchardist. The Wenatchee and Okanogan districts, North Yakima and Spokane, made attractive exhibits of apples and grapes.

Utah showed apples, pears, peaches, and plums, some of them very beautiful specimens, and processed fruits that would be hard to beat in California. There were canned goods and honey of fine quality.

New York took great pains and went to much expense to make a creditable pomological exhibit, and in spite of distance from the source it succeeded admirably. The apple industry in New York is tremendous in extent, the product is of fine quality, and the showing in the Palace of Horticulture could hardly have been improved. A colonial pergola was erected, and wreathed with trailing vines as a frame-work, and two large refrigerator cases, each 20 feet long and 13 feet high, with double plate glass fronts, were put in. The exhibit was maintained throughout the Exposition and the temperature was kept in these cases between 36 and 40

degrees for some 300 days. In one case there were 68 boxes of apples four tiers high, and in the other 40 barrel ends, half of them showing face ends and half showing the tail or press ends. In the front of each case were canned and glassed fruits. A show case before the booth contained large fancy baskets of most perfect apples. There were seasonal changes in the fruit exhibited, but by October it was almost all fruit of 1915, with a little of the best of 1914 retained because it was in such good condition. Visitors were generally surprised to learn what an apple State New York was, contributing about a fifth of the apple production of the Union. The Rhode Island Greening, the Pumpkin Sweet, and the McIntosh figured importantly.

In addition to the New York pomological exhibit, the Burt Olney Canning Company of Oneida and Albion, N. Y., showed attractive bottles of catsup, and tinned and glassed vegetables and fruits.

One of the most striking apple exhibits of the Exposition, in fact the largest and finest shown, was that of Montana. It consisted of a large inclined slope of apples in 210 boxes, so arranged as to show two American flags with their pikes crossed in the center, the whole surrounded on four sides by mirrors, so that when you looked in either direction you saw the scene indefinitely multiplied, and a field of boxed apples spreading before you sufficient for an army. And the real ones were very fine and fragrant fruit, some of the most attractive in appearance in the whole Palace. With them were melons, peaches, plums, and pears in jars and otherwise preserved.

Idaho had a King David apple tree that at five years produced 1,540 apples or five boxes, and being thoroughly and properly proud of such precocity, where precocity means dollars and cents and early independence for the man that owns enough of it, Idaho exhibited some of these apples, inasmuch as she could not move the tree. There were about 15 varieties of apple shown, and fine exhibits of Hungarian, Italian, and silver prunes. Idaho's exhibits of processed fruits, particularly her canned prunes, were especially fine.

Arkansas specialized in her horticultural exhibit, featuring apples that had originated in that State, such as the Arkansas Black, the black Ben Davis, the Champion, the Senator, and the Mammoth Black Twig. Many of these blacks were related, the Black Twig being a seedling from the Winesap, and the Arkansas Black from the Black Twig. Arkansas showed the largest pear on exhibition in the Palace, a Kiefer weighing 30 ounces. She also made a good showing of spraying apparatus, fruit shipping packages, cartons, folding crates, frost-fighting heaters, and insecticides.



IDAHO FRUITS



AN OREGON APPLE

Missouri made a mound of processed fruits in jars and an extensive plate display of perfect pomological specimens. There were crates showing the box pack, and barrels showing the method of facing for shipment. In a corner of the space was an apple tree with a hill of fruit awaiting the packers. Large signs overhead indicated the advantages of buying lands for fruit-growing in Missouri. The installation of this exhibit was handsome and impressive.

Hawaii, in addition to the demonstration of the easy edibility of the pineapple, conducted in a restaurant devoted largely to that fruit and to Kona coffee, made a beautiful display of hibiscus, the hedge plant with the glowing scarlet flower.

CHAPTER LXI

A HORTICULTURAL STATE

CALIFORNIA, represented in the multiform exhibits of twenty-eight counties extending from Siskiyou to San Diego, occupied the largest exhibit space in the Palace of Horticulture. This space contained 10,340 square feet and was packed with the most interesting diversity, not merely of products but of horticultural ideas, ever brought together in one building. The enclosure was under green lattice, supported by green latticed columns, suggestive of trellised gardens; airy, and quite beautiful.

Of Mrs. Ehmann and her ripe olive curing there is some account below. That was an idea on which an industry was built and is still building. Besides the various olive exhibits there were Deglet Noor date trees, the pride of Arabian deserts, sprouted in California where their presence was the result of radical ideas and bold experimentation. There were dates from the Coachella Valley of Riverside County, from trees that had been planted as late as 1900, dates that contained from fifty-four to seventy per cent sugar and so would keep without processing. They represented a comparatively new, and growing, departure in California fruit raising. And then there was the exhibit of the State Commission of Horticulture, and of Luther Burbank, remodeler of organic forms.

The orchards of California are probably better protected from importations of pests than any in the world. But eternal vigilance has been necessary to keep out infected fruits that travelers sought to bring in: "just a few to eat." The nature and necessity of the quarantine were illustrated by the Commission, by means of pests in bottles, "taken alive, and material destroyed at quarantine." One specimen, perforated with maggots whose progeny would have paralleled the destructiveness of the 17-year locust, bore the announcement, "An official inspection certificate covered this shipment." There were eggs of the gypsy moth, the tree pest of Massachusetts, which costs that Commonwealth millions of dollars a year. Many others, such as the white fly and the Mediterranean fruit fly, were shown by pictures, and mounted under lenses, so that they might be identified and recognized.

There were also specimens of pest destroyers: the mealy-bug destroyer

from Australia for example, *Cryptolæmus montrouzierii*—and *Vedalia cardinalis* that eats the cottony cushion scale. The researches and travels of agents of the Commission, on the hunt for pest destroyers once this method of fighting had been adopted, would fill a book, and it would be a book of absorbing interest. But right at home was a friend of the melon planter, glad to serve as the devourer of the little green aphid that spoils the Rocky Ford cantaloupe vines in the Imperial Valley. This is *Hippodamia convergens*, the little red ladybird beetle that hatches out in myriad swarms along the edge of the receding snow in the high Sierra of California. A large cubical glass case, open at the top except for a wire screen, contained thousands of these ladybirds, living, and a card told the public that "This beetle forms the basis of the largest experiment in the transportation of beneficial insects in the world's history. During the past season the California State Insectary collected, sorted, and redistributed over 75,000,000 of these friendly insects." In calling them "friendly" we probably ascribe to them a sentiment they do not keenly feel, but as long as their appetite for the aphid continues they will be shoveled out of the snows by the millions and invited to the feast. California showed the world the advisability and practicability of this strategic use of organic pest destroyers, and this exhibit of predacious insects and their beneficial uses was the most complete and instructive ever made. It was intently and intensively studied by thousands of visiting horticulturists.

*Pestering
the Pests*

The central booth in the California enclosure was, appropriately, Luther Burbank's. Here were exhibits of his rainbow corn, his spineless cactus, many varieties of improved deciduous tree, a venture in grain known as "thread wheat," beardless barley in a jar, the Standard prune, a new loquat, and a new artichoke, the Santa Rosa plum, cactus fruit, a transparency picture of the crimson winter rhubarb, thornless blackberries, a giant sweet pepper. These were but a few among the edibles. Among the improved flowering plants that had added beauty to the world was a new *Watsonia*, ready for distribution for the first time this year. Transparencies showed the blossoms of some of the most wonderful of the late Burbank creations. In this way you saw the size and color of the double-fluted Shasta daisy, the Corona rose, in clusters, the long-season sweet pea, the giant zinnia, the giant variegated amaryllis, and wonderful gladioli.

*Burbank
Products*

The persistent person that taught the world to eat ripe olives, and thus conferred a new sort of food on at least a part of mankind, was at her own booth in the California Section of the Palace of Horticulture; the woman originator of an industry, Mrs. Freda Ehmann, of Oroville, California. A

great horticultural authority once said that the Spaniards were unable to pickle ripe olives successfully, so they taught the world to eat them green. As the world had plenty of green olives, Mrs. Ehmann began to pickle them ripe, in some barrels under a back porch in East Oakland, and she saw that if she was to break that old Spanish green olive habit she must make a product superlatively good and teach people to eat it. She did. It is. They do. She put the big, black, leathery, rich-savored fruit, vegetable, salad, or whatever it is, on the tables of the finest hotels in the world, beginning with the Palace Hotel in San Francisco and the Bellevue-Stratford in Philadelphia, and they are customers yet. She organized the Ehmann Olive Company, and at Oroville, the center of the olive growing territory of California, 126 miles north of San Francisco and a region of early ripening oranges, began the development of an immense pickling and canning plant, and the acquisition of grove after grove to supply it.

The back porch enterprise in East Oakland began about 1896. Mrs. Ehmann took her first samples east in 1897. By 1910 she was shipping olives to London, to Java, to Constantinople, all over the earth. Thousands of California acres went into olives; and there was a profitable outlet for the fruit, instead of the narrow and restricted one that in the late nineties had been tempting many growers to grub out their trees.

At the Ehmann olive booth in the California Section of the Palace of Horticulture, Mrs. Ehmann held a sort of season-long reception. Leading horticulturists were glad to call and do her honor. It was said that she still personally superintended every vat of pickle when she was at Oroville—although that was a great many vats. She declared the main secret of quality was to pickle olives that were really ripe, not green ones that had to be dyed ripe. Certainly her great success must have had some such solid foundation.

Some of the special exhibits of the counties in the California section were worth noting, although it is obviously impossible to mention them all, they were so numerous and of such varied excellence. From the southern California counties came such examples of productive versatility as the varnish nut, St. John's bread, pomegranates, the sapota, and the tree tomato, as well as limes, lemons, and grapefruit. Kern County had a tremendously diversified exhibit. Sonoma County showed great walnuts, Jefferson plums, sugar plums, and dried apples of superlative quality. Orange County sent up some seedless seedling avocados or alligator pears, and feijoas, a small green fruit new to the State. From Placer County came Kelsey Japan plums, prunes, and Bartlett and Vicar of Wakefield pears, of most perfect development; while Alameda County,

*Fruit
and Flowers*



FOUNTAIN AND PALACE

across the Bay from San Francisco, showed processed blossoms of the night-blooming cereus, some of the finest varieties of almonds and walnuts known, and a profusion of improved cherries, plums, and processed flowers.

Among the other valuable features of the California Section were the strawberries of Albert Etter of Briceland, Humboldt County, California. Etter had made a study of the soul and vital essence of the American shortcake for twenty-six years and had produced so many varieties the writer can't believe his own notes on the subject. But among them was one that was especially drought-resistant, with broad, thick, leathery, high foliage, fruiting well off the ground. Another species had been produced by a cross of two useless wild varieties, resulting in a meatier fruit with a pungent, woody flavor, a fruit which, steaming from between two broad, hot slabs of butter-soaked biscuit dough, would make the average American family forget the mortgage and all the world besides. Etter succeeded in producing an almost evergreen strawberry plant. He tried for hardiness, and he developed some species that were most prolific. No such strawberries as he exhibited had ever been known before. He also showed some hybrid columbines of great interest, although of no account for shortcake.

The twenty-eight counties exhibiting in the California enclosure were: Alameda, Los Angeles, San Bernardino, San Diego, Riverside, Orange, Imperial, Ventura, Kern, Monterey, Placer, San Mateo, Santa Clara, Siskiyou, Solano, Sonoma, Sutter, Tulare, Yolo, Napa, Fresno, Merced, Madera, Calaveras, Kings, Mariposa, Stanislaus, San Joaquin.

Castle Brothers, of San Francisco, put in a dried fruit exhibit that showed a wonderful perfection in this commodity. Pears, figs, peaches, apricots, prunes, and even the democratic dried apple looked like boxes of confectionery. As soon as any of it darkened from exposure to light it was replaced, so the exhibit was always fresh, and the fruit looked almost so.

The Winters Dried Fruit Company had a corner devoted to packed fruit and nuts, the best product of Yolo County. There were some fine Jordan almonds, and black figs in packages.

The California Fruit Cannery Association made a striking exhibition of cans and glass jars of the best California product. The apricots and pears in glass were very fine and perfect. This concern issued a readable and instructive pamphlet on fruit canning.

Hunt Brothers, of San Francisco, with their main cannery at Hayward, made some very fine jar exhibits, and showed their well-known brands of canned fruits and vegetables. They had a handsome booth with a small moving-picture adjunct.

There was a grand display of the Sylmar brands of ripe olives and olive

oil, installed by the Los Angeles Olive Growers' Association. The product came in part from what was said to be the largest olive grove in the world under one management, a tract of 2,000 acres with some 100,000 trees on it, about twenty-five miles from Los Angeles.

Floral calendars have been done before and often. They are beautiful but not edible and the enthusiasm they arouse is rather æsthetic than gastric. C. C. Morse & Company, of San Francisco, maintained in the Palace throughout the Exposition season a commercial exhibit of seeds and products that might have served as a vegetable calendar. If you were a good table gardener you might have told the time of the year by the products on display. There were 82 varieties of lettuce and 40 of corn. There were 21 varieties of cucumber, each variety in condition for slicing, for pickling, and for ripe preserving. There were 26 varieties of muskmelon, 44 of onion, making one of the greatest onion exhibits ever seen, 36 varieties of tomato, 24 of beet, 22 of squash, 36 of bean, in pods and dried. There were eight changes of the material, and every time the scene was set in the best of exhibit style. The show finished strong in October with a regular harvest home spectacle of squashes and pumpkins of the most gorgeous green and golden color.

There was a large exhibit of seeds by Sutton & Sons of Reading, England, accompanied by models of vegetables and pictures of flowers.

Mrs. E. A. Wright of Oakland conducted a model jam kitchen where the best available preserving processes produced appetizing results. The Pacific Coast Syrup Company of San Francisco demonstrated preserving processes.

The Stewart Fruit Company, operating some thirty packing plants in various parts of the State, established a fruit packing plant where it showed the improved methods of grading, cleaning, packing, and stamping fruit.

CHAPTER LXII

ORCHARD MACHINERY

MOST of the agricultural machinery was either in the Palace of Agriculture or the Palace of Machinery, but the spray pump was peculiarly a horticultural aid, and so its representatives were exhibited in that Department. The previous ten years had revolutionized the methods of combating orchard pests, and the most improved power and hand spraying implements with insecticides and washes were shown by several manufacturers.

Indeed, pest fighting had reached such a stage of effectiveness that it might have been called antiseptic agriculture. Like clean culture in orchards, these practices had crept East, and had been applied widely, until we find in a bulletin of the Maine Agricultural Experiment Station that one energetic sprayer had obtained 420 bushels of potatoes from a measured acre, with no decay in storage, on account of six double *Medicating Potatoes* sprayings, while the produce of fields in the vicinity where no spraying had been done was showing from 25 to 75 per cent of rot. Spraying had been found to be applicable and profitable in undreamed-of ways.

The Field Force Pump Company of Elmira, New York, exhibited a 400-gallon tank with a ten-horse-power gasoline engine. It had traction sprayers for beans and potatoes, all sorts of portable hand pumps for low-growing vines and small trees, knapsack sprayers and barrel sprayers and sprayers that traveled on two wheels like a pushcart.

The Bean Spray Pump Company of San José, California, showed some remarkable developments in the spraying machinery line, with internal combustion engines and centrifugal pumps. It showed a pump for the small orchard, giving high pressure by hand; and large horse-drawn pumps for major operations, with which you could spray orchards or forest trees or whitewash a barn.

Many of the spray pumps in use operated under heavy pressures. The Air Tight Steel Tank Company of Pittsburgh entered its "Atsco" sprayer, which worked under far lighter pressure than the ordinary pump, and atomized the liquid at the nozzle. This was claimed to be an improvement,

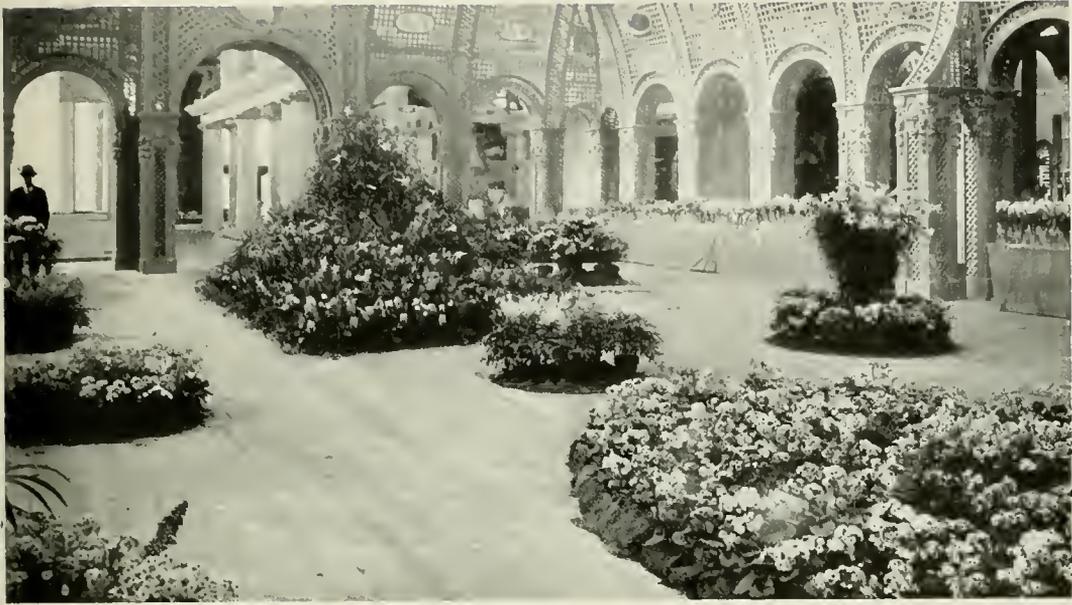
inasmuch as the fine, light mist produced by it was supposed to drift all about and stay where it struck, so that there were no "holidays," as a sailor would say, a sort of non-missing mist. C. Solomon, Jr., the San Francisco importer, was the local agent and exhibitor, and he made the booth very handsome, with a trellis hung with Japanese paper wistaria, and a back drop depicting the use of the spray in a beautiful California orchard amid typical California scenery.

One of the great American outdoor sports is pushing the lawn mower. The mower that started it, the first one made in America, was on exhibition, in the booth of the Caldwell Lawn Mower Company, of Newburgh, New York. It made one think how fine life must have been for thousands of American householders before it was invented, and how much better the cities of this country have looked since.

Here again the horse looked forth on signs of emancipation—and perhaps of extinction. The horse-drawn lawn mower was giving place to one propelled by a motor and guided by a man walking behind it, and there were larger motor mowers for parks and golf courses. All had demountable cutters, that could easily be taken out and ground.

Many of the exhibits in the Palace of Horticulture depended on refrigeration to keep them in condition throughout the season, and that refrigeration was supplied by an automatic machine installed by the Automatic Refrigerating Company of Hartford, Connecticut. The system of absorption of heat by anhydrous ammonia, and condensation afterward, was operated by motors, which in turn were under the control of a thermostat so that steady temperatures were assured no matter what might be the factor of human frailty on the part of the man in charge. In the Exposition year such systems were being applied to apartment houses, hotels, and individual residences.

An exhibit that everybody liked to watch at work was the grading machine of the Price Fruit Sizer of North Yakima, Washington. Instead of passing fruit through holes of various sizes, this machine worked by momentum, and so graded according to weight, tossing wooden apples by a sort of miniature catapult into canvas pockets at various distances. Inasmuch as the impulse was uniform the lightest apples went the farthest; and the precision of the machine, doing it over and over again with all sizes of fruit, seemed miraculous. It dropped the same wooden ball into the same pocket every time, and the pockets were not large. They were of course devised in such shape as to prevent bruising, and the machine could toss eggs a dozen feet without breaking them. Twenty-six of these contrivances were sold to Watsonville packing houses before the Exposition was over.



THE SPRING FLOWER SHOW



THE CALIFORNIA SECTION

CHAPTER LXIII

HORTICULTURAL OCCASIONS AND EVENTS

THE special features of the Department of Horticulture covered a wide field of activity and added many attractive Special Day Events to the Exposition. They were as follows: Spring Flower Show, March 19, 20, 21; May Flower Show, May 7, 8, 9; Sweet Pea Show, June 11 and 12; Dahlia Show, September 18 and 19; Fall Flower Show, October 21 to 26; Horticulture Day, October 21; Apple Contest, November 6 to December 4; Winter Shrub and Berry Show, November 24 to December 4.

