PARIS UNIVERSAL EXPOSITION, 1867.

REPORTS OF THE UNITED STATES COMMISSIONERS.

GENERAL SURVEY OF THE EXHIBITION;

WITH A REPORT ON THE

CHARACTER AND CONDITION

OF THE

UNITED STATES SECTION.

WASHINGTON:
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1868.

PARIS UNIVERSAL EXPOSITION, 1867.

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J. N. Proeschel, Secretary.

J. C. Derby, United States Agent, New York.

LIST OF THE MEMBERS OF THE INTERNATIONAL JURY ALLOTTED TO THE UNITED STATES.

Charles C. Perkins, new order of awards.

W. T. Hoppin, Group I, classes 1 and 2.

J. P. Kennedy, Group I, class 3.

R. M. Hunt, Architect, Group I, class 4.

Frank Leslie, (supplemented by Dr. T. W. Evans,) Group I, class 5.

W. A. Adams, (supplemented by W. T. Hoppin and Dr. T. W. Evans,) Group II, class 9.

J. R. Freese, (supplemented by Dr. T. W. Evans,) Group II, class 11.

Professor F. A. P. Barnard, Group II, class 12.

William Slade, Group III, class 20.

Professor J. Lawrence Smith, Vice-President of Jury, Group V.

Professor J. P. Lesley, (supplemented by Professor T. S. Hunt,) Group VI, class 51.

C. R. Goodwin, Engineer, Group VI, class 52.

J. E. Holmes, Engineer, Group VI, class 54.

H. F. Q. d'Aligny, Engineer, Group VI, class 57.

J. Debeauvias, Engineer, Associate Juror in Group VI, class 54.

J. P. Reynolds, Juror on Agricultural Trials at Billancourt.

PREFACE.

THE examination of products and making awards was committed to international juries, numbering in all six hundred members.

The number of jurors taken from each nation was in proportion to the ground occupied by each in the Exhibition, and the general commissioner of each nation nominated the jurors allowed to his national section.

The organization comprised one special jury, ninety-four juries of classes, ten juries of groups, and a superior council.

The work was divided and distributed among them as follows:

I. The subjects which were presented for the new order of recompenses, intended for persons, establishments, or localities, which, by organization or special institutions, have developed harmony among co-operators and produced in an eminent degree the material, moral, and intellectual well-being of the workmen, were submitted to a special jury of twenty-five members, whose decision was final.

II. The examination of Group No. 1, comprising the five classes of fine arts, was committed to four separate juries, whose reports were subject to revision and adjustment by a group jury formed by the four class juries united, numbering sixty-four members, whose decision was final.

III. The remaining ninety classes of products were submitted to the inspection of the corresponding ninety class juries, whose work was subject to revision by the group juries and superior council.

Each class jury elected from its own body a president, vice-president, and reporter.

The nine group juries were composed of the presidents and reporters of the ninety class juries, with the addition of a president and two vice-presidents to each group jury, not taken from the class juries, but specially appointed by the respective general commissioners of the national sections to which these appointments were allotted. The secretary for each group was appointed by the imperial commission.

The superior council was formed of the presidents and vice-presidents of the nine group juries, presided by one of the vice-presidents of the imperial commission.

IV. The organization thus comprised—

		Members.
One special jury on new order		25
One class and group jury on fine arts		64
Ninety class juries, numbering in all		483
Nine group juries, numbering—		
Presidents and vice-presidents of classes	180	
Added, nine presidents and eighteen vice-presidents	27	27
	207	

		Members.
One superior council—		
Presidents and vice-presidents of groups	27	
One presiding officer added	1	1
	28	
Total		600

V. The duties of the class juries were to examine the products in detail in their respective classes, and make lists of the exhibitors whose products they considered deserving of awards, naming the award they proposed for each, and the reason of it, which completed their work.

The reports on products and exhibitors thus drawn up were passed to the group juries, whose duty it was to revise them, concurring in the recommendations of the class jurors as far as approved, modifying the parts not approved, and sending them in this form to the superior council.

The duty of the superior council was to decide upon the whole number of awards to be made, and the number of each grade of awards, for which purposes they had a limited authority to add to the whole number which had been recommended, and power to diminish the whole number called for by the juries. Having determined the whole number and the grades, they apportioned the numbers and grades to each group for distribution, and in this form returned the work to the respective group juries, whose remaining duty it was to adjust the awards made to the numbers and grades thus placed at their disposal, retrenching the names, if any in excess of their means; and this adjustment was final.

The classification of products adopted by the imperial commission having been made known two years in advance, and the national allotments of jurors made public at an early period, ample time had been given for the selection of jurors qualified to appreciate the particular class of products on which each was to be placed.

A more highly competent body of experts in the products of every industrial art and science was probably never assembled for a similar purpose. The rapidity of their appreciations, in many cases, was not in conformity with the views of exhibitors, who thought more time and explanation would have made their products better understood. But men devoted to special studies, familiar with first principles, and acquainted with their application, modified by human skill, in almost every form, seldom meet with a product in their line so entirely new in principle, so ingenious in design, or so complicated in structure, as to make it difficult for them to arrive at a correct opinion upon its general merits in a short space of time. Exceptions occur, but the inventive skill of producers rarely exceeds the comprehension of experts, and the general accuracy of the conclusions of the juries will, without doubt, be proved by experience and largely confirmed by public opinion.

In the ceaseless struggle to gratify human wants, scientific, mechanical, and industrial progress are developed unequally in different countries and in different localities of the same country. Bringing together the best fruits of industry and skill from all regions facilitates the exchange and diffusion of the arts and methods of production, and equalizes the common stock of intelligence. All are gainers in the highly civilized commerce which consists in the gratuitous exchange of useful ideas and practical knowledge, together with the methods of their application in every form to ameliorate the material and moral condition of mankind.

The united verdict of the international jury, composed in great part of professional men of known skill and established reputations, is the ablest and soundest judgment that will be pronounced on the relative condition of the arts of industry at the present time, as displayed in the products of all countries.

Ninety-five juries, working simultaneously and independently, and rendering in every department separate reports, produce, when collated, revised, and confirmed, an aggregate verdict of reliable value.

The relative condition of national industries thus indicated will be most easily and readily understood by a tabular statement, divested of the embarrassment of superfluous figures and variable numbers, showing merely the percentage of awards to exhibitors.

Percentage was not the object, but is the inevitable result, of awards, and it is the most unquestionable expression, in a concentrated and reliable form, of the united opinion of the whole body of jurors, the importance of which is not diminished by its being unforeseen and unpremeditated.

The table which follows shows in the first line the percentage of awards of each grade, and the total average percentage. The percentage of awards in each grade results from a comparison of the whole number of awards in each grade with the whole number of exhibitors in the Exhibition; and the total average percentage results from a comparison of the whole number of awards with the whole number of exhibitors; this total average results equally from the sum of the averages of the grades.

The subsequent lines show in like manner the percentage applicable to each country. In these the percentages of awards in each grade result from the whole number of awards in each grade, made *to the country named*, compared with the whole number of exhibitors *from that country;* and the total average percentage of each country results from a comparison of the total number of awards and total number of exhibitors pertaining to the country named, or equally from the sum of the preceding percentages.

The lines read horizontally show, therefore, the percentage of grades and awards to each country, and the columns read vertically present the relative grades and awards of each country compared with the other countries.

The percentage of awards to the exhibitors of the remaining twenty-five countries falls below the succeeding.

PERCENTAGE OF AWARDS TO EXHIBITORS.

Name of country.	Percentage of grand prizes.	Percentage of gold medals.	Percentage of silver medals.	Percentage of bronze medals.	Percentage of honorable mentions.	General average percentage.
General average percentage of awards to exhibitors	0. 00175	0. 02221	0. 08113	0. 12759	0. 11265	34. 53
Special average:						
France	0. 00306	0. 04272	0. 14742	0. 20086	0. 16166	55. 57
United States	0. 00932	0. 03171	0. 13432	0. 17910	0. 17350	52. 79
Austria	0. 00095	0. 02722	0. 12273	0. 18194	0. 14326	47. 60
Prussia and North Germany	0. 00226	0. 02890	0. 10760	0. 18497	0. 15028	47. 40
Belgium	0. 00161	0. 01834	0. 10518	0. 15428	0. 15326	43. 26
Russia	0. 00073	0. 01538	0. 06593	0. 14945	0. 10915	34. 06
Switzerland	0. 00092	0. 01944	0. 07500	0. 11388	0. 10926	31. 85
Great Britain and colonies	0. 00178	0. 01829	0. 06217	0. 09531	0. 08338	26. 10
Italy	0. 00122	0. 00589	0. 02826	0. 06311	0. 09338	19. 18
Spain	0. 00000	0. 00794	0. 02950	0. 07630	0. 07333	18. 70

The ardor of competition in a great international assembly, with the eagerness and suspense which precede the declaration of awards after that event, display the reaction common to all excitements. The awards of the successful, so desirable by anticipation, diminish in importance by possession, and seldom give satisfaction; while the unsuccessful, with more courage or more philosophy, find little difficulty in adopting the conclusion of their friends who have succeeded, that the whole affair has been greatly overrated.

Neither of these impressions is probably very accurate. Experience on former occasions has in the main justified the awards of the juries, and they have served not only to confirm established reputations, but to bring into more prominent notice the excellent products of thousands of skilful and worthy producers, who labored previously in comparative obscurity, and whose improved fortunes date from those periods. But the benefits resulting from this are not limited to the successful exhibitors. They are naturally stimulated to renewed efforts to maintain their new positions, which quickens their invention, improves their products, and raises their own standards, whilst their rivals and competitors, who, if equally skilful, are less lucky, are thereby compelled to work up to this higher level. A new spirit is thus breathed into every department of industry, and the benefits of increased production, improved qualities and varieties, and diminished cost become universal.

The influence of exhibitions in producing the remarkable rise and equalization of the industrial arts over a large portion of the civilized world, increasing useful products and augmenting the growth of commerce, is conspicuous everywhere and obvious to every intelligent mind which has been turned to the subject under circumstances favorable to observation.

Their effects also in a scientific, economic, and political sense are subjects of great interest, but may be with more propriety separately considered.

The high position conceded by the verdict of the juries to American industrial products is not due in general to graceful design, fertile combinations of pleasing colors, elegant forms, elaborate finish, or any of the artistic qualities which cultivate the taste and refine the feelings by awakening in the mind a higher sense of beauty, but it is owing to their skilful, direct, and admirable adaptation to the great wants they are intended to supply, and to the originality and fertility of invention which converts the elements and natural forces to the commonest uses, multiplying results and diminishing toil.

The peculiar and valuable qualities of our products will be adopted and reproduced in all parts of Europe, improving the mechanical and industrial arts, and it is reasonable to expect and gratifying to believe that the benefits will be reciprocal, that our products will in time acquire those tasteful and pleasing qualities which command more admiration and find a quicker and better market than the barely useful.

The reports of the United States commissioners upon the important subjects selected by them will undoubtedly command attention.

For a general survey of the Exhibition I refer with confidence to the able sketches of Commissioner Seymour, written with clearness and freedom, in a flowing and agreeable style, free from the stiffness of technical language; and to the observations on the American section, which will convey to those interested, especially in that department, correct general information on the products of our own country.

I refer with equal confidence to the special reports of a more practical character, on subjects of particular importance to the great industries of the country. Several of these reports are from professional men whose established reputations guarantee the thoroughness of their studies and the accuracy of their work, whilst the authors who have not yet acquired this authority may reasonably expect to obtain it from the just appreciation of the public. In this connection I cannot deny myself the pleasure of alluding to the assiduity, the ability, the zeal, and the excellent spirit which have animated the commissioners in devoting so long a period to labors adapted to promote the common welfare and prosperity of the country.

N. M. BECKWITH,
United States Commissioner General.

PARIS, *January* 17, 1868.

GENERAL SURVEY

OF THE

PARIS UNIVERSAL EXPOSITION OF 1867.

INTRODUCTION.

THE following report has been prepared in conformity with the instructions from the Department of State, August 20, 1866, which require the Commission to make a "report presenting a brief general survey of the Exhibition, and upon the character and condition of the American department." The committee formed for the purpose consisted of three members Messrs. Seymour, Evans, and Auchincloss.

It has been attempted in the following pages to present to the reader a sketch of one of the most important events of the nineteenth century, and to describe certain objects of general interest in a rapid and, it is hoped, popular way. There were 95 classes in the Exposition, many of them subdivided into other classes, and all worthy of deep consideration. To obtain information, and to collate and compile it, were matters of difficulty, and hence absolute brevity, although it has been attempted, could not, in the nature of things, be attained. But details have been avoided; they belong properly to the special reports. Nevertheless, it has been thought desirable to reproduce in English, from the French official catalogue, some of the introductions to the principal classes. They have been prepared with the greatest care, contain many interesting particulars, and offer the latest data on the subjects treated.

Before concluding their labors the committee think it proper in this place to acknowledge the valuable assistance of the Commissioner General, Mr. N. M. Beckwith, in the preparation of these reports. Involved in duties which were alike arduous and ungrateful, because seldom properly appreciated, he was able, by unflagging attention to the interests of the commission, by great executive ability, unyielding integrity of purpose, and inflexible resolution, to render great assistance to exhibitors and to all who sought his knowledge and advice.

To Professor W. P. Blake, of California, the committee is indebted also for much useful matter.

CHAS. B. SEYMOUR,
Chairman of Committee.

ORGANIZATION AND LOCALITY.

The Exposition of 1867 takes its origin from the imperial decrees of the 22d June, 1865, and subsequent dates, instituting an International Exposition, to be opened at Paris on the 1st April, 1867, and placing it under the direction of an imperial commission of 60 members, of which the Prince Imperial was named president; M. Rouher, minister of state, M. Forcade de La Roquette, minister of commerce and public works, and Marshal Vaillant, minister of the imperial household, vice-presidents; and M. Leplay, councillor of state, commissioner general.

The locality selected for the Exhibition was the Champ de Mars, the great military parade ground, extending from the military school to the Seine, and from the avenue Labourdonnaye to the avenue Suffren, forming a rectangle of 48 hectares, or 119 acres. To this was annexed the island of Billancourt, giving an additional area of 21 hectares, or 52 acres; making a total of 171 acres appropriated to the Exposition. Although somewhat removed from the most attractive parts of the city, it was easy of access; and being also the property of the government, and without any constructions which needed to be removed, it was suitable for the intended edifice, and was free from expense on the score of rent.

The ground was given up by the government on the 28th of September, 1865, and the first iron pillar of the building was raised on the 3d of April, 1866. At the end of the year the structure was comparatively ready for the exhibitors.

It is proper to use the word "comparatively," for there was delay and backwardness on many sides; and the opening, although it took place on the day and hour announced, was a regulation rather than a necessity. A few only of the groups were in a condition to be fairly presented to the public, and still less to the jurors whose work was to commence and terminate within the first 14 days of the opening month. Thanks, however, to the efforts of the respective commissions, and the hearty good-will of the exhibitors, those who had seen with dismay the condition of the building on the day when the Emperor and Empress dedicated it to its beneficent and instructive purposes, were certainly the most gladdened and surprised to find a fortnight later that order had sprung from chaos, and that the vast idea of this colossal undertaking had crystallized into an object of beauty.

As the season progressed the enclosure known as the Park advanced in clearness and interest. Structures that ranged from the nomadic hut of an Esquimaux to the gilded palace of a sultan, sprang up on every side. These buildings, being constructed by the various governments represented, were eminently national, and, in many instances, were faithful reproductions of edifices that are of world-wide fame. They were rendered additionally interesting from the fact that, to whatever use they were devoted, the attendants, either as workmen or servitors, were almost invariably national. It was thus possible in many ways to visit the habitations and witness the customs of the most remote as of the most intimate nations of the earth—a study which can hardly be considered inferior to any other that was afforded on this occasion. It may be mentioned in this place that, amidst all the allurements of strange designs and blazing decorations, the simple structures contrived for cheapness, and intended for working-men and their families, attracted not only the attention of the public, but won the highest prizes of the juries. It may surely be added as a matter of congratulation that the Emperor Napoleon, who planned this immense and splendid show, was himself a competitor in the simple walks of useful ingenuity. He gave the world a palace of unequalled splendor, and contributed himself a design for small dwellings, suitable for the commonest order of laborers. The latter was so excellent that it received the principal prize awarded in such competition.

Thus in a short time the appearance of the Champ de Mars was totally changed. It was no longer an arid, gravelly surface without vegetation or adornment. It became a place where the palace and the cottage, often together by accident, were purposely put side by side for examination; where the traditions of generations could be contrasted with the latest discoveries and experiences of to-day. The vast elliptical building in the centre occupied 190,000 yards, or 39 acres. The circumference was 1,600 yards, or nearly a mile. Externally the effect was heavy, and by no means imposing; but it speedily became apparent that it was admirably adapted to the purposes for which it was intended. The entire length between the Quai d'Orsay and the military school was 1,125 yards, and the width between the two avenues De Labourdonnaye and De Suffren 515 yards.

The Exposition was divided into three portions; the first, called the Park, comprising the palace and structures before referred to, and the banks of the Seine; the second, called the Reserved Garden, containing the botanical, horticultural, and piscicultural collections; the third, called Billancourt, from the name of an island in the Seine, where the agricultural implements were exhibited. To facilitate the practical trials of the latter, the Emperor was also good enough to give up to the competitors all the land and crops they required. Thus the mowing machines were tried at the Emperor's farm at Fouilleuse, near St. Cloud, and the reapers at the imperial establishment at Vincennes.

PREVIOUS EXHIBITIONS.

The Champ de Mars was the site of the first French industrial exhibition, held in the year 1798. This had 110 exhibitors and lasted three days. It was succeeded by other exhibitions with a constantly increasing interest and number of exhibitors, as will be seen from the annexed table. In 1820 Belgium and Holland united in an exhibition at Ghent. Prussia held an exhibition at Berlin in 1844, and Austria at Vienna in 1846. But the first exhibition which it was proposed to make *universal* was opened in London in 1851 at the Crystal Palace, constructed for the purpose. It was followed by an exhibition in New York in 1853, and by the Universal Exhibition at Paris in 1855, held in the Palais de l'Industrie, also specially constructed for the purpose, and which was the scene of the distribution of the prizes by the Emperor on the 1st of July, 1867.

The second international exhibition in England was opened in 1862 and covered about 17 acres, exclusive of annexes, and had over 26,000 exhibitors.

The relative importance of these different exhibitions, the space covered by each, and number of exhibitors and visitors as far as ascertained, is given in the following table:

Year.	Name of country.	Space in sq. meters.	Number of exhibitors.	Number of awards.
1798	France	23	110	23
1801	France	....	220	80
1802	France	....	540	254
1806	France, (empire)	....	1,422	610
1819	France, (restoration)	....	1,662	869
1820	Belgium and Holland	....	....	....
1823	France	....	1,642	1,091
1827	France	....	1,695	1,254
1834	France, (Louis Philippe)	....	2,447	1,785
1839	France	....	3,281	2,305
1844	France	....	3,960	3,253
1844	Prussia, (Berlin)	....	....	....
1846	Austria, (Vienna)	....	....	....
1849	France, (republic)	....	5,494	4,000
1851	London, (great exhibition of all nations)	88,027	13,937	5,248
1853	New York, (world's fair)	....	....	....
1854	Germany, (Munich)	....	....	....
1855	France, (Paris universal exhibition)	118,786	23,954	10,811
1862	London, (international)	119,994	28,653	....
1867	France, (exposition universelle)	694,153	50,226	....

THE BUILDING.

The buildings erected for previous great exhibitions are generally known as *palaces*, but the structure on the Champ de Mars had nothing in its appearance, as our previous remarks have hinted, suggestive of the name. In its plan and construction architectural effects were subordinated to the great end in view—the exhibition of the objects of all nations in such a manner as to invite and facilitate comparison and study. This end was attained by the classification of the objects in groups, and their arrangement in a corresponding number of galleries disposed side by side concentrically. As three out of the ten groups—such as the agricultural exhibitions, live produce, &c.—could not be properly placed in the building, only seven galleries were required and constructed. These galleries, ellipsoidal in form and one story in height, composed the building.

The ground plan was not exactly an ellipse, it was rather a rectangle with rounded ends and the sides running parallel with the adjoining avenues. The exterior lines of the two sides ran straight for a space of 120 yards, one facing the quarter of the Gros-Caillou, the other the quarter of Grenelle, and were united by two demi-circumferences of equal diameter, with one side of the rectangle facing the bridge of Jena, and the other the military school. An open space in the centre, prettily ornamented with flowers, statues, and fountains, served as the point of radiation for the seven enclosing galleries. It was also the site of a central pavilion which contained the exhibition of the weights, measures, and moneys of all countries.

In the construction of this building upwards of 370,000 cubic metres of soil had to be removed to make room for foundations, drains, air passages, and water-pipes. The outer circle was excavated so as to give a succession of vaulted cellars built of stone and concrete and lime with cement. The two interior galleries of the building were built of stone and the seven others of iron.

The outer circle, devoted to the engines and machinery, was the highest and the broadest of all. Its width was 114 feet, and its height, to the top of the nave, 81 feet. The roof was formed of corrugated iron and supported by 176 iron pillars (each weighing 24,000 pounds) upon which the arches or ribs were placed. Along the centre of the whole length of this great machinery gallery or arcade an elevated platform was supported upon iron columns, and afforded a safe and convenient promenade and point of view for the machinery below. It appeared to support the line of shafting by which motion was communicated to the various machines, but this shafting was sustained by a separate frame.

The supply of water for this enormous structure, and for the Park and its various buildings and fountains, was obtained from the Seine, and was raised by powerful steam pumps to a reservoir placed upon the high ground on the opposite bank. This reservoir had a capacity of over 4,000 cubic yards of water, and was made water-tight by a lining of concrete. The main conduit leading from this reservoir crossed the Seine by the bridge of Jena, and traversed the whole length of the Champ de Mars. Complete details of the hydraulic service and of the ventilation and mechanical appliances generally will be found in the subsequent part of this report under class 52, Group VI.

AVENUES OF COMMUNICATION AND CLASSIFICATION OF OBJECTS.

The avenues of communication within the buildings and in the Park may be best understood by reference to the map. Both the Park and the building were bisected through the entire length by one straight avenue leading from the grand entrance opposite the bridge of Jena to the front of the military school at the opposite extremity of the Champ de Mars. This was crossed at right angles by three other broad avenues leading to the side entrances upon the public streets. These principal avenues, together with several others at each end, radiating from the central garden to the outer circle, intersected each gallery at right angles, and divided the whole building into 16 sectors of nearly equal area.

The objects exhibited by France and its colonies occupied seven of these sectors; England filled two and a half, and the United States one-third of one, exclusive of the displays in the buildings outside.

It will be seen that the form and arrangement of the building and the disposition of its contents was in harmony with the classification and grouping adopted by the imperial commission.

This classification included 10 groups, subdivided into 95 classes, as follows:

Group I.—Works of art, classes 1 to 5.

Group II.—Apparatus and applications of the liberal arts, classes 6 to 13.

Group III.—Furniture and other objects for the use of dwellings, classes 14 to 26.

Group IV.—Clothing, including fabrics, and other objects worn upon the person, classes 27 to 39.

Group V.—Products, raw and manufactured, of mining industry, forestry, &c., classes 40 to 46.

Group VI.—Apparatus and process used in the common arts, classes 47 to 66.

Group VII.—Food, fresh or preserved, in various states of preparation, classes 67 to 73.

Group VIII.—Live stock and specimens of agricultural buildings, classes 74 to 82.

Group IX.—Live produce and specimens of horticultural works, classes 83 to 88.

Group X.—Articles exhibited with the special object of improving the physical and moral condition of the people, classes 89 to 95.

To each of the first seven of these groups a gallery of the building was assigned. Thus Group I, works of art, occupied the inner circle or gallery 1, and so on to Group VII, which occupied the outer circle.

By following one of these galleries the observer passed in succession among the productions similar in kind of different countries. By following the avenues he passed successively through the different productions of the same country. The student therefore could investigate the condition of any particular art or industry as manifested by different nations, or he could pursue his studies geographically and note the characteristic productions of each country, and compare them as a whole with those of other countries. The arrangement facilitated exhibition, prompted study and comparison, and in these respects fully realized the intentions of its authors.

After the adoption of this classification, it was decided to devote a portion of the inner gallery, next to the central garden, to antiquities, so as to give a history of human labor.

The order in which the various countries were ranged in the building, the space occupied, and the number of exhibitors from each country, are shown in the following table:

Name of country.	Space occupied in square metres.				No. of exhibitors.
	In the Palace.	In the Park.	On the shore.	Total.	
France	65, 228. 84	88, 507. 00	2, 756. 52	156, 492. 36	15, 025
Republic of Andorra	2. 00			2. 00	1
Holland	1, 995. 84	4, 764. 50		6, 760. 34	538
Luxembourg	6. 60			6. 60	6
Belgium	7, 325. 60	9, 273. 90		16, 599.50	1, 853
Prussia and North Germany	12, 365. 31	9, 408. 14		21, 773. 45	2, 249
Hesse	4, 396. 26	2, 553. 75		6, 950. 01	242
Baden					203
Wurtemburg					259
Bavaria					414
Austria	8, 381. 25	9, 820. 60		18, 201. 85	2, 094
Switzerland	2, 855. 37	3, 819. 28		6, 674. 62	1, 080
Spain	1, 771. 88	1, 574. 00		3, 345. 88	2, 644
Portugal	759. 38	1, 530. 00		2, 289. 38	1, 648
Greece	759. 37			759. 37	480
Denmark	1, 012. 50	453. 00		1, 465. 50	283
Sweden	1, 940. 62	3, 008. 00		4, 948. 62	605
Norway					411
Russia	3, 037. 50	3, 146. 40		6, 183. 90	1, 365
Italy	3, 459. 37	3, 035. 28		6, 494. 62	4, 069
Rome	709. 38	410. 00		1, 119. 38	172
Roumania	663. 02	1, 767. 00		2, 430. 02	1, 056
Turkey	1, 187. 53	2, 889. 00		4, 076. 53	4, 817
Egypt	587. 55	6, 005. 00		6, 592. 55	14
China	1, 784. 18	4, 075. 37		5, 859. 55	80
Japan					139
Persia					1
Siam					1
Tunis	890. 22	3, 498. 00		4, 388. 22	1
Morocco					13
United States	3, 576. 95	5, 183. 60		8, 760. 55	703
Brazil	1, 387. 82	815. 20		2, 203. 02	1, 138
Republics of Cent'l and South America					394
Hawaii					52
Great Britain	23, 033. 42	12, 137. 20	1, 175. 04	36, 345. 66	6, 176
Interior promenades	3, 472. 47			3, 742. 47	
Central garden	5, 882. 65			5, 882. 65	
Reserved garden		48, 350. 00		48, 350. 00	
Vestibules		77, 792. 96		77, 792. 96	
Restaurants			1, 053. 00	1, 053. 00	
Roads and warehouses			10, 308. 44	10, 308. 44	
Floating exposition			6, 300. 00	6, 300. 00	
Total	158, 742. 88	303. 817. 12	21, 593. 00	484, 153. 00	50, 226

GALLERY OF THE HISTORY OF LABOR.

It was a happy thought to so arrange the antiquities as to give a connected view of the progressive development of the arts and form a fitting introduction to their present advanced condition. Even the pre-historic relics of the human race were displayed there to complete the series. The Exposition was thus not only of the present, but of the past. It gave the history of human labor in various countries from the earliest periods, and became to a great degree an exposition of the mental development of the human race. It was impossible to pass successively from the inspection of the implements of stone, bronze, iron, and finally of steel, without recognizing a progressive development of humanity. The galleries of antiquities made the Exhibition an unwritten history of civilization which every one could read, of whatever nation or language. It attracted the peasant and the scholar, and taught history and philosophy by the contrast of the productions of human labor of all periods and countries.

The French exhibit was the most complete as a whole, and was divided by partitions into a series of halls or apartments, so as to more distinctly mark the different periods.

The pre-historic period was brought boldly forward by the extensive collections which have been made in various parts of Europe during the past ten years—such as implements of stone from the bone caverns, peat bogs, and from the lake dwellings of Switzerland.

The cases were filled with enormous spear heads of flints, hatchets and other rudely-made implements formed by chipping and without polish. These occur in association with the bones and teeth of the extinct cave bear, the elephant, and the mastodon, and specimens of these were displayed in the same cases. These rudely-made implements are supposed to belong to the first or earliest stone period. A second or later period of the stone age is indicated by implements of a superior finish; such as were ground down to smooth surfaces, and in some instances polished.

All these objects of the pre-historic period were classified and displayed under the direction of a commission with Mr. Edward Lartet at the head. The interest attached to the exhibit was greatly enhanced by the meeting during the progress of the Exposition of the "*Congrès International d'Anthropologie et d'Archéologie Préhistoriques*," the members of which were enabled to make studies and comparisons of the various collections.

The next hall contained instruments of the bronze period, extending to the Gallo-Roman. The objects consisted chiefly of cutting instruments, agricultural implements, lamps, and objects of ornament, such as bracelets of bronze and of gold, rings and pins. Of the latter a large collection contained pins with a shield for the points, and a spiral spring at the back almost identical in form with some of the patent pins of the present day.

The next hall was devoted to the Celtic and Gallic relics, and contained the remarkable golden necklaces from the museum of Toulouse. The representation of the work of the middle ages was characterized by a variety of church ornaments and relics, such as oak chests, seals, caskets, croziers, bronzes set with masses of rock crystal, like those of China and Japan; ivory carvings, illuminated missals of vellum, swords, and chain armor.

The fifth hall contained objects of the sixteenth century, or the Renaissance period. Here were found curiously fashioned iron locks and keys, cutting instruments, jewels, and a few nearly spherical watches. The enamels of Limoges occupied a large space, and came in great part from the collection of Baron Rothschild.

At the entrance of the sixth hall, representing the arts of the seventeenth and eighteenth centuries, a curious collection of high-heeled boots and shoes attracted considerable attention. Here, also, were seen the faïences of Rouen, and the productions of the renowned Palissy, old furniture, mirrors, inlaid cabinets, black letter books, and specimens of bookbinding. The collections of this period were continued in the halls beyond, and contained the porcelains of Sevres, richly wrought table services of silver, tapestries, miniatures, snuff-boxes, thread lace, and elaborately decorated fans.

Among the curious relics from other countries the most noteworthy were the cradle of Charles XII of Sweden, the elaborately fashioned trappings of the horse that Mahommed rode in 1331 at the siege of the town of Castro el Rio, and a variety of specimens of ancient arms and armors. The richest collection of ancient arms was sent from the Imperial Museum of Austria, and contained a number of guns with ivory stocks, richly inlaid with metal, and steel bows, also mounted in ivory.

Among the ancient ornamental works and jewels of Austria of the sixteenth and seventeenth centuries, there was a remarkable display of tankards, vases, and goblets of rock crystal, of great size, and showing a high degree of taste and skill in the art of the lapidary at that time.

There were several interesting relics and works of ancient art in the English section, among them a table covered with silver in *répoussé*, or beaten work, belonging to her Majesty Queen Victoria, and another table made in 1700. A selection of old armor from the Tower of London occupied one of the cases, and in another were various specimens of silver and gold plate, and tablets of Wedgewood's porcelain.

Although the collection of antiquities as a whole was very large and interesting, it could not be regarded as a complete exhibit of the progress of human labor up to the present time. The wonderful advances made in the mechanical arts of the present century, and the various applications of science to the arts, were not historically shown. The collection was also deficient in representations of the ancient arts and civilization of China, Japan, of Egypt, Mexico, Central America, and Peru.

GROUP I.

WORKS OF ART.

CLASS 1. PAINTINGS IN OIL.—CLASS 2. OTHER PAINTINGS AND DRAWINGS.—CLASS 3. SCULPTURE, DIE-SINKING, STONE, AND CAMEO ENGRAVING.—CLASS 4. ARCHITECTURAL DESIGNS AND MODELS.—CLASS 5. ENGRAVING AND LITHOGRAPHY.

CLASS 1.—PAINTINGS IN OIL.

The interior circle of the Exposition was, as already indicated, devoted to works of art. Thus, by an arrangement which, if accidental, was, at all events, poetic, we passed from the gross necessities of life such as the cereals, the wines, &c., to the machinery which represents industrial force; to the manufactures which conduce to individual comfort; to the instruments which add to the intelligent perception of all natural phenomena, and so to that last and refining phase where the immagination excites its most powerful and refining influence.

The fine arts naturally involve certain cognate professions. Group I was therefore made up of five classes, thus tabulated: 1. Paintings in oil; 2. Other paintings and drawings; 3. Sculpture, die-sinking, stone and cameo engraving; 4. Architectural designs and models; 5. Engraving and lithography. The various articles exhibited in these classes occupied a considerable but broken space in the Exposition. Several nations feeling that the space allotted to them for pictures in the first gallery, which, in accordance with the original plan, was subdivided into fourteen compartments, was inadequate, declined to avail themselves of it. They found it preferable to erect structures of their own in the Park. The statuary was more houseless than the pictures, and was scattered, not always disadvantageously for effect, through the entire surface of the Champ de Mars. The theory on which the central gallery was devoted to the fine arts was, perhaps, good, but practically it was open to serious objection. The rapidly closing concentric lines had the effect of presenting many of the best works at inconvenient angles. This was particularly the case in the small portions devoted to foreign countries, which, being in the elbows of the building, were exposed to many cross lights. Probably no two sections were more unfortunate in this respect than the American and English. They occupied the same gallery and worthily. But the United States, with nothing to complain of in their portion of the gallery itself, were unhappily compelled by the number of their contributions to take refuge for the surplus in the adjacent passage. called by a ludicrous accident of neighborhood "the street of Africa." In no respect of light or atmosphere could this be considered a favorable location; but it had its advantages in point of popularity. A large proportion of those who even transiently visited the Exposition passed through this artery, and, it may be presumed from their expressions, were gratified with and interested in the display which was provided for their examination.

One-half the entire space—and the best half because the lateral half—was occupied by works of art contributed by French artists. It does not fall within the province of a brief review like the present to discuss the merit of individual pictures, or to contest the claims of the French school of art, which most assuredly is capable of taking care of itself, and which, without question, was nobly and amply represented. It is agreeable to the writers of this report to state this at once, for, from some discussions in the preliminary committees appointed on the subject of the fine arts, it was understood that the collection, although admirable, did not by any means represent the full vigor of the nation. Owing to this cause it has been stated by writers of eminence that the display was not equal to that made at the Palais de l'Industrie in 1855.

But it was rich in the French masters who are most known and admired in America, many of whom indeed were on the jury and received the highest honors that were awarded to the class. Gérome was represented by a large and valuable collection of singularly accurate and impressive scenes, depicting for the most part the savage side of eastern life or the similar episodes of Roman history. There was nothing from this artist, however, that was unknown to Americans. The majority are familiar in a photographic form, and several are owned by our private collectors who loaned them for the present occasion. The same remark applies to the productions of Meissonier, whose minute masterpieces, difficult to obtain and highly prized by their fortunate possessors, are great favorites in America. Each of these masters contributed more than a dozen works—children of studios that had been scattered for years, but had been brought together by the interest of the Exposition and the worthy pride of their creators who gathered them together for this solemnity. Gérome and Meissonier represent the most popular form of French art, or rather that phase of it which, requiring the greatest accuracy of detail and closeness of study, produces its results at long intervals, in small forms, and with extreme concentration of thought and action. The canvases are of the most modest cabinet dimensions, and protest with singular emphasis against the vastness which vulgarizes the many battle-pieces of the larger national picture galleries. Nothing could be more dramatic or free from the clap-trap of commonplace than Meissonier's picture of "Napoleon I in Russia." The tone of the work, expressing a disaster without depicting it; its fulness of detail and clear faithfulness of particulars, cannot be sufficiently praised. A work of almost equal importance represents "Napoleon III at Solferino." Both indicate a larger scope in composition than we are apt to expect in this fine colorist and genial but microscopic artist, who usually is content with one or two figures. Gérome has been accused of hardness in the matter of drawing, and a selection of subjects which are ordinarily painful, or, at all events, repulsive. Conscious of this reproach he exhibited a painting called "Louis XIV and Molière," in which the monarch and the poet are exhibited, greatly to the advantage of the latter in point of condescension. The courtiers express their amazement and contempt at the easy ways of the writer, but the King is obviously overwhelmed. Such a subject naturally affords an opportunity for the contrast of many physiognomies, and for the display of much variety in the matter of color and costume. The success of Gérome in this new field has not been pronounced as positive. Most impartial spectators regarded the stern, nay, dismal tragedy of the "Duel after the Masquerade" with more interest than the insipid smiles and supercilious sneers of the big-wigged actors who make up the tableau of "Louis XIV and Molière." Thus it would seem, so far as the Exposition of 1867 permits us to judge, that Meissonier can step more easily and successfully out of his ordinary sphere of action than Gérome. Both, be it added, are great and strong, and the deviations noticed are a matter of curiosity rather than of criticism.

Very different from these pillars in art is Corot, a painter whose every work is extolled to the skies or condemned to pitiless ridicule by his countrymen. So far, no other people has put itself to the trouble of going to either of these extremes. In New York, Corot's pictures were exhibited without producing even a pecuniary result. They were returned with promptness to the country of their birth, and many visitors from the other side of the Atlantic were surprised to find them turn up again in the Exposition. The artist has touched the whole range of art, and his knowledge is as undisputed as his eccentricity. He has a style of his own, inasmuch as no one has ever thought of imitating it; nevertheless it has many admirers. It is characterized by a singular vaporiness of color, and a consequent faintness of outline which suggests haste, but is the result of an elaborate effort to be dreamy. To live in a constant atmosphere of fog, surrounded by objects of ghostly aspect, is not agreeable to most spectators; but such as are predisposed this way will find congenial feeling in the canvases of the eccentric Corot.

Classical art was represented by Cabanel, who had six pictures—three of the number being on epic subjects, and the other three portraits. The largest of the former was from "Milton's Paradise Lost," and represented the Deity surrounded by his heavenly ministers—an effort which is seldom successful, and was not rendered so on this occasion. This and its companions, however, displayed great academic skill and the influence of a school which makes the study of the form the first necessity of its existence, and which has recently lost its greatest exponents in the lamented Ingres and Flandrin.

In a semi-classical vein, but with a quaint infusion of sentiment and allegory, were many works, mostly by artists who owe their education to the liberality of the government. The productions of Hamon, Bougereau, and others, are of this agreeable class. These gentlemen have each, at various times, taken the *prix de Rome.* This is more than a recompense: it is like a presentation to a college, and means a classical education. Those who are fortunate enough at the academy competition to gain it are, for five years, nursed and cherished as men of superior ability and trained in a settled and severe way. They are sent to Rome, and during each year of their sojourn in the Imperial City they are expected to send specimens of their progress to the powers of the academy in Paris. These specimens are preserved with national care, being placed in a building where they are at all proper times exposed to the view of the public. The Palais des Beaux Arts and of the Luxembourg are, to a great extent, representations of the art progress of the country, and the pupils who each year contribute to their treasures remember that they have vast reputations to contend with. They are encouraged, too, with the reflection that these reputations were no greater than their own when their fortunate possessors sent their first contributions to the academy. It may be interesting to state that the earliest of these canvases was sent by Sarrabat, and bears the date of 1688. The school, which also comprises an academy of architecture, was established in 1648—the architectural section being founded in 1671, and the pupils being sent to Greece instead of Italy. It includes also three studios for sculpture, one for copperplate engraving, and one for engraving on medals and fine stones. A competition for the *Grand prix de Rome* takes place every year for painters, sculptors, and architects; every two years for engravers; every three years for engravers on medals and fine stones. After remaining two years at Rome the young students are permitted to travel. Engravers on medals and fine stones have only three years' provision made for them, and must remain two years in Rome. The governor of the establishment sends official reports every six months of the progress and pursuits of the pupils.

So far as painting is concerned strict attention to design is of the highest importance. But as the manner of the age drifts slowly from the stern manner of the ancients we find, as in the case of the artists just named, a tendency to fanciful subjects, with just sufficient of the classic element to remind the spectator of good training and of the intellectual restraint of other and older schools where inanimate art was conventionalized by uniformity and straightness in such things as foliage, and animate art was confined almost exclusively to the exhibition of the nude figure.

Hamon's pictures are familiar everywhere. They have been reproduced by the process of the engraver equally with that of the photographer. Every one has seen in some way a reproduction of his "Aurora," where the goddess of morning sips from the lips of the cup the first libation of day. The pose of the figure is charming, and whilst showing the coquettish knowledge of the female form which French artists possess and display with a gracefulness all their own, it seems also to answer the purposes of the life study which those who win the *prix de Rome* are expected to pursue. Bougereau is perhaps less known in America. He is more severe than Hamon, and his sense of color is more positive. The object of referring to these artists is not so much to explain what they have done, and still less to tell the American people how they have done it, which indeed would be a difficult task. But, to add a further statement, they occupy a very prominent position before the most intelligent community in the world. Whatever comes from their easel is in demand—great demand—a demand which can scarcely be supplied. It is pleasant to know, therefore, that a portion of the time so much occupied is devoted to other purposes. It is to the co-operation of such thoroughly informed artists that the government manufactories of France owe their unquestionable pre-eminence.

The government of France indeed exercises a direct and practical influence on art which cannot be overestimated. It is paternal in the means it affords to its youth to avail itself of the opportunity to study, and it is liberal in purchasing what has been done. Out of the 625 numbers mentioned in the catalogue as appertaining to France, no fewer than 252 are contributed by the government. Many of the others, as we have before hinted, were loaned for the special occasion of the Exposition, being traced by their painters to their distant homes in the Old and New Worlds.

The dramatic phase of historic art—that in which an action is expressed to the eye—was very largely represented. From the soldier who wraps his wounded leg in his pocket-handkerchief, to the tyrant who lays his head prayerfully on the block, it is in this department the same thing, namely, a matter of what can be remembered or felt, and mainly in French art, of what can be remembered. The innumerable, colossal, and tedious battle pieces which prevail in every museum of France are an evidence of this. Versailles tells the history of France with the coarse, smoky gusto of a dragoon. Throughout the pitiless range of chambers there is not a scene which recalls a pleasing incident of battle, of triumph, or of defeat. The battle pieces at the Exposition were almost entirely of this character. They displayed an idea of action, a thorough sense of what is called situation, and an utterly faithful amount of details, topographical, military, and otherwise. To the eye not inanately tutored to the beauties of red, there seemed too much in these productions, but the uniform which offends the foreign eye from its brilliancy is naturally the recognition point of Frenchmen, and appealing with earnestness to the recollection, recalls the liveliest interest. The government, of course, was the principal exhibitor in this department. The pictures were the product of commissions given to various artists and intended for, or borrowed from, various museums of the country. History and poetry alike delight to record the triumphs of valor, but it is only of late years that painting has attempted to do so. The attempts have nowhere been so successful as in France. It may be questioned if any one will desire to essay more than Yvon has accomplished, an artist of splendid abilities, whose two pictures of the "Taking of the Malakoff," and the "Struggle in the Gorge of Malakoff," are perfect, but it may be asked if such gigantic productions are desirable even as records of patriotism. As works of art they excite the regret that such splendid ability should be thrown away on a scene which could be rendered with greater effect, and precisely the same color, at a minor theatre of the city.

Nearly five per cent. of all the pictures exhibited in the French department were battle pieces. The three which from their real sentiment and vigor of drawing attracted the most attention were by Protais: "The Morning before the Attack," the "Evening after the Combat," and the "Return to Camp," a work of very singular vigor, although windy, and which was contributed by the celebrated Bellanger. It depicts the episode of Waterloo, described in every French history, but which Victor Hugo has put himself to the trouble of refuting, namely, that the Old Guard was prepared to die, but not to surrender.

In animal paintings the French department was represented by Rosa Bonheur, Fromentin, and Troyou, deceased. Animal paintings, or, to speak more closely, the desire for animal paintings, is the fancy of a day. Judging from the productions of the artists named, it would seem that the fancy is somewhat out of fashion. Rosa Bonheur's powers were finely represented, but recent productions of the lady do not maintain her very high reputation.

Of that large class of subjects which are called "genre," and which relate to little episodes of life or peculiarities of costume, there was an endless variety. Among the most prominent of French artists in this respect, may be mentioned Plassau, Fichel, Poulmouche, and Wetter, who each exhibited a number of interesting figure subjects charmingly suggestive and exquisitely painted. Of the painters of rustic life, Breton and Millet preserved their well-known pre-eminence.

In the way of landscape artists, the most agreeable and well known were Theodore Rousseau, Lambinet, Daubigny, Cabat, and Dupré; the most singular was Corot.

The French collection, as before remarked, consists of no fewer than 625 pictures, of which many were the personal property of the Emperor or the nation. It was said by French critics that the display did not indicate any progress, and contained very little that was new. With few exceptions all the important pictures had been exhibited elsewhere. This remark, however, applies with equal force to every other nation. The fine arts department of the great undertaking was intended as an exposition, not as a competition. Otherwise it would have been unfair to have given such marked preference to reputations. As an exposition it was exceptional excellence, and represented very forcibly the prominent position occupied by several artists of France.

There were four nations who, not finding themselves sufficiently provided with space in the interior, obtained permission to build, and thereupon erected galleries of their own in the Park. These were Belgium, Switzerland, Holland, and Bavaria. Of these outside collections the most important was that made by the government of Belgium, it consisting of 186 pictures, and, as in the case of France, it was more a display of individual and well-established reputations than a competition of numbers. Of the 186 frames no fewer than 52 were contributed by five artists only. These were Leys, Stevens, Willems, Verlat, and Clays, (marine.) The names suggest almost everything that is vital in the Belgian school. Of the five, the least known in America is Alfred Stevens. This artist has no fewer than 18 pictures, all of them of cabinet size, and having for subjects familiar episodes of life, many of them touching and simple, and all of them interesting to the eye. Thus the picture called "Tous les Bonheurs," representing the serene content and bliss of a young mother nursing her infant, may be cited as a happy illustration of the artist's powers. Stevens paints with great boldness, and his coloring from its brilliancy is occasionally offensive to the eye, but his power is unquestionable. In his selection of subjects, however, he sometimes borders on the "demi-monde." This is a fault which cannot be charged against his colleague Willems, whose extreme delicacy of fancy is apt to invade the realms of the insipid. No one ever understood the swirl of a lady's satin dress better than Willems, whose knowledge of this texture is singularly exact. Indeed, the details of all his work are remarkable for their truth and delicacy. They are never in the way, and interest the mind only as a part of the recollection of a very charming impression. The subjects selected by Willems are of the simplest character, and neither suggest invention nor any other form of intellectual activity. But as they invariably represent a lady of refined appearance and elegant costume, with hair and eyes of exquisite hues, they never fail to be interesting. As specimens of faithful and conscientious work they are unequalled. The most important work exhibited by this renowned artist, and one which marks an ambitious step in the way of composition, was "L'accouchée," a quiet interior which two visitors are entering on tip-toe. A young wife sleeps peacefully on a bed, and not far from her is the nurse holding in her arms the first offspring of a happy house. The tone of the picture and the treatment are in every way admirable. The subject too is clearly expressed; a soft and tranquil stillness, not of death, but of exhaustion, hangs about the apartment like a spell. It would be a sin to disturb that fair young mother. "Two lovers exchanging a ring," another large picture—if the term can be used of this artist, whose canvases are always of the smallest—displays the indications of a new style, bolder in color and in treatment than that with which heretofore we have been familiar. There is no artist, possibly with the exception of Coomans, who understands so thoroughly how to harmonize the most delicate tints.

A thorough contrast in this respect is found in the 12 works exhibited by the Baron Leys, the pre-Raphaelite prophet of the Netherlands. The characteristics of this singular mediæval style are too pronounced to escape notice. The prevailing color is dead red or brick color. Bricks indeed of every color are favorite objects with the baron, as also are the cobble-stones which line his thoroughfares with painful distinctness. All the figures stand with their legs astride, a position more comfortable than graceful. All the legs are in red stockings, which, added to the cobble-stones and the bricks, contribute to a massive monotony of tone which, no doubt, is highly characteristic of the period and might serve as a warning to the present generation. In the faces there is invariably a painful expression, as if the toothache were a mediæval invention that had recently been discovered. It is impossible to resist the laughable side of this school. But it has another and a serious significance. These lurching and lugubrious figures that seem to be falling out of the frames are at least correctly garbed. Every detail of dress or habitation or decoration is the result of learned investigation and study. The details of Leys's pictures are revelations of archæological lore. To a certain class of minds, too, this seeming antiquity is irresistible. Leys's pictures were of all shapes and sizes. The subjects were taken for the most part from the stirring period of the great struggle with Spain for religious and civil liberty in the sixteenth century.

Verlat's tendencies are more classic. He exhibited a very beautiful "Virgin and Child," a work quite exceptional in its excellences. Also a "Dead Christ at the foot of the Cross."

It would be superfluous to speak further of the pictures in this excellent collection. The tendency of the Belgian school is ambitiously French, except in the case of Leys, who is individual and pre-Raphaelistic.

The government of Holland exhibits 170 pictures, among which are many works of unquestionable excellence. Israels is the head of this school, and is distinguished by delicacy of sentiment and simplicity of statement. He had five frames, all of which were worthy of attention. But it is evident that this artist and nearly all the others in the gallery attach more importance to the teachings of the French school than to the traditions of the Dutch. Bles, Alma, Tadema, Bukkerhorff, Schendel, Scheltema, and Verveer, contributed acceptably to the display.

The Swiss collection was composed of 112 pictures, most of them of local interest. Where indeed could a Swiss artist find grander scenes for study than those of his own country?

Bavaria, as we have before mentioned, had, like the three preceding countries, her own building in the Park for the display of her art treasures. Her principal artists were Piloty, Horschelt, Adam, Schuets, Schwind, and Lizzenmayer, in figure subjects; Woltz, in cattle pieces; Lier, in landscapes; and Lenbach, in portraits. The number of oil paintings contributed by Bavaria was 211. A large proportion were, avowedly, sent for sale, and hence the display was neither so national nor so good as in other countries.

Prussia, for reasons of various kinds, did not do justice to herself. Many of her best artists were unrepresented. The number of works in all was but 98, and a large proportion was the property of the artists. Nevertheless there were several works of interest, such as Knaus's "Saltimbanque," well known by the engraving, and others equally familiar to the frequenters of our print-shops. Knaus's style is genial and earnest, and he possesses the power of concentration in an eminent degree.

Austria contributed 89 pictures, the most important of which was the "Diet of Warsaw, 1773," by Matejik, a very bold and well-distributed composition, laid on in heavy but effective masses of color.

Spain was represented by 42, Portugal by 23, Greece by 4, Denmark by 29, Sweden by 54, and Norway by 45 oil paintings.

Among the 63 contributions of Russia were several that attracted attention. The subjects were mostly original, but the treatment had no distinctive national characteristic. It was, however, good, and worthy of comparison with the best in the gallery. Such comparison would be out of place here. The principal contributions were Gué, sacred subject; Simmler, history; Peroff, Rizzoni, and Popoff, genre; Kotzebue, battles; and Clodt, landscapes.

Italy, the mother of arts, contributed 51 oil paintings, none of which were distinctive, and but few of which were above mediocrity. The Papal states sent 25, Turkey 7 paintings.

Next in the order of the catalogue—which we have followed, except when speaking of the establishments in the Park—came the limited space allotted to the United States of America. In another portion of this report, devoted to the special consideration of objects exhibited in the American department, will be found a description of the 75 works there put on view. The collection was in every way a creditable one. The foundry scene of Weir was the best work of the kind in the Exposition; indeed, it was entitled to even greater consideration, for it was the only work of its kind. The landscapes of Church, Kensett, and Bierstadt were also eminently national, and the productions of Boughton, Huntingdon, Hart, Johnson, Healy, Hunt, Whistler, &c., drew the attention of connoiseurs who knew nothing of their origin. For, be it remembered, most of these paintings occupied the extreme end of the English gallery, and it was natural to suppose that they formed a portion of it. This in itself was no advantage. Nothing can convince a continental critic that art is either known or practiced in the British isles; and, owing to this cause, the stranger paid but passing heed to what was there displayed.

In the schools we have so far hastily glanced at there has been a certain uniformity of effort, which we have explained by describing the mode of study practiced by France. French influence in art at this moment extends to every continental country. The distinctiveness of the Dusseldorff school is rapidly disappearing. That, too, it is evident, will become French. It is useless to look elsewhere. But if we cross the channel we shall find a totally different state of affairs. Instead of 5,000 men who paint precisely alike, and differ from each other only in the order of their intellectual, emotional, or mechanical force, we shall not find five who have agreed on any settled plan or style. The lack of regular methodical instruction, combined with a total, or almost total, deficiency of government support, throws the art student entirely on his own resources. He is compelled to seek the manner which is readiest to him, and select the subjects which are more congenial to private taste. The government will neither show him the way which is best, nor reward his efforts for pursuing it successfully. A certain number of picture galleries, to be sure, are provided, and the student may do as he likes about following the style of any master there exposed. No direct influence controls his studies, and he consequently wanders. There is something to be regretted in this, but a great deal, also, to be commended. Self-help is tedious and slow in its results, but it has often proved that it is the best kind of help, and certainly in art, as in everything else, it has shown on many occasions that it is better than blind subjection to established rule. There is character in the English exhibition, as there is in the American—so much character, so much contrast, so much individual effort, that the dilletant who is familiar only with the smooth competition of the schools is bewildered, and condemns where, perhaps, it might be better to investigate. Certain it is that the French critics have been unusually severe on the English exhibition, and also on the pictures exhibited in the American section. The remarks we have made may seem an easy way of accounting for this severity. They have, at all events, their value with unprejudiced persons.

CLASS 2.—OTHER PAINTINGS AND DRAWINGS.

Under this general head were comprised miniatures, aquarelles, pastels and drawings of all kinds; paintings on enamel, on porcelain, on crockery; cartoons for frescoes and for glass windows; mosaics.

Water-color drawing (aquarelle) or painting is, comparatively speaking, a new art. It has been brought to its greatest perfection in England, where Turner is still regarded as its best exponent. On the continent it has attracted some attention, but it is regarded with distrust. Water-color drawing differs from oil-color painting in many mechanical matters of detail. The separate names of these two arts suggest the most important of these differences; the one is wrought in oil and the other in water. But beyond this there is a general distinction, which is often overlooked: In a water-color drawing all the colors are transparent; the "lights" are obtained from the original surface on which the drawing is made. In oil color, all the lights are superimposed on the canvas, and the original surface is of no value at all. Some of the finest artists that England has possessed have devoted attention to this very pleasing branch of art; among others, may be mentioned Turner, Cox, Dewint, Hunt, Copley, Fielding, and Stanfield.

The only important collection was in the English gallery, where the pictures, glazed and framed, occupied swinging panels in the centre of the apartment. Other nations, in their respective departments, contributed a few specimens; but the whole, put together, were greatly inferior in number and quality to the English. It was intended in this, as in the case of the oil painting, to illustrate the past ten years, not to assert positively what had been done from the very recent date of its birth. The drawings were, of course, entirely supplied from private sources, the government having no museums from whence to draw a supply. Of late years these private sources have been called upon very often to give up their treasures. Local art exhibitions have been rife in England, Ireland, and other parts of the British isles. Pictures have been borrowed, and, after due exhibition, returned to their owners in an injured condition. It has been affirmed that, owing to these causes, the owners of valuable works declined to run the risk of sending them across the channel, and that, in consequence, the collection, good as it was, could scarcely be said to represent satisfactorily the present condition of the art in England. Nevertheless, there were many works of sterling value, and nearly all were worthy of examination. It would be useless to describe the excellencies of particular frames, but it may be serviceable to refer to the comments of an admirable artist, who seems to think that the art has taken a downward tendency. He bases this opinion on the ground that in nearly every picture exhibited opaque colors were used. By this expression he meant little masses of mineral substance placed in prominent places, and heightening, by a sort of embossed brilliancy, the effects of the lower tones. It is affirmed by the best critics that water-color drawing should be entirely transparent, and that this tendency to overlay the natural source of the light is meretricious. Moreover, it is known to be detrimental to the permanent value of the drawing. The imposed substance drops off, from climatic causes, and is especially effected by the glass covering which gives protection to the other parts of the picture. This point is of importance to purchasers of water-color drawings, and of interest to artists who may not themselves be familiar with a fact which, while increasing their present popularity, endangers their permanent fame. Mr. Horsley speaks feelingly on the subject. He says:

"A water-color draughtsman who cherishes the beautiful ground he works upon for his lights, or, if he has lost this, scrapes or washes them out, has a far harder and more anxious time of it than he who, by the aid of opaque mixtures, dabs them on in a moment and renews them at pleasure. It may, however, readily be conceded that another and worthier reason for the use of opaque color is the yearning of the artist to have substance and solidity in his material; but when he feels this, and that he is flagging in devotion to those qualities of art which water-color, and water-color alone, can produce, he should become an oil painter, and cease to be a water-color draughtsman."

There were scanty displays of water-color drawings from France, from Austria, from the Pontifical States, from Greece, from Sweden, and from Russia. The latter were by far the best. China, too, exhibited a distemper painting of almond-eyed beauties, with skins that seemed to have been wound up tight by means of the hair-dresser, and their under lips painted green.

Of pastels and drawings of all kinds there was no end. Every design, indeed, could be brought under one of these two heads, and almost every country contributed to the store. The word "pastel" in these days means anything from chalk up to body color. The French department offered fine specimens of the various processes. Bavaria presented a remarkable display of drawings and models, showing the various stages of study from the cast and from life.

The subjects of "painting on enamel, earthenware, and on china," do not greatly interest the American community, except in their practical bearing on housekeeping; but in Europe they engage the attention of the better classes, and give occupation to the highest kind of skilled labor. Thus, while it happens that beauty and permanency are often attained, it is often the case that the local fame of an artist and his tedious patience take the prize which the former should have commanded. Mr. Horsley, writing on this subject, says:

"It seems necessary to bear in mind not only the principles of art that should be applied to these various branches of industry, but also to suggest that peculiar abstraction of mind is in some instances requisite in order to appreciate the results, as far as the arts of pictorial designs and execution are concerned. Take, for instance, what it is presumed would be considered the highest class of enamelled works in the Exhibition—those of Lepec and Rudolphi, who exhibit enamels on gold and other metals. The pictorial art exhibited in those works is both puerile and bad, as, for example, the 'Angelique and Roger,' by Lepec, which is placed among the French miniatures. Nothing can be less worthy of regard, in an artistic point of view, and his portrait is little better. Lepec has also a case of enamelled vases, executed with the rarest skill and ability, with fabulous prices attached to and given for them; yet the painting which is intended to ornament these *objets de luxe* is quite beneath notice. Again, look at the series of elaborate enamels in porcelain in the Bavarian *annexe*, by Wimmer, of Munich, and other German artists, after well-known pictures. What are these but wicked copies of immortal works?—so bad as to be irritating to the artist who looks at them; copies, which, if made on canvas or paper, would not fetch as many pence as the pounds which are now given for them. Then, what quality is it that makes these productions so readily marketable? It can be only that of permanency—a quality appealing to minds so constituted as to derive satisfaction in the possession of 'Angelique and Roger,' of Lepec, or one of Wimmer's travesties of Raphael and Rubens, simply because they are works which will never tone with age or fade with time. Great as may be the charms to some minds of the sense of permanency, it must be permitted to those of more artistic sensitiveness to assert that this quality does not compensate for other wants."