The Spring Flower Show, March 19, 20, and 21, was held in conjunction with the Pacific Coast Horticultural Society. The display of cut flowers and flowering shrubs and bulbs grown in flats was distinctive, comprehensive, and beautiful, and a large attendance attested its success. It was held in the central part of the building, and presented a magnificent display of Darwin tulips, violets, rhododendrons, hyacinths, narcissus, daffodils, freesias, ranunculus, hydrangeas, and Easter lilies. There were good prizes for the bulbous plants, and gold, silver, and bronze medals as well as diplomas offered in some of the contests. On the second day there was a show of table decorations and on the third one of bridal bouquets. These introduced very beautiful features.

*Gorgeous
Bloom*

The May Flower Show was conducted in conjunction with the California State Floral Society and the Alameda County Floral Society, and the displays of roses and herbaceous peonies, and of iris and other garden flowers, were large and fine. The exhibit of wild flowers, under direction of Miss Charlotte Williams, including California's wonderful poppies, was unusually interesting and comprehensive. All the shrubs that flower in May in this vicinity were represented. Over 400 varieties of outdoor roses were shown.

The Sweet Pea Exhibition, held under the auspices of the American Sweet Pea Society, brought out what was said to be the largest single exhibit of this blossom ever seen in America: that of C. C. Morse & Company of San Francisco. It contained 135 varieties, and showed the evolution of the sweet pea, from its lowly beginning in 1837 on a little six-inch stem, down to the royal specimens produced in 1915, on stems twenty-six inches long

with five flowers on each one. The National Sweet Pea Society of Great Britain participated in the event by conferring its medals as awards, and prizes were donated from all parts of the United States. The latest creation, the Fiery Cross, was shown publicly for the first time in this country by W. Atlee Burpee of Philadelphia. It was first announced that this show would be held on the 4th of June but on account of inclement weather it was postponed to June 11 and 12.

The Dahlia Show came along on September 18 and 19 and was held by the Exposition in conjunction with the California State Floral Society and the Alameda Floral Society. This was the most colorful of all the shows and certainly drew a record attendance. One grower, Mr. T. A. Burns, put in more than 1,000 varieties of cut dahlia. The color-mad crowds were suffocating in their density and had to be put out of the building at 10:15 at night almost by force.

But the shows kept getting better and better, and the attendance larger and larger; and the most enjoyable occasion, with the largest attendance, was the Grand National Fall Flower Show on October 21 to 26. It was held in conjunction with the Pacific Coast Horticultural Society and the Chrysanthemum Society of America. There was a magnificent display of chrysanthemums, in great variety. The showing of ferns was very fine and luxuriant, while J. A. Carbone of Berkeley put in eighty of the most curious and gorgeous kinds of orchid. October 21 was Horticulture Day, and the Exposition attendance exceeded 92,000.

Finally these occasions closed with the first Winter Shrub and Berry Show ever held in the country. It was arranged in conjunction with the California State Floral Society and the Alameda County Floral Society, and was one of the most interesting and beautiful of the whole series of special horticultural events. There was no schedule of awards, but the exhibits were of the highest quality and utmost interest in their respective classes. The show opened on the 24th of November and ran until the end of the Exposition season.

Commencing November 6, and continuing until the close of the Exposition, Oregon, Washington, Idaho, California, and Arkansas engaged in a five-box sweepstakes apple contest, which was won by Fred Conklin of Brewster, Washington, on five boxes of Winesaps.

The system of seasonal judging in floriculture was probably the best ever maintained by an Exposition. From May 1 until Closing Day, Mr. H. Plath and Mr. E. James scored the garden exhibits weekly, having as additional jurors in that time Mr. J. R. Fotheringham, Mrs. Myrtle Shepherd Francis, and Mr. Charles W. Johnson. The six special flower shows were

greatly assisted by the Pacific Coast Horticultural Society, the California State Floral Society, and the Alameda County Floral Society, the American Sweet Pea Society, and the American Chrysanthemum Society, and such individuals representing them as Mrs. John A. Scannavino, Mrs. Richard H. Grey, and Mr. F. G. Cuthbertson; while effective jury service was rendered by Mrs. Herman Rosse of Palo Alto, and Mrs. M. S. Francis of Ventura, in addition to many others named below.

At the Spring Flower Show, prizes were taken in Class A, by Ferrari Bros., for flowering bulbs in pots, and for pink, yellow, red, red and yellow, double pink, and double yellow tulips; by the San Mateo County Commission, second, and by Pelicano, Rossi & Co., third, for flowering bulbs in pots; for Easter lilies in pots, by Domoto Bros.; for lilies of the valley, by Ferrari Bros.; by Schwerin Bros., first prize, and E. James, second prize, for rhododendrons; by Ferrari Bros., first prize, and Schwerin Bros., second prize, for azaleas; by E. James, first prize, and Ferrari Bros., second prize, for roses in pots; by E. James, first prize, and H. Plath, second prize, for spiræas; by E. James, first prize, and H. Plath, second prize, for the best collection of *Primula obconica*; by the Hillsborough Nurseries, first prize, and E. James, second prize, for the best twelve *Primula obconica*; by Domoto Bros., first prize, and E. James, second prize, for hydrangeas; and by I. W. Hellman, Jr., first prize for cinerarias.

*Spring
Prizes*

Class B prizes were taken by Schwerin Bros., for hyacinths and tulips. Mrs. J. A. Scannavino received honorable mention for Darwin tulips. I. W. Hellman, Jr., took first prize and Mrs. Scannavino second for narcissus and daffodils; for Easter lilies, in vases, the Hillsborough Nurseries took first prize, and Domoto Bros., second. For flowering shrubs George Nunn took first prize and Domoto Bros., second. Mrs. R. E. Darbee took first prize for violets, and Pelicano, Rossi & Co., second. Second prize (there was no first) for ranunculus went to the United Floral Supply Co. For anemones, the first prize went to the United Floral Supply Co., and the second to I. W. Hellman, Jr. Mrs. R. E. Darbee received honorable mention for the most artistically arranged basket of bulbous flowers.

Pelicano, Rossi & Co. were awarded the first prize, a silver medal, for a bridal bouquet of butterfly orchids and lilies of the valley. The second prize, a bronze medal, went to A. Lundborg for a bridal bouquet of white cyclamen.

The jurors in these events were Mrs. William H. Crocker, Mrs. Du Val Moore, Mrs. Edgar J. de Pue, Mrs. P. E. Bowles, Mrs. Charles S. Wheeler, Mrs. George W. Pinchard, Mrs. L. S. Sherman, Mrs. W. S. Davis, Mrs. Frederick P. Stone; and Messrs. F. Pelicano, J. Baedocchi, Charles Mitchell, A. O. Stein, Otto Stein, and Sidney Clack.

Prizes were awarded at the May Flower Show as follows:

No. 1—Roses, John Smith, first prize; Mrs. E. M. F. Spencer, second.

No. 2—Roses, John Smith, first and second prizes.

No. 3—Roses, John Smith, first prize.

No. 5—Pansies, J. G. Wintjen, first prize.

No. 6—Iris, Mrs. J. Branin, first prize.

No. 11—Delphiniums, Major Vanderbilt, first prize; Mrs. Green, second prize.

No. 14—Poppies, Clarissa Mitchell, first prize.

No. 15—Garden flowers, Mrs. T. J. Sachau, first prize; C. Garrison, second prize.

No. 18—Roses, Mrs. C. W. Clark, first prize.

No. 27—Roses, Domoto Bros., first prize.

No. 28—Roses, E. Gill Nursery Company, first prize; Vallance Nursery, second prize.

No. 29—Carnations, Peninsula Nursery Company, first prize; Holland Nursery Company, second prize.

No. 31—Lilies, Y. Okimo, first prize.

No. 36—Iris, Mrs. R. E. Darbee, first prize; Fred Agari, second prize.

No. 33—Herbaceous peonies, Paul Grallert, first prize.

Special awards were given to Mrs. Neal T. Childs, The E. Gill Nursery Company, Paul Grallert, Dean Iris Gardens, Mrs. Muhler and Mrs. R. H. Grey.

Those who received special mention for cultivated displays were:

California Nursery, flowering shrubs; Mrs. Frowberk, marigolds; Hogan and Kooyman, Formosan iris; Mrs. Niehaus, calceolaria; Mrs. Luders, cinerarias; San Leandro exhibitors, complete display of garden flowers.

In the wild flower display, the exhibits of the Misses Edith and M. Alice King, plucked from Twin Peaks and the Lake Merced district, received first prize.

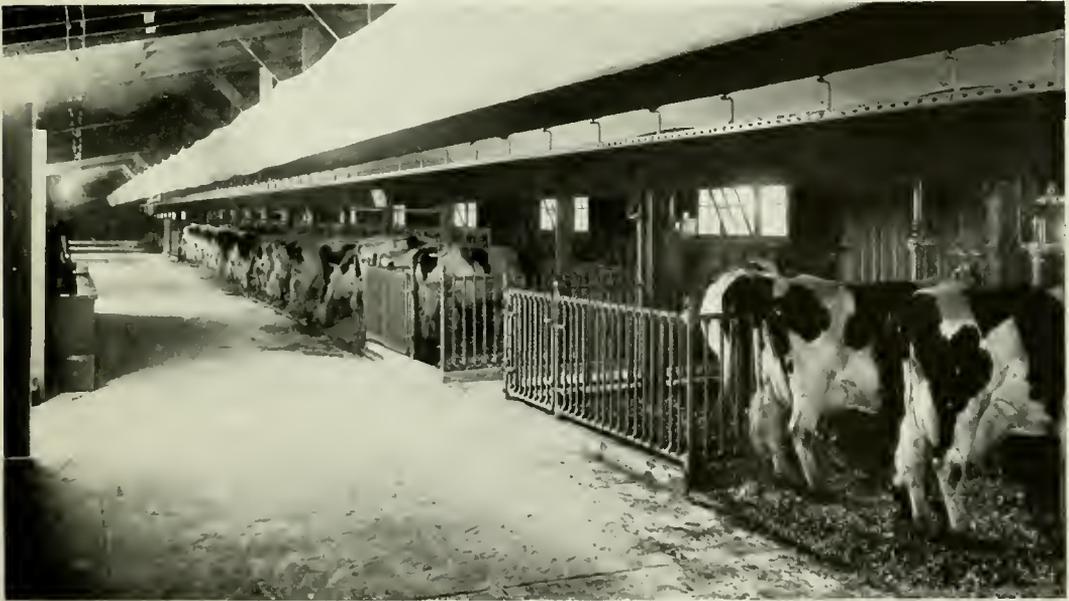
Mrs. John A. Scannavino was manager of the cultivated flower display and Miss Charlotte F. Williams in charge of the wild flower exhibit.

The appointed jurors were Messrs. H. Plath, E. James, J. R. Fotheringham, Charles H. Totty, George Roeding, Dr. Barton W. Everyman, Mrs. Marion T. Campbell, and Mrs. Ernest Meiere.

In the Dahlia Show, September 18 and 19, the gold medal prize was awarded Leslie E. Doolittle of Pacific Grove. The silver medal went to Mrs. W. E. Estes of 1458 Forty-seventh Avenue. The manager of the event was Mrs. John A. Scannavino. The jurors were Messrs. J. W. Bagge, H. Plath, and E. James.



LIVE STOCK HEADQUARTERS



A SANITARY DAIRY BARN

The Fall Flower Show opened with Horticulture Day on October 21, and ran six days. Prizes were as follows:

The silver cup offered by the Chrysanthemum Society of America for the best 10 blooms, one variety of chrysanthemum, on long stems, was won by the Lynch Nursery of Menlo Park. The gold, silver, and bronze medals offered by William Wells, Merstham, Surrey, England, and Charles H. Totty of Madison, N. J., for the best 3 blooms of the "Earl Kitchener" chrysanthemum, were awarded to the Lynch Nursery, Mrs. C. R. Waters of Menlo Park and Shibuya Ishida, of Stege, respectively.

Percy Ellings of Menlo Park won the medal given by the National Association of Gardeners for the best six chrysanthemums of six varieties. The Elmer D. Smith prizes for the best six white, yellow, and pink chrysanthemums went to the Lynch Nursery and the Hillsborough Nursery. Mrs. George H. Roos of Menlo Park won the Mitchell silver medal for 12 chrysanthemums.

Other awards were: best 30 chrysanthemums in 6 varieties, George H. Young, Ross Valley, first; best 12 white chrysanthemums, William Young, San Mateo, first; best 12 yellow chrysanthemums, Mrs. Sig Stern, first; best 12 chrysanthemums, any color; William Young, San Mateo, first; Mrs. George H. Roos, Menlo Park, second; best 36 chrysanthemum plants, Hillsborough Nurseries, silver medal; George H. Young, Ross Valley, bronze medal; best 4 vases of 14 varieties of roses, 12 blooms each, James B. Smith, Burlingame, first; Mrs. George H. Roos, Menlo Park, second; best vase one variety, 25 blooms, James B. Smith, Burlingame, first; William Young, San Mateo, second; best collection, 12 varieties, herbaceous perennials, James B. Smith, Burlingame, first; George A. Pope, Burlingame, second; best collection 12 varieties annuals, James B. Smith, Burlingame, first; George A. Pope, Burlingame, second; best collection single dahlias, 12 varieties, George A. Pope, Burlingame, first; Ruth C. Gleadell, San Francisco, second; best collection tuberous begonias, 50 varieties, and best collection 25 varieties, Henry E. Bothin, Ross Valley, first in both; best collection of vegetables, George A. Pope, Burlingame, first.

*The Fall
Winners*

The following special awards were made:

To Mrs. R. E. Darbee, a silver medal for a Marie Antoinette vase constructed of chrysanthemums, orchids, and roses.

To Frank R. Clark, a bronze medal for a miniature Tower of Jewels in chrysanthemums, hung with Tower jewels and lighted with electric bulbs within.

Pelicano, Rossi & Co., exhibited a dining table done in pink, white, and

yellow roses, and ferns. This took first prize in its class. The same firm took first prize for the best arranged hamper, or basket, the second going to Mrs. R. H. Grey. For the most artistically arranged basket of cut flowers, Pelicano, Rossi & Co. received first prize and Mrs. R. E. Darbee second.

The jurors were: Mr. C. W. Johnson, Mrs. M. S. Francis, Mr. William Munro, Mr. Ed Schwerin, Mr. Charles Abraham, Mr. William Eldred, Mr. George Walters, Mr. J. W. Bagge, Mr. John Gill, Mrs. Laurance I. Scott, Mrs. Jos. D. Grant, Mrs. Louis F. Montegale, Mrs. Henry P. Crocker, Mrs. Randolph Whiting, Mrs. George B. Carr, Miss Marcella Willis, Mrs. Louis Kast, Miss Edna Rooney, Mrs. Edgar de Pue, Mrs. Du Val Moore, Mrs. Charles S. Wheeler, Mrs. Frederick P. Stone, Mrs. Philip E. Bowles, Mrs. John Flourney, and Mrs. M. Koshland.

The Winter Shrub and Berry Show was an entire novelty and a great success. Mrs. John A. Scannavino was general manager, assisted by Mrs. T. J. Sachau, and the committee in charge consisted of Mrs. E. G. Ely, Dr. L. Friederichs, Mrs. John Bronin, Mrs. T. J. Sachau, and Mrs. Edna M. F. Spencer. The jurors were Messrs. H. Plath and E. James.

CHAPTER LXIV

THE DEPARTMENT OF LIVING EXHIBITS

THE spirit of the Exposition, expressed through the Department of Fine Arts, the Department of Mines and Metallurgy, the whole Division of Exhibits, through its great events and occasions, through every organ it developed with which to perform its functions, could, in the Department of Live Stock, be best represented by the words of a sign on one of the paddock fences, reading:

“A UTILITY DEMONSTRATION, NOT A FAT STOCK SHOW. . . . THE PURPOSE OF THIS DEMONSTRATION IS TO PROVE THAT WELL-BRED STOCK WILL MATURE AT AN EARLY AGE AND WILL BRING HIGH PRICES. A DISPLAY FOR THOSE INTERESTED IN RAISING STOCK AND FOR THE MEAT-EATING PUBLIC.”

The classification in Live Stock was very broad, but practical. Oxen were excluded as of little more than curious interest now; and freak breeds of cattle, sheep, and swine, and some of horses that had small utility value, were excluded also. But nothing was kept out that could teach the great lesson of Utility.

You don't have to build a palace for the live stock department of an exposition, but you do have to have corrals, barns, dairy, and poultry buildings, a stadium for the stock shows and a building for the congresses of breeders. And the Department is worth it and all the prize money besides. Intelligent breeding builds wealth. And hardly any field of industry has more progress to show from one exposition to another. It is the opinion of experts that since the St. Louis Exposition the Hereford cattle, just for an example, have been so improved that the individuals will average 150 pounds more in weight, while the type has been radically changed. Under the applied eugenics of the breeder, the Poland China hog has become an altogether different being. Character, shape, disposition, right through the animal world that is tributary to man, are being remade from day to day, and in some quarters of that world the improvement has even been carried into those secret sanctuaries of nature wherein

*Teaching
Nature*

it is determined whether a ewe shall bring forth one lamb or several at a lambing.

For the first time in the history of world's expositions the Live Stock barns were especially constructed for exhibition purposes. And the arrangements, especially the feed alleys, greatly pleased the exhibitors, many of whom said they had never been given such conveniences before.

The arrangement of barns, corrals, and show area is very important, far more complicated than the mere division of floor space in a palace. The Exposition was fortunate to have in Mr. D. O. Lively, Chief of this Department, a man of experience in live stock shows, with definite ideas about such arrangements. He had observed the effect of a lot of small detached barns for horses and cattle at an exposition, and had decided that it was wrong—killed the visitor's interest before he had been in and out of very many of them. He wanted large barns, and he wanted them close to and surrounding the show ring. The large units would make it possible to house the specimens of a breed together for comparative inspection, and they would also make it easier and pleasanter for the visitor. The barns were so planned and built.

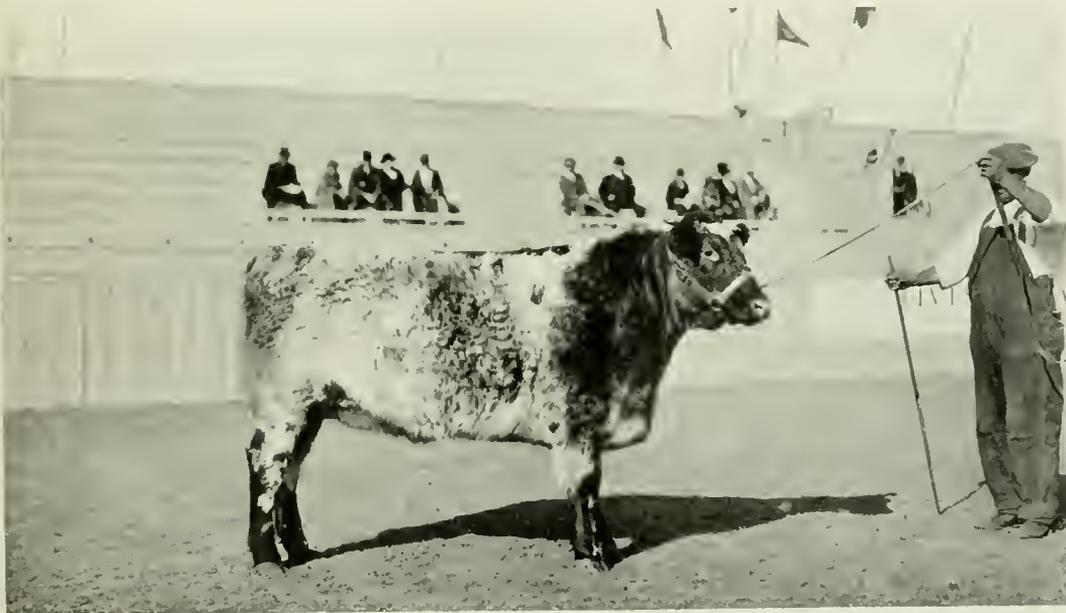
The stall that is perpendicular to the barn aisle, or corridor, or whatever it is that a barn has in which the spectators walk, gives those spectators an excellent view of the hind quarters of the occupant, but most visitors would like to see more of the animal. So Lively had the stalls set at an angle of 45 degrees to the aisle, which was a great improvement over former practice. Grooms and herdsman, instead of sleeping in stalls, had comfortable quarters in galleries under the eaves, whence they could speak to a restless horse at night and quiet him. To keep shipping-boxes and bales of hay out of the aisles, traffic alleys were provided, running in front of the manger ends of the stalls, for small supplies of feed and for the business incident to the handling of live stock. As a result the circulation ways were clear and comfortable to walk in, and people could really see and compare the exhibits.

*Exhibit
Barns*

The exhibit barns surrounded the stock forum or show ring, but the dairy cattle building stood apart, so that its product could not absorb any of the odors from the other parts of the section. However, there was little danger of that, inasmuch as the whole place was kept perfectly clean, and moreover the magnificent herd of 125 Holstein milch cows kept here by the Carnation Stock Farm of Seattle was milked by machinery and the milk was never exposed to the air. Mr. J. N. Gilman of San Francisco, representing the James Manufacturing Company, finally prepared the plan for the dairy barn, inasmuch as dairy equipment was in his line of work.



MY BEUCHAN PETER PAN, GRAND CHAMPION AYRSHIRE BULL
OWNED BY J. W. CLISE; REDMOND, WASHINGTON



BELLE CUMBERLAND, CHAMPION SHORTHORN COW
ALLEN CATTLE COMPANY; COLORADO SPRINGS, COLORADO

There had to be an architect for all these structures. With wonderful adaptability, B. R. Maybeck, designer of the Palace of Fine Arts, turned to planning barns, with the result that instead of looking like some bald array of sheds and byres the whole Live Stock Section had a light, spacious and festive air that was very charming; and utility was consulted in every detail. The barns were made interesting with broad, overhanging eaves that cast cool shadows on the walls, and they were gay with hundreds of slender, painted flag-poles like Venetian masts. It is not likely that live stock was ever exhibited in any handsomer quarters, and the congress hall and office pavilion was pleasant and inviting. This building was equipped with moving picture facilities, and would seat 500 people.

Eight barns were built, four of which were 215 feet by 87, and four 200 by 87. There were 992 stalls in the barns around the Forum, and 132 under the Forum grand stands, making 1,124 besides those in the dairy cattle building. Overhead, the Forum grand stands would seat 2,680 people.

There was a mile track for horse racing, and within it a polo field, in addition to the drill ground and athletic field. Three grand stands that would seat 25,758 people bordered the straightaway. They cost about \$57,079. Under one of these was a cooling shed for the polo ponies, and there were cooling sheds for race horses, and quarters for contending athletes. There was a separate feed storage barn.

The buildings cost about \$151,646. The mile track including the drill grounds, polo field, and athletic field cost \$101,281. In addition to this expenditure the Exposition paid out on account of the horse show \$23,666 of which \$18,361 went for prizes. As offset there was an income from this source of \$10,768. The miscellaneous stock shows cost \$105,873 of which the prizes took \$96,429; and there was an income from entry fees of \$11,083. The egg-laying contest that raged throughout the Exposition season cost \$4,424, of which \$230 was paid in prizes. Entry fees, eggs, and percentage on poultry sales returned \$2,261. The Summer race meet called for \$95,100 in prizes and the total cost was \$106,740. The prizes for the Fall race meet came to \$61,755 and the total cost was \$65,281. A Live Stock Department is expensive, especially if it includes horse racing. As an offset there was income from race meet entry fees, box rentals, and similar items amounting to \$112,064.

*Some
Costs*

There were quite large supplemental prize offers for cattle and miscellaneous live stock by some of the breed associations, a few of which were withdrawn on account of the effects of foot-and-mouth disease, but most of which were paid to the winning contestants.

The provision made for live stock premiums, and for transportation and

care of stock amounted to \$190,000 by the Exposition, \$100,327 by some 45 breed record associations for special premiums, and \$150,230 by the Exposition commissions of various States, to promote live stock participation—making a grand total cash attraction of \$440,557 for premiums and transportation.

Feed was sold to exhibitors, from the feed storage building, through a Feed Superintendent. It cost the exhibitor what the Exposition had bought it for, plus ten per cent, and the business was administered at a small loss. This was a very important service to exhibitors, who were thus protected by a fair price.

Collections on these sales were assured by a part of that model control that secured all the financial interests of the Exposition. An exhibitor bought for cash, at the office of the Cashier of the Live Stock Department, small books of 100 five-cent coupons. With these coupons he paid for a feed delivery order, made out with two duplicates, in an Autographic Register, and signed by the Feed Superintendent. The Comptroller imposed and enforced the rule that no such order should issue from the Autographic Register until the purchaser had paid over the coupons for it. The purchaser gave the order to an assistant, whose duty it was to get the purchaser's signature on it, give him a receipt for it, and make the delivery. The plan worked perfectly. Everybody paid for what he got, and got what he paid for, and nobody could, without forgery, get some other person's hay. The order went back to the Feed Superintendent, and the whole transaction left a clear, straight record. Daily reports were made and they had to balance. If the volume of business had come up to expectations there would have been a small profit in this business; but the important thing was to protect the exhibitor, which it did.

*Protecting
Purchasers*

On the opening of the Exposition a general live stock superintendent was put in charge with four men under him to take care of the buildings and keep things clean and sanitary. Late in the season the force was increased to nine. So well was the work done that among the thousands of animals exhibited, deaths were limited to one cow, one calf, one steer, one pig, and one polo pony. Sanitary technique was carried out through a representative of Parke, Davis & Company of Detroit, the manufacturing chemists that supplied the disinfectant (Kreso) on an exhibit basis.

The horses, cattle, sheep, goats, and swine that were shown came to 3,815 head, out of 4,683 accepted. The accepted exhibitors in these classes numbered 500. This makes no account of the exhibits of dogs, cats, poultry, and pet stock.

CHAPTER LXV

BRINGING IN THE BREEDS

TO Lively, breeding stock was one of the fine arts, and he considered that the breeder who, by the exercise of trained perceptions and careful and scientific selection, evolves an approximation of an ideal animal, has not merely achieved an economic triumph, but is as much an artist as the man that paints a canvas of merit. That he never went so far as to insist that a side of meat from some prize-winning beef animal should be hung in the Palace of Fine Arts, was perhaps owing only to his jealousy for his own Department.

In Live Stock, as in Fine Arts, advisory committees were formed to give the Chief the benefit of their knowledge or their previous exposition experience—so broad is this field. Owing to the fact that Col. Charles F. Mills of Springfield, Ill., had been through two expositions in live stock departments he was, on Chief Lively's recommendation, made Chairman of an Advisory Committee for the Live Stock Department at San Francisco. Although much absorbed in his own affairs in Illinois, Col. Mills suggested a plan that was afterward carried out with a measure of success, and that was the appointment of State advisory committees on the situation in the various States. The plan worked well except for one particular: the appointment to such committees of State boards of agriculture and State fairs. These men owe first allegiance to their own localities and their own enterprises, and can hardly be expected to sacrifice them, or even very much of their time and attention, which would amount to the same thing, even to an international exposition outside the limits of their own States.

*State
Assistance*

A peculiarity of the local situation was the fact that California has developed much faster in horticulture than it has in live stock. An effort was made by the Exposition to stimulate the latter branch of husbandry (and something was undoubtedly accomplished in that direction by the 25 per cent freight refund on any live stock that remained here) by attempting to secure from the Legislature an appropriation of \$100,000 to be given to California live stock exhibitors. This would have encouraged the upbuild-

ing of many pure-bred herds. The plan was energetically pressed by the Chief of the Department, and the bill passed the Assembly, but died in the closing rush of the Senate.

The judges for the stock shows were selected with care in order that their verdicts might be of the utmost possible value in determining future tendencies in breeding. The breed record associations were asked for two or three names each, lists were made up from these, and the lists were then submitted to the exhibitors of record. The men for whom most of them voted were invited to act, and such was the prestige of the Exposition that the best talent in the United States was glad to serve without compensation above its expenses. About 75 were invited, and with the exception of one man (asked as a judge of dogs) there was not a refusal. They were allowed a first-class round trip fare on a regular express train, lower-berth Pullman rate, \$5 a day in lieu of subsistence while en route coming and going direct, and the same amount for the time they were actually engaged in judging, and no other expenses whatever. Undoubtedly in most cases it cost them more than they received.

*Stock
Judges*

Thus assembled, the Live Stock Jury of Awards constituted a most important, in fact a vital, organ of the live stock industry in America, for its judgments would affect the temperamental characteristics and the very shapes of the bodies of the horses, the beef and dairy cattle, and the sheep, goats, swine, and poultry that will be produced in this country by the best breeders, and through them ultimately by all breeders, for an indefinite time to come; as long in some cases, perhaps, as such organisms are on the earth. They were all licensed judges, and no appeal could be taken from their verdicts to any other branch of the Exposition's International System of Awards.

Among the judges of the Horse Show there were, for example, such experts in horse flesh as Prof. C. F. Curtiss, of Ames, Iowa; Samuel Ball, of Wooster, Ohio; Henry Fairfax, of Aldie, Virginia, and Charles Railey, of Lexington, Kentucky. The cattle judges included Hugh Van Pelt, of Waterloo, Iowa; T. E. Robson, of London, Ontario; Phil C. Lee, of San Angelo, Texas, and W. H. Standish, of Lyons, Ohio. Among the judges of sheep were J. C. Duncan, of Lewiston, New York; F. B. Marshall, of Washington, D. C., Ernest Robson, of Denfield, Ontario, and John E. Webb, of Southport, Indiana. We find Thomas W. Brunk, of Salem, Oregon, and Prof. E. C. Voorhies, of Berkeley, California, judging goats; F. A. Scott, of Belleville, Illinois, and H. W. Mumford, of Urbana, Illinois, judging swine, and Daniel P. Shove, of Fall River, Massachusetts, and Mrs. Florence Forbes, of New Decatur, Alabama, judging poultry.



WHERE THE MOHAIR GROWS



TIPNA NO. 176, TWO-SHEAR STUD ROMNEY RAM
BRED BY G. E. ALLEN; TIPNA, NEW ZEALAND

The live stock field is peculiar and highly technical, and is served in the United States by some 700 trade papers devoted to stock, poultry, and agriculture in general, with a total circulation running high into the millions. The Department thought it best to serve these papers with a special output of publicity material in the form of bi-weekly bulletins. These were prepared by writers familiar with the subject-matter involved, were sent to the agricultural press and were quite generally run in full so that the live stock enterprises of the Exposition were widely advertised to those especially interested. The publications were largely instrumental in promoting the coöperation of the breed record associations.

*Special
Publicity*

A card index of practically every live stock exhibitor in the United States and many in Europe was built up from catalogues of national, State and foreign shows, and these exhibitors were systematically circularized, and sent copies of the preliminary classification and information of every sort that could interest them. Early in 1913, the Chief of the Department prepared a booklet of advance information with a map of the Live Stock section. This was widely circulated and materially helped exhibitors to formulate their plans. In the fall of that year he made the rounds of a large number of State fairs to interest stock raisers in the premiums and opportunities offered at San Francisco.

About the middle of November, 1913, Lively attended the meetings of the International Live Stock Show at Chicago, and during ten days addressed the meetings of more than 50 breed record associations. Many of them afterward made appropriations to establish continuous exhibits in the form of view herds to be maintained throughout the season, although the idea was altogether novel, and had required much argument "about it and about"; but of these only one actually exhibited in this manner.

The work in Europe in promotion of the foreign participation and much of the work in anticipation of the International Mounted Military Tournament, was done by Eugene Grubb, of Carbondale, Colorado, the well-known authority on agriculture and especially on the potato, acting under direction of Chief Lively, who secured an appropriation to send him abroad. These efforts, well directed and deserving success, were brought to naught by the war.

Another enterprise of the Department was that of securing conventions of the breeding and other associations, of which there is a large number connected with the live stock industry. The Chief went East and attended the annual meetings of such organizations, and succeeded in getting many of them to pledge themselves to hold their 1915 sessions in San Francisco.

Among them were such important bodies as the American National Live Stock Association, and the American Poultry Association.

*Favoring
Freights*

Favorable freight arrangements were made by the Exposition through its Bureau of Transportation with so many railroads that it could in general be said that exhibitors of live stock from points throughout the greater part of the United States could ship to San Francisco with a free return privilege, provided the charges had been prepaid in full, and on shipments not returned they would be entitled to a refund of 25 per cent of the one-way rate, except the terminal charges. This did not apply to race horses, and there were some minor modifications of the rule, which we need not recite here. The arrangement encouraged exhibiting, and the refund tended to make it easier to sell the exhibit at the Exposition and so add the superior strain to the stock in California.

In such ways as these, including many details of work there is no space to mention, there was built up a great additional body of interest in the Exposition and especially in its Live Stock exhibits. In fact, the preliminary activity of this Department constituted the widest and most vigorous propaganda ever carried on in the live stock field, and had it not been for the foot-and-mouth quarantine the results would have swamped the accommodations. In spite of all drawbacks the work produced a great show, and attracted thousands of people.

The Exposition presented to the public the greatest horse show, and one of the largest poultry shows ever held in this country. Indeed, the poultry show may have been the largest ever held anywhere. But when it came to cattle the plans of its Live Stock Department suffered the worst calamity in the history of such undertakings.

Many of the foremost cattle breeders had spent thousands of dollars purchasing and preparing animals to be shown at San Francisco. In a number of instances they had kept out of shows, and so had foregone valuable prizes, in States where foot-and-mouth disease was known to exist, for fear of spoiling their chances to exhibit at the Exposition. Entries for the cattle events at San Francisco promised the greatest exhibits of beef and dairy cattle ever seen, and there would have been more hogs and sheep than the Exposition could have taken care of. Down to the first of October the management had reason to believe that all these fine prospects were going to be fulfilled, and prepared to accept the promised embarrassment of riches as a triumph rather than a trouble. Then came the State quarantine against all cloven-footed animals from several western States, and all States east of the Mississippi River.

*A National
Tragedy*

The war had been bad enough in its effect on the foreign entries.

It had destroyed the greatest international mounted military tournament ever conceived, and made impossible such educationally invaluable exhibits as a herd of wild white British cattle that had not been out of its enclosure on an English duke's estate for 800 years. But there were still the United States. Now came the quarantine, like a stroke of paralysis; and the State Veterinarian even urged the Directors to call off the entire show of cloven-footed animals.

We cannot here go into the merits of a question involving so much of uncertain fact and dubious policy and so subject to the warping effects of public alarm as this matter of the foot-and-mouth quarantine. Great bitterness was engendered by it and grievous charges were made. There is one thing angry men practically never do: they never give one another the benefit of the doubt. If they did they would almost always cease to be angry. And they seldom concede a proper motive in an adversary. But right or not, there was no question of the effect of the quarantine. It killed the greatest exhibit of beef cattle that had ever been arranged in the country, just at a time when the country needed an exchange and expansion of knowledge about beef cattle more than it had ever needed it before.

In the face of the suggestion of the State Veterinarian that no show of cloven-footed cattle be held, the responsibility thrown on the Directors was heavy, but they had turned back from few things thus far and they would not turn back from this, and they instructed the Chief of the Live Stock Department to go ahead with such a show as he could get together from the open States, leaving up the \$100,000 of cash premiums they had offered.

The cattle show was good. It was not the country's greatest, but there was a very fine exhibit of dairy cows, altogether worthy a world's Exposition, and there was a fair show of beef animals, of sheep, and of swine.

The International Military Tournament was killed by the war in Europe. And among the first men to die in that war were some of Great Britain's hard-riding polo players who had enlisted in the Exposition's Polo Tournament. Hence this event was greatly curtailed, after the Duke of Westminster and other enthusiasts had gone so far as to engage San Francisco houses for the season. But there was a society horse show and there were race meets, and in addition to all the regularly recognized and accustomed live stock events the season concluded with one of the most touching and beautiful of all and one that had not been accomplished before, and that was the Children's Pet Show.

CHAPTER LXVI

THE FIRST EXPOSITION VIEW HERDS

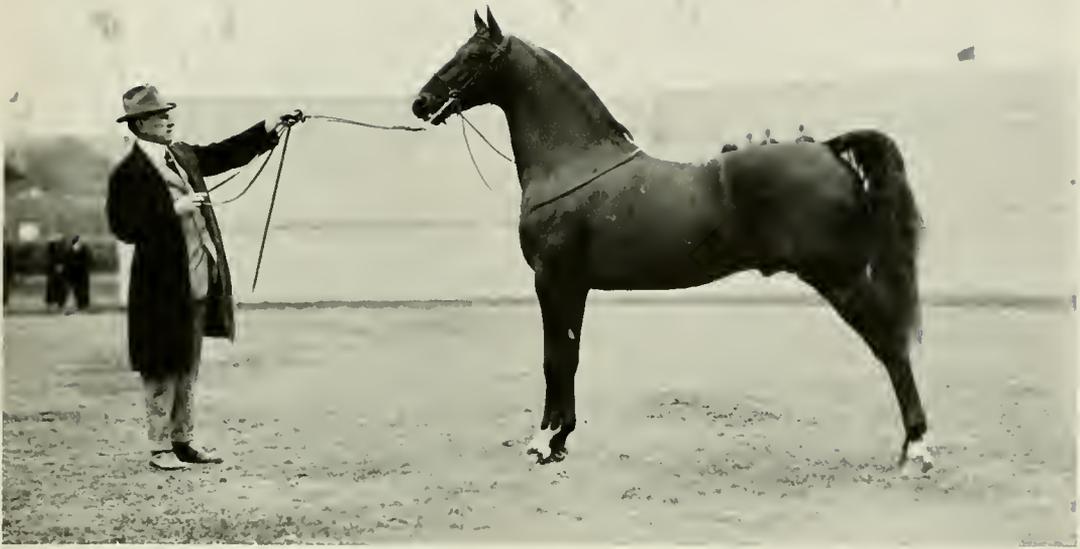
IN the Department of Live Stock, the Exposition undertook a number of enterprises that were new. It had been a weakness of other expositions that the live stock shows were occasional events rather than established exhibits, consisting of sharp competitions for prizes, and being mainly confined to the Fall of the year when the crops were in and the farmers could take time for a trip. This weakness was obviated at San Francisco by the determination of the Chief of the Department that his part of the grounds should have a continuous interest for the whole 288 days, through the maintenance of a collection of non-competitive exhibits. It was his theory that the visitor who came in May or June had a right to see an entire exposition. The Live Stock Department should teach its lessons of utility all the time, and the layman that knew little about the subject should be able to get some understanding of it through comparison.

*For the
Visitor*

Permanent view herds, as exhibits for the information of general visitors, were not the accepted practice at fairs and stock shows—in fact they were revolutionary in the stock business—but Chief Lively aimed to have such living exhibits, and had succeeded in interesting many of the breed record associations and some of the leading stockmen of the country when the widespread alarm about foot-and-mouth disease began to cast its pall over the enterprise. In spite of that heart-breaking calamity, the Exposition did succeed in presenting some such exhibits that came early and stayed late, and that proved to be of the greatest value both to exhibitors and the interested public.

A real view herd was entered by the American Berkshire Association. This organization maintained its exhibit throughout the Exposition and reaped a commensurate reward, for the direct returns to breeders and the advertising given the association repaid the outlay many times over. Some good sales were made. A sow under six months, exhibited by D. C. Bunn, of Prosser, Washington, brought \$860. A first prize yearling boar exhibited by Clark Bros., of North Yakima, brought

*Living
Bacon*



MY MAJOR DARE, GRAND CHAMPION SADDLE STALLION
ENTERED BY MISS LOULA LONG; KANSAS CITY, MISSOURI



SHIRE HORSES

BLYMHILL FORESTER, ANWICK ARTHUR, DOVECOTE KING, BLACKHAWK BARN KING, WITCHFORD ALBERT
EASTON & WARD; DIABLO, CALIFORNIA

§685. There were 23 head in this herd, and while they boarded at the Exposition they were contented, fat, sleek, and very appetizing. As you looked at their long, flat, rectangular sides you could almost smell the bacon frying in the pan, and the cackle of a nearby hen was maddening.