The same able critic also makes the following remarks, which are in every way worthy of attention:

"To come to what may be termed painting proper upon porcelain, *i. e.*, the decoration of vessels of various forms for ornament and use, it may be submitted that the general principle to be observed in applying art to such work is that it should harmonize in every way with the forms receiving it. As these forms are of a well-defined and architechtonic form, so the pictural adjunct should, as far as possible, partake of the same qualities. Thus, speaking broadly, all landscape subjects and those requiring picturesque treatment are undesirable and incongruous for the object in view. Occasionally in the present exhibition you will come upon a vase on which a landscape is painted, which commencing on the body of the vessel, is made to meander (trees, sky, buildings, and all) over the concave and convex forms to be found at its neck. Can there be a more absurd departure from true taste in ornamentation than such an example as this?"

There were many cartoons for stained glass and fresco, but they were of interest chiefly to artists who work in this extensive way. It is hardly desirable to refer to productions which may never come before the public again. In America everything that is painted on a ceiling or a wall is called a fresco. Such work is ordinarily executed in distemper, in wax, water-glass, or oil. True fresco has a peculiar quality of its own which eminently distinguishes it from all other methods of painting. It is this: that a fresco is a non-absorbent of light. The fresco ground is composed of certain proportions of lime (from which the heating element has to a great extent been washed out) and sand, and this mixture is used by the painter in its moist state. The wet lime, absorbing carbonic acid from the atmosphere, becomes carbonate of lime, and in combination with the sand produces an impermeable cement which is formed over the surface of the ground during the day's labor, and in which the color used is incorporated and fixed. This cemented surface has been stated to be sufficiently crystalline to reflect light; but whether this be so or not, its non-absorbency of light is unquestionable. Thus, where an oil painting would be invisible a fresco is clearly seen.

The Russian mosaic work was by far the finest in the exhibition and deservedly attracted much attention. It came from the atelier of Michel Chmielevski, of St. Petersburgh, and was designed by Professor Noff. The subject was a group of ecclesiastics in their vestments, and the object the decoration of a Greek church. The Roman mosaics were far inferior.

CLASS 3.—SCULPTURE, DIE-SINKING, STONE AND CAMEO ENGRAVING.

It would be impossible in the space devoted to this report to do justice, even cursorily, to the many specimens of sculpture exhibited in the various sections of the Exposition, and it may be added, too, that it would be entirely uninteresting to do so. To the majority of people, statuary, at best, is a sealed book. It creates no sensation when it is visibly before them, and it would certainly create less, if it were possible, when simply described by the feeble power of a reporter. Nevertheless, it is the grandest, most ancient, and most durable of the arts. The works which delight the critic of to-day and are believed to mark the golden age of statuary, date their origin many centuries before the Christian era. The full beauty of the human form has never been so accurately described as by the Greek sculptors. The mythology of the country gave to their efforts an elevation and purity of thought which in these days cannot be conveyed to similar subjects however skilfully manipulated. Hence the tendency of sculpture has been to moderate the severity of the ancient school and to create another in which clothes should not be wholly disregarded. The toga imposed itself on the thoughts and consciences of artists. Were it a booted warrior with a cocked hat that had to be depicted he was found clad in the garb of a Roman senator. An absurdity so conspicuous could not long continue. A new school sprang up. Its aim was to call a spade a spade. If top boots and a cocked hat were wanted the disciples of that school were ready to supply them. Nay, if Achilles, himself, in addition to his one natural defect, had also had a pimple on the top of his nose, they would have alighted upon it with enthusiasm. Excess of any kind naturally leads to reaction, and a reaction took place. But the various theories still remain. The purists and the realists contend for their separate ideas, and the able men on either side prove how easy it is for both to be right.

There never was a better battle-field than the Champ de Mars, where statuary of colossal proportions contended with the humbler but equally interesting productions of our own Roger, whose small domestic groups for the mantelpiece are well known to loyal people. Nothing could be more realistic than these touching incidents of the late war. While thus bending, as all young nations will, to the ideas which are newest, it happened curiously enough that the gem of the classical school was also of American origin. The composition referred to was by Miss Hosmer, and was called the "Sleeping Faun." The attitude of the principal figure is graceful and natural, the expression of the face thoroughly winning. A mischievous child faun is most happily introduced in the group. He is partly hidden behind the trunk of the tree beneath which the elder faun is reposing, and amuses himself by knotting the tail of the latter into the tail of a lion's skin upon which the elder faun reposes.

The French statuary, by its numbers and the variety of its styles and subjects, was considered the best. The Italians also exhibited much that was very marked in character, and sufficient to show that in this respect Roman art yet maintains her own. One of the most striking statues in the Italian vestibule was "The Last Days of Napoleon I." This was another realistic work, and, so far as execution went, its details were worked out with a skill and power of execution that was not to be found elsewhere. But its subject was painful. It may be questioned whether any amount of skill justifies an artist in exhibiting a hero in so decrepid, diminute, and hopeless a condition. Sculpture has nothing whatever to do with decrepitude. Its office is to ennoble and idealize the grandest types of humanity. Napoleon seated in his arm-chair, with his head drooping forward, his eyes heavy and sad, and the hour of dissolution visibly upon him, is a spectacle which robs history of a hero. The French, however, were satisfied with the work, and a gold prize was awarded to the artist. It may be added here that there was a very curious and interesting collection of busts of Napoleon I. They were six in number; but only three or four of the six were derived from authentic sources. The authority for the last, "Napoleon at St. Helena," may be disputed, and the first, representing him as a child, has no other authority than an apocryphal sketch in pencil which may be seen yet at the Louvre. Taking them, however, as real presentments of the boy and the man, they are in the highest degree interesting and valuable.

In the Belgian department were exhibited some small terra cotta models belonging to the familiar picture sculpture school and representing scenes from domestic life and from Shakespeare and Moliere. Their merit consisted in their broad humor and true expression, to which may be added great care and ability shown in the modelling.

The sculptor Westmacott, in concluding his official report on the statuary of the Exposition, says: "The impression left by a careful examination of the works in sculpture of different nations is on the whole of a favorable character. That there is much that challenges criticism must be admitted; but the general practice of the art affords satisfactory evidence that while its employment is very greatly extended there is also manifest improvement in sculptors, in knowledge of form and in a feeling for the beautiful, showing the value of close observation of nature regulated by the discipline derived from a careful study of the best ancient examples. There is also considerable technical power shown in execution, in carving, modelling, casting, and chasing, proving beyond question that in the material exercise of the art there is good ground for congratulation."

French artists have long been eminent for their attention to and skill in medal engraving and die-sinking. It has always been the practice of France, from a very early date, to encourage these arts, and the sculptors have worthily responded to the patronage and protection thus accorded. Some of these works in the present Exposition were of large size, consisting of groups and compositions admirably treated. Others displaying beautiful workmanship, although merely portraits, were, in fact, gems of art.

CLASS 4.—ARCHITECTURAL DESIGNS AND MODELS.

The display of architectural designs and models was ample. The latter especially exhibited remarkable skill of production and elaborateness of detail. Both pertain to subjects that do not come within the range of this report, which is not technical but general. Among professional men it was thought that a better show might have been made, particularly in the case of works that are now actually progressing. The most perfect exhibition was made by the Suez Canal Company, which, topographically, architecturally, and otherwise, exhibited the difficulties which beset that great undertaking, the way they have been overcome, and what yet remains to be accomplished. These details occupied an entire building in the Park, and formed a special attraction of themselves.

CLASS 5.—ENGRAVING AND LITHOGRAPHY.

The subjects in this group appeal in a thousand ways to every taste, and are especially valuable alike for amusement as for instruction. There is hardly a work of any importance in the scientific world that does not in some way appeal to or depend upon one or other of these sister arts. The larger and more important part of all engravings are transcripts from paintings, and this mode of reproduction has of late become so popular that the number of those who pursue the profession, which was declining, has greatly increased. Of the innumerable body of engravers on wood it is impossible to speak. A fair exposition of their products would have filled half the building. There has been no marked improvement either in engraving or lithography during the past decade, save what could be traced to increased skill on the part of those who exercise these professions.

GROUP II.

APPARATUS AND APPLICATION OF THE LIBERAL ARTS.

CLASS 6. PRINTING AND BOOKS.—CLASS 7. PAPER, STATIONERY, BINDING, PAINTING, AND DRAWING MATERIALS.—CLASS 8. APPLICATION OF DRAWING AND MODELLING TO THE COMMON ARTS.—CLASS 9. PHOTOGRAPHIC PROOFS AND APPARATUS.—CLASS 10. MUSICAL INSTRUMENTS.—CLASS 11. MEDICAL AND SURGICAL INSTRUMENTS AND APPARATUS.—CLASS 12. MATHEMATICAL INSTRUMENTS AND APPARATUS FOR TEACHING SCIENCE.—CLASS 13. MAPS AND GEOGRAPHICAL AND COSMOGRAPHICAL APPARATUS.

CLASS 6.—PRINTING AND BOOKS.

The principal contributions in this class were from France, Austria, England, and the United States. The following extracts from the introduction by E. Dentu, to the catalogue of the exhibitors in the French section, present a condensed view of the condition of the publishing trade in France, and some general observations upon the present state of the typographic art:[1]

"The productions comprised in Class 6 may be divided into eight sections: I. Specimens of typography. II. Autographic proofs. III. Lithography in black and colors. IV. Engravings. V. New books and new editions of various works. VI. Collection of works forming special libraries. VII. Periodical publications. VIII. Drawings, atlases and albums, technical or educational. This class includes 144 exhibitors from seventeen departments of France. Paper and ink, and in a less degree vellum, and objects in paper and pasteboard, are the raw materials of printing and the library. These articles make part of class 7. Good quality of the raw material, and perfection in the manufacture, are the essential requisites for paper, which, in the form of books, lithographs, or engravings, is destined to bear the test of time. The facilities afforded for the export of rags from France have not yet been counterbalanced by the employment of substitutes so eagerly sought in the manufacture of printing-paper. Periodical publications, produced in large numbers and of ephemeral interest, alone, employ paper containing ligneous or other substances mixed with waste textile materials. Parchment and vellum are only used for a few special matters; such, for instance, as patents and diplomas. The imitations of vellum in paper, having the strength and surface of the skin, are more generally employed in choice editions. The quality of the ink has a great effect on printing and on the beauty of the work produced; its price varies according to the degree of fineness.

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[1] This and the subsequent extracts from the Official Catalogue have been taken from the English version, published under the authority of the Imperial Commission by J. M. Johnson & Sons, London.

It should dry rapidly, give clear lines, and reproduce the finest strokes. The manufacture of colored printing-inks has been much improved, and they are now applied in many ways in printing. The series of colors and tints is very varied; some are remarkable for tone and brilliancy; but, unfortunately, their price is relatively high, especially in the case of those which include the aniline colors in their composition. Since the day when Guttenberg conceived the idea of producing the characters of the text accompanying engravings in movable types, to the commencement of the present century, the improvements introduced in the art of printing were but few. Sixty years ago hand-presses were still in use, with the vertical pressure which had replaced the originally lever arrangement; the ink was still ground by hand with a muller, and the ball still inked the type or engraving in relief. The impression was still taken from the forms composed of movable characters. The progress of modern society soon rendered these primitive means insufficient. The problem to be solved was, how to arrive at the most rapid and most economic production. This was resolved by the invention of stereotyping, or method of converting into single plates the pages composed in separate types. The galvano-plastic process afterwards enabled the stereotyped plates to be formed with increased rapidity, and, moreover, assured their preservation. The transformation was completed by the invention of cylinder machine. Chromo-lithography, or lithographic printing in several colors, in consequence of improvements in the methods of registering, and in the facilities of multiplying without great cost the number of stones necessary for the printing in various colors, has assumed enormous importance. It has thus been made applicable to the demands of trade, especially in the production of decorated tickets and show-cards. One of the happiest applications of chromo-lithography is the reproduction of the miniatures and stained glass of the middle ages, and the publication of *fac simile* copies of ancient manuscripts and illuminated missals. Independently of designs executed directly on the stone, lithography is applied to the printing of maps, engraved drawings of machinery, to writing transferred to stone by means of autographic paper, to copperplate and wood engravings, and to typographical printing. Photo-lithography, which has for its object the obtaining of photographic pictures on stones, and the production of printed impressions, begins to yield some practical results. Copperplate printing, which consists in inking a copper, steel, or pewter plate by the ball or by the hand, is still executed by hand-presses; the mechanical processes attempted have yet yielded but small results. Engraving and ornamental printing has been greatly aided by the galvano-plastic process, which supplies stereotype plates as perfect as the plates or block cut by the engraver, and which thus allow an unlimited number of impressions to be taken without affecting the original. The plates furnished by this process for chromo-typography, or typographic color printing, possess an exactness which it has been found impossible to obtain by other means. They enable the printer to produce for a few halfpence excellent impressions worked from fifteen to twenty plates, in register, each with a different color or shade. The numerous and persevering attempts made to reproduce in relief the original designs of the artist, and to convert drawing and writing on stone into typographic stereotype plates, have yielded, if not perfect results, at any rate sufficient proofs that the problem is in reality solved. Paticonography, a chemical process which produces blocks in relief from the hollows of engraved plates, is now employed in the illustration of many important publications. It is used with success for printing maps, *fac similes*, and music.

The publisher is, at the present day, a real producer; carrying on, not a house of business, but a sort of collective workshop, in which the designer, the engraver, the printer, the paper-maker, &c., work together under his guidance with a fixed object. He has also another claim to the title of producer. He not only issues new or old works in choice or popular editions, but he creates collections of works with special objects, periodical or encyclopedical publications, and supplies subjects for treatment. It is by such combinations that the greater part of the extensive publications now issued are brought to light. The extension of the home trade in books would be considerably increased if the law of colportage, (hawking and sale at stalls,) and the limitation of printers' licenses, did not diminish the means of action. Working printers are divided into two classes: those who work by the task and those who are paid by the day. Compositors employed at task work receive for a thousand letters [ens?] 55 centimes to 1 franc 40 c., according to the type employed, and the language in which the copy is written. Those who work by the day are paid according to a tariff arranged by the employers and workmen in common, and of which the lowest rate is 5 francs 50 centimes per day for ten working hours. The pressmen stand in the same condition, and their wages are as high as those of the compositors. The workmen who attend the machines only earn 4 francs a day, and the children employed as assistants receive from 1 franc to 1 franc 50 a day. Wages in the provinces are about 30 per cent. lower than in Paris. The employment of women in printing establishments, after having encountered great opposition, has at length been carried out, and gives very satisfactory results. The wages which they receive are very nearly the same as those of the men. The great printers have established relief funds; but only one in Paris, equally prominent for the importance of his business, and his personal character, has admitted his workmen to a participation of profits. The principal centres of the business are: Paris, Tours, Rouen, Lille, Lyon, Limoges, Rennes, and Epinal. Strasburg stands in the second line; and afterwards come Bordeaux, Marseilles, Grenoble, Caen, and Chatillon. The printers are divided into typographical printers, who number about 900 in France; and lithographic printers, amounting to 800, of whom 391 are in Paris. As to the copperplate printers, Paris possesses about 138. There are but very few in the provinces.

The number of works printed in the year 1866, including new books as well as reprints of all works, amounted to 13,883. Of this number the "Belles Lettres" and novels form the greater portion. Political and religious works amounted to nearly 2,000; history, geography, voyages, and travels to nearly 1,500; scientific works, 1,900; works on commerce and agriculture to nearly 1,000. The production of engravings, lithographs, photographs, plans, maps, charts and drawings of all kinds, amount to about 30,000; to which must be added 9,000 publications of vocal and instrumental music. These productions represent on an average 20,000,000 of francs in the total exportation of France, and employ 2,500 tons of paper. There are also printed in France 1,771 periodical publications, of which 336 are political journals, and the remaining 1,435 literary, scientific, and miscellanous. Among the improvements introduced into the printing and bookselling trades since 1855, the following may be pointed out: 1. The variety and clearness of the types produced in the foundries, and the better choice of types employed in the printing of books, as regards the subject and the object of the publication. 2. The progress made in chromo-lithography and chromo-typography. 3. The improvement made in stereotyping, both as regards rapidity and perfection; the development of stereotyping by the galvanoplastic process, and the employment of paniconographic stereotype plates. 4. The improvement and cheapness of the impressions obtained by the excellent method of cutting employed in engraving, and the general introduction of improved printing presses driven by steam; the satisfactory result obtained by the application of these presses to lithography and chromo-lithography; the skill exhibited in the composition of tabular matter; and, above all, the increasing number of printing establishments capable of executing difficult work with great perfection."

The exhibition from the United States was by no means as complete as it should have been. Only two or three of the prominent publishers were represented by their publications. D. Appleton & Co. sent a bound copy of the New American Encyclopedia; Merriam & Co., of Springfield, sent specimens of their printing, and Brewer & Tileston sent a copy of Worcester's Dictionary. The choice and beautifully printed works from the presses of Cambridge, New York, and Philadelphia, were not to be found. The books and apparatus for the use of the blind attracted much notice.

The very interesting display made by the American Bible Society should be noted here as one of the most remarkable of the typographical and publishing exhibits of the Exposition. This society, organized in 1816, has issued 22,118,475 copies of the Holy Scriptures, in about 50 different languages, at home and abroad; such as English, German, French, Spanish, Italian, Portuguese, Welsh, Irish, Gaelic, Dutch, Danish, Swedish, Latin, Greek, Hebrew, Polish, Russian, Esthoman, Hungarian, Finnish, Syriac, Arabic, Armenian, Hebrew-Spanish, Armino-Turkish, Arabo-Turkish, Mpongwe, Zulu, Arrawack, Grebo, Benga, Choctaw, Chickasaw, Ojibwa, Dakota, Mohawk, Delaware, Creolese, Hawaiian, Micronesian in several dialects, Chinese in several dialects, Siamese, Hindu, and Urdu.

A very interesting and valuable series of publications upon science, art, medicine, and morals was sent by the Viceroy of Egypt, as specimens of typography from the government establishment, Boulac, Cairo. The government of Hawaii sent various specimens of native publications in English and the Hawaiian language. The latter works were curiosities, simply showing the mechanical march of letters into regions where education had scarcely penetrated. They had no claims to typographical merit. The perfection of a printed page is to look clear. It must never look crowded, whatever be the type in which it is printed. The proportion of each letter must be mathematically correct. The capitals must bear a true relation to the small letters, and neither escape the attention nor attract the eye too much. The spaces—or intervals between the letters and words—must be well determined, not capricious, for in the latter case the effect would be spotty. In this art, modern printers may yet learn much from their predecessors. The regularity of black letters was favorable to uniformity, and the contrast of black and white was more positive from the heaviness of the characters used. In the earliest books, the capital letters were left to be illuminated by hand, but very soon wood engravings were used both for the capitals and as borders for the last. Later, the borders were abolished and large ornamental capitals cast in type metal were used for the capitals of each chapter. These were succeeded by engravings on copper with head and tail pieces, many of which were the works of the first artists of their time. The process was a slow one, inasmuch as it involved two distinct modes of printing. It was in due time abandoned, and the fashion has now returned to borders cut in wood, or types, and to illumination, a new process involving lithography as well as common printing, expensive but very beautiful.

There were admirable specimens of books in the Oriental languages. The Hebrew types are the clearest and most elegant that exist. They have long had this renown, and the Arabic, although stiffer, are still more elegant than any other type cast in Europe. The charm probably lies in the respective alphabets.

CLASS 7.—PAPER, STATIONERY, BINDING, PAINTING AND DRAWING MATERIALS.

The following statistical data are extracted from the report of Messrs. Haro and Roulhac, members of the committee of admission of class 7 in the French department. The facts relate chiefly to France, but are of general interest.

The articles exhibited in class 7 comprehended stationery proper, bookbinding, the various objects comprised under the title of office requisites, and artistic materials.

STATIONERY, AND PAPERS.

There are few departments which do not possess several paper-mills. Angoumois, Ardèche, Vosges, Isère, and the basin of the Loire are the most important as regards the number of the mills. The rags employed in the manufacture are nearly all purchased in France. Since the treaty of commerce, these materials, of which the export was previously prohibited, may be exported on the payment of a small duty, which is gradually being reduced to extinction. The importation of cotton and linen rags and old cordage amounted, during the first nine months of 1866, to 2,830 tons. The importation of foreign rags, including cotton, linen, and old cordage, during the same period, amounting to 7,914 tons. The number of vats for hand-made paper in France is said to be 140; that of great machines for making white or colored paper, sized or unsized, 270; and of machines for making wrapping papers, 230. These vats and machines occupy about 34,000 persons, of whom 11,000 are women, and produce more than 129,000 pounds of paper. The annual consumption of the rags may be estimated at 115,000 tons. The average price of hand-made paper does not amount to more than two francs the kilogram; that of printing and writing papers is about one franc ten centimes the kilogram; that of packing and wrapping papers, forty centimes the kilogram. The greater part of the paper manufactured in France is consumed in the country. Exportation, however, tends to develop itself; it has considerably augmented since 1865. During the first nine months of 1866, it rose to 7,578 tons. As to the importation of foreign papers it is unimportant; the amount, during the same period, did not exceed 100 tons. The committee of admission of class 7 points out, among the improvements carried out in the paper manufacture: 1. The use of motive power, which during the last few years has increased at least 10 per cent.; 2. The gradual and intelligent application of substitutes for rags in those places where the latter are wanted or are dear; 3. A positive amelioration in the general economy of the manufacture, which has surmounted all difficulties by reducing the price, in spite of the constantly increasing cost of the raw material and of everything which contributes to the production of paper.

PASTEBOARD.

Pasteboard is divided into three sorts: 1. Pasteboard in sheets, which is obtained by uniting sheets of paper one upon the other by means of pulp paste; 2. Pulp pasteboard, which is made in the frame with waste paper, old paper collected, paper cuttings, and often with the aid of a mixture of straw and other materials; 3. Machine-made cardboard, which is nothing more than cardboard made by machines similar to those employed in making paper. This mode of manufacture only dates from 1846. Among the pasteboard which is employed in a special manner must be cited bitumenized pasteboard, the pasteboard which serves for the Jacquard loom; the pasteboard of which railway tickets are made; and especially the glazed pasteboard used in the dressing of shawls, stuffs, and papers. This last manufacture is developing very considerably, and there is no country that can equal France in this kind of product. The manufacturers of ordinary cardboard are to be found in all the districts of France. They have little connection with foreign countries; they exported, however, during the first nine months of 1866, 211 tons to various countries. Paris employs in this branch of trade more than 500 work people, and the annual amount of business exceeds £120,000.

PLAYING CARDS.

The manufacture of playing cards comprises the making of the card; the impression of the design; the coloring of the engraved figures; the glazing. The French cards, that is to say, those of which the designs and the ace of spades are furnished by the government, are divided into fine cards, demi-fine, and common. The fancy cards, of which the price is higher, are charged with a tax of 50 centimes. Foreign cards, intended for exportation, pay no duty. The home consumption of this article is increasing, but the exportation is not extending. A large number of playing cards is exported to Mexico, to Hayti, to Peru, and South America generally.

FANCY PAPERS.

This name is given to all papers gilt, silvered, colored, printed, embossed, pierced, &c., which are used in making objects in paper for bookbinding, confectionary, pharmacy, drugs, and laces. Among these papers, some, such as marbled papers, are made entirely by hand; others, printed, watered, and shagreened, are machine-made. All these articles are manufactured with white French paper, more or less fine. This trade exports little, in spite of the incontestable superiority which an immense assortment and excellent taste confer upon it. The manufacture, in France, of these fancy papers amounts to nearly £280,000. Paris is the centre of this interesting specialty, which employs more than 1,200 work-people.

OBJECTS MADE OF PAPER AND PASTEBOARD.

This class includes a multitude of articles small and large, rich and common, for offices, warehouses, travelling necessaries, packing, and the makers of fancy articles. This trade is essentially Parisian, and is continually on the increase. There are nearly 400 makers in the two branches of the trade above indicated; they employ more than 2,500 work-people, and the total amount of business may be safely estimated at £400,000.

OFFICE STATIONERY, ETC.

This term includes account-books, pocket-books, ink-stands, sealing-wax, wafers, pen-holders, pencils, and miscellaneous articles. This trade is essentially Parisian. Its various branches include 309 makers, who employ 1,436 work-people, and do business to the amount of 9,220,860 francs, (£368,834.) The article of account-books is the most important; it is treated with great care and superiority in all parts of France, but particularly in Paris, where 130 manufacturers and stationers do business to the extent of not less than £252,880 in this one article. The invention of artificial lead for pencils has given rise to an industry which is essentially French. The sealing-wax manufacture is interesting from the progress which it has made since the treaty of commerce. The custom which prevails of gumming envelopes interferes seriously with the fabrication of sealing-wax and wafers.

ENVELOPES.

There are few trades which exhibit a development equal to that of envelope making. This specialty dates from 1838, but only began to grow into importance in 1851. All the envelope makers are found in Paris, and they do not produce less than 2,500,000 a day. Nearly all the operations are performed by mechanical means: folding and gumming are done by machines; even the boxes in which the envelopes are sold are produced mechanically. The annual product of this article exceeds £80,000.

ARTISTS' MATERIALS.

The number of painters, professors of drawing, of water-color and miniature painting, pastel drawing, of engravers, wood and lithographic draughtsmen, &c., amounts to more than 6,000. These 6,000 artists—all of whose names are not, doubtless, celebrated, but at least obtain a living by their pencil, chisel, or burin—employ more than £240,000 worth per annum of fine colors, canvas, panels, brushes, varnish, &c. To the cost of materials to these artists must be added the still larger sum expended by their pupils and by amateurs every year. It is quite safe, therefore, to estimate the total amount of this industry at £800,000. Machinery plays a certain part in the preparation of colors, trituration, grinding, and washing, but it is not universally employed. Each establishment has still the aspect of those of the alchemists of the middle ages, and works without publishing its processes, its secrets—in a word, that which constitutes its specialty. It is admitted that France makes the best of oil colors, pastels, and canvas; the last are superior, as regards finish and dimensions, to those made in other countries. The proofs lie in the orders received from foreign artists, and even foreign governments. It must be admitted, however, that with respect to water colors the French makers have serious competition to contend with, as regards quality, especially in the case of England; but some French houses have made great efforts to rival the quality of the English colors, while at the same time selling them at a lower price. The instruments and apparatus employed by painters, engravers, lithographers, architects, engineers, and sculptors, present an immense variety. Pencils and brushes occupy in their production more than 2,000 men and women. French brushes are greatly preferred by foreigners to those of their own make, and amount in value to several millions of francs. Drawing-boards, T—squares, &c., used especially by architects and engineers, form a remarkable branch of industry, and the same may be said of Indian ink, printing ink, chromo-lithographic colors, and engravers' and lithographers' materials. The making of lay figures for painting draperies calls for serious study of anatomy and mechanism. It requires encouragement, as it does not supply sufficient remuneration to the persons engaged in it. Nevertheless, by perseverance, several manufacturers have achieved results which deserve to be noticed. The same remark will apply to easels, color-boxes, and, above all, to the metal tubes which enclose color ground in oil. The transfer from their canvas, the remounting and the reparation of pictures—in short, the means used for preserving works of art, form a branch of art to which too much attention cannot be invited. As an industry it is equally useful and interesting, and it may be affirmed that the best results and the greatest study have been made in France in connection with it, and that it is still the object of highly praiseworthy efforts.

There were but two exhibitors of paper from the United States. Jessup & Moore, of Philadelphia, sent specimens of paper made from wood, straw, and hemp. The other display consisted of white and straw papers, of excellent qualities, from the San Lorenzo mills, Santa Cruz county, California. This establishment has been in operation about six years, and now produces annually about 31,000 reams of straw paper and 7,000 reams of white newspaper; the total production is valued at over $100,000.

In the Wurtemberg section a machine for making paper pulp or paste out of wood was shown in operation. Logs of wood at one end of the machine were cut into billets a foot long by a circular saw. These billets were then subjected to the action of the machine, and were delivered at the other end in the form of a white paste or pulp, which is used to mix with rag pulp to the extent of from 25 to 60 per cent. This invention is claimed by the firm of H. Wolker & Sons, at Heidenheim.

There are now 20 paper establishments in operation at Wurtemberg, having 28 machines and 237 rag-mills, and 29 establishments where hand labor alone is employed. The total production of paper is about 15,800,000 pounds, representing a value of £265,708, most of which is exported. The principal localities of the manufactures are Dettingin, Faurndeau, Göppingen, Heidenheim, Helbronn, and Pfullingen.

In addition to paper made from wood and straw, there was exhibited in the French section paper made of "esparto," (the Spanish rush,) the fibres of the palm tree, the aloe, the Indian fig or cactus, and from sea-weed. Excepting the last, these are all fibrous plants, possessing in some instances a length of fibre sufficient even for other manufacturing purposes. The sea-weed, in addition to its known tenacity, possesses a sort of glue, which, it is claimed, renders it valuable as a mixture with other substances.

France excels in many varieties of paper, especially those used for printing and fancy purposes. England manufactures most of the finest qualities, and enjoys almost a monopoly for certain kinds used in the arts. Holland was once famous for its paper. It had but two exhibitors. The paper of Venice, inferior to that of Holland, enjoyed a great reputation 200 years ago, and up to a late period the letter paper of Naples was considered the best in the world. No one would have that opinion now. Spanish paper has also had its vogue; but the only branch of the manufacture in which Spain now excels is in the paper for cigarettes. Linen is still the ordinary wear of the peasantry in Spain; linen rags are there more easily obtained than in other countries, and from these a thin and admirably tough paper is conscientiously made.

CLASS 8.—APPLICATIONS OF DRAWING AND MODELLING TO THE COMMON ARTS.

Class 8 comprises artistic productions applicable as models and ornaments for industrial purposes. They are: 1. Designs for printing—Dresses, fancy silks, foulards, ribbons, muslins, cotton fabrics, woollen goods, chintzes, &c. 2. Designs for weaving—Shawls, carpets, hangings, &c. 3. Designs for embroidery, lace, &c. 4. Designs for furnishing—Paper hangings, furniture, pottery, &c. 5. Designs for ornamentation, models, &c.—for jewelry, plate, fine iron and lock works, cameos, engravings, wood, copper, ivory, bronze, and other metals, stained glass, &c. 6. Designs and objects of industrial modellings, obtained by mechanical means, (reductions, enlargements, and photo-sculpture.)

It will thus be seen that the number and variety of objects exhibited in this class was very great, comprising not only drawing upon paper for tissues, but models for carvings in wood, ivory, metal, glass, and stone.

There were but two exhibitors in the United States section—one of embossed locket and miniature frames; the other, J. Rogers, of New York, three groups of statuettes.

The Science and Art Department of the South Kensington museum, London, sent a series of illustrations of the course of drawing, painting, and modelling, and studies for the improvement of manufactures pursued in that institution, and also a collection of reproductions of works of art, for the use of museums or similar schools of art.

Inasmuch as these articles form an entirely new branch of commerce as well as of useful instruction, and have for their end the instruction of labor where skill is required, it is thought desirable to give a full description of what they consist. They are commercial to the extent that any museum or school can procure exact copies of them, and thus be on a satisfactory level at once with the material of a good art school. A few particulars will explain the value of this fact. In all countries examples of more or less excellence for the use of art schools have been prepared. They are easily obtained. But, besides the production of work to be used as a course of study for training the hand and the eye, the culture of taste and of sound principles of art have to be promoted by placing before the decorative artist the purest specimens of ancient and modern production, wherein handicraft skill has realized beautiful design. For this end all countries have gradually awakened to the necessity of founding museums and collections of rare and beautiful objects for use and reference. Such works, however, were difficult to obtain, and as museums multiplied the difficulty naturally increased. It then became absolutely necessary to discover a means of reproduction that was at once faithful and cheap. The various processes of the electrotype, of photography, of chromo-lithography, of gelatine and gutta-percha moulding, &c., were called into play. The English government, in the interest of their own schools of industrial art, left no means untried, and at length succeeded. After the Exposition of 1855, the French Emperor responded to its request to allow the most valuable jewels, crystals, enamels, &c., in the Louvre to be photographed, and he placed at the disposal of the English government the means of carefully coloring those photographs after the originals. On a subsequent occasion he added permission to mould, for electrotyping, the finest pieces of armor in the Musée d'Artillerie, and allowed repetitions to be made from the casts prepared for France from the Trajan column. Other countries have since permitted similar reproductions, so that now almost any remarkable object, exactly reproduced in size, color, and present appearance, can be obtained. The boon is of inestimable value. It places within the reach of small associate bodies of students the power of studying the finest specimens of art from all quarters of the earth, to visit which, apart from the matter of expense, would be the work of a lifetime. An idea of the material may be gathered from the fact that in the British section were shown plaster casts from the pulpits of Giovanni and Nicolo Pisano; of part of the door of Santiago de Compostella in Spain; electrotypes from the gates of the cathedral of Pisa; from the bases of the standards on the piazza at Venice; electrotypes of armor in the Musée d'Artillerie; of the coronation plate in the Tower of London; of rare objects in the South Kensington Museum, and of colored imitative drawings, photographs, etchings, and chromo-lithographs of the choicest works of Europe.

There were 22 exhibitors in this class from England, 36 from Italy, and 41 from Switzerland. In the French section there were 240 exhibitors, mostly of designs and engravings. The following observations upon the relations of the French school of design to the manufactures of the empire are translated from the introduction to the Class in the catalogue:

"Schools of design, established in most of the great manufacturing centres, have contributed to disseminate in France the most elevated notions of industrial art. Paris is the centre par excellence from which radiate to the varied branches of our national industry the highest inspirations of taste, elegance and novelty. The most distinguished pupils of the provinces come to Paris to perfect themselves in design, and many establish themselves advantageously there. It is in Paris, then, that we must seek the source of the great artistic current. In certain industries many large manufacturers who formerly had designers attached to their establishments now prefer to apply to Parisian artists for designs more novel in themselves and more adapted to the various demands of the consumer. Some artists work alone, or assisted by a small number of pupils; but all those who have made themselves a name have created *ateliers*, where young men come to perfect themselves in their art. Some of these workshops confine themselves to one specialty; others, veritable sources of industrial information, combine several branches of design. The raw material holds an insignificant place. The intrinsic value of the drawings and models is merely nominal. Their importance and merit are due to the artistic inspiration alone. The methods employed are extremely simple; in fact, it may be said that there is no manufacture, properly so-called, because the mechanical processes merely serve to carry out or to produce the designs or the models, which are the personal work of the artists. The manufacture only commences with the industrial execution, that is to say, with the manufactured product; the design itself, whatever may be the material to which it is applied, has few essential differences. As already remarked, the establishment of ateliers is on the increase. In such cases the artist selects his assistants and portions out the work according to circumstances. He remunerates his employés by the day or by task work; sometimes, even, by annual salaries, according to their merit or to the value of their work. From the first idea placed upon paper or plaster to the finished design or model which is to serve for the manufacture, each sketch passes through a long series of artistic elaborations. The master-artist finds in the co-operation of others acting under his orders at once economy as regards time and greater perfection of execution. It is almost impossible to supply any exact information relative to the value of works of industrial art, because the cost is included and mixed up with the price of the manufactured objects. The price of this artistic contribution varies with the products. It is higher or lower in proportion to the demand for the objects themselves."

The fullest exhibition of the works of pupils in art schools was made by Wurtemberg. The students, as in England, seem to be taught practical geometry, perspective and mechanical drawing, of which good examples were exhibited; the course of orthographic projection being very full. In freehand drawing, a clear and precise system of outline seems to be sought after, and the early training of the hand and eye to correctness carefully attended to. The shading from the casts was more with the point than with the stump, the object of the schools apparently being to form good draughtsmen and modellers—intelligent artisans skilled to handle the pencil and the modelling tool, and able thoroughly to comprehend working drawings rather than to instruct designers for manufacture or to instil the principles of decorative art. Italy, Bavaria, and Austria also exhibited specimens of their schools of art. They were similar to those from Wurtemberg without being better.

CLASS 9.—PHOTOGRAPHIC PROOFS AND APPARATUS.

Class 9 includes: 1st. Photographs on paper or on glass; 2d. Photographic enamels; 3d. Photographs obtained in printing ink by the various processes of heliographic engraving, or of photo-lithography; 4th. Photographs obtained on metal or on paper, with the colors of nature; 5th. Specimens of the various applications of photography; 6th. Apparatus and wood-work for photography, chemical, and all other accessories.

The Exposition was exceedingly rich in the number and variety of photographs exhibited, but the specimens were in general widely separated and not displayed to advantage. If all could have been assembled in a special gallery the interest in them would have been greatly increased and there would have been an opportunity for direct comparisons. France had 165 exhibitors, Great Britain 105, Austria 58, Prussia 52, Italy 42, and the United States 17.

There does not appear to have been any recent marked advance in the art. The progress has been chiefly in the direction of production of photographs in enamel and upon porcelain and glass, and in the heliographic process, by which the pictures are engraved upon copper or steel, so that they may be multiplied by printing. There are several exhibitors of such plates and of photographs engraved upon lithographic stones. Lackerbauer, of Paris, exhibited lithographic engravings of objects and microscopic preparations magnified from 5 to 2,500 times. No satisfactory results in the attempts to produce colored pictures appear to have been obtained.

In the English section there was a very interesting series of views of the ancient architecture of India, as shown in the temples and palaces of the interior of that country.

The most notable display from the United States was made by Mr. C. E. Watkins, of San Francisco, who sent a series of 30 views of the Yo Semite valley of California, and views of the great trees. These photographs were not only interesting as pictures but as splendid specimens of the art. The jury awarded a bronze medal. A similar series was sent by the firm of Lawrence & Houseworth, of the same city, with the addition of a great number of stereoscopic views of the interior mining regions of California, showing in a very distinct manner the various processes in use there for the extraction of gold from the soil.

The contributions in this department of Mr. L. M. Rutherford, of New York, are to be particularly noted for their high scientific value as well as peculiar excellence as photographs, and for the subjects represented. One is a large photograph of the moon, representing its pitted surface as seen through a powerful telescope; and the other is a photograph of the solar spectrum, two feet long, showing the almost infinite number of dark lines. These two photographs, although scarcely noticed by the multitude, excited great attention and interest among the savans, and received a silver medal from the jury.

The exhibition of photographic apparatus and chemicals was very large. It is to be noted that the photographic art has exerted a very marked influence upon various branches of manufacture, particularly of chemicals, and that it has given great impulse to industry and commerce in these directions. The demand for photographic apparatus and materials is so large as to require many considerable establishments devoted exclusively to their production.

Certain substances, such as hyposulphite of soda, which formerly were rarely employed and therefore rather expensive, have been so much used in photographic operations as to cause them to be made on a large scale, and thus to reduce their prices to half or one-third, or even one-sixth, of their former value. We may mention also the sulphocyanides of potassa, and ammonia, which were only used before in the chemist's laboratory, but are now manufactured extensively at gas works, where large quantities can be obtained from the distillation of coal. Photography in France has given rise to considerable trade with foreign countries. Not only are apparatus, paper, and chemicals largely exported, but also stereoscopic views on paper and other materials.

CLASS 10.—MUSICAL INSTRUMENTS.

The following information upon the variety of the objects exhibited in the French section, and upon the condition of the French manufactures of musical instruments and materials, is extracted from the translation of the report of Mr. Wolf, of the committee of admission:

"The products exhibited in Class 10 include eight principal series, viz: 1st. Church organs; 2d. Harmoniums; 3d. Pianos; 4th. Stringed instruments; 5th. Wind instruments; 6th. Percussion instruments; 7th. Accessories for the manufacture; 8th. Editions of musical works."

"Paris is the only important manufacturing place for organs, pianos, and harmoniums. Then follows, according to importance, Marseilles, Lyons, Nancy, Toulouse, and Bordeaux, where pianos are chiefly manufactured. Stringed instruments are made principally at Mirecourt; wind instruments, in wood—such as flutes, clarionnets, hautbois—are more specially manufactured at Lacouture, (Eure.) All kinds of instruments are also made in Paris. Chateau-Thierry has, likewise, no specialty; nearly all kinds are manufactured there.

"The woods for musical instruments are produced from France, Russia, Norway, Brazil, St. Domingo, and Isle Bourbon. The native woods most frequently employed are oak, fir, lime, beach, maple, box and pear. These vary in price from 55 to 200 francs the cubic metre. Box is sold from 50 to 60 francs the 100 kilograms. The exotic woods most used are rosewood, mahogany, cedar, and cedrine, ebony and grenadille, which cost from 15 to 150 francs the 50 kilograms. Those more generally used are oak, fir, and beech for the heavy parts of pianos, organs and harmoniums; cedar, lime, maple, and pear-tree for the mechanical parts; rosewood and mahogany for veneering and ornamentation; box, ebony, and grenadille for wind instruments. Beech and mahogany are chiefly in use for bassoons. Ivory for piano keys is sold from 22 to 45 francs the set (50 keys.) The felt, woollen stuffs, skins, and glue for pianos are manufactured in France. Part of the felt comes from England. There is in France no manufacture of metallic cords. Those in steel are imported from England and Germany, and are worth about 8 francs per kilogram. The copper covering for strings is worth from 5½ francs to 7½ francs per kilogram. The metals most in use are iron, lead, copper, for wind instruments; tin for organ pipes. The gut cords are manufactured in France.

"The tools employed for working the wood are the ordinary tools of the joiner and cabinetmaker. However, we must notice the profile machine for making panels, which is only an improvement of the parquetry machine; and also the special steel perforators for wooden wind instruments. The only special tools in use for working metals are mandrils, employed in the manufacture of wind instruments. We must mention also, wheels for covering cords. All these tools were unknown in 1855, or rather have been very much improved since then.

"In Paris and all the large towns the men employed in the manufacture of musical instruments work together in the workshops; scarcely any work at home. At Mirecourt, on the contrary, the men, about 250 in number, all work at home. Half the Paris workmen work by the piece; the other half by the day. The salary varies from 3 francs 25 centimes for common workmen, and from 5 to 11 francs for the superior artisan. The musical instrument trade employs few women and children.

"Part of these articles are sold in France, and part to commission merchants, who buy for exportation; a third, perhaps the most considerable, is exported direct, to order, to all parts of the world. The small instruments are worth from 50 to 200 francs; harmoniums from 100 to 1,500 francs; violins and violoncellos from 200 to 500 francs; copper instruments, 80 to 400 francs; wind instruments, in wood, 80 to 300 francs pianos, 500 to 4,000 francs; church organs, from 2,500 to 100,000 francs. The profits of the manufacturers vary from 12 to 18 per cent. The manufacture of musical instruments represents a sum of twenty or twenty-three millions of francs per year. Raw materials are imported into France to the value of five or six millions. About half the produce goes to foreign countries, and is exported to all parts of the world, but particularly to America, and chiefly to South America. The importation is next to nothing.

"The committee of admission for class 10 points out among the improvements made during the last ten years, in the manufacture of musical instruments: 1st. The considerable extension given to mechanical processes, and the general use of steam machinery; 2d. The application, as far as possible, of the principles of the division of labor; 3d. Piece-work substituted in most cases for work by day."

There was no class in the Exhibition more thoroughly and completely represented than this. Every nation contributed its quota to the huge aggregate. That the art of music "hath charms to soothe the savage breast" was amply demonstrated. The wildest and strangest countries contributed their eccentric contrivances of bamboo and hide—instruments that were dulcet to native ears, but hideous to the average tympanum of civilized Europe. There were large and small drums, in wood and clay, used by the Tinkaonis; rude violins covered with gazelle skin and ornamented with horns and men's heads; trumpets made of antelope horn and elephant's tusks, of which the sound is heard at the distance of a league; and perhaps worse than this, the bagpipes of the Arab tribes used in the region of Cordovan. Many of these instruments were of the greatest antiquity, and were played upon by "professors" in the various departments precisely in the same way as when they were invented. A few steps sufficed to take the spectators to an adjacent section where the latest improvements of Europe were standing side by side—improvements which require the greatest technical skill to appreciate or use.

The United States had nine exhibitors. Numerically considered, the display was insignificant, but the objects comprised in it were of the highest excellence. The piano-fortes contributed by the New York firm of Steinway & Sons and the Boston house of Chickering & Sons were considered the best in the entire Exposition. Each was awarded a gold medal. The latest improvements are to be found in these instruments, which are almost wholly constructed on original plans and produce results of a very satisfactory character. For length of tone, brilliancy, sympathetic quality, and magnificence of power they are unrivalled. The broad merits of both pianos were found to be so superior that the jury, having but four gold medals to award, unanimously voted two to America—an honor which cannot be overstated, for it was remarkable enough that pianos should be sent at all from America to Paris, and still more singular that they should there be regarded as the best.

The harmoniums and cabinet organs of Messrs. Mason & Hamlin were also objects of much interest, and gained the award of a silver medal. They were, like the pianos, admired for their workmanship and for the singularly pure tone which they possessed. The mode of producing this tone was the subject of much curiosity, inasmuch as it differs essentially from the European plan, and in America has entirely superseded it.

The wind instruments of the Schreiber Cornet Manufacturing Company and the string instruments of Gemünder, both of New York, also obtained prizes. The brass instruments of the former were regarded as excellent specimens of manufacture. The violins, &c., of Gemünder were greatly admired for their forms and for certain improvements which that maker has introduced into the construction of the instrument.

The general display of piano-fortes was unusually large. All the European centres of the trade sent their best specimens. These were of the ordinary forms—grand, upright, oblique, square, and cycloid. (There was a specimen of the latter in the American department and several specimens elsewhere.) France was represented by Erard, Pleyel & Wolff, and Henry Herz; England by Broadwood and Kirkman; Prussia by Blüthner and Bechstein; Wurtemberg by Schiedmayer; Austria by Streicher, &c. Of these Broadwood took the prize for England and Streicher for Vienna. The pianos of the latter house are made on the plan of Messrs. Steinway & Sons.

Of the infinite variety of wind instruments it is impossible to speak. It will suffice to say that the efforts of all modern makers is to introduce a homogeneous quality into the separate families, namely, that all those composed of wood should sound like each other; that all those formed of brass should bear a respectable and not overbearing relation to the rest of the family. Many curious instruments have been invented for military bands by which orchestral effects can be better imitated.

There were innumerable specimens of stringed instruments, but with this it is the singular fashion to go backwards, and progress therefore had to be looked for in an inverse ratio. The ancient model of Stradivarius seemed to be the model most in favor.

There were but few organs in the Exhibition, and the best, on account of the size, had to be accommodated in the machinery department. It was of French make and is intended for the new church at Nancy.

CLASS 11.—SURGICAL INSTRUMENTS.

In this class France had 101 exhibitors, Prussia 18, Austria 19, Italy 38, United States 22, Great Britain 31.

"The articles exhibited in this class were very numerous and varied; they related to the practice of medicine, surgery, and hygiene, and included—1. Surgical instruments used in operations, such as cutting instruments, forceps, tenaculæ, suture needles, instruments employed in amputations, setting broken bones, &c. 2. Special instruments used in certain operations connected with diseases of the organs of sense, the respiratory passages, and the male and female genito-urinary organs. 3. Instruments or apparatus intended to cure natural or accidental deformity, such as orthopœdic instruments, bandages, belts, and elastic stockings. 4. Articles relating to dental art which have greatly improved of late years. 5. Instruments usually employed in determining the diagnosis of diseases of the heart, lungs, eyes, &c., and those which are used in experimental physiology. 6. Apparatus used in public or private hygiene, such as bathing and hydropathic appliances, instruments employed in friction, the two systems of application, electricity, artificial lactation, and various appliances used in domestic gymnastics.

In France the principal centre of the manufacture of surgical instruments and apparatus is Paris, after which rank those large towns which possess a faculty or a secondary school of medicines, such as Strasburg, Montpellier, Lyons, Toulouse, &c. In the different manufactures connected with class 11, the principal materials employed are the metals, such as steel, iron, gold, platinum, silver, and German silver, so that, from one point of view, this class is closely connected with metallurgy.

Besides the metals, many products of the mineral and vegetable kingdoms are used; such as ivory, horn, skins, gum, and, above all, India-rubber. The articles exhibited in class 11 partake of the nature of cutlery and of mathematical and philosophical instruments, but this class of manufactures possess comparatively limited resources, and the trade is necessarily spread over a large area and a more numerous constituency.

"The delicacy of manipulation and intelligence necessary in making surgical, hygienic, and orthopœdic instruments requires the greatest attention and care on the part of the workmen. A certain number make only special articles, either at their own homes or in their employers' workshops. Women are employed in a large proportion. It is calculated that the manufacture of surgical instruments and orthopœdic apparatus in Paris and the provinces, gives employment to from 3,500 to 4,000 workers, male and female. A large number of these articles are sent into the country or abroad. Foreign manufacturers also have closely copied our own inventions, and have, nearly everywhere, endeavored to reproduce French instruments and apparatus. It is difficult to estimate the value of the articles produced in this complicated trade. Simply taking into consideration surgical instruments, bandages, and orthopœdic apparatus made in France, the productions may be valued at 13,000,000 to 14,000,000 francs. These figures would be largely increased if hygienic, hydropathic, and other apparatus were included in the estimate. This committee has but few changes to point out since the exhibition of 1855, either in the instruments themselves or in the mode of manufacture, but the improvements in the instruments have been very numerous; such as the extended application of certain products, caoutchouc, for instance, and the progress made in the management of baths and thermal establishments."—(Extract from the report of the members of the committee of admission of class 11.)

Among the many interesting objects from the United States in this class, the exhibition made by the Surgeon General was particularly complete and worthy of attention. It included ambulances, medicine wagons, army field hospitals, and litters which were used throughout the war, and the best artificial limbs which have been invented.

The display of American artificial teeth and of dental instruments and apparatus was very creditable to this branch of the healing art.

Pertaining to this class and described elsewhere was the exhibition of the societies for aiding wounded soldiers and sailors.

CLASS 12.—MATHEMATICAL INSTRUMENTS AND APPARATUS FOR TEACHING SCIENCE.

The French exhibition in this department is decidedly the largest and most interesting. The manufacturers of instruments of precision have fully maintained their high reputation for the accuracy, elegance, and cheapness of their productions. Of the 107 exhibitors in this class, we may note the following as prominent in their respective specialties: Ruhmkorff exhibits a variety of electrical, magnetic, and electro-magnetic instruments, and particularly several enormous coils bearing his name, but known in the United States as the Ritchie coil. Auchet & Son exhibit a great variety of excellent microscopes, arranged for one or more observers at the same time, and an apparatus for microscopic projection and reproduction. Soleil exhibited several optical instruments of interest to mineralogists and chemists, particularly a polarizing microscope upon the pattern of M. Descloizeaux, together with numerous crystals cut and polished so as to show their optical characters. Deleuil exhibited philosophical and assay balances, photometers, machine for the solidification of gas, pneumatic machines, force pumps, Foucault's pendulum for demonstration. M. Deschanel, member of the committee of admission, subdivides class 12 as follows, and adds some interesting general observations:

"1. Instruments intended for scientific research and education. 2. Special optical instruments, microscopes, telescopes, and field-glasses. 3. Mathematical instruments, graduated rules and compasses, levels of all kinds, and geodetical circles, whether for the use of the marine or of engineers. 4. Barometers and thermometers, of which glass forms the principal element of manufacture. 5. Apparatus intended to carry a new idea into effect, or to execute a known operation by a new process, and special apparatus, which, without being new, have a special object, and consequently do not enter into the preceding series. Lastly, collections of natural or artificial preparations intended to illustrate the three great natural kingdoms. This series of the naturalist's preparations, logically connected as much with that of medical art as with natural philosophy, also forms part of another class. The production of philosophical instruments is confined almost exclusively to Paris. In some of the ports, however, there are special makers of mariners' compasses for ordinary navigation. In the Jura and in Picardy are to be found some manufactories of optical glasses, intended for common instruments, and which draw their materials from the works of St. Gobain. For carefully constructed instruments, glass of a special kind is produced in Paris itself. For other kinds of instruments ordinary glass is employed. According to the statistics collected by order of the Chamber of Commerce in the year 1860, the value of this manufacture in Paris amounted to 15,861,720 francs. Since the exhibition of 1855 the progress in the construction of scientific instruments has followed that of science itself.

Among the articles which exhibit a decidedly enhanced importance, we may mention telescopes with silvered reflectors, apparatus for the production of inductive currents, electro-magnetic machines, the regulators for the electric light, and optical indicators of the vibrations of sonorous bodies."

In the American section the instruments sent by the United States Coast Survey comprised some of the instruments of navigation, and a thermometer for measuring the temperature of the sea at great depths. The beautiful graduated rules, squares, and gauging instruments made by Darling, Bangor, Maine, attracted much attention from those interested in such objects.

CLASS 13.—MAPS AND GEOGRAPHICAL AND COSMOGRAPHICAL APPARATUS.

The following complete and instructive *aperçu* of the exhibition made by France in this class, is a translation of the introduction to the class by the committee of admission:

"The objects of class 13, which figure for the first time in a universal exhibition, may be divided into four series: 1. Maps, whether separate or forming atlases, including geographical, cosmographical, astronomical, marine, hydrographical, topographical, geological, agronomical, historical, itinerary, meteorological, or other maps. 2. Terrestrial or celestial globes, uranographic apparatus, &c. 3. Maps and charts in relief. 4. Works, tables, pictures, and other accessories of geography and cosmography."

"Paris is the only centre of production of these works, even of those which are edited or published in the provinces. Among the material employed, the copper and steel are prepared in Paris by the planers and polishers, who supply the engravers. The lithographic stones come principally from Bavaria, (near Munich,) but during the last few years they have been obtained also at Vigan, (Gard,) nearly of equal value and at a much lower price. Quarries have also recently been discovered in Isère, (Cerin, Crey.) The sized paper, almost the only kind employed, is produced in the Vosges, Isère, (Rivès,) and Angoulême; the unsized paper is obtained from Nièvre (Clemency) and the Marais, (Seine and Marne.) The processes of the manufacture are: Engraving on copper, steel, and stone; engraving on wood or metal; lithography or drawing on stone; autography; the transfer on to stone of engraved work, and chromo-lithography. The laying down of the maps on cloth constitutes a supplementary operation frequently called into use. The persons engaged in this branch of industry include designers or draughtsmen, map and writing engravers, colorists, mounters and binders, globe and sphere makers, lithographers and few photographers, and lastly, copperplate and lithographic printers. The last named are generally engaged in large establishments, in which the printing of maps is but a secondary matter; the rest work either at home or in small work-shops, where not more than 25 or 30 persons at the utmost are engaged.

"There are in Paris about a dozen employers and 150 artists and workmen engaged in the specialty of geographical industry. The productions of French cartographic establishments are principally destined for the institutions of public instruction in France; the remainder is sent to South America, Russia, Germany, North America, Italy, Spain, and England. Egypt and Algeria also take a certain quantity. The depot of the war department and that of the marine assist greatly in this exportation, either through the mediums of booksellers or by their depots abroad. The maps and globes imported come principally from England, and the total value is between 40,000 and 45,000 francs. The export is estimated at about 150,000 francs, out of a total production of the value of 400,000 francs. The military and naval establishments furnish about one-quarter, not including the large number of maps which they supply to various public departments, and especially to the naval service belonging to the state."

Among the improvements which have been made in this business during the last 12 years, the following may be pointed out: "1. Imparting a steel-like hardness to copper plates, with the view of making them serve for a longer period. 2. The employment of photography as an expeditious method of multiplying, enlarging, and reducing drawings. 3. The heliographic method of engraving on stone or copper. 4. Chromo-lithography and chromo-printing. Many colors are now applied to maps, particularly for special maps. 5. The extended use of relief maps, made to the same scale, as regards the vertical and horizontal measurements. 6. Printing on curved surfaces for globes. 7. The increased use of various methods of projection. The above information applies to the drawing out of maps. As to the original operations of surveying and projection, they are centralized, as far as regards terrestrial geography, at the war office, and for navigation at the admiralty. The publishers generally avail themselves of the productions of these two departments for the preparation of maps for the trade, making use, however, also of official documents furnished by foreign governments, as well as of the works of travellers and literarti of all countries."

MAPS FROM VARIOUS COUNTRIES.

Among the numerous, large, and interesting maps from various countries, one from Russia, a relief map of Caucasus, is worthy of particular notice. It was upon a large scale, so that the highest mountains rose fully six inches above the sea level, and every detail of the topography and the distribution of forests appeared to be accurately given. In the English section a relief map of India on a large scale showed the chain of the Himalaya, the high plains of Asia, the valley of the Ganges, and the lines of railway, in a most striking manner.

The Geological Survey of the United Kingdom sent a full series of its geological maps and sections, all elegantly bound, and specimen sheets of the ordnance maps were to be found in the same section.

In the United States section the principal contributions were from the Coast Survey office, Washington, of a full series of the published maps of the survey, printed on large, thick paper.

In the preparation of the British ordnance maps, resource has been had to processes comparatively unknown, and the facilities thus discovered have led to interesting results. These were exhibited in the same department, and may be briefly described. They consisted of two very remarkable publications, namely, a photozincographic *fac simile* of "Doomsday Book" and the "Ordnance Survey of Jerusalem." Every boy who has studied history has heard of "Doomsday Book." It was made by order of William the Conqueror, in 1086. It contains a description of the owners and inhabitants of every manor, hundred, village, &c., in England, with the exception of Northumberland, Cumberland, Westmoreland, and Durham, and an estimate of the area of the lands and their cultivation. Besides its value as an ancient historical document, it is of great interest as showing the ownership of the country at that remote period. A copy of "Doomsday Book" was published at the end of the last century at great cost, but the type was accidentally destroyed by fire, and copies are now rare and expensive. By the art of photozincography an exact *fac simile* has been reproduced at a comparatively insignificant cost. A county, for instance, costs from $2 to $6 currency. The *modus operandi* by which the result is obtained is thus described: A photographic negative of the map or drawing to be reproduced is first made. A positive print is then taken on paper prepared with a solution of gelatine and bichromate of potash, mixed up with lithographic ink. The effect of the light on this solution is to render it insoluble; therefore, after the print has been taken, those portions which were protected from the light can be washed away, leaving intact the remaining insoluble portions which correspond to the lines of the map or drawing. This can then be transferred at once to zinc or stone, and printed in the same way as if the plan had been drawn on lithographic transfer paper. Thus a plan which it would take weeks or months to copy by hand for lithography, can, by this process, be executed in a few hours, and with a fidelity which no copyist could hope to rival.

The survey of Jerusalem was made, in 1864–'65, by a party of sappers who were detached for that purpose from the ordnance survey of England. The funds were provided by Miss Burdett Coutts, and others, the special object being to obtain a basis on which to work for improving the sanitary condition of the city, especially as regards drainage and water supply. Thus for the first time a map of the Holy City has been produced that can be relied on with certainty in discussing the localities and events connected with its history, which are of such deep interest to the whole civilized world. The map is accompanied by photographs of different parts of the city and neighborhood, which were taken while the survey was in progress, and also by photozincographs. During the course of the survey the ancient aqueduct from Solomon's pools, which supplied the city with water, was traced. It is a work of the highest engineering skill, and in so good a state of preservation that, at very little cost, it has been put into such a state of repair that water has actually been again conveyed through it for the use of the city. In connection with this survey a line of levels was also run between the Mediterranean and Dead seas, in order to settle accurately the much vexed question of the amount of depression of the latter below the former. The result showed it to be 1,290 feet.

Austria and Switzerland exhibited beautiful maps, showing and *not* showing the hill features of the respective countries. The object of the latter is to secure greater clearness. Austria exhibits a map of Bohemia, the most ridgy and mountainous country in her possession, without the indication of an elevation. The well-known map of Switzerland, by General Dufour, is still regarded as the best work of its kind in existence. It is a complete and picturesque representation of the most romantic country in Europe.