The Carnation Stock Farm of Seattle, Washington, established a herd of about 125 high grade Holstein cows, "in milk," putting them in the dairy cattle building at the opening of the Exposition, milking them by machinery twice a day, and maintaining them throughout the season as a source of supply for the Carnation condensery, in the grounds.

Messrs. Easton and Ward, of the Blackhawk Ranch at Burlingame, California, decorated the middle aisle of one of the great barns and there maintained for six months an exhibit of about 30 Shire horses.

Mrs. Anita M. Baldwin, of Santa Anita, California, and the Dunham-McLaughlin Company of Wayne, Ill., maintained, in a beautifully decorated barn, from the opening of the Exposition to the end of the Horse Show, a fine exhibit of Percheron, Belgian, thoroughbred and Arabian horses.

In August, the American Shorthorn Breeders' Association put on exhibition a view herd that was underwritten by a few enterprising coast breeders, and this herd was one of the star features of the Live Stock Department. At the suggestion of the Directors of the Association a little syndicate was formed to take over at the end of the season the eight animals the Association had purchased and shipped to San Francisco for this exhibit. Mr. A. W. Foster, Director and Treasurer of the Exposition, and a regent of the University of California, sent two animals from his herd at the Hopland Stock Farm, and agreed to buy two of those the Directors of the Shorthorn Association sent out. H. A. Jastro, Fred H. Bixby, and the Howard Cattle Company agreed to take the rest, two apiece. On the death of Mr. Howard this obligation of his company was assumed by Macomber Bros., of the Paicines Ranch Company. The Association bought the cattle, maintained them on view, and at the close sold them at cost to these guarantors.

The Hopland Stock Farm made an exhibit of Hungarian ponies such as is never seen in this country outside of California, and only here at rare intervals. This was the largest, and consisted of twenty of these bright little animals: two stallions, and the rest geldings and mares. They were beautiful, intelligent and affectionate pets, about the size of Shetlands, but had more the conformation of the light type of horse. This exhibit arrived on August 4, and was, of course, very attractive to children.

Saddle horses and hackneys were shown by Thornberry & Shropshire, of Los Angeles, and by the Woodland Stock Farm. A herd of pure bred

Guernsey cattle was maintained by Mr. Walter H. Dupee, of Santee, California. The American Shorthorn Breeders' Association put its herd on exhibition in August.

One of the most valuable continuous exhibits was established in this Department early in the Exposition season by the Western Meat Company of San Francisco, the Union Meat Company of Portland, Ore., the Cudahy Company of Los Angeles, and the Pacific Coast Beef and Provision Company of the last-named city. It was intended to show the advantage of good breeds over scrub stock, and, granting that by good breeds we mean those good for man to breed and eat, it certainly showed it. In adjacent pens north of the barns and on the north line of the Avenue of the States were exhibited highly bred animals fattening themselves day by day, and scrub stock eating its various individual heads off and staying too lean to sell well. In one pen were two Aberdeen Angus two-year-old steers each weighing 1,085 pounds, and worth 7½ cents a pound on the hoof. Just opposite was a pen of Mexican steers eight years old and weighing only 750 pounds each. And what there was of them, after those eight years of feeding, was worth only 5½ cents a pound. Cheaply bought, and pastured for nothing, they might pay, but the moral of the story was that such stock was not suitable for a feed lot or a small farmer.

*A Needed
Lesson*

Similar lessons were demonstrated in other pens of horned cattle, and repeated in regard to sheep and hogs. It taught the small landowner that if he would invest his money in good stock he could get high prices for good beef, and perhaps mature it faster than the mortgage on the farm—a fine thing to be made known, in the service of the farmer, the banker, the packing house, and the consumer. And the proofs were right there. It had been all very well to talk it and talk it, but the Exposition showed it and proved it. The Utility Live Stock show was one of the best exhibits on the grounds.

Throughout the Exposition season the International Egg-Laying Contest was in progress, so that the hens, many of which arrived for early practice in November, and all of which stayed until the close, constituted a continuous poultry exhibit and a very instructive and fine one. Its object was to encourage the breeding of strains of high producers. Poultry was entered from the United States, Canada, and England, and fifteen leading varieties were represented in some 56 pens of ten birds each, with two hens as substitutes on each team.

Such, at least, was the general plan, but it was impossible to keep all the pens full throughout the season. No egg-laying records were broken, and it is unlikely that any could have been under the conditions of an exposition, for the hens were an exhibit, and hundreds of thousands of people visited

the pens during the year, with a disquieting effect on the birds—doubtless took their minds off their work. Nevertheless, this exhibit laid a lot of eggs: 55,230 during the contest.

The first prize for an individual performance went to a Barred Plymouth Rock which laid 226 eggs for the year. Her owner was F. H. Sherman, of Lebanon, Ore., the man that showed in the Oregon agricultural exhibit what could be done on ten acres of "dry" farm. He received the Exposition trophy and \$15 in gold, a silver cup offered by the Sperry Flour Company, a 126-egg incubator offered by the Petaluma Incubator Company, and 500 Keyes-Davis leg bands. The second and third prizes went to two White Leghorns that were tied for place with 204 eggs apiece. *Egg-Laying Contest* One was entered by Will Barron of Bartle, England, and the other by the Oregon Agricultural College. The prizes were the Exposition trophies and \$15 in gold. The first yearly pen prize went to a pen of White Leghorns entered by Oregon Agricultural College, which produced 1,616 eggs; the hens, not the College. This performance took an Exposition trophy, \$75 in gold, a 504-egg Petaluma Incubator, the Zenner Disinfectant Company's Zenoleum trophy, and 500 Keyes-Davis leg bands.

The second and third prizes in this class were won by a pen of Barred Plymouth Rocks entered by the Oregon Agricultural College, and a pen of Oregonians (hens) entered by the same institution, each pen producing 1,407 eggs. The prizes were trophies and \$75 dollars each.

And the fourth pen prize for the year went to a pen of White Wyandottes entered by George D. Adams of Victoria, for 1,392 eggs.

There were monthly prizes for which silver trophies were awarded. These were all won by White Leghorns and White Wyandottes.

The records were kept by, and the contestants fed and cared for under direction of, the Department of Poultry Husbandry of the University of California, the work being performed by two graduates of that institution.

Among the other special features of the Live Stock Department were the Japanese long-tailed roosters. As an indication of what can be accomplished by selective breeding they were as impressive as some of Burbank's most striking creations. It would have been hard to imagine a breed of fowl thus handicapped in the struggle for existence that would not have been wiped out, yet human protection with its artificial instead of natural selection, had produced cocks with tail feathers 10 or 12 feet long. It even encouraged the hope that in time we may have oblong eggs, easy to handle and pack. There were three of these birds on exhibition. They lived on their perches almost continuously, and the perches had to be very high to give the tail feathers room. At night these appendages were done up

in curl papers. They tended to aggravate the thirst of the bibulous, for they probably constituted the longest cocktails ever produced.

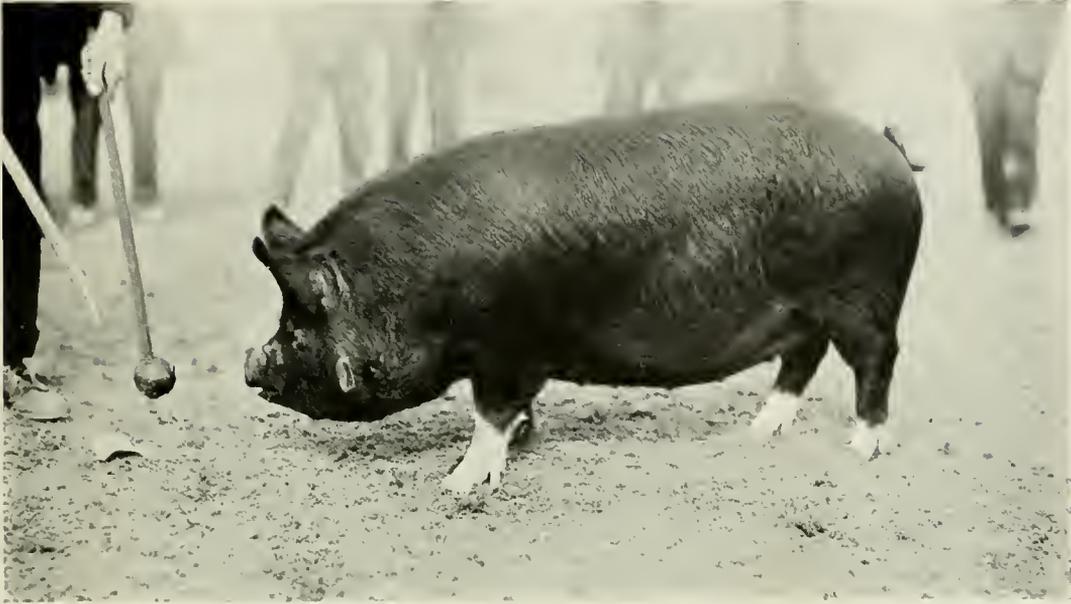
Then there were the Japanese "silkie," fowl whose feathers had no quills.

To its great credit it should be recorded that the San Francisco Humane Society made one of the finest demonstrations ever seen of the nature and the need of the sort of work it does, notwithstanding the fact that it received no substantial assistance from any outside or national source. It erected, out of its own funds, a building covering about 2,000 square feet of space in the Live Stock Section of the grounds, where it stood ready to perform for injured animals the same merciful service that the Exposition's own Emergency Hospital did for human visitors and employees. It had an animal ambulance ready to rush to the relief of injured animals in any part of the grounds at any time, and either bring them in for treatment or give them such treatment as they needed.

*The Humane
Society*

In its relation to the live stock, including polo ponies and cavalry horses, on exhibition and in active service in the grounds, this was another example of the high development of organization the Exposition achieved with the coöperation of participants. But in itself it constituted a most striking demonstration of humane society work. There was a section of a model animal shelter, with full-size kennels, and such other exhibits as a model stall for horses, with fire escape and safety devices; there were sanitary drinking troughs for animals; there were lethal chambers and electrocution cells to show various painless ways of ending the lives of small animals whose lives needed to be ended; there were humane slaughtering tools, anti-slipping horseshoes, humane bits, feed bags, and even humane traps. On the walls were photographs and posters relating to the work; and there were implements taken from persons guilty of cruelty to animals. A large number of manufacturers of humane and safety devices exhibited their appliances under the auspices of the society.

A very fine living exhibit, and one that gave pleasure to thousands, was the concession known as the "Dogs of All Nations," conducted by W. E. Mason, at the approach to the Live Stock Stadium. Mason was an enthusiast on dogs, and here he had a collection that would have interested Maeterlinck. In kennels and cages was a large congress of the best friends that man has found in the animal world. There was the largest sort of dog, and the smallest sort: an Irish wolfhound, and a Pekinese sleeve dog of a breed hardly large enough to sneeze, specimens of which sometimes bring \$10,000. There was a large Belgian draft dog whose owner had sent him over for safe keeping during the war. There were Mexican hairless dogs and Alaskan huskies; and Airedales and setters and otterhounds, and Dalmatians, and



RIVERBY PRINCESS, GRAND CHAMPION BERKSHIRE SOW

D. C. BUNN; PROSSER, WASHINGTON



THE HOG MOTOR

American foxhounds with the voice of old Kentucky in their throats, and silent English bulls with strong exposed teeth, and English bloodhounds that bayed like an organ, and American bloodhounds not at all of the Little Éva type, but with mournful faces and crystal-brown eyes and tenor voices full of longing for human company. And there was "Tip," the North Greenland Eskimo who led the team of sledge dogs that took Peary to the Pole. He was the only dog living that had made the trip, and in the Exposition year was 11 years old and blind of one eye. The concessionaire had on view the sledge and boat, and the dog harness, used by Anthony Fiala in command of the Ziegler Polar Expedition of 1903-5.

*He Saw
the Pole*

There was a large exhibit of the latest improvement in silos in the Live Stock Section although they were classified under Agriculture. And another exhibit in this part of the grounds that was of interest to farmers was the demonstration of the climbing powers of the Holt Caterpillar tractor. It had shown its ability to turn in a contracted space in the Palace of Agriculture, but it could not there be operated by gasoline on account of the fire risk. In the Live Stock Section an inclined plane was built up at an angle of 45 degrees, and a Caterpillar crawled up and down it at will.

Among these established exhibits a veracious and particular history should not fail to make record of the Hog Motor, which, for the simple euphony of its name, and its manifest standing in the eternal fitness of things, enjoyed a fame that extended the length of the grounds and the width of the city. That local hailing sign of 1915, "Have you seen Stella?" was closely pressed for first place by the query, "Have you seen the Hog Motor?" Among the naturally cautious and preternaturally wise there was even skepticism of its existence; but it was there, as real as a hoe-handle.

The Hog Motor was a sort of porcine cafeteria, where the hog, after a fashion, got his own meals. It was a cylindrical mill, capable of rotation on a vertical axis, with a hopper on top to receive the grain, and some little gates below from which the meal emerged. These gates were set in the inner ends of small tangential troughs, or pockets, so that when the hogs rooted for their feed they turned the mill and ground it.

*Grinding
a Living*

It was another case of "root, hog, or die." Under the circumstances almost any animal would root, and the claim was made that the contraption saved 25 per cent of the grain fed, owing to the fact that it compelled the hog to devote plenty of time to his meals. With the improved digestion thus induced he slept like a baby and made better ham. The Hog Motor was classified in Agriculture but was installed in the Live Stock Section, where it could be seen of stockmen. It has not yet been introduced into families of the *genus homo*, but it has some grand possibilities.

CHAPTER LXVII

LIVE STOCK EVENTS

THE main events of the Live Stock program for the season were:

The Berkshire Swine Exhibit, which ran throughout the season.
The Polo Tournament, from March 15 to May 1.

The Utility Dog Show, occurring on various days in May, August, September, and October.

Matinée Races, May 21 to August 8.

The Summer Race Meet, June 5 to June 19, except Sundays.

National Milk Show, June 14 to 19.

Running Races, August 21 to September 18.

The Horse Show, September 30 to October 13.

Demonstration of Trained Sheep Dogs, October 10 to 16.

Horses, Mules, and Asses, September 30 to October 13.

The Cattle Show, October 18 to November 1.

Fall Harness Races, November 1 to 16.

The Shows of Sheep, Goats, and Swine, November 3 to 15.

Prize Goat-Milking Contest, November 7.

Car lots of Live Stock, November 11 to 14.

Pigeon and Poultry Show, November 19 to 25.

Bench Show, November 29 to December 1.

Cat Show, November 29 to December 1.

Pet Stock Show, November 29 to December 1.

Children's Pet Show, December 1 to 3.

On some of these events, cash prizes were paid by the Exposition to the extent of \$95,100 for the Summer Race Meet, \$61,755 for the Fall Race Meet, \$18,361 for the Horse Show, \$96,429 for Stock Shows, and \$230 for the Egg-Laying Contest—a total of \$271,875, partly reimbursed from entry fees and other receipts.

Characteristic features of the Live Stock Department exhibits were the dog shows and sheep dog trails "staged" in the Polo field inside the Race Track during afternoons in May.

The Milk Show, which had the assistance of the milk experts of the

University of California and of the University chemists, and of the Dairy Delivery Company of San Francisco, which donated the use of wagons and storage, was a very successful event. About 2,500 samples of milk came from as far east as Massachusetts and as far north as Montreal, and brought the Exposition a large amount of favorable publicity; as well it might, for it was the world's greatest milk show thus far.

*Battle
of Milk*

Classes were made for market milk and cream, certified milk and cream, pasteurized milk and cream, milk and cream dealers, college and experiment station milk and cream, medical milk commissions, and city boards of health. The purpose was to give producers and dealers an opportunity to display their products and to bring to the attention of producers, dealers, and consumers the importance of cleanliness, purity, and other desirable attributes familiar to users of this widely and favorably known beverage.

All the milk was taken on the seventh of June, packed in ice, and shipped by express to the Exposition. Samples were tested for flavor, odor, dirt, acidity, butter fat, and appearance of package. The tests for bacteria were made by experts in the laboratory of the University of California, with the Dairy Division of the United States Department of Agriculture acting in an advisory capacity. Over 500 exhibitors participated, and this included dealers and boards of health in such cities as Philadelphia, New York, Boston, Toronto, Detroit, Kansas City, Salt Lake City, the cities of the Pacific Coast, and smaller communities all over the country.

It was said to be the largest competition of the kind ever held, and greatly emphasized the function of the cow as the foster mother of millions of human infants. Incidentally it demonstrated that milk can be shipped long distances and kept a considerable time, and still be fit for the food of those that like it, with the bacterial count as low as thirty. One hundred dollars was offered to the city Board of Health making the best display, and it was won by Portland, Ore., with 500 bottles entered. The other prizes were diplomas and medals.

This was the first international exposition that ever undertook to conduct horse racing, and the racing was beautifully successful as an attraction and as an exhibit in Live Stock. For the harness races an executive committee of local horsemen was appointed and it prepared a schedule for the race meet. This committee consisted of E. P. Heald, President of the Pacific Coast Trotting Horse Breeders' Association; its first Vice-President, J. C. Kirkpatrick, its second Vice-President, I. L. Borden; J. A. McKerron, Director, and F. W. Kelley, Secretary. There was an advisory committee for these races comprising some of the foremost horse lovers of the United

States. Some great trotters were entered and raced, and the revival of the sport was keenly enjoyed by thousands of people.

The executive committee for the Polo Tournament consisted of Joseph S. Tobin, Chairman, J. Cheever Cowdin, Vice-Chairman, and Francis Carolan, George T. Cameron, and John B. Miller. Some account of the results of their labors will be found in another part of this narrative.

After an effort to create a State race commission and then a jockey club, to take care of the running races, both of which attempts were unsuccessful, the Golden Gate Thoroughbred Breeders' Association was organized and entered into contract with the Exposition to hold a 25-day meet on the Exposition track, the Association to stand all the expenses, pay all the purses and give the Exposition 50 per cent of all there was over. About 300 horses were assembled for the meet. The races were a series of most enlivening events, especially as California, which has always been fond of the sport, had had no running races for years.

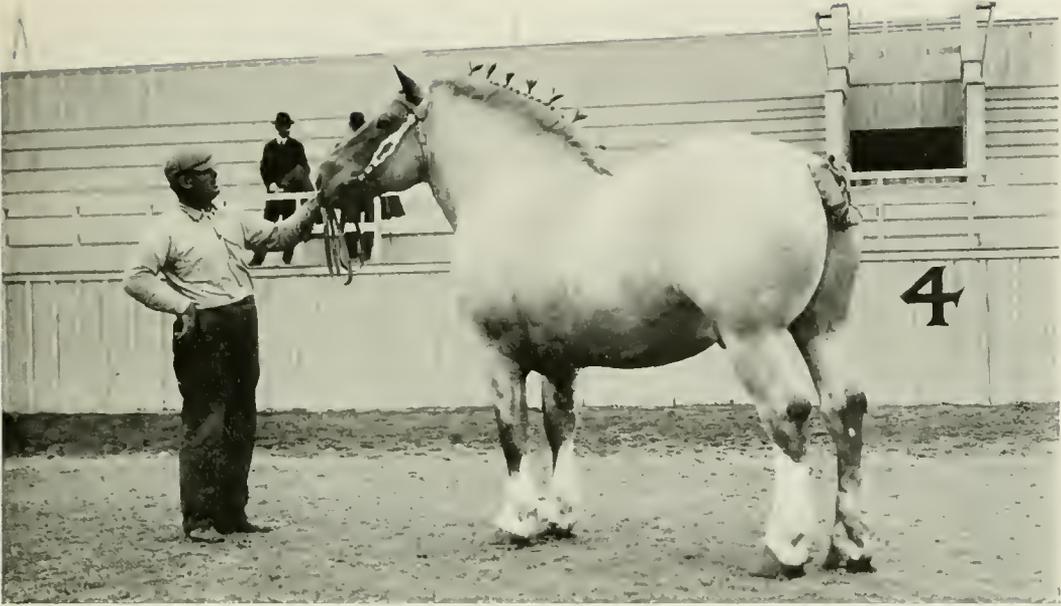
*Running
Races*

To forestall a counter attraction at Golden Gate Park, the Exposition entered into an agreement with the two driving clubs in San Francisco whereby they used the Race Track Sunday afternoons for a season of matinee races. These, in spite of bad weather, kept alive the interest in harness racing, and attracted quite a number of visitors to the grounds that would not otherwise have attended. The races began May 21, and finished August 8.

The performance Horse Show, in addition to the regular competition among the breeding classes which went on at the same time, was based upon a special appropriation of \$15,000. A ring was constructed in the infield of the Race Track, floored with tanbark and surrounded with boxes for the enthusiasts, who paid for them at the rate of \$50 a box. Mornings were devoted to the breeding classes in the Forum, and afternoons to the saddle, jumping and harness classes in the Race Track infield. To quote one of the country's most eminent authorities on the subject, Mr. W. R. Goodwin of the Breeder's Gazette, Chicago:

"It was a world's fair Horse Show judged by any standard. It surprised and delighted all who were fortunate enough to participate in and witness it. In at least three divisions—draft horses, saddle horses, and ponies—it was wholly adequate to the occasion. A more sweeping compliment could not be coined."

On the same authority one of the most interesting features of the show was the entrance of the famous Santa Anita Ranch in the lists. This ranch under E. J. Baldwin had produced four American Derby winners, and under his daughter, Anita M. Baldwin, had largely extended its field of operations



FARCEUR, 7332, WORLD'S CHAMPION BELGIAN STALLION

IMPORTED BY WILLIAM CROWNOVER, HUDSON, IOWA; PURCHASED IN 1917 BY C. G. GOOD OF IOWA FOR THE RECORD PRICE OF \$47,500



THE EXPOSITION HORSE SHOW

and now demonstrated its interest in the breeding of Percherons, Arabs, and jacks as well as Thoroughbreds.

Manifestly it would be impracticable for this narrative to present in detail all the grand groups of contestants—the Shires, the Belgians, the Clydesdales, the Thoroughbreds, the gaited saddle horses, the Standard breds and Hackneys and Morgans and Arabs and Welsh and Shetland ponies, the mules and jennets and grand, big jacks from Kansas and Missouri. It was the greatest horse show ever held anywhere, a visual feast for horse lovers, mornings and afternoons, and a most instructive series of demonstrations for those that had a serious purpose to improve horseflesh and the quality of mules. One hundred and five Percherons were shown, 60 Shires, 39 Clydesdales, 60 saddle horses and about 45 jacks and jennets. About 1,695 horses and asses appeared in the ring. Detailed records of results were presented by the agricultural papers and preserved in their files.

*Day of
the Horse*

In spite of the war there was an important Military Competition although it was confined to United States Army entries, and was nothing to what it would have been had it been possible to carry out Chief Lively's original plans, plans which had the sanction and the coöperation of the highest authorities in the Nation. In December, 1912, the Chief called on President Taft at Washington and explained what he wanted to promote in this particular field: an International Mounted Military Competition at San Francisco. Gen. Leonard Wood, then Chief of Staff of the Army, entered into the plan with enthusiasm. A conference was held between a number of army officers and representatives of a number of horse breeders. Gen. Wood detailed to the Exposition's Live Stock Department, Capt. Arthur Poillon of the First Cavalry to assist in the development of the scheme, and had a program prepared by cavalry officers at Fort Riley; and through the Secretary of War, letters signed by the President of the Exposition were sent abroad inviting the participation of every country having mounted soldiers. Many acceptances were received. In this service and in promotion of the Polo Tournament, Capt. Poillon was most valuable. In March of the Exposition year he was detailed to other duties and Capt. Lewis Brown, Jr., was appointed by the War Department to succeed him. He was a worthy successor and rendered the Department great assistance in polo, and in the regular Horse Show as well as the mounted military features of it.

The Military Competition was merged with the regular horse show, of which it formed a brilliant phase. It contributed so many entries that it was necessary to stable part of the military exhibit in the racing paddock

back of the grand stand, and to ask local exhibitors to keep their horses in their home stables. The exhibitors, outside the military, totaled 188, and the entries came from California, Colorado, Illinois, Iowa, Kansas, Missouri, Nevada, Oregon, and Wisconsin. The show ended with a military tournament and grand parade.

Although 699 beef and dairy animals were shown, the rest of the original 1,834 entries were barred by the quarantine. The dairy cattle came in strength from the Pacific Northwest, where the disease had not appeared. Of dairy cattle entered, a little less than a third were barred. In sheep, goats, and swine there had been 1,848 entries, and 1,250 were barred. Judging of cattle began on October 18, with four rings working at once. Judging of sheep and swine began on November 3 in four rings, two for sheep and two for swine, and went on simultaneously, but the swine entries were large and the judging slow, and it became necessary to carry on seven rings instead of four. The authority we have quoted above said: "Never was more careful or discriminating judging done."

The Superintendent of Entries, Mr. J. W. Kavanagh, endeavored to develop an improvement in the troublesome field of entry and record in the group and herd sections, with fair success as far as it went. One previous difficulty had been that owners wanted the decisions in the individual classes to help them select the animals for their herd or group entries, but the time was always too short between the individual contests and the judging of the herds or groups, and efforts to list the latter through entry clerks after they had come into the ring resulted in many mistakes and much confusion. At the Exposition an effort was made to obviate this difficulty by requiring each exhibitor to file, on prepared blanks, supplemental entries giving the names of the animals of his group. That put the responsibility for a correct record on the owner. As a method of securing clear and serviceable records it was a step in advance and would probably add to the value of these competitions could it be generally adopted.

There was a fine showing of Colorado cattle, and an excellent exhibit of bullocks from the University of California Agricultural College farm at Davis. Good showings were made among the Herefords, the Aberdeen Angus, and Red Polled, but the Galloways and Polled Durhams were caught by the closing down of the quarantine, and though there were fine entries in these breeds, none were shown. When it came to dairy cattle the Jerseys were there in strength, both cows and bulls. One of the bulls was led without a staff by a woman, and he handled as quietly as a well-broken dog. The Guernseys, Ayreshires, Dutch Belted, Brown Swiss, Dairy Shorthorn, and the Holstein-Friesians all made exhibits long to be remembered, whether one

knew them intimately or not, for the evident milk capacity of the cows and the stately pomp of the bulls were impressive sights.

The sheep show was badly hit by the quarantine, the large entries of the Cheviot, Leicester, and Tunis breeds being eliminated, as well as some fine flocks of other breeds from middle western States, flocks that had been under preparation for a year. Most of the sheep exhibited came from Oregon, Wyoming, Idaho, and Washington, with a few notable specimens from New Zealand. There were fairly good exhibits of Shrop-^{The}shires, Hampshires, Cotswolds, Oxfords, Dorsets, Southdowns, *Sheep Show* Lincolns, Romneys, Rambouillets, and Corriedales, with eight Persian Fat Tails. The show was very instructive and there was a good market for the animals shipped in from a distance. Fifty-nine Angora goats were shown, 10 of which were of the long mohair class. The money prizes for sheep and goats came to \$13,067 of which the goats took \$1,375.

The swine show was a distinct success, with the Berkshires leading the interest for the size and importance of the exhibits, because many of them were in ahead of the quarantine. Without the quarantine there would have been a better showing of Duroc Jerseys, Chester Whites, Yorkshires, and Hampshires. There were good showings in Poland Chinas, Large Yorkshires, and Essexes, besides those mentioned. The money prizes for swine came to \$14,076.

Among the minor events promoted by the Department of Live Stock was the St. Patrick's Day Horse Show, and Horse Lovers' Day. Saturday, October 23, was set apart as Live Stock Day; at the conclusion of the judging, and the parade through the Exposition grounds and in the Forum, the milking contest for women, with its 30 entries, and the baby calf distribution to the holders of lucky tickets by the Carnation Stock Farms, brought the exhibit much more thoroughly under public attention than had the preceding work of judging in the arena. The Milkmaids' Contest aroused much interest and was attended by the President and several Directors of the Exposition.

A quarter of a million dollars worth of high bred poultry all under the single roof of the Motor Transportation Building, constituted the Panama-Pacific International Poultry Show, which ran from November 18 to 25, inclusive. Such at least was the estimate of Prof. T. E. Quisenberry, Assistant Chief of the Department, and Superintendent of Poultry, who performed the executive labors of promoting and managing it. It was more than twice as large as the largest poultry show ever held on the Coast before. There were birds from England, Germany, and Japan. Thirty States were represented, and many birds came from Canada. They came in car lots

from Washington, Missouri, Illinois, Iowa, Ohio, Indiana, Kansas, Nebraska, Wisconsin, Oregon, Montana, and British Columbia, and in lesser lots from other parts of the country until there was a total assemblage of 7,725 cocks, cockerels, hens and pullets, pigeons, turkeys, ducks, geese, and game birds, representing 156 varieties. The expenses to the exhibitors could not have been less than \$50,000. Distance, with its high express rates, together with the highest entry fees ever charged at an Exposition poultry show, tended to exclude all but the finest birds in their respective classes, and raise the standard to the very highest.

*A World
of Poultry*

And it was one of the conspicuous successes of the closing days of the Exposition. The Motor Transportation Building, in which the show was held, as the largest available shelter on the grounds, swarmed with people all day long. The total attendance exceeded 800,000, the largest on record at any such event at an Exposition or anywhere else. And yet the show suffered somewhat for lack of a properly printed prize list.

The event was governed by the rules of the American Poultry Association, and prizes were awarded by the American Standard of Perfection. Ribbons, and checks for the cash prizes, were mailed to all exhibitors during the last two days of the show, something never accomplished by an Exposition before. The assistant superintendents had actual charge of cooping in and cooping out all birds, and no exhibitor was permitted to handle his bird at these times without the presence and consent of the assistant in charge of that variety. The rule prevented much confusion, and there were almost no losses. The Exposition appointed a poultry sales commissioner in the person of Judge W. S. Russell, and the sales were handled without trouble.

While the show was going on in the Motor Transportation Building, a number of poultry authorities of national reputation were lecturing on the subject to appreciative audiences in one of the lecture rooms of Festival Hall.

The Pigeon Show was staged with the Poultry Show, in the southwest corner of the same building. In purity of breed and quality it was a very worthy exhibition. The entries were not so numerous as had been expected, although there were over 1,500 birds.

The Poultry and Pigeon Shows had hardly subsided before 340 dogs were barking in a vacant restaurant on the Zone and enjoying themselves so much and giving the visitors so much delight that it was frequently necessary to close the building to get rid of the congestion. The Dog Show barked three days, from November 29 to December 1 inclusive, and the superintendent, Mr. J. A. Boutelle of New York, declared that more people attended it than ever entered the doors in all four days of the Westminster



VIEW IN THE DISPLAY SECTION OF THE CALIFORNIA BUILDING



A HUMBOLDT COUNTY LOG

Kenel Club Show at Madison Square Garden during his twenty years' experience.

Concurrently with the Dog Show but not in the same building, occurred the Cat Show, managed by Mrs. Jack Gordon, and it was said to be the largest cat show ever given in the United States. The Pet Stock Show was held at the same time in the Motor Transportation Building. Mr. C. S. Gibson of Detroit, Secretary of the National Pet Stock Association, was superintendent and judge. The show was creditably handled but the entries were not numerous.

Then came the final and the most human event of the Live Stock Department, the show of Children's Pets. Dr. Frederick W. D'Evelyn originated the idea and was made superintendent of the show. The scheme was new, and there was a lack of sympathy and understanding at first, especially noticeable in the schools, where coöperation of the teachers was most desirable. But the San Francisco Board of Education finally fell in line, the San Francisco "Examiner" conducted a prize contest for the best essay on the humane treatment of pets, the Woman's Board of the Exposition through sub-committees held meetings on the general subject for three months preceding the date set for opening, special publicity writers were put to work upon it, and altogether a great deal of interest was aroused, so that the show finally attracted as much attention as any feature of the closing days of the Exposition. A number of San Francisco ladies gave special prizes, and the Exposition offered ribbons. The Children's Pets Show was held in the Motor Transportation Building on December 2 and 3, so that it was almost the last event of the Exposition's life. Thousands of children attended, and it was remarked that some of them knew more about the sort of animal in which they were interested than some of the adult judges. They took it very seriously, as if recognizing the responsibility attaching to an occasion so peculiarly their own. And when the animals were teased it was by the grown-ups, not by the children.

*A Show
for Pets*

There were squirrels, birds, frogs, dogs, cats, rabbits, guinea pigs, ducks, pheasants, pigeons, a bear, and menagerie stock of many varieties. There were plants and there were posters. The poster show was not particularly valuable; and the only part that caused tears and insurrection was the cat display.

It took over 20,000 ribbons to attest the awards in the Department of Live Stock. In spite of all difficulties it was probably the greatest show of the sort ever seen.

The judges for the Live Stock events and exhibits were:

For the Horse Show: Samuel Bell, Wooster, Ohio; Chas. W. Burgess,

Sr., Wenona, Illinois; C. F. Curtiss, Ames, Iowa; C. Howard Davison, Millbrook, New Jersey; Henry Fairfax, Aldie, Virginia; Alex. Galbraith, De Kalb, Illinois; Jeff. D. Gates, National Stock Yards, Illinois; Frank B. Graham, Kansas City, Missouri; George B. Hulme, New York; Walter A. Palmer, Ottawa, Illinois; Charles Railey, Lexington, Kentucky; W. J. Rutherford, Saskatoon, Saskatchewan, Canada; G. Jason Waters, New York; Capt. Douglas McCaskey, Fourth Cavalry, U. S. A.

Cattle judges: Elliott Davis, Lincoln, Nebraska; Thomas Dempsey, Westerville, Ohio; Calvin Ewing, Youngstown, Ohio; Charles L. Hill, Rosendale, Wisconsin; M. A. Judy, West Lebanon, Indiana; Phil. C. Lee, San Angelo, Texas; T. E. Robson, London, Ontario; W. H. Standish, Lyons, Ohio; Hugh Van Pelt, Waterloo, Iowa.

Judges of the Sheep Show: Henry Arkell, Guelph, Ontario; George W. Cavan, Sugar Grove, Illinois; C. F. Curtiss, Ames, Iowa; F. E. Dawley, Fayetteville, New York; J. C. Duncan, Lewiston, New York; R. A. Hayne, Adena, Ohio; F. B. Marshall, Washington, D. C.; Ernest Robson, Denfield, Ontario; John E. Webb, Southport, Indiana.

Judges of Goats: Thomas W. Brunk, Salem, Oregon; Prof. E. C. Voorhies, Berkeley, California.

Judges of Swine: Thomas Canfield, Canfield, Lake Park, Minnesota; A. L. Goodenough, Morrison, Illinois; W. M. Hoover, Oskaloosa, Iowa; James M. Kemp, Kenney, Illinois; H. W. Mumford, Urbana, Illinois; C. C. Roup, Kalona, Iowa; F. A. Scott, Belleville, Illinois; F. J. Wade, Weston, Ohio.

Poultry judges: E. C. Branch, Lee's Summit, Missouri; W. H. Card, Manchester, Connecticut; H. H. Collier, Tacoma, Washington; A. H. Currier, Santa Rosa, California; W. M. Coates, Vancouver, British Columbia; Elmer Dixon, Oregon City, Oregon; W. C. Ellison, Elma Center, New York; Mrs. Florence Forbes, New Decatur, Alabama; A. G. Goodacre, Compton, California; W. R. Graham, Guelph, Ontario; Theo. Hewes, Indianapolis, Indiana; C. G. Hinds, Oakland, California; Reese V. Hicks, Brown's Mills, New Jersey; George D. Holden, Owatonna, Minnesota; V. O. Hobbs, Mt. Grove, Missouri; O. L. McCord, Peoria, Illinois; Charles McClave, New London, Connecticut; Russell Palmer, Lincoln, Nebraska; H. A. Pickett, Mattoon, Illinois; W. C. Pierce, Hope, Indiana; Irving Rice, Cortland, New York; W. S. Russell, San Francisco, California; E. G. Roberts, Fort Atkinson, Wisconsin; C. H. Rhodes, Topeka, Kansas; James A. Tucker, Royal Oak, Michigan; C. P. Van Winkle, Dallas, Texas; Daniel P. Shove, Fall River, Massachusetts; Theo. Wittman, Allentown, Pennsylvania; Walter Hogan, Petaluma, California.

Pigeon judges: George Ewald, Cincinnati, Ohio; W. J. Head, West Berkeley, California; J. A. Jansen, Milwaukee, Wisconsin; C. E. Twombly, Boston, Massachusetts.

Judge of Cats: Mrs. Helen Brayton, Brighton, Massachusetts.

Pet Stock judge: C. S. Gibson, Detroit, Michigan.

Judges of Dogs: Jos. W. Burrell, Broomal, Pennsylvania; W. M. Coates, Vancouver, British Columbia.

Judges for the Children's Pets Exhibition: rabbits and cavies, M. Regner, San Mateo; Hale Prather, Ukiah, California; poultry, ducks and pheasants, Mrs. D. B. Spaulding, San Francisco; E. J. Talbott, San Mateo, California; dogs (all classes), Mrs. Agnes Fenwick, and A. B. Korbel, San Francisco; cats, (all classes), Mrs. Jack Gordon, Menlo Park, California, and Mrs. Langley Porter, San Francisco; posters, Miss Katherine N. Ball and Mrs. Bertha Stringer Lee, San Francisco; pigeons, H. F. Whitman, Oakland, California, and Mr. George I. Marsh, Mill Valley, California; plants (all classes) John McLaren, San Francisco; birds and menagerie stock, Mrs. L. D. Mills, Berkeley, California; Mrs. W. Cooley, Alameda, California, and Dr. Frederick W. D'Evelyn, San Francisco.

CHAPTER LXVIII

THE CALIFORNIA COUNTY DISPLAYS

“Before the river enters into Egypt, people who are accustomed so to do, cast their nets outspread into the river, at night; and when morning comes they find in their nets such goods as are sold by weight, and brought into the land, viz., ginger, rhubarb, wood of aloes and cinnamon. And it is said that these things come from the earthly paradise; for the wind blows down the trees in paradise, just as the wind blows down the dry wood in the forests of our own land; and the dry wood of the trees in paradise that thus falls into the river is sold to us by the merchants.”—*De Joinville's Chronicle of the Crusade of St. Louis.*

PERHAPS the first feeling one experienced on entering the county section of the California Building was one of utter bewilderment that so many beautiful natural and cultivated products could have been brought together in one space. Here were four acres of tabernacles and kiosks and open-topped booths, in which the products of a refined and favored agriculture and specimens of a mineral wealth famous the world around, excited the admiration of every beholder for their excellence. Even the native son was not exempt.

Agricultural and horticultural products are likely to be, in the mass and merely as objects of passing regard, more attractive than the average of manufactures or machinery; and California fruits are beautiful in themselves individually and in their vast variety. The olive and the orange, the grapefruit and the pear, the apricot, and the humble prune of the American *pension*, green or dried or in the magic liquor of tall crystal jars, can, at the hands of artists in preservation and display, be made to look as delectable as any fruit in fairy lore. And of course the aforesaid artists did not waste their talents on the poorest examples. The best of it was here, the most nearly perfect specimens that have ever been produced. The jars stood in gilded niches, the booth fronts were ornamented with panel pictures made of silken grasses and the golden grains, the booths themselves were in the best of festive design, and here and there were dioramas exquisitely painted and delicately illuminated, showing such scenery as Yosemite, such beautiful natural wonders as the Big Trees, and museum



THE SAN MATEO COUNTY BOOTH



FROM SOUTH OF TEHACHAPI

sets with diorama backgrounds into which these things faded imperceptibly, showing bears, and mountain lions, and spotted fawns, and the haunts of wild geese and feathered game of too many kinds to mention. And the whole thing was a-bloom with potted plants and cut flowers, among which fountains tinkled. The best of the State was brought or represented here. The walls of the vast exhibit hall were hung with paintings of California scenes by California artists, and such canvasses as "Santa Clara Valley in Blossom Time" were a revelation to the eastern visitor.

Around the great display space ran a broad balcony, from which opened rest rooms, or more display rooms, kept open by the various counties or county groups for their people and their friends, like little State buildings.

So much of excellence was here presented that it is practically impossible to convey any very definite impression of it as a whole. We can only record, bit by bit, what a few counties and groups of counties accomplished, with no hope of making the reader see what the displays looked like, but merely with idea of making some record of the things some of them did. Out of 58 California counties, 53 are mineral producers, 48 are far advanced in agricultural and horticultural development, and 20 claim eminence as centers of education. Seven counties represent the largest redwood timber stands in the world. Products of all these lines of endeavor and development, exemplifications of all their possibilities, were here in the most imposing order.