Elsewhere in this report mention has been made of a well-executed model of the Isthmus of Suez. In the French court was also exhibited an interesting map of the region by Goujon, of Paris, showing the course of the proposed canal. The undertaking being of general interest, a few particulars here of its progress may not be out of place. The map and model show the works not as they are, but as they will be when completed. These works consist of two distinct portions, a fresh-water and a maritime canal; the former is about six feet deep, and 50 or 60 feet broad at the top, with shelving sides. It starts from the Nile at Cairo, runs in an easterly direction as far as Lake Tinisah, which forms a portion of the maritime canal, and then, bending to the south, terminates at Suez. This canal is completed. Its object is to supply with fresh water the laborers and machines employed in the maritime canal, and also to afford to the town of Suez a plentiful supply of fresh water, which was much needed.

The maritime canal is still in a very miniature state. It starts from Port Saïd, on the Mediterranean, and is to traverse the isthmus to Suez, with sufficient works at its extremities to afford good harbors in both seas. Its breadth is to be 100 metres (rather more than 100 yards) at the level of the water, and its depth about 26 feet. The portion between Port Saïd and Lake Tinisah is so far advanced that barges, towed by steam tugs, can traverse it to the latter point, where, by means of locks, they are placed on the fresh-water canal, by which they can reach Suez. Thus, there is already water communication from sea to sea; but, before the fleets of the world can be transported across the isthmus, much time must elapse, and a vast amount of money must be expended. The cost of the works up to this time is said to be $45,000,000 specie.

In all the countries of Europe the necessity has been recognized of having a detailed and accurate map which should be available for military and other purposes. The scales on which these surveys have been published have varied from about three inches to a mile to about three miles to an inch. First in point of scale comes the little electorate of Hesse, now politically extinct, the excellent map of which is published on a scale of 1 in 25,000, or about three inches to a mile. Belgium comes next, 1 in 40,000; then Baden, Bavaria, Sardinia, Holland, Wurtemberg, Oldenberg, Grand Duchy of Hesse, 1 in 50,000; Saxony, 1 in 57,600; Great Britain, 1 in 63,360, (afterwards increased to 1 in 10,560, and again to 1 in 2,500;) Denmark, France, and part of Prussia, 1 in 80,000; Lombardy, Venetia, States of the Church, Tuscany, Parma, Placentia, Guastella, 1 in 86,400; Hanover, Portugal, Prussia, Sweden, Switzerland, 1 in 100,000; Schleswig-Holstein, 1 in 120,000; Russia in Europe, 1 in 126,000; Austria, 1 in 144,000; Norway and Greece, 1 in 200,000. The survey of Great Britain commenced in 1784; that of France (the new map) in 1818. Belgium has been late in the field. Only a few sheets are published. The last country in Europe to recognize the necessity of a government survey (except Turkey) was Spain. Within the last year or two steps have been taken to remedy the defect. In Turkey no government survey exists.

It will be seen by the above particulars that the only important step in the way of topographical precision has been taken by the British government. It was found that the scale of one inch to a mile was not sufficiently large to make the maps available for many important operations in which maps are specially necessary—such as the apportionment of taxation, the registry and transfer of property, &c. It was therefore determined to increase the scale to six inches to a mile, and subsequently to 25 inches to a mile, on which scale the ordnance survey of England and Scotland is now being carried on. Specimens of the English maps on all three scales were exhibited, and also of town surveys on the extraordinary scales of five and ten feet to a mile.

GROUP III.

FURNITURE AND OTHER OBJECTS FOR THE USE OF DWELLINGS.

Class 14. Furniture.—Class 15. Upholstery and Decorative Work.—Class 16. Flint and Other Glass; Stained Glass.—Class 17. Porcelain, Earthenware, and other Fancy Pottery.—Class 18. Carpets, Tapestry, and Furniture Stuffs.—Class 19. Paper-hanging.—Class 20. Cutlery.—Class 21. Gold and Silver Plate.—Class 22. Bronzes and other Artistic Castings, and Rèpoussé Work.—Class 23. Clock and Watch-work.—Class 24. Apparatus and Processes for Heating and Lighting.—Class 25. Perfumery.—Class 26. Leather Work, Fancy Articles, and Basket Work.

CLASS 14.—FURNITURE; AND CLASS 15.—UPHOLSTERY AND DECORATIVE WORK.

Class 14 included furniture, such as sideboards, bookcases, tables, bedsteads, chairs, billiard tables, &c.; and class 15 comprehended upholstery, bed furniture, coverings, curtains, hangings, articles of ornament, and ecclesiastic as well as domestic furniture.

The principal displays of fine furniture were to be found in the French, English, and the Italian sections. In the former there were 220 exhibitors, in the next 41, and in the latter 66. The United States numbered only nine. It cannot be said that there were any prevailing styles. The principal objects might be referred to the Gothic, Renaissance, Egyptian, Etruscan, and Pompeian.

The observer from the United States, accustomed only to the furniture there, could not fail to be impressed with the general use of ebony as the material for ornamental furniture, and with the richness of the decorations of ivory, porcelain tablets, and enamels, and with metallic bas-reliefs, medallions, and figures. It is evident that the use of these decorations is largely increasing, and that a great impulse is thereby to be given to the reproduction of suitable ornaments and to new designs. The metallic ornaments consist chiefly of the choicest productions of the galvano-plastic art, and they are left either in their usual bronzed condition, or are silvered, and in some cases thickly gilded by the same process.

The finer and highest colored stones, such as lapis-lazuli, malachite, and the choice marbles, are now freely used in the fronts and sides of fine cabinets, sideboards, and similar pieces. Some of the richest examples of such inlaying were found in the Italian and Russian sections. In the former lapis-lazuli tablets and columns ornamenting ebony cabinets were abundantly displayed, together with choice Florentine mosaics and a series of splendid inlaid tables.

The Russian cabinets in the style of Louis XIV were remarkable for their beauty and value, being made of ebony and inlaid with broad tablets of the finest colored lapis-lazuli, and adorned with bunches of fruits and flowers, carved with wonderful fidelity to nature, out of precious stones. These cabinets were made at the imperial establishment of Peterhoff, and the finest was valued at 27,418 roubles.

In the English section the displays made by Trollope & Sons, Holland & Sons, Gillow & Co., Wright & Mansfield, were particularly noticeable for their elegance and excellence. The last-mentioned firm received the gold medal for their display, which included fine specimens of inlaid maple, ornamented with porcelain tablets.

In the Prussian display in this class the most notable feature was an alcove filled with carved walnut furniture in the Renaissance style. The Wurtemberg section was characterized by the beauty of the samples of inlaid floors sent by Wirth & Sons, Stuttgart. Other fine exhibitions of parquetry were noted from Bembe and from Knussman, of Mayence, Hesse.

The exhibition from the United States did not in any degree represent the actual condition of the manufacture of either common or fine furniture. A few folding steamer, or camp chairs, and rocking-chairs from Massachusetts, with an inlaid table from Wisconsin, (honorable mention,) and an ornamented door from San Francisco, composed the exhibition. The door from California was a beautiful specimen of the laurel wood of that State, and of excellent workmanship—superior, decidedly, to anything of the kind in the Exhibition.

Denmark has an interesting and curious exhibition, contributed by a society for the encouragement of art workmen. There was a cabinet on legs of ebony, lightly carved in parts and inlaid with red and green tortoise shell. The green color, like the red, is given by painting the ground on which the shell is laid. This is applied in large medallions, each surrounded by a line of brass. Several other objects were exhibited, all of them conveying a high idea of the solid good taste of the country that sent them.

Italy made a great show of artistic cabinet work. The trade appears to be reviving in the land which gave it birth. The Italian models of the sixteenth and seventeenth centuries are still regarded as the most perfect in existence. They show what is not always remembered in the present day—the proper way of treating ivory in combination with ebony. Not only must the ebony be almost covered with delicate traceries of ivory, but in the parts where the ivory forms masses its whiteness must be corrected by engravings filled in with black. In this way all violent contrast is avoided, and the decorator, with only two elements to work upon, obtains a third means of effect from the power of modifying to any extent the tone of the ivory. For instance, where a plate of ivory intended to be engraved with a subject is inserted on a flat surface of ebony, a close hatching gives a border which forms an easy transition from the black to the white, and, as we have said, the pure white is only used in very fine or closely interlaced lines in direct contact with the ebony. This work was frequent in France about the year 1550.

The following general observations upon the manufacture of furniture in France are extracted from the official catalogue:

"All the principal furniture makers who have given real importance to their trade have experienced considerable advantage by adding to it the sale of everything connected with decoration and ornament, and with very few exceptions their establishments undertake upholstery as well. On the other hand, the best upholsterers manufacture, or commission the manufacturers to make for them in their name, all kinds of elegant furniture and cabinet work. It is the same in the case of beds and bedding, now made by manufacturers of furniture as well as by upholsterers.

"A few years ago the manufacture of elegant furniture in France was almost exclusively confined to Paris; but of late some important firms have arisen at Bordeaux, Lyons, Nantes, and in several other towns, such as Troyes and St. Quentin. These, however, are not numerous, and the Paris trade has much extended since the last universal exhibition, and become more important than ever, on account of the increasing demands caused by the greater comfort and elegance of the new habitations. The reports on the international exhibition of 1862 showed, in relation to all the trades connected with furniture and decoration, the valuable assistance obtained by great establishments from artists of approved merit, and the great improvement thus produced, both as regards good taste and practical fitness. The manufacturers have understood the advantage to be derived from art, together with that technical ability that French industry possesses in so high a degree, and have boldly entered into the new path, which has already in some cases led to the most brilliant successes. The most important improvements to be noted during the last twelve years are these: Considerable increase of production; the introduction, in the case of ordinary articles, of the use of cutting machines and mechanical processes, often producing the cheapest possible results; and the employment, in all the trades connected with furniture and decoration, of distinguished artists, whose co-operation has introduced art and good taste into the manufacture.

Class 15, being intimately allied with the preceding, was included in it by the jury. Both were fused in one.

CLASS 16.—FLINT AND OTHER GLASS; STAINED GLASS.

The articles included in this class were divided into eight sections, and involved eight separate processes of manufacture: 1. Crystal glass, with basis of lead, for table services, lustres, candelabra, ornamental and fancy crystal glass, cut and plain, white and colored, threaded, gilt and painted. 2. Fine and common table glass; articles for restaurants and cafés;

mineral water bottles or syphons; retorts and other chemical apparatus. 3. Glass for mirrors and windows; moulded glasses for light-houses and paving; rough glass, channelled and plain, for glazing conservatories. 4. Window glass, plain and colored; cylinders, globes and shades of various shapes; glass tiles. 5. Bottles for wine and mineral waters; bell glasses for gardeners, &c. 6. Flint and crown glass for optical purposes. 7. Enamel in block and in tubes, for jewellers, enamellers, &c. 8. Stained glass.

The finest exhibitions of plates and mirror glass in the Exposition were from the establishment of St. Gobain & Chauny. Enormous plates standing in the outer circle of the building on each side of the main entrance were unobserved by many, for their great perfection of surface and transparency permitted objects beyond to be seen as if nothing were interposed. These plates were nearly 18 feet high and 12 feet broad; another plate measured 5.94 metres in height by 3.65 or 21.68 square metres of surface. Among the silvered plates there were two of 18 square metres and 20 square metres respectively. These firms made exhibitions not only in the French but in the Prussian and Baden sections. The products comprised mirror plates, glass for flooring, roofing, light-houses, and for telescope reflectors.

The saloons in the French section devoted to flint glass in its divers forms, for table services, decanters, pitchers, chandeliers, &c.. &c., were exceedingly brilliant. In one of the saloons, the most striking of the large objects were the grand candelabra at each end, rising some 20 feet above the floor, with an enormous chandelier between them. These splendid objects were displayed by the Joint Stock Company of St. Louis, Moselle. The long ranges of tables and supports around these chandeliers were covered with other splendid productions of the works, such as urns, vases, and table services of various patterns.

The next saloon contained another magnificent display around a colossal fountain, made entirely of flint glass and rising some 25 feet above the floor, with the lower basin in massive crystal 10 feet or more in diameter. Around this remarkable object were displayed the most exquisite productions in the art of painting, enamelling, and engraving upon glass.

There was also a fine exhibition of flint glass in the English section, from London and Birmingham, particularly of finely engraved glass for the table from the firms of Millar & Co., Edinburg, and of Dobron & Green, London. These specimens of engraving were recognized by the French as even superior to their own.

There was an exhibition of moulded flint glass in the American department, which, although not attractive in point of quality or color, was remarkable as demonstrating the success with which large vessels can be moulded in a single piece without showing any trace of the mould.

In the process of manufacturing glass, the most important change that has taken place of late years is the employment (for melting the materials of which glass is composed) of Mr. Siemen's regenerative gas-furnace instead of the ordinary furnace heated by coal.

From a report presented by Mr. H. Chance to the British Association in 1865, it appears that the weekly produce of plate glass in Great Britain is about 100,000 feet. There were seven manufacturers of crown and sheet glass, three of whom made 75 per cent. of the whole quantity produced. The number of workmen engaged in these works was stated to be 2,500, and the quantity of glass produced 17,000 tons. The annual produce of flint glass in the Tyne and Wear district *only*, was estimated at £10,000,000. Birmingham produces about £5,000,000, and Stourbridge £3,500,000 annually. The make of glass bottles in the Tyne and Wear district in the year 1862 is stated by Mr. Swinburne to have been about 4,230,000 dozen.

GLASS MANUFACTURE IN FRANCE.

The introduction to this class by the French committee of admission gives the following datas upon the glass manufacture of France:

"The products of this class are chiefly manufactured in the departments of the Nord, the Aisne and the Seine, the Meurthe and the Moselle, the Rhone, the Loire and the Allier. The raw materials of the glass manufacture principally comprise silica, which, in the shape of sand, forms one-half the bulk of flint glass and three-fifths of other kinds of glass; oxide of lead, which forms one-third part of the composition of crystal glass; carbonate of lime, which represents one-fifth of the composition of common glass; and sulphate and carbonate of soda, which also form a fifth of the composition. With the exception of the lead, these materials are all of home produce; the lead is derived from Belgium, England, and Spain.

The fusion is performed in crucibles, heated by coal or wood; but the substitution of the former for the latter fuel is becoming universal. The glass manufacture depends principally on the skill of the workmen; machinery plays but a secondary part. It is only in the case of plate glass that machinery is indispensable. Glass making is carried on in houses provided with furnaces, glass-cutting, dressing and polishing shops. The workmen generally work by the piece, and there are no middlemen employed; the glass houses employ few women, but the number of children employed about the furnaces is nearly equal to that of the men. Paris is the chief market for flint, table and plate glass, as well for home consumption as for exportation. Window glass is sold to wholesale dealers, who retail it to the glaziers. The bottle makers sell to the wine producers, bottlers of mineral waters and wholesale dealers. The annual production of flint glass has risen since 1862 from 9,000,000 to about 11,000,000 or 12,000,000 francs. Ordinary table glass is extensively manufactured in France, and the importance of this trade is at least equal to that of flint glass. The production of plate glass is estimated at 350,000 to 400,000 square metres per annum, and the trade at 12,000,000 francs or 13,000,000 francs. The quantity of window glass produced may be set down as 5,000,000 to 6,000,000 square metres, of the value of 12,000,000 to 15,000,000 francs. The number of bottles is estimated at 100,000,000 to 115,000,000, of the value of 18,000,000 to 20,000,000 francs. The glass trade is increasing in all parts of the empire; and it is probable that the glass stainers here will speedily rival the skill of the old masters. Finally, the value of the whole industry reaches about 75,000,000 francs, one-third of which represents the salaries of 35,000 men, women and children. Among the improvements introduced into the glass trade since the last Exhibition must be mentioned a new method of fusing glass, by means of a combination of combustible gases, derived from coal, wood or peat, with the aid of special apparatus. This transformation, which promises important results, is the most remarkable fact in the glass trade."

The art of glass painting, says Mr. Gambier Parry in his admirable resumé of the specimens exhibited at the Exposition, published by order of the board of the council, can rarely receive justice in a general exhibition. Its diminished light is injurious to most other objects. It is as exclusive in an exhibition as a beech tree in a forest, under which nothing else will grow. Manufacturers, conscious of this fact, were careful not to undergo an ordeal which exposed them to danger. The well-known names of Bertini in Italy, Capronnier in Belguim, Aismüller in Germany, Gerente at Paris, and Clayton and Bell in England, did not appear in the catalogue. The art therefore was facilely represented. But there were, notwithstanding, many interesting specimens of excellent work. No comparison could be made between the respective merits of the various countries which exhibited, inasmuch as the specimens were scattered, and while on one side of the building the light was good, on the other it was necessarily bad.

A few general remarks on the subject of painted glass will suffice for the purposes of this article, and we shall borrow their substance from the report already referred to.

In France the system now generally prevails of giving a semi-opaque solidity to the glass, by the use of various enamels. If the light be strong outside, this dimness gives clearness to the design and makes the subject more important than the material, which theoretically is correct, but which practically, in the case of stained glass, is open to objection. In the earlier styles of the 13th and early 14th centuries the "dim religious light," of the cathedral or church was produced only by the quality of the glass. The taste of the present day is for pictorial effect only, and to produce this opacity is more or less necessary; at all events it facilitates the operations of the mere designer. A lustrous reflective glass is always preferable for the mellowness which much semi-opaque enamel would mar. The genuine gothic feeling and drawing, both in figures and ornaments, are much better represented by the English painters on glass than by their continental competitors, but their knowledge of drawing is infinitely less, and is sometimes awkward to absurdity. There is no more fatal mistake than that any one can draw well enough for a gothic window. The continental artists are educated to their profession; elsewhere it is considered an easy thing to construct a window on the old plan. The wretched result of consigning this art to inferior hands and minds is to discard so many styles and modes of expression, and to bring all work to one level of tameness and insipidity.

The principal exhibitions, in this department were from France, Belgium, Prussia, and England. France bore off the palm. The glass pictures of Marechal were art gems. Produced by the combination of opaque and transparent enamels, they seemed to exhaust the resources of the art.

CLASS 17.—PORCELAIN, EARTHENWARE, AND OTHER FANCY POTTERY.

"The productions exhibited in class 17 and designated by the title of ceramic, were for domestic use or decoration. They may be divided into four sub-classes: Terra cotta, earthenware, faïence, and porcelain. 1. Terra cotta includes all plastic objects, which, by the application of fire, are rendered fit for decoration. 2. Earthenware is hard unalterable pottery, employed to satisfy the artistic taste of the day and for the manufacture of chemical products. 3. Fine and common faïence are both used equally for domestic purposes and for decoration. Tin-glazed faïence supplies the decorative arts with indispensable elements. The ground lost in the case of common faïence has been gained by the finer sorts, which now answer perfectly the demands of the public, both as regards perfection of form and decorative appearance. 4. Hard porcelain, characterized by its whiteness, is the pottery "*par excellence*" for the service of the table and for domestic use. It is, also, advantageously applied in many cases in indoor decoration. Fine porcelain, on account of the brilliant colors which it is capable of receiving, is exclusively reserved for ornamental purposes. It is not adapted for domestic use on account of its fragility. Terra cotta is made almost everywhere. Earthenware is made in Paris, at Beauvais, and in some parts of Normandy. Fine faïence is made chiefly at Creil, Montereau, Sarreguemines, Choisy le Roi, Gien, and Bordeaux. Artistic faïence has its centre in Paris and its environs.

Steam power tends to replace hand labor to a certain extent in the making of faïence. The introduction of the methods employed in England have transformed this branch of the manufacture. As regards porcelain, the softening caused by the high temperature required for the baking deforms pieces made in any other way than by hand; and to the present time no mechanical assistance has been found available. However, there is good reason to hope that in the shaping and preparation of the material mechanical art may eventually lend its aid. The workmen are almost always paid by the piece. In consequence of the tenderness of the production, especially before baking, the men can only work in factories. As regards the decorative portions of the work, even when the artistic element predominates, the workman is compelled to manipulate the pottery. No less than 1,362 men and 458 women are employed in Paris in the decoration of china alone. The greater portion of the potteries have agencies or depots at Paris or send their wares to the wholesale dealers there for sale. The latter often take the decorative portion into their own hands and equalize the productions of the various provinces by making one supply the deficiency of another. Paris is, therefore, the grand centre of the porcelain and faïence trade. Limoges, which comes next, sends its ware to all parts of the empire by the aid of travellers and agents. Artistic ware, however, finds an almost exclusive market in Paris. The treaty of commerce has made little change in the importations. The home production has greatly augmented; the annual value of fine faïence is estimated at 10,000,000 francs, and that of porcelain at 20,000,000 francs.

The improvements realized during the last 12 years are as follows: 1. The increasing use of terra cotta in the decoration of public and private edifices. 2. The almost complete renewing of the plant of the faïence potteries, so that good organization, from being an exception, has become the rule. 3. The substitution of coal for wood in the baking of porcelain and the consequent reduction in the cost of the process. 4. The improvement introduced in the art of decoration through the chromolithographic process." *Extract from the translation of the report of Messrs. Salvetat and Dommartin, members of the committee of admission of class* 17.

The word "faïence" is of recent origin, and its employment indicates an elegant extension of the business which was formerly carried on under the vulgar name of pottery. A fine pot is no longer a piece of delf, but a specimen of faïence. No business has grown more rapidly and satisfactorily than that represented in class 17. Beyond all doubts, pottery is the most ancient of arts. Drinking cups, hardened in the sun of the tropics, were, perhaps, the first utensils fashioned by man. From this first step, long since forgotten in the series of uncounted ages, the art of the potter has maintained its ground as the most important in the series of human economy.

Pottery is the most fragile and at the same time, from its very nature, the most durable of the works of man. In the term are included all kinds of earthenware from the rude jar and brick of the Sakkara pyramid to the porcelain of China, and the "*pâte tendre*" of Sevres. It is, however, in the modern application of earthenware that the present age excels. This divides itself into two important groups. The first comprises all pottery composed of a non-vitrified body, such as terra cotta and fine and coarse earthenware. This is the lower order. To the second belongs all pottery composed of a vitrified body, such as stoneware and porcelain. This is the higher order. Each of these groups is capable of being subdivided into a very great number of different kinds. Proceeding, then, from the simple to the more complex, we find, first, terra cotta, which is intended to serve as a substitute for stone in architectural decoration. When an ornament has to be repeated many times, terra cotta has the advantage of cheapness over stone, and, if well prepared, possesses greater durability. Stone that can be easily worked by the chisel and at the same time resist, for centuries, the changes of climate, is rare and difficult to obtain. The resistance of terra cotta, on the contrary, is well known. A glance at that of the ancients is sufficient to prove that after several thousand years it remains unchanged. In Greece the use of terra cotta was general. The Romans employed it in great profusion, and it descended naturally to the Italians. The employment of terra cotta in England has revealed a remarkable fact. "It does not," says Mr. Arnona, "blacken in the atmosphere as readily as stone and can be much more easily cleaned." It is in Italy, France, Prussia, and Belgium that it is most generally used. The best example in the Exposition was the fragment of a façade exhibited in the garden near the Italian section by Mr. Boni, of the national manufactory at Milan. This specimen, very elaborate, in which the artist endeavored to show all the resources that could be made available in this material for external decoration, was in the form of a gateway, the framework of which was ornamented and decorated with figures and the panels elaborated in the style of the Renaissance. It was regarded as the finest piece in the collection, although the Prussian and English work in terra cotta was very admirable. For practical purposes the latter specimens were, perhaps, the best. We noticed, particularly, magnificent specimens of glazed drain-pipes, ranging from ten to thirty inches in diameter and sounding to the touch like a tube of metal. They were made of coarse stoneware, a material harder than common earthenware and glazed. There are three kinds of glazes commonly used, the bases of which are chloride of sodium (common salt) and salts of lead and tin; the last for majolica and other light ware in various proportions and with various adjuncts. Salt only is used in glazing the ordinary drain-pipes.

This hard brown stoneware is also used in forming the vessels used in many of the arts. Among other things were a large distilling retort with a well constructed worm, a barrel the size of a half-hogshead, and some gigantic jars, besides retorts and filters of all shapes and sizes. Machinery is now largely used in the preparation of this description of pottery. It kneads the clay and moulds it into shape, and it is, thanks to the facilities thus obtained, that the economic application of hard earthenware has received such extension.

Bricks and terra cotta are the same form of pottery, differing only in treatment. Numerous specimens of the hollow or perforated bricks were exhibited. These, although invented twenty years ago, have only recently come into general use. They have many advantages over the solid brick; not the least of which is their lightness. They hold the mortar with great tenacity, and, when properly used, make drier, warmer, and healthier houses.

In a higher order of faïence the specimens were innumerable, and here it may be proper to give the latest definition of the word faïence. Any clay, which after having passed through the fire, preserves a certain amount of porosity, and which is then covered with a glaze, takes the name of faïence. When composed of a common body and covered with transparent and colored glazes, it is a faïence of the same description as that of Palisse. If it is made of common clay, but coated with an opaque enamel, it is the Italian, the delft, or the old French faïence, according to the degree of opacity in the enamel. Again, if clays of different colors are worked some upon the other, or some into the other, it becomes similar to the old ware of Perugia or that of Voiron, known as Henry II ware. If the clay contains sands and is covered with a transparent and uncolored glaze, it is the style known as the Persian ware; then, again, if the clay or the body is of a fine description, white and covered with a transparent uncolored glaze, it is the cream-colored ware or the ordinary earthenware. Those processes are often combined together, sometimes on the same piece.

Pottery that is not porous is of a vitreous texture—that is to say, porcelain biscuit and porcelain itself. There is no natural clay or mixture of clays which, being submitted to the action of fire, does not lose its porous nature, and acquire a degree of vitrification, which for the same clay will be in proportion to the heat applied. All clays have in them a natural flux. In the inferior sort this is lime and the metallic oxides—oxide of iron, chiefly; in the superior sort, which is the clay arising from the decomposition of feldspar and granite, it is a very small amount of potash or soda. The vitrification known can be arrested by mechanical means. In this process, requiring great experience and skill, the English houses excel.

Porcelain itself is the perfection of the potter's art. There are two kinds: hard—the true porcelain—the eldest, which is that of the Chinese and the Japanese, of very simple composition; and soft porcelain, an invention of the last century, in which transparency—the characteristic of porcelain—is obtained by artificial means.

The principal centres where hard porcelain is manufactured are China, Japan, Germany, and France. The manufacture of soft porcelain is even more limited, for it is the most difficult to produce of all pottery. For many years it was confined almost exclusively to the imperial factory at Sèvres. In 1804, however, the manufacture of soft paste ceased there. Investigations into the nature of hard porcelain had never been discontinued. The secret of the manufacture was known at the royal manufactory of Saxony, but every precaution was taken against its being divulged. The royal manufactory of France, founded at Vincennes in 1745, and removed to Sèvres in 1753, had always pursued its researches, and the first success dates in 1768. From 1753 to 1768, therefore—a period of 15 years—soft porcelain was exclusively produced at Sèvres. Starting from 1762, the two were produced together, with a gentle preference to one or the other, according to the taste of the directors for the time being. The French Revolution and the emigration of the nobility, which followed, struck a severe blow at a manufacture which was conducted only for the most delicate tastes. It ceased to be appreciated, and by degrees attention was diverted from a complicated and costly manufacture to one comparatively easy, capable of producing larger prices, and which offered to the artist painter the advantage of being able to estimate, during the execution of his work, the real value of the tints he employed. Hard porcelain thus became the national pottery—a source of wealth to many departments, and an important article of exportation. Since 1847, however, the old *pâte tendre* has been again produced at Sèvres.

Specimens of every kind of porcelain were exhibited in the Sèvres court. The display in every respect was superb, and worthy of a government which, without regard to cost, has established a school of pottery entirely without any equal.

There were two exhibitors in this class from the United States.

CLASS 18.—CARPETS, TAPESTRY, AND FURNITURE STUFFS.

The productions included in this class were: 1. Silk and satin damask; 2. Reps and table-covers; 3. Velvet, in goat's hair, wool, and cotton; 4. Woollen, damask, poplin, Algerian stuffs, and horse-hair fabrics; 5. Chintz, cretonne, textile fabric, and printed cloth; 6. Carpets and tapestry; 7. Embroidered and figured muslin; 8. Tick for furniture, blinds, and bedding.

In this class there were about 60 exhibitors in the French section; in the Prussian, 28; Great Britain, 39; United States, 2; but in the section of Turkey there were no less than 260, nearly all, however, of carpets; Algeria also contributed a great number of carpets and mats, but generally of small size.

The display was also exceedingly good in the Persian and Russian sections. The coarser description of Persian carpets were hung side by side with the ribbed rug woven in Koordish tents, and there were beautiful specimens of both. In color, precision of outline, and beauty of texture, some of the Persian specimens seemed more like shawls than carpets. Such work is generally intended for the mosques; men never tread on them but barefooted.

European carpets are sufficiently well known. Among the French, those of the *savonnerie*, as a short-pile carpet, are still unequalled, and in the furniture department were some very creditable imitations of this manufacture, which has been abandoned. Of long-piled carpets there was a large display, but none to equal those of the imperial factory of the Gobelins. In the French *moquettes* (velvet pile) there were many beautiful imitations of Smyrna and other ornamental carpets.

Carpets are comparatively of modern introduction in private houses in France; they were reserved for the mansions of the wealthy, small rugs or mats laid before the seats being the only provision made to preserve the feet from the cold of the waxed oak or brick floors. Carpets are now in very general use, but they are much more expensive than in England.

In the English section there was a fair show of Brussels and velvet piles, chiefly from Kidderminster.

There was a very remarkable carpet in the Austrian section. It was designed for gas-light, being intended for the saloon of the Emperor's box at the new opera-house. The peculiarity of coloring was not seen to advantage under the softer influence of daylight. The pile was rather long, like that of Smyrna carpets, but the texture was close, and parts of the design were exceedingly delicate.

PRODUCTION IN FRANCE.

"In France the principal centres of production are: For group 1, Lyons and Tours; 2, Paris and Nimes; 3, Amiens; 4, Roubaix, Courcoing, Mulhouse, and Paris; 5, Mulhouse, Rouen, Claye, (Seine and Marne,) and Paris; 6, Aubusson, Amiens, Abbeville, Beauvais, Nimes, and Courcoing; 7, Tarare and St. Quentin; 8, Lille and Flers. The imperial manufactories of Gobelins and Beauvais produce the beautiful tapestry which is only used for the imperial palaces. That which is sold in the trade is made at Aubusson.

The raw materials used in the manufacture of fabrics for upholstery are very numerous. The organzines of France and Piedmont, the wefts of China and Japan, are used in the manufactures of the silk fabrics. The price of these materials has much increased during the last few years; it is now at 120 francs to 130 francs for the warp, and 110 francs to 120 francs for the weft. The French silk is the dearest and the most esteemed. The manufacture of reps and table-cloths is composed of French wool, valued at 10 to 15 francs the kilogram, and floss silk, worth 40 to 60 francs, which is chiefly derived from Switzerland. Utrecht velvet is made of goat's hair, spun in England, and sold at from 9 to 30 francs the kilogram, according to its purity. Horse-hair fabrics are woven of materials of French origin; that which comes from Buenos Ayres is much more expensive, costing from 16 to 30 francs. Woollen damasks are woven with wool coming from the north of France; the weft is worth from 7 to 8 francs the kilogram, the warp from 9 to 10 francs. For the mixed silk fabrics they use warp at a price of 50 to 60 francs the kilogram. The Algerian fabrics are composed of cotton warps and woollen wefts, worth 5 to 6 francs the kilogram. The price of cotton fabrics, such as calico and cretonne, used for making prints and chintzes, is from 50 centimes to 150 centimes per metre. These fabrics are woven in Alsace and Rouen. The cloth used in upholstery is manufactured at Mouy; the widest, used for table-covers, is worth, in its rough state, 3 francs the metre, and that used for covering furniture about 8 francs the metre. The printing of the calico, cretonne, and textile fabric is per formed principally at Mulhouse, Rouen, and Claye; the cloth is printed in Paris. The carpet manufacture employs English and French wool; the minimum price for the ordinary qualities is 8 francs the kilogram. Tapestry is made of unmixed English wool, which costs, without dyeing, from 12 to 15 francs the kilogram. The embroidered cotton fabrics come from Tarare and its neighborhood, the figured muslins from St. Quentin. The flax yarn for tick is spun at Lille. The figured fabrics used in upholstery are woven in the Jacquard machine; the plain fabrics are partly woven in power looms; the embroidery and tapestry is produced by hand, but they are beginning now to manufacture carpets by machinery; the printing is accomplished by cylinders or plates.

The cost of manufacture amounts to 10 or 15 per cent. of the value of the common article, to 20 or 25 per cent. in that of the better fabrics, and to 30 or 40 per cent. of that of the most expensive articles. The average amount of general expenses is 10 per cent. of the value of the production, without counting the cost of the designs and the inventions, which is often very considerable. Plain fabrics, at least those which are worked by hand, are manufactured in the homes of the workmen, in the neighborhood of the principal manufacturing centres; for instance, Utrecht velvets are woven in the environs of Amiens, by workmen who also cultivate the ground. Figured and fancy fabrics are usually manufactured in large workshops. In the upholstery trade only about 30 per cent. of the hands employed are women.

Paris is the principal market for all kinds of fabrics for upholstery; those manufacturers who have no depots in Paris have always an agent of some kind. Many manufacturers only work for one or two Parisian wholesale houses, and refuse all other business; and this association between the manufacturer and the Parisian salesman results from the absolute necessity of dividing, and thereby diminishing, the risks of manufacture (often considerable) in the production of those fancy articles, of which the consumption is relatively small and variable. The manufacturers of hand-made tapestry only work to order, for a new pattern has to be made for almost every buyer. Those who make carpets by machinery prepare their designs beforehand of the different sizes accepted in the trade, so as to always have a large assortment on hand. The manufacture of fabrics for upholstering is one of those for which France is most justly celebrated; the tapestry of the imperial manufactories of Gobelins and Beauvais is without a rival. The production of these fabrics is estimated at about 60,000,000. The exportation of carpets and tapestry is now very large. French woollen manufactures bear comparison with those of the best foreign markets, and their silk fabrics are unrivalled.

The committee of admission points out, among the principal improvements introduced since 1855: "firstly, the great extension of steam machinery; secondly, the introduction of a machine with eight and ten rollers, printing fabrics with that exquisite perfection of coloring which formerly could only be produced by hand."—*From the introduction to class* 18 *in the official catalogue.*

CLASS 19.—PAPER-HANGINGS.

The products exhibited in class 19 comprise: 1. Paper-hanging; 2. Painted or printed blinds.

Paper-hangings are principally made in Paris, and particularly in the faubourg St. Antoine, where are collected about 130 large factories, in which are employed 4,500 workmen, and whose produce per annum amounts to about 18,000,000 francs in value. There are also some works at Bixheim, Lyons, Metz, Caen, Toulouse, Epinal, and Mans. The raw materials employed in the production of paper-hangings, that is to say, the papers, the colors, the gelatine, &c., are now all of French origin. The designs for the decorations are always produced by French artists; the cuttings of the blocks and rollers have the same origin; and the machinery is constructed in our workshops. The materials, in the production of which foreigners for a long time held the monopoly—ultramarine and German gold, for example—are now all made in the French manufactories. The introduction of machinery into the French paper-hanging trade does not date more than 30 years back. Limited first to the production of striped papers of a single color, machine working was rapidly improved as to enable it to produce designs in many colors. In the year 1851, the number of machines employed by the paper-hanging manufacturers of France scarcely amounted to 20; they number more than 100 at the present moment. Each machine produces, on an average, 25 times as much as a hand printer; still, the introduction of mechanical means has not had the effect of diminishing the number of workmen in the same proportion. The number of slabs for hand printing has only fallen from 900 to 700 since 1851. It is to the increase in the trade itself that this result is to be attributed. If the statistics of the last 15 years be compared, we find that the amount of trade in 1865 was about 20,000,000 francs, or double that of 1850. The workmen nearly all work by the piece, and in shops where rarely less than 10 or more than 100 persons are employed, one-third of these consist of boys of less than 16 years of age; there are few women employed in the trade. There is no special market for paper-hanging, the trade being always carried on by means of commercial travellers and samples. The exportation of French paper-hangings, after having increased rapidly until the year 1860, was suddenly arrested at the time of the treaty of commerce; but it has risen again to the amount of the best years. In 1855 it was 4,074,916 francs; in 1857 it had risen to 5,948,331 francs; and finally, having fallen to 3,407,675 francs in 1861, it rose again to 5,085,000 francs, or nearly to the level of 1857; but the average price of paper-hanging fell in the same period from two francs sixty centimes to two francs twenty centimes the kilogram. From 1863 to the present day the imports have remained steadily at about 450,000; they are almost exclusively from England. The committee of admission may point out, among the improvements which have taken place in the trade: 1. The development of machine printing, and the daily improvements of the process. At first restricted to papers with two or three colors, it is now applied to the production of papers and borders with from 15 to 20 colors. 2. The recent introduction and immediate adoption of machines for strengthening or deepening colors. 3. The invention of some special kinds of paper-hangings, such as stamped, velvet, and gilt imitation of leather, of silk damask, &c.; the application of some new colors, such as the anilines and Guignet-green, in place of arsenical green, &c.

PAINTED OR PRINTED BLINDS.

The use of painted or printed blinds is much less general in France than in some other countries, Sweden and Germany for instance. They are often produced by artists working on their own account, and seldom attain the position of manufacturer. Nor is their production confined to any particular district or locality; they are produced in small workshops in nearly all great towns. There are about 30 of these in Paris, employing from 100 to 150 artists and workmen, and doing business to the extent of about 700,000 francs annually. One-fifth of the production is for exportation. The blinds made in France are for the most part painted by hand; block-printing is sometimes used, but in general only when the design employed is regular and geometrical. There has been no progress in the trade worth mentioning during the last 12 years; the processes remain the same, but the quantity produced is notably increased. In place of the unsightly blinds, overcharged with pretentious designs, and loaded with a mass of heavy opaque colors, we now see elegant compositions, produced in fine transparent colors, and worthy to take part in house decoration.

Paper-hangings had their origin in the desire to produce a material for the decoration of walls which should be less expensive than tapestry. At their first invention they were so expensive that they were literally hung on the walls, not pasted on them. They were carefully treasured, and were moved from house to house like other goods of the proprietor. They were first made at Rouen, in the early part of the sixteenth century. The earliest specimens resemble the flock-paper of the present day. They were imitations of tapestry, made by painting a pattern in adhesive oils and powdering it over with the colored wool obtained from the dressing of cloths. The next step seems to have been in marbled papers, in many of which gold and silver were introduced. It was not till the latter part of the eighteenth century that the use of chintzes suggested the application of printing to this manufacture. Of course, like the original chintz-printing, as it is still practiced in India and Persia, the design was produced by a number of engraved blocks, each charged with one color. Mechanism has long since abolished this tedious process. The paper, no longer in small sheets, but in an endless roll, passes under a succession of engraved cylinders so accurately combined that, when it issues from the press on the other side, it is completely and accurately colored. France, England, and Germany contend for the superiority in this branch of manufacture, and it is not certain that either nation maintains the superiority, although each has its own peculiar character to maintain. The French common papers surpass those of any other country in elegance, and, perhaps, also in cheapness. There were some papers with a white pattern on a gray ground, which could be bought at the rate of eight yards and a half for three cents; brown, blue, and white upon grey, a combination of three colors, cost four cents. These were for modest purposes, but the papers in imitation of Cordovan leather, gorgeously colored and gilt, were costly objects of luxury. Several of the French flock papers were excellent imitations of velvet, cloth, and reps.

Many of the English hand-made papers were admirable in execution and exceedingly rich, although generally inferior in design. Mr. Owen Jones, the famous mediæval decorator, exhibited a curious design in the way of paper-hanging. It looked like the border of one of his favorite mediæval manuscripts surrounding a page of the blue sky, powdered with a microscopic gold pattern.

The German display was not regarded as a satisfactory one.

CLASS 20.—CUTLERY.

Cutlery, properly so called, exhibited in this class may be divided into several descriptions: 1. Table cutlery, which includes knives and forks, with blades of the precious metals, commonly known by the appellation of small table plate; 2. Pocket cutlery, including spring knives of all sorts, certain huntsmen's knives and penknives; 3. Cutlery with fixed blades, such as hunting knives, poignards, and cutting tools of various kinds for business purposes; 4. Scissors and shears of all kinds, including gardener's shears, &c.; 5. Razors of every kind.

The familiar articles in this class were represented by 60 French and 94 foreign exhibitors. Of late years the French have made vast progress in the difficult art of manufacturing cutlery. England has enjoyed for years the reputation of excelling in this industry, and it is recorded that at the World's Fair in London, 1851, there was but a single exhibitor of cutlery from France. Of late years a vast stride has been taken in this business, not only by France, but by the German States and Belgium. A large proportion of the cheap cutlery which is called English has never crossed the channel, but is native and of continental production.

The English cutlery exhibition was a fine one. Sheffield was still able to maintain her own. The forms of table cutlery have gained in lightness and elegance; the razors are as keen as ever, and the scissors were very pretty, without having yet attained to the quaint ornithological forms of the French. Among the curiosities was a knife containing 28 blades, from Solingen, and any quantity of travelling knives from all parts of the world. In the six exhibitions of England were to be found clasp-knives, in the handles of which means had been found to place a spoon, a fork, a corkscrew, a pair of scissors, a saw, a file for the nails, a gimlet, a bodkin, a cutting punch, and four or five other objects, the use of which it is difficult to devise. It must be dreadful to own such a knife.

FRENCH CUTLERY.

The following, from the translation of the official catalogue, gives some interesting facts regarding the manufacture in France:

"There are four principal centres of cutlery manufacture in France: 1. The Puits de Dôme, represented by the town of Thiers, which is by far the most important as regards the amount of business. The number of pieces of cutlery produced annually in the factories of the Puits de Dôme amount to 48,000,000. This enormous production consists exclusively of cheap articles. 2. The Haute Marne, represented by the town of Nogent, produces cutlery of all qualities. It is from Nogent especially that the Paris cutlers obtain the blades for their table knives. The trade is considerable. 3. Paris, whose manufacture of articles of cutlery is far more interesting as regards the quality than the quantity of its productions; fine articles of all kinds are made at Paris, but principally table knives and razors. Lastly, Châtellerault, in the department of Vienna, which produces principally table knives and ordinary razors. The raw materials used in the cutlery trade are numerous; as iron, steel, gold and silver, employed for the blades and the ornaments; ivory, mother-of-pearl, ebony, bone, and many sorts of hard wood and horn, are used for the handles. English cast steel forms about one-half of the material for the manufacture of Parisian cutlery, and the cast steel of St. Etienne supplies the remainder. For ordinary cutlery, the cast steel of St. Etienne, the ordinary steel of Rives, (Isère), and the iron of Berry, are all employed. The principle of the division of labor is generally carried out in the cutlery trade in a very complete manner. Still manual labor predominates in this branch of industry, as the workmen only make one sort of article, and that always the same. He buys his raw material and finishes the article himself. There are, however, some important manufactories, where a certain number of mechanical tools are employed, such as stamping and cutting presses. In the centres of the great cutlery districts the workmen work at home, with apprentices, living in the surrounding villages. In Paris, however, and in a limited number of large establishments, the men work at the shops. There are but few women employed in the cutlery trade. The great centre of sale is in Paris; the manufacturers of Thiers, Nogent, and Châtellerault have depots in Paris and many other towns. Middlemen, who travel through the provinces to supply the retail houses, obtain their goods at these depots. The depots also supply the merchants for the export trade and the Paris cutlers. The value of the French cutlery trade amounts to about 20,000,000 francs; and by far the larger part of the productions of this trade is for home consumption. Thiers and its environs produced about 12,000,000 francs' worth of cutlery; the department of the Haute Marne about 4,000,000 francs' worth; Paris, 2,000,000, and Châtellerault about 1,000,000 francs' worth. A certain description of knives, called "Eustache," which formerly were in very great demand on account of their low price, are made at St. Etienne and at Nontron, in the Dordogne. The exports amount to about one-quarter of the whole production. These knives are sold at present at from 35 cents to 85 cents (3½*d.* to 8½*d.*) per dozen. A certain amount of progress has been made in the cutlery trade since the year 1855; there has been a constant improvement in the machine tools which have been applied to the production of very many kinds of articles; and in spite of the very decided increase in the price of most of the raw materials employed, and also of the advance of wages, the amount of the production has undergone little change.

CLASS 21.—GOLD AND SILVER PLATE.

This class comprises: 1. Artistic goldsmiths' work; 2. The major part of small table plate in gold, silver, and in alloyed metals, silvered or gilt by electro-chemical process; 3. Bronze ornaments for the tables and dessert services; 4. Plated ware; 5. Gold, silver and church plate; 6. Gold, silver and copper enameled ware. The goldsmith's trade is almost entirely concentrated in Paris, but there are some makers of church plate at Lyons. Fine silver is worth on an average 220 francs the kilogram. The law allows the employment of two different standards of alloy for solid plate, but the first of these is almost exclusively employed. This is worth 212 francs 62 centimes, while the second is worth only 180 francs the kilogram. Silver and gold are applied by the electro-chemical process upon articles made either of brass or of white metal, (maillechort,) which is brass, with the addition of nickel. The prices of the metals which enter into the manufacture of these alloys are as follows: Copper, 200 to 300 francs the 100 kilograms; zinc, 75 to 80 francs; nickel, 12 francs to 13 francs. The manufacture of plated ware is rapidly disappearing. The operations which contribute to the production of goldsmiths' work are very numerous. The metallic alloys are melted in crucibles; they are afterwards cast in moulds of beaten earth and sand. When taken from the mould the articles pass into the hands of the chaser. The chaser's work is, however, economically replaced in the case of stamped work by presses and steel dies. By means of these processes are produced table ornaments, certain objects of art, and various pieces of goldsmith's work, which are also made by means of the latter, the hammer and stamping. Mounting consists in uniting the various parts of a work together. This is done by means of soldering, and also of screws and nuts. Spoons and forks are made by means of rollers, on which the forms of the articles are engraved. The other processes are hand engraving and biting in with acid, enamelling, engine turning and polishing with special lathes; and, lastly, finishing, which includes rouge polishing and burnishing with steel, agate, and other tools. Goldsmiths' work is done almost exclusively either in large shops or at the houses of master workmen, employing a certain number of assistants and apprentices; very few work entirely alone. The proportion of men to women employed in the business is four to one. The number of females engaged has, however, increased since the introduction of electro-plated work, the polishing of which is entirely performed by them. The average rate of wages in Paris is 5 francs a day for men and 2 francs (40 cents) for women. The manufacturers generally sell their productions either to retail dealers or to merchants and agents for exportation. The annual value of productions, including plated ware, is 43,000,000 francs, of which only about 4,000,000 francs' worth are exported.—*Translation of the introduction of Paul Christofle, member of the committee of admission of class* 21.

The oldest establishment in France, the well-known house of Odiot, made a large display. There was nothing, however, that claimed the merit of novelty, unless it were the three massive pieces of plate which were intended in some way to celebrate the fame of the Creusot Iron Works. These were remarkable for the introduction of figures in the ordinary artisan's costume of the day, smiths resting from their toils with their implements in their hands, and cog-wheels, piston rods, and cranks filling up the details of the foreground. The idea was an innovation, and the difficulties to be overcome were no doubt great. But in these matters the effect is all that need be judged, and this did not give general satisfaction.

The collection exhibited by the brothers Fannière, besides its high order of artistic merit, had the extremely rare peculiarity of being the work of the hands of the exhibitors themselves. The brothers Fannière, pupils of Vechte, from being art workmen in the employ of others, have risen by their talent and industry to an independent commercial establishment, and in this exhibition carried off the first gold medal awarded to silver plate. Their *specialité* is a very high perfection of *repoussé* sculpture. Two shields, one in iron and the other in steel, were the most remarkable of their productions. The amount of relief was considered greater than had ever before been attained in the material, and as steel is not a tractable metal, it was deserving of attention, not only for its great artistic merit, but as defining the limit within which bold embossing, almost amounting to alto-relievo, retains its genuinely metallic character. With silver it is different. If it be burst by forcing it into a relief beyond its powers of expansion, it may be patched up by soldering in new pieces neatly enough to escape observation, unless the back be carefully examined, and even the back may be so cleaned up by files and other implements as to show no seam.

The largest collection was by Mr. Christofle, whose inumerable stores all over Paris are easily recognized by the invariable sign of windows filled with table spoons tossed into confusion with a prodigal hand. The house is one of the largest in the world, employs an enormous number of workmen, and manufactures everything, from the commonest articles of plated ware to the most expensive art productions for the table. The mass of material put on show was of a very heterogeneous character.

A collection of great artistic value and beauty was also exhibited by Mr. Le Pec, whose specialty is enamelling on a solid gold ground—gold being the only metal that can withstand the firing necessary for the superimposed work which Mr. Le Pec employs. When a vase has been thoroughly finished by this elaborate process it looks more like the production of the potter than the goldsmith.

The German collection by Wagner, the court silversmith of Berlin, was well worthy of examination. He exhibited two important works—bucklers—one given to the Prince Royal on his marriage, the other to Francis the Second of Naples, in 1864, in memory of the siege of Gaeta. Both were examples of the art skill for which the house is renowned.

Russia had a superb collection of thoroughly characteristic silver ware, mixed with occasional imitations of Arabic and Persian art. The Muscovite style is a combination of the various contrasts of whitened silver, oxydized silver, both obtained by the aid of acids, and gilding. The designs are striking, and, in not a few, inscriptions in the Russian alphabet, either pierced or engraved, are used with quaint effect. The hammered and chased silver work was regarded as the best in the class.

In the English section there were three names that challenged attention, Hancock, Hunt & Roskell, and Elkington, the English Christofle, but Elkington only exhibited silver ware. The collection was exceedingly fine. A silver swan exhibited in one of these cases occasioned a good deal of amusement, and was certainly one of the most ingenious pieces of mechanism in the building. It was of life size, and was gracefully poised on a basin of artificial water represented by revolving spirals of crystal. In this water a shoal of artificial fish were seen swimming. The swan moves the feathers of its neck gracefully, takes a proud and dignified survey of the situation, perceives the fish, seizes one in its bill, and then raises its neck and straightens it so that the fish disappears. Satisfied with this frugal but somewhat indigestible repast, the automaton curls its neck under its wings and goes to sleep. The whole is effected by means of clockwork machinery, which is said to be old, the present exhibitor only having refitted it.

In this class there were but two American exhibitors. A small collection of chased silver ware was forwarded by Messrs. Tiffany & Co., of New York, which was good enough of its kind, but inadequate to the occasion. Two pretty models of steamboats in precious metals were much admired. They were from the same house. A collection of Connecticut table ware was shown and used in the American restaurant.

CLASS 22.—BRONZES AND OTHER ARTISTIC CASTINGS AND REPOUSSÉ WORK.

The alloy forming what is called imitation bronze consists of tin, regulus of antimony, and lead. The productions of this alloy are remarkable for sharpness; but it is dear and almost always wanting in solidity. At the present day it may be almost absolutely declared that the manufacturers have given up the use of this alloy in favor of pure zinc, and particularly that prepared sort known as the Vieille Montagne zinc. Zinc, then, remains nearly the only metal in use, and when covered with a coating of copper by the electro process produces a good imitation of bronze. This galvano plating, however, entails considerable expense; and in order to produce very cheap articles certain establishments use a mere varnish, either of the color of bronze or gold. In some shops steam power is employed, but this cannot in any case supersede manual labor. All that it does is to aid the workman by saving him a considerable amount of fatigue, especially in the turning shop. The apparatus included in class 22 employ about 11,000 workmen, some of whom are paid by the day and others by the piece; the wages of the former range from four francs fifty centimes to eight francs a day. There are, however, many instances of men earning much higher wages. Piece work is of course affected by the laws of supply and demand, and is a matter of special arrangement. About 4,000 men work at home or with the designers, the others are employed in large shops, the day's work consisting of 10 hours.

The annual value of the productions of the trade reaches about 70,000,000 francs, nearly £3,000,000 sterling. In 1863 the export amounted to 44,000,000 francs, but it fell to 40,000,000 francs in 1864, and 34,000,000 in 1865. The returns for 1866 are not yet made, and we cannot, therefore, give exact figures, but, in all probability, there is still a further falling off. This diminution in the exports is attributable to the efforts made in England, Belgium, Germany, and even Russia, to establish works for the production of bronze, zinc, and iron castings. These nations are making great efforts to develop these valuable manufactures in order to compete with French producers, not only in the markets of these nations themselves, but also in the general trade.

The importation of manufactured articles is valued, at the above-named periods, at 480,000 francs, 545,000 francs, and 495,000 francs, divided between England, Belgium, and, since 1864, Germany.

The improvements to be noted are those which have arisen out of elevation of taste and knowledge of art, which are progressing daily, rather than to any improvements in the tools, &c., which have remained unchanged for a long time. There remains, however, a great deal to be done. The study of drawing and modelling becomes more and more indispensable every day, in order to enable the workmen to maintain our productions in the high esteem which they have hitherto enjoyed. Like that of bronze, the zinc and iron casting manufactures are greatly improved. They produce in the present day works which formerly belonged exclusively to art, and which, on account of their cost, were rendered almost unavailable for the decoration of private dwellings. Finally, all these industries are closely connected, and each of them, in various degrees, has undergone a perfect revolution during the last 20 years, with the aid of the fine arts. Our best artists have readily met the demands of the bronze manufacturers, and the production of a host of articles for various usages within doors bears witness to the increasing alliance of art with industry.

The articles exhibited in this class form six principal groups: 1. Artistic bronzes and ornamental bronzes, including statues, statuettes, clocks, vases, tazza, decorative candelabra, &c. 2. Iron castings, comprising figures, vases, tazzi, fountains, candelabras, railings, balconies, crosses, and miscellaneous articles. 3. Imitation bronze, (composition,) including compositions for clock cases, tazzi, vases, candlesticks, &c. 4. Repoussé work, including figures, vases, ornaments, &c. 5. Galvanized cast-iron. 6. Zinc figures and ornaments, statues, statuettes, clocks, vases, &c. The bronze, as well as the imitation bronze and zinc trade, is essentially Parisian. The art, taste, and fancy which preside over these productions have given them a special character, which, to the present moment, has kept them above rivalry. The same may be said of repoussé work, adding, however, that this industry, which is in its youth, or rather renaissance, may be expected to assume great development. The galvanization of metals, as regards France, is concentrated in Paris, but it is practiced in all parts of Europe. The application of cast-iron to ornamentation is comparatively of recent date; its progress has been marked at each of the great exhibitions of 1851, 1855, and 1862; the low price of the raw material allowing of its application to monumental works, and therefore to contribute to the adornment of large public places, and edifices of all kinds, parks, gardens, &c. Iron foundries exist in almost every part of France, but there are but few that produce artistic work. For these, as for bronzes, the study and the production of the models are made in Paris. Paris is also the principal market for the disposal of these productions. The principal metals employed in the manufacture of bronze are: The copper of Chili, Russia, New Zealand, Minnesota, or Lake Superior, but the greatest portion is from Chili; zinc, from Silesia and the Vieille Montague; tin, from Banca, Sumatra, and Cornwall. In this branch of manufacture the metal represents two-ninths of the value of the production, the rest being divided between the moulder, the founder, the chaser, the mounter, the turner, &c.

The principal exhibition of bronzes was from the establishments of France. The above general description of the bronze trade and manufacture is from the translation of the introduction to the class by Barbedienne, member of the committee of admission of class 22, and one of the largest producers of artistic bronzes.

Although the actual business of France in the articles of bronzes does not seem to be on the increase, her supremacy in the manufacture is unquestionable. At all periods bronze has been a favorite material for art. The small bronzes of antiquity, occasionally found in Greece and Egypt, and of which a vast collection has been exhumed from Herculaneum and Pompeii, prove that the ancients employed this material preferentially for the decoration of their houses, as well as for celebrating the virtue and valor of their heroes. At a later period bronze was used for ecclesiastical purposes, and it is for the most part the objects in this comparatively valueless metal which have been preserved as specimens of the church art of the past. The rapacity of enemies, and the impecuniosity of religious bodies, have consumed almost all the works in the nobler metals which the church had accumulated. The Renaissance was not slow to adopt this material, and in Italy schools of bronze workers have flourished from the beginning of the sixteenth century.

In France the art has passed through many trying ordeals, and survived a variety of styles. The French section of the Exhibition contained three large compartments exclusively filled with bronzes. The majority of these were in zinc bronzed, real bronze itself being vastly more expensive. Thus the Buveuse of Moreau, a crouching girl or nymph drinking out of a shell, could be produced in zinc for 550 francs, while in bronze it would cost 2,000. For such purposes, however, many prefer cast-iron, of which work fine specimens were to be seen. Some of the castings exhibited in the state in which they had left the mould were exceedingly beautiful, testifying to the great perfection to which the French have brought this art. Statues made of this material must be painted or bronzed, or covered with copper by the galvano plastic method, as much to prevent rusting as to hide the unpleasant color of the metal, which, in its natural state, is as dull and ugly as anything can well be. Iron is unquestionably the metal of the present day, and if protected by a proper coating of copper, it is not only as lasting as bronze, but much less exposed to the cupidity of revolutionists. The metal is almost worthless. No Jew, says an amusing writer on this subject, will buy it by the ton, like him who loaded so many camels with the Colossus of Rhodes; it would hardly pay the carriage. No revolution will coin it into pence, unless, indeed, posterity returns to the manners of Sparta, which is by no means the direction in which the world seems moving.

There were, of course, many fine specimens of real bronze. The reductions of famous statuary, by Barbedienne, in this substance, deserved the most unlimited praise. He is regarded as the best in the *specialité*, but there are many other names of almost equal renown.

The only American exhibitors in this class were Messrs. H. Tucker & Co., of New York, who brought a good collection of iron ornaments bronzed by a new process of their own, which is claimed to be better than the French method, and practicable at one-fourth its cost. The objects here shown were of general interest, and engaged the particular attention of all who were in the business. Cheapness, durability, and sharpness of outline are the characteristics of iron when wrought successfully. The Tucker company have made considerable progress in these directions—apart from any consideration of the special merit of their invention for bronzing—but the models and forms of their goods can very easily be improved.

CLASS 23.—CLOCK AND WATCH WORK.

The exhibits of this class were divided into three series: 1. Clocks for public buildings and their parts, such as winding apparatus, escapements, chimes, hands, illuminating apparatus, &c. French monumental clock-work is an entirely national and superior industry, taken altogether, as compared with that of foreign countries, and the value of the manufactures, principally confined to Paris, may be estimated at about 2,000,000 francs per annum. 2. The ordinary watch and clock work of commerce, which includes the making of the rough parts of both, pendulums included; dials and time-pieces for apartments, portable time-pieces, common silver watches, and watches of higher finish, whether in silver or gold cases. 3. Astronomic regulators, and marine and pocket chronometers. This branch of trade only occupies a secondary rank, but it holds the first place for its scientific importance and the beauty of its products. 4. The accessories of horology, including the manufacture of main and balance springs, the working of precious stones and machine tools. 5. Wooden clocks, the use of which is so general in villages and country places. The total value of the productions of the trade in France is estimated at 35,000,000 francs.