Santa Barbara County, rolling gently down in green billows to the Channel and soothed by warm winds of the Pacific, showed her gentle and picturesque landscapes by means of paintings. Her venerable Mission was represented by a model. The "Forbidden Garden" of that Mission was copied in part in the garden of the California Building itself.

*A Spanish
Mission*

Humboldt County, far in the north, put in one of the best collections of forest scenes ever made, for Humboldt County has great stands of redwood trees. The pictures were hung in the "redwood room," inside a redwood stump 20 feet in diameter, and 2,000 years old.

Marin County, San Francisco's superb and pet playground, took a space on the north side of the building, and opened a wide plate glass window that showed without the painter's brush or colors her mountain ridges rising into the blue across the Golden Gate. Original as the idea was, however, there was so much more to be set forth that she had to hang paintings and install dioramas to indicate a little of it. Such was the painting of the landing of Sir Francis Drake, the first landing of white men in California.

It may have lacked photographic accuracy, but it recorded and proclaimed a historic fact of great and general interest.

The San Joaquin Valley Association installed a grand diorama of Yosemite Valley—a hard thing to depict. Yet here one saw El Capitan, grim and frowning, Bridal Veil and Yosemite Falls, all the charm of the Merced winding through its azaleas and water elms, the stupendous walls, and the stone domes against the sky above them. By manipulation of electric lights you had here the effects of the crimson glow before the dawn, of sunrise, sunset, moonrise, moonset, and starlight. Other dioramas of the San Joaquin Valley Section showed mining along the Mother Lode, the Big Trees, and the agriculture and viticulture of the participating counties. But scenery was not all this great region had to show. One of the finest ceramic displays in the whole Exposition was in this section.

The Sacramento Valley dioramas showed mining, river navigation, and the great irrigation projects and hydro-electric power plants for which the State has been famous, as a pioneer in this field. Here was the monument to James Marshall, discoverer of gold in California, and here, too, was one of the original nuggets he picked up at Coloma. There was a miniature reproduction of the Sacramento River, with a 2,000-dollar working model of a river steamer. There were working models of a quartz mill, and a gold dredger. This section featured one of the best wild game and song bird collections of the State. The San Joaquin Valley, and Lake, Mendocino, Sonoma, and San Luis Obispo Counties, also displayed mounted game and birds.

The seven counties south of Tehachapi Pass were grouped in one section as Southern California. In addition to cotton, citrus fruits, dates, olives, nuts, and other products, there was a fine collection of deep sea fish taken off Catalina Island, including one of the great leaping tuna, weighing 150 pounds. Probably the most impressive thing in this section, more impressive than the large values in ostrich plumes, was the cotton of the Imperial Valley, for it was comparatively a new crop, and meant much to California, commercially and industrially.

There was a fine collection of Indian baskets, although not wholly Californian. The "redwood counties," including Mendocino and Sonoma, made some grand displays of the gigantic trees from which the redwood lumber comes, although they were not the California Big Trees, being somewhat smaller and of slightly different growth. California iron, copper, sulphur, asbestos, lead, and diatomaceous earth were shown, besides quartz and nuggets. Dairy products played a large part in the displays. The wine sample showing was handsome and varied, representing the counties of the

*Magnetic
Nugget*

Sacramento and the San Joaquin Valleys, of Southern California, and Napa, Sonoma, Humboldt, Mendocino, Santa Cruz, and Santa Barbara Counties, with notable displays of wine in bottles.

Of course no California display worthy the name would have been complete without examples of the productions of Luther Burbank, whose achievements in hybridization and selection have not only given the world botanical species that nature never thought of, but have helped spread new modes of thought and new conceptions of creative processes.

Sonoma and Alameda Counties showed some of the Burbank productions in the California Building, although the best exemplifications of the California plant wizard's patient and discerning magic were in the Palace of Horticulture.

*Burbank
Again*

Gravenstein apples and White Leghorn hens were an important part of the display of Sonoma County. The apples were in boxes, but the hens rode around on the rim of a huge Ferris wheel coated thickly with Leghorn and Barred Rock feathers. Its motion attracted attention and it was one of the noticeable features of the eastern part of the hall. Redwood timber and grains were conspicuous in this booth.

Besides processed fruit and flowers in jars, Alameda showed by dioramas her development in transportation, and the rapid advancement of her cities and towns. It was an impressive display of community growth in the conveniences of modern life.

The San Mateo pavilion with its fountain was one of the gems of the Exposition. Little of the mercantile motive appeared in San Mateo's display, and perhaps it was the more effective in a mercantile way for that. If the hand of the land boomer was in it, that hand was skillfully concealed under the floral wealth lavished on this little beauty spot by the villa gardens of the southern part of the San Francisco peninsula. There was an uninterrupted supply of the most exquisite cut flowers to be seen anywhere in the world, the cherished products of the care and skill of real amateurs. Only this touch was needed to give ample and convincing support to all that has been told the world about the "land of sunshine, fruit, and flowers."

And California is not only that, but it is historically the land of religious zeal and ministry, a land whose earliest traditions are suffused with the glamor of the conquests and missionary labors of Spain, reflected through the Moorish wars from the dead Crusades. The last northward-moving wave of that ancient Spanish ardor died on the sands of the Presidio shore; but it was still strong when it reached the Bay of Monterey. Monterey County displayed relics of the Spanish Missions and of the days when under Spain and under Mexico it was the capital of

*The
Old Capital*

Alta California. The flagpole and the American flag raised on it by Commodore Sloat were exhibited. Here was a copy of the original Custom House, and there was a chair made from the wood of a tree under which Father Junipero Serra preached.

Contra Costa County, richly pastoral and agricultural, lying beyond the hills of Alameda County and running north and westward to the Bay, had experienced in the decade before the Exposition a sudden industrial expansion, manifested in the establishment of some of the largest manufacturing plants in the State along its northern and western Bay shore. This growth was illustrated by displays showing the products of powder mills, oil refineries, sugar factories, chemical works, smelters, steel pipe factories, sanitary potteries, tank factories, wineries, and canneries.

That smiling child of hope and chance, the "pocket miner," still roots in the auriferous foothill soil of Siskiyou County, dreaming of a bucket of nuggets. And Siskiyou supports his optimism and sometimes a little rewards it. If it had no gold whatever it would still be a wonderful region, and in addition to its mining resources it showed a remarkable collection of furs to indicate its wild game attractions, and of processed fish so that no tourist might escape. The gold display was in a cement enclosure with an entrance built of twelve varieties of stone. But agriculture, horticulture, and lumbering also had their places.

Peter Lassen's old volcano decided, the year before opening, to participate in the Exposition, and even though it could not come to the grounds, it did the best it could by blowing off a little of its crest and starting a mud and lava flow of considerable size. As a tourist attraction it worked hard, and so Lassen County rewarded it by taking its picture to the California Building and displaying it advantageously in the Lassen County booth, together with a painting of famous old Susanville in 1864. Here were a large collection of Indian baskets, and some scenic models of mountain scenery with furred and feathered game.

The delicate beauty of Lake County, region of delight to the lover of nature and fine landscapes, was depicted in photographs and paintings.

Tuolumne County displayed \$30,000 worth of gold, with some very rich specimen ores. It exhibited some beautiful processed fruits, and a line of pictures showing the road to Yosemite by way of Big Oak Flat.

Tourists in Napa County are invariably delighted by the simple and artistic stone highway bridges that cross the streams. They were represented in the Napa County section by a considerable structure of tufa, said to contain one hundred tons of this material, and having three arches of large span. It was an actual ready-cut bridge which was to be put together



FRUITS OF THE CENTRAL VALLEY



FROM MONTEREY BAY

in position after Closing Day. The diversified products of this county were illustrated by examples of nuts, fruits, wines, olive oil, grape juice, cider, mineral waters, corn, grain, leather, and manufactured goods. There were some silk worms and raw silk from the station of the women's silk culture society at Rutherford.

Oil derricks and oranges characterized the joint display of Tulare and Kern Counties. There were some giant bamboos, and many samples of oil products.

Santa Clara County, forking the southern apex of San Francisco Bay, has over 7,000,000 bearing fruit trees, which make it one marvelous garden set with prosperous homes. It showed its fruits, among which the prune and the apricot hold high place, and it showed by means of paintings and as well as paintings can, how these millions of fruit trees look when they are all in blossom at once. Flowers were a large part of this display.

Almost every county in California was represented in the display section of the California Building, and obviously it would be impossible to catalogue here all the varied and excellent things they showed. The fruits, flowers, grain, and gold of the State were there in abundance, accompanied by the necessary data to inform people just where all that abundance and all that excellence had been produced.

But these were not the only things displayed. If local exploitation was somewhat indulged in it took its best form in response to the higher spirit that animated the whole Exposition, for a great many counties seized the opportunity to show what they were doing to advance and facilitate education. That note was very pronounced. Schoolhouses of the most advanced type, progressive educational tendencies, were exemplified in every possible way. Manual training and domestic science figured largely in these displays, as both had been highly developed in the California schools. The most extensive effort at display of this kind was made by the sixteen Sacramento Valley and foothill counties. They showed kindergarten work as well, and many of the products of polytechnic training. Hardly a county in the State neglected its educational display. The majority installed the educational features in the balcony or the rest rooms opening from it. Tables, chairs, desks, davenport, beds, tools, and other products of polytechnic training impressed the beholder with a strong sense of the versatility of the California youngster and the efficiency of the methods of training his practical qualities. And the handiwork of the girls was shown in the form of needlework, basketry, paintings, drawings, and tapestries.

Over 100,000 feet of moving-picture film was exhibited in the many

moving picture theaters in this building. Almost all the leading counties had moving-picture theaters, or shared them among groups.

Horticulture, stock raising, irrigation, lumbering, mining, the oil industry, bee raising, fruit packing and canning, the movements of shipping, and the other large industries of the State were depicted by this most fascinating method of representation, accompanied by lectures.

CHAPTER LXIX

THE HIGH COURT OF THE ARTS

THE award system of a great exposition becomes a court whose verdicts affect the public choice of commodities, and the prosperity of industries involving millions of capital; and through those verdicts the trade of nations may be seriously modified. In this court the foremost producers of the age go voluntarily to trial, and they go without knowing who their opponents will be until they find themselves side by side with them in the Palaces; for the list of exhibitors is necessarily one of the most carefully guarded of exposition secrets. *Coming to Judgment*

To institute simultaneous, and competent, surveys of the products of civilization collected in an exposition, and to provide judicial machinery that shall not only decide among those products, but shall quiet appeals and reconcile protests arising out of such decisions, and do it without suspicion of influence or risk of important error, is one of the gravest responsibilities of exposition management.

For, an exposition is not merely a collection of exhibits; it is a collection of competing exhibits. And it forms a great stimulus to producers in their endeavors to excel, if they know that at more or less regular intervals they are going to be able to get world recognition of their excellence from the one tribunal competent to accord it. So the award system, far from being a mere accident, and dispensable, is of the essential substance of all expositions that do their proper work in the world.

A properly administered award system calls into being a congress of authorities and world experts, men whose intellectual attainments are the latest developments in the arts and sciences, and these men are asked to sit in judgment on the fruits of the world's industry. The public does not see much of this congress, because the delegates are very busy, and their deliberations necessarily private; but it is there, and for the public good it is determining what material acquirements of man are for man's best service, and adding to the world's stock of organized practical learning while doing it; in fact, experting the materials of civilization.

Nearly 500 leading men and women in the various fields of the arts and

sciences assembled at San Francisco on the third of May, 1915, called together by the International Award System of the Exposition, to serve on its juries. Their advent was unheralded except in a very casual way, but quietly they arrived from the ends of the earth and reported at the offices of the chiefs of the various exhibit departments. It was *Congress of Experts* unprecedentedly early in the season, a fact of which the successful exhibitors and the general public were to have the benefit in the form of the announcement of awards long before the Exposition closed.

The International Award System at San Francisco was separate from and independent of the other branches of the Exposition government, and every precaution was taken to keep it so. Although the System was called into being by the Exposition, and the Exposition paid the expense of it, the juries were organized independently, and their function was kept scrupulously clear of any possibility of entanglement with, and hence any suspicion of influence from, the rest of the organization. The only link between the Exposition and its own Award System was the fact that President Moore of the Exposition was the Honorary President of the Superior Jury, and Dr. Frederick J. V. Skiff, Director-in-Chief of Foreign and Domestic Participation, was its President. Beyond the Honorary President's opening address to the Superior Jury, solemnly charging it with the exercise of impartial justice, he very rarely participated in its deliberations.

The organization of the System was based on the experience of the Director-in-Chief of Foreign and Domestic Participation, Dr. Skiff, who had been an important factor in the Award System at Chicago and St. Louis, and had laid out the plans for the one at Nashville. In successive issues of the rules for the guidance of participants the Directors had notified intending exhibitors that the awards would be competitive, and that the merit of exhibits as determined by the Jury of Awards would be "manifested by the issuance of diplomas divided into six classes: a grand prize, a medal of honor, a gold medal, a silver medal, a bronze medal, and an honorable mention (without medal)"; furthermore that no exhibit could be excluded from this competition except after a review of the reasons or motives by competent authorities, and subject to the approval of the Director-in-Chief of Foreign and Domestic Participation. In a fixed ratio to the number of exhibits, but reserving to the citizens of the United States approximately fifty per cent of the jury membership, the composition of the International Jury *Make-up of Juries* would be based upon a determined number of judges allotted to each group of the classification, and upon the number and importance of the exhibits in such group. Officers were provided for; and special regulations would be adopted afterward. These were left to the wisdom of



MEMBERS OF THE SUPERIOR JURY, INTERNATIONAL SYSTEM OF AWARDS

LEFT TO RIGHT, UPPER: GEORGE A. DENNISON, LUIS ABELLI, CHARLES E. VAN BARNEVELD, T. T. READ, ENRIQUE NELSON, THEODORE HARDEE, CAPT. J. J. HITTINGER, DR. A. W. BITTING, GEORGE W. DANFORTH, O. H. FERNBACH, SECRETARY; E. DE KRUYFF, PROFESSOR EDMOND O'NEILL, JIRO HARADA, J. R. TAYLOR, L. Y. HO, DR. A. S. DOWNING, CHARLES H. MAGEE, ALVIN E. POPE, DR. S. C. SIMMS.

LOWER: J. E. D. TRASK, J. ALDEN WEIR, MANUEL ROLDAN, IGNACIO G. SARAVIA, IT. EDUARDO PEROTTI, CHESTER H. ROWELL, CAPT. ASHER CARTER BAKER, DR. A. COLASANTI, DR. F. J. V. SKIFF, PRESIDENT; HORACIO ANASAGASTI, HARUKI YAMAWAKI, H. A. VAN COENEN TORCHIANA, CHEN CHI, MAJ. GEN. E. LOYNAZ DEL CASTILLO, EDMUND CLIFTON, DR. L. M. GUERRERO, CAPT. F. W. FERRIS, BLYTHE H. HENDERSON, M. L. PERRASSO.

the Director-in-Chief of Foreign and Domestic Participation, whose experience and international repute made him the logical person to direct this vital business.

The Jury had to be invited from universities, from the laboratories of great manufacturing corporations, from schools of art. It must consist of the most eminent living authorities available—steel experts, cement experts, machinery experts, petroleum, landscape painting, food, roofing experts, every sort of engineer the schools produce. It must be proportioned numerically to the exhibits, and balanced internally between foreign and United States members so that, the latter slightly preponderating, its decisions should be those of an American exposition.

Strict account of the acceptances had to be kept. There had to be an office that should be a clearing-house for the System, and an officer in whom all the lines of it should center, and who should also be independent of entanglements with any jury or judge. About the middle of 1914, O. H. Fernbach, Secretary of Foreign Participation of the Exposition, was made Secretary of the International Award System, to serve as executive officer for the whole work. Owing to his peculiar qualifications, added to his familiarity with the Exposition's development and his vigor in execution, the choice was probably the best that could have been made.

It was decided that the United States jurors should be recommended by the chiefs of the Exhibit Departments, inasmuch as they would be familiar with the leaders in their respective fields. Estimates were made of the necessary numbers of jurors in each group and Department. The chiefs opened correspondence with lists of men they thought desirable, to ascertain whether they would serve, and then communicated the resulting lists of available members to the Director of Exhibits, who, after carefully canvassing them, and making any necessary eliminations, sent them to the Director-in-Chief of Foreign and Domestic Participation. The approved list went to the President of the Exposition, who, being satisfied of the qualifications of the persons named, tendered them the appointments.

Foreign members were appointed by the Commissioners General of their respective countries, and as a rule the foreign commissions sent back to those countries for qualified jurors. Jurors representing foreign exhibitors received no compensation from the Exposition nor any allowance for expenses; nor did those representing domestic exhibitors and residing within 30 miles of San Francisco. All other domestic jurors were allowed traveling expenses and a subsistence per diem while traveling and employed on jury duty.

The System thus instituted was known internationally as the Skiff

System. There were three stages and three grades of jury through which an award recommendation had to pass on its way to becoming an award. The first grade was the Group Jury. Of these there were 54, covering the 156 groups of the classification. Each Group Jury had its Chairman and Vice-Chairman, either one of whom had to be a citizen of the United States and the other a foreigner from a country represented in the Division of Exhibits. These juries were composed of men of renown; such authorities and masters of craft as William M. Chase, Frank V. Du Mond, Frank Duveneck, Jean Guiffrey of the Louvre, Prof. Arduino Colasanti of Rome, Hiromichi Shugio of Japan, and C. Y. Yen of China in the field of the Fine Arts; Dr. Rupert Blue, Surgeon General of the United States Public Health Service, and Dr. Thomas W. Salmon of the National Committee for Mental Hygiene, in the Department of Social Economy; Dr. Arthur A. Hammerschlag, Director of the Carnegie Institute of Technology, Dr. Maria Montessori of Italy, Dr. Benjamin Ide Wheeler, President of the University of California, Dr. David Snedden of the Massachusetts Board of Education, and Dr. Lewis M. Terman of Stanford University, specialist in defectives in the Department of Education; and in the domain of the commercial exhibits such technical experts as L. A. Fisher of the United States Bureau of Standards at Washington, E. de Kruyff, of Batavia, Hugo Lieber, Milward Adams, Prof. V. Karapetoff of Cornell, Daniel Mercein, editor of "Silk," Charles E. Lucke, Professor of Mechanical Engineering in Columbia University, F. R. Low, editor of "Power," George W. Dickie of San Francisco "the man that built the 'Oregon,'" C. M. Jansky, Professor of Electrical Engineering in the University of Wisconsin, David L. Gallup, Professor of Gas Engineering in Worcester Polytechnic Institute, Jiro Harada, Dr. Koji Miyake and Kinji Ushijima of Japan, Dr. V. M. Placeres of Cuba, Prof. William Dallam Armes of the University of California, Edward C. Crossman, the small-arms authority, Atruro Fauzon of Argentina, Charles Carpy of San Francisco, Prof. F. T. Bioletti of the University of California, Prof. E. G. Montgomery of Cornell, Dean C. F. Curtiss of Ames, Iowa, George C. Roeding of Fresno, discoverer of fig capri-fication, Dr. W. A. Bitting, food technologist of the National Cannery Association, Prof. William R. Appleby, Dean of the Minnesota School of Mines, Ralph Arnold, the petroleum expert, F. W. Bradley, the mining engineer, Dr. F. G. Cottrell, Chief Chemist of the United States Bureau of Mines, and Dr. A. C. Lawson, the geologist of the University of California. These are but a few among hundreds of illustrious names.

The Department Juries consisted of the Chairmen and Vice-Chairmen of the Group Juries in each Department. Each Department Jury had its

Chairman and Vice-Chairman, of qualifications similar to those of the Group Juries.

Directly after their arrival on May 3, the jurors subdivided into separate juries and went to work testing and studying and judging the exhibits in their respective groups. This went on for 20 days (except in the case of the Departments of Horticulture and Live Stock, the exhibits of which are largely seasonal) and the findings were certified to the Department Juries. The Department Juries reviewed the reports of the Group Juries for five days, and then through the Chiefs of their various Departments submitted their findings to the Director of Exhibits, who within another five days had to certify them to the Superior Jury, together with any uncompleted work of the Department Jury.

*Trial
Begins*

The Superior Jury was composed of the Commissioners General of the eleven foreign countries whose exhibits occupied the largest amounts of space in the exhibit palaces; the Chairmen and Vice-Chairmen of the Department Juries, the Chiefs of the Exhibit Departments, a member of the Federal Commission and a member of the State Commission. The President of the Exposition could appoint from the American members of the Department Juries such other members as were necessary to give each Department a representative on the Superior Jury, but this power it was not found necessary to exercise.

The Group and Department Juries were recommending bodies only. The decisions were actually made by the Superior Jury of 46 members, and the recipients were sent the notices of their awards by the President of the Superior Jury, Dr. Skiff. Besides the President of the Exposition, the other members of the Superior Jury were:

Luis Abelli of Bolivia, Department of Mines; Milward Adams, Manufactures; Dr. A. W. Bitting, Horticulture; Major General E. Loynaz del Castillo, Commissioner General for Cuba; Chen Chi, Commissioner General for China; Edmund Clifton, Commissioner General for New Zealand; Geo. W. Danforth, Chief of the Department of Machinery; E. de Kruff, of The Netherlands, Horticulture; George A. Dennison, Chief of the Department of Horticulture; Count del Valle de Salazar, Representative for Spain; G. W. Dickie, Machinery; Dr. A. S. Downing, Education; Captain F. W. Ferris, Transportation; Chas. H. Green, Chief of the Department of Manufactures and of Varied Industries; Dr. L. M. Guerrero, Commissioner General for the Philippine Islands; J. Harada of Japan, Liberal Arts; Theodore Hardee, Chief of the Department of Liberal Arts; Blythe H. Henderson, Chief of the Department of Transportation; J. J. Hittinger, Agriculture; L. Y. Ho of China, Manufactures; D. O. Lively, Chief of the Department of Live Stock;

A. de Sousa-Lopes of Portugal, Fine Arts; Chas. H. Magee, of the Philippine Islands, Education; Enrique Nelson of Argentina, Agriculture; Prof. Edmond O'Neill, Liberal Arts; F. G. Pemberton of Australia, Machinery; M. L. Perasso of Italy, Transportation; It. Eduardo Perotti, Commissioner General for Uruguay; A. E. Pope, Chief of the Departments of Education and Social Economy; T. T. Read, Mines; Manuel Roldan, Commissioner General for Portugal; Chester H. Rowell, Commissioner for the State of California; Ignacio G. Saravia, Commissioner General for Guatemala; Dr. S. C. Simms, Social Economy; Thos. G. Stallsmith, Chief of the Department of Agriculture; J. R. Taylor of Cuba, Social Economy; J. E. D. Trask, Chief of the Department of Fine Arts; Chas. E. van Barneveld, Chief of the Department of Mines and Metallurgy; J. Alden Weir, Fine Arts.

The four Vice-Presidents of the Superior Jury were appointed in accordance with the rules by the President of the Exposition, three of them to represent Europe, Central and South America, and the Orient. They were: First Vice-President, His Excellency Ernesto Nathan, Commissioner General for Italy, who was succeeded by Dr. A. Colasanti, Commissioner for Italy, succeeded in turn by H. A. van Coenen Torchiana, Commissioner General for The Netherlands; Second Vice-President, Horacio Anasagasti, Commissioner General for Argentina; Third Vice-President, Haruki Yamawaki, Commissioner General for Japan; Fourth Vice-President, Capt. A. C. Baker, Director of Exhibits of the Exposition.

The Superior Jury convened on June 3 in a chamber of the Administration wing of the California Building. In furnishings, decorations, and appointments, the chamber was a dignified setting, very like a Supreme Court room, as befitted so important a drama. Here the sessions of the Jury continued until June 18, when it disbanded, leaving uncompleted matters to a Residuary Committee composed of the President and four Vice-Presidents of the Superior Jury, with two additional members; who were to continue the work as long as necessary, and who actually carried it on until the close of the Exposition. The limitations of time constituted what was called the "time lock system," and was one of the precautions of the Skiff jury plan against vexatious and expensive delays.

According to the scale of markings, 100 indicated perfection. Exhibits receiving marks ranging from 60 to 74 inclusive received a bronze medal; those receiving from 75 to 84 inclusive received a silver medal; those from 85 to 94 inclusive a gold medal; those from 95 to 100, a medal of honor; and anything taking a Grand Prize had to be the best exhibit in its class. For special reasons a diploma of honorable mention, without a medal, might be

*Final
Verdict*

THE UNITED STATES OF AMERICA
PANAMA-PACIFIC INTERNATIONAL EXPOSITION
 SAN FRANCISCO, MCMXV.

GRAND PRIZE

W. H. ...
Mar. 6, 1915
Wm. H. ...
Wm. H. ...
Wm. H. ...

PANAMA



ARTS & SCIENCES

MANUFACTURES

TRANSPORTATION



EDUCATION

AGRICULTURE

MINING



DIPLOMA OF AWARD

awarded. In the case of musical instruments the markings went fifty numbers higher, the extra fifty being for tone.

As a guide to the juries the suggestion accompanied the rules that a marking of not more than 25 be allowed for the value of the article "as measured by its usefulness, its beneficent influence on mankind in its physical, mental, moral, and educational aspects"; that a marking not to exceed ten be allowed on the magnitude of the business represented as measured by its gross sales for the year preceding the opening of the Exposition— which would indicate the service it had rendered the public; that a marking not to exceed ten be allowed for quality or cheapness— for the same reason; that a marking of not over five be allowed for the length of time the exhibitor had been in business, and another of not over five for awards received from other expositions. Here were markings of 55 out of 100, which, it was suggested, should be given for reasons based entirely on the service of the exhibitor to the consumer, rather than on the character of the exhibit as a novelty or as a money-making device—a most advanced position from the standpoint of economics, and of public welfare.

*Scale
of Marking*

This was, in outline, the International Award System as instituted and operated at San Francisco. The time limits set could not be observed exactly, on account of complications brought about by the war, so there was always an Unfinished Business Committee in session, but the work ran very close to schedule, and was finished much earlier than had been the case at other expositions. The labors of the Group and Department Juries were greatly facilitated by carefully prepared questionnaires, on which could be entered all relevant information and findings in uniform order. These sheets, by thousands, became vital reference volumes in the files of the System, the basis for the issue of the diplomas and medals. Here especial value attached to business cards and printed letter-heads, because they carried personal and corporate names legibly and accurately.

The medals were designed by John Flanagan, the sculptor, and struck in bronze at the Philadelphia Mint, for Exposition account. The recipients could have them plated with the metal corresponding to the award, according to exposition practice. The diplomas were the work of M. W. Baldwin, engraver, and C. A. Huston, designer, and were turned out for Exposition account by the Bureau of Printing and Engraving at Washington, on special Japanese paper of such fiber that no erasures could be made without detection. They bore the signatures of the President and Secretary of the Exposition, the President of the Superior Jury, the Secretary of the Award System, the Director of Exhibits, and the Chief of the Department in which the exhibit was made.

The work of issuing the diplomas and medals occupied the Secretary of the Award System and six assistants for more than two years after the close of the Exposition. The precise object for which the award had been rendered had to be defined with the greatest exactitude, to keep one award from trespassing on another. And, of course, a diploma in which the name of the exhibitor, Greek, Turk, Armenian, German, Frenchman, Japanese or Chinese, individual or corporate, had been misspelled by one letter was worthless, and an offence to the recipient. Some notion of the exacting clerical labor involved in issuing the diplomas may be derived from the fact it was found necessary after the close of the Exposition to send out over 9,000 letters to decide the spelling of doubtful names, before it was safe to proceed; while the mere estimate of diplomas to be printed and medals to be struck involved a long and difficult count under careful check.

There were 25,527 awards, involving the issue of 20,344 medals and 25,527 diplomas. Contestants in the Milk Show received 237 of these diplomas and 36 medals. In addition, 22,500 ribbons were necessary for the Live Stock Department, where the awards were made under a special and separate system by licensed judges. There were no lawsuits, although the last international exposition in this country had five arising out of award contests. There was but one per cent of protests at San Francisco; of which less than a quarter were found to have merit. Domestic exhibitors received 8,573 diplomas and 7,492 medals, domestic collaborators 2,746 diplomas and 2,667 medals, while foreign exhibitors and collaborators received 11,520 diplomas and 8,985 medals. In addition there was a large number of commemorative awards requiring the issue of diplomas.

The public did not have to await the actual issue of the diplomas and medals to learn which exhibitors had received awards. About the middle of the Exposition season hundreds of booths began to blossom with different colored ribbons and banners announcing that the exhibit had been adjudged worthy a Grand Prize, or a Gold Medal or a Medal of Honor. The furnishing of these ribbons to exhibitors was a concession let to the B. Pasquale Company of San Francisco, and administered under jealous control. Although one exposition had to revoke a similar concession, there were no abuses of it here, and it netted the Exposition a satisfactory cash return. In spite of the display of these ribbons and banners, numberless letters of inquiry from intending purchasers of all sorts of commodities, demonstrated the public's interest and confidence in this very vital function of Exposition work.

It is not within the province of this history to present the list of awards,

*Expert
Labors*

*Early
Decisions*

which is matter for separate publication, if any; but it will be of interest in connection with the general subject of the Exposition to note that these exhibits received prizes for the finest installations in various exhibit palaces.

The Eastman Kodak Company, in the Palace of Liberal Arts; the Gorham Company, in the Palace of Manufactures; the Busch-Sulzer Bros. Diesel Engine Company, in the Palace of Machinery; the Westinghouse Electric and Manufacturing Company, in the Palace of Transportation; the International Harvester Company, in the Palace of Agriculture; the Sperry Flour Company, in the Palace of Food Products; the State of Oregon, in the Palace of Horticulture; and the United States Steel Corporation, in the Palace of Mines and Metallurgy.

We append here the jury lists, as matter of contemporary interest and historic value; for these were among the leading names in the arts and sciences at the time of the great European war:

DOMESTIC JURORS—DEPARTMENT OF FINE ARTS

PAUL WAYLAND BARTLETT
A. STIRLING CALDER
WILLIAM M. CHASE
GEORGE WALTER DAWSON
CHARLES J. DICKMAN
FRANK V. DUMOND
FRANK DUVECK
CHARLES GRAFLY
JEAN GUIFFREY
PHILIP L. HALE
JOHN MC LURE HAMILTON
WALTER MAC EWEN
LOUIS MARK
ARTHUR F. MATHEWS
FRANCIS MCCOMAS

L. H. MEAKIN
C. POWELL MINNIGERODE
JOSEPH J. MORA
LOUIS CHRISTIAN MULLGARDT
EUGEN NEUHAUS
HAIG PATIGIAN
WILLIAM M. PAXTON
JOSEPH PENNEL
EDWARD W. REDFIELD
THOMAS WOOD STEVENS
EDMUND C. TARBELL
CHARLES J. TAYLOR
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 EDUCATION: ERNESTO NELSON.
 SOCIAL ECONOMY: ALBERTO M. D'ALKAINÉ, HERMAN BUCHER.
 LIBERAL ARTS: SALVADOR POSITANO DE VINCENTIIS, GUILLERMO F. KOCH.
 MANUFACTURES AND VARIED INDUSTRIES: EUSEBIO E. GARCIA, GUILLERMO AGUIRRE.
 AGRICULTURE: ENRIQUE M. NELSON, HUGO M. CURRAN, EDUARDO QUIROGA, ARISTOBULO SIFREDI, ARTURO FAUZON, LUIS VERNET BASUALDO.
 MINES AND METALLURGY: DR. ANSELMO WINDHAUSEN.

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 MACHINERY: F. C. PEMBERTON.
 AGRICULTURE: HENRY C. BRODOSKY, H. W. MOBSBY, NIEL NIELSEN.
 MINES AND METALLURGY: LEO J. JONES.

BOLIVIA

MINES AND METALLURGY: LUIS ABELLI.

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 EDUCATION: WU CHING, THOMAS F. CHANG.
 SOCIAL ECONOMY: TZON FAH HWANG.
 LIBERAL ARTS: Y. C. YANG, C. T. HSIA, M. Q. FONG.
 MANUFACTURES AND VARIED INDUSTRIES: Y. C. FUNG, T. Y. CHEO, L. Y. HO,
 EMIL S. FISCHER.
 TRANSPORTATION: C. S. CHEN.
 AGRICULTURE: WEN-HSUAN CHIEN, T. Z. CHANG.
 MINES AND METALLURGY: EARL C. OWYANG.

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 EDUCATION: ALICIA A. SOMEILLAN.
 SOCIAL ECONOMY: JOHN R. TAYLOR.
 AGRICULTURE: DR. V. M. PLACERES.
 HORTICULTURE: JAMES A. BUCHANAN, T. CAJIGAL.

DENMARK

MANUFACTURES AND VARIED INDUSTRIES: WILLIAM ARUP.

GUATEMALA

MANUFACTURES AND VARIED INDUSTRIES: ERNEST KAHL.
 AGRICULTURE: DONALD J. LINDO, JOSE DE COSTA.
 HORTICULTURE: LOUIS GETZ.

HONDURAS

EDUCATION: COUNT DEL VALLE DE SALAZAR.
 MINES AND METALLURGY: FERNANDO SOMOZA VIVAS.
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 EDUCATION: MARIA MONTESSORI.
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 MANUFACTURES AND VARIED INDUSTRIES: ANDREA SBARBORO, UMBERTO FRILLI,
 F. N. BELGRANO, BRUNO FERRARI, GIACOMO GIOBBE, EDORADO FERRARIS, CARLO
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 AGRICULTURE: A. PEDRINI, UBALDO TALOCCHINI.

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 EDUCATION: JUNZO FUJIHIRA, SENPACHI SOYEJIMA, KINICHI TAKABE.
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 KITAMURA, YUJI NAGASHIMA, SHINICHI YOSHIDA.

AGRICULTURE: NOBUICHI KASUGA, SUZUO TAKEI, KINJI USHIJIMA, ICHIHEI ITO,
 KANAE NAGASAWA.

HORTICULTURE: RISABURO OTA, DR. KOJI MIYAKE, J. TUROLA.

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AGRICULTURE: BARON FORSTNER VAN DAMBENYO.

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MANUFACTURES AND VARIED INDUSTRIES: J. GORDINO, HERMANN ROSSE.

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AGRICULTURE: A. S. GOUVEA.

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THE STORY OF THE EXPOSITION

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CHAPTER LXX

SHADOWS OF THE WORLD

“ Moving in a mirror clear
That hangs before her all the year,
Shadows of the world appear.”—*The Lady of Shalott.*

THERE were sixty places in the Exposition grounds where moving pictures could be seen, without price. They were all through the exhibit palaces, and in six foreign pavilions and over a dozen State buildings, entertaining and painlessly instructing hundreds of thousands of people while those people rested in comfortable chairs and recuperated from their efforts to see the whole Exposition at once. And, resting there, they had a vast advantage over the Lady of Shalott, for while that original movie patron saw but the river and the road and the barley fields, with a few abbots, knights, pages, village girls, and an occasional funeral, the Exposition visitors saw the far more interesting modern world, *Better Entertainment* from Norway to New Zealand. In fact, if the luckless lady had seen what they saw she might have been content to attend to her knitting and let Launcelot go hang.

The development of the motion picture gave the Panama-Pacific International Exposition a singular advantage over its predecessors. The exhibits showed the products of different lands, but the films showed the countries themselves; their topography, their harbors, mines, transportation facilities, their life and industries, how some of the exhibits they sent had been produced, and the conditions under which their people worked. The device was exactly adapted to exposition purposes. It brought far countries together at San Francisco in a peculiar sense. Visitors from every part of the world could view scenes from every other part, and exhibitors could display their processes of manufacture, as far as it suited their purposes. The late Mr. Heinz showed his men planting tomato vines by machinery, to make his endless bottles of ketchup. The Italian Swiss Colony demonstrated champagne production, from the vine; including the interesting and little known process of “disgorging,” easily described in words but never

quite understood until one saw it done. Railroads portrayed the sort of country they served, and the opportunities it offered the settler and the tourist. And in the pavilions and State buildings you could make a trip to Australian pearl fisheries, or live for a few minutes in some dreamy old village of the South.

In setting and subject matter some of these pictorial exhibits were quite novel and unexpected. The Pennsylvania railroad's theater in the Palace of Transportation, made of two railway coaches, we have described. It took three and a half days to present the thriving American cities the Pennsylvania system serves, and this theater alone attracted a total attendance of over 137,000. In the same palace, the Wells Fargo Express Company introduced romance to the express business by "filming" the travels of a beautiful vase from an enamored young man to a young lady in a receptive mood for vases. Thus was Cupid outdone by corporation efficiency. This theater also illustrated the moving of \$20,000,000 through San Francisco, the rescue of American tourists' baggage from the field of Europe's war, and the delivery of gifts to Belgian children. The United States Steel Corporation's theater in the Palace of Mines and Metallurgy was particularly large and the reels shown were of much educational value, revealing the extraordinary power and resource of the country in steel production.

Twenty-two of these theaters were in the exhibit palaces. There were four in the Palace of Liberal Arts, one in Machinery, two in Agriculture, three in Food Products, one in Horticulture, three in Mines and Metallurgy, one in the Congress Hall of the Live Stock Section, two in Transportation, and five in Education. There were four or five more in the display section of the California Building. Contrary to expectations they did not in the least interfere with the demonstration of manufacturing processes by the old methods.

It was estimated that nearly a million feet of film was used in the grounds.

The "film drama" was not much in evidence in the Exposition, the subjects presented being almost wholly of an informative character. In the Oregon Building one could see the Pendleton Roundup, where the cowboy practices his art on wild steers; intimate nature studies of the bird and fish life of the State, prepared by the Oregon Fish and Game Commission; the Columbia River Highway, right up the wonderful Columbia Gorge; the Rogue River Valley, in a playlet; and the Hood River apple industry. Slides were used, as well as motion reels. This theater played to packed houses every afternoon.

The New Zealand Pavilion turned its display hall into a theater every day from 3 to 4, and showed the wonderful and fantastic scenery of the



PART OF THE LIVE STOCK DAY PARADE

islands: the great fjord of Milford, with cliffs 4,000 feet high; the Sutherland Falls, of 1,900 feet; the geysers; sheep raising, agricultural processes, meat refrigeration, horse racing, yachting, fishing, and surf bathing; automobile journeys over the mountain roads; the antipodean cities of Dunedin and Queenstown. You could see the aboriginal Maori cooking over natural steam jets in the geyser region, bathing in hot pools, and having his epidermis lastingly embellished by the tattooers. Many of the most beautiful of these films were in kinemacolor, or colored film.

*In the
Antipodes*

Nearby, in the Australian Pavilion, you could visit Melbourne, attend the carnival on Swan River, see the pearl fishing industry and the Mount Morgan gold mine, take a trip through the Blue Mountains, visit an Australian cattle station and see the sheep-shearing; all explained by lecturers. The program was changed every day. This pavilion had 28 reels, of 1,000 feet each.

From Australia it was but a step to the winter sports of Norway, and the Lofoten fisheries. Here you saw great fjords and snow-clad mountains, reindeer, the canning industry and the timber industry, and the production of nitrates from the air by electricity.

Sweden would show you old Visby, ancient treasure city of the Hanseatic League; the meeting of the three kings of the North at Malmo in 1914; the Swedish artillery; an iron ore field north of the Arctic Circle; logging and lumbering and iron and steel manufacturing, and skating and the national dances. Hydro-electric plants and electric locomotives, nomad Lapps and their reindeer herds, all appeared with perfect realism, and there was much more, for the equipment included over 37,000 feet of film.

The growing industries of West Virginia were shown in film from 48 of the 55 counties of that State. The West Virginia Commission had 25,000 feet made in the six months just preceding the opening of the Exposition, which showed mountain and valley scenery, the larger cities, glass plants, steel and iron mills, and the great Pocahontas coal field.