The centres of manufactures in France are, for the finishing of clocks, Paris; for finishing of watches, Besançon, Doubs; for the movements of watches, Beaucourt, Haute Rhin, the districts of Montbéliard and Cluses, upper Savoy; for the wheels and parts of turret and portable clocks, St. Nicolas, D'Aliermont, Seine Inferieure, Beaucourt, and Montbéliard; lastly, Morez, Jura, for large iron clocks and those called *de Comté*, principally used in workshops and large factories. The productions of the last-named places form a considerable portion of this national industry, and it is valued at more than 4,000,000 francs. All these factories feed the French markets, and their manufactures are also exported to a considerable extent.

The number of persons engaged in horology at Besançon is about 15,000, men, women, and children. It is about one-seventh of the whole population of the arrondissement. There are 110 watchmaking shops, 20 engravers, and two large establishments which refine and prepare gold and silver for the trade. One hundred and fifty licensed manufacturers supply work to a number of isolated workmen, or to families of three or four persons, men and women, working together. These work-people are divided into classes which correspond with the various parts of the watch. Thus, there are separate workmen for the dial, the hands, the springs, the pendant, winders, &c. The shops that feed Besançon extend at present all along the Swiss frontier in the arrondissements of Moreau and Pontarlier, in the district of Montbéliard, and the mountains of the Doubs. The last two centres, represented by large factories, only make the rough pieces and detached parts, such as wheels, pinions, balance wheels, cylinders, &c. The produce of Besançon amounts to 300,000 gold and silver watches per annum, of the value of about 10,000,000 francs. In this amount labor is represented by about two-thirds, and material by the remainder. At the present moment the watch manufacture of Besançon represents four-fifths of the entire consumption of France. Its progress is very rapid, as the following figures will show: In 1845, the total production was 54,192 watches; in 1855, 141,943; and in 1865, 296,012. Within the same period importation has considerably fallen off. It diminished from 200,000 watches in 1855 to 45,454 in 1865. There exist many mutual aid societies in Besançon, and a school of horology, towards which the municipal authorities have voted a grant of 20,000 francs per annum. There are turned out annually, in addition to a large number of alarms, musical boxes, &c., more than 200,000 clock movements from Beaucourt, Badevel, and the district of Montbéliard. The town of Cluses, upper Savoy, also possesses a school for young watchmakers. The boys are employed for making rough movements and detached pieces, especially pinions, which are sent to Besançon or to Geneva. The manufactures of St. Nicolas d'Aliermont, although far from equalling that of Franche Comté in importance, still furnishes a considerable share to the horological trade of France. Out of a population of 2,500 inhabitants, about 1,000 are employed in the watch trade. Chronometers and astronomical regulators are produced there, the prices of which range between 600 and 1,200 francs, besides a large quantity of wheels for clocks, alarums, and electrical apparatus. The produce amounts annually to 144,000 pieces, the value of which is estimated at more than 1,000,000 francs. As at Besançon, numbers of workmen live in their own homes, and work, with their families, around the manufactories. Women are employed in preference to men for polishing, pivoting, and mounting the wheels. The weight of the raw material employed is 50 tons per annum, copper forming nearly the entire bulk. The articles manufactured at St. Nicolas d'Aliermont are sent principally to Paris and London.—*Translation of the introduction to Class 23, by Làngiere. (Official catalogue.)*

At the London Exhibition of 1862 there were, of all nations, 300 exhibitors in this class, of which 54 were French and 97 English. In the Exposition of 1867, the number had increased to 535, France being represented by 223 exhibitors, and England by 29.

The manufacture has made more progress in France than elsewhere, but for scientific and the higher purposes of horology the English makers still occupy the first rank. From the period when timekeepers, in the form of the quaint "Nuremberg egg," were invented, it has been the constant effort of horologists to improve the construction of horological instruments; and the efforts in this direction have been so successful that ships in the middle of vast oceans are enabled, by means of chronometers, to ascertain their position with extraordinary precision; and parties in dense forests provided with these instruments cut paths through them with unerring accuracy. To the marvellous precision of chronometers the laying of submarine telegraph cables is, in a great measure, due, and without their aid the picking up of the lost Atlantic cable—one of the most astounding feats of the century—could not have been effected.

This perfection has been attained after incessant thought, experiment, and trial. The principal difficulty that had to be contended with, and which even now has only been relatively overcome, was that of compensation. Metals, however carefully prepared, expand and contract with the atmosphere, and these variations naturally interfered with rate of speed. The errors were of vast importance to the navigator, and admonished him that he should be very careful that his chronometers were adjusted for high and low temperatures in the ice-chambers and gas-stoves of their makers. Bad oil was another cause of imperfect working, but to correct the temperature error was the chief aim of the makers of these sensitive and valuable pieces of mechanism. Vast progress has been made in this direction. The faults of the chronometer have been brought down to a matter of statistics, like the rising and setting of the sun, so that every deviation is regular and anticipated. The Arnold-Earnshaw compensation balance, composed of brass and steel laminæ, corrects every temperature error to a daily rate of four seconds, which may be regarded as pretty nearly uniform in all temperatures between 30° and 90°. Mr. Charles Frodsham exhibited some curious compensation balances, involving various new constructions; also a micrometric balance affording a simple means of adjusting chronometers without removing the balance or disturbing the mean time.

English chronometers are, in general, constructed to go two days, or 54 hours, and to be wound up daily. A considerable number, however, are constructed to go eight days, and are to be wound up every seventh day. The same gentleman exhibited an astronomical regulator combining every accumulated improvement, including new brass tubular mercury compensation pendulum and connecting galvanic apparatus for recording the time of observations. This clock was especially interesting to Americans, inasmuch as it was made for Cambridge University, Massachusetts. It was regarded by experts as the most perfect instrument of its kind in the Exposition. It is a model of the celebrated clock made by Mr. Frodsham for the Melbourne Observatory. The results of the performance of this clock during three years were submitted to the jury and pronounced to be the most remarkable for accuracy on record.

Mr. Frodsham attributed its wonderful precision not only to mechanical excellence, but also to the discovery that few pendulum-rods are ever so perfectly homogeneous as to lengthen directly by heat and shorten directly by cold. On the contrary, experiments show that they often expand into a bow form. In submitting six rods to a temperature of 600° only one of the rods remained perfectly straight, and the others bowed and warped into such shapes as to be entirely useless until they were reannealed; and what was even more surprising was the fact that the flat rods not only warped more than the round ones, but also warped edgeways. The pendulum rods used in the clock for the United States were submitted to this test of 600°.

The French collection was admirable not only in fashionable and other kinds of watches, but also in instruments of precision for astronomical and marine purposes. Gaurdin exhibited a turret clock built for the new cathedral at Buffalo, United States, and containing chimes of 43 bells, with machinery by which the airs may be varied. The bells are sweet enough, but it is to be presumed that the airs *will* be varied, for they are of a singularly trashy character, and entirely unsuited to the purposes for which they are intended.

A few electrical clocks were exhibited in the French department, and also some specimens of clocks made by machinery at Dieppe. But in the latter art the French have not yet approached the precision of American manufacturers.

Very ingeniously constructed, small, portable alarm clocks were exhibited by Phillipe. They strike an alarm and light a candle at any desired hour.

Among the revolutions attempted to be effected by the French makers is the ten hours' movement. They wish to introduce the decimal system of time in watches, dividing the day into ten hours and the minutes into 100 seconds.

The watch manufacture of Switzerland was represented by 163 exhibitors, 67 of whom were from the Bernese Jura. Watches were there to be seen ranging in price from eight francs to 1,250 francs. Among the cheap watches were some curious specimens constructed for exportation to China. A school for teaching watchmaking, founded in Geneva in 1824, turned out some extremely fine work. Pupils are admitted at the age of 14, and may remain in the establishment for four years and a half, during which time they are taught all horological processes. The terms are, for natives of Switzerland, five francs a month, and for those of other countries, 20 francs. Natives of Switzerland also enjoy the advantage of being provided gratuitously with all necessary watchmaking tools. During the winter months the pupils have the privilege of attending free courses of lectures, given in the evening, on geometry, mechanics, and linear drawing. There are also four other schools in Switzerland with professors at their heads.

Watches that are wound up with the pendant, or, as they are popularly called, the keyless watch, were very general. The fashion is convenient and advantageous, inasmuch as the watch need never be opened, and is therefore kept free from dust and moisture. The invention, however, is by no means so novel as is generally supposed. It was first introduced, says Mr. Weld, by John Arnold, in 1823, for the convenience of a naval officer who had lost his right arm.

There were two exhibitors in the American department. The workmanship of Fournier's turret clock was regarded as extremely good. It was, in every respect, a carefully constructed instrument. The contributions of the New Haven Clock Company were remarkable mainly for the processes by which they were made.

CLASS 24.—APPARATUS AND PROCESS FOR HEATING AND LIGHTING.

In this very extensive class were included the following subjects: Fireplaces, chimneys, stoves, furnaces, calorifiers, accessory objects; apparatus for heating by gas, by hot water, by hot air; apparatus for ventilating and for drying stoves; enamelled lamps, blowpipes, portable forges; lamps for oil—mineral, vegetable, or animal; other accessories of lighting; apparatus for lighting by gas; photo-electrical lamps; apparatus for lighting by magnetism.

There were fourteen exhibitors in the American department. The processes employed did not vary materially from the most advanced principles of Europe, and both in warming and lighting it may be claimed that the United States are ahead of other nations. European makers address themselves mainly to the utilization of fuel, and where they attempt warming a building they contrive to throw a small stream of heat into many apartments without interfering with the boiling of the pot in the kitchen.

The uses of gas are as yet imperfectly understood in Europe, owing to the fact that there is still a wide-spread prejudice against its use. Most of the contrivances were for regulating the supply, and measuring it with extreme accuracy.

An ingenious contrivance was shown in the English cottage. It was for lighting grate fires without the troublesome use of wood, paper, and other combustibles. Two small tubes containing burners similar to those used in gas stoves are placed besides the chimney jambs. They are on moveable joints, and can be turned to any bar. The grate is filled with coal and these tubes are lighted. They blow a blue flame into the grate, and rapidly ignite the coal.

In the French department was exhibited a plan for heating the new Grand Opera.

CLASS 25.—PERFUMERY.

This class comprehends, under the head of perfumery, all the numerous articles of the toilet. A great number of perfumery establishments exist in Paris, and there are also very important ones in Nantes, and nearly all over the south of France, particularly at Grasse, Marseilles, and Nice. The raw materials employed are oils and greases, impregnated with perfumes of flowers; distilled waters, with and without alcohol; cinnamon, cloves, &c.; odoriferous chemical essences, in their natural state and prepared, are also used. Algeria and south of France supply the flowers for perfumery at a price relatively low. Those who produce special articles, such as soap, the preparation of which involves complicated operations, employ in their workshops machines of all sorts, the use of which is becoming general everywhere. One of the Paris exhibitors who produces the raw material is a soap and perfume maker, and retails his own manufactures. A large proportion of the work people are women; they are employed both in the preparation and the making up of the perfumes. Children could also be employed, if required. The ordinary journeyman perfumers take very little time to learn the trade. They are divided into producers of raw materials, the purifiers of fatty substances, and the perfumers, who select the perfumes, incorporate them in certain substances, and sell them made up in forms more or less elegant, according to their qualities. The products of perfumeries, which attain a large total, are delivered for home consumption and to agents for exportation. The exports reach the sum of 15,000,000 francs, while the imports do not exceed 1,000,000 francs, including a certain quantity of raw materials. The exports from France are made to all parts of the world; the excellent preparation of the ingredients, the care with which they are made up for sale, and their incontestible quality, cause them to be in great demand, and daily increase their value and importance. It is to be regretted that the numerous counterfeit imitations from abroad tend, every now and then, to interfere with the impulse acquired by this branch of industry. We must signalize, however, the considerable and interesting progress which has been made in perfumery during the last few years. The methods of working have been improved, as much in regard to the processes as in an economical point of view. The plant and utensils employed in the production of toilet soap have undergone a complete transformation. The use of certain machines has become general in the greater number of workshops. Finally, in spite of the duties which weigh upon some of the raw materials, we can safely assert that the trade of perfumery has not attained its greatest development, and that the formation of the syndicate will open up a new outlet, which will tend to maintain it in the high rank it now occupies among the great French industries.—(*From the Official Catalogue.*)

Perfumery, in the present sense of the word, owes its origin to the Egyptians. The process of embalming involved the use of scented substances of all kinds, and for toilet purposes aromatic preparations were used in great profusion. The unguents used by the priests were compounded with such skill that a specimen in the museum of Alnwick castle was found, a few years ago, to have retained its scent after the lapse of 3,000 or 4,000 years. The Jews, after the Israelite captivity in Egypt, possessed themselves of all the secrets of the Egyptians, and improved upon them. They became the greatest experts of the ancient world in preparing odors of all kinds. All the Asiatic nations exhibited an intense love of perfumes. The Greeks were addicted to fine scents, and the wise Solon enacted sumptuary laws on the subject. The Romans brought many Greek customs from parts of southern Italy which had been settled by the Hellenes, and among others that of perfuming the body. Julius Cæsar issued a mandate like Solon against the importation of these dangerous articles, but without success. Caligula the Gross constantly bathed in perfumed waters, and in Nero's golden palace the drinking tables were made with concealed silver pipes, which cast on the guests a spray of essences. The unctuarium of a Roman bath contained innumerable preparations for the hair, the beard, and body. The boudoir of a Roman beauty was a complicated laboratory, where nature's idea of beauty was corrected according to the latest code of fashion, even to the particular of changing the obstinate color of the fair one's hair, which then, as now, was considered beautiful if auburn, light brown, or golden. The dye used consisted of a soap from Germany made of goat's fat and ashes, no doubt containing some very powerful alkali.

Arabia discovered the secret of extracting perfumes from flowers by the process of distillation, and the first flower to surrender its sweets was the rose. Hence the earliest commercial perfume was, and still is, known by the name of "rose water." This must not be confused with "otto of rose," which is an Indian preparation of singular potency and great price. The story of its discovery is related by Mr. Rimmel and other writers on this very interesting topic. A fair princess, while walking in her garden, through which meandered a gentle stream of rose water, observed certain oily particles floating on the surface, and this turned out to be the veritable "otto." In the present day the essence is, of course, procured by means of distillation.

Musk, although known to many nations of antiquity, seems to have been the special favorite of the Chinese, owing, perhaps, to the fact that many of the northern provinces of China are the "habitat" of the musk deer, a little animal about the size of a greyhound, from whence the perfume is obtained. When once musk has been used, its obliteration from the sense of smell is almost impossible, as an instance of which it is stated by Dr. Piesse that the walls of Malmaison, inhabited more than forty years ago by the Empress Josephine, though since then repeatedly rubbed and painted, and even washed with aquafortis, still retain the odor of this imperishable scent, of which, it is needless to add, the empress was inordinately fond.

Soap, it may here be added, whether perfumed or otherwise, was known to many savage nations long before it was discovered by Europeans.

These historical particulars, and the precise statistics of the French department, will suffice for a rapid glance at a class which cannot be made interesting by description, save by him who can paint the lily and perfume the rose. The French display was fine, not only in the manner in which these delicacies were "put up" for the market, but especially fine in the exhibit of essences and materials employed by perfumers of all countries in the fabrication of their goods. There were sixty-two exhibitors.

After France, England, except in the article of eau-de-Cologne, in which Prussia, of course, bore off the palm, ranked next. She had fifteen exhibitors. There were two contributions from America.

The contribution from Egypt was made by his Highness the Viceroy, and consisted of "galena" in powder, called "lohle," used for darkening the eyebrows and eyelids; henna powder, "lansonia alba," used for the toilet of Arab women; soap made at Cairo, small caskets; scented wood, used for perfuming rooms; "dilka" (cosmetic) and ostrich grease, used by the women of Nubia and the Soudan; wooden bottles, covered with embroidered tissues, containing bladders of crocodile musk and various perfumes used in the "Sennar;" wooden bottle and pencil used for the coloring of the eyebrows and eyelids; ivory horns used for perfumery by the nomade Arab tribes; wigs worn by the negroes of Niams-Niams on fête days.

His Highness the Bey of Tunis sent: Metikaux, essences of roses, cassia, behar, cloves, amarante, double jasmine, aloes, ambergris, sfax, jasmine, and mixed perfumes; ambergris pastilles, zebed pomade, chenouda, and oil of jasmine; "sousse" soaps, with and without scent; orange flower, "nesri," jasmine, rose, and other waters.

CLASS 26.—MOROCCO WORK, FANCY ARTICLES, AND BASKET WORK.

The articles exhibited in class 26 represented several trades which are closely connected; we may say in a general way that they belong to that kind known under the name of "articles de Paris." There are three principal series: 1. Articles in Morocco leather, and other small fancy articles; 2. Articles in fancy wood; 3. Basket work.

MOROCCO WORK AND OTHER SMALL FANCY ARTICLES.

The small fancy articles included under this head are pocket-books, dressing and travelling-cases, purses, cigar-cases, &c. The manufacture of articles in morocco leather is chiefly confined to Paris, and particularly to the third arrondissement. For these manufactures a great variety of materials are used, of which the principals are sheep, goat, boar, and other skins, specially prepared; paper, silk, velvet; rosewood, mahogany, oak, and other woods derived from Algeria; bone, horn, ivory, tortoise-shell, gold, silver, and veneers are also employed, besides iron, steel, copper, white metal, and sometimes aluminium is used.

A great number of instruments and tools are used to work the different materials; turning-lathes, presses, stamping and drawing machines, dies to cut out stuffs, frames, &c.; paring, piercing, and hinge-making machines; sewing and stitching machines; polishing and nail-making and tempering machines. The last-named description are moved by steam, the former by hand. The great variety of articles in morocco makes it difficult to reckon the value of the materials used; we can say, however, that it is of no great importance, when the articles are plain, and require no ornamentation in gold or silver. Most of the manufacturers have no working establishments, and do not employ any men in their workshops; they resort to cabinet-makers, jewellers, and others, who work by the piece. One-third of those employed are women; they almost all work for employers. The salaries vary in Paris from five francs to six francs for men, and from two francs fifty centimes to three francs for women. The articles are delivered direct to the retail venders, and to the agents for exportation. Two-thirds or so are sold in France; the remaining third is exported, principally to America, England, Germany, Spain, Russia, and several other countries. The production of articles in morocco, including small fancy articles, dressing and other cases, represents more than 12,000,000 francs. The manufacture of these articles has been much improved since 1855, and is constantly on the increase; and, at the present time, the articles are remarkable for great finish, good taste, and variety of shape.

ARTICLES IN FANCY WOOD, BASKET-WORK, ETC.

These include small articles in ivory, tortoise-shell, mother-of-pearl, shell, horn, bone, cocoa, hard wood, &c., such as ivory statuettes, billiard balls, combs, snuff-boxes, brush mountings, fans, screens, chessmen, dominoes, draughts, tric-trac counters, parasol and umbrella handles, and quantities of other articles in general use. The small lacquer-boxes belong to the same class. Their manufacture is carried on chiefly in Paris, Dieppe, St. Cloud, (Jura,) Beauvais, and in the cantons of Meru and Noailles (Oise,) Beaumont, (Seine and Oise,) in the arrondissement of Eureux, (Eure,) and in the departments of the Aisne, Marne, and Loire, Moselle, and Vosges. The articles exhibited in class 26 belong almost exclusively to the Paris trade. The materials employed are of great variety, both as to price and origin. The following are the most generally used: gold, silver, tortoise-shell, mother-of-pearl, ivory, horn, cocoa-nut wood, pasteboard, waxed leather, &c.; for the manufacture of pipes, meerschaum, brier-root, common and yellow amber, horn, ivory, bone, all the white woods, colonial woods, cherry, ebony, &c.; for combs, tortoise-shell, ivory, common horn, Irish horn, and buffalo horn, wood, hardened India-rubber, and, in some cases, metals.

The mode of manufacture of these articles is extremely varied; it changes with the articles produced. The work is usually done by hand; nevertheless, the comb-makers have used machinery to cut out the plates of horn and tortoise-shell. The daily wages are five or six francs for men, and two francs fifty centimes or three francs for women. Two-thirds of the workmen work by the piece, and about two-thirds of the workwomen are employed in workshops. The trade includes many specialties. The principal men employed are sculptors, engravers, painters, lacquerers, horn-flatteners, workers in bronze, pasteboard cutters, decorators, filers, inlayers, moulders, polishers, turners, &c.; for women, pasteboard shapers, polishers, and piercers, *(reperceuses.)* Most of the tradesmen employ workmen at home, and have no workshops; a certain number of workmen work on their own account, and sell their articles to the special houses in Paris, or the provinces, and to commission merchants, for exportation. The amount of production of these small fancy articles represents as much as 50,000,000 francs. Paris alone, whose products are almost exclusively shown in class 26, makes 11,000,000 francs.

The greater portion of the products are sent to America, England, Russia, Spain, and Germany. During the last 10 years, the manufacture of fancy articles has become very important; brush-making particularly has made great progress. We may note, in the first place, an important decrease in the price of almost all the products, and we can add that the Paris workmen are particularly skilful in the manufacture of fancy boxes.

BASKET-MAKING.

Basket-making has but a small space in class 26; however, a few fancy articles, which are only manufactured in Paris, may be seen there. These are baskets and flower-stands in osier, painted, varnished, bronzed, gilt, and remarkable by the variety of their ornaments. Few common baskets are made in Paris. It has become a most active branch of industry in several departments, and chiefly in the Aisne, at Brigny-en-Vierache, near Vervins.—(*Extracted from the translation of the Official Catalogue.*)

The articles embraced in this class were so numerous that it would be easier to describe one-half of the fancy stores of Paris, and two-thirds of those of Vienna, than to give an idea of their infinite variety and extent. Nevertheless, they were divided into three families, called, in French, *maroquinerie, tabletterie, et vannerie.* Each of these families was numerous enough, and distant offsprings were to be found in every part of the building. *Maroquinerie* proper relates to large objects, such as travelling bags, &c.; *la petite maroquinerie*, to small articles, as purses, &c. They are, as the name implies, made from morocco leather, or imitations thereof. *Tabletterie* comprises all articles turned in ivory and wood; *vannerie*, everything that is wrought by the basket-worker.

The French had 93 exhibitors in class 26, and for ingenuity, elegance, and beauty combined, were incontestably ahead of any other nation. The English excelled in leather articles, where substantiality (as in dressing-cases) was the desideratum. The Austrians were formidable rivals to both nations.

A small amount of usefulness and a large proportion of style are the characteristics of all the well-known objects of class 26. Most of the novelties were consequently dependent on the latter quality, no new material having been lately introduced into the manufacture of these charming objects.

Mr. Latry (France) exhibited several articles in hard wood, which were not exactly what they pretended to be. They were, in reality, composed of fine wood-dust, mixed with the blood of animals. This curious process is new and a trade secret. The intensely black appearance given to the articles is ascribed to the carbonization of blood, caused by the action of heat—boiling or baking.

Another exhibitor displayed a slab of ivory of unusual proportions and vastly larger than could be obtained from the diameter of the elephant's tusk. It was obtained by sawing spirally, in concentring rings, a longitudinal portion of the solid ivory and then opening the coils into one sheet by means of steam or some other softening process. The specimen was 1½ foot long by 1 foot broad.

The exhibition of England in leather articles was extremely good. Austria shone best in the smaller ware, in articles made of stag-horn, and in the specialty of meerschaum pipes. Meerschaum, though popularly supposed to be made from the froth of the sea, is, in reality, a fine clay, found principally on the coasts of the North sea, and is composed of hydrate of magnesia combined with silex. It is easily and cheaply imitated.

There were six American exhibitors in this class. The beautiful skeleton leaves of Mrs. Hanxhurst, the meerschaum pipes of Kaldenberg & Sons, and the wax flowers of Mrs. Bloodgood, were excellent specimens of conscientious and thoughtful skill.

GROUP IV.

CLOTHING—INCLUDING FABRICS AND OTHER OBJECTS WORN ON THE PERSON.

CLASS 27. COTTON YARNS, THREADS, AND TISSUES.—CLASS 28. FLAXEN AND HEMPEN YARNS, THREADS, AND TISSUES.—CLASS 29. COMBED WOOL AND WORSTED YARNS AND FABRICS.—CLASS 30. CARDED WOOL AND WOOLLEN YARNS AND FABRICS.—CLASS 31. SILK AND SILK MANUFACTURES.—CLASS 32. SHAWLS.—CLASS 33. LACE, NET, EMBROIDERY, AND TRIMMINGS.—CLASS 34. HOSIERY, UNDER-CLOTHING, AND MINOR ARTICLES.—CLASS 35. CLOTHING FOR BOTH SEXES.—CLASS 36. JEWELRY AND ORNAMENTS.—CLASS 37. PORTABLE ARMS.—CLASS 38. TRAVELLING AND CAMP EQUIPAGE.—CLASS 39. TOYS.

The articles included in this group are of vital importance to nations, constituting, indeed, the most active source of industry and wealth. There is hardly a country in the world that is not, in our days, affected by the interests radiating from the cotton trade; yet it is hardly more than a hundred years that cotton goods were regarded as a luxury. It was known long before having been introduced into Europe as a produce of India, in the time of the Romans, but the earliest traces of the employment of the raw material do not go beyond the sixteenth century. The manufacture at that time was almost exclusively French, the cotton being obtained from the Levant. In 1770 the consumption of raw cotton in France was only 1,600 tons a year. In England it had reached 2,500 tons; though the manufacture had been introduced later, it had already made more rapid progress. In that year America sent to Europe her first venture in raw cotton. It was a ton! Before the rebellion, in 1859, that is, in 90 years, the export from America had reached the incredible quantity of 600,000 tons.

Since that time cotton has been cultivated in almost every quarter of the globe, and with more success than could have been anticipated. Owing to this circumstance the production of cotton goods was barely interrupted by the war.

The English manufacture in 1865 was of a value of more than £80,000,000 sterling, of which £52,000,000 were exported. The quantity of cotton consumed by all the other countries of Europe and by the United States, collectively, was about one-fifth more than that required for Great Britain alone, where nearly a million of persons are employed in this branch of industry.

It was natural, under these circumstances, to have anticipated a large display in the British section; but those who had this idea were doomed to disappointment. There were but 30 exhibitors, against 210 in France. Even these 30 made but an indifferent effort at display. "The exhibition of British cotton goods," says Mr. Murray, in his official report, "was chiefly remarkable, as to its contents, for the absence of many important and essential departments; and as to its arrangements, for the absence of the practical common sense one is accustomed to expect in connection with that large and active manufacture. The goods were, for the most part, in glass cases, where they could neither be seen to advantage nor tested by the touch. The display was mute and useless to the practical visitor, and quite unattractive to the general public. Among the absentees were nearly all the leading houses of the trade."

The Scotch manufacturers entirely abstained from making a display, and thus several lighter branches of the trade were entirely unrepresented. There were no plain or printed muslins, no Jacquard muslin curtains, no muslin linings, no ginghams, no handkerchiefs. Even from Manchester, whence the principal exhibitors came, most of the leading branches failed to appear. Yarns, with a single exception, were conspicuously absent. Calico, of which England exports £23,000,000 worth a year, was represented only in one branch. Fine shirtings, another immense branch, and that of prints, of which she spreads far over £16,000,000 over the world, declined to appear with remarkable unanimity. Excepting the articles of sewing thread, which was well represented, and of which the exports are £750,000, and the calicos just mentioned, the Manchester exhibition consisted of a few minor branches, in most cases imperfectly represented, which, as exports, do not sum up, altogether, a million a year. This remarkable absence is ascribed to the operations of a tariff, which maintains a protection of 10 to 20 per cent. against British goods.

The French display of all kinds of cotton goods contrasted with that of England, greatly to the disadvantage of the latter, not only in completeness and arrangement, but in the particular that everything was left open, to be touched and examined by all comers.

The Swiss collection was well arranged and attractive, especially in the particular of Turkey red. A conjunction of favorable circumstances, plenty of pure water, cheap labor, and steady, determined industry, have given the Swiss the lead of the world in this branch. Cheap, but well printed and effective calicos, were also exhibited by several firms, competing successfully with the best goods of the same class in the French department.

Germany has many exhibitors. The most remarkable of the cotton goods were those intended for men's clothing, imitating woollen cloths, of which Armitage showed various specimens intended for the American market. Some excellent specimens of velvet and velveteen were also sent by the Power Loom Company of Linden.

Belgium occupied a very important position, and held her own against all competition with true gallantry. The quiltings and piqués were the most successful articles in the display. The calicos were both good and cheap, and cloths for men's clothing similar to those exhibited in the German court were plentiful.

There were four American exhibitors in this class.

Mr. Murray, to whose report we have already made reference, concludes his survey with these frank words:

"Few practical and reflective observers will glance, even as hurriedly as we have done, round these competitive displays of industrial ability in cotton manufacture, without feeling, however long and largely England may retain the leadership, anything like an extensive empire or undisputed sway in the cotton trade is no longer possible. The superior education of continental workmen in certain branches, or the better position of foreign merchants in regard to certain articles, already reduce us (England) to a secondary position in some respects. If, in all countries, as excellent a system of public education and as independent a spirit prevailed as in Switzerland, our position would soon be menaced in many more directions. These exhibitions of the rapidly developing powers of so many rival centres of production must quicken our efforts, by education, by political development, by co-operative interests, by every means in our power, to bring every latent energy of our population to bear in maintaining our position. While we are hovering round the question of national education, and hesitating over the petty interests of parties in regard to it, the industrial sceptre is imperceptibly slipping away from us; and, with practical obtuseness, we shall refuse to see it till the fact is accomplished and it is too late to mend."

CLASS 27.—COTTON YARNS, THREADS, AND TISSUES; AND CLASS 28.—FLAXEN AND HEMPEN YARNS, THREADS, AND TISSUES.

The following statistics relating to classes 27 and 28 are extracted from the official catalogue:

The districts in France where these yarns and fabrics are manufactured may be divided into four groups: 1. The Haut Rhin and Vosges, whose centre is the town of Mulhouse, produces all these articles, but particularly the more common sorts, such as calico, cambric, muslin, jaconet and prints. 2. Normandy, which comprehends the departments of the Seine Inférieure, Calvados, and Orne, and in the towns of Rouen, Flers, Condé-sur-Noireau, Evreux, &c., are maufactured cotton cloths, handkerchiefs, jeans, prints, checks, and other articles, in which the price of the cotton employed bears a large proportion to the cost of the manufacturer. 3. In the group formed by the departments of the Nord, Aisne, and Somme, containing the towns of Lille, Roubaix, St. Quentin, and Amiens, are principally to be found manufactures of cotton yarn for net and lace of thin fabrics, figured muslin, curtains, and cotton velvet. 4. Tarare produces tarletan, muslin, and embroidered muslin curtains; Roanne, colored fabrics, and checks. The cotton employed by the French manufactories for the last forty years has been almost completely derived from the United States of America, which produced yearly from 700,000,000 to

1,000,000,000 kilograms. This market has been entirely closed for the last four years. India, China, Egypt, the Brazils, and the coasts of the Mediterranean have developed their production during this time, and have alone furnished cotton to the whole world. The price of middling New Orleans cotton, which, before the war, was 1 franc 80 centimes the kilogram, rose in 1864 to 7 francs, and is now worth 3 francs 40 centimes. Good Indian cotton costs, generally, about a franc less per kilogram.

Machinery has everywhere replaced manual labor in the cotton spinning trade, which employs more than 6,250,000 spindles. The weaving is also, in a great measure, done by machinery, especially that of the more usual articles of consumption. In the departments of the Haut Rhin and the Vosges, where 50,000 looms are employed, about 9,000 only are worked by hand. Hand weaving is still maintained for the manufacture of those fabrics which, subject to the changes of fashion, demand great variety of style and pattern, such as the thin tissues of St. Quentin and Tarare, piqués for waistcoats, and the other miscellaneous articles of the department of the Seine Inférieure. Machinery, by reducing the prices of the productions, and thereby enlarging the demand, employs a greater number of workmen than did the hand-looms. About 80,000 power-looms and 200,000 hand-looms are worked in France. In those departments where machinery is principally used the workmen work together in large manufactories; where, on the contrary, hand labor predominates, the weavers usually work at home. About 600,000 hands are employed in the cotton trade and are mostly paid by the piece. Out of this number about 200,000 work in their own dwellings.

The produce of the cotton trade is sold in the central towns of the different manufacturing districts. Mulhouse is the market of the eastern department, while Rouen is that of the western. There are also smaller markets: Flers for jeans, Amiens for velvets, St. Quentin for piqués and figured muslins, and Tarare for tarletans and embroidered muslins. Most of the manufacturers have a depot at Paris, sometimes dealing directly with the public and at others through the medium of a large wholesale house. This makes Paris one of the principal markets of the cotton trade.

The importation of cotton from different sources during the year 1866 amounted to 120,000 tons, of the estimated value of 420,000,000 francs. The yarns and woven fabrics produced amounted to 105,000 tons, of the value of 800,000,000 francs, the cost of manufacturing which may be set down at 320,000,000 francs. The export was 21,000 tons.

The committee of admission of this class make the following reports upon the progress of the cotton trade in France during the last 12 years:

"1. All the machinery employed in the preparation and spinning of cotton has been much improved. For the old spinning machinery have been substituted self-acting machines which make thread of all sizes from No. 1 to No. 200, the first measuring 1,000 metres and the second 200,000 metres to the pound.

"2. The almost universal use of power-looms in the manufacture of heavy fabrics, the invention of the fast-working looms, throwing the shuttle no less than 240 times a minute, and making from the coarsest to the finest fabrics; the bringing into general use of sizing machines.

"3. Numerous improvements in the details of cotton printing; the employment of new colors; the introduction of new machines which, receiving between their rollers a white material, deliver it up printed in ten or twelve colors. During the last 12 years the French manufacturers have renewed their machinery, and well-organized mills, which were the exception in 1855, have now become the rule. The treaties of commerce which have led to a wholesome rivalry with foreign countries have accelerated this improvement. The employment of Indian cotton has necessitated a change in the machinery, and permits the use of part of the raw produce which was formally rejected, leaving but small amount of waste.

FLAXEN AND HEMPEN YARNS, THREADS AND TISSUES.

"The linen trade comprises the preparation, spinning, and weaving of various textile materials, such as flax, hemp, jute, China grass, &c. We have only to treat here of the spinning and weaving of these fibres from which are made cambric, lawn, coarse and fine linen of all kinds, damasks, diapers, and various tissues of thread mixed with cotton and silk.

"The principal seats of the French linen trade are: Lille, Dunkirk, Boulogne-sur-mer, Amiens, Abbeville, Valenciennes, Cambray, Chollet, and Lisieux. Hempen fabrics are made especially in the departments of Sarthe and Finistère. Lisieux and Noirmoutier are famous for white sheetings. Flax, hemp, jute, and China grass are grown in various countries. The flax used in France comes principally from the north of France, Belgium, Picardy, and Normandy. The flax grown in the department of the Nord and in the environs of Bernay (Eure) is of superior quality, but not equal to that produced near Courtray in Belgium. Russia also supplies us with pretty good flax, but which can only be employed for the lower numbers of yarns.

"Flax is very variable in price, but we may take 1 franc 70 centimes the kilogram as about the average price of No. 30 of good current quality. Flax is cheaper than hemp; the best kinds come from Picardy and Champagne. The average price of heckled hemp is about 90 to 120 francs. Jute comes from the East Indies in large quantities; its price for some time has been about 45 francs the 100 kilograms. China grass, the name of which indicates its origin, is a textile fibre which is likely in future to become of considerable importance in our trade. The methods of preparation and working are very nearly the same for all kinds of textile matters. The plant is first submitted to the operation of rotting, which is generally performed by allowing it to soak in water or to expose it on the ground until the gummy matter which it contains is dissolved. Next comes the operation of beating, the object of which is to separate the fibres from the rest of the plant. These two operations belong to agriculture. The spinners of flax and hemp purchase their materials of salesmen who travel about the country and act as middlemen between the farmers and the spinners. These materials are ready to be submitted to the operations of the spinning mills, from which manual labor may be said to have been banished entirely, except in the case of yarns of exceptional fineness used for the production of cambric.

"The number of spindles has increased from 90,000 in 1842 to 600,000 in 1865. Power-looms are being substituted more every day for hand-looms, as allowing of a more rapid and economical production. Of the whole number of persons employed in the flax and hemp mills two-thirds are women; but in power-loom weaving the proportion is only about one-half. In each case the female work-people gain 2 francs to 2 francs 50 centimes per day, and the men 2 francs 50 centimes to 4 francs. The organization of the linen trade is now very powerful in France. Some large manufacturers sell their goods directly to retail dealers or agents. The business increases daily in extent, and the importation, especially of table and toilet linen, has become insignificant. The prices of the various kinds of fabrics are extremely various; very low for certain qualities and certain widths, and very high for the finer sorts and widest kinds. Linen cloth, for instance, varies from 80 centimetres to 3 metres in width, and in price from 75 centimes to 15 francs. The manufacture of linen or hempen cloth and jute tissues has increased largely during the past few years, as the following figures show: The imports of flax and tow, which were only 19,200 tons in 1862, had risen to 48,000 tons in 1865. The importation of raw jute rose from 6,300 tons in 1862 to 10,650 tons in 1865. On the other hand, the exportation of heckled flax and tow fell off from 7,037 tons in 1862 to 6,068 tons in 1865, while the exports of yarns rose from 497 tons in 1862 to 2,374 tons in 1865. The exportation of plain linens rose from 2,054 tons in 1862 to 3,254 tons in 1865. It must be added that these results were principally due to the cotton crisis; but they owe something also to the improvements made in the machinery employed in its manufacture. Some very happy modifications have been introduced of late years into the machines employed in combing flax and preparing tow. In weaving, as we have already said, self-acting power-looms are replacing those worked by hand, and thus the quantity produced has been increased while the cost of labor has been diminished. Some very important establishments for spinning and weaving have been set on foot. It is right to add, in justice to the linen trade, that most of the great works are constructed and arranged in the most favorable conditions with regard to the welfare of the work-people employed in them."

CLASSES 29–30.—COMBED AND CARDED WOOL AND WORSTED YARNS AND FABRICS.

These two classes, embracing the most extensive and ancient form of industry known to the world, were represented competitively by all the manufacturing countries of Europe and by seven exhibitors from the United States. The range of articles being very large the display was naturally of great importance, particularly to experts. As a matter of interest to the eye it was unattractive, and there was little in either class that could engage other than a technical pen. Coats and pantaloons in the concrete have no innate charm, and wool and worsted, although comfortable to wear, are unsuggestive in a literary point of view. It will be readily understood that this manufacture does not admit of much scope for artistic design. It depends on a successful blending of colors and an ascertainable degree of perfection in texture and finish. The French excel in fine and fancy articles; the English in plain tissues; and the German and Belgian makers in imitations, having cheapness for their main end. During the past ten years shoddy has come greatly into use, and it is said that as much as 60 per cent. can be employed advantageously in cheap materials. Shoddy is the woolly part of old garments cleaned and prepared by processes that are daily being improved. By utilizing material that was formerly cast away as waste, great progress has, of late years, been made in the production of cheap cloths.

We give below the following details of the trade in France:

"Class 29 includes: 1. Combed wool; 2. Woollen yarns combed and carded; 3. Tissues of pure combed wool; 4. Flannels and fancy stuffs of carded and slightly fettled wool; 5. Tissues of wool mixed with other materials.

"The principal centres of production for these articles are: Rheims, Roubaix, St. Quentin, Amiens, Mulhouse, St. Marie-aux-Mines, Rouen, Fourmies, and Le Cateau, in the Nord; Guise, in the Aisne; and, lastly, Paris.

"In 1855, French wool held a more important place in the supply of our manufactories than it does at present. At that period, but little was known of Australian wool, of which 23,000 tons was imported in 1865. On the other hand, the imports from Belgium, Spain, Germany, Turkey, Algeria, La Plata, and other countries have not diminished in importance; they amounted, during the same year to nearly 50,000 tons. It is Australia, however, which has principally met the increased demands of our trade. These various wools are now combed and woven by admirably constructed machinery; the weaving of woollens by power-looms, which was scarcely tried in 1855, has acquired of late years, and particularly since 1862, a rapid development, and is increasing daily. Still, hand weaving has not diminished in importance; but it has remained nearly stationary; and the increase in production is due to the employment of mechanical means.

"The situation of the work-people employed in the manufacture of woollen fabrics is improved. Those engaged in combing and spinning works have not suffered from want of work, and their wages are generally high. The same has been the case with the power-loom weavers; but in spite of the importance which power-loom weaving has already assumed, the number of power-loom weavers is still very inferior to that of the weavers who work by hand at their own houses; and, in the 'Aisne,' the proportion of the former to the latter does not exceed five per cent. The proportion of women employed in combing and spinning, as well as in the weaving of woollen fabrics, whether working in factories, or at home, varies greatly according to local conditions; it may be safely estimated that it amounts to one-half in some places, and two-thirds in others. Nearly all the woollens, whether pure or mixed, manufactured for consumption in France, are adopted by other nations; the prices have been much reduced since 1855, in spite of the maintenance or the increase in price of the raw materials. The growth of the manufacture has been very favorable to the maintenance of the quotations with respect to these matters; but the same development has often, on the contrary, produced a depreciation in the value of the manufactured articles by the superabundant supply. Thus, the manufacturer has been compelled to look for his profit in the continual improvement of his methods and industrial processes. To this frequent over supply, and consequent increase of the stocks, must also be attributed the incessant efforts of the manufacturer to place himself in direct communication with the retailer and the exporter, and thus avoid the middleman.

"The home and export trade, and the means of production have grown rapidly. In 1855, the imports of raw wool only amounted to 68,000,000 francs; while, in 1865, they reached 247,000,000 francs. The exports of woollen of all kinds have followed the same rapid course, having risen from 165,000,000 francs in 1855 to 396,000,000 francs in 1865, in which amounts yarns and stuffs of combed wool represented 279,000,000 francs. Remarkable improvements have, moreover, contributed since 1855 to the development of the production and exportation. New methods of combing and spinning; ingenious means of facilitating the work of the operative or the machinery; the application of the products of aniline as coloring matters; and lastly, the introduction into France of new methods of dressing, have enabled the manufacturers of combed wool to make successive reductions in the price of their fabrics, while losing none of their superiority.—*From the translation of the Introduction to the Class by Gustave Larsonnier.*

CARDED WOOL AND FABRICS.

"The products exhibited in class 30 form four principal series:

"1. Black and colored broadcloths, livery cloths, billiard and coach cloths, black satin cloths, eider-down cloths, and castors.

"2. Fancy paletot and ladies' cloths.

"3. Fancy trouserings.

"4. Articles for jackets and fancy suits. These productions are manufactured in five great groups in France:

"1. The group of Normandy, the centre of which is the town of Elbeuf, and which includes the departments of the Seine Inférieure, Eure, and

Calvados. The towns of Elbeuf and Louviers produce nearly all the descriptions of goods cited above. Vire, Lisieux, and Romarantin produce cheap fabrics especially, such as pilot cloths, fancy trouserings, and velvet cloths for ladies' mantles.

"2. The Ardennes group, the centre of which is Sedan, and where are manufactured principally the black tissues, such as satin cloths, cashmeres, eider-downs, fancy paletot cloths, and ladies' velvet cloths.

"3. The Isère group, of which the centre is Vienna, and which produces mostly low-priced goods for trousers, paletots, and complete suits, as well as ladies' cloths.

"4. The Haut Rhin and Moselle group, the centre of which is the town of Bischwiller, and which produces satin cloths, paletots and black fancy cloths; the coarse stuffs for country wear are principally made at Nancy.

"5. The southern group, comprising the towns of Carcassone, Mazamet, Saint Pons, and Bedarieux, which produce generally all the kinds of cheap goods mentioned above. The town of Chateauroux, which supplies the cloth for the army, may be added to this group.

"The wool employed by the French manufacturers is indigenous or imported from Germany, Australia, Russia, Buenos Ayres, and Spain. The price of washed undried wool varies from 5 francs to 12 francs. Mechanism has been almost everywhere substituted for hand labor; hand-loom weaving is only now employed in the manufacture of articles in which the designs following the caprices of fashions demand great variety. Of these articles are the stuffs for trousers, paletots, jackets, and ladies' clothing. Mechanical labor, by reducing the price of the goods, induces large consumption, and, consequently, the employment of more workmen. It may be estimated that the labor and the general expenses, taking the average of winter and summer clothing, adds one-third to the cost of the raw material. Where steam power predominates, the operatives work in the factories; where, on the contrary, hand labor is still employed, the majority work at home; in both cases they are generally paid by the piece. About two-thirds of the whole of the work-people are engaged in factories; the proportion of women employed is about two-fifths. The manufactured goods are sold in the various centres of the trade. Elbeuf is the great market of the western department, and after it comes Sedan, Louviers, Vienna, Lisieux, Vire, and Bischwiller. Generally the large manufacturers sell their products directly to large houses of business in Paris and the departments; the latter send their travellers through France and other countries to dispose of the goods.

"The great mass of the wool used in the making of cloth comes from abroad. French wool is principally employed for common fabrics. The export, in 1865, amounted to 5,500 tons, of an approximative value of 71,000,000 francs. The annual production of France is about 250,000,000 francs.

"The committee of admission of class 30 notice, among the improvements which have taken place in the trade, during the last 12 years—

"1. The washing of wool by machinery.

"2. The improvements in the machines used in the preparation of the wool, such as beating, teaseling machines, &c., which allow of the use of wool from all sources; the new system of cards and of looms.

"3. The almost universal employment of power-looms for weaving broadcloths, satins, paletot and fancy cloths. Power-looms with several shuttles are yet but little used for weaving fancy cloths.

"4. In scouring and fulling, the conjunction of steam-engines with hydraulic motors, to prevent the works being brought to a stand-still during very dry seasons.

"5. In dressing, the employment of machines in place of hand-beaters and mechanical tenter frames."—*From the Introduction by Vanguelin to Class* 30.

In the United States section the principal exhibitors were the Webster Woollen Mills of Massachusetts, which sent broadcloths, doeskins, castors, and muskowa; the National Association of Wool Growers, John L. Hayes, secretary; and the Mission Woollen Mills, San Francisco, California. This establishment made a very fine exhibit of cloths, cassimeres, and flannels, and particularly of blankets. The following descriptive notice of the Mission Woollen Mills in California is extracted from the Commercial Review of the Pacific States for 1866:

THE MISSION WOOLLEN MILLS.—CALIFORNIA.

"The Mission Woollen Mills are located at the head of Mission creek, in the southwestern portion of San Francisco. With the exception of a very large two-story stone warehouse, used for the storage of wool, all the mill buildings are of wood. The grounds used comprise some 10 acres, a portion of which, probably three acres, is covered with the different buildings. The mills were first put in operation in the autumn of 1860, starting with a capacity equal to the employment of 40 men. The works have been increased until, at the present time, running night and day, they employ 400 operatives, 300 of them being Chinese. In 1865, these mills consumed 1,200,000 pounds of wool, which was manufactured into 32,000 pairs blankets, nearly 500,000 yards of flannels, and over 100,000 yards of cloths, cassimeres, tweeds, and cloakings. Since then the machinery has been increased, and the estimated consumption of wool for 1866 is set down at 1,900,000 pounds. The business sagacity of the proprietors of these mills has made them keenly alive to improvements in machinery, with which they have supplied their works as soon as known. The present working power of the mills consist of two engines, each of 150 horse-power, which drive 11 sets of cards, 4,000 spindles, and 50 broad-power looms, which will be soon largely increased. To give some idea of the extent of their manufacture, we may say that, during the month of August, there were completed from the raw wool to the finished cloths 15,270 yards cassimeres, tweeds, and cloakings, 35,475 yards flannels, and 6,270 pairs blankets. The Mission Woollen Mills were the first on the Pacific coast to manufacture varieties of woollen goods, besides blankets. Their blankets (in common with the Pioneer Woollen Mills) have made a reputation for California manufacturers the world over, wherever known, they exceeding in fineness of wool and finish the best blankets made in Europe. One feature in the working of these mills in San Francisco is the employment of Chinese operatives, who, being intelligent and industrious, at low wages, enable successful competition to be had against white labor in the manufactories of the eastern States and Europe. Without this cheap labor, mill-owners state that they would be unable to manufacture with profit. Very large quantities of goods are shipped to Montana Territory, where they are preferred to the manufactures of eastern mills, which pay less freightage by way of the Missouri river."

CLASS 31.—SILK AND SILK MANUFACTURES.

"The material exhibited in class 31 may be divided into three principal sections: silk and yarns, silk tissues, and ribbons. The first section includes silkworms' eggs, new and dried cocoons; raw silks; thrown, unbleached, and dyed silks, designated by the names of weft, organzine, grenadine, &c., for the manufactures of tissues; twisted silks for sewing, embroidering, hosiery, trimming, guipure, and lace, and waste and floss silk; and these last products carded, combed, and spun into single, double, twisted, unbleached, and dyed yarns. The silk tissues include velvets; plain and figured stuffs for dresses and furniture; bolting tissues; tissues for men's and women's hats; sarcenet and lutestring for linings; plain and printed foulards for dresses and handkerchiefs; shawls, neckerchiefs, and cravats; crapes and tulles. The ribbons comprise plain and figured ribbons; galloon, binding, and trimming for dresses and bonnets.

"The principal centres of production are: for the spinning and throwing of fine silk the departments of Ardêche, Drôme, Gard, Herault, and Vaucluse; then come those of Isère, Var, the Lower Alps, Rhône, Bouches du Rhône, and Tarnet Garonne. The strong silks that are imported raw from abroad, and especially from Persia, China, and Japan, are manufactured in the departments du Rhône, Gard, Loire, and Indre et Loire; and above all in the departments of Oiseet Ere, from whence the Paris manufacturers mostly supply themselves. The principal spinning mills for waste silk are in England, Switzerland, and France. For stuffs, Lyons and its environs; then Tours, where the furniture stuffs are principally manufactured. For ribbons, binding, and galloon St. Etienne and St. Chamond. There are also a few manufactories in Moselle and Haut Rhin. The cocoons used in the French spinning mills were almost entirely supplied by the silkworms of the fine breed of France; but, since the year 1863, an almost universal epidemic has successively attacked the silkworms in every part of the world. To remedy these disasters eggs have been imported from those countries in Europe where the disease had not penetrated, and afterwards from the east, to which is due, in a great measure, the improved result of the last few yields. Before the invasion of the disease, from the year 1846 to 1852, the average yield in France was generally valued at 24,000 tons of cocoons, producing 2,000 tons of silk, and representing a sum of about 120,000,000 francs. After the appearance of the disease the amount fell to one-half, to one-third, to one-quarter; and in 1865 they had become reduced to one-fifth of the ordinary yields. The average price has risen from four to six francs, and has even surpassed the latter sum. The effect of this is, of course, to raise the price of the silks, which are employed according to their qualities. Thus the silks of France and Italy, and of the Broussa and Syrian spinning mills, are used to make the best tissues, plain and figured. The silks of Japan, China, Bengal, and Persia are employed, according to their sizes and worth, in the manufacture of plain and figured tissues of current qualities, in making foulards, and sewing and embroidering silks.

"Machinery is everywhere rapidly replacing manual labor in the spinning and working of silks; machines are substituted for hand-work, even for twisting and sewing silk, which was formerly done only by hand. The silk goods, properly so called, are always woven by hands. In the manufacture of foulards, and of nearly all the stuffs which can be woven with raw silk, the power loom has replaced the hand loom for weaving as well as for the warping and other processes. A great many attempts have been made to use machinery in the manufacture of the stuffs which are woven with prepared silk, and they have been successful for the light satins, which are dressed, and to a certain extent with the black silks of light quality. At St. Etienne manual labor has been continued in the ribbon trade, while the power loom has been adopted for the galloons and bindings. One or two manufacturers in Haut Rhin are using machinery for plain ribbon-making with some success.

"The cocoons are spun and the silk prepared in the south of France by women and girls, who work by the day in workshops belonging to a principal, under the superintendence of foremen. The system is the same for the winding off by machinery, but when the winding is done by hand, the people work at home and by the piece. The twisting is generally done by men. For the silks, the organization of the workshops varies according as the weaving is done in the towns or in the country, in private workshops or in manufactories. At Lyons, for example, the material prepared for weaving is delivered by a manufacturer to the master of a workshop who possesses a certain number of looms. This latter furnishes the premises, the looms, and all the tools necessary to the manufacture; then, for the hire of the workshop and the looms, he retains from the weavers the half of the price of manufacture paid by the manufacturer. In the country the manufacturer treats directly with the weavers; he furnishes all the implements to the workmen who work at home, and pays them 55 per cent. on the price given at Lyons. The salaries for the work done in manufactories are from 45 to 50 per cent. lower than those of Lyons, the premises being supplied by the manufacturer. The workmen are always paid by the piece. The fresh cocoons, silks, and waste are sold at the various centres of production.

"Marseilles is the great market for dyed cocoons as well as for the silks and waste imported from abroad; Lyons, for the fine silks of the south of France and Italy; Paris, for the foreign strong silks, unbleached and dyed; Paris and Lyons, for the spun waste. As regards the manufactured products, it is Lyons, St. Etienne, and Paris which supply England, America, Germany, Belgium, Russia, Turkey, Spain, all those countries, in a word, which employ silk tissues. The importation of all the productions from silkworms' cocoons, raw and thrown silks, floss silk, in hanks, and spun, &c., is estimated for the year 1865 at 297,000,000 francs, and the exportation of the same articles at 126,000,000 francs. The importation of silk tissues and floss silk, ribbons included, of all productions for the year 1865, were upwards of 10,000,000 francs. The exportation of the same articles amounted to 400,000,000 francs.

"The committee of admission for class 31 point out among the improvements realized in the silk industry since the year 1855:—1. As regards silks and waste, considerable improvements in the spinning and twisting machines: 2. As regards tissues, a more intelligent use of the very varied materials which the rarity of our beautiful silks of France and Italy have forced us to have recourse to:—3. The new process of dyeing by the application of colors with aniline and fuchshine bases; new processes for printing on warps and foulards; and, finally, the improved systems of figuring silks." *Report of the Committee of Admission.*

The beautiful fabrics exposed in this class exhibited, perhaps, to the best advantage the skill and taste employed in French manufactures, relatively, too, in the manufactures of other countries, for there were silks from all parts of the world. But France unquestionably maintained her rank as the foremost among the producers of these attractive articles. The exhibition was unusually large and interesting. It commenced with the cocoon and ended with the finest triumphs of the loom. Specimens were also shown of vegetable silk produced from a bulb which is common at the Cape of Good Hope. Wild silk is abundant in India and China. It is produced by an insect like a caterpillar, which forms the cocoon in a shrub, yet it does not die there, but escapes and becomes a butterfly. Though, in many respects, totally different from the silkworm, the silk is much prized on account of its strength.

The principal exhibitors of raw silks were France, Algiers, Italy, Austria, Spain, Portugal, Russia, Turkey, India, and Victoria. The spinning of silk is becoming more and more a manufacturing industry, and everywhere large spinning mills are being erected, worked by steam power. Some of the best specimens in the French department were from Ardèche; in the Italian, from Milan. Austria, too, had a good exhibition. The Russian silk is produced in the Caucasus.

The fertile imagination of French designers, stimulated by the means placed at their disposal in the new colors obtained from aniline and other chemical products, has given a fresh impulse to the silk trade, and led to very beautiful results. In appropriateness of design, happy contrast of color, and excellence of fabrication, the French silks were admittedly the best on exhibition.

Switzerland had a good display of light and low-priced silks. They were of the simple kinds that find a market everywhere. An excellent feature in Swiss silks is the extreme beauty of color, and the fact that the lightest and most delicate tints are altogether unaffected by the touch of the hand or the impurities of the atmosphere.

Italy had a large exhibition, including the famous Genoa velvet, and much fine silk brocade and tapestry.

Austria displayed tapestry silks of great beauty. Spain sent some fine specimens from Valencia and Barcelona. Tunis exhibited good tissues of silk and silver. India had some rich samples of silk tissues and silk with gold and silver. Russia had some excellent silks, from Moscow; and Prussia and the Zollverein made a fine display of silk velvets and ribbons. The British display was good in certain heavy specialties, such as moire antiques, &c., but in other respects it was meagre. A novelty was exhibited in this section. It consisted of a material for curtains, composed of silk and fine threads of glass, woven in the usual way, and producing a very charming effect; it is called *tissues de verre.* In general respects there was a marked inferiority in British silks, and a notable falling off since the exhibition of 1862.

There were two exhibitors in this class from the United States.

CLASS 32.—SHAWLS.

"Class 32 comprises figured shawls of all kinds—that is to say, Cashmere shawls, woollen shawls; shawls of wool, cotton, and spun silk, mixed, and silk shawls. The shawl manufacture exists in but three districts of France—Paris, which makes, or causes to be made elsewhere, rich, middling, or cheap shawls; Lyons, which produces chiefly shawls of moderate and low price; and Nimes, which manufactures cheap shawls only. The greater part of the shawls sold in Paris are produced in Picardy, chiefly at Fresnoy-le-Grand, at Bohain, and in the environs of the latter place. The Parisian makers have always maintained a *bona fide* superiority in the manufacture of rich shawls, by means of their taste and inventive spirit; and we may say that all the happy innovations which have perfected the invention of Jacquard are due to Paris. The designers of Paris enjoy a well-earned reputation. Foreign countries which manufacture shawls, such as England and Austria, obtain their patterns and even have them placed on cards in Paris, especially for shawls of a certain price.

"The materials which enter into the manufacture of shawls are: The Cashmere hair, which comes by way of Russia, and is principally obtained in Thibet from a peculiar variety of goat; wool of various countries, but particularly of Germany; raw silk, or the organzine of the south of France; spun silk, and even cotton. The price of the yarns made with these various materials, and used in the shawl manufacture, varies from 10 to 70 francs the kilogram. The weaving of shawls is performed by the Jacquard loom, which has been greatly improved since the time of its illustrious inventor. The shawl manufacturers, in the first place, have their designs produced either in their own establishments or out of doors. The pattern, once settled, is put on the cards by the designer, revised, and handed over to the reader. This latter operation, which is generally performed by special workmen, consists in translating, as it were, from the design-card to the cards of the machine, each of which represents one of the little squares of the former and each of the colors which has to be produced in the loom. For the weaving, the workman or the foreman receives the warp, dyed or prepared, and also the material for the weft. When the shawl is woven it is handed over to the dresser, who cuts it, shears it by mechanical means, and finally washes and dresses it. The rich shawl is the type of all the other classes. It is generally woven on a warp called cashmere, but composed of a thread of Cashmere twisted with a thread of organzine or of raw silk; the weft is of pure Cashmere, of excellent quality. The manufacturers of rich shawls are, and must always necessarily be, the originators of new types as regards design and colors; it is upon this condition only that they can obtain a remunerative price for their productions. Their novelties are usually copied by the producers of inferior shawls, and, finally, by the makers of low-priced articles.

"The persons employed in the shawl manufacture consist of foremen, heads of shops, designers, composers, carders, readers, warpers, and wefters; a few women are employed in the weaving shops. The greater part of the shawl weavers work at their own houses; they generally employ workmen, to whom they give two-thirds of the price they receive from the manufacturer. In Paris these master weavers are the proprietors of their looms, but in Picardy they generally possess only the framework of the loom, and not the Jacquard machinery and accessories. The wages of the weavers are not very high. Those who possess their own looms may earn, in Paris, from 5 francs to 5 francs 50 centimes per day; the under weaver earns from 3 francs 50 centimes to 4 francs per day; the boys and girls employed as assistants earn from 1 franc to 1 franc 50 centimes per day.