The Pennsylvania Building had 75,000 feet depicting historical and industrial and social matter, and gave a change of reel every day in the week. It showed Fairmount Park, a panorama of Independence Square, historic Valley Forge, the public bath houses, chestnut farming, a chocolate factory, the manufacturing of vaccine at a great biological laboratory, anthracite coal mining, safety appliances in mills and factories, the United States Mint at Philadelphia, the anniversary meeting of the Blue and the Gray at Gettysburg, Girard College, Pennsylvania's war on tuberculosis, and various processes of manufacture from that of hats

*Life of
a State*

to that of saws and automobile tires. The investment in these reels was said to be about \$65,000.

The Hawaiian Building showed some 550 special colored slides and about 5,000 feet of film, representing the sugar and pineapple industries, the extinct crater of Haleakala, the active volcano of Kilauea, scenes on the islands of Oahu, Hawaii, and Kauai, some of the beautiful Honolulu homes, canoe and surf-board riding at Waikiki, and ships entering and leaving Honolulu harbor.

If you went thence to the Bolivian Pavilion you could see the cities of La Paz, Sucre, and Cochabamba, the region of Yungas, the tin mines of Uncia, and what Prescott called the "silver-quarries" of Potosi. There were llamas and alpacas moving through some of these scenes, and you were also treated to views of the prehistoric ruins of Tiahuanaco, a place so completely and successfully prehistoric that no one wastes time trying to guess how old it was when Moses started for the wilderness.

From this ancient Spanish conquest you could wander over to the Massachusetts Building and see some of the best things the Pilgrim Fathers did to New England. The assembly hall seated over 300 people, and here nearly 37,000 feet of film was shown, and nearly 1,200 stereopticon slides. These pictures would help you visualize the Landing of the Pilgrims, the Boston Tea Party, Paul Revere's Ride, the Battle of Lexington, the Battle of Bunker Hill, and the Deerfield Massacre. Inasmuch as the actual incidents happened without rehearsals, and the moving picture reels of them were carefully composed by the Edison Company, it is likely that they looked more like the originals than the originals did. You could take a trip through Boston in a street car without getting lost, and you could see a game between the Braves and the Giants—the Braves winning, naturally. The Boston Harbor reel was a very interesting one. It showed the largest and most complete fish pier in the world, and several German liners interned for

the war. The Massachusetts manufacturing cities were shown, and in the Gloucester reel you could see the "Natalia," an invention of John Hays Hammond, Jr., operated and controlled by wireless electrical apparatus from the shore. And here you could take a trip through the Cape Cod Canal, just completed. Reels were also shown in the Palace of Education by the Massachusetts Board of Managers, and from these you saw what was being done by the State for crippled children, and the work of the boys and girls at the State industrial schools. Other reels, by the United Shoe Machinery Company, showed every process in the manufacture of a shoe. Pictures were shown at the Massachusetts Building from 11 A. M. to 5 P. M., and you could see anything you called for.

*Living
History*

The Argentine Pavilion contained a beautiful theater with a comfortable gallery. The Commission had over 18,000 feet of reel showing a panoramic view of Buenos Aires, the National Council of Education, public parks, the national military academy, the Tucuman sugar industry, the National University of La Plata, an Argentine training ship, and scenes in Argentine cities and country districts. This theater was open every afternoon.

At the Illinois Building you could see the Chicago park system, the State Fair at Springfield, the reformatory methods in effect at Joliet Penitentiary, the great Chicago Sanitary Canal, the development of modern farming machinery, the public schools and the State University, underground views in the Illinois coal mines. These films were shown daily, and any one of them on request. The theater was open for this purpose morning and afternoon except when there were organ recitals.

Then you could go to Mississippi by stepping into the Mississippi Building, and see the cotton growing industry, good roads development, shipping along the Gulf of Mexico, harbor activities at Gulfport and Pascagoula, and the operations of what was said to be the largest hardwood lumber mill in the world.

So it went; at Iowa House with its effective agricultural scenes, at the New York City Building, where you saw various municipal functions illustrated, at the Washington Building, where you saw the life (and death) of the salmon from the egg to the can, the busy developments at Seattle, and the lumber from the big tree to the mill.

The United States Government had motion-picture theaters in the Palaces of Machinery, Liberal Arts, and Mines and Metallurgy, where a few of its multitudinous functions were illustrated. Some of its titles were: "Marketing by Mail," "Postal Service on the Great Lakes," "Metal Mining," "The Dams of the Ohio River," "Marvels of ^{Busy} Government Horsemanship by United States Cavalry," "Maneuvers of the Torpedo Fleet," "Removing a Dangerous Wreck," "Macadam Road Construction," "Lobster Culture," "The Red Cross Nursing Service"; and there were films on forestry, good roads reclamation, and geological survey work.

New York State showed farming scenes, in the Palace of Agriculture, and the construction of the Barge Canal, in the Palace of Liberal Arts.

In the Palace of Agriculture the Holt Manufacturing Company showed the operation of some of the revolutionizing farming machinery that has been invented in California; among which is the caterpillar tractor device the British used in 1916 for armored cars or "tanks" in the battles in

France. Here, too, California showed her vineyards, and the industries based upon them. The National Cash Register Company illustrated its factory welfare work.

In Congress Hall in the Live Stock section were shown reels illustrating the rice, hemp, match, cocoanut, and sugar industries of the Philippines, the Holt Caterpillar plow, the Calf-way milker, fine herds of blooded stock, and other things of interest to progressive farmers. Reels from the finest stock farms throughout America, Canada, and the Argentine were shown for the instruction of the stockmen or of the casual visitor who dropped in for a half hour of rest and entertainment.

In the Grand Trunk Railway Building you could see British Columbian scenery, including Niagara Falls and Lachine rapids, with fishing and camping scenes in the highlands of Ontario. The Great Northern showed scenes in Oregon, Minnesota, North Dakota, Montana, and Washington, and Glacier National Park. The Canadian Pacific illustrated the whole journey from Sidney to Quebec, and showed the farming development of western Canada. The Southern Pacific Company had in its building one of the finest theaters on the grounds, the "Sunset," where romantic scenery was shown, with explanatory lectures by George Wharton James.

*Railway
Systems*

The Young Women's Christian Association had a motion-picture theater. So did the Enlisted Men's Club House.

In the Palace of Education there were departmental theaters where a number of important educational films were exhibited. The work of the Salvation Army was illustrated in the theater of the Federal Council of Churches.

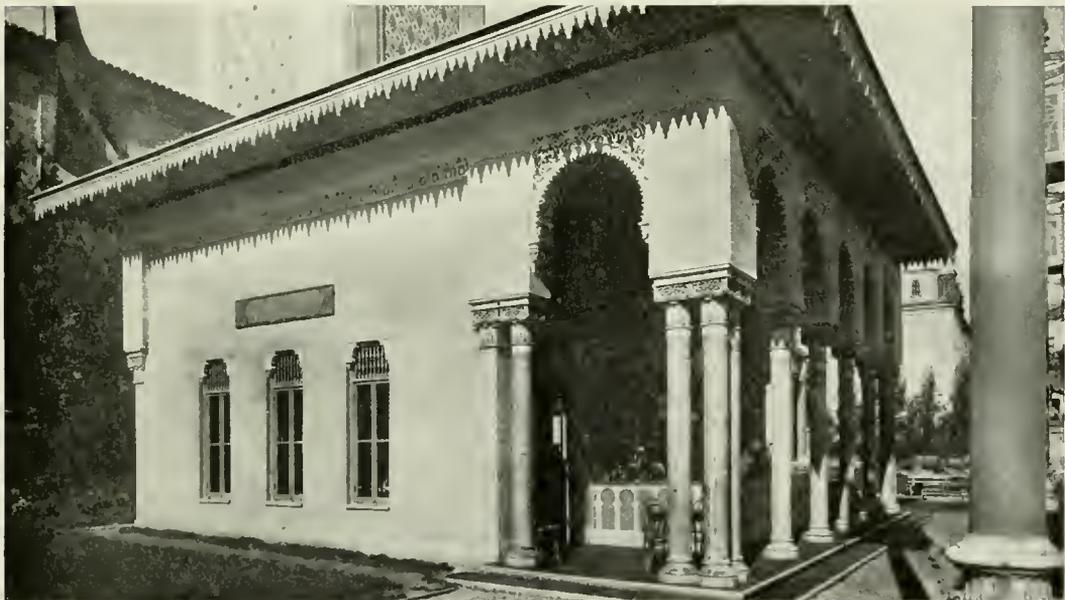
Then there were motion-picture theaters in the display section of the California Building that used about 130,000 feet of film to exploit the mining, agricultural, manufacturing, social, and educational resources of the State, and some of its thrilling scenery. The equipment was divided among five groups of counties. With the motion reels there were about 3,000 colored slides, and the subjects illustrated had the wide diversity of a most varied and versatile region.

Something could be learned through this medium on the widest range of subjects, from city planning to the production of radium.

These things could not have been done a decade ago. The motion picture had been invented, but its possibilities were still the dreams of visionaries, and the industry had not been developed to the reliable and effective character it had in 1915. It was one of the educational wonders of the Exposition, and one of the things the Exposition offered exclusively,



MANUFACTURES AND VARIED INDUSTRIES DAY



FESTIVAL INN

for many of the reels we have mentioned were not to be seen in the motion-picture theaters of that day.

Whether a pavilion had a theater or used its general assembly hall to show motion pictures, it had to have a properly constructed and protected operating booth, and these booths were inspected at brief intervals by an engineer representing the Board of Fire Underwriters. This inspection, accompanied by careful tuition of the operatives, many of whom were at first inexperienced, prevented any disasters from this source.

CHAPTER LXXI

THE TELEPHONE IN EXPOSITION SERVICE

AN exposition may be a microcosm, but neither in time, space, nor content does it fit common experience or existing arrangements at very many points. When it came to the telephone, something that had not bothered the Crystal Palace exposition people back in 1851, nor the Centennial in 1876, where it appeared only as an experiment, there was a chance to lose money rapidly. And the local telephone company saw it as soon as anybody and did not seek any sudden expansion of business in the direction of the Exposition grounds. Under the law it would have had to serve any applicant, and do it at rates fixed by the Board of Supervisors of San Francisco—rates based on the prospect of continuing service for an indefinite time, whereas most of this demand would cease in about a year, and the whole plant would go out of business shortly thereafter. So the Exposition developed its own system, putting in such a one as a mercantile establishment would use, but on a very large scale, and furnishing service on a revenue basis.

*Special
Conditions*

The telephone bonded the human elements of the Exposition together and made them almost a unit. But the installation of the system was a large and complicated undertaking. In a single month, from February 20 to March 20, 1915, a total of 890 instruments were installed, under the most trying conditions of uncertain and shifting demand. In the Exposition period some 910,000 nickels and slugs were handled, the slugs representing about six per cent. Calls broke records, in a city that ranks third in the world in the use of the telephone per capita. There were 49,000 calls into and out of the Exposition grounds on February 19, and about 68,000 on Closing Day, the biggest day in local telephone history. For the operating season of 288 days the outgoing calls alone numbered 807,422, or an average of 2,800 a day, without counting those coming into the grounds, or the inter-office traffic of the Exposition itself. Brisk business, of course, rose high above this average.

A contract was made about July of 1914, with the Pacific Telephone and Telegraph Company, whereby that corporation agreed to install and re-

move all necessary equipment, and charge the Exposition rental for it at the standard rates, with a depreciation charge of ten per cent a year. The Exposition was to defray the costs of installation and removal, and to put in the underground distributing system; and the telephone company was to connect this plant with its general system by all the trunk lines needed. The Exposition was to operate the plant but the telephone company was to have the selection of the operatives. The Exposition was to have a commission of ten per cent on all tolls for long distance service originating in the grounds.

On this basis and subject to these arrangements, the Exposition stood in the position of a merchant of telephone service, using some itself and retailing more to participants and the public. Charges were based on expenditures for installation and removal and the costs of operators, on a ten-months rental arrangement for all participants. The Division of Works, through its Mechanical and Electrical Engineering Department, closed the original contract on which all payments to the telephone company were based. Those having phones paid the Comptroller's Department, and the Comptroller paid the telephone company.

*Marketing
a Service*

The internal service, the calls among the officers and employees of the Exposition itself, was very large, and of immense help in construction, organization, and operation, and its importance as a work factor calls for the presentation of some details of the plan. During construction a private branch exchange of one position was installed in the Service Building to take care of inter-office demands, but they soon proved so numerous that another position was installed six months before opening, and a third a month before. Then an expansion for internal service became necessary, and it was accomplished by installing three positions for the Division of Works, three for the Executive Staff and the Exhibits Division, two for the Division of Concessions and Admissions, one for the Division of Exploitation, one for the Mechanical and Electrical Department, one for the Comptroller, and one for the Live Stock Department; although these were reduced later. And to these, 460 stations were connected. There were trunk lines between all these exchanges, and there was a trunk line from every one to the telephone company's West Exchange, both for outgoing and incoming business. Intercommunication, and communication with the world outside, were nearly perfect, and of a vast and incalculable value. It would be hard to imagine the development of a modern exposition without this instrumentality.

The management intended some novel uses for the telephone by visitors,

such as the registered message, and the method of recovering lost children. The former was not much used, and not many children were lost. But the whole telephone system had orders to give the workers of the Young Women's Christian Association prompt service without charge, and the work of moral protection within the grounds was greatly facilitated by this measure.

Central office quarters were situated in the Palace of Food Products, which from a survey of the grounds was found to be the wire-center. An area of 2,400 square feet was devoted to the purpose, and here was installed a complete storage battery plant, with charging generator and ringing machines. Through this office any participant could connect with the city and with long distance lines. The switchboard was intended to have fifteen positions, so wired that every call should come in at three places. This was one better than the best city station, and would enable some operator to take the call instantly. But requirements had been slightly underestimated, and it was found necessary about January 1, 1915, to install three additional positions and rearrange the answering jacks, to relieve the strain on the operators.

*Uncertain
Demands*

The new positions were wired, installed, and in service within seventeen days, but they were seventeen days of heartbreaking labor. Installations and operation were carried out under A. McBirney, who was appointed telephone engineer of the Exposition for that purpose. He had had a wide range of experience at just such work and conducted this highly technical business in a way that resulted in a service almost one hundred per cent effective. The chief operator was Miss Helen B. Hart, and she was a thoroughly competent person who maintained in her little organization a high standard of courtesy, accuracy, and promptness.

The cable system was laid out so that the cables would run mainly in the conduits with the underground electric light and power lines. The plant required 47,700 feet, or nine miles, of cable ranging in size from 400 to 10 pair. The wire in it would have stretched 1,800 miles, and there were 416 miles of aerial wire besides.

Original plans for the telephone service contemplated thirty-six attended pay stations. It was the Exposition idea that they should serve as information bureaus in a way, and that they would more than pay for themselves. The number was cut down before opening day to fifteen. After a few months' experience two important discoveries were made about them: there was no dire need of so many information bureaus of this kind; and, what was even more vital, as pay stations they did not pay. In July, they were replaced by coin-collecting ma-

*Dispensable
Attendance*



AT THE CLOSING OF THE DAY

chines, which brought in just as much gross revenue; and far more net, because it enabled the Exposition to save \$950 a month in labor, and \$50 or \$75 in rentals for switchboards — or a clean \$1,000 a month. The working test of service would seem to indicate that attended pay stations were unnecessary in an exposition telephone service; at least, they were not needed in this Exposition.

The engineer superintending the telephone system kept very close account of the work it had to do, and in July, when attendance was comfortably large, his charts showed between 15,000 and 16,000 calls a day. Among these, on a typical July day, were 4,150 from outside, 8,227 from inside to outside, and 2,280 local to local; that is, communication within the grounds. This was business between concessionaires, visitors, employees and officials of the Exposition, and exhibitors.

In the State and foreign sections, and in the Live Stock and Race Track section, where there were a great many separate buildings, a large cable was looped into several of the more important structures, and connections made to feeder cables for others. In some cases where no cable was needed weather-proof wires were taken off the nearest building, and connected with a feeder cable. This method was used in the Zone as well, where the wires were carried along the backs of buildings and fences, and connected with the main cable through feeders. On study of the area to be supplied and the number of buildings and booths it would contain, the system was prepared for handling 1,000 participants' lines; but it was also installed in such a way that it could be expanded rapidly and cheaply at need.

Applications for telephones were made to the Director of Works. The charges made participants represented their proportion of the cost of installation, and the arrangement was approved by the Chairman of the State Railway Commission, which has regulative powers over public service corporations.

Installing the underground plant started about August 20, 1914, and the work was continuous to Opening Day. The complete installation of the main switchboard took from November 15 to January 3. Soon after January 1, 1915, all participants were canvassed and it was found that five per cent required service. But they did not want the phones in until Opening Day, and then they all wanted them at once. After Opening Day another canvass was made, and it showed that about five per cent of the balance had discovered their need of phones. This threw tremendous labor on the telephone crew. Exhibit booths were incomplete, or had not been designed in just the way required and had to be rearranged, and a large proportion of the number of instruments naturally

*Keeping
Busy*

got into the wrong corners. During the Exposition period the Department handled 1,625 connections, 1,000 disconnections, and 394 moves.

Although not complete, the switchboard went into service on December 5, 1914, with 50 stations working. At this time there were five operators. By Opening Day there were 100: 54 on the main exchange, 16 on private branch exchanges, and 30 at attended pay stations. Two months after opening, owing to increased skill and the settling of the service load into something like a norm, it was possible to reduce operating expenses about \$600 a month.

The force had been built up with great care and selected in the light of long experience. Preference was given girls with central office experience and girls from the switchboards of large hotels; and the latter proved extremely valuable through the facility with which they memorized the names of subscribers and employees of the Exposition, and learned to associate them with their proper offices and departments. And the work of locating many of these people was made very difficult by the continual moving and rearranging of offices.

It was found that a greater amount of labor could be performed by the operators if they were allowed time off during the dull hours to watch parades or visit the exhibits. The Opening Day load was exceeded a number of times during the season, and was handled with a five per cent decrease in the operating force.

Three months after opening it was found practicable, on account of the settling of the traffic load, to consolidate some of the private branch exchanges in the Exposition offices. There were retained three positions for the Executive Staff and the Division of Exhibits, three for the Division of Works, two for the Divisions of Concessions and Admissions and of Exploitation and the Comptroller. The change reduced the positions from twelve to eight, and effected another considerable saving in salaries and rentals. After the close of the Exposition all departments were connected to the three positions used by the Division of Works.

The total expense of the Exposition telephone service, including operation, for the construction, operating, and post-Exposition periods, came to \$146,688. The income amounted to \$94,123, and there was salvage to the extent of \$9,981, making the net cost to the Exposition \$42,564. When one considers the value of the telephone in conducting the Exposition affairs, the loss is only apparent. The service was more than worth it, was in fact essential to the results produced with the force engaged.

The telephone business of the Exposition reflected interesting phases of human nature in crowds. "Traffic" was always light as long as any-

thing important and entertaining was going on; and the instant it was over, people seemed to think of something they wished to tell the folks at home, and rushed to the booths. It was very quiet on the exchanges while Mr. Bryan was delivering his address at the celebration of Independence Day on July 5; possibly because people thought there was enough speaking going on just then. On Roosevelt Day there seemed to be some public agitation and more telephone business than usual until the Colonel began to speak, when it subsided a bit, only to pick up again as soon as the address was over.

*Causes of
Big Loads*

Accidents caused a sudden accession of calls to learn the nature and extent of the damages. This was very noticeable when Beachey fell. When the "General Frisbie" ran on the rocks at Fort Point it caused a small "peak." Pettrossi, the aviator, fell in the Bay on September 2, and started an hour's rush at the switchboards. On October 25 Charles Niles the aviator fell, and the same thing happened.

Great occasions, of course, produced more traffic, and it was apt to be especially pronounced on the day preceding, because of preparation and inquiry. A light rain produced similar effects—perhaps a demand for umbrellas. San Francisco Day caused a very heavy load; and on the night of the Guatemala Ball the telephone system was busy until five o'clock in the morning. Thanksgiving Day was very quiet, and so was the day of the Hawaiian Pineapple and of the departure of the Liberty Bell.

At 9 o'clock on the morning of Closing Day the traffic curve began to mount. From 10 A.M. to 7 P.M., all eighteen positions at the main switchboard were filled, and during the time between 4:30 and 7 P.M., 120 trunk lines were not sufficient to carry the load. At 7 the activity began to subside, but four operators had to be kept on all night.