"The shawl manufacturer sells directly to the retail dealer, who sells the shawls again in the same state in which he receives them. The prices of French shawls are very various; they range from as low as 12 francs to the most elevated rates; certain long shawls, for example, sell for 1,000 francs, and square shawls from 400 to 500 francs. The export trade is carried on through the medium of commission agents, or directly with the representatives of foreign houses, who come over and buy in the markets of Paris, Lyons, and Nimes, and sometimes, also, by travellers representing the producers abroad. The value of the shawl trade in France may be estimated at 20,000,000 francs per annum. Paris alone furnishes about 15,000,000 francs' worth, and sells nearly a quarter of this amount to foreign countries, especially to North America, Belgium, Germany, and England. Very promising attempts have been made, since 1855, to substitute paper for cardboard in the pattern, which would make a notable reduction in the heavy expense of reading, in order to weave by steam-power a stuff which would rival, in relief and color, the shawl of India."—*Translation of the report of Mr. Herbert, jr., member of the committee of admission of class* 32.

The shawl is, perhaps, the most universal article of dress in the world, and, from its extreme beauty, is an object of admiration in all countries. It is the perfection of eastern skill, and years were often consumed in the manufacture of a single cummerbund or scarf for the waist. Shawls were intended for the male sex, but the fairer portion of creation quickly appropriated an article which possessed such manifest attractions. In the east the shawl is still a principal article of dress—on the head as a turban, and over the head as a hood; twisted round the neck, folded round the shoulder, or wrapped round the waist as a girdle; at times forming the entire dress, and at other times being but an adjunct of luxury, falling in graceful folds on the person; in every way it is suitable, becoming, and popular. The shawl used for the turban is of extreme length, often as much as 60 yards.

The finest shawls are still made, as of yore, in the beautiful valley of Cashmere, the Oriental Eden, which is shut out by precipitous mountains from all surrounding countries. The Cashmerian is industrious, intelligent, and lively. It is only in Cashmere that production is organized on principles nearly akin to the economical plan of Europe. The shawl is the glory and pride of the country, nearly the entire population being engaged in its production. The goats of Thibet, from which tremendous steeps separate it on the north, supply the silky wool which alone is used in the tissue; none other can surpass—none has yet equalled—it in softness. The downy substance found next the skin, and below the thick hair, is the part employed; it is of exquisite fineness. So jealous is the Maharajah of Cashmere to maintain his reputation, that he has recently taken steps to prevent any deterioration in the quality of the shawls manufactured. The Indian display of these articles was exceedingly fine, and of great value.

Next in interest and importance were the French imitations of the Cashmere shawls—the most beautiful tissue which mere machinery has yet produced. The machinery itself is one of the triumphs of human ingenuity, producing in a few days what in the valley of Cashmere would take years to produce. The French Cashmere has none of the softness of the Indian; it has a smooth, firm texture, hard and cloth-like to the touch, without the knottiness of the hand-worked Cashmerian, and the folds which it makes are more angular; but the designs are very beautiful and the colors exceedingly brilliant and varied. In the latter respect, it may be doubted if France has not already surpassed her eastern rival. There was a magnificent display of these shawls.

Austria is also famous for its imitations of Cashmere, and made an excellent display. There is more regularity and clearness in the patterns, but the colors are neither so harmonious nor so good. Prussia and England also exhibited extensively in this class.

There were three American exhibitors.

CLASS 33.—LACE, NET, EMBROIDERY, AND TRIMMINGS.

The products comprised in this class form four distinct groups: 1. Lace made by hand, with bobbins, and with needles, including Alençon point, white and black lace, guipure, and Chantilly, Mirecourt, and Puy lace.

2. Plain, figured, and embroidered net and its derivatives, comprising machine-made silk and woollen lace, known by the name of French tulle, and net of Valenciennes, India, Lama, &c.; white silk blond; plain and figured silk net, and cotton guipure for upholstery.

3. Hand and machine-made embroidery on various tissues; embroidery on civil and military uniforms; church embroidery, and embroidery in silk and wool on canvas.

4. Trimmings of all kinds, for upholstery, religious and military ornaments, men's and ladies' garments, carriages and liveries, and fancy miscellaneous articles.

Almost every civilized country in the world produces the article called lace—the most difficult and delicate result of skilled labor. There are, however, only two or three countries that have given any original impulse to the trade. The others have simply followed in the trains of events, taking what had been done as a model, and imitating it to the best advantage. To two nations—France and Belgium—belongs the credit of prosecuting this trade with vigor. The laces of Alençon and Brussels are of so complicated a nature that each process is assigned to a different lace maker, who works only at her special department. Formerly a piece of Alençon lace would pass through eighteen hands before completion; the number is now somewhat diminished. Valenciennes lace is also of most elaborate workmanship; the pattern and ground are made together, with the same thread on the same pillow. One exhibited with the lace in progress had no fewer than 1,200 bobbins.

There is a legend regarding the introduction of this manufacture into Flanders. A poverty-stricken but pious young girl was dying of love for a young man whose wealth precluded all hopes of marriage. One night, as she sat weeping at her sad fate, a beautiful lady entered the cottage, and, without saying a word, placed on her knee a green cloth cushion, with its bobbins filled with the fine thread which on autumn evenings float in the air, and which the people call "*fils de la Vierge*." The lady, though of romantic bearing, was a practical manufacturer.

She sat down in silence, and with her nimble fingers taught the unhappy maiden how to make all sorts of patterns and complicated stitches. As daylight approached the maiden had learned her art, and the mysterious visitor disappeared. The price of her lace soon made the poor girl rich. She married the man of her choice, and, surrounded by a large family, lived happy and rich, for she had kept the secret for herself. One evening when the little folk were playing round her knee, by the fireside, and her husband sat fondly watching the happy group, the lady suddenly made her appearance among them. Her bearing was distant; she seemed stern and sad, and this time addressed her protégé in a trembling voice. "Here," she said, "you enjoy peace and abundance, while without are famine and trouble. I helped you; you have not helped your neighbors. The angels weep for you and turn away their faces." So the next day the woman arose, and, going forth with a green cushion and its bobbins in her hands, went from cottage to cottage, offering to all who would be taught to instruct them in the art she had herself miraculously learned. So they also became rich, and Belgium became famous for this manufacture.

The most recent improvement in the production of lace is the introduction of shaded tints in the flowers and patterns, giving them the relief of a picture. This effect is produced by varying the application of the two stitches used in making the flowers—the "toile," which forms the close tissue, and the "grille," employed in the more open part of the pattern. The system is successfully applied to the laces of France and Belgium, but it is in France that it has been adopted with the greatest success.

The species of lace which is peculiarly French is the "point d'Alençon," properly the "point de France," the manufacture of which was introduced by Colbert to avoid the annual importation of lace from Italy and Flanders, which in his day was employed in the dress of both sexes. A fine and very early specimen of this lace was exhibited. It was a piece of a flounce about two and a half feet long, displaying exquisite design and workmanship. It belonged in the day of its prime to the celebrated Madame de Pompadour.

The exhibition of modern French lace was of the highest order. Alençon maintained its reputation, and the black pillow lace of Bayeux was unrivalled in elegance and beauty. A dress of the former material, consisting of two flounces and trimmings, was shown, the cost of which was 85,000 francs, or $17,000 in gold. A "point" or half-shawl by the same maker was estimated at 10,000 francs.

Belgium, as a lace-producing country, is the most formidable rival of France. It was difficult to say which nation shone to the greatest advantage, but perhaps in delicate manipulation of design and ready and graceful taste the French makers were a little ahead of their energetic and intelligent neighbors. Belgium had a magnificent display of her manufactures, Brussels and Grammont, to which must still be added Mecklin, the prettiest and lightest of its fabrics, but the fashion for which has died away, and there is little made at the present time. The specimens in some cases were of great value, and all displayed the highest order of workmanship.

After the productions of France and Belgium, there was little to admire in the lace exhibition of other countries. England had some good samples of Honiton lace, but the patterns were heavy and inartistic, and detracted materially from the excellence of the workmanship.

Nottingham and Saint Pierre-les-Paris are the principal seats of the bobbin, net, and machine-made lace manufactures. Since the application of the Jacquard cards to the making of lace, many imitations of great beauty and very low price have been produced. The Calais manufacturers exhibited imitations of every kind of lace, cotton, silk, and mohair; Valenciennes, Cluny, colored laces, blondes, white and black, silver and gold. The manufacturers of Nottingham exhibited many admirable articles of the same character, and Belgium maintained her pre-eminence, closely pressed by Lyons, in the well-known article of tulle.

No particular nationalities are concerned in the production of embroideries and trimmings, of which the infinite variety almost exceeded enumeration. There were specimens from almost every quarter of the globe. Germany, perhaps, pays more attention to embroidery. There are government schools for teaching the art, and the frugal peasants of the mountainous regions practice it as a means of livelihood. Colored embroidery comes mainly from the east. In the matter of trimmings France is the centre of the trade, and sent a large display to the Exposition.

PRODUCTION IN FRANCE.

The following complete *resumé* of the productions in this Class, in France, is from the translation of the Introduction to the Class by Felix Aubry, President of the Committee of Admission.

LACE.

"Lace is generally made in the country; it takes the name of the town which is the central market, and the principal seats of its productions are: 1. Alençon, where the magnificent '*point à L'aiguille*,' (made with needles,) known by the name of '*points de France*,' are made. These laces are sometimes veritable works of art.

"2. Chantilly, Bayeux and Caen, whose products are similar, and include black silk laces of large dimension for dresses, flounces, shawls, and veils. This manufacture, particularly at Bayeux, has been brought to the highest perfection.

"3. Lille and Arras, where pillow lace is made of excellent quality, but is little used in the present day.

"4. Bayeux, which furnishes that very durable sort of lace known as Valenciennes.

"5. Mirecourt, (Vosges,) celebrated for its new creations; the productions from this locality, specially manufactured according to the exigencies of fashion, are much sought after by the general public and imitated largely in foreign countries.

"6. Auvergne, where the Puy laces and guipures are made at very low prices; the manufacture of this description of lace employs a very large number of hands, and the amount produced is enormous.

"All the raw materials used in textile fabrics are employed in this manufacture, and are spun specially for it. The flax yarn comes from Lille; the cotton from the north of France and from England. Lyons furnishes white and black silk yarn, as also the gold and silver thread; the woollen yarn (goat's hair and mohair) is spun at Bradford. The price of the raw material amounts to from six to twenty per cent. of the value of the production. Pillow lace is made on a sort of frame, very light and simple in construction, and which is held on the knees of the lace-maker. The shape of this pillow has varied little for the last 300 years, and is called a 'coussin or carreau;' it is invariably the property of the workwoman.

"The total number of lace-makers is estimated at 200,000 women and girls. They gain, on an average, 1 franc 25 centimes per day; some who are particularly skilful and industrious earn as much as 3 francs 50 centimes for 10 hours' hard work. Lace-makers are for the most part peasant women, who all, without exception, work in their own homes, often quitting their pillows and babes to attend to household duties, or to work in the fields. Lace making has the advantage of being carried on at home, and therefore not depriving agriculture of too many able hands. French lace is sold at all markets—to the United States, the Brazils, Russia, Germany, Italy, Great Britain, the East, and to India. Paris is the principal centre of consumption.

"The annual production of this trade is valued at 100,000,000 francs, but it is very difficult to arrive at any precise calculation, as lace is not only sold as a simple production, but is used in so many different ways in the several departments of trade. We may note among the recent improvements the invention of many new tinted designs and stitches, as also the production of that thick kind of lace, with the pattern in high relief, which imitates, at a comparatively low price, the old Venetian point, as well as that of Flanders and Raguse.

NET.

"Saint Pierre-les-Calais, and Calais, are the principal centres of the cotton net and silk blonde manufactories; plain, embroidered, figured, and damask silk nets are made at Lyons; figured and plain net for upholstery, at Lille; Saint Quentin and Inchy produce white cotton net, plain and figured; Amiens supplies machine-made lace in silk and mohair, (goat's hair.) Cotton, silk, and wool are employed in the manufacture of machine-made lace, as also in that of all kinds of net; the cotton comes from Lille, the silk from Lyons and England, and the wool from Bradford, where they succeed in spinning a kilogram of goat's hair into 300,000 metres of yarn. Machine-made net and lace is generally woven in manufactories by the aid of steam power, acting with wonderful automatical precision. The machinery is very complicated and expensive, and represents a value of no less than 25,000,000 francs; a great many different systems are adopted, but the most general are the pusher, lever, and circular machines.

"The manufacture of net employs about 25,000 hands, both male and female. The women earn from 1 franc to 2 francs per day, the men from 3 francs to 6 francs. The latter alone work at the machinery; the women are occupied in the preparation and arrangement of the raw materials. The net trade has made great progress in the last 10 years, thanks to the numerous improvements that have taken place in its method of production, and especially to the manufacture by machinery of silk blonde and lace. The productions of Calais and Lyons are now in universal demand, and the principal markets are the United States, Italy, Germany, Spain, the East, India, and even England—cotton and silk net, blonde and lace, made by machinery being of an infinitely lower price than hand-made lace, and is of much more general use; this section of the trade doing business to the amount of about 75,000,000 francs, yearly. Among the most recent improvements, we may point out the wonderful imitations of real silk blonde, the production of very exquisite silk and woollen lace, and numerous modifications in the machinery which permit the attainment of great variety of effects and beauty of detail.

EMBROIDERY.

"Embroidery is carried on in all parts of France, and the chief centres of production may be divided into four principal groups:

"1. White embroidery for clothing and upholstery comes from the departments of Vosges, Meurthe, Meuse, Moselle, Haute-Saône, Rhône, and Calvados, and also Paris.

"2. Gold and silver embroidery, artistic and fancy embroidery for military uniforms, church ornaments and vestments, upholstery and other garments, are made in Paris and Lyons.

"3. The principal seat of production for that embroidery in silk and wool called tapestry work is Paris, and the departments of Eure, Yonne, Lot, Doubs, &c.

"4. Tarare is especially celebrated for its large articles of upholstery, such as curtains, &c., embroidered on net and muslin.

"Embroidery is, so to speak, the raising of one fabric on another; a multitude of different kinds of articles are used to embroider with, such as straw, jet, beads, and gold and silver thread; but cotton, silk, and wool, are those most commonly employed. Embroidery is prepared by hand and by machinery; the former is worked merely on the fingers, on canvas, or on tambour frames. For braiding the sewing machine is much used. Within the last six years embroidery has been worked by machinery, and the new embroidering machines, though still rare in France, (about 100 having been erected,) have superseded hand-work in many cases. The number of women and girls employed at embroidery in France is estimated at 100,000; they all work at their own homes. There are but few workshops, and the work done there is confined to the production of special articles. The wages of the workwomen are very variable; those who do the artistic description of embroidery with gold and silver thread earn from 3 to 5 francs a day; the others from 1 to 2 francs.

"Paris is the principal centre of this trade, and the most important manufacturers have all a depot there. French embroidery is prized for the beauty of its manufacture and the novelty of the design. It is exported to the United States, Italy, the east, Russia, and British India. The importance of this trade, on account of the great number of hands employed, is considerable. The value of the raw materials used, and even that of the fabrics on which the embroidery is done, is often inferior to the value of the workmanship, so that it is impossible to accurately separate the value of the workmanship from that of the manufactured material on which it is based, and thus arrive at a correct estimate of the worth of the entire product in a commercial point of view. However, the wages of the workwomen amount yearly to a sum of more than 30,000,000 francs. Among the latest improvements we must distinguish the new embroidery machines, which will more than double the production; the invention of new stitches for gold and silver embroidery, and that of tinted and shaded needle-work embroidery.

TRIMMINGS.

"Lyons is celebrated for its gold and silver military gimps, cords, and trimmings; St. Etienne for its fashionable trimmings for dresses and outer garments, and for all those fancy articles which are created and changed with the fashion. At Nimes, St. Chaumond, and Rouen may be found excellent manufactures of cord, braid, and elastic fabrics; but Paris is the active and important centre of the trade. For trimmings all the textile fabrics are employed, principally wool, silk, and cotton, and sometimes straw, gold, silver, aluminium, &c. Each different description of trimmings demands a special kind of manufacture; some are made with the needle, and some on looms of high and low warp, with and without Jacquards; the more ordinary productions are made by means of steam machinery. The manufacture of trimmings occupies more than 30,000 hands, and, after that of lace-making and embroidery, is the trade which employs the largest number of women and children. The wages are variable, as they depend not only on the skill of the workman, but upon the nature of the work. Men earn from three to eight francs per day, and the women and children from one to three francs.

This branch of industry, very considerable from the great number of hands employed and the vast capital it represents, is very prosperous at the present time. All the foreign manufacturers buy the new designs from Paris, for the purpose of copying them. The exportation is very large, principally to North and South America, India, the East, England, Russia, Spain, and Italy. The entire production is supposed to exceed 100,000,000 francs yearly. The chief improvements we have to point out are: great improvements in the different kinds of looms, which has much increased the production; considerable diminution in price, and an enormous development of the whole trade."

CLASS 34.—HOSIERY, UNDER-CLOTHING, AND MINOR ARTICLES.

The productions exhibited in this class formed twelve distinct groups: 1. Hosiery; 2. Buttons; 3. Braces, garters, and buckles; 4. Gloves; 5. Fans; 6. Umbrellas and parasols; 7. Canes and whips; 8. Cravats; 9. Shirts; 10. Ladies' and children's ready-made under-clothing; 11. Stays; 12. Petticoats and crinolines.

Full and entertaining particulars of the trades interested in these branches are given below. They are extracted from the official catalogue, and relate to France. Hosiery was largely represented by other nations. France was rich in fancy articles, such as ladies' silk stockings with open lacework and embroidery, mittens, scarfs, and veils. England excelled in articles of a more substantial make, but in cotton and woollen hosiery she was without a rival. In almost all the other groups France maintained the first position, and was quite undisturbed by competition. There were four American exhibitors in this class.

HOSIERY.

"Hosiery is made in almost every part of France, it being manufactured in no less than 500 communes, but principally in the departments of the Aube, Marne, Oise, Somme, Gard, Herault, Seine, Calvados, and Upper Garonne.

The textile fabrics employed are principally cotton and wool, while silk, floss silk, flax, and the down of the Thibet goat (Cashmere) are used, though less generally. The cotton employed in the manufacture of hosiery is carded, combed, and spun in France, and is derived chiefly from America, Egypt, and India. The price of the cotton varies according to quality: that of India (No. 10 to 24) is worth from 4 francs to 5 francs 50 centimes the kilogram. That of America and Egypt (No. 16 to 150) from 7 francs to 36 francs the kilogram. The wool is furnished by France, England, Russia, Italy, Germany, Australia, Spain, and Africa, and is carded or combed and spun in France. The price varies from 4 francs 50 centimes to 20 francs, according to the number, of 6 to 80,000 meters to the kilogram.

The silk is spun, but the cocoons are obtained chiefly from the Levant, and also from Italy and France. The common qualities are worth from 75 francs to 90 francs the kilogram. The finer qualities from 120 to 130 francs. Floss silk is spun in France and Switzerland. In 1866 the price per kilogram of the more ordinary sorts varied from 25 to 36 francs, and for the superior qualities from 45 to 60 francs.

Flax thread is very little used now, and that only by some few manufacturers at Pas-de-Calais. It is sold at from 3 to 18 francs the kilogram.

Cashmere goat's hair is but seldom employed. The finer qualities are worth from 26 to 60 francs the kilogram, and the more ordinary from 18 to 20 francs. The use of the hair of the rabbit has been entirely discontinued of late years.

Nearly all the machines for making hosiery are worked by hand; however, steam machinery is being gradually introduced into some of the principal French manufactories, and hand machines are, for the most part, employed by those men who work at their own homes. Knitting is no longer required, except for some few fancy articles, and then it is always performed by women, who work at home.

In France the small manufactories of hosiery are very numerous, while there are but few large ones. The men and women who work in their own houses—which form by far the greater proportion, being 90 per cent. of the entire number employed in the trade—earn 30 per cent. less than those who are occupied in the factories. Forty-five per cent. of the employés are women, their occupation consisting in sewing the seams, embroidery, getting up the various articles, and knitting and crocheting different fancy goods.

The greater part of the manufacturers have depots in Paris, which constitutes it the principal market for French hosiery. The town of Troyes is the chief manufacturing centre, and, at the same time, an important market. About half the home trade is carried on directly between the manufacturer and retail vender, the other half through the medium of wholesale houses. Exportation is mostly undertaken by commission merchants. The annual production amounts to about 100,000,000 francs, of which 15,491,722 francs are exported. As much as 549,788 francs of hosiery was imported into France this year. Great progress has been made in this branch of industry since 1865.

Firstly, as to the means of production, we must mention the automatic rectilinear looms, of different kinds, and both of English and French invention, which allow a workman to produce at one time six stockings, and even twelve, of different fineness, whereas the old-fashioned small machines only made one at a time. Also, the circular machines made according to a new system, of every size, and by which no less than thirty rows can be woven with one revolution of the machine; and again, the machine for taking up the stitches and sewing the stockings in the greatest perfection. Secondly, the productions themselves are of a much more equal quality, and made with greater care. The amount exported has much augmented this branch of the trade, being now carried on to a very large extent. The number of mills where yarn is prepared for working hosiery has greatly increased. The salaries of the workmen have risen about 30 per cent. since 1855.

BUTTONS.

"Paris is the principal centre of this industry. Buttons of all sorts are manufactured there in metal, silk, mother-of-pearl, horn, enamel, and also those fancy kinds which serve to ornament outer garments. The department of the Oise is the seat of manufacture for buttons in shell, mother-of-pearl, vegetable ivory, bone, ivory, &c, besides silk buttons, which are one of the most staple productions of France, and which are exclusively made in this department. China buttons are made in great quantities at Briare, in the department of Loiret, at Montereau, Seine-et-Marne, and at Creil, Oise. As to the other places, where only horn, mother-of-pearl, and bone buttons are manufactured, they are of so little importance, comparatively, that we shall not make any particular mention of them.

The raw materials made use of in this branch of industry may be divided into five sections: gold, silver, aluminium, German silver, copper, tin, zinc, iron, steel, &c.; silk, wool, linen, cotton, velvet, and various other fabrics; china, enamel, glass, crystal, beads, imitation stones, mosaics, &c. The amount of metals used annually in the first series may be estimated at 2,500,000 kilograms, representing a sum of 4,000,000 francs. The silk and other fabrics of series No. 2 may be valued at about the same amount. The raw materials of the third series, nearly all derived from the tropics, are employed to an extent of 3,000,000 kilograms, exceeding 5,000,000 francs in value. The annual consumption of horns, hoofs of mammalia, and the other articles of the fourth series, is not less than 1,500,000 francs' worth; while the glass and china manufactures of the last series are entirely of French manufacture, and represent a yearly value of 2,500,000 francs.

Steam and hydraulic machinery has come into more general use since 1855, and is principally employed for cutting out the raw materials, and for stamping metal buttons. The other kinds are made by hand, with the help of small machines and tools. Certain kinds of silk buttons are the only ones made entirely by hand.

The number of hands employed in France in the manufacture of buttons is 22,000; of which 8,000 are men, 10,000 women, and 4,000 children, some of whom work at home and others in manufactories. The wages may be estimated at 4 francs 25 centimes per day for the men, 1 franc 85 centimes for women, and 1 franc 10 centimes for children.

All kinds of French buttons are exported to Great Britain, Italy, Russia, and North America, while South America, Mexico, and China buy a large quantity of the common sorts. The annual production may be valued at 45,000,000 francs, of which three-fourths are sent to foreign countries. This branch of industry, which was comparatively insignificant thirty years ago, has made extraordinary progress since 1855, and we may safely say that France furnishes to the whole civilized world by far the greater part of the button manufacture.

BRACES, GARTERS, AND BUCKLES.

"The manufacture of garters and braces has been created in France since 1834. From Paris, where it was first established, it was removed to Rouen, where it now almost exclusively flourishes. Buckles in copper are principally made in Paris; those in steel at Rancourt, (Ardennes.) The raw materials consist of cotton, India-rubber, and silk for ornamentation.

For these articles, buckles are chiefly manufactured in copper and steel; the metals employed in making buckles for trousers, waistcoats, and shoes, are steel, iron, copper, zinc, lead, tin, &c. Rouen employs relatively but a smaller number of hands in the manufacture of garters and braces; all the work is done by machinery. In Paris, hand labor predominates. For the manufacture of buckles by means of cutters, machinery has, since 1836, quite replaced hand labor. The workmen and apprentices who weave the braces are employed in manufactories, while the women who mount them work at their own homes. The men earn 5 francs 50 centimes per day, and the women 3 francs. The apprentices are not paid, but are provided with board and lodging. The greater part of the men who make buckles work in manufactories; but the productions are finished off by workmen in their own homes. The men's wages vary from 2 francs 50 centimes to 5 francs; the women's from 1 franc 50 centimes to 2 francs 50 centimes, and that of the children from 75 centimes to 2 francs.

French braces and garters are exported to nearly every part of the world; principally to England, Russia, and America. The buckles made in France compete advantageously with those of the best foreign manufacturers. The annual production of braces and garters in France amounts to about 10,000,000 francs in value. The manufacture of buckles in Paris alone amounts to 2,000,000 francs, of which one-third is exported. Among the improvements of the last 15 years we must mention the weaving machine of Mr. Fromage, producing 80 dozen pairs of braces per day, of which the price of manufacture does not amount to more than six centimes per dozen; also the invention of the hygienic braces, which differ from the other kinds, inasmuch as the stress of the elastic fabric is entirely removed from the shoulders, and only bears upon the lower part of the braces. Lastly, the common kind of buckles have been replaced by those called *à pont*, of a much more convenient form.

KID GLOVES.

"The principal manufactures of kid gloves are to be found in Paris, Grenoble, Chaumont, and St. Junien, *(haute Vienne;)* the lambskin gloves are made chiefly at Lunéville and Niort, and those in deer-skin and chamois-leather (called castor) at Rennes. Many provincial towns make gloves for local use, as Lyons, Nancy, Strasburg, and Rochefort. The manufacture of gloves employs kid, lamb, and sheep-skins, as well as the skins of the lamb, the deer, and the reindeer, (dressed chamois fashion.) Almost all these skins are procured in Europe; but the finest are to be met within the centre of France. The best kids come from Switzerland, the north of Italy, Tyrol, Austria, Bavaria, Saxony, and Silesia; those of northern Europe are, in general, very inferior.

The skins are first tanned, then dyed and cut out to make gloves. Dressing by means of machinery has been tried, but does not seem to have succeeded for any but the thickest kind of skin. The "dollage," or process of equalizing the thickness of the skin, is done either by hand or by means of stone cylinders moved by steam. The fingers are divided by means of dies moved by a screw. The remainder of the processes are performed entirely by hand. The dyeing of the skins is likewise a manual occupation. Two sorts of dyes are used for skins; that which is applied with a brush, and that into which skins are dipped. After the skins have been dressed, they are sorted and appropriated to the use for which they seem most fitting; then comes the dollage, the cutting, &c.

The working tanners earn daily, in the Paris workshops, from 4 francs 50 centimes to 5 francs; and in the provinces from 3 francs to 3 francs 50 centimes. The *palissoneurs*, who work by the piece, can earn as much as 6 to 8 francs a day in Paris, and from 5 to 6 francs in the provinces. The wages of those who dye the prepared skins, and who also work by the piece, amount, in Paris, to 5 or 6 francs per day; and in the provinces to 4 or 5 francs. Skins prepared in the chamois style are chiefly manufactured in Milhau and Niort, and the hands employed in this process receive about the same amount of wages as the tanners.

The glove trade occupies in France about 50,000 or 55,000 work-people, of whom 40,000 or 45,000 are women. Those men who cut out and prepare the gloves, and who work in their own dwellings and in the workshops of their employers, can earn from 6 to 8 francs per day, and even as much as 10 francs; the wages in the provinces may be estimated at one-fifth less. Some workwomen, especially those that cut out, earn from 3 to 4 francs; others from 2 francs 50 centimes to 3 francs. The women who sew and stitch the gloves, and who work principally in the country, seldom earn more than 1 franc per day.

The productions are sold directly to retail vendors for home consumption, and to commission merchants for exportation. Some of the principal glove manufacturers have established houses in the principal foreign markets, especially in England and America. The number of gloves made up annually in France amount to 1,800,000 or 2,000,000 dozen pairs, which represents a sum of nearly 70,000,000 francs. With the gloves of first quality the materials are worth about two-thirds of the value of the production; the price of manufacture, the general expenses, and the profits account for the other third. The materials of the second and third qualities cost a little less, and the manufacture and general expenses a little more in proportion. At least two-thirds of the produce of the glove trade are exported; England and America consume nearly the whole of this amount. The French glove trade has made no marked progress since 1855; but it still remains immeasurably superior to all foreign manufactures.

FANS.

"Fans are composed of two parts: the mountings are made in certain communes of the department of Oise, and the upper part in Paris; and it is there also that the two are joined together, so that Paris may be considered the principal manufacturing centre. The raw materials used in the making of fan-mountings are:

1. White mother-of-pearl, called poulette, which comes from Madagascar, and costs nine francs the kilogram; another sort of white mother-of-pearl, called Franche, which comes from the same place, but costs 11 or 12 francs the kilogram; black mother-of-pearl, brought from Sidney, and sold at seven francs the kilogram; oriental mother-of-pearl, and the green délotide kind, which is found in Japan, and is worth about 35 centimes the shell; the Burgot variety, found also in Japan, and worth 85 centimes the shell; brown tortoise-shell, from India and China, and light-colored tortoise-shell, the former costing 60 francs the kilogram and the latter 200 francs; also ivory, sold at 40 francs the kilogram; and lastly, bone, largely used for fan mountings, and furnished by Paris, Bordeaux, and Rouen, at 50 centimes the kilogram.

2. Oriental woods—ebony, mahogany, rose, satin, and lemon-tree wood, and in general all the hard woods of Africa, Ceylon, and Madagascar, which cost, on an average, 60 centimes the kilogram; sandal wood, which comes from Japan, and which is worth 2 francs 25 centimes the kilogram.

3. Indigeneous woods, such as plane tree, acacia, beam tree, wild cherry, plum, apple, and pear tree, cost from 15 to 20 centimes the kilogram.

The materials of which the coverings of the fans are made vary according to taste and fashion; silk, crape, lawn, paper, feathers, and kid, are used.

Machinery has replaced hand-work in the cutting of the mountings, except for ivory and tortoise-shell. Designers make the drawings for the fan coverings. These drawings are lithographed or engraved on copper, steel, or wood, and then printed, pasted, colored, or painted, mounted, bound, edged, spangled, riveted, and examined. Some workmen work in shops by the day; all the others work by the piece, at their own houses, with their wives and children. The fan trade occupies, in France, 4,000 workmen of different trades; of which 1,000 are in Paris and 3,000 in the department de l'Oise. Workers in bone, ivory, &c.,

gilders, looking-glass workers, paper makers, feather mounters, painters, embroiderers, goldsmiths, jewellers, engravers, chasers, carvers, &c., all combine in the manufacture of these articles, whether they be plain or ornamented, superior or ordinary. The wages of the workmen are, on an average, 5 francs a day; those of the workwomen vary from 2 francs 50 centimes to 4 francs 50 centimes.

Paris, [Japan] and China monopolize the fan trade. Spain, Italy, Portugal, and England are the principal foreign markets in Europe. The Brazils, Mexico, Havana, St. Thomas, Chili, Peru, Buenos Ayres, and North America may be considered merely as tributaries. Some fans are also exported to the East Indies, and as far as Manilla; but in those ports the rivalry with China for the ordinary articles is maintained with difficulty. The annual production amounts to 10,000,000 francs, of which three-fourths is exported. The progress made in the fan trade since 1855 consists in the use of mechanical processes for the production of current articles and in the more developed application of art to industry, the improvement in certain mechanical processes, such as (to cite but one example) a machine for ornamenting by heat, capable of executing, on a mounting of two francs, a work which could not be attained by hand at any price.

UMBRELLAS AND PARASOLS.

The principal centres of production are Paris, Angiers, Bordeaux, and some less important towns of France. For umbrella and parasol covers cotton tissues are employed, which are produced at Rouen, and worth from 40 centimes to 1 franc 25 centimes the metre; silk, made at Lyons, and worth from 2 to 20 francs; and alpaca, imported from England, and costing from 1 franc to 3 francs 50 centimes the metre. Parasols are ornamented with lace of various kinds, made at Alençon, Puy, and Caen, worth from 25 francs to 1,500 francs the cover, or with imitation lace, produced at Lyons, Calais, St. Pierre, &c., only costing from 3 francs to 25 francs. The embroidery and trimmings are made in Paris.

Colonial woods, of all kinds, only form about one-twentieth part of the material used in the manufacture of umbrella and parasol handles. The price of bamboos and laurel wood vary; for bamboos, from 10 to 35 francs the hundred, and for the laurel from 20 to 50 francs the hundred. Algiers supplies the myrtle, of which the prices vary from 20 to 50 francs the hundred; and Guiana nearly all the colonial wood, costing from 30 to 170 francs the hundred for sticks of 90 centimetres to 1 metre in length. The woods of French growth are beach, yoke-elm, oak, sycamore, maple, beam tree, hazelwood, wild cherry, cornelian tree, medlar, and holly; the prices vary from 5 to 45 francs the hundred handles, ready rounded. Umbrella and parasol handles are made in considerable quantities, of various materials, of which the principal, besides woods of all kinds and from all parts of the world, are bullock, buffalo, ram, and rhinoceros horn; bone, ivory, and tortoise-shell are also employed in the manufacture. The prices vary to infinity: bullock horn from 25 centimes to 1 franc 50 centimes each; buffalo and ram horn from 50 centimes to 3 francs; and rhinoceros horn, ivory, and tortoise-shell from 2 to 100 francs per piece. The most ordinary prices for these last are from 6 to 20 francs each. Umbrella and parasol frames are made in steel, ratan, and whalebone. The steel wire used is worth, according to the size, from 1 franc 80 centimes to 2 francs 10 centimes the kilogram, all prepared; that is to say, drawn, cut into lengths, and tempered. Ratan, which is used for common mountings, comes from India. The prices vary from 1 franc to 1 franc 50 centimes the kilogram, cut, squared, turned, pressed, and varnished. Whalebone is becoming exceedingly scarce; its price has risen to 15 francs the kilogram; that is to say, it has tripled during the last quarter of a century. The wood is cut up and rounded by machinery; the ornamentation, carving, and varnishing are performed by hand. A part of the frames are made by machinery, but hand-work is employed in the great majority of instances. Sewing machines begin to be applied, with great advantage, to the sewing of the seams.

The workmen employed in the workshops receive one-third of the total profits; those who work at home, for others, two-thirds. All the women work at home. The average wages for the men are 5 francs per day; those of the women, 3 francs.

The trade is principally wholesale, and confined to the dealers in the provinces, through the medium of commercial travellers, and directly to those who negotiate personally with the manufacturers every half year, the foreign trade being conducted solely through the medium of export agents.

The Paris shops treat directly with the producers, the purchases comprising a considerable moiety of the entire trade. Cotton parasols are worth from 1 franc 25 centimes to 5 francs; those in silk from 4 to 40 francs. Cotton umbrellas are worth from 1 to 10 francs; those in silk from 3 to 150 francs. The principal foreign markets are Spain, Greece, Italy, Turkey, Austria, Switzerland, Prussia, Russia, Holland, Belgium, England, and her dependencies, Asia, Egypt, North and South America. The umbrella and parasol trade does business, annually, to the amount of about 35,000,000 francs.

Few changes have taken place since 1855 in the manufacturing processes, excepting the introduction of sewing machines. The average wages of the workmen, workwomen, and others employed, has risen about 20 per cent.

WALKING STICKS, RIDING AND DRIVING WHIPS.

Paris is the principal centre of production. Canes, ratans, and stiff and flexible bamboos, worth from 10 to 400 francs the hundred pieces, are imported from British India, China, and Japan. Palm, myrtle, orange, and locust-tree wood, worth from 40 to 100 francs the hundred pieces, come from Algeria. Dog-wood, thorn, oak, elm, ash, and wild cherry-tree woods, costing from 10 to 50 francs the hundred pieces, are produced in France, (Alsace, Lorraine, and Nivernais.) Whalebone, ivory, tortoise-shell; rhinoceros, buffalo, and rams' horns, worth from 90 centimes to 30 francs the kilogram; gold, silver, brass, white metal, gold-plated on copper and silver, jasper, cornelian, lapis lazuli, malachite, &c.; cotton, silk, and catgut, are bought in the Paris and London markets.

All the articles are made by hand, except the plaiting of the whips, which is done by machinery. After the moulding of the horn and tortoise-shell, and the laying of tortoise-shell on ram's horn, the principal operations are the planing and varnishing of canes, stoving, cutting and carving wood and ivory, chasing and engraving metal.

The workmen working in shops form a third of the whole number of persons engaged in this industry. This does not, however, include the women. The work-people who work at their own houses include men, women, and children, and form the other two-thirds. The wages of the work-people are very good; the men earn from 3 francs 50 centimes to 7 francs, and the women 2 francs 50 centimes to 3 francs.

The manufacturers sell directly to the retailers in Paris, and to the provincial dealers through the medium of travellers. The exportation is carried on by commission agents.

Walking sticks are worth from 25 centimes to 100 francs each; riding whips from 25 centimes to 50 francs; and driving whips from 1 to 50 francs. These articles are exported to all parts of the world.

The value of the industry, divided between about 60 manufacturers, living in Paris, is between about 3,500,000 and 4,000,000 francs.

The principal improvements to be noted since 1855 are the employment of gas for coloring and dressing the wood, and the use of machines for plaiting two whips at a time. Nevertheless, the competition of Germany has become serious as regards common and low-priced articles. This state of things must be attributed to the rise in wages, which are 8 to 10 per cent. higher in Paris than a short time since.

CRAVATS AND SHIRTS.

This trade originated in Paris, and has greatly developed since 1848. It has increased to a large extent, particularly during the last few years. The makers of cravats especially employ silk stuffs, from the lowest to the highest prices. The number of work-people occupied can be estimated at about 10,000, and the average of their daily wages at 2 francs 50 centimes.

This industry employs, at the present moment, a considerable number of sewing machines; and the low prices of the articles made render them acceptable to all classes of the population.

Shirt-making for men possesses considerable importance at the present moment. It includes the making of shirts, shirt fronts and collars, waistcoats, drawers, flannel bands and shirts, and linen and cotton drawers, The cotton stuffs employed in this trade come from the manufactories of Mulhouse and Rouen; England, Ireland, and France supply the linen fabrics. This industry, which has been scarcely 30 years in existence, has greatly extended latterly.

The shirt-makers can be divided into two categories: those who deal directly with the retail houses and those who make for the wholesale trade and for exportation. The work-people employed under the first category earn, on an average, two francs per day; the second category of dealers have their articles made in the provincial workshops, in asylums, and convents, and rarely give more than one franc a day to the work-women employed. The number of women supplied with work by the shirt-making trade is estimated at about 30,000. This total includes the cutters, needlewomen, mounters, embroiderers, and laundresses.

The amount annually produced reaches 70,000,000 francs, of which 25,000,000 francs' worth are delivered for exportation. The manufacture of shirts, flannel bands, and drawers, has also increased to a great extent during the last 10 years, in consequence of the orders given for the army. The total value of this branch of business amounts to about 10,000,000 francs. Articles in flannel are made by the same persons, as are also similar articles in cotton and linen; and although there is some difference in the methods employed, the mode of manufacture may be looked upon as the same. The flannels used in this trade are produced in the town of Rheims; and it should be added that the quality and lowness of its price causes it to find great favor in the foreign market. As a last consideration, it should be mentioned that the industries above referred to have, in one respect, a very interesting aspect, as they allow the women employed in it to work at their own homes, and thereby give their attention at the same time to the duties of the household.

UNDERCLOTHING FOR WOMEN AND CHILDREN.

This is another trade, which has been greatly developed during the last few years. Among the various articles which it includes may be mentioned chemises, jackets and drawers for ladies and children, and which, with many secondary articles, comprise the childbed linen and marriage trousseau. The manufacture of these various articles demands, especially in the case of the more elegant kinds, much experience and taste, and great skilfulness and care on the part of the women employed in it. The Parisian seamstresses earn from 2 francs 25 centimes to 3 francs a day; and those who work in the provinces, in the convents, asylums, &c., from 1 franc 25 centimes to 2 francs 25 centimes per day. The number of women employed in the made-up linen trade is about 10,000. Sewing machines have had a powerful influence in developing this business; the women who work them earning from 3 francs to 3 francs 50 centimes per day. The ready-made linen of France, and above all, that of Paris, enjoys a good reputation abroad, and the export trade has increased in a notable manner since 1855. The articles known under the name of Paris hosiery are in great demand in England, Germany, Spain, Switzerland, and the two Americas. Nearly the whole of the fabrics which are used in the ready-made linen trade are of French origin, and especially from the factories of Quentin, Tarare, and St. Etienne. Alsace and several departments of the north supply linen cloth and plain cotton tissues. That kind of lace known as Valenciennes is supplied by Belgium. The value of this trade is estimated at about 30,000,000 francs per annum.

Since 1855, the stay-making trade has progressed in a very considerable manner, and the value of the business has increased in a very notable degree. Stays are divided into two very distinct categories: stays with seams, and stays without seams. The sewn stays are made by hand or with sewing machines. The seamless stays are woven on the Jacquard power-loom. It is especially in Paris, or in the principal provincial towns, that the sewing stays are made. The seamless stays are produced in large establishments at Bapaume, (Pas-de Calais,) Bar-le-Duc, (Meuse,) and at Ehézy, (Rhône.) The raw materials employed in stay-making are white and gray drills, which are supplied by the manufactures of Flers and Evreux, real or imitation whalebone, sewing-cotton spun in France and in England, and sewing-silk, which is exclusively bought of Paris houses.

Women are alone employed in the making up of stays, and work in tacking and sewing workshops; they earn, according to their capacity, from 1 franc 75 centimes to 4 francs 50 centimes a day. For the making of stay bones of all kinds men are employed, whose daily wages are from 3 to 5 francs.

At the present moment, the stay-making trade, in consequence of the new patterns introduced since 1862—the results of which have been, in most cases, to prevent the great inconvenience, or rather the serious danger proceeding from imperfectly manufactured stays—merits encouraging notice. It has entered into a rational path, and pays still greater attention to the laws of health and nature. On this point we must not omit to mention the judicious innovations of clasps in the place of laces, the absence of gussets, &c. This branch of industry is daily establishing itself in the estimation of scientific men, who are not influenced by the unhappy and injurious exigencies of fashion.

The crinoline trade, comparatively recent in its origin, and which occupies such an important place in ladies' dress, comprehends two rather distinct articles, skeleton crinolines and crinoline petticoats. These articles are made in all the towns of France, but the sale of them is especially active in Paris; and the Parisian makers owe this not only to the elegance of their productions, but also to the continual creation of new patterns.

The principal materials used in the manufacture are the bands of steel, rolled and cut, which are made in France and England, and which are encased in a cotton covering, produced by machinery. The woollen and cotton stuffs employed in crinoline-making come especially from Roubaix, Amiens, Tarare, and Saint Quentin. The diaper, cambric muslin, and other fancy tissues are supplied by the manufactories of Mulhouse, Rouen, and Saint Marie-aux-Mines; the tape and sewing cotton are made at Bernay. To these various products must be added the silk and velvet trimmings, and the buttons of all sorts, made in France and Germany. The construction of petticoats without steel forms a special branch of the trade in question. The Parisian work-people are the most skilful in the making of these various articles, and their salaries vary from 3 francs 50 centimes to 4 francs a day. The value of this trade is estimated at 20,000,000 francs, of which half is due to the export trade.

CLASS 35.—CLOTHING FOR BOTH SEXES.

The articles exhibited in class 35 may be divided under nine different heads: 1st. Clothing for men; 2d. Clothing for women; 3d. Bonnets and head-dresses for women; 4th. Artificial flowers; 5th. Ornamental feathers; 6th. Men's hats; 7th. Men's caps and other head-gear; 8th. Boots and shoes; 9th. Fancy hair work.

The familiar objects embraced in this class need no detailed description in an official report. For the most part they have been already described in the newspapers devoted to fashions, and, at all events, a walk through any fashionable thoroughfare will convey a better idea of what was shown than any labored effort of the reporter. France was again upon her own ground, and distanced all competition. We give below the latest French particulars of the curious branches of industry included in the class. America had nine exhibitors.

Men's clothes are made almost everywhere, but the principal establishments, both for fashionable as well as ready-made garments, are in Paris. Low-priced articles are, for the most part, made in the provinces. Many important houses have their principal workshops in the departments of the Nord, Pas-de-Calais, Gironde, Gard, &c. Tailors and clothiers employ a great variety of fabrics, and consequently of all prices. Tailors and clothiers also use a considerable quantity of trimmings and buttons of all kinds. A few years ago tailors' work was done altogether by hand. Now, sewing machines are used to an immense extent; in fact, it may be said that the greater part of the seams of garments are sewn by these machines.

The cost of the workmanship of men's clothes amounts to about one-fifth the value of the goods. The workmen employed by the tailors and clothiers are naturally divided into two different categories: those who prepare, cut out, and arrange the work, and those who put it together. Five-sixths of the tailors work at home, while the rest are employed in the tailors' work-rooms. As to the workwomen—who, in Paris, are only half so numerous as the workmen—five-sixths of them work at home.

The men, working either by the day or by the piece, earn from three to six francs a day, though some more industrious and skilful gain from eight to ten francs. The women earn from two to three francs fifty centimes, and a few from five to six francs. The tailor and clothier deal directly with the purchaser. The tailors generally do their own cutting out, but the vendors of ready-made goods employ cutters, who prepare the work for the sewers. The business of exportation is generally made through the mediation of agents. It is almost impossible to ascertain the extent of the production of men's garments; but it must be considerable, as the tailors and clothiers in Paris alone do business to the amount of more than 150,000,000 francs per annum. The articles exported do not amount to the tenth part of the whole.

The business has made great progress since 1855. The use of sewing machines increases every day. Many foreign governments have now recourse to French clothiers for the equipment of their troops. This new branch of the business has rendered great service to the workmen, enabling them to obtain employment in all seasons of the year; and also to the great cloth manufactories, by giving them extra work, or helping them to get rid of unsalable articles.

CLOTHING FOR WOMEN.

Paris is the great centre for the making of ladies' clothing. This branch of trade employs an immense quantity of stuffs of all prices, from common printed cotton to the most expensive velvet. Articles for summer wear are principally made of the light fabrics of Rheims, Elbeuf, Sedan, and Roubaix, Scotch cashmeres, and French merinos; while those for winter are made of the thick, strong stuffs of Sedan, Elbeuf, and the south of France. Pillow and machine-made lace, as well as Paris, St. Etienne, and Lyons guipures and gimps, are used for the trimmings of ladies' clothes. The clothiers give the stuffs, cut or uncut, to dressmakers or ladies' tailors, who employ from four to forty workwomen besides those who work at home. The articles are generally mounted and sewn by hand, the sewing machines being used for the trimmings. The sewing of ladies' outer clothing is done almost entirely by women, and females are generally employed for the sewing machine also. At this trade men earn in Paris on an average five francs a day and women two francs twenty-five centimes.

The export of ladies' ready-made clothes is very considerable, the principal markets being England, Belgium, Holland, Russia, Spain, Italy, Turkey North and South America, and Australia. The articles principally exported are known by the names of paletots, talmas, pelisses, mantelets, embroidered shawls, scarfs, and jackets. Dresses, hoods, and children's clothing are also exported. The wholesale houses where these articles are made furnish the small provincial linen drapers and commission merchants, while the principal linen drapers in Paris and the provinces generally buy the patterns and have the articles made up for themselves.

The production of these articles in the whole of France is estimated at 100,000,000 francs, (£4,000,000.) Paris alone makes to the amount of 40,000,000. Five-sixths of the whole are used in France, and only one-sixth is exported. Ready-made articles are sold from three francs to four hundred francs each; embroidered shawls, for instance, vary in price from eight francs to three hundred. This branch of industry increases daily; new patterns are continually produced, and are remarkable for taste and originality. Here, again, the growing use of the sewing machine must be noted. The business of the dressmakers—that is to say, those who make ladies' clothes, and particularly dresses to order—is daily becoming more important. This is one of the Parisian trades that demand the greatest amount of taste and invention; it is, naturally, almost exclusively followed by women. However, there are in Paris many important houses whose business is confined to the making of dresses where men are employed. The greater number of dressmakers are paid by the day, though some work by the piece; the wages are not high; they earn, on an average, two francs twenty-five centimes per day. Dressmakers do not work exclusively for home use; a certain quantity of handsome articles are sent to foreign countries. The export trade of Paris amounts to about the twelfth part of the whole production.

LADIES' HEAD-DRESSES.

Millinery is essentially a Parisian trade; it is in Paris that all those novelties are created which, at the commencement of each season, decide the fashions. The materials used in bonnet and cap making, such as buckram, wire, whalebone, various stuffs, flowers, and lace, are obtained from special manufacturers. The milliners, so to speak, only arrange and combine these materials. There is no fixed method of manufacturing articles of millinery; it is altogether a matter of taste and ingenuity. The workmanship forms only a small item in the value of the whole. Three-quarters of the working milliners are Parisian; about an eighth part are natives of Belgium and Germany; the rest come from the provinces, especially Angoulême, Tours, Nancy, and Dieppe. Part of these workwomen board and lodge with their employers, and earn, on an average, two and a half francs a day. This trade employs very few men; a great number of young girls work as apprentices. Nearly all milliners sell direct to the purchaser. Some houses make up articles specially for exportation, and these alone employ under-milliners, who receive the requisite materials for a certain number of bonnets and head-dresses, and prepare the work by tacking the various stuffs upon the ready-made shapes which they furnish. The ribbons and flowers are always added by the milliner herself.

It is difficult to estimate the exact amount of bonnets and head-dresses annually made in France, but it must be considerable, as the Parisian milliners' returns amount to nearly 20,000,000 francs, (£800,000;) the export amounts to about a tenth of the whole. Paris millinery is sent chiefly to America, England, Spain, Belgium, Holland, Germany, Russia, and the French and English colonies.

ARTIFICIAL FLOWERS.

The fabrication of artificial flowers occupies a conspicuous position among the various and interesting Parisian industries, and may be called artistic. The materials used in the manufacture are very numerous; for the leaves and blossoms, jaconet, nansouk, cambric, muslin, velvet, crape, satin, silk, French cambric, feathers, paper and wax are made use of; for the stems, berries and fruits, wire, silk, cotton, floss silk, paper, starch, gum, gelatine, wax, paste, chenille, quills, whalebone, gauze, chopped wool and glass balls are employed. For mounting the flowers, silk, paper, gauze, iron, and brass are required. Artificial flower-makers always use the same instruments—goffering irons, stamps, &c.; the galvano-plastic process is sometimes employed.

The cost of the workmanship amounts to about the four-tenths of the value of the productions, and the materials employed to about three-tenths; the remaining three-tenths represent the profit of the producer. The manufacture of artificial flowers is divided into a great many different branches; for the preparation of the colors there are special workshops. The manufacture of artificial flowers is generally carried on at the homes of the work-people; such is the case in, at least, 1,500 of the 2,000 Paris flower-makers. This trade employs 15,000 people, of whom nine-tenths are women and girls. The men earn about four francs a day; the women two francs twenty-five centimes. The mounting and sale of artificial flowers is carried on, for the most part, in handsome shops and show-rooms, where all kinds of flowers are generally sold, as well as the different sorts of ornamental feathers. Three-quarters of the whole amount of artificial flowers are exported through the medium of commission agents. The extent of the trade is about 18,000,000 francs per annum. Artificial flowers are exported principally to America, England, Belgium, Russia, and Germany.

ORNAMENTAL FEATHERS.

Feathers are prepared and mounted in Paris, which enjoys a justly-earned reputation for the preparation, bleaching, dyeing, and arrangement of this article. The most beautiful and *recherché* feathers are those of the ostrich and marabout, which are imported through Leghorn and London. Next come the feathers of the birds of paradise, the cassowary, and those known by the name of aigrettes, and bastard ostrich feathers, called vulture's plumes. Cock's feathers, the down of the white turkey, and the feathers of the various kinds of exotic and indigenous birds, are also made use of. The different preparations to which feathers are submitted consist merely in arrangement, bleaching, and dyeing, though we must not forget to mention a mechanical process by which goose's feathers are made to imitate different kinds of grasses.

The ornamental feather trade employs few men, but a great number of women and girls. The dyeing of feathers is all that is done by men. The great part of these feathers are exported, through the medium of commission merchants, to America and the colonies; but Paris furnishes also the principal milliners of Europe. Ornamental feathers are prepared to the amount of 10,000,000 francs, of which about 8,000,000 are exported. The manner of dyeing and preparing feathers has undergone little modification since 1855, only a method has been discovered of turning black feathers into gray, which allows of their being dyed of various colors.

MEN'S HATS AND CAPS.

French hatters manufacture silk hats, black and white, short nap beaver hats, fancy dressed felt hats for country wear and for travelling, and soft felt hats. Paris, Lyons, Marseilles, Aix, Toulouse, Bordeaux, and some other southern towns, are the centres of the hat trade. Caps of various kinds are principally made in Paris, Rueuil, Châlons, and Condom. The principal materials used in the manufacture of hats are the skins of the beaver and muskrat, imported from Canada; that of the Gondin rat of the centre of South America; the fur of the hare, furnished by France, Germany, and Russia; that of the rabbit, so abundant in France, and wool of different kinds used for making cheap articles. France alone supplies annually rabbit and hare skins to the amount of 70,000,000 francs, and exports 35,000,000 worth. The average price of rabbit skins is 40 francs for 104 skins; hare skins are worth one-third more. The manufacture of hats may be divided into two distinct sorts, the manufacture of soft and firm felt hats and that of silk hats. Workmen, whose special business it is to cut the hair from the skins, furnish the makers with their raw materials. The manufacture of felt hats includes several operations. The fur is first beaten, either by hand or by a machine. By this process a bag of felt twice the size of the hat is produced; this is then fulled, either by hand or by a special machine used for the purpose. Arrived at this point of its manufacture, the hat is scraped with a knife, to take off the long hairs, rubbed with pumice-stone, then stiffened or not, as required. It is then dyed, blocked into forms, bound, and finally the leather and head-lining are added. The manufacture of silk hats is different. First of all, the form is made of various fabrics, stiffened with gum-shellac, and upon it is placed a kind of silk plush, and within it a fabric which serves for lining. A great many silk hats are made with the adhesive linings, in which case the interior becomes part of the solid form. The working hatters are generally well paid; some earn as much as 10 francs per day, but the average is between 40 and 50 francs per week. The men work by the piece, and are under the direction of foremen, chosen from among the best workmen. The latter earn from 2,000 to 3,000 francs per year. Women do not earn more than from 18 to 24 francs per week. Nearly all the men and women employed in this trade, and especially the men, work in the factories.

The productions of the French hatters are exported to nearly all parts of the world, sales being effected through the medium of commission merchants. The prices of hats vary greatly; they are sold from three or four francs to 25 and 30 francs each. Opera, or spring hats, in particular, are exported in considerable quantities. The manufacture of hats alone, without taking into consideration various kinds of caps, amounts to the sum of 24,000,000 francs, or nearly £1,000,000 a year, out of which, at least, 10,000,000 worth of felt and about 2,000,000 worth of silk hats are exported.

Since 1855 a great many ingenious tools and machines have been invented to facilitate the manufacture of hats. The materials employed remain the same, but the wages of the workmen have greatly increased. The hat manufacturers now make and completely finish their goods, so that the hatter who puts his name into the crown of the hat is only an agent between the producer and consumer.

The principal places where caps are made are Paris, Toulon, Lyons, Limoges, Lille, Bernay, &c. The manufacture of men's caps employs a great variety of fabrics, from silk and fine cloth to the commonest stuff. Even old materials dyed and turned are made use of. The manufacture of the better sort of caps has been greatly improved during the last few years. This is partly due to the sewing machine, which does the sewing very neatly, besides doing a great variety of embroidery at comparatively low prices. The women who make caps sometimes work at the shops and sometimes at home. One set of workwomen join together, with the aid of the sewing machine, the several pieces of the cap, which is then padded, if required, stitched, and embroidered; women press the seams, put on the peak, and complete the work. Most of the workwomen work at home, and earn from 2 francs and 25 centimes to 2 francs and 50 centimes per day.

Most of the caps made are sold at home, but a certain number are exported to America, Spain, Portugal, Holland, Germany, and Italy. This trade is carried on through commission merchants. The value of the caps made amounts to about 20,000,000 francs annually, and a small portion, as already stated, is exported. The cap called "képi," which, since 1848, has been introduced into the army, the national guard, the public schools, and administrations, forms a considerable item in the manufacture.

The workmen's wages have greatly increased since 1855. They are all now pretty well remunerated. Connected with the general cap trade is that of the Greek cap or "fez." These are either knitted or made of felted cloth. The principal fabrics of fez caps are produced at Orleans, Paris, Rueuil, Chalons, and Condom. A considerable portion of these caps are exported.

BOOTS AND SHOES.

Shoemaking may now be divided into three classes—sewed boots and shoes, which represent a large amount of business; those put together by pegs or nails; and those put together by screws. Sewed boots and shoes are mostly made in Paris, Nantes, Marseilles, Bordeaux, and Fougères; pegged boots and shoes in Paris, Liancourt, Romans, Blois, and Angers; while those made with screws are only manufactured in Paris. Shoemakers generally use ox and cow hides for the soles, while the upper leathers are made of calf, kid, goat, and sheep skins. Woollen, silk, and woollen mixed, cotton and linen, and elastic fabrics, are also brought into use.

France produces about eight-tenths of the whole amount of hides employed for making soles, five-tenths of the calf skins, five-tenths of the kid and goat skins, and nine-tenths of the sheep skins used for upper leathers. As to the different woollen, silk and woollen, cotton and thread fabrics employed in the manufacture of boots and shoes, they are nearly all produced in France. However, only five-tenths of the mixed fabrics of wool and cotton, and eight-tenths of the elastic fabrics used in shoemaking, are of French manufacture. The various kinds of lining are made in France. No machinery is employed in the manufacture of those boots and shoes which are made to order. On the other hand, ready-made boots and shoes are partly manufactured by machinery, and those soles which are made with pegs and screws are put together by machinery. The raw materials are cut out by means of paring-knives and cutting-out machines of various kinds.

The men employed in the manufacture of boots and shoes are divided into three classes—the foremen, receivers, and cutters. The proportion of workmen and workwomen working in their own homes is eighty-five to the hundred; the rest are employed in the manufactories. Half of the people employed in this trade are women; their work consists in binding, tacking, stitching, and joining the upper portions. Women earn, on an average, 2 francs per day, and men 4 francs. The ready-made boot and shoe trade is in France carried on by commercial travellers, who sell to the provincial dealers. Commission merchants buy for exportation. The average price of good boots and shoes is 16 francs for men, 8 francs for women, and 6 francs for children; the commoner sort of boots and shoes for men are sold on an average at 8 francs, for women at 5 francs, and children at 3 francs a pair. These productions of the French trade are principally exported to the Levant, North and South America, the East and West Indies, England, Italy, and Switzerland. Paris alone produces boots and shoes to an amount of 100,000,000 francs; the provinces also contribute largely to this trade, and about 40,000,000 francs' worth of boots and shoes are exported.

Since 1855 the use of sewing machines for the putting together of the upper leathers has become very general, and the various other mechanical means for saving labor are being employed on a large scale. Workmen's wages have risen 20 per cent. in the same space of time.

HAIR-WORK.

The hair trade is now one of considerable importance. It is in Paris that hair is particularly well prepared, and it is also in Paris that wigs and false hair are made in the greatest perfection. Hair is, in France, chiefly obtained in the following departments: Puy de Dôme, Cantal, Corrèze, Lozère, Deux Sèvres, Vienne, Allier, Manche, Côtes du Nord, and Ille et Villaine. Italy, Belgium, and Germany also furnish a large amount of human hair. A great deal of beautiful hair is obtained from the convents. The hair from the western departments is superior to that from the south and midland departments. The price of hair not prepared and sorted is, on an average, 50 francs the kilogram; but in 1865 it rose to nearly 65 francs, and it is even supposed to have been sold at 100 francs.

In these productions there are only two kinds of manufacture—that of wigs, fronts, &c., and that of false plaits and curls. The beauty of the article varies according to the skill of the hair-dresser. In such matters the form is everything. The condition of the women and workmen employed in this trade is becoming better every day. The wages have risen considerably during the last few years; the working hair-dressers now earn on an average 5 francs a day; those women who are employed in making false plaits, &c., receive on an average 2 francs and 25 centimes per day, and those who make wigs, &c., 3 francs. Hair-dressers deal directly with the public.

The hair trade is carried on by large wholesale buyers, who obtain the hair from the travellers and small itinerant dealers, and then, after its having undergone different preparations, sell it to the hair-dressers. The average price of prepared hair is 140 francs the kilogram; wigs cost, on an average, 40 francs the piece, and chignons 15 francs. In France are sold annually 68,000 kilograms of hair, of which 40,000 are French and 20,000 from Italy, Belgium, and Germany; 8,000 kilograms of refuse hair are gathered in the hair-dressers' rooms and other different quarters. Great Britain, America, and Russia buy from France 30,000 kilograms of hair; 25,000 kilograms are employed in France in making wigs, &c., and about 13,000 are exported into different other countries. During the last few years a great many new kinds of fabrics in which to implant the hair for the making of wigs have been invented. They are made of all kinds of materials—silk net, cotton net, and silk gauze; there is even a fabric woven of white hairs. All the wigs, plaits, &c., are made by women, as well as the watch-chains, bracelets, and other fancy articles in hair.

CLASS 36.—JEWELRY AND ORNAMENTS.

"The articles exhibited in this class form two principal divisions, and comprise: 1. Fine and imitation jewelry; 2. Trinkets, including gold ornaments, decorated or enriched with precious stones or enamels; plated jewelry; copper gilt jewelry, which may be decorated with imitation pearls, coral work, steel and black ornaments.

"According to the distinction made in France, gold and silver are mere accessories in jewelry, but precious stones are essential; while the contrary is the case with respect to trinkets or bijouterie, (which terms do not correspond with those used in England.) Paris is the chief seat of the jewelry and ornament trade of France; after the capital city comes Lyons, Marseilles, and the departments of Cantal, Puy de Dôme, and Ariège. Watch cases are made especially at Besançon. The lapidary trade, both for precious and other stones, has become a very important branch of industry in the Jura.

"The chief materials used in the manufactures of jewelry are diamonds, precious stones, pearls, or imitation gems. The prices of pearls and precious stones are very variable, on account of weight, color, and quality. The principal sources are India, the Indian archipelago, Siberia, and the central regions of the new world. The raw materials of bijouterie are: gold, of the value of 2,600 francs the kilogram; and silver, worth 200 francs the kilogram. The chief sources of supply are Australia, Siberia, and North America. The jeweller receives the cut gems from the lapidary, who, from his experience, is enabled to add greatly to their value. The cutting is performed with the aid of a mechanical process. The business of the jeweller is to mount the gems or other substances, his trade being especially one of taste. The workman models and chases the precious metals, and enriches them with enamels, or with gems or stones. The elements employed by both, such as the bezels or settings, bodies of rings, and other parts, are produced with the aid of cutting presses, rollers, and other machines. Plated jewelry work is executed, with the aid of machinery, with such perfection that sheets of copper, upon which are soldered plates of gold one-twelfth the thickness of the former, are transformed into ornaments of all kinds without exhibiting a trace of the existence of copper. In these trades, with the exception of a few special cases, the masters rarely employ more than eight or ten workmen, and on one-quarter of the whole work alone only employ one journeyman and apprentices. The operatives sometimes work in the shops of their employers and sometimes at home; the last-named representing about one-tenth of the entire body. Women are also employed to the extent of about 20 per cent., but chiefly in polishing. The principal markets for the exportation of jewelry and trinkets are Spain and her colonies, the United States, Brazil, Turkey, Egypt, Italy, Switzerland, England, and Russia.

"The quantity of gold annually employed by the jewellers and goldsmiths of France is equal to 17 tons, and of the value of 44,200,000 francs, (£1,768,000.) The silver amounts to 89 tons, of the value of 17,800,000 francs. The workmanship adds 60 per cent. to the value of the gold and 40 per cent. to that of silver. The total value of the production is therefore 95,640,000 francs, (£3,825,000.) The exports of gold jewelry are equal to two and a half tons, and of the commercial value of 10,400,000 francs; and of silver work to eleven and a half tons of the value of 3,150,000 francs, (£126,000.) The diamonds, pearls, and other gems are not included in the above estimate. The trade is carried on by 1,250 manufacturers, who employ 20,500 persons, of whom 12,500 are workmen, properly so called. It is estimated that 2,000 wholesale dealers and 1,000 merchants are engaged indirectly in disposal of the produce of the trade.

"The employment of machinery has become general since 1855, and has reduced the cost of production without detracting from the perfection or finish of the work. Plated gold jewelry is without a rival abroad, and enables French commerce to compete with the low-standard gold work of England and Germany. The formation of a company for sweep-washing, and the reduction of the products, the initiation of a syndical chamber, and of an association formed of masters and workmen, have greatly favored the progress which the jewelry trade commenced to make in 1855."—*Introduction to the class; official catalogue.*

ENGLISH AND FRENCH JEWELRY.

The principal exhibitors in this class were France and England. In the absolute merit of the goods exposed—speaking only of the finer sorts—it would be difficult to say which excelled the other. English jewelry, in accordance with English taste in general, is characterized by solidity and massiveness. French jewelry, on the contrary, aims at lightness of effect and beauty of design. The English try to make their precious stones secure; the French to make them fascinating and also secure. The precious stones of a piece of jewelry are let into small cells cut for each individual stone out of a solid piece of silver or gold. The stones when inserted into these have to be secured that the portion of the edge of the stone held by and therefore concealed in the setting may be the smallest portion possible consistently with firmness of grip. To avoid the vulgarity of heaviness and the insecurity of lightness requires the nicest skill. Precisely as the artist triumphs over these difficulties does he produce a work of excellence and durability.

There was a dazzling display of diamonds particularly noticeable in the French court where the exhibitors were together, and the opportunity for contrast and study were most readily commanded. In the English section the exhibitors occupied little stalls of their own like sentry boxes, and isolated themselves as much as possible from their neighbors.

The productions of Mr. Massin and Mr. Froment Meurice were remarkable for perfection of workmanship and richness of materials. One of the most beautiful examples, by the first-named jeweler, was a sprig of wild rose executed in diamonds, presenting the lightness, the suavity of curve, elasticity of bough, and other characteristics of nature itself. In perfection of symmetry and radiant simplicity it was almost faultless.

A pair of earrings shaped as rosebuds, whereof the bud was a pink pearl, formed an exquisite adjunct to a parure of similar treatment representing a rose branch, while a charmingly rendered water-lily and a cornflower of sapphires and diamonds may further be pointed out, as lovely specimens of Mr. Massin's handling of the forms of nature. These works were carefully scrutinized by the jury and found to be as firm as they were light and elegant.

The value of Mr. Meurice's jewels was mainly in the workmanship. A head ornament of colored diamonds, a shell with a sprig, was the most elegant and probably the most valuable ornament of the kind in the Exposition. It is extremely difficult to match colored diamonds. These were extremely well mated and worked up. Among them were some pink diamonds, which, with more brilliancy, had almost the depth and color of the ruby. There were also green, yellow, and brown diamonds among them.

The fashions seem once more to incline to colored gems. Lemoine made an immense display of dark pearls in all shades of green, red, pink, yellow, and brown. They are used mainly in combination with diamonds.

Boucheron, another maker of repute, had a good display of diamond jewelry. A single pair of earrings in this case was worth $120,000 in gold. They were set with simplicity, but each weighed 23 carats. The same maker exhibited many articles where the skill of workmanship exceeded the value of the material.

In a different, but not much cheaper way, were the agates and rock crystals of Duron set in the style of Benvenuto Cellini and his school; works of art that would worthily occupy a place in any collection.

In an adjoining case were two necklaces of half crystalized black diamonds, a mineral phenomenon little known, and remarkable more for its rarity than beauty.

The jewels of the Countess of Dudley, exhibited in the English section, were the finest in the Exhibition, both as regards the size and color of the stones employed. They were shown, with many other splendid specimens of work, in the cases of Messrs. Hunt and Roskell.

Mr. Harry Emmanuel and the other British makers amply sustained their world-wide reputations.

The effort of the present time in the manufacture of diamond jewelry is to give movements to the different parts by which the reflections and refractions are increased.

DIAMOND-CUTTING ESTABLISHMENT.

The illustration of the processes by which precious stones or other artificial imitations are wrought was excellently given by Mr. Coster, of Amsterdam, who had a diamond-cutting factory erected in the Park, fitted up with the customary machinery and occupied by his regular workmen. The first rough shaping of the more important facets of the brilliant is performed by operating with two diamonds at once, each firmly secured in a handle and bruising each against the other, angle against angle. The dust that falls from the stones is preserved for the subsequent processes of grinding and polishing those facets that distinguish the many-sided brilliants from the dull original crystal of diamond. It is used, mingled with oil, on a flat iron disk, which revolves rapidly by means of steam power, the stone being laid upon this disk or wheel and pressed upon it by means of a weighted tool, which the attendant watches carefully. Skill of eye and hand, only attainable by great practice, is needed for this work. But more curious still, and requiring equal or greater skill, is the cleavage, or splitting of the stone. A little notch is scratched in the diamond by means of a knife pointed with the same material. A steel blade is then inserted in this opening, and a tap cleaves the stone in the direction required. The process is rapid and based on mathematical rules which govern the splitting of the stone. The diamond, when a blow is struck on an edged tool placed parallel to one of the octahedral faces of the crystal, readily splits in that direction. It was not the less remarkable to see the process so aptly performed.

There were other objects of interest in Mr. Coster's exhibition. For the first time the diamond was exhibited side by side with the minerals that accompany it in the river-bed of Brazil; and there were very rare examples in which crystals of diamonds were included within a mass of quartz crystals, having all the appearance of having been formed simultaneously with the diamond, but believed by some of the mineralogists to be artificial combinations. But the most extraordinary curiosity possessed by Mr. Coster was a rose-pink diamond of some 29 carats, endowed with the marvellous property of becoming perfectly bleached by an exposure of some four minutes to the effect of the atmospheric light. It recovers its rose color at a gentle heat and retains it for any length of time in darkness.

It may not be uninteresting in this place to give some particulars of Mr. Coster's Amsterdam establishment, which employs 316 lapidaries, assistants and apprentices, 88 cutters, and 21 splitters, forming an aggregate of 425 workmen, and receiving from $5,000 to $6,000 per week for wages. The annual importation of the diamond in the rough state amounts to nearly 1,000 pounds troy. Of this immense quantity Mr. Coster has received nearly half. For the finer varieties of diamond, averaging in weight under half a carat, a price equivalent to $50 or $55 (always in gold) a carat is now paid; and the price has doubled since 1848, at which date $22 or $25 would have purchased diamonds for which $50 or $55 have to be paid now. Thus a diamond of 2 carats weight, worth then some $150, is now worth from $300 to $350, and sometimes more; while a perfect brilliant of 4 carats is now worth from $1,000 to $1,500. When Jeffries wrote his book on the diamond, a century and a half ago, a carat diamond now worth $85 was valued at $40.

Two of the three great existing historical diamonds were cut by Mr.

Coster. These were the Koh-i-noor, of 103 carats, and the Star of the South, a Brazilian stone, slightly brown in hue, of 125 carats. The third, known as the Pitt or Regent diamond, the well-known crown jewel of France, weighs 135 carats, and was cut in the last century.

Among the curious uses of diamonds, rubies, and other fine stones, may be mentioned that of using them for the purpose of drawing fine wire. They are drilled to the requisite diameter, and answer the purpose better than any other material. Precious stones are also used for the working points of watches, for pointing drilling machines, and many other purposes. Indeed, the increased price of the diamond may be ascribed to the fact that it is rapidly becoming a tool as well as an ornament. Thus, while it is superseding steel, steel revenges itself by stepping into the polite domains of the diamond. It has even created a sensation there. Much of the fine steel jewelry exhibited in the Exposition was second only in delicate faceting and brilliancy to that of the diamond itself.

There was but a single exhibitor in this class from the United States. It was to be regretted, inasmuch as in a medium style of cheap jewelry the United States can, owing to the great use of machinery, be compared favorably with the best.

CLASS 37.—PORTABLE ARMS.

The manufactures included in this class form three distinct series: 1st. Sporting and gallery fire-arms, comprising fowling-pieces, rifles, pistols, revolvers, duck-guns, blunderbusses, and military arms for exportation; 2d. Side-arms and other arms, such as sabres, swords, foils, poignards, bayonets, axes, maces, casques, shields, cuirasses, &c.

The principal centres of production in France:

1st. For fowling-pieces and highly-finished fire-arms, are Paris and St. Etienne. The latter place, producing the largest quantity, may therefore be considered as the chief seat of the trade. Paris is famous for its highly-finished arms. Her models are sought by all nations, and the arms produced by her manufacturers are justly renowned for the finish of the work, the perfection of the details, and the elegance of the forms.

2d. Military arms for exportation are produced almost entirely by the directors of the factories of the state, at St. Etienne, Chattellerault, (Vienne,) Tulle, (Corrèze,) and Mutzig, (Bas Rhin,) and by private makers in Paris and Maubeuge, (Nord;) certain detached portions are made at Charleville, (Ardennes.)

3d. Swords and other side-arms are made at Chattellerault, Kingenthal, (Bas Rhin,) and St. Etienne, but the whole of the mountings, scabbards, and accessories are produced in Paris, where they form a special industry, remarkable for artistic workmanship and finish.

4th. The manufacture of percussion caps, priming, and cartridges, is confined exclusively to the metropolitan departments of the Seine and Seine-et-Oise, and is in the hands of five or six manufacturers, who are enabled not only to supply the entire home demand, but also to export a considerable quantity.

The iron and steel employed in the manufacture of fire and other arms are produced on French soil. For the finer arms the iron is derived from the department of the Vosges, and costs, on an average, 66 francs the 100 kilograms, (33 francs the hundred weight.) The steel comes from Isère and Loire, and costs from 120 to 150 francs. The mountings and accessories of swords and other side-arms require, also, copper, horn, leather, ivory, mother-of-pearl, silver, gold, and other materials. Steel forms the chief material of military arms; it is derived from the basin of the Loire, at Rive-de-gier and Ferminy, and is delivered, on an average, at 95 francs the 100 kilograms for cannons, and at 160 francs for sabres, bayonets, and cuirasses. The price of the iron employed in the making of military arms is 65 francs the 100 kilograms. Steel forms about three-fifths of the material of the arms manufactured in France, and its amount is estimated at 2,500 tons per annum for all kinds of arms. The walnut wood used for gun-stocks is produced at Auvergne and Poitou; the price of the wood when cut up is about 2 francs per piece for military arms, and 8 francs for fowling-pieces. Percussion caps, priming, and cartridges are manufactured with Chilian copper, which, when refined and rolled out, is worth in France, on the average, 250 francs the 100 kilograms. Brass wire only costs 225 francs. The makers of these articles use about 500 tons of copper per annum. The fulminating powder is composed of mercury, from the mines of Spain, costing 5 francs 40 centimes per kilogram; alcohol, mineral acids, nitrate of soda, and chlorate of potash, at the price of 4 francs. These last materials are of French production. The making of cartridges absorbs annually 200 tons of paper, made in France, and costing from 60 francs to 170 francs the 100 kilograms. Lastly, the materials of felt wads cost 28 francs the 100 kilograms.

Machinery occupies daily a more conspicuous place in the production of the barrel, the stock, and certain other parts of military fire-arms. For the barrels, the principal means employed are the tilt-hammer, for faggoting iron and steel; rollers, the lathe, and slide-rest, to replace the file; drilling, boring, and rifling machines. The barrels of highly-finished arms are manufactured with the aid of the same machines and tools, to which, however, must be added the soldering furnace, for uniting double barrels. Lathes, countersinking tools, and planing machines are used in the manufacture of the stocks, the lock-plates, and other portions of military arms. Lastly, the use of machines has been adopted in the making of revolvers, which have been in great demand during the last few years. Hand-labor, on the contrary, is still employed for the adjustment and fitting of the various parts of arms. The same is the case as regards highly-finished arms; and, with the sole exception of the barrel, it is easy to comprehend that the application of machinery would be almost impossible in the case of elaborate and fancy arms, which require delicate ornamentation and great variety in the form. In the case of swords and other side-arms, the operations of sharpening and mounting are also performed by hand. This portion of the manufacture which partakes of the arts of the engraver, chaser, gilder, and arm-goldsmith, in their highest phases, can never be executed without the hand of man.

Each maker of percussion caps, priming, and cartridges has his own peculiar machines and materials. These are driven by steam, and include cutting and stamping presses, rollers, filling machines, &c.

Men, women, and children are employed in the making of arms. The manufacture of percussion caps, and particularly of cartridges, employs a large number of women. Generally the work-people are employed in the shops of the manufacturers, and, under the direction of the latter, a certain number work at home. Some are paid by the piece and others by the day. The number of workmen employed in this trade is about 15,000. The arms are sold generally where they are manufactured, but especially in Paris and at St. Etienne. Paris is the principal market; the armorers there supply not only the arms called Parisian, but also many others made elsewhere, and which are sometimes finished by Parisian workmen. Paris is also the market for side-arms, mounted and finished, for the officers of the army, the officials who wear uniforms, for the provincial dealers in arms and military equipments, and finally for exportation. Paris is thus the great *depôt* for arms, as well as for cartridges. The whole production of arms, cartridges, &c., in France may be set down at about 15,000,000 francs in value. This amount, of which St. Etienne represents about 6,000,000 francs, may be divided as follows: Fire-arms and bayonets, 10,000,000 francs; side-arms, 1,000,000 francs; caps, priming, and cartridges, 4,000,000; total, 15,000,000 francs.

Among the improvements introduced into the manufacture of arms since 1855, the committee note the following: Planing machines, which allow more perfect workmanship in the barrels, as regards their finishing and boring; the many improvements made in the methods of breech-loading; the adoption of small calibre and breech-loading for military arms; the use of cast steel in place of iron for the barrels of rifled and other arms; and, lastly, the introduction, already referred to, of mechanical processes which tend to replace manual labor more and more every day. England and America preceded France for some time in these respects; but manufacturers have followed boldly the examples of these two nations, and march in their footsteps with courage and success. We must point out, also, the introduction of more ingenious methods in the manufacture of cartridges, with the view to obtain the most complete and effective combustion.

The manufacture of arms, considering its importance and the amount of trade, is not yet sufficiently developed; but sensible progress has already been made, and the impulse which circumstances have recently given to the production of military arms is aiding us to bridge over more rapidly the distances which separate France from the more advanced nations. Moreover, it is right to repeat that, in the matter of highly-finished arms, French manufacturers stand in the first rank; it defies all competition as regards artistic taste, elegance of form, and the ability of workmen. Similar superiority is also to be noted in the case of priming and cartridges. This class of manufacture, which is not of French origin, and not yet 40 years old, has grown with great rapidity, and its products, which have nearly doubled since 1855, are sought by all nations, on account of their perfection and low price. The rapidly-increasing use of breech-loading arms, and the improvements which are constantly introduced, are opening up new sources for this manufacture, and promise it an almost unlimited field.—*Alexander Fouquier, member of the committee of admission of class* 37.

It may be presumed that the invention of portable arms was almost coeval with the creation of man, inasmuch as the term means anything from a stone, or club cut from the neighboring thicket, to the electric pistol, which does not even put a murderer to the trouble of pulling the trigger. To make a weapon that would protect the bearer from the onslaughts of wild beasts was an early necessity. He did it rudely at first, but improved as he found a finer beast—man—to kill. No art has made such rapid strides as this, and no art has left behind it such unquestionable traces of its growth and progress. The tiller who whistles at his plough, in our western lands, turns up at each furrow some indication that a race less agricultural, but vastly more belligerent, has preceded him. In the gallery devoted to the so-called "history of labor" were specimens of all the earlier weapons, commencing with the flint, and progressing rapidly to the metal. The progress, even in the remote past, was rapid; in the present day it has exceeded that of any other art. Especially is this the case in fire-arms. Skill can never be abolished, either in warfare or in sporting; but a very small amount of skill is all that the manufacturer of to-day requires. The soldier blazes at his enemy at 5,000 yards until he "pots" him, or undergoes the process of being "potted" himself. The sportsman pursues his covey with cartridges that place themselves in a breech-loader, and require nothing at his hands except a touch of the finger. Well may Captain Majendie, R. A., bewail this state of things. "It is impossible," says this officer, who was also a reporter on the class, "not to feel that the interest which has hitherto attached to this class of arms has, in a great measure, departed since the general adoption of breech-loading rifles. The occasions henceforth must be comparatively rare in which hand-to-hand contests will be possible." This opinion, indeed, found practical expression in a bayonet exhibited among the English arms by Mr. Scott Tucker. It was hardly half the length of the present bayonet, and Mr. Scott Tucker suggests its adoption, on the distinct ground of "the chance of crossing bayonets being materially lessened by the introduction of breech-loaders." He claims for it the advantages of being comparatively light, cheap, strong, handy to draw and return, less easily parried, quick for thrust and withdrawal, free from chance of locking, and out of the way when skirmishing.

Of swords and spears and hand-lances the variety was almost without limits. Solingen, as of yore, distinguished itself in these branches. During the early months of the rebellion Solingen blades were regarded almost as articles of luxury; they commanded extravagant prices. Here are the terms upon which they are supplied in Europe: An English infantry officer's regulation sword, with steel scabbard, may be obtained wholesale for 22 francs; a French line officer's sword, for 24 francs. The process by which the Solingen makers impart to their sword blades a gilding of peculiar permanence is said to be a secret; so, also, with the precise combination of metals used in their manufacture. A good Solingen blade can be wound round the body, and when released will straighten absolutely. The blades of Toledo, much more expensive, do no more.

Swords of every shape and quality were found in almost all the sections of the building, remarkable either for excellence, cheapness, or decoration. Among the latter class may be included nearly all weapons that came from the east. Turkey, for instance, had no fewer than 102 exhibitors, and about the same number of articles.

In long-range arms of precision there has been but little progress made since the introduction of the conical gas-expanding bullet of 1855, but an infinite variety of small improvements have been introduced for the better throwing forth of the projectile. The American rifles were considered among the best exhibited. The object of late has not been to secure greater length of range, but to obtain a quicker rate of discharge; hence the breech-loaders. Weapons of this make were naturally the features of the Exhibition. Twelve years ago breech-loading had been largely applied on the continent of Europe to sporting guns, but it has not been applied to any considerable extent (except in Prussia) to rifles, either for military or sporting purposes. In 1867 it was the accepted principle of all military arms. The battle of Sadowa abolished all theories on the subject. The principal result showed that the breech-loader was the most deadly weapon on that memorable day. Every government is now supplying its troops with new pieces on this plan, or altering the old ones in conformity with it. Models adapted for either purpose were exhibited in every court. The superiority of the breech-loaders having been accepted, a new question has arisen, namely, whether the central fire, or the pin or rim fire, is the best. It is a matter which has been fully discussed in the report of the American commission appointed to inquire into it.

Nearly all the small-arms on the revolving principle were made in accordance with well-known American inventions. The American display of these weapons was very good.

A novelty, already referred to, was exhibited in the American department, consisting of a gun fired by electricity. The apparatus is concealed in the stock. It is claimed for this mode of ignition that there will be less danger in preparing the cartridge, inasmuch as it contains no fulminating powder, and that, for a like reason, there will be no risk in the transportation of ammunition; also, that the arm cannot be fired accidentally, and that, as there is no blow of the hammer, there is no inevitable deviation in the aim of the person who fires the piece. The rapidity of fire is claimed to be greater, and the escape of gas less, than in other arms. All these points have yet to be proved in practice.

Another curiosity was a muzzle-loading cap gun, having two bullets for each barrel, the piece having two barrels and four hammers. Each barrel is loaded with two charges and two balls; the front charges are fired by the front set of hammers; when these have been fired, the second pair of hammers are brought into play to fire the hinder charges. The manufacturer claims that there is no danger of the first charge exploding the second.

And still a last curiosity was a shield in the English collection, from which projects, in place of a spike, the muzzle of a breech-loading pistol. These shields formed part of the equipment of the body-guard of Henry VIII, dated 1530.

CLASS 38.—TRAVELLING AND CAMP EQUIPAGES.

This class includes four principal divisions, which again include many distinct industries.

The first division, camp equipage, comprises two branches: Articles for soldiers and articles for officers; for agents and workmen engaged in the construction of railways, of the canal of the Isthmus of Suez, &c., and scientific explorers and travellers. During the Crimean war the French government caused a great number of tents and other objects to be made, which served first for that war and afterwards in the Italian campaign. Since that time the demand has been arrested in that quarter; but foreign governments buy their camp equipage of French manufacturers, and this trade amounts on an average to about 5,000,000 francs per annum. As regards equipments for officers, agents and others, the trade amounts to 2,500,000 or 3,000,000 francs, principally for abroad.

The second series, travelling equipments, is divided into three branches: Articles in iron work, leather trunks and portmanteaus, wooden chests and ladies' travelling bags. Fifteen years since the first-named articles were all imported; at present the home manufacture supplies all demands, and, out of a production which represents about 1,200,000 francs per annum, about one-fifth is exported. The manufacture of leather trunks and wooden boxes, which took its rise in France about thirty years since, has, since the opening of railways, assumed an importance which grows every day. The value of the trade amounts to 5,000,000 francs a year, and about one-third of the production is exported. Twelve years since the manufacture of ladies' leather bags was unknown in France. It soon afterwards was established, and has since grown with considerable rapidity. The value of the manufacture is 8,000,000 francs per annum, of which three-fourths are exported.

The third series, sporting equipments, includes, besides the articles which come properly under that denomination, certain other items, among which are water-proof and waxed cloths. This class of manufactures, the centre of which is at St. Sylvain (Calvados), has followed a constantly increasing rate for several years. The manufacture amounts to 1,000,000 francs per annum, and one-third of the whole is exported. The trade in oiled and water-proof cloths is not very old in France, but at the present moment the production not only suffices for all demands of the home markets, but allows three-fifths to be exported. The raw materials employed in the construction of the above-named articles are cloths and drills, which are produced in the departments of the Nord, Sarthe, Orne, and Mayenne; leather, which is furnished chiefly from Paris; card-board, principally supplied from Lyons; poplar wood, which comes from various parts of France; and linen tissues, the produce of the Nord, Seine Inferieure, Haut Rhin, and Rhône.

Hand labor predominates in the manufacture of camp, travelling and sporting equipages, but machines have been used for a long time to perform the sewing, especially in the case of tents and bags, and their employment has greatly reduced the market price, and at the same time allowed a production of four times the quantity in the space of time. The greater part of the workmen are engaged in the shops of the manufacturers, but a certain portion work at home. Women are employed, particularly in the tent trade. In Paris those who work the machines earn from 3 to 4 francs a day; others only realize from 2 francs to 2 francs 50 centimes. The men earn from 5 to 6 francs. The iron-workers obtain 5 to 8 francs. In the other branches the wages vary from 4 to 6 francs for the men, and from 2 francs 50 centimes to 3 francs 50 centimes in the case of the women. The total number of persons engaged in the trade is between 3,600 and 4,000; during the Crimean war the number was as high as 10,000. Paris is the chief, if not the only, centre of manufacture for camp and travelling equipments. In the departments some towns, such as Lyons, Toulouse, and Tours, a few makers can be found, but they are very limited in number and work principally to order. The distribution of the trades connected with the production of sporting requisites has been already shown.

It will have been seen, by what has already been said, that the raw materials used by the manufacturers of the articles which come under Class 38 are almost exclusively of home production. The value of the trade amounted in the year 1865 to about 25,000,000 francs, and one-half of the amount produced was exported. The date of the commencement of these various branches of industry is but recent; they had scarcely arisen at the time of the Universal Exhibition in Paris in 1855. Since that period, however, they have developed rapidly; and, at the present time, in consequence of the improvements brought to bear in every part of the manufacture and the good taste and finish of the articles, France has nothing to fear from any rivals whatever, and can even cope with them in their own markets.

The fourth series comprises blankets and rugs. This trade, although confined to a small number of houses, has assumed very great importance in France, and employs a considerable number of workmen. The trade not only supplies the home market, but exports a part of its productions. The chief materials used are wool and cotton; hair of different kinds is also employed, but there are no examples of this in the Exhibition. Wool performs the most important part in the manufacture. That of France is the most esteemed, but wool from Africa, the Levant, and La Plata is also employed. Algerian wool is capable of being bleached to almost absolute whiteness, but its quality is not equal to that of France. The manufacture of white woollen blankets presents great difficulties; like that of cloth, it has to pass through all the operations of spinning, bulling, &c., without possessing the resource of dressing to remedy imperfections. The employment of cotton blankets is less common, but the simplicity of the method of manufacture and the moderate price of the raw material gives them a special interest, as coming within the means of the less wealthy classes. It is to be regretted that the manufacture of railway rugs is not represented by French producers, especially as that industry, which has become very important, is essentially remarkable for the improvements that have been introduced, and which give the productions incontestable practical advantages over those of other countries.

There was a good display of French articles in this class, but considering the importance that travelling has assumed of late years, and never more so than in 1867, the competition, if it can be dignified by the name, was strikingly poor. There was no novelty worthy of record. America had nine exhibitors, among them the Quartermaster General of the United States army, who exhibited the material in use for transportation, clothing, and equipment in camp and in garrison.

CLASS 39.—TOYS.

"Class 39 comprises: 1. Automatons, (mechanical figures and animals.) 2. Toys in general, including an immense variety of articles, of which dolls form the most important branch, and among which may be mentioned, besides kitchen utensils, dinner and tea things, card-board boxes and other articles, dressed figures, animals and arms. The greater number of toys are manufactured in Paris. The common wooden playthings form the special trade of the town of Liesse, Aisne. Limoges supplies the China services, which are ornamented in Paris; at Nevers and Sarrequemines are made these same articles in various kinds of earthenware. The manufacture of the different kinds of toys necessitates the use of the greater portion of the raw material known, and the co-operation of nearly every trade. Nearly all the Paris toys are made by hand, by men and women; children are not employed, being unable to bestow upon the work the excessive patience and minute attention which it demands. Cutting and stamping presses and lathes are used for the metal and wooden toys. Few makers employ more than 20 work-people. In Paris, the larger number of the men work at the shops; the number of women is about equal to that of the men. The making of dolls' clothes alone occupies several hundred women, of whom half work at home. The wages are, on an average, 4 francs a day for men, and from 1 franc 75 centimes to 2 francs a day for women. The makers deliver their products to the retail dealers and to agents for exportation. Very few among them export directly to other countries. The manufacture of small wares occupies about 2,200 people, and business is done in it to the amount of 10,500,000 to 11,000,000 francs (£440,000) a year, of which two-fifths are realized by the exportation trade. The toy manufacture is making rapid progress; the models are more varied and have more taste and elegance; greater attention is paid to the work and the prices have nevertheless diminished. Automatons and mechanical playthings have been brought to great perfection, and the singing birds are made to imitate nature so far as to deceive the most practiced ear. Certain instructive toys, moved by electricity, can, without danger, be placed in the hands of children. Numbers of dolls are made whose trousseaux show so much taste and are so elegant, that they are constantly used by dress and bonnet makers as types of Parisian toilettes."—*From the translation of the official catalogue—France.*

It is not necessary to add anything to the above *résumé*, except that the few exhibitors in other countries seldom rivalled and never excelled the French makers.

GROUP V.

PRODUCTS, RAW AND MANUFACTURED, OF MINING INDUSTRY, FORESTRY, ETC.

CLASS 40. MINING AND METALLURGY.—CLASS 41. PRODUCTS OF THE CULTIVATION OF FORESTS AND OF THE TRADES APPERTAINING THERETO.—CLASS 42. PRODUCTS OF SHOOTING, FISHING, AND OF THE GATHERING OF FRUITS OBTAINED WITHOUT CULTIVATION.—CLASS 43. AGRICULTURAL PRODUCTS (NOT USED AS FOOD) EASILY PRESERVED.—CLASS 44. CHEMICAL AND PHARMACEUTICAL PRODUCTS.—CLASS 45. SPECIMENS OF THE CHEMICAL PROCESSES FOR BLEACHING, DYEING, PRINTING, AND DRESSING.—CLASS 46. LEATHER AND SKINS.

CLASS 40.—MINING AND METALLURGY.

This class included:

Collections and specimens of rocks, minerals, and ores, ornamental stones, marble, serpentine, onyx, hard rocks, refractory substances, earths and clays.

Various mineral products; sulphur, rock salt, salt from salt springs, bitumen and petroleum.

Specimens of fuel in its natural state and carbonized; compressed coal.

Metals in a crude state; pig iron, iron, steel, cast steel, copper, lead, silver, zinc, &c.; alloys.

Products of washing and refining precious metals, of gold-beating, &c.

Electro-metallurgy; objects gilt, silvered, or coated with copper or steel by galvanic process.

Products of the working of metals; rough castings, bells, wrought iron, iron for special purposes, sheet-iron and tin plates, iron plates for casing ships and constructions, copper, lead, and zinc sheets.

Manufactured metals; blacksmiths' work, wheels and tires, unwelded pipes, chains, &c.

Wire-drawing; needles, pins, wire-work and wire gauze; perforated sheet iron.

Hardware, iron-mongery, edge tools, copper, tinware, &c.; other metal manufactures.

As almost all the countries that participated in the Exposition were able to send raw materials, the number of exhibitors in this class was very great, as will be seen by the following list, which shows the number of exhibitors from each country of importance:

France	349	Belgium	104
Algeria	33	Prussia	515
Holland	7	Hesse	2

Bavaria	25	Sweden	97
Wurtemberg	9	Norway	19
Austria	182	Russia	91
Switzerland	14	Italy	262
Spain	183	Turkey	210
Portugal	39	United States	68
Greece	79	Great Britain	137

Colonies and dependencies of Great Britain:

Barbadoes	3	Newfoundland	12
Canada	68	Nova Scotia	22
Cape of Good Hope	8	Queensland	10
Malta	6	South Australia	17
Natal	15	Victoria	6

It should be observed that in the case of Prussia, and perhaps some of the other countries, each mine, or company, or individual furnishing specimens of minerals to the collections was enumerated as an exhibitor, thus repeating many times the same product. If the names of all the donors to the collections from the United States had been sent in, the list would, in like manner, amount to many hundreds.

In neatness and careful preparation the Prussian mineral collection was the finest in the Exposition. The specimens were all rather large, but were uniformly trimmed and well arranged. The whole was illustrated by numerous well drawn and colored maps and sections of mines, and by models of furnaces. The collection comprised the products of the mines and quarries of the country, and was systematized and arranged under the orders of the minister of commerce and public works by Doctor Wedding, mining engineer, who received a silver medal from the jury as a recognition of his labors. It was accompanied by a special printed catalogue. The principal minerals shown were coal, iron ores, copper ores, and argentiferous lead ores. The salt mines of Stassfurt were represented by a quantity of the salt cut from the mine in large blocks and built up in the Exposition building into the shape of a half dome. A very interesting series of salts of potash found above the salt bed were also shown. These potash salts are now largely used for the preparation of manures and for other purposes requiring potash. The supply is believed to be practically inexhaustible, and it has already greatly diminished the demand for wood ashes.

Spain made an exceedingly interesting exhibit of its ores in a building erected specially for the purpose and for the agricultural products, in the Park. The prominent objects were blocks of cinnabar from the famous mine of Almaden, which is still largely worked.

In the Russian section there was an interesting suite of models of famous meteorites, and many pepites and nuggets of native platinum from the Siberian mines of Prince Demidoff. The display of wrought and sheet iron was very good, but the chief attraction was the variety of rough and polished precious stones, and large vases and candelabras made of malachite, jasper and rhodonite, (described more particularly under class 15, Group III.)

Among other notable objects was a mass of beautiful malachite, very solid, weighing over two tons, from the mine of Prince Demidoff. This mine was discovered in 1814 and has yielded 35,000 *pounds* of malachite, about 700 tons since 1840, besides a large amount of copper. A mass of native copper sent from the Kirghiz steppes, Siberia, and weighing about 1,500 pounds, much resembles the specimens from Lake Superior, and like them contains some native silver. The most remarkable exhibit of graphite was made by J. P. Alibert, of Mount Batougol, near Irkoutsk, Siberia. A large glass case was filled with blocks of the graphite cut and fashioned into various forms and exhibiting a fine polish.

MINERALS FROM THE UNITED STATES.

The mineral exhibition of the United States was very creditable. The coal, iron, lead, copper, zinc, gold, silver, and quicksilver, and the petroleums of Pennsylvania and California, were all represented. Among the iron-ores may be noted a large mass from the Iron mountain of Missouri, blocks from Lake Superior, and masses from the iron region of Lake Champlain. There was also a large representation of our limonite ores, and of the franklinite from New Jersey. The recently discovered *black band iron ore* was there also, and was doubtless thought by most persons to be coal, it is so black and coal-like in appearance. This ore is said to form a bed five feet thick directly below the anthracite coal, or only 150 feet from it. It contains 39 per cent. of iron and 35 of combustible matter. Its enormous value can hardly be estimated.

Several large and very rich masses of silver ore from the Poorman lode, Idaho, attracted much attention, and received recognition from the jury by the award of the gold medal. These masses occupied the summit of a pyramidal mass of ores in which were found blocks of iron ore from Missouri Iron mountain and Lake Superior, copper and ingots from Lake Superior, coal of Pennsylvania, silver ore from California, and rock-salt from Louisiana.

The copper of Lake Superior was well represented by specimens of the crystallized metal and of the minerals which accompany it, sent by Mr. Bigelow of Boston.

The gold-bearing quartz of California, and the ores of copper, quicksilver, lead, iron, manganese, and other metals, together with the salt, borax, sulphur, coal, and petroleum from the same State, were exhibited by a collection classified and sent forward by W. P. Blake, the State commissioner, and which received a silver medal. The gold ores of Colorado were shown by a large and brilliant collection arranged by J. P. Whitney, of Boston, commissioner from the Territory, who received a gold medal for the display.

The Chester Iron Company, of Massachusetts made a very interesting exhibit of the ores of iron and emery, with the associated minerals from

Chester, Massachusetts. This emery was discovered a few years since by Dr. C. T. Jackson, of Boston, in the ores of the company, and it is now largely explored. The jury signalized the value of this emery, and of the discovery, by awarding a silver medal to the company and a silver medal to Dr. Jackson as the discoverer.

The minerals of the United States section were catalogued by Mr. D'Aligny, commissioner, to whom the jury awarded a silver medal.

IRON AND STEEL.

Wrought iron, in all its forms, figured largely in this department of the exhibition. Enormous bars, plates, and girders were to be seen in the English, French, Russian, and Prussian sections. The iron ores of Sweden were represented by large blocks which formed the base of a pyramid of iron bars and rods, square, round, and twisted, together with samples of the various grades of pig iron and bars of steel.

The manufactures of the cast-steel works of F. Krupp, in Essen, Prussia, were represented by a cast-steel ingot, locomotive tires, railway axles, junction rings for steam boilers, crank shafts for marine steam engines, and plates or girders, besides several breech-loading rifled guns, all of cast steel.

The ingot of steel is the largest ever made. It is about 10 feet high and 56 inches in diameter, and weighs 40 tons. The upper end of the block is forged into an octagonal shape, and the whole is to be forged under a 50-tons hammer into a marine crank shaft. Cast-steel tires for locomotives form a very considerable portion of the manufactures of this establishment. Nearly 40,000 are made each year. They are all forged out of ingots without welding. This is accomplished in the following manner: The ingots are first forged out into long plates, from which rectangular pieces of the weight of the intended tires are cut off. A slit is then made in the centre of these pieces and the opening is enlarged by wedges until a ring is formed, and this ring is ultimately worked into a tire in a rolling mill.

One great attraction of the Exposition was the enormous steel gun from this establishment. This was 210 inches long, 14 inches bore, and weighed 50 tons. It is intended for the arming of coast batteries to defend them from the attacks of plated ships. It required sixteen months' work day and night to complete this monster gun.

The works of Mr. Krupp cover about 450 acres, 200 of which are roofed over. He employs 8,000 men, and 2,000 more at the iron and coal mines. The value of the yearly production of these works is said to be over $7,500,000.

The exhibition made by the Bochum Company, Westphalia, is also exceedingly interesting. Four bells of cast steel weigh, respectively, 1,800, 4,500, 9,000, 14,750 kilograms. The largest is nearly 10 feet in diameter at the mouth. This company also show a string of 22 car-wheels all cast in one piece connected at the hub, the whole weighing nearly 10,000 kilograms; and also the cylinder of a locomotive engine with steam pipes and box and flanges, complete in one piece of solid cast steel as it came from the mould.

The exhibitions of steel, iron, &c., in the French department were remarkably fine and complete. The largest ingot of cast steel weighed 25,000 kilogram, or about half as much as the great Krupp ingot. Beautifully finished steel cannon and fittings were shown in connection with thick armor plates for ships, some of which had been indented by pointed shot from heavy rifled guns. These guns and steel ingots were placed in buildings in the Park, where a great variety of the products of iron and steel works were arranged together.

One of the most interesting exhibits in the whole Exposition was the collection of ornamental iron castings from the foundries of Durenne at Sommevoire, consisting of bas-reliefs, busts, statuettes, and figures of the size of life. The success which has there been attained in the reproduction of fine works of art is wonderful. The castings are beautifully smooth and sharp, and when covered with copper, by the galvano-plastic process, they have the appearance and durability of bronze.

In the English section, Messrs. Johnson, Matthey & Co., of London, exhibited an extensive collection of the precious metals, and of large stills made from platinum for the use of manufacturers of sulphuric acid. One of these stills was sufficiently capacious to concentrate eight tons of acid a day, and was valued at $12,500. These stills are made without joints, soldered with gold as formerly, the joints having been formed by autogenous soldering. There was also shown in the same case an ingot of platinum forged into one mass large enough to make a five-ton still. The collection contained many of the rarest metals, such as ruthenium, osmium, iridium, &c. The total value of the exhibit was estimated at $100,000.

CLASS 41.—FOREST PRODUCTS AND INDUSTRIES.

The collections of specimens of forest trees, of timber, boards, and of ornamental wood, were very extensive. France, Austria, Canada, Norway, and Sweden, Russia, Brazil, and Australia were the principal exhibitors. Austria, by the Administrations of the forests of the different states, sent the trunks of oak, fir, pine, and other trees, with a great variety of planks, boards and timber for building purposes. The trunks of the large trees were sawed into lengths convenient for transportation, and were afterwards united upon the ground. The great size of these objects prevented their being received into the buildings, and they were placed in a group together in the Austrian section of the Park.

The exportation of Austrian woods is increasing, and has already reached the total value of 75,000,000 francs. Full statistics are given in a brochure prepared under the orders of the minister of commerce and political economy, and entitled "Les Richesses forestières de l'Autriche et leur exportation" Vienna, 1867.

The Canadian exhibit attracted much attention by the size of the hewed timbers of fir and pine, and the beauty of the specimen slabs of the walnut, maple, oak, ash and other forest trees. This collection was prepared under the direction of the Abbé Brunet, and was accompanied by a complete descriptive catalogue, forming a pamphlet of 64 pages. A gold medal was awarded by the jury.

The Brazilian woods were tastefully arranged in a room, with the walls and ceiling painted in imitation of the forests of the country.

The saw-mills and lumbermen of Norway and Sweden united in sending samples of their sawed and planed lumber suitable for building. There are in Norway 3,300 saw-mills, and the annual production of lumber is said to be worth about $12,000,000. The exports in 1865 reached a value of 45,600,000 francs—about $9,120,000. A little over one-half of these exports consist of sawed lumber, and the remainder is in the form of logs and timbers; the latter are sent chiefly to Holland and England.

The State of California failed to send the cross-section of the great tree *Sequoia gigantea*, as proposed. It was found that a cross-section of a tree 30 feet in diameter would weigh several tons, and that it could not possibly be transported from the forest in season for the exhibition. There were several samples of a beautiful ornamental wood from that State, a species of *arbutus*, the "madrona" or "laurel," which were remarkable for their beauty of grain. An ornamental door made of this wood by J. D. Boyd, of San Francisco, was very beautiful in this respect, and also in finish. There were contributions from the States of Illinois, Missouri, Kansas, and Wisconsin.

FORESTS OF FRANCE.

The French exhibition was beautifully arranged in a saloon of gallery V, at the end adjoining the main avenue. Sections of all the principal kinds of forest trees of the empire were ranged around the walls, and the interspaces were filled with moss. The tables in the centre supported models of the mills, and of the machines and tools used in cutting and preparing the timber for market. The following general exhibit of the extent of forests of France, and of the industries immediately connected with them, was prepared by the committee of admission of the class, and is extracted from the translated catalogue.

"The objects shown in this class fall under four principal divisions:

"1. Collections and models, including specimens of all kinds of timber and woods indigenous to or naturalized on the soil of France; the tools, implements and machines used in the forest, and in the various occupations carried on there; models of habitations and buildings, such as keepers' lodges and cottages, establishments for sawing, for the inspection of timber and other operations; plans, in relief, of various works executed in important localities; the replanting of the Alps, and the most remarkable methods employed for clearing forests situated in hilly countries; saw-mills, water-mills, &c.

"2. The more important products of forest industry, such as cork, fibres, tanning materials, charred wood and charcoal.

"3. Timber cut up and prepared; mouldings, shaped woods, clap-boards, staves and other split wood.

"4. Coarse basket work, wooden-shoe making, &c.

"Amidst these various products is exhibited the forest chart of France, which shows in the most striking manner the importance of the woodlands of the country, and the remarkable relation which exists between them and the geological constitution of the soil. The collections of class 41 will be completed on the most interesting manner, by a series of specimens of destructive forest insects, with a selection of timber ravaged by the fructifications of a certain number of exotic coniferæ which must be regarded as naturalized; lastly by a series of publications on practical or scientific questions relating to sylvaculture. The collections of transverse sections of trees, and of other specimens of timber, will exhibit the marvellous productiveness of the soil of France in ligneous matters. The many kinds of timber and other woods will be represented by numerous samples from various parts of the country where the trees which furnish them exist under the most varied conditions. The examination of these specimens will show how the qualities of the same species of tree vary according to the fertility, the exposure and the mineralogical composition of the soil.

"The most important wooded spots of France are: in the north, the forest of Fontainebleau, 17,300 hectares;[1] Compiègne, 14,000; Rambouillet, 13,000; Villers Cotterets, 11,500; Mormal, 9,000; in the east, the forest of Chaux, 11,500 hectares; La Harth, 14,500; Hagueneau, 15,000; Dabo, 11,000; Haye, 7,000; Grande Chartreuse, 6,200; in the west, the forest of Lyons, 10,500 hectares; Bercé Perceigne, 10,500; Ecouves, 7,500; in the centre of France, the forest of Orléans, 37,600 hectares; Troncais, 10,500; Viezron, 5,200; Chateauroux, 5,100; Bertranges Guerigny, 5,300; in the south, the forest of La Maitrise de Quillau, 11,000 hectares; Soule, 7,000; Lannet, 5,000.

"The woodlands of the empire amount to 8,900,000 hectares, divided as follows:

"1. 1,100,000 hectares belonging to the state, of which 49 per cent. is in timber—539,000 hectares, and 51 per cent. in coppice, with or without timber—561,000 hectares.

"2. 2,200,000 hectares, the property of communes or of public establishments, of which 36 per cent. is covered with timber—720,000 hectares, and 64 per cent. coppice, with timber or coppice alone—1,280,000 hectares.

"3. 5,800,000 hectares, the property of private owners, in timber, 17 per cent., 980,000; in coppice, with or without timber, 4,814,000.

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[1] A hectare is equal to 2 acres, 1 rood, 35 perches.

"The annual products of these forests are in the following proportions: 3 for the state land, 2.75 for those of the communes, and 2 for those belonging to private owners, giving a gross total of about 20,000,000 cubic metres, viz: timber and working woods, 2,000,000 cubic metres; wood for fuel, 18,000,000 cubic metres.

"These resources are on the increase in consequence of the numerous improvements in management and of the construction and amelioration of the means of transport undertaken upon a large scale during the past ten years in the forest lands of the state and the communes. But the production is still far from sufficient to supply the demands of consumption.

"The annual consumption in France is as follows:

"1. In timber for constructive purposes and wood used in manufactures. The naval and mercantile marine, 118,000 cubic metres; artillery and engineering, 30,000; railways, 600,000; building, 1,600,000; lath wood and espaliers, &c., 3,700,000; river navigation, carriage buildings, furniture, utensils, &c., 4,300,000. Total, 10,348,000 cubic metres.

"2. Fire-wood, 30,000,000 of steres,[1] and charcoal, 15,000,000 of steres. The consumption thus exceeds the production by the following quantities: In timber and wood for manufacture, about 8,000,000 cubic metres; in fire-wood, 15,000,000 steres. The balance is principally drawn from Norway, Russia, Germany, and Italy. The importation of common woods of all kinds, which in 1855 did not amount in value to 70,000,000 francs, was 154,000,000 in 1865. During the same period of ten years, the importation rose from less than 9,000,000 to 31,000,000. The necessarily restricted limits of this introduction renders it impossible to mention all the manufactures in which wood is employed. The number is very large and the entire catalogue of the exhibition furnishes the most complete inventory of the usages to which wood is applied. We shall ass in review, successively, the articles directly connected with forest products, and which are specially represented in class 41.

CORK.

"Cork is the substance lying beneath the true bark of a particular kind of oak, called the cork-oak, and which grows principally in Italy, Corsica, Algeria, Spain, and the south of France. The tree begins to furnish cork at the age of from twelve to fifteen years; but the first cork is of poor quality and only fit to make floats and other coarse objects, and Spanish black, which is nothing more than cork burned in closed vessels. After the first layer has been removed the cork bark is deposited with more regularity, and then yields materials fit for the finer purposes, such as the making of wine and other corks, sheets, and other well known objects used for many purposes. From the period already mentioned, the cork may be removed from the tree regularly once in 8 or 10 years, and the same tree will yield cork 12 or 15 times. Raw cork, or that which has

[1] A stere consists of 35.3174 feet.

merely been rasped, comes principally from Italy, Spain, Portugal, and Algeria. Spain supplies nearly the whole of the manufactured cork of commerce. Seville is the most important entrepot of this product. Its principal application is in the making of bottle corks; but floats and a thousand small articles, in which lightness is a necessity, are also made of the same materials. The importations into France were, in 1855, 532½ tons, of the total value of about 257,224 francs. In 1865, they had risen to 3,855½ tons, of the value of 2,502,696 francs. The export amounted to 169½ tons in 1855, and in 1865 had risen to 1,319½ tons, of the value of 1,236,900 francs.

CHARCOAL.

"Charcoal is the result of the slow and imperfect combustion of wood. It is manufactured in two different methods. The first and most general is that which is practiced in the forest itself in mounds or stacks containing from 40 to 50 steres. This process yields hard, sonorous charcoal, which lights with difficulty, but which, once in a state of ignition, gives great heat and burns for a considerable time. The second process consists in distilling the wood in closed retorts; but the charcoal thus obtained has not the qualities of the former. It is friable, very light, very porous, and highly inflammable. The quality of the charcoal (valued according to its density) corresponds pretty closely with that of the wood from which it is made. The method of burning, whether fast or slow, the age of the wood, the nature of the soil in which the tree grew, all affect the quality and weight of the charcoal. Charcoal-making is the object of an extensive industry in many European countries. In France it employs a great number of workmen, who sometimes pass whole years in the forest. Still our production is not equal to the demand, and from 150,000 to 200,000 cubic metres of charcoal are imported annually from Belgium, Germany, and Italy. In 1856 the imports were 204 tons, of the total value of 3,670,128 francs. In 1865 they had fallen to 151 tons and 2,876,000 francs. In the same period of 10 years the exports grew from 1,209 tons, of the value of 108,800 francs, to 6,698 tons and 602,800 francs.

TANNING BARKS.

"This expression is applied generally to the bark of indigenous trees used in the tanning of hides and skins. Such bark is furnished by the oak, beech, chestnut, willow, white birch, and fir trees. The departments of Ardennes, Moselle, Meuse, Meurthe, Bas-Rhin, Nièvre, Yonne, Saone-et-Loire, Cote-d'Or, Ille-et-Vilaine, Deux Sèvres, Gironde, Vaucluse, Hérault, Bouches-du-Rhoñe, Var, and Corsica, supply nearly all the bark for the tanner's purposes. The last named departments, especially, supply oak bark, which is almost entirely consumed in the neighborhood. Algeria now furnishes considerable quantities of tanning bark, which is exported, and of which France alone consumes annually about 2,500 tons. In 1865 the importation of tanning bark into France amounted to 7,678 tons, of the total value of 930,000 francs. In the same years the exportation was 15,900 tons, valued at 1,900,000 francs. In 1855 the import was only 2,216 tons, and the export 558 tons.

RESINS.

"The maritime pine tree is the only tree in France from which resin is extracted. The cultivation of this tree constitutes the principal, if not the only, wealth of the district lying between Bordeaux and Bayonne. According to the nature of the soil, the pine is tapped for resin between the ages of 20 and 40 years. The operation consists in making long incisions in the trunk, whence the resin exudes and is collected in various ways. The natural results of bleeding the pine trees, are: the soft gum or resin, which by distillation yields turpentine; the galipots, an almost solid substance, which, by means of evaporation, forms in stalactites all down the tree; the crottas, a mixture of the two former products; the barras, which are the galipots entirely dry and adhering to the tree. A pine tree 60 to 70 years old furnishes, on the average, about six or eight kilograms of raw material, of which about one-third is galipots and barras. The American war gave a great impulse to the resin trade. The following statistics will give an idea of the results in 1855. The exports of French resins did not amount to more than 4,133 tons, of the total value of 2,250,000 francs. In 1865 they had risen to the enormous total of 5,250 tons, worth 27,200,000 francs. The importations amounted in 1865 to 2,960 tons, of the value of 2,400,000 francs.

BASKET-MAKING.

"Coarse basket-work, which alone is included in class 41, includes bakers' baskets, hampers, hottes or creels, &c. The osier is the chief material used in this trade, which is principally exercised in the valleys, of Ver, Aubeaton and Hirson, in the Aisne, where osiers grow in large quantities. In the arrondissement of Vervins alone there are 3,000 families engaged in basket-making, who produce more than 2,500,000 francs' worth per annum, and of which two-thirds are exported to England and America. The importations amounted in 1855 to 105 tons, of a total value of 321,000 francs, and in 1865 only to 59 tons, of the value of 53,000 francs. The importation of osiers in bundles, which in 1855 was 105 tons, had risen in 1865 to 180 tons, of the value of 22,000 francs. The exports grew in the same period from 59 tons to 1,700 tons, the value of the last-named total being estimated at 370,000 francs.

COOPERING.

"Class 41 includes the works of the cooper, but the dimensions of the articles exhibited precluded their admission within the building, and they were placed beneath a shed in the Park. This annèxe contained a vat and various specimens of cooperage from different localities. The wood employed in this manufacture is called merrain; that is to say, oak or other wood split, according to the natural grain of the tree, into planks of various sizes, by means of a special tool, called a coulter. Merrains are produced of all dimensions, from 8 to 117 inches in length, from 3 to 10 inches wide, and from one-eighth to three-eighths of an inch in thickness.

"The chief places of production are Germany, Russia, Turkey, and the United States. The exports of the last-named country supply the greater part of the European cooperage. The best woods for making merrains are oak and chestnut. In Languedoc they also employ the white mulberry.

"The importation of merrains amounted in 1855 to 15,600,000 pieces, estimated at the value of 10,900,000 francs. In 1865 it had grown to 37,000,000 pieces, and 26,300,000 francs. Nearly the whole of the split wood imported into France is consumed in the country. The total exports in 1865 only amounted to 630,000 pieces, of the value of 390,000 francs."

CLASS 42.—PRODUCTS OF THE CHASE AND FISHERIES—UNCULTIVATED PRODUCTS.

(REPORT OF THE COMMITTEE OF ADMISSION FOR FRANCE.)

"This class includes a large number of natural products, having undergone but slight preparation. It also comprehends skins and furs, which represent a very complicated trade, and demands, particularly for the made-up furs, much special knowledge, a great deal of taste, and, to a certain extent, that creative power peculiar to the Parisian manufacturers in matters of dress and furniture.

"The natural products belonging to class 42, and which demand but slight preparation, are elephant and hippopotamus teeth, sponged tortoise-shell, mother-of-pearl, horse hair, the various kinds of hair employed in hat-making, fish oils, and collections of dried plants. We must also mention the collections of stuffed animals, for the study of natural history, the preparation of which belongs both to the domains of art and science. As to the trade in and preparation of skins, and the making up of furs, we think it necessary to make it the object of a special notice; because this kind of a product represents not only a considerable trade, but also a very difficult branch of industry on account of the dyeing and making up of the skins.

FURS.

"Paris first, and Lyons next, are the principal centres of commerce for skins and made-up furs. These articles are employed both for dress and domestic use. Of furs are made muffs, cloaks, tippets, coat collars, boas, cuffs, pelisses, carpets, cushions, trimmings for dresses, foot muffs for carriages, &c. The Parisian trade employs the most beautiful, as well as the most ordinary skins—from the rarest kinds of sable down to glossy rabbit skins, of lowest price. Articles of fur are also made with swan, grebe, and goose skins. The trade of clipping hair for hat-making also brings into use rabbit and hair skins. It is in Paris that articles in fur for dress and furnishing are most exquisitely made up. The various operations that skins are submitted to are—firstly, dressing, glossing, and dyeing. These preparations are done by special workmen, who work by the piece. When the skins arrive at the shops they have undergone no preparation whatever. They are dyed with the brush or in the vat when the skin is to be dyed also. The number of women employed in the trade is about equal to that of the men. The workmen are divided into dressers, glossers, fullers, cleaners, and cutters; the women are seamstresses and mounters. The salaries of the men vary from 6 to 7 francs; those of the women from 3 francs to 3 francs 50 centimes daily.

"The fur trade in France includes three classes of dealers: 1. The colorers of skins; 2. Wholesale skin and fur merchants; 3. Furriers or makers-up of furs.

"The price of furs varies to infinity—from the rabbit skin, worth about 50 centimes, to the Siberian sable skin, the price of which rises to 500 francs. The greater part of the best furs are sold in Paris; the rest are bought in the departments and abroad.

"Paris possesses about 30 hair-clipping establishments, which produce annually material amounting in value to 20,000,000 francs. The horse-hair trade is also very important, and gives rise to a considerable movement.

"A large amount of business is also done in sponges. The dealers who are engaged in this branch of trade are at once fishers, importers, and cleaners of sponges. The preparations to which sponges are submitted increase their value from six to eight per cent.

"It is difficult to state precisely the value of the furs made up in France; but it is very considerable. It is believed to attain, in Paris alone, the sum of 20,000,000 francs, including the sale of glossy rabbit skins. About 5,000,000 worth of the total is delivered for exportation.

"Since 1855 the fur trade has developed to a considerable extent. This flourishing condition is due to the fur dealers of Paris, who are incessantly creating new patterns in all kinds of new made-up articles in fur, and who have thus maintained that supremacy in taste and design which have so long been accorded to France in all matters pertaining to articles of dress and fashionable requisites.

"There were about 750 exhibitors in this class, displaying naturally a vast and heterogeneous mass of objects. Although many of these articles were of the highest interest in a philosophical, geographical, and social point of view, they were not of a nature to require much description. Furs of all sorts were, from their value and beauty, the principal attraction of the class. There was a fine collection from the French colonial possessions in New Caledonia, Guadaloupe, Caboon, &c. The raw industrial products of these little-known regions were shown with great taste and skill. But of the finest sorts of furs there were hardly any important specimens. The material is so easily damaged by dust that manufacturers hesitate to expose their better classes of goods. The French exhibitors, who had less to risk in the way of transportation than any other nation, made the best display. The taste of their work and the labor bestowed upon it left nothing to be desired. A grebe mantle, of extraordinary workmanship, was exhibited by Mr. Delmar, of Paris. Each single feather was sewed in separately on a basis of silk, the darker feathers being formed into patterns of wreaths round the skirt. One of the most interesting novelties, or rather revivals of a method which was in use many years ago, was the *galonnement* of furs. Some of the finest and most expensive furs, especially those from northern regions, such as the sable and the silver fox, are almost too close and heavy in the original state of the skin. To obviate this, the pelt is cut up into strips about a third of an inch in width, and between two of these is inserted a strip of equal width of silk. The strips are carefully matched in color and united with the greatest dexterity, so that the fur completely closes over the seam. A fabric is thus produced more open, light, and better toned than the original skin, while the latter is economized by the substitution of silk for a portion of the fabric. It is claimed that the articles thus made are more wholesome and much cheaper.

"Russia had a fine assortment of furs; but, for the reasons already given, it was, except perhaps in individual specimens, inferior to that exhibited in the French court.

"Messrs. Gunther, of New York, exhibited some fine specimens of North American furs and a collection of fur-bearing animals, very well prepared.

"The fleeces of rabbits and hares, used by hatters, made a large display. They are shorn and prepared with great skill. Up to the beginning of the present century hatters prepared the materials of their manufactures, from the crude skins, on their own premises. About the year 1826, owing to the steadily-increasing demand, the process of cutting and preparing the fleeces for making the felt was separated into a distinct trade. The material is used principally in the manufacture of soft hats.

"The increasing scarcity of whalebone has led to many interesting experiments in the way of providing a substitute. Buffalo's horn seems to answer the purpose satisfactorily. From the close similarity in the structure of the two substances there seems to be no reasons why this substitute should not answer most of the purposes to which whalebone is now applied. The horns, after undergoing a special process, are cut into strips, which are compressed and straightened and rendered suitable to every purpose of the dress-makers' art. There is another imitation of whalebone in compressed cane, but it does not seem to answer the purpose so successfully."

CLASS 43.—AGRICULTURAL PRODUCTS, NOT USED AS FOOD, EASILY PRESERVED.

Many, indeed most of the articles referred to in the following and succeeding classes of this group, have been or will be referred to under other heads. We continue to quote from the catalogue simply because the particulars are interesting and late:

OLIVE OIL.

"The most important article in class 43 was the oil derived from all sources. Oil, in some way or other, plays a most important part in the domestic economy of Europe. It is not only the source of light, but, to a great extent, of life itself. A large portion of southern Europe would perish were the olive crop to fail.

"Oils are obtained from an immense variety of nuts, grains, fishes, and minerals. All these are more or less edible, but real olive oil is the one which most readily agrees with sensitive stomachs, and which, for centuries, has partly taken the place of meat and butter with large and intelligent populations.

"The range within which the olive grows corresponds with the zone within which maize and rice can be cultivated. It is much more confined than that of the cereals. Its northern limit may be roughly placed in the most southern provinces of France, and it does not extend far into the interior of Africa. Spain, Italy, the islands of the Mediterranean sea, and the Greek archipelago, are the most civilized places where it flourishes. Asia Minor and Syria, and the whole northern coast of Africa from Morocco to the borders of Egypt, are covered with it.

"The olive requires but little attention, and is content with a poor, stony soil. This hardiness is rewarded by long life. Olive trees live far beyond the memory of man, and some indeed pass the ordinary limits of tradition. At Pescio, in Italy, there is a tree which can be proved, historically, to be more than 700 years old; and the trees on the Mount of Olives, if not those that witnessed the Passion, are at least the sprouts from their roots. Olive trees grow hollow as they grow old, the trunk splitting into fantastically-shaped masses, which unite higher up. To support them it is often found necessary to fill up the interstices and build up the trunk with stones.

"The best olive oil is that of Lucca and Tuscany. The province oil, known as the oil of Aix of commerce, is the most esteemed for the table. It owes all its merits to the admirable manipulation of the manufacturers, for the olives which yield it are the poorest of any country.

SEEDS, FLAX, HEMP, AND WOOL.

"Class 43 comprehends an immense variety of products, for, with the exception of cereals, fruits, cattle, and forest produce, it represents the whole of the productions of the soil. All these can, nevertheless, be arranged in 11 principal series:

"1. Seeds, which include the collections of the various seeds employed in agriculture and horticulture. 2. Textile materials of vegetable origin, and principally flax and hemp. 3. Wool in the fleece, washed and unwashed. 4. Cocoons of the various kinds, of silk-worms and raw silk. 5. Tobacco in the leaf or prepared, for the various uses of consumption. 6. Hops. 7. Plants for forage. 8. Oils of all kinds. 9. Honey and wax. 10. The various agricultural products employed in trade, such as the dyestuffs and the different plants which supply materials applicable to the arts and manufactures. 11. The mass of products which exhibit the progress and condition of the rural and agricultural industry of a district.

"The trade of seeds for sowing is becoming more and more important in France. On one hand, the agriculturists pay greater attention to procuring varieties remarkable for certain qualities; and on the other, the taste for horticulture is increasing every day. Some houses have acquired a European reputation for the care given to the selection of seeds, and many establishments have cultivated largely, exclusively with a view to produce seeds of first-rate quality.

"Flax and hemp are the two plants most cultivated in France for the manufacture of stuffs. The cultivation of flax especially, favored by the dearness of cotton, has increased, during the last few years, to a large extent. The principal centres of production are Flanders, Picardy, Normandy, and Brittany. Hemp continues to be cultivated not only wherever flax is grown, but also in several other provinces of the centre of France, and particularly in Touraine. The process of retting in running water is almost abandoned for retting on the spot. Inventors continue to occupy themselves in discovering new processes of retting, and trials on a large scale have shown that the problem is, to say the least, about to be solved. Attempts have also been made to cultivate cotton. Various interesting experiments have given rather remarkable results.

"Wool, in spite of foreign competition, which, during the last 10 years, has lowered the average prices, continues to be one of the great products of agriculture. Strenuous endeavors have been made to increase the weight of the fleeces; and to accomplish this object without deteriorating the quality of the meat, or the abundance of the wool, and at the same time to maintain an average strength and length of the staple. The improved merino race is in the highest repute in France. Chatillonais, Brie, Beauce, and Soissonais have even supplied breeders for all parts of the world. The Rambouillet type is in demand everywhere. The wools of Naz and Mauchamp, also, still occupy the attention of the breeders. The exhibition of French wool deserves the notice of visitors, by reason of the numberless efforts which have been made to improve this branch of industry.

"The silk producers have suffered terribly in France during the last 12 years. In the principal departments, where the culture of the mulberry was a source of considerable wealth, general desolation reigns; however, many efforts, some of which have been successful, have been made to produce eggs which will yield worms capable of resisting the disease. The small establishments, and particularly those situated in districts where the culture of the mulberry tree is not very extensive, have fortunately not suffered from the ravages of the epidemic. Lastly, efforts to secure the acclimation of other silk-worms than those indigenous to the ordinary mulberry districts have been, in most cases, successful."

TOBACCO AND HOPS.

"The cultivation and manufacture of tobacco has followed, step by step, the constantly increasing consumption in France. The cultivation is now pursued in 18 departments, as well as in Algeria. The directors of the state manufactories exhibit specimens of the material grown in these localities; and they show also many varieties of tobacco in the various stages of vegetation. Out of 36,000 tons used in the state manufactories, 23,000 to 24,000 tons are of indigenous growth, and the rest is imported from abroad. The 17 tobacco manufactories actually in work employ about 17,000 work-people, of whom from 14,000 to 15,000 are women. Few manufacturing industries supply women relatively with so much work. There are, besides, upwards of 2,000 persons, of whom more than half are women, employed in the tobacco-growing establishments. There are also manufactured in France snuffs of every description; tobacco for chewing; smoking tobacco, called *tiscaferlaté;* tobacco in rolls; cigars made of Havana tobacco; cigars sold at 10 centimes and called *etrangers;* five-centime cigars, called *ordinaires;* and cigarettes of all kinds. These establishments also sell cigars imported from Havana, Manilla cigars, cigarettes, and other articles in great demand by the trade. The refuse tobacco, which is applicable to agriculture, consists of the waste and ashes. The directors of the state manufactories also exhibit all the various products which can be extracted from tobacco.

"The cultivation of hops increases in France, particularly in the north and in Alsace; it had successively spread into several other regions, and has acquired a certain importance in Burgundy. The qualities of the French hop begin to be appreciated in the most important centres of consumption.

"The evident necessity for a continual increase in the supply of animal food has led to a large extension in the cultivation of plants for fodder. Several attempts have been made to introduce new plants, or at any rate better varieties of plants under cultivation. Instead of leaving the meadows to themselves, they are now cultivated, dressed with manure, and sown with selected seeds. Important improvements have also been introduced in the gathering and in the mode of preserving fodder.

"The cultivation of oleaginous plants has also considerably increased during the last 12 years, the farmers appreciating more and more the importance of cultivating some industrial crops side by side with cereal and garden crops. The progress of industry, as well as the general advance of civilization, tends moreover to augment the demand for oils of various qualities. A special exhibition of oils offers a particular interest; analogous therewith will be found colza oils, linseed oils, red poppy oils, nut oils, &c., from the superfine oils used in horology to the coarsest oils employed for the lubrication of machines and the manufacture of common soap."

AGRICULTURE IN FRANCE.

"The taste for agriculture is gradually diffusing itself throughout the country. Great care is bestowed on beehives, so as to multiply the swarms, and insure a much larger quantity and better quality of wax than formerly. France produces plants of the most various perfumes, and others which give most brilliant and durable colors. Besides the aromatic and dyeing plants, are to be found those used for pharmaceutical and tanning purposes. The researches for plants capable of yielding fibres suitable for paper-making occupy the attention of scientific men; and from this point of view these various agricultural products deserve attention. Rural cultivation produces almost every description of crop, so that it is impossible to properly appreciate a system of cultivation by a single product; the whole must be examined. For this reason many eminent agriculturists have exhibited collections of the plants which their lands yield, as well as some products of their cattle-sheds and poultry-yards. Moreover, in many cases, rural trades are so essentially and peculiarly associated with the culture of the land, that it is absolutely necessary to impart a knowledge of the special method of cultivation in its various phases; and it is only in collecting all the products of a district that its riches, its fertility, and the results arising from the labor expended, can be fully appreciated. With this object several agricultural societies, committees, and other associations, were desirous of sending collective exhibitions. In studying these exhibitions it will be seen what differences are presented by the various localities of the three great agricultural circles. During the last 12 years evident progress has been made in every district of France. The agricultural produce of France has certainly increased, on an average, fully one-tenth, in spite of the difficulties which have resulted from the advance in wages, and from capitalists quitting rural enterprises and devoting themselves to industrial and commercial speculations. Agriculture demands, moreover, a supply of manure equivalent to the amount of its cultivated produce; in proportion as its products increase it needs larger quantities of fertilizing materials. The multiplication of rapid and cheap means of transport has at last favored these objects, and gives more activity to rural occupations."

CLASS 44.—CHEMICAL AND PHARMACEUTICAL PRODUCTS.

"Under the general appellation of chemical products, class 44 comprises almost every mineral and vegetable matter which chemistry has been instrumental in transforming and adapting to the use of the various branches of industry. Generally these products are manufactured entirely in the laboratory; but sometimes they are simply extracted from natural substances, in which they exist ready formed. Chemical products furnish to a great number of other industries the material necessary for their existence and working; consequently a new discovery or a remarkable improvement is a fact of importance of which the tributary trades should take special note.

"Chemical works are distributed in various departments of France, according to the convenience or locality of the proximity of the materials for manufacture. They form an important branch of commerce in Paris, Lille, Marseilles, Lyons, and Rouen; but St. Gobain, Bouxvillier, Dieuze, Thann, the island of Carmargue, and the coast of Brittany, possess establishments which are not surpassed in importance by those of any of the great towns. The aggregate trade in these productions represents an annual value of 1,200,000,000 francs, (£48,000,000.) The manufacturers of sulphuric acid, soda, soap, and stearine candles alone give circulation to 600,000,000 francs; and if to these be added dyestuffs, products applied to the bleaching of tissues, paper-making, painting, glass manufacture, calico and other printing, to manuring purposes, electro-metallurgy, photography, the gilding and silvering of metals, &c., the estimate of 1,200,000,000 francs will be a moderate one. The exports amounted, in the year 1863, to 53,000,000 francs.

"The workmen employed in these manufactures work under the direction of foremen or superintendents. In order to carry on such operations with economy, large premises are required, as well as special buildings and costly apparatus, and consequently an expenditure of capital which excludes small undertakings. Nevertheless, some workmen, having special manipulative powers, have succeeded in manufacturing certain products more advantageously than the large factories; this, however, is the exception to the rule. The improvements which have taken place in chemical manufactures since 1862 are: The invention of new coloring matters, obtained from toluidine and methylic aniline, and, consequently, an improvement in the quality and the reduction in the price of colors then exhibited in London; the conversion of naphthaline into benzoic acid, a substance derived from the vegetable kingdom; and the commercial production of magnesium, now so usefully employed as a means of illumination in photography. But the fact which merits the greatest attention is the large increase in the production of chemical matters—a certain sign of progression in all other branches of industry. If we take into consideration the extent and value of the service of chemical science, it would appear advisable, in order to maintain France in the industrial rank which she occupies, to give greater development to practical instruction in this science, either by increasing the resources of the laboratory established by the initiative of his excellency Mr. Duruy, and conducted at the Museum of Natural Sciences ('Jardin des Plantes') by Mr. Fremy, member of the Institute of France, or by the creation of similar establishments in all the great industrial centres of France. In Prussia the fact that theoretical teaching is insufficient to make good chemists has been so thoroughly recognized that immense laboratories have been established at Bonn and Berlin, where pupils are instructed in those practical experiments without which theory remains fruitless. The interest which attaches to pharmaceutical products is somewhat dwarfed by that which is created by commercial chemical products. It is true that in pharmacy progress is slow, especially under a system of excessive restrictions, which practically sets aside individual action. When the apothecary has once given a guarantee of his practical knowledge by submitting to the examinations for his diploma, he has a full claim to liberty of action in the commercial exercise of his profession. Such a new state of things would certainly give a great impulse to the importation of French medical preparations, which are highly esteemed in the commercial world."

[Signed by Menier and Forçade, members of the admission committee.]

CLASS 45.—SPECIMENS OF THE CHEMICAL PROCESSES FOR BLEACHING, DYEING, PRINTING, AND DRESSING.

I. The products exhibited in this class and in the five classes belonging to Group IV—class 27, cottons; 28, flax and hemp; 29, woollens; 30, cloths; and 31, silks—are: 1. Wool in the fleece, washed and dyed, for the manufacture of cloths; 2. Combed and carded woollen yarn, bleached and dyed, for the manufacture of shawls and garments, and furniture stuffs; 3. Cotton, linen, hempen, and other yarns, bleached, dyed, and dressed; 4. Silk yarn, bleached and dyed; 5. Cotton, linen, and hempen tissues, plain and figured, bleached for printing, or bleached and dressed; 6. The same tissues, dyed and dressed; 7. Mixed and unmixed woollen tissues, dyed and dressed; 8. Clothes dyed in the piece; 9. Cotton, linen, woollen, and silk tissues, plain and figured, mixed and unmixed, printed and dressed, dresses for the general trade, superior fancy tissues, furniture stuffs, printed shawls and carpets, and tissues printed on the weft; 10. Cotton, hempen, and linen furniture stuffs, glazed, gummed, and waxed, plain and printed; 11. Cotton cloths, waxed and grained, in imitation of Morocco leather; 12. Textile fibres of various kinds, reduced to pulp, bleached and dyed, of all colors, for the manufacture of paper-hangings.

II. The principal centres of production are Paris, Lyons, Rheims, Rouen, Mulhouse, Amiens, St. Quentin, Roubaix, Cambray, Elbœuf, St. Etienne, Sedan, Lisieux, Mazamet, Lodève, Laval, Bischwiller, Ste. Marie-aux-Mines, &c.

III. The raw materials the most in use are the following: Chemical products, starchy materials, neutral animal matters, essences, oils, greases, insoluble mineral colors, dyeing stuffs, (indigo, cochineal, madder, orchilla, dyewoods, extracts, lakes, &c.,) and artificial colors produced from coal tar, (red, violet, blue, green, yellow, brown, black.)

Among the improvements introduced since 1855 may be mentioned:

1. Improved methods of engraving the designs.

2. The application on an extensive scale of the pantograph and electric pile to the engraving of the rollers.

3. The considerable economy resulting from the application of the galvano-plastic process, or the covering with copper of cast iron, steel and bronze rollers, which now replace the solid copper rollers previously employed.

4. The restoration of old engraved rollers.

5. The improved method of, and economy in bleaching; the improvements of the dressing and washing machines, (economy of power and of water;) the more advantageous use of the power employed in working the printing machines.

6. The improvements made in the manufacture of Turkey red; the application of pyrogallic acid in the production of black for grounds; the discovery of new colors, principally those derived from coal tar, and their application on a vast scale to dyeing and printing processes; the great extension given by these discoveries to the manufacture of chemical products; the novel process, by means of animalizing vegetable fibres, to render them more susceptible of taking colored matter; the use of zinc in dyeing with aniline colors. The most important fact is the decrease of the net cost, coincident with the improvement of the products and the increase of the wages of the operatives.

CLASS 46.—LEATHER AND SKINS.

"The products exhibited in this class comprise eight divisions:

"1. Tanned leathers, including strong sole leather and leather intended to be curried. 2. Curried leathers for boots, shoes, saddlery, and machinery. 3. Black and colored varnished leathers, for boots, shoes, and saddlery. 4. Goatskin and imitation morocco, for boots, shoes, bookbinding, furniture, and small articles. 5. Tawed leathers for boots, shoes, and gloves. 6. Chamois leather. 7. Tanned Hungary leather. 8. Parchment.

"Paris is the most important centre of the trade for all kinds of leather. Givet, Chateau-Renault, and Strasburg especially manufacture strong leather; Nantes and Millhau, leather for vamps; Grenoble and Annonay, tawed leather for glove-making; Niort, chamois leather. The principal seat of the morocco manufacture is in Paris, which also furnishes strong leathers. The leathers called '*à la Garouille*' are produced by a special method of tanning, and come from the southeast of France. The leather manufactured in the French tanneries has two distinct sources of supply: the slaughtering of cattle at home, and the importation of raw hides from England, Ireland, Holland, Germany, La Plata, Peru, Brazil, Mexico, the West Indian islands, Madagascar, India, and Australia. The price varies with the locality from whence it is derived, the nature, the quality, and the state of the merchandise on its arrival. The leathers exported into France come in the salted, dry, and dry-salted forms. The imported hides, as well as those of home produce, include the skins of various kinds of animals. Each year the import of raw hides amounts to about 220,000,000 francs. The tanning materials are generally of French derivation. The export of tanning bark increases every year. Algeria supplies a great quantity of kermes oak-root bark, necessary for the tanning of leather '*à la Garouille.*'

"Mechanical aid is being introduced daily in the leather factories; still manual labor continues at the present moment the base of the industry. Machinery has been brought into use in a great many large tanneries, but it is applied especially to the preliminary processes of tanning and currying. The greater part of these operations have not been well performed by mechanical means, and recourse has, consequently, hitherto been had to manual labor in spite of the promise held out by some machines, and, among others, by those intended for the fleshing of hides, whether calf or morocco. As to the processes for rapid tanning they have not yet yielded satisfactory results. The workmen are generally employed in the tanneries. There exist, however, a few small manufacturers, of limited means, who employ sometimes one or two workmen. They either undertake one special department of manufacture, such as currying or morocco work, or only certain operations, such as flushing. There are, especially in Paris, many large establishments which work for the retail skinners and curriers.

"The leather trade has a central market, France in each centre; still, Paris, where so many beasts of the first quality are slaughtered, is at once the greatest market both for fresh raw hides and for manufactured leathers. Havre, Marseilles, Nantes, and Bordeaux are the great seats of the import trade in raw hides. The provincial manufacturers, who do not dispose of their products in the district, send them to Paris, either to the leather market or to the houses of commission merchants. A certain number of manufacturers have depots at Paris, but sale by commission is the mode most generally adopted by second-rate manufacturers.

"The consumption of meat in France is constantly on the increase, and the supply of the raw material of the leather trade augments in like manner. Between 1850 and 1863 the imports have increased one-half. The total importation of raw hides salted, dry, or salted and dried, was, in 1865, 48,646 tons, and the total value nearly 100,000,000 francs. The exportation amounted, at the same time, to 6,685 tons in tanned, curried, morocco and varnished leather. To this must be added dressed skins, which figure on the returns of the Douane for 3,168 tons, of the total value of 81,223,902 francs, thus increasing the gross total to 147,198,106 francs.

The committee regrets that it cannot point out any great improvements in the trade during the last 12 years; the leather manufacturers of France generally being very chary of innovations.

"As regards tanning, we have already said that several improvements have been introduced to accelerate the process, though the results have not been satisfactory. A new tanning substance has also been introduced in place of oak bark, namely, the wood of the chestnut tree reduced to shavings; and still further efforts have been made to do away with the use of tannin entirely, and prepare hides by means of turpentine alone, but subsequently a certain portion of tannin extract has been used with the turpentine in order to produce a better result. In the currying trade there is scarcely any actually new invention to be found, unless we consider as such a system of working which the *Société d'Incouragement* judged worthy of reward. This method has for its object the rendering the leather more supple by the improvements in the details of the manufacture, and to render it impermeable by means of a thick coating of gutta-percha. The true progress made in the trade is the increased skill brought to bear on the various operations. As regards the morocco trade, we must not omit to mention the attempts made, with the view to a more general and ordinary application of the magnificent colors produced from aniline and its derivatives, now so numerous. These are new resources for the morocco worker, who is thus enabled to assimilate more nearly the color of the skin and that of the stuff intended to be incorporated. In all the different branches of the leather trade the committee has pointed out the necessity for accelerating and improving the manufacture by the constant introduction of improved plans and utensils and improvements in the workshops in which the various operations are performed."

GROUP VI.

APPARATUS AND PROCESSES USED IN THE COMMON ARTS.

CLASS 47. APPARATUS AND PROCESSES OF MINING AND METALLURGY.—CLASS 48. IMPLEMENTS AND PROCESSES USED IN THE CULTIVATION OF FIELDS AND FORESTS.—CLASS 49. IMPLEMENTS USED IN THE CHASE, FISHERIES, AND GATHERING WILD PRODUCTS.—CLASS 50. APPARATUS AND PROCESSES USED IN AGRICULTURAL WORKS AND FOR THE PREPARATION OF FOOD.—CLASS 51. APPARATUS USED IN CHEMISTRY, PHARMACY, AND TANNING.—CLASS 52. PRIME-MOVERS, BOILERS, AND ENGINES SPECIALLY ADAPTED TO THE REQUIREMENTS OF THE EXHIBITION.—CLASS 53. MACHINES AND APPARATUS IN GENERAL.—CLASS 54. MACHINES, TOOLS.—CLASS 55. APPARATUS AND PROCESSES USED IN SPINNING AND ROPE-MAKING.—CLASS 56. APPARATUS AND PROCESSES USED IN WEAVING.—CLASS 57. APPARATUS AND PROCESSES FOR SEWING AND FOR MAKING-UP CLOTHING.—CLASS 58. APPARATUS AND PROCESSES USED IN THE MANUFACTURE OF FURNITURE AND OTHER OBJECTS OF DWELLINGS.—CLASS 59. APPARATUS AND PROCESSES USED IN PAPER-MAKING, DYEING, AND PRINTING.—CLASS 60. MACHINES, INSTRUMENTS, AND PROCESSES USED IN VARIOUS WORKS.—CLASS 61. CARRIAGES AND WHEELWRIGHTS' WORKS.—CLASS 62. HARNESS AND SADDLERY.—CLASS 63. RAILWAY APPARATUS.—CLASS 64. TELEGRAPHIC APPARATUS AND PROCESSES.—CLASS 65. CIVIL ENGINEERING, PUBLIC WORKS AND ARCHITECTURE.—CLASS 66. NAVIGATION AND LIFE-BOATS, YACHTS AND PLEASURE-BOATS.

The twenty classes of this group embraced nearly 100 sections, any one of which was sufficient to furnish a report of the length of the present. Indeed, on some subjects the best informed talent of the world has employed itself for many years. The result in literature is a library; in practice, a million new processes whereby the increasing wants of the age are supplied. The intent of this report being general and not special, a few points of public interest only will be dwelt upon. Following the remarks thus offered will be found the usual extracts from the French official catalogue, containing the latest local data on the special sections.

CLASS 47.—APPARATUS AND PROCESS OF MINING AND METALLURGY.

COAL-MINING IN FRANCE.

Among the plans and models exhibited in class 47 was one of great interest to the French people. It represented, in a map, the newly discovered coal mines of Pas-de-Calais. Fuel of all kinds is expensive in France. The country has been denuded of its trees, and coal, until recently, had to be imported from neighboring countries, and was, in consequence, a luxury which the poor could not command. It may safely be said that the scarcity of fuel has in a great measure affected the domestic habits of ordinary life. It has compelled the masses to seek warmth and life in the various *cafés*, where these cheering influences are always conspicuously displayed. Any prospective cheapening of the article of fuel is therefore an object of particular concern to the French, and has occupied the best attention of the government.

Another map of the Pas-de-Calais, by Mr. Coince, was on the scale of 1 to 10,000, and gave a fair idea of the prodigious perseverance and energy which have been bestowed on the opening of pits which were at one time supposed to be chimerical. It was only in 1846 that a boring for water at Oignies, not far from Douay, gave rise to the theory that there was a deflection of coal in that direction. Between 1850 and 1864 concessions of land were made to various companies, mostly in the Pas-de-Calais, and extending in that department over a length of 35 miles. Some 40 pits have already been sunk, averaging in depth from 100 to 350 yards. The amount of coal produced from this hidden and accidentally-discovered source—for it had no geographical indication—has risen from 5,000 tons in 1851 to upwards of 1,600,000 tons in 1866.

There were maps of other coal mines in France, exhibited by the French ministry of public works. The best were those of the Loire. These pits, less than 20 years ago, were on the point of being abandoned, the obstacles in the way of their being worked seeming to be almost insurmountable. The government instituted an inquiry into the subject, and detailed its best engineers to examine thoroughly the nature of the ground. Their reports presented in a clear and practical light the difficulties that had to be encountered. These were in due time conquered. At the present time over 3,000,000 of tons of coal are obtained from the basin of the Loire.

A large model of the ravine of the Grande Combe, whence the south of France begins to obtain its supplies, was also exhibited, and demonstrated the great amount of exploration done during the past few years, and the very minute and accurate record which is kept of all the phenomena of mining. The Grande Combe is the third district, in point of productiveness, in France. It now averages 1,200,000 tons.

These maps and models, and others exhibited in the same department, demonstrate the fact that coal beds in France diverge from the pit with singular sinuosity—the workings in several places being far beneath the overlying strata of the Trias. Such mines in wealthy coal districts would be almost disregarded, but skill, even more than necessity, has rendered them valuable and remunerative. When this is not the case the very wealth of the seams presents unusual difficulties. The coal-fields of central and southern France, although individually of small extent as compared with those of England and Belgium, are remarkable in this respect. The tolerably regular beds of coal at Blanzy and Montceau run to 50 feet, and even to 60 feet, in thickness; at Creusot, where the bed stands in a vertical position, it varies from a few feet to 50 feet, 80 feet, and ascends to as much as 130 feet; and the great seam of Decazeville (Aveyron) often extends to 100 feet in thickness. The vast vacuities which must necessarily be produced in working these mines lead necessarily to very serious engineering obstacles, which have only been surmounted by an extraordinary display of skill, and by the adoption of a plan which, while it involves labor, almost amounting to a double operation of mining, seems at all events to insure safety. This consists of packing all excavated places, except the passage ways, with rubbish carried down from the surface. A change of hands is required for this purpose, the colliers being absent from the mine. In some districts a particular shaft and line of roads and special wagons or tubs are set apart for the work, and in certain mines fully one-third of the hands employed are engaged in the business of filling up.

The maps and models from Belgium were also singularly exact and instructive. France imports, mainly from Belgium, 7,100,000 tons of coal. Her own production had reached 12,000,000 tons in 1865, and is undoubtedly greater.

PRESSED COAL.

The progress of manufactures requires a constantly increasing supply, and the scarcity of wood, as before remarked, renders fuel in any shape a luxury. The navy, too, requires inexorably its rations. To provide these economically has been the study of many practical men, and a result has been obtained which is worthy of record. The dust of coal is used. It is pressed into cakes by a variety of processes, nearly all of which seem to be in favor. For naval use this kind of fuel possesses advantages. It is asserted that in the carriage of the little bricks there is a loss of only one per cent., instead of six to ten per cent., as in lump coal; and when stored abroad they are found after two years' exposure to be scarcely at all injured, while ordinary coal would have suffered to the extent of 50 per cent. It is claimed for them also that they are free, or comparatively free, from ash, and can be made from the refuse of almost every kind of coal, and in such a ratio as to produce the best effect in getting up steam, and maintaining it. The bricks are exceedingly compact. They are produced by hydraulic pressure and require but a small percentage of extraneous, gummy, or resinous matter to make them stone-like and thoroughly durable. The best approved process, or rather the one which seems to give the best results, is that adopted by the company of La Chazotte. The machine used has 16 cylinders disposed as the radii of a circle, in which the coal slack, after being heated by a current of steam and mingled, by the means of very ingenious apparatus, with pitch, is pressed by pistons, and formed either into cylindrical or hexagonal blocks of convenient length. The prices of compressed fuel are as follows:

First quality, containing only 2.10 per cent. of ash, 28 francs per ton; second, containing 5 per cent., 26 francs; the other sorts range from 23½ to 9½ francs. A single manufacturer produces no fewer than 175,000 tons of this agglomerated coal per year. There are several others of almost equal extent. The slack or waste of the coal mines is thus economized, and an article produced which, apart from the question of cheapness, possesses special considerations which seem to adapt it for general use in stoves and furnaces of every kind.

BORING SHAFTS AND DRILLING ROCKS.

An interesting display of maps and models illustrating the process of boring was made in the French department. Two important public works are now in progress in the city of Paris, and the contractors were the principal exhibitors. The French capital obtains its best and purest water from artificial sources, namely, the artesian wells of Grenelle and Passy. Two additional wells are now in process of being sunk; one in the suburb of the Chapelle in the extreme north of Paris, by Messrs. Degousée and Laurent, and the other at the Butte aux Cailles in the extreme south of the city, by Messrs. Dru. These celebrated firms exhibited the apparatus by which they make all kinds of borings, ranging from four inches to five feet.

Pure water being an object of great concern to every community, it may be well here to give a few particulars of the two artesian wells now in successful operation. At Grenelle the surface is 121.3 feet above the level of the sea; at Passy 305.2 feet; the depth of bore-hole at Grenelle is 1,800.7 feet; at Passy 1,923.7 feet; internal diameter of tube or lining of hole at Grenelle approximately 9 inches to 6 inches at bottom; at Passy 2.4 feet. The full diameter of the Passy bore-hole was 1 metre, or 3.28 feet. The new ones are to be in one case above five feet, and in the other about four feet; whilst it is proposed to sink much deeper than heretofore, in order to open new sources of supply and avoid drawing too extensively on the old ones.

Examples were shown of the application of boring to the ordinary process of mining, such as the excavation of shafts. It is often difficult and sometimes impossible, owing to the watery character of the soil, for workmen in the usual way to penetrate to the requisite depth and perfect the casing of the pit. When this is done it is at a great cost of labor and money. By the machinery used for ordinary boring it is done with comparative ease, and the casing is always perfect, because it is a tubing which, if necessary, can be filled in against the side of the pit with concrete and other preparations more or less impermeable. The expense by this process is not more than one-quarter of what it would be under the usual way. Sections of two pits at St. Avold, France, were exhibited. The first of these was sunk through 426 feet of permeable red sandstone, and coal was found at a depth of 1,036 feet on the 4th of April, 1867. The second had progressed to the depth of 521 feet on February 3d. The diameter of the cutters used in boring these pits was 13 feet.

Several machines for working under ground and superseding hand labor in drilling rocks were displayed, many of them of ascertained value.

One of these, by General Haupt, was from the United States, and was characterized by simplicity and directness of action.

The diamond-pointed drill of Mr. Leschot, exhibited in the French section, whatever may be the original cost, is claimed to be the best and cheapest in the end. It works with great rapidity and is utterly indifferent to the stubbornness of the material against which it is placed. A drawing showed the way in which it is proposed to arrange several of these implements moved by steam power for boring tunnels. The boring tool is tubular and admits a jet of water through the middle into the hole; its face of soft iron is studded with eight pieces of black diamond carefully set in the iron, and the incomparable hardness of the adamant is so little affected by contact with the hardest granite, that the engineer stated the cost of the abrasion of diamond for a hole of half a yard deep to be less than four cents.

A machine for channelling and quarrying marble and other stone for building or ornamental purposes was exhibited by the Steam Stone Cutter Company of New York, and is in use at the marble quarries of Rutland, Vermont, and is the invention of Mr. Wardwell. It is asserted that this machine reduces the labor cost of the production of marble, and cuts it from the quarry with much greater cleanness.

The safety lamp for working in coal mines was exhibited in many forms, but the principle was always that of Davy. Intended for the preservation of the workmen's lives by the prevention of explosions, it seems curious that the only impediments in the way of its fulfilling this duty are the workmen themselves. Nearly all explosions of fire-damp are caused by incautiously opening the Davy lamp. There seems to be a fascination about doing so, for locks are in vain, and are picked or broken when the workman wishes to get at the flame. An ingenious invention possessing strength as well as other merits was exhibited by Mr. Arnould of Mons, who so inserts an iron pin that the lamp can only be unlocked by placing it in a proper position over the poles of a powerful magnet.

The objects exhibited in this class form five principal sections: 1. Plans in relief and drawings of mineral deposits; 2. Boring tools and machines; 3. Mechanical apparatus employed in mines for extraction, ventilation, &c.; 4. Apparatus serving for the after treatment of the materials extracted, such as apparatus for the mechanical preparation of ores and the agglomeration of combustibles, machines for foundries and forges, &c. Lastly, numerous drawings of metallurgical establishments and special apparatus.

FRANCE.

"It is principally in the departments of the Nord, Saone, Loire, Seine, and Seine Inferieure that the objects contained in this class are produced. The supply has generally sufficed for all the wants of home consumption; we may even say that small exports are made to England, Italy, Spain, Africa, and the two Americas. The French coal mines recently opened, especially those of Pas-de-Calais, can be compared, as regards their method of working, exhaustion, and ventilation, to the great establishments of Newcastle, Belgium, and the basin of the Ruhr, and can vie advantageously with all foreign countries.

"As regards the elaborations of mineral combustibles, no country is so advanced as France, and there exist none where such a large proportion of small coal extracted is submitted to purification by washing, by means most varied, and by more improved apparatus; none where the processes of agglomeration—a branch of industry which is, moreover, of French origin—have been more studied; none, lastly, where the making of coke is accomplished with less loss of combustible materials. The progress which the committee of admission of class 47 can point out, since 1855, is: 1. For the working of mines, the improvements in the processes of sinking shafts in loose and aqueous soil; the general improvement of apparatus, with a view to increase the productive power of the mines. 2. For the mechanical preparation of ores and combustibles, the employment of a great number of new apparatus, with a view to render work still more mechanical, and thereby economize hand labor; the application of improved methods of construction to those apparatus which have hitherto been executed in a rough manner. 3. In the development of metallurgy generally, the increase of the individual production of the blast furnaces; the more general and judicious use of selected fuels and ores, a use which is facilitated by the increased means of transport; the substitution—each day more marked—of the coal iron for the charcoal iron, in consequence of the new applications that coal iron has found in the production of improved pig iron, and in the invention of improved or entirely new methods of refining, (Bessemer process;) and, finally, the increased power of the machinery and tools used for hammering and rolling, augmenting every day in dimensions, such as armor plates, large iron for buildings, iron plate, &c."

CLASS 48.—IMPLEMENTS AND PROCESSES USED IN THE CULTIVATION OF FIELDS AND FORESTS.

The objects included in class 48 were exceedingly important, comprising: 1. Implements and machines for forest cultivation; 2. Agricultural machines and implements; 3. Plans of agricultural works, and reports relating to farms which have obtained the prize of honor or other prizes, and which offer incidents worth studying and good examples for imitation, either as regards rural construction or other matters, such as irrigation, drainage, plantation, &c.; 4. Commercial manures, which supply agriculture with matters of great utility in preserving or increasing the fertility of the soil.

There were exhibitors in one or all of these sections from almost every country on the face of the earth. It was curious to observe in the glittering courts of eastern nations the rude appliances for tilling the soil, appliances which have barely changed their form since the commencement of the Christian era; and thence to go to the annèxe, or better still to the island of Billancourt, and see the huge progress that has been made since the application of steam, and the general knowledge of mechanics which was its natural result.

Traction engines were conspicuous in the English department. They are intended mainly for drawing hay or wood over the ordinary surface of the country, but by the application of belting they can be used for any other purpose connected with agriculture. A good traction engine can draw 30 tons at a mere trifling cost per mile.

Reapers and mowers were the specialties of America. They came out triumphant at the two trials which were made at the Emperor's farms at Vincennes and Fouilleuse. Several of these admirable machines were ordered by the Emperor.

The inventions and contrivances in other branches of agriculture were innumerable. They indicate clearly that the day is not far distant when the historical plough-boy will disappear from the field—whistle and all—and be replaced by an intelligent engineer.

FRANCE.

"Among the practical improvements which have been made in the articles included in this class, during the last 12 years, may be cited: First. The more general employment of machines and implements for turning over the soil, and especially the invention of the Valleraud plough, which serves to bring the sub-soil to the surface; the increased use of the threshing machine; the employment of steam power as a motor in the more advanced agricultural undertakings; the application of the drills to the sowing of cereals in line; and, finally, some attempts at steam cultivation, and the introduction of a multitude of reaping machines, which have but rarely fulfilled the expectation of those using them. Secondly. As regards the several methods of cultivation, and the progress made of late years in rural architecture, there exist a large number of farms which, by the general arrangement and details of their buildings, possess commodious and ingenious arrangements, having the effect of economizing hand labor and facilitating the connection of various operations. In reference to commercial manures, we may mention principally the fossil sulphates, which, being extracted from French soil and submitted to simple and inexpensive processes, supply the agricultural community, at a low cost, with valuable means of increasing their crops. Thirdly. Like other industries, those connected with the forest obey the law of progress. Instruments for cutting wood, such as axes, billhooks, saws, &c., have latterly shown considerable improvements. The use of the plough, in aiding natural reproduction in coppices, produces marvellous results, and its employment cannot be too much recommended. The pruning of the trees, practiced for a long time by most faulty methods, is now carried on in a superior and efficacious manner, the value and importance of which have been placed beyond all question by numerous and conclusive experiments. Interesting experiments are being carried on relative to the barking of oak, a matter of the greatest interest to the tanning trade. Lastly, strenuous efforts have been made, during the last few years, principally by the forest administrations, to effect the entire rewooding of the denuded mountains of France."

CLASS 49.—IMPLEMENTS USED IN THE CHASE, FISHERIES, AND GATHERING WILD PRODUCTS.

The objects exhibited in this class form five principal series:

1. The implements and engines of the chase include, except fire-arms, all the other apparatus used for the capture of game, such as nets, snares, decoys, &c., equipments for sportsmen, such as game-bags, powder-horns, shot-pouches, and cartouche-boxes. 2. Fishing implements and tackle, including lines, hooks, fishing-rods, harpoons, nets, bait, and the materials used in the manufacture of these articles. 3. Implements used in collecting natural and uncultivated material. 4. Apparatus of pisciculture: arrangements for hatching spawn, for raising the fry, and transporting fish; aquariums, apparatus intended to stock rivers with fish, such as salmon ladders; lastly, plans of piscicultural establishments, and scientific works treating on such subjects. 5. Apparatus for diving or for submarine industry, such as the collection of sponges, coral, and pearls, for submarine construction, the closing of water sources, the raising of sunken vessels, &c.

The whole machinery of fishing was exhibited in class 49, even to human fishing in the shape of divers, and their complicated accoutrements. France possesses several establishments for the artificial cultivation of fish, and the subject of pisciculture has attracted the attention of the government. Large quantities of fish are now bred artificially, and with the best pecuniary result. Streams that have been emptied of salmon have been repopulated with that delicacy, by means of the pisciculturists, and oysters which were in a fair way of dying out on the coast are now submitting to the same quiet mode of increase. Experiments leave no doubt that fish can be cultivated as profitably as any other article of food. With the smallest amount of state protection, the salmon fisheries could again be established on the principal rivers of America.

"Sporting implements are mostly manufactured in Paris and exported to all the world. The leather of French origin is worked by mechanical processes. Stamping presses and sewing machines are used for making shot-bags, cartouche-boxes, game-bags, &c. The nets are made by hand. The trade in sporting necessaries in France is estimated at from 3,000,000 to 4,000,000 francs. No very striking innovation has been noticed in this branch of industry since 1855; but the methods of manufacture have been so much improved that French productions now leave nothing to be desired as regards the excellence and finish of the work. Fishing-tackle and implements are made in the immediate vicinity of the principal fisheries—Angers, Bordeaux, Boulogne, Dieppe, Dunkirk, and Nantes; the hooks were formerly obtained entirely from abroad, but are now produced partly in France, and particularly in the departments of the Bouches du Rhône and the Côtes du Nord. Fresh water fishing-tackle is made in Paris and its environs. The raw materials employed in the trade are very various and are derived from almost all countries on the face of the globe. Hempen yarns are obtained from Angers, and those of flax from Lille. Rushes and reeds are obtained from Fréjus. China, Japan, and India send us bamboos and silk. The so-called Florentine horse-hair comes from Spain and Italy, and we borrow from innumerable birds the feathers with which to form artificial flies. All the delicate articles are made by hand; nets alone are in part produced by looms. The products of this industry amount in number to about 1,000,000 a year, and are exported to all countries. The trade now obtains at home that supply which, before 1855, it used to obtain from foreign markets. The apparatus employed in gathering wild products has no special characteristic that demands notice.

"The trade in piscicultural apparatus has extended, since 1855, in a very marked manner. From 500,000 to 600,000 francs' worth of such apparatus is annually sold for home consumption and export. The slate of Angers and the plate-glass of St. Gobain are laid under contribution for the construction of aquariums. The apparatus for restocking rivers with fish, such as salmon ladders, constructed at the instance and under the superintendence of government, have produced great improvements in the productiveness of our streams.

"Diving apparatus is also manufactured in Paris. Copper, lead, leather, India-rubber, with Laval thread and Rouen cottons, are the chief materials used in the manufacture. These apparatus, which are in increasing demand in every part of the civilized world for fisheries and hydraulic works, amount in value to about 400,000 francs or 500,000 francs per annum. Since the Exhibition of 1855 the apparatus have undergone great improvements which fit them for submarine exploration at great depths."

CLASS 50 TO CLASS 54.—MACHINES AND APPARATUS IN GENERAL.

The classes 50 and 51 contained: 1. Apparatus and processes used in agricultural works, and for the preparation of food, such as making pipes for drainage, making manure, making sugar, brewing, &c.; and 2. Apparatus used in chemistry, farming, and tanning, such as apparatus and utensils for laboratories; instruments for making tests, &c. Both classes were interesting to experts.

Class 52 included the machinery, &c., used for the purposes of the Exhibition. It is fully described elsewhere in an extract from the French report. There were seven American exhibitors in this class.

Class 53, machines and apparatus in general, contained detached pieces of machinery, supports, rollers, slides, eccentrics, cog-wheels, &c. There were six American exhibitors.

CLASS 54.—MACHINE TOOLS.

Class 54 embraced all the articles comprised under the head of machine tools, such as lathes, planing machines, and other instruments used in the working of wood and metals. No more important class was to be found in the Exposition; indeed without this, many other classes could not have existed. The principal nations exhibiting were France, England, Prussia, and America. At the former exhibitions of 1851, 1855, and 1862, the English were almost without rivals. On the present occasion they made but a small display, and were vastly outnumbered by France and Prussia, while in point of novelty of form and excellence of workmanship America was admitted to be on a par with any nation. In the French section were tools of every possible description, many possessing a high degree of excellence, and some of extraordinary size. Prussia was represented in the fullest manner, and her progress in this branch of manufacture excited general remark.

In the American department the display made by Sellers, of Philadelphia, was highly commended. Among other articles was a machine for cutting the teeth of wheels, which when once set in motion, is completely automatic until it has gone completely round, when it stops of itself and calls for the attendant. The Sellers planing machines were equal to the best in the Exposition, and were remarkable also for many novelties. So, also, the steam hammer with its new mode of manipulating the steam valve. The same firm, says Mr. J. Anderson, civil engineer, in his report to the board of council, has a fine display of screwing apparatus entirely of a new character, and all constructed on a sound principle. By this system screws of all sizes are the same in the form of the thread, namely, an angle of 60 degrees; six cutting tools for any size of screws, if placed together, will form a complete circle. The depth of the thread, the amount to be taken off the sharp point of the cutting-tool, are all derived from the diameter, or the pitch, or from each other, on a well defined principle. These screws, when complete, are what is technically termed "flat-top and bottom," and although this system may be objected to by those who are accustomed to and prefer "the round-top and bottom," yet it is very evident the flat gives greater facility for measuring the diameter with extreme accuracy. Altogether, adds the same writer, the collection (of tools generally) exhibited by Sellers probably contained more originality than that of any other exhibitor in class 54.

The lathes of Harris, and of the American Tool Company, possessed several novelties which were interesting to the experienced eye. Brown & Sharp exhibited a machine for making any description of screws out of the rough bar. When the screw to be made is once determined upon, every instrument necessary to its production is placed in suitable holders therein provided; the wire or bar passes through the centre of the revolving spindle, when tool after tool is successively brought into operation, and screws of perfect identity are thereby produced with facility. Bement & Dougherty's machine tools displayed many points of excellence. The American exhibit in all respects, although not large, was extremely praiseworthy, and was a matter of surprise to many toolmakers who heretofore have had a sort of monopoly in this business.

FRANCE.

The machines exhibited in class 54 may be divided into four principal sections:

"1. Machine tools for working metal, such as simple lathes, mechanical lathes, parallel lathes, spherical lathes, facing lathes, and lathes with four points, axle turning lathes, lathes of precision, counter-sinking lathes and rose engines, lathes for cutting screws and forming heads of bolts, &c., for turning the wheels of carriages and the driving-wheels of locomotives, planing machines of all kinds, filing machines, mortising and drilling machines, whether horizontal or vertical, machines for shaping the heads of bolts and nuts for boring cylinders, forging, rivet making, punching, shearing, chamfering, centering, riveting and pipe-drawing, and lastly, machines for pounding and for polishing.

"2. The machine tools employed in working wood, such as reciprocating, continuous and circular sawing machines, planing, moulding, turning, and mortising machines.

"3. The various tools used in machine construction shops, such as rules, squares, trusses, bevels, chisels, glass and sand paper and cloths, &c.; blocks and tackle, and other apparatus used in mounting machines.

"4. Machines for pressing, crushing, mixing, sawing, and polishing, are comprised under the general denomination of machine tools, although they are, in fact, manufacturing machines. Such are also rolls for flattening the precious metals, cutting and stamping presses, nailing machines, brick and tile making machines, stone-breaking machines, machines for grinding plaster and colors, for bending and welding the tires of wheels, for cutting paper, for piercing hard and precious stones, and for diamond cutting.

"Machine tools used for working iron and wood, and the greater part of the machines comprised in this class, are manufactured principally in the departments of the Seine, Seine Inférieure, Nord, Haut Rhin, Bas-Rhin, Bouches du Rhône, and Somme. Paris, Rouen, Mulhouse, Graffenstaden and Hâvre, are the chief places of production of tools and machine tools. Fécamp manufactures wood-working machinery. The small machine tools used for metal-ware manufacture form the object of an important trade at Albert and Maubeuge. Machine tools, properly so-called, are constructed of metal; cast-iron is generally employed for the purpose. The preference is given to Scotch iron, at the price of about 15 francs the 100 kilograms, as presenting a uniform quality and not being too hard. Castings of moderate size cost about 35 francs, and large castings only about 25 francs. The other metals used are mostly of French origin. Rough iron costs 24 to 25 francs the 100 kilograms, and forgings from 70 to 80 francs; pieces of small dimensions submitted to great strain, and therefore requiring superior power of resistance, are made of special iron, costing from 50 to 60 francs; but its production diminishes daily. The Bessemer steel does not yet offer sufficient guarantee to allow of its being used for these parts. Until this is the case, the manufacturers are compelled to employ steel which costs them from 90 to 150 francs the 100 kilograms. Case-hardened iron is substituted for the former in the case of small pieces of machinery, and for very small pieces malleable cast-iron is preferred. The parts of machine tools are nearly all produced by machinery, in large workshops abundantly supplied with all the means of giving with rapidity the form required before the parts are put together, and with the view of increasing production without adding to the extent of their establishments. Many constructors now produce the castings and large forged pieces on the very spot where the iron is produced. This principle of the division of labor and of the setting apart of certain workshops for special purposes is being adopted more and more every day in our large towns.

"The cost of hand work varies greatly according to the locality and the ability of the workmen. In Paris the average wages of the operatives who work by hand or direct machine tools is five francs a day. In other central towns more favorably situated, such as Mulhouse, for example, the average is not more than three francs. First-class hands, however, earn much higher wages, sometimes as high as nine francs per day. The constant increase in the machinery of construction shops tends incessantly to improve the condition of the workman by diminishing his bodily labor and giving him time and opportunity for making numerous arrangements which have the effect of increasing his earnings, especially when he is engaged on piece-work. The machinists generally construct the machines which they produce after their own models, but they are often obliged to modify them according to the demands of the purchaser. For several years the great houses have established depots at Paris for the machines in most general use, such as lathes, drilling, planing, punching, and shearing machines. These depots render great services to the manufacturers, who are often obliged to increase their machinery at a moment's notice. Even public establishments often take advantage of this arrangement. The greater part of the products of this trade are for home use, but of late important business has been done with Italy, Spain, South America, Russia, Turkey, and even Japan.

"The productions of France, which a few years since were very limited in extent, may be valued at about 12,000,000 francs. Although the prices of the raw materials have submitted to considerable diminution since the treaty of commerce came into effect, the selling price of the machinery has remained almost stationary, in consequence of the increasing dearness of labor and the constant augmentation of the weight of the machines, in order to diminish vibration and to simplify the arrangement of the foundations."

RECENT IMPROVEMENTS.

"The committee deem it their duty to point out the following improvements as having taken place within the last 12 years:

"1. More solidity of construction, simplicity and perfection, and more frequent adoption of automatic motions.

"2. Forms better adapted to the materials employed.

"3. Constantly increasing tendency towards mechanical production, and the completion of parts by the use of machinery alone.

"4. As regards metal working machines, the introduction of machines which allow of several operations being performed on the same piece without dismounting it; as, for example, universal drilling and planing machines, working horizontally and vertically; lathes upon which parts having a different axis to the principal piece are worked by means of cutters having a compound rotating and traversing movement; bolt cutting machines; mortising machines with revolving tools, and countersinking machines.

"5. As regards wood-working machines, the construction of portable and locomotive machinery for sawing wood in the forest, the application of the endless handsaw to the cutting up of round timber; the employment of helicoidal blades in planing; the modification of the tools used in boring and planing, and the increase in the rapidity of rotation given to these tools.

"6. As regards the tools themselves, a general improvement in the execution of small tools used in connection with the machines, and the differential pully, which causes the load to remain in the same place when left to itself.

"7. Generally, as regards machines of all kinds, we may point to many simplifications in the means of transmitting motion, and specially the mechanical imitation of proceeding by hand; the employment of mechanical means in the working of fly-presses; an increase in the production of brickmaking machines, and, lastly, a tendency towards the suppression or diminution of previous working of the clay by the augmentation of the pressure employed and by the greater dryness of the clay employed."

CLASS 55.—APPARATUS AND PROCESSES USED IN SPINNING AND ROPE-MAKING.

In class 55 were comprised all the machinery and apparatus used in the preparation and specimens of textile materials, of which cotton, wool, flax, hemp, and silk are the most important. The materials and machinery used for rope-making were also included in this class, together with ropes and cordages of all kinds. It may be here mentioned that some excellent specimens of cordage were exhibited, made from the fibre of the aloe.

America had four exhibitors of machinery for preparing cotton and wool. There was a considerable display from other countries, but without a complete knowledge of the technology of the trade it would be impossible to describe the peculiarities of the various machines. The subject belongs to the specialist. The following, from the introduction to this class in the official catalogue, will prove interesting:

FRANCE.

"This class includes the machines and apparatus destined to manufacture textile fabrics, of which cotton, flax, hemp and silk are the most important.

The machines for spinning, twisting, and weaving are constructed in different industrial centres of France. The machines employed in the silk trade are principally made at Lyons; Alsace manufactures for the cotton, woollen, worsted and spun silk trades; Lille is principally engaged with flax and hemp machinery; Rouen furnishes the cotton trade especially; Louviers, Elbeuf, and Sedan the machines used in the cloth trade; Troyes and its environs produce hosiery looms. Paris combines all these branches, but particularly those appertaining to the class now under notice.

"In consequence of the multiplicity of their forms and of their masses, textile materials require several series of spinning machinery or arrangements. Cotton is, at the present time, worked upon two systems very distinct from each other, and according to whether the yarns are to be carded or combed. For wool, four series of machines, corresponding with the denominations, carded yarns, combed merino yarns, long combed yarn, and mixed or combed carded yarns; lastly, a new apparatus, recently introduced, gives woollen yarns by felting instead of spinning. Hemp, flax, and jute are prepared by two principal descriptions of machines—one for long fibres upon the combing principle, the other for short fibres or tow prepared by carding. Each of the two branches of the flax and hemp manufacture has other modifications in its machinery, according to the special character of the raw material employed and the strength of its fibres. Nor are the means the same for producing fine and coarse yarns. The former requires not only a special machine, but the application of water at various temperatures. Of all spinning machinery employed, that which is used for the most costly material is the most simple in its construction; but the winding of silk from the cocoon, although apparently so extremely simple an operation, is in reality so delicate that with cocoons of the same quality the value of the silk may be doubled by the ability of the "durder" or winder. The manufacture of spun silk, which increases daily with the cost of the raw material, also requires a variety of combs as well as cards. The spinning machinery for cashmere, alpaca, and goat's hair is identical, with a trifling exception, with that employed for wool.

"This class includes, also, the machinery and products of the rope and twine manufacture. The machines of class 56 act upon yarns as upon a raw material of common origin to transform them into fabrics. The loom changes with the nature of the tissue to be produced. The same parts apply to the weaving of cotton, wool, flax, silk, &c., but are modified according as the tissue to be produced is plain or figured. Knitted articles, tulle, bobinet, net, and lace have each a machine specially constructed for it, and which changes according to the form of the mesh. The looms of class 56 are divided, then, into:

"1. Looms to make plain fabrics with close threads. 2. Looms to weave fancy stuffs, plain, napped, or with velvet pile. 3. Frames for knitting tulle, nets, lace, &c.

"The apparatus employed in the preparation of yarns for weaving, and also for the dressing of tissues, are included in this class. Some, such as calenders, presses, clipping machines, &c., indispensable in all textile manufactures, are applied, with certain modifications, to each of the branches; others, such as fulling mills, are used only in one branch of this vast group. The purification of wools has been greatly improved as regards not only the economy but the perfection of the process since the general adoption of machinery for washing, scraping, and other operations.

"Special modifications introduced in the apparatus for the preparation of cotton have produced unhoped-for results with the common productions of India and China. The fine cottons of Georgia, Egypt, and Algeria are largely indebted for their present position in the market to the application of combing machines. The same principle has produced greater results still in the woollen manufacture. Spinning machinery, mill-jennies, and their contingents receive constant improvements, which allow increased speed to be given to the spindles, and consequently an acceleration of their productive power. The spinning of silk itself, in spite of its simplicity, is the object of many experiments, with a view to the preservation and preparation of cocoons, as well as the improvements of the mills for twisting and organzine. The machines for milling, dressing, and preparing the yarns for warps, and the wefting machines, have been modified with great success, and have thus contributed to the extension of power-loom weaving in those special articles where a substitution for hand-weaving seemed very difficult. The several parts of power looms have been the object of careful study, which has brought about many improvements, such as governors, instantaneous stopping on the breaking of a thread, either warp or weft; cages with a number of shuttles, &c. Increased care in construction has produced improvements in the movements, and a proportional increase in the production. In the weaving of figured stuffs attempts have been made to substitute paper for card in the Jacquard machine. This idea, which is far from new, has no chance of success until the various organs of this ingenious mechanism can be made to work with absolute precision. Another important fact consists in the happy combination of a Jacquard loom in which the same part produces various effects in succession, so as to simplify the machine and produce an important economy in the results. Straight looms for hosiery which work by hand produce no more than 5,000 meshes a minute, while machinery produces nearly 50,000 in the same period. In circular knitting machines the number of meshes is raised from 50,000 to about 500,000. Dressing machines do not seem to call for similar remarks, and present but few special modifications. Improvement in this direction depends, in fact, more upon the ability of the workmen than upon the principle of the machine.

"France employs annually from 80,000 to 85,000 tons of cotton, the necessary machinery and material for spinning, weaving, and dressing amounting in value to about 400,000,000 francs. The woollen manufactures involve about the same aggregate expenditure; the mechanical spinning of hemp and flax and the weaving of linen about 100,000,000 francs; lastly, the silk trade furnishes an amount very nearly approaching to 200,000,000 francs, giving the total value of the material employed in these several industries as 1,100,000,000 francs.

"It may be calculated that the amount spent annually for construction represents one-twentieth of the above total—that is to say, a sum of 58,000,000 francs, without taking into account exportation, which greatly exceeds the importation.

"The character of the improvements now in course of realization may be thus summed up:

"1. A more precise acquaintance with the special constitution of the raw materials, and, consequently, a better arrangement of the means by which they are transformed.

"2. A more rigorous application of the mechanical laws in the execution of all the parts of the machines."

CLASS 57.—APPARATUS AND PROCESSES FOR SEWING AND FOR MAKING UP CLOTHING.

"The machines and tools exhibited in this class form three distinct series:

"1. Sewing machines applied to the different works of sewing and embroidery. 2. Machines employed in shoe-making. 3. Machines and apparatus used in felt-hat making.

"The articles exhibited in this class show the advance made in the trade. The first sewing machine which was worked for trade purposes was invented by a Frenchman named Thimonier, a tailor at Amplepuis, (Rhone,) the invention being patented 17th April, 1830, and improvements therein registered 21st July, 1845. Until the year 1855 the use of these machines was very restricted. They were only applied in a few special ways, and it is since that time, and particularly since 1862, that they have come into general use in France."

MACHINES USED IN SHOE-MAKING.

"Machines have long been used in shoe-making, and the principal aim of the experiments latterly has been to replace sewing by screw pegs. The exhibition in this class shows the mechanical apparatus for this kind of work in movement, such as cutting presses, mounting and screwing machines, shears, grindstones, piercers, &c. The mounting and screwing machines, worked by steam and guided by women, admit of a rapidity of execution and an economy of hand work which enables the makers to deliver the products for consumption at a much lower price and of an equally good quality. We must also mention the special apparatus called dressing machines, intended for the mountings of the upper leathers, which was done hitherto by hand."

APPARATUS FOR FELT-HAT MAKING.

"The machines serving for the manufacture of felt hats have accomplished a complete transformation in the trade during the last few years. Previously the workman shaped, fulled, pounced, and pressed by hand. This system produced much inequality in the work, and, above all, great slowness in the production. At the present time machinery replaces hand work in general. The several machines working in class 57 serve for forming, fulling, and pouncing felt hats, and for shaping straw hats. They show a considerable progress as regards the regularity of the work, and, by rendering the manufacture more easy, admit of the productions being sold at a lower price, and thus meeting in a much better degree the demands of the home consumption and the extended sales for exportation."

CLASS 58.—APPARATUS AND PROCESSES USED IN THE MANUFACTURE OF FURNITURE AND OTHER OBJECTS FOR DWELLINGS.

"The productions exhibited in class 58 form four principal sections:

"1. Tools for wood-work, including ribbon saws, reciprocating treadle saws, vertical moulding machines, planing machines with helicoidal blades and with disks, mortising, engine-turning, and carving machines, and collections of tools for hand work. 2. The worked produce of these machines. 3. Engraving machines and portrait lathes. 4. Saw blades and collection of wood-working tools."

It embraced the apparatus and processes used in the manufacture of furniture, and other objects for dwellings—familiar machinery for the most part that had very little interest for the general public. America exhibited several ingenious contrivances, among which may be mentioned a gauge lathe for turning the legs of chairs, &c. It is a lathe with a slide-rest traversed by a screw. This rest carries two tools; one, a chisel, is fixed and roughs off the work; the second, a V-shaped cutter, cuts out the pattern and is guided by a template fixed to the bed of the lathe. A knife whose edge is molded to the form to be produced, moves vertically in a frame behind the lathe; as the slide-rest passes along, this knife descends and smooths off the pattern produced by the first two cutters. In this manner chair legs are produced from a rough square log with an accuracy equal to that attained by hand, and with immense rapidity and cheapness.

FRANCE.

"In the French section a lathe for copying medals was shown by Messrs Barrere & Caussande. The work and the original revolve slowly at the same speed. A tracing-point moves from the circumference of the model, so as to describe a spiral track over the surface to be copied, and rises and falls as it meets with elevations and depressions. The vertical motion of this point is communicated to a drill which moves in a similar manner over the work. Reduction or enlargement is produced by causing the horizontal movement of the drill to be slower or faster than that of the tracing point by means of change wheels.

"The principal centres of manufacture are in the department of the Seine, but a certain number of machines are furnished by other departments. The raw materials, such as cast and wrought iron and steel, are derived almost entirely from French sources. The price of cast iron varies from 24 francs to 26 francs the 100 kilograms, and that of iron castings from 30 to 35 francs the 100 kilograms; charcoal iron, plate, and cast iron of the second fusion are preferred.

"Mechanical labor has taken the place of manual for sawing up and shaping the wood; and in the forest, when it is impossible to bring out the rough timber, saw-mills are used, which cut up the timber on the spot, and convert it into pieces for parquetry, staves, &c. It took some years to break through the old routine, but the perseverance of constructors has triumphed at last, and now almost all the works are provided with machines of all kinds. Even carving by machinery has come into practice. The engraving machines and portrait engines have made sensible progress. Lathes are used, which reproduce, with the utmost fidelity, and on steel, all kinds of models, without the slightest alteration of form. Saw blades and cutting tools have undergone considerable modifications, and complete the machinery in a satisfactory manner. The blades of ribbon saws have now arrived at great perfection. Hand-tools for woodwork leave nothing to be desired in any respect. The number of woodworking machines in actual operation may be estimated at 10,000.

"The employment of machine tools has not had the effect, as might have been expected, of superseding manual labor, the production having considerably increased. Simple laborers have become directors of machines, and workmen of the first class, following the same profession, have given to this kind of work the impulse that it required. Wages have increased in large proportion. The workmen who formerly earned three francs a day now obtain five francs. Good workmen have become masters, and established saw-mills, which now form a very important branch of commerce. Machine tools are sold principally, in France, for cabinet-making, inlaid work, furniture-making, cutting-out stuffs, bones and ivory. They are also sent abroad for forest works. The number of machines working since 1855 is estimated at 10,000, and the average cost of each, 2,000 francs, making a total of 20,000,000 francs. Each machine represents the power of four workmen, from which has to be deducted the conductor of the machine. The saving effected is therefore equal to three-fourths of the whole.

"The committee of admission has to point out the following instances of progress made during the last twelve years: Ribbon saws, with moulded or cast-iron frames and columns, which may be placed on a simple slab of stone, and worked without the slightest trepidation, the diameter of the pulley so much enlarged that wood of a metre in diameter may be cut up; moulding and mortising machines, worked with greatly increased rapidity; machines with helicoidal blades, for working wood across the grain and for planing knotty wood in all directions; planing machines, with disks working vertically, by which wood may be worked square or obliquely, according to circumstances; the improvement of hand tools, reciprocating saws, worked by treadle at the rate of 250 cuts per minute, and which move so easily that the workman is in no way occupied with the action of his foot; the arris handsaw, especially useful for cutting tenons, for square cuts, and mitreing. Saw-blades and cutting tools are manufactured in Paris; the largest articles are circular saws, and the smallest ribbon saws. The products of these, exhibited in specimens of cutting, which are models of precision and patience, show the perfection of the ribbon saw; the specimens of carving and ornamental cutting and of carton work also exhibit a high degree of perfection."

CLASS 59.—APPARATUS AND PROCESSES USED IN PAPER-MAKING, DYEING, AND PRINTING.

The exhibits included in this class are manufacturing machines employed especially in the making of paper, in dyeing and printing of all descriptions. They form six principal series: 1. Printing machines and presses, apparatus for stereotype and type-founding, and for composing by machinery; 2. Lithographic printing presses; 3. Machines for various kinds of printing and decoration on paper, roller and scraper machines for copperplate and other incised engraving, and for the cheap printing of children's copy books; machines for the rapid printing of railway tickets; self-cutting, stamping and registering machines. Among the many tools used for paper work, folding machines and powerful paper-cutting machines ought to be mentioned: 4. Machines for paper-making; 5. Apparatus for printing paper-hangings; 6. Accessories of calico and other printings; pricking machines; singeing mchaines; stretcher for dyeing dyed fabrics, &c.; accessories of printing on paper; processes of engraving with the aid of galvanic deposits; seal engraving, &c., &c.

"Paris and Mulhouse are the two principal centres of production for machinery and apparatus belonging to this class. Some of them, and particularly those used in stereotype work and type-founding, are modifications of American models. The precision of the machines for fine printing, for printing from wood-blocks, and the rapidity of production for ordinary works, and especially for newspapers, are the principal objects of the labors of the constructors. The problem of lithographic printing by machinery, at prices similar to those of typographical printing, has, within the last few years, been practically solved. The Exhibition contains many specimens of machines which have been adopted by the trade. The annual value of machines belonging to the first series amounts to 1,500,000 or 2,000,000 francs, and their success is attested by the exportation of nearly one-half the amount.

"We have to draw attention to the improvements made in the machines for reducing pulp, with regard to form, dimensions, and mode of construction, which are shown in the Exhibition. The machines exhibited consist of pulp-engines of large dimensions, of one of new construction, and lastly, of the accessories of the paper machine, dryers, wire-cloth, felt, &c. The machines for engraving, rollers for printing by means of circular cutters, engine-turning, electricity, and the employment of the pantograph, &c., are valuable auxiliaries placed in the hands of the roller-engravers. The printing machine figures in the Exhibition with its last improvements, and a special motor, adopted on account of its simple action."

Class 60 was devoted to machines, instruments, and processes used in various works. It included among the objects from the United States a machine for dressing printing types, and machines for cutting files. In the French section there were watch-makers' and jewellers' tools, and machines for making envelopes. Many of the machines in this class are described elsewhere.

CLASS 61.—CARRIAGES AND WHEELWRIGHTS' WORK.

Class 61 was devoted to carriages and wheelwrights' work, comprising carriages entire and in parts. The display of the former was exceedingly good, especially in the English and French departments. There were a few light wagons from America, but neither in style nor variety of style was the exhibit worthy of this important industry. Russia displayed several specimens of her carriage work, which, in the lighter sort of road vehicles, is obviously borrowed from American models. There were fine specimens also in the Austrian, Prussian, and Spanish sections. The English exhibit was characterized by elegance of form, brilliance of varnish, and graceful poise. There were but few novelties. The most important had in view the better and quicker opening and shutting of barouches, so as to afford immediate protection in case of rain. This is done very rapidly from the driver's seat by means of a crank, which winds it up without requiring to stop, or any derangement to the occupants. A similar contrivance, but worked by springs, and balanced to the greatest nicety, is operated from the interior. A touch of the strap raises the cover.

FRANCE.

"The productions exhibited in this class comprise: 1. Carriages of various kinds and forms, such as landaus, calashes, broughams, victorias, phætons, omnibuses, American trotting carriages, fancy vehicles of all sorts, and children's carriages; 2. Detached parts employed in the manufacture of carriages of all kinds, such as wheels, axles, springs, boxes, shafts, specimens of forging, &c. The principal manufactories for the production of dress carriages are in Paris, but there are some also at Lille, Lyons, Bordeaux, Toulouse, Caen, Abbeville, Colmar, Boulogne-sur-mer, &c. Each district, as a rule, builds carriages in ordinary use in its own part of the country. The dimensions, form, mounting, and the accessories of these vehicles are necessarily modified according to the nature of the ground, the state of the roads, and the quality of the horses of the country. As to the detached parts of carriages, carts, and other vehicles, their production is spread over the whole extent of the country; they exhibit, however, a tendency to concentrate themselves round certain centres, where, with the aid of machinery, they are produced in large workshops amply provided with means, with great rapidity and economy. The materials used by the coachmaker and wheelwright are principally wood, iron, steel, leather, cloth, galloons or coach lace, silk and woollen fabrics, horse-hair, morocco, colors, varnish, &c. For a long period French industry depended on foreigners for many of these items, especially springs and varnish, which came from England; but for some time the French makers have found nearly all they required at home. In consequence of the great variety of forms, coach-building cannot be effected by mechanical means. Such processes are only used in the case of certain detached parts, such as springs, axles, and wheels. The work is divided amongst a large number of workmen; one class of workmen make the wheels and the carriages; a second, the bodies; smiths and fitters make the springs, the axles, and all the iron-work; saddlers and stuffers provide the furniture of the interior, the seats, and also the exterior parts in which leather is employed; and to those must be added the platers, the painters, the lamp-makers, the lace-makers, the carvers, &c. Besides the great establishments in which the carriages are produced complete, and in which all the classes of workmen are employed, there are shops which confine themselves to the fitting and mounting of coach bodies purchased in the rough state; others are specially organized for painting only; and, lastly, certain persons devote themselves entirely to the production of designs and models. The products of the French carriage trade are not only sold all over France, but exported to other countries. The number built in France may be estimated approximately at about 5,000 annually, and of the value of about 15,000,000 francs. But this does not include the work of repairing and keeping in order, which surpasses considerably in amount the cost of the new work. The inquiry instituted in 1860, by the Chamber of Commerce of Paris, proved that, including the whole of the coach, carriage, and wheelwright's works, lamp-making, iron-work, painting, &c., the trade of Paris alone amounted to 36,000,000 francs. Although the treaty of commerce has offered great facilities, this is at present almost *nil*. The exportation, on the other hand, is on the increase; this scarcely exceeded 1,000,000 francs from 1847 to 1856, but it amounts, at the present time, to four times that sum. French carriages are exported mostly to Spain, Russia, Egypt, Portugal, America, Turkey, and the colonies; a certain number are even sent to England.

"The principal improvements to be noted in the trade may be summed up: 1. The carriages, being manufactured of the very best materials, are more solid than formerly; 2. The models are more varied, both as regards elegance, and also to suit the many different employments for which they are destined; 3. The manufacture is more rapid, in consequence of improvements introduced in the tools employed, and of a better distribution of the work in factories."

CLASS 62.—HARNESS AND SADDLERY.

The productions exhibited in class 62 comprise: 1. Harness of all kinds, coarse and fine; 2. Collars on different systems; 3. Saddlery work; 4. Driving and riding whips and sticks; 5. Detached parts which enter into the structure of the preceding articles, and which furnish employment to special workmen.

The display was by no means remarkable, and the contest was mainly between France and England. The latter country, some few years since, had almost a monopoly of this business, but French ingenuity and skill have made such rapid progress that she can no longer boast of occupying the same position. Both nations, however, manufacture superb articles in this branch. In the Spanish department was exhibited a magnificent set of state harness, in which material workmanship, taste, plating, &c., seemed perfect. It was for eight horses and took many years to make. Spanish leather is famous.

FRANCE.

"Paris is the centre of production for dress harness, saddles, whips, riding whips and sticks. Common harness, such as that used in trade and agriculture, is made in all parts of France; its forms, which are very various, adapt themselves to the wants of the several localities where it is employed. Formerly the makers of harness in France obtained their burnished leather and polished steel spurs from England; a few houses have still retained this habit, as regards certain articles, but the tanneries of Paris and Pont Audemer now produce leathers which will bear comparison in all respects with those of the best English houses. As to spur and harness-making, the makers of Paris and those of the departments of the Aisne, Eure, and Ardennes, are now able to produce all the fine articles. The materials employed are tanned leather, (bullock, cow, calf, pig, and horse.) Varnished leather is only used for the finer kinds of harness; the white, or Hungarian leather, is now only employed in agricultural harness; the ox and cow hides are employed for common and ordinary harness; pig skins are used for the making of saddlery.

"The articles composing this class are made in workshops under the eye of the manufacturer. Hand labor is still most in demand. The use of sewing machines has introduced great regularity in the manufacture of many parts of the saddles and collars, but hand work is preferable for the pieces which require great solidity. Some houses which employ themselves upon military equipments, and others who work for exportation and the omnibus and other great companies, possess large workshops, directed by foremen, and including cutters and preparers, as well as special workmen for each branch of the trade. French saddlery is exported all over the world, the principal markets being Egypt, Spain, Turkey, Belgium, and especially South America, which sends us the raw hides and receives back the finished manufactured articles.

"It is difficult to estimate the value of the trade. It appears, from a report made to the Chamber of Commerce of Paris, in 1860, that the amount of the harness manufacture in Paris alone was 12,276,000 francs; and that of saddlery, spur-making, and saddlebow-making, to 2,992,000 francs, giving a total of 15,000,000 francs and upwards, which must at least be doubled to represent all France, and that without including military harness. The exportation of French saddlery exceeds 5,000,000 francs per year. The improvements which have been introduced into the trade during the past 12 years are of two kinds; on the one hand, the forms have been modified so as to render them more simple than those formerly in use, and to get rid of heavy and ungraceful pieces; and, on the other hand, hand labor has been replaced with advantage in several branches of the trade, by mechanical means."

CLASS 63.—RAILWAY APPARATUS.

The objects ranged under this class comprise the material of railways: Locomotives, designs, and models of locomotives, railway carriages, goods wagons, signals, turn-tables, specimens of permanent way, weigh-bridges, models of various systems of brakes and modes of communication between passengers and guards; specimens of wheels and axles and other iron-work employed in the manufacture of railroad rolling stock. Nearly all the continental countries, Great Britain, and America, contributed to this highly important and interesting division.

LOCOMOTIVES.

The locomotives exhibited were 32 in number. Of these, France contributed 11 passenger and goods engines, and two small tank-engines for tramways; Belgium sent five; Prussia, two; Baden, one; Wurtemberg, one; Bavaria, one; Austria, three; the United States, one, and Great Britain, three passenger engines and two contractors' tank engines. Some of these were of enormous proportions. The Paris and Orleans railway exhibited a ten-wheeled tank-engine, weighing 60 tons, on a wheel base of 14 feet 10½ inches. English engines seldom have more than six wheels, and in England the inside cylinder is largely adopted. On the continent the cylinders are generally outside. The workmanship of the French engine-makers is fully equal to the best. In this industry, indeed, France has made immense strides. Only a few years have elapsed since the time when she used to import her locomotives from England. The shoe is now on the other foot. The Creusot Iron Works exhibited a remarkably well-finished express engine, made from English drawings, indeed, but intended for an English railroad, the Great Eastern. It was the 16th out of an order for 40; the first 15 having been already delivered over to the railway company, and accepted by them, the period of warranty for them having expired. Another singular instance of the way in which this manufacture is passing into new hands was furnished in the case of Mr. Kessler, of Esslingen, who exhibited a locomotive built by him, also on English designs, for an English colony, it being part of an order from the East India Railway Company for 20 engines. The workmanship was thoroughly good. These two engines, says Sir D. Campbell, afford incontrovertible proof of the possibility of getting English designs carried out in France, or on the continent, quite as well as in England, and at a cheaper rate.

The Grant locomotive of Paterson, New Jersey, attracted much attention, and was universally regarded as the handsomest piece of work in the Exhibition. The handles of the various cocks were made of ivory, and the covering of the boiler, cylinder, and chimney, were of polished brass and German silver. The engine-driver's house was of inlaid wood, and every particular of fine workmanship was carefully and beautifully wrought out.

In the Russian department of the Park was a model illustrating the working of the Mahovos system of locomotion on steep inclines from mines. The apparatus consisted of a truck fitted with a pair of 15-ton fly-wheels on an axle carried on friction rollers, which themselves rest on the wheels of the truck. Each train of loaded wagons has one of these trucks attached, and is impelled down the incline by its own weight, and the truck wheels, in revolving, transmit a rotary motion to the fly-wheels by means of the friction rollers. On reaching the bottom of the descent the rollers are lifted by means of levers, clear of the truck wheels, and then revolve freely, opposing hardly any resistance to the action of the fly-wheels. The truck is then detached, turned round on a turn-table, and attached to the head of a train of empty wagons. The friction rollers are then let down upon the truck wheels, transmitting to them the rotatory power stored up in the fly-wheels, which, it is claimed, suffices to draw the empty wagons up to the top of the incline. It certainly accomplished this object in the working model.

SIGNALS TO GUARDS.

Many devices were exhibited in this section for enabling passengers to communicate with the guards. They were curious to Americans, inasmuch as they show how much thought has been bestowed on a subject which has already in the United States found a very ready solution. With us, however, the conditions are somewhat different. The cars are open from one end to the other, and the guard is constantly passing through them. In Europe there are three and sometimes four different classes to each train, and the subdivisions extend to carriages of the same denomination, so that the guard is compelled to pass from coach to coach by means of the steps outside. This, however, would not prevent a simple rope passing along the entire length of the train, as with us. It would be sure to be within the reach of every one, while it seems that it is only desired to afford succor to the occupants of first-class carriages. This circumstance is the occasion of all the difficulties which European engineers have had to meet. Their effort has been to provide in first-class carriages a means by which the train could be arrested, and then to surround it with such difficulties and complications that no one, unless in extremity, would think of using it. And it may be added that a person in extremity, attacked by a maniac or a murderer, would be utterly unable to command the resources, within his reach technically, but practically out of his power. We will briefly refer to one or two of these methods. They consist of signals communicated by acoustic, pneumatic, or electrical agency. The latter form the large majority, especially in France, but it has been found so difficult to obtain an undisturbed connection that one-third of the signals fail. The way in which this scientific security is proffered to the traveller is curious. A small triangular piece is taken out from the partition which divides two compartments of a carriage, and which otherwise are strictly separate and private. This triangle is glazed with two panes of glass, one in each carriage. Dangling between the two is a ring attached to a wire, and beneath it an intimation that, in case of accident or dire necessity, the passenger may break the glass with his elbow, pull the wire, then open a window and wave his arms in the air, by which means the guard or engineer will be duly warned. Heavy penalties are demanded from those who should wantonly indulge in this luxury, but the difficulties in the case are sufficient to deter people from risking their elbows and fingers in such an exploit. In cases of real danger a powerful ruffian could accomplish his purpose long before his victim had mounted to the seat, crooked his elbow, broken the window, pulled the bell, opened the window, and called for help in the open air. A better arrangement than the one we have described is that where the suppliant pulls a peg like an organ stop. The lever thus pulled from its place cannot be put back. The guard knows who has summoned him, and can either succor or prosecute, according to the merits of the case. The good Samaritan always comes with a club in his hand.

The pneumatic method of Chevalier, Cheilus & Co. is by far too complicated for description in these pages, and its merits, we believe, have yet to be ascertained. Practically it is a bell rung by means of weights, which are kept in their place until otherwise disposed of by pneumatic means.

RAILWAY POST OFFICES.

In the English department the post office authorities exhibited an excellent working model of the carriages and system adopted in England for depositing and taking up the mail-bags at stations where the main train does not stop. The bags are suspended on poles, secured with a suitable catch. A net sweeps past them, and from its velocity opens the catch and sweeps off the bag, which is then put in the travelling post office, opened and arranged *en route*. This is the process on the cars. The same naturally holds good at the stations—the train holds out the bag, and the station pole seizes it. Thus, whilst travelling at a high rate of speed, letters are both delivered and received without a moment's detention.

The travelling post office consists of three carriages with a continuous communication throughout. Two of them are used for sorting the London and the country correspondence respectively; the third being devoted to the delivery and reception of the mail-bags. All projections in the interior, which are as few as possible, are covered with stuffed cushions in order to lessen the effect of collision on the officials. In these carriages the post office clerks perform their duties. There is a post box in the car, so that when a stoppage takes place letters may be forwarded up to the last moment. The latter convenience is well known and appreciated in various central parts of the United States.

On account of the special nature of this exhibition, the committee of admission to this class thought itself bound to study the statistics of the subject, and reviewed successively the phases of this important branch of French industry as follows:

RAILWAY CONSTRUCTION IN FRANCE.

"On the 1st day of January, 1866, the whole system of railways conceded to companies amounted to 21,000 kilometres, of which the part in working was 13,570 kilometres; remaining unfinished 7,430 kilometres. The total cost of the whole of the lines in work amounted to 6,824,000,000 francs, of which 5,840,000,000 francs was paid by the companies and 984,000,000 francs by the state; the expenditure remaining to be made by the companies amounting to about 1,900,000,000 francs. The cost per kilometre[1] of the completed portion was 500,000 francs, (£20,000,) and that of the remainder is estimated at 255,000 francs for the com-

[1] The kilometre is equal to about five-eighths of a mile.

panies' share. With the exception of some special railways and some lines of secondary importance, the whole system of French railways is divided between six great companies. The following statement will show their importance:

"The Northern Railway Company, 1,613 kilometres conceded, 1,197 kilometres completed, 549 locomotives, 1,032 carriages, and 13,123 vans and trucks, at a total expense of 92,172,022 francs for rolling stock and repairing sheds.

"The Eastern Railway Company, 3,088 kilometres conceded, 2,512 kilometres completed, 762 locomotives, 1,962 carriages, and 16,316 vans and trucks, at an expense of 115,832,561 francs for rolling stock and repairing sheds.

"The Western Railway Company, 2,520 kilometres conceded, 1,857 kilometres completed, 514 locomotives, 1,770 carriages, and 10,160 vans and trucks, at an expense of 85,734,342 francs for rolling stock and repairing sheds.

"The Orleans Railway Company, 4,199 kilometres conceded, 3,067 kilometres completed, 690 locomotives, 1,945 carriages, and 12,299 vans and trucks, at an expense of 223,770,000 francs for rolling stock and repairing sheds.

"The Paris and Mediterranean Railway Company, 5,817 kilometres conceded, 3,198 kilometres completed, 1,262 locomotives, 2,108 carriages, and 35, 659 vans and trucks, at an expense of 223,770,000 francs for rolling stock and repairing sheds.

"The Midi Railway Company, 2,252 kilometres conceded, 1,496 kilometres completed, 287 locomotives, 878 carriages, and 9,092 vans and trucks, at an expense of 70,827,885 francs for rolling stock and repairing sheds.

"Various smaller undertakings, 1,511 kilometres conceded, 243 kilometres completed; giving a grand total of 21,000 kilometres conceded, 13,570 kilometres completed, 4,064 locomotives, 9,695 carriages, and 96,649 vans and trucks, at an expense of 690,476,810 francs for rolling stock and repairing sheds, and 655,649,400 francs for permanent way.

"The cost of maintenance during the year 1865 was about 36.650,000 francs for the rolling stock, or 2,800 francs per kilometre; and about 15,000,000 francs or 1,150 francs per kilometre for the permanent way, &c., together 51,650,000 francs or 3,950 francs per kilometre.

"The work done during the year 1865 gave for the whole of the lines the following results: Number of kilometres in work, 13,239; number of persons carried, 84,025,546; average number of railway travellers, 40; total number of travellers to one railway, 3,330,639,807; total number of tons of merchandise carried, 34,049,435; average distance carried per ton, 152 kilometres; total number of tons to one railway, 5,172,847,825; receipts from passengers, 184,245,213 francs; receipts from merchandise, 314,609,184 francs; receipts from parcels, &c., 80,032,447 francs; total gross receipts, 578,856,874 francs; average cost to passengers per railway

0*f*.0553; average cost per ton, 0*f*.0608; total cost of working, 266,202,095 francs; ratio of expenses to gross receipts (general average) 45.98 per cent.

"The employés on the French lines are divided (like those elsewhere) into the permanent staff and workmen and laborers. On the 1st of January, 1866, the former numbered 60,160, and the latter 51,300, or, in all, 111,460 persons."

REPAIRING SHOPS OF THE RAILWAY COMPANIES.

"The companies, in general, do all that is required for the maintenance of the rolling stock in their own factories. The number of workmen and others employed for this service amounts to about 20,000 for the whole of the lines, and the salaries and wages paid amount to about 23,350,000 francs, or an average of 1,167 francs per head. Some companies also construct their own carriages and locomotives. Such construction amounted, in 1865, to 32 locomotives, 37 tenders, 32 carriages, and 2,570 trucks, and cost 9,180,000 francs. The railway companies have introduced the system of job work to a great extent in their machine shops, with division of profits amongst the members of each association of workmen, or *pro rata* wages. This organization has produced the best possible effects, and may be regarded as a starting point of co-operative associations.

"The number of private construction shops, inclusive of the companies, is, for locomotives, six in number; two in Paris, two in Alsace, one at Creuzot, and one at Fives-Lille. These six establishments can turn out annually at least 450 locomotives and tenders. The factories for carriages and trucks are nine in number, namely, six in Paris, two in Alsace, and one at Lyons, and they are able to build at least 1,500 carriages and 12,000 trucks. The total amount of the business of these establishments was, in 1865, in round numbers, 54,500,000 francs, made up as follows: 436 locomotives and 374 tenders, 26,700,000 francs; 1,439 carriages, 8,000,050 francs; and 31,056 trucks, 19,800,000 francs. These figures include locomotives and carriages exported. The total number of workmen employed in these factories amounts to about 10,000."

WORKSHOPS AND FORGES.

"The works are engaged in the manufacture of material for the permanent way, not including rails; they are scattered over the whole country and their number is considerable. Some of these are established on a large scale, but they are not special, and therefore no statistics of any utility can be presented as applying to railways in particular. As to rails, their production is nearly confined to the thirteen great furnaces situated on coal basins of France. Of these two are in the department of the Nord, two in the Eastern, three on the basin of the Loire, two in that of Alais, two in Aubin, one in Commentry, and, finally, one at Creuzot. The whole of these works produced together, in 1862, the period of the largest production, 205,000 tons of rails, of the total value of about 40,000,000 francs; in 1865 the produce was 184,131 tons.

"The iron works and construction shops exported in the year 1865, 193 locomotives and 174 tenders, for the sum of 11,900,000 francs, 420 carriages at 2,700,000 francs, 1,868 trucks at 3,200,000 francs. Total 19,800,000 francs. These figures, compared with those given as the result of the total manufacture in France, show that the reports equalled one-third of the whole amount produced. As regards rails, the statistics of 1865 show an export of 32,860 tons, or, in value, about 6,200,000 francs."

PROGRESS MADE IN THE MATERIAL.

"The progress made during the last ten years in the construction of railway material consists in the constantly augmenting power given to the locomotives, either with the view of overcoming the inclines of 25 to 30 in the thousand, or of running trains of 600 to 700 tons over inclines of four to five in the thousand feet. Thus the power of traction has been carried to 7,000 kilogrammes. The use of coal has almost entirely superseded that of coke by the employment of smoke consuming furnaces, or of well selected coal for the locomotives. The passenger carriages have been made more spacious and comfortable, the trucks have been increased in strength, and their tonnage has remained fixed at from eight to ten tons, with a few exceptions, in which it has been carried to fifteen tons. The construction of safety apparatus has been studied and its application persevered in. We may cite:

"1. The methods of communication by means of electricity between the guards and drivers of the train, and also between them and the passengers, the practicability of which are now being tested on all the trunk lines.

"2. The improvements introduced in the signal disks, their connection with the points of the branch lines, in order to connect the movements of the whole. The breaks have been improved, but they still act as gradual moderators of the speed, the instantaneous arrest of the train being in all cases carefully avoided. Besides possessing very powerful locomotives, engineers are giving great attention to the construction of small engines, employed on railways connected with mines, and which are intended in future to be employed in working agricultural and other local lines. As regards materials, we may mention the use of cast steel instead of iron plate in the construction of boilers. Attempts are being made also to substitute iron for wood in the frame-work of carriages and trucks, as well as for sleepers. Lastly, as regards the cost of manufacture, the following facts deserve special notice. In 1855, locomotives were paid for at the rate of 2 francs 10 centimes the kilogram; in 1866, the price was 1 franc 75 centimes; for tenders, the price was 1 franc 20 centimes and is now 90 centimes. The price of rails at the works was 320 francs per ton, to-day it is about 185 francs. These reductions will give an idea of the economy exercised in the provision of the material and general expenditure in the maintenance of railways."

PROVIDENT AND BENEVOLENT INSTITUTIONS.

"All the great railway companies have organized for their numerous employés funds for assistance in time of sickness and superannuation, and nearly all the companies vote to those funds an amount equal to that subcribed by their servants. Besides this, depots for the sale of articles of food and clothing have been established on several lines, which enable the employés to supply themselves with the necessaries of life at prices varying from 10 to 50 per centum lower than the ordinary rate. At the principal centres of railway traffic, places of refreshment, perfectly organized, have been established, where the employés, laborers, and their families may obtain food ready prepared for them at extremely low prices. The people are charged for what they consume, the amount of credit allowed being in proportion to that which is due to each person from the company. During the whole period of the high price of bread, the companies added to the wages of the workmen and laborers, and to the salaries of others whose income was below 60 pounds a year, a sum equal to the increase in the price of bread, not only for the officer or workman himself, but also for such members of his family supported by him. Lastly, the inauguration of courses of instruction for the workmen, and of schools for the children, and for all who need instruction, completes the organization of the institutions destined to improve the moral, intellectual, and material condition of those who are employed on the several railway establishments."

CLASS 64.—TELEGRAPHIC APPARATUS AND PROCESSES.

In class 64, American ingenuity and invention were conspicuously displayed. Every telegraphic instrument exhibited was more or less on the American principle, as indeed every telegraphic instrument *must* be. The practical value of telegraphy, at this day, is known in America, where it is not merely a political instrument of intercommunication, but a medium for the commonest expressions of domestic wish or want. In whatever country or whatever way a message be sent or received, instruments and methods of American origin are most in use. The fact was recognized by the imperial commission, who awarded the highest honor in their gift to Mr. Morse and to Mr. Hughes.

In the general application of electricity to mechanical purposes the French have advanced far beyond any other nation. The bell which you pull at the doctor's door, tingles so long as you keep your hand on the pull. It is a part of an electrical system which costs a trifle and acts positively, inasmuch as the bell will continue to ring so long as you keep your hand on the pull. This is the simple form. At the hotels they have an improvement on it. At the side of your bed there is a small dial, rather larger than an old fashioned-watch. Except that it is perpendicular, you might suppose that it was a compass. It is indeed supplied with a needle precisely like a compass. This needle has a limited service to perform, but it does it thoroughly. You press a button on the rim, and the needle moving on the surface of the dial tells you that the bell is ringing in the room of service. It continues to ring there until one of the domestics disconnects the wire. At that moment the finger of the dial returns to its place in the room whence the first communication was made, and the visitor knows that the servant *ought* to come. He has the basis, at all events, of a complaint against the management, if the servant does not come.

For railroad purposes, also, electricity is rapidly taking the place of human watchfulness. On many lines there are contrivances where the passing of a train is automatically announced to neighboring stations. The carriages pass over connecting wires and the train records itself before and behind, so that its progress and appearance are alike indicated.

It has been proposed, but not successfully carried into effect, to supply individuals and towns with the correct time by electricity; in other words, to lay it on like water. It stands to reason that if a perfect connection can be obtained, it is as easy to lay on or supply electricity as either water or gas. But so far practice has not come up to theory. The clocks regulated by electricity are the most unreliable in the world, and indeed the clocks of the Grand Hotel, Paris, regulated in this way have been the subject of common ridicule. There can be no doubt, however, that one of these days, companies *will* supply the time just as exactly and correctly as companies now supply the wants of lighting.

The American Commission was fortunate in having Professor Morse to report on the many interesting topics connected directly or indirectly with telegraphy.

FRANCE.

"The several processes applied to telegraphic purposes, and forming class 64, have occupied but a small space in preceding exhibitions; their importance, in fact, in spite of the services they have rendered, only dates from the time when the telegraph called the resources of electricity to its aid. Scientific men then entered upon a numerous series of experiments; and enlisting in their service a number of skilful constructors, they have arrived at results as important as they were unlooked for. The aerial telegraph of brothers Chappe has been made the subject of many improvements by the French telegraphic administration, but it could not attract the attention of scientific men, which was fixed on the discoveries and labors of Galvani, Volta, Oersted, Ampere, and Arago. The first electric telegraph apparatus was based on the action of current upon the magnetized needle, and the magnetization of soft iron under the influence of the same current. Wheatstone in England, and Morse in America, were the first to make (about the year 1839) experiments on lines of any length. The French administration adopted, in 1864, an apparatus founded on the property which soft iron possesses of becoming magnetized under the influence of an electric current; and this French apparatus, as it is called, reproduced the signals of the Chappe telegraph. It was a useful connecting link between the old system and those which were at once more simple and more complete. At the same time, the railway companies felt the necessity of connecting together by means of telegraphs the principal stations on their lines, and placed simple apparatus for that purpose in the hands of their agent. Since 1855, the Morse system has been adopted in France, where, with the aid of able manufacturers, it advantageously replaced the old apparatus. From this period the labors of men of science and engineers have become more and more numerous, and a great number of new systems have been attempted within a short time. Subsequently a telegraphic printing apparatus was introduced, more rapid in its action than those with arbitrary signals, and electro-chemical apparatus reproducing with great facility the exact image of the despatch or drawing confided to it for transmission. The telegraphic stations are connected with each other by metallic conductors insulated from the ground and fixed to supports, the elevation, form and dimensions of which vary according to the nature of the weight they have to support. Experiments with underground lines have been made from the very commencement of electric telegraphy, and have since greatly increased; and the results already obtained hold out a legitimate hope that the engineers who are persevering in these interesting labors will attain the object for which they are employing their time and talents. The submarine lines have been brought into successful action since the year 1850; their number has increased concurrently with the improvements which have been introduced into telegraphic industry, and have resulted in the recent successful laying of the transatlantic cable.

"This special exhibition shows the immense resources which may be looked for in the very varied applications of electricity to telegraphy; they include not only apparatus for writing or transmitting thoughts, but also the piles or sources of electricity; and the conductors, aerial, underground, and submarine, which are their indispensable auxiliaries."

CLASS 65.—CIVIL ENGINEERING, PUBLIC WORKS, AND ARCHITECTURE.

The objects exhibited in class 65, under the general head of civil engineering, public works and architecture, comprised four series of groups, which with much interesting matter relating to France will be found described at length beyond. No nation is more occupied with public works involving the highest engineering skill, or possesses a better method of tabulating all that has been accomplished or is yet in progress. The French display was superb. It consisted of models, admirably got up, of bridges, viaducts, reservoirs, docks, tunnels, &c., with plans and particulars of unquestionable accuracy and minuteness. Among these were two models of the swing bridge of Brest, which has a larger span than any bridge of similar construction in the world, being 571 feet, spanned by two wrought-iron lattice frames, revolving upon turn-tables. The foundations of the piers are on the solid rock. There were models and drawings, of several other important engineering works which have recently been completed in the vicinity of Paris.

LIGHT-HOUSES.

One of the most conspicuous objects in the Park was the iron light-house constructed by Mr. Rigolet, and intended for practical use on the rocks called *Les Douvres*, situated midway between the islands of Guernsey and Brehat, off the coast of Brittany. The rock on which this light-house is to be built is in the middle of the south edge of the shoal; its summit is washed at high tide. The masonry foundations are 6 feet 10 inches high; the height of the iron column is from base to floored gallery, 158 feet 6 inches; to top of lantern 184 feet 2 inches. In plan it is a sixteen-sided polygon, 36 feet 6 inches at the base and 13 feet 2 inches at the top; the light being 174 feet above high water. Round the base of the column are the store-rooms and living rooms of the light-house keepers; above these are rooms for the accommodation of persons rescued from shipwreck. The staircase is in the centre. The chief peculiarity of this fine piece of work was that the structure depended for its strength wholly upon its skeleton; the external iron plates being merely a shell upon which no reliance is placed for strength. In wrought-iron light-houses of ordinary construction, strength is obtained by riveting together the plates by which it is composed. The light is dioptric, revolving upon 10 steel friction rollers; the supply of oil is regulated by clockwork.

In the English section was an important exhibit of the dioptric system of August Fresnel, the one now most generally in use. It consists of a structure of segments of glass enveloping a central flame, whose focal rays are parallelized in a horizontal direction and deflected, in the case of fixed lights, in meridian planes only, while in revolving lights the rays are gathered into a number of cylindrical beams, which are made to pass successively before the observer by the rotation of the apparatus.

The Trinity House corporation exhibited the application of the magneto-electric light. The machine is complicated, but it answers its purpose, and is being generally adopted.

MOUNT CENIS TUNNEL.

In the Italian quarter were plans and sections of the famous Mount Cenis tunnel, which, when finished, will connect France with Italy by an unbroken line of railroad communication going through the Alps. The works, which were commenced in 1857, were first carried on by manual labor, a slow and difficult process. They are now carried on by machinery driven by compressed air, and the progress is much more rapid. The present rate is about one yard a day on the French side. The excavation proceeds from both ends, and it is now stated that the probable time when the workmen will meet and shake hands in the middle of the Alps will be some time in 1873.

A series of plans illustrated the principal public buildings and restorations executed in Paris during the last 12 years. The importance of these works may be estimated by their cost, which exceeded 150,000,000 francs.

SUEZ CANAL.

One of the fullest, and at the same time most interesting, exhibits in the way of civil engineering was that made by the company now engaged in constructing a canal through the isthmus of Suez, by which the Mediterranean will be connected with the Red sea. The distance is 72 miles, as the crow flies, and the levels of the two seas only differ to the extent of 6½ inches. The canal will be about 100 miles in length, of which 37 miles are in cutting, while 63 miles are at or beneath sea-level. In order to obtain a sufficient supply of fresh water, an additional canal had to be constructed, bringing its supply from the Nile, a distance of 44 miles. The general dimensions of the maritime canal are: Width of water-level in embankment, 328 feet; ditto in cutting, 190 feet; width at bottom, 72 feet; depth, 26 feet 3 inches.

In the American department was exhibited a plan of the engineering scheme recently adopted for supplying the city of Chicago with water, by which the lake is tapped at a sufficient distance from the shore to insure purity of supply. It attracted much attention, as a bold and successful scheme of engineering.

FRANCE.

"The products exhibited in class 65 form four principal series:

"1. Materials, including natural and artificial stone, bricks, tiles, pottery, lime, cement, plaster, asphalt, and slate. 2. Productions of various trades, occupying a position of greater or less importance in the art of building, such as works in zinc, lead, and copper, sanitary apparatus, joiners' work, and parquetry. 3. Blacksmiths' and whitesmiths' work for building and furniture. 4. Apparatus, machines, and processes used in the execution of architectural and civil engineering works, as well as the models and samples of those works.

"Amongst the trades of this class some are of the very highest necessity, and are represented in every department of France; for instance, the contractor for public and private works, the mason, the carpenter, and the smith; the others, and especially those whose productions are executed in metal, are situated in those localities which are most favorable to their system of manufacture and to the nature of their particular occupation. Around the principal industrial and metallurgical centres are congregated the construction factories for extensive works in metal, such as that of Creuzot, Fourchambeault, and the great establishments in Paris and its environs. Iron-work, such as bolts, latches, window fastenings, screw, and other ironmongery and metal-work used in buildings, is principally manufactured in large works at Charleville, in the Ardennes; Aigle, in the Orne; Rugle, in the Eure; St. Etienne, in the Loire; Beaucourt, in the Haut Rhin; and in the department of the Somme. Black and whitesmiths' work, including locks, railings, gates, &c., is concentrated in the department of the Somme, Fouquierés, Bourg-Dault, Escarbotin, Bettancourt, in the department of Orne, Jura, Loire, St. Etienne, St. Bonnet-le-Chateau, of the Haut Rhin, and of the Haut Saone. The manufacturers of the Faubourg St. Antoine, of Paris, are famous for locks for furniture. The manufacture of objects in copper, lead, and zinc, cast or stamped, is also practiced on a large scale in Paris.

"The principal centres for the trade in cutting and other tools are Molsheim, Zornhoff, in the Haut Rhin; Pont-de-Roide and Valensigney, in the Doubs; St. Etienne, in the Loire; and Paris. Until a short time ago, the difficulty of transport obliged the contractors to supply themselves with stone within a relatively small radius. The exhaustion of the good quarries, especially at Paris, the impetus given everywhere to contractors, and, above all, the development of the means of communication, have greatly modified the old habits. Thus the circle of supply of the capital extends, at the present moment, to the mountains of the Vosges, the Jura, and the Alps. For the purpose of trying the materials, which are offered daily, and are often little known, the administration has opened special laboratories, where the materials of all kinds presented by the public are analyzed and tried gratuitously.

"The methods of manufacture peculiar to the numerous trades which contribute to the execution of architectural and civil engineering works cannot be set forth in a description at once general and abridged. All that can be affirmed is, that in no specialty has the simultaneous concurrence of science and practice, and the intelligent use of machinery, produced results more favorable to the welfare of all and the progress of public prosperity.

"The condition of the work people is as diversified as the nature of the occupations to which they apply themselves, whether sedentary or nomad. The workmen present the greatest variety of character, habits, and natural disposition. The inhabitants of certain districts seem more particularly suited to certain lines of business. The skilled operatives of the centre of France, in the department of Creuze and Correze, possess a special attribute for the masonry works called *limousinage;* the workmen from Piedmont and the neighboring mountains for mining and quarrying. The habits of periodical emigration, and the traditional and, it may be said, inherent skill with which the men of St. Etienne and of some other localities handle the file and the chisel, are well-known facts, and numerous similar examples might be quoted.

"The immense enterprises carried out lately have occasioned great changes in the old usages. The modifications which have resulted therefrom in the habits of the inhabitants of the country give rise to the gravest social and political questions. The trade in building materials is generally local; nevertheless, there are those exceptions, already noticed, occasioned by the necessity of supplying Paris and some other great towns. On the other hand, certain materials, on account of their special qualities or particular circumstances, are sought after far from the places of production. Of these are the granites of Brittany and Normandy, the calcareous stones of Caen, the marbles of the Pyrenees, the serpentines of the Vosges and the Alps, and similar stones, more or less precious, which the soil of France yields in such abundance; the slates of Angers and Ardennes; the various products in terra-cotta; the plasters of Paris, used for light objects and in-door work; the limes of Teil, in the Ardeche, particularly adapted to sea works; the cements of Passy, Boulogne, and Grenoble; the asphalts of Seyssel, &c.

"In the large workshops are constructed edifices, metallic bridges, cranes, dredging machines, lighters, &c., which are exported to Russia, Spain, Egypt, America, &c. The trade of black and white smiths' work has its principal entrepôt in Paris, and the amount of its exports is very considerable.

"To give an idea of the activity, during the last 12 years, of the branch of national work represented in class 65, it is sufficient to state, that in that time 9,000 kilometres of railway have been made in France; that the works in ports for the lighting and erection of beacons on the coasts, for the salubrity of towns, the sewers and the distribution of water, have received a proportionate impulse, and that the greater part of the large towns of France have been completely transformed by their application.

"The committee of admission of class 65 point out, among the principal technical improvements realized since 1855—

"1. The progress made in the trades of hydraulic limes, cements, artificial stones, potteries, slates, and asphalts; and in that of hammered metal, applied to the preservation and decoration of roofs. 2. The increase of the use of metal structures, which are more and more appreciated every day. 3. The increase in the number of machines employed in working wood for joiners' and other work. 4. The constantly increasing application of compressed air in places deep and difficult of access. 5. The ingenious methods of lifting heavy bridges, viaducts, and other metallic works. 6. The new system of movable dams. 7. The recently-invented and powerful dredging apparatus. 8. The application of electricity to light-houses and the new combinations made with a view to assist navigation, among which may be reckoned the creation of a system of coast semaphores."

CLASS 66.—NAVIGATION AND LIFE-BOATS—YACHTS AND PLEASURE BOATS.

The governments of France and England were the principal contributors to class 66. The English admiralty contributed a complete series of models of all the types of ships introduced into the royal navy since the adoption of the screw propeller, and a French firm exhibited a very valuable historical series of models of merchant ships, indicating the many and varied changes which have taken place since 1735.

In the English collection of models was the armor-plated steam gunboat Waterwitch, remarkable for having a hydraulic or jet propeller. By this plan she draws in the water from the sea through a sort of sieve in her bottom. The water is then taken up by a turbine wheel, or centrifugal pump, driven by steam, and thrown out aft with considerable force, the action of the water thrusting the boat forward. The Waterwitch is a double-ender, with a rudder at each end, and has attained the not very remarkable speed of 8.8 knots.

Fishing boats were largely exhibited by Norway and Sweden, and life-boats by England and France.

Benoit-Champy, the president of the admission committee for class 66, makes the following observations upon boats for river navigation:

"The number of boats registered at the office of the superintendence of the Seine navigation is about 2,000. The continued extension of boat racing, by directing the efforts of the maker toward one special object, has almost suppressed the pleasure-boat of former days. The river sail navition makes use solely of boats of American construction, which are called centre-boards. The Margot, the first American clipper known in France, was imported in 1847, and brought about a complete change in the construction of vessels for river navigation. The plans and models have been improved from time to time since that period, and can now artistically compete with the American builder. During the last few years a great taste for yachting has sprung up among French amateurs, and the Parisians have endeavored to make their clippers of such a size as to reproduce the real yacht models. These large clippers are remarkably swift, and take a most successful part every year in their ocean regattas. Paris and Rouen are the two principal manufacturing centres for the construction of clippers. The manufacturers of Marseilles, Toulon, and Bordeaux produce more especially sea yachts. France has in its several ports 4,696 pleasure boats of all sizes, mounted by 5,776 amateurs, or registered, marines. The boats which took part in the races of the Society of the Regates Parisiennes during the years 1865 and 1866 represent alone a capital of 500,000 francs.

"The steam yachts, used for races properly speaking, are gradually disappearing, and are replaced by boats more especially designed for travelling. Their number increases daily, and the Parisian yachting possesses already three steam yachts. The use of new engines, the elegance and comfort of internal arrangements, the application of well-studied forms combined to swiftness and safety, the realization of great speed, with a reduction in the expenditure of strength, are the improvements exhibited in the recent constructions. One of the most difficult problems would be to create mixed models of steam yachts for the sea and river, enabling amateurs to undertake all kinds of excursions. Steam-boats seem to be best adapted for both travelling and pleasure excursions. The tour through France by means of rivers and canals is the aim and ambition of the leading yachtmen. Paris, Rouen, and Angers have produced interesting specimens, but the most important have come from Havre."

In the United States section the model of the American yacht Fleetwing received the recognition of a bronze medel, and the same award was made to the model of the tackle for disengaging ship's boats, exhibited by Messrs. Brown & Level. There were several other exhibits including models of life-boats, life-saving rafts, fishing smacks, rudders and oars.

GROUP VII.

FOOD, FRESH OR PRESERVED, IN VARIOUS STATES OF PRESERVATION,

CLASS 67. CEREALS AND OTHER FARINACEOUS PRODUCTS, WITH THEIR DERIVATION.—CLASS 68. BREAD AND PASTRY.—CLASS 69. FATTY SUBSTANCES USED AS FOOD; MILK AND EGGS.—CLASS 70. MEAT AND FISH.—CLASS 71. VEGETABLES AND FRUIT.—CLASS 72. CONDIMENTS AND STIMULANTS; SUGAR AND CONFECTIONERY.—CLASS 73. FERMENTED DRINKS.

The objects embraced in these classes, especially the first six, although of the highest importance and even interesting when on the spot, cannot be sufficiently preserved or kept fresh for the purposes of a report, save by a professional pen, wielded for professional criticism. The display was a large one, but the specimens were rarely well arranged. People constantly imagine that the common products of their country are not worth taking pains with, when in reality it is precisely these common products that are of vital and national worth. It may be added here that, in almost every important instance, there was a restaurant connected with each country, where the various foods, &c., could be practically tested.

In the Algerian section were several good specimens of the fruit of the *Carica papaya*, or papaw. This, when young, is used for sauce, and water impregnated with the juice acquires the property of rendering all sorts of meat steeped in it tender. Chickens of excessive maturity can be mollified by feeding them on the leaves and fruit, and joints of exceeding toughness are prepared by hanging them for a sufficient time in the branches of the tree.

There was an excellent collection from the United States, consisting of all kinds of fruits preserved in spirits.

CLASS 67.—CEREALS AND OTHER EATABLE FARINACEOUS PRODUCTS, WITH THEIR DERIVATIVES.

The products which are included in this class comprise—

1. Cereals, including different kinds of wheat, rye, rice, maize, millet, buckwheat, and the productions these grains yield for making flour. 2. Vegetable flour. 3. Potato feculæ, tapioca, sago, arrow-root, salep, and other English productions. 4. Grain, ground and packed. 5. Semolinas and groats. 6. Macaroni, vermicelli, nouilles, and pâtes of all kinds of wheaten flour, pure and mixed. 7. Gluten and starch. 8. Alimentary preparations, produced either from meals, feculas, or vegetables.

CEREALS OF FRANCE.

The various kinds of corn and wheat, with their productions, form, in the French exhibition, 11 divisions, corresponding to the 11 territorial divisions:

"1. Paris and its radii, comprehending Isle of France, Brie, Bauce, Gatinais, Champagne, Hurepoix, and French Vexin. 2. The Normandy region, embracing Bessin, Avranchin, Caux, and Normandy Vexin. 3. The Brittany region, which includes upper and lower Brittany, Vendée, Poitou, and Anjou. 4. The Bordeaux region, containing Saintonge, Angoumais, Perigord, Bordeaux, Bazadais, and les Landes. 5. The Languedoc region, comprising the Basque provinces, the Small Landes, Chalosse, Condomais, Bearn, Armagnac, Foix, Roussillon, Lauragnais, Albigeois, and Narbonne. 6. The Provençal region, comprehending lower and upper Provence, Nice, Avignon, and Corsica. 7. The Lyons region, including Dauphiné, Beaujolais, Savoie, Lyons, Bresse, Franche-Comté, Bourgogne, and Niverne. 8. The Auvergne region, comprising upper and lower Auvergne, Limousin, Boulonnais, Forey, and Vivarais. 9. The Maine region, including Maine, Blaisois, Touraine, Berry, and Orleans. 10. The Lorraine region, comprehending Lorraine, Vosges, Alsace, Barrois, Messin, and Berthelois. 11. The Flanders region, in which is included Picardy, Hainault, Flanders, Boulonnais, and Artois.

"In 1820 the number of hectares covered with corn in France was 4,683,788, which have produced 54,347,720 hectolitres. In 1857, 6,543,530 hectares produced 110,462,000 hectolitres. So, from 1820 to 1857, the number of hectares sown with corn has augmented 50 per cent., and the production has nearly doubled. At the present time the number of hectares cultivated is 7,000,000; but the production has not increased since 1857. France exports much more flour than wheat. In 1864 the exportation of wheat amounted to 1,308,480 hectolitres unground, and to more than 2,000,000 hectolitres of flour. Rye is divided into two classes—March rye and winter rye. France yields yearly 20,000,000 to 22,000,000 hectolitres of rye, of which 1,000,000 is employed in the distilleries of northern France, Belgium, and Holland. The growth of rye is diminishing, and is being replaced with advantage by wheat, wherever the nature of the soil admits of it. Barley is divided into two classes: 1. Bearded barley, common barley, &c.; 2. Bare-eared barley, Celeste barley, &c. The barley harvests yield 16,000,000 hectolitres per year, of which 2,000,000 are used in distilleries and breweries. Of these 2,000,000 hectolitres more than one-fourth is sent to England. Oats are divided into two classes: 1. Winter oats; 2. Spring oats. Nearly as much oats as corn are grown in France. The harvest is valued at 90,000,000 hectolitres. Oats are rarely exported; on the contrary, they are often imported from Odessa, Sweden, and Ireland.

"Buckwheat is divided into two classes—common buckwheat and Tartary buckwheat. Buckwheat is grown to an amount of from 6,500,000 to 7,000,000 hectolitres yearly, which is consumed entirely in France.

"The production of maize is confined to three regions: the southwest region, comprehending Guyenne, Poitou, &c.; the southern region, comprising Languedoc, Provence, &c.; and the eastern region, including Bresse, Dijonnais, Alsace, &c.

"Millet is divided into two classes—millet in ears and millet in panicles. The production of maize and millet amounts to at least 6,000,000 hectolitres.

"The sorghos form only one class. The feculas are divided into two classes—that which comes from seed and that which is made from roots.

"The French production of potatoes amounted to 100,000,000 hectolitres per year before the outbreak of the potato disease, 15 years since. It is difficult now to estimate the exact product of this plant. About 10,000,000 hectolitres are planted; 13,000,000 or 14,000,000 are made into fecula; the rest is employed, one moiety for human food and the other for animals. A great part of the fecula is used for making sugar and certain kinds of syrups. It is estimated that for this manufacture alone the produce of more than 7,000,000 hectolitres of potatoes was employed during the year 1865. Since the disease the average yield per hectare has been 77 hectolitres; before that time it amounted to 110 hectolitres.

"The manufacture of *pâtes* may be divided into classes: 1. The northern regions—Paris, Versailles, Meaux, &c.; 2. The midland regions—Clermont, Auvergne, Lyons, &c.; 3. Southern regions—Marseilles, Nice, &c. The amount of pâtes consumed in France has much increased. The addition of fresh gluten is derived from the manufacturers of starch by the washing process, which allows of the richness of the pâtes being augmented at will, and has therefore tended to diminish in great part the difference of quality that existed between the French and Italian pâtes. The latter owe their superiority merely to the nature of the grain, which is richer and more glutinous than the French grain.

"France exported, in 1855, 1,100,000 kilograms of pâtes, of which a quarter was for Switzerland, and the rest for America, the Antilitos, Guyane, the United States, England, and Belgium. The price of the pâtes varies according to the price of wheat.

"The committee of class 67 point out as an evidence of the progress realized since the exhibition of 1865, in addition to the general improvement of cultivation:

"1. The extended cultivation of the best white and red corn, [wheat,] which have less bran and possess more elasticity and extensibility of gluten, and therefore produce flour whiter and of better flavor.

"2. The almost total change in the mode of obtaining starch, which, instead of being procured by fermentation, which causes the decomposition of the gluten, is obtained by the means of washing, a process which produces starch in greater quantities, and much whiter, without deteriorating the gluten; the preservation of grain by means of vacuums; the drying of the flour by mechanical apparatus, working in the open air, which produces flour well dried that can be kept a long time."

CLASS 69.—FATTY SUBSTANCES USED AS FOOD; MILK AND EGGS.

Class 69 includes: 1. Conserved milk and the different varieties of cheese; 2. Alimentary fatty substances, such as butter, olive oil, and animal grease; 3. Hens' and other birds' eggs.

The following review of the production in this class is from the report of the committee of admission:

MILK AND CHEESE.

"The production of cow's milk is by far the most considerable, the number of cows in France amounting to more than 5,000,000. The departments of Calvados, Orne, Manche, Seine Inférieure, Loirèt, Nord, and the Vosges, are those which supply the largest quantity of milk. For Paris alone the consumption amounts to about 500,000 litres a day. Milk is sold at from 10 to 40 centimes a litre, according to the localities and the quality; from 25 to 30 per cent. of water is often added. The frauds practiced in the trade are easily discovered by means of the cremometer and butyrometer, and by the amount of sugar in the milk. The preservation of milk is obtained by the original process of M. Appert, and by new improved systems.

"The production of cheese in France is considerable, particularly in the departments of Aveyron, Seine Inférieure, Calvados, Loirèt, Marne, Seine d'Oise, Creuse, Cantal, Vosges, &c. Cheese is generally made by coagulating the caseine of the milk by means of pressure, in a temperature of 68 to 77 degrees Fahrenheit, and straining it on a cloth or in tin molds. The caseine holds the globules of butter, and constitutes the commercial products known under the name of fresh cheeses, such as those of Neufchâtel. When, on the other hand, strong cheeses are required of more decided flavors, and intended for preservation, they are packed in sea salt, and exposed to currents of air in a cool place, and care is taken to turn them often. Under the influence of cryptogamious growths the caseine becomes separated, and gives rise to various products, which communicate new properties to the cheese. The conditions of this manufacture differ according to the varieties of the cheese, thus: Roquefort cheese is made with sheep and goat's milk, in specially constructed cellars, at a constant temperature of about 53 degrees Fahrenheit; Neufchâtel cheese is prepared with milk and cream; that of Camembert with milk skimmed slightly, and with particular care; that of Brie is obtained in the form of a soft paste; and in the manufacture of double-cream cheese cream alone is employed. The importations of foreign cheeses rose in 1862 as high as 5,262 tons, and the exports to 5,027 tons, 1,660 tons of which were of our own production. The annual consumption of cheese is very considerable, Paris alone consuming 5,422 tons, and it would not be far from the truth to state that, for the whole of France, this consumption surpasses 100,000 tons. The Roquefort cellars deliver annually to the trade 2,750 tons; the sale of Camembert cheese amounts to 500,000 francs; and the quantity of Brie cheeses that is sold annually in Paris represents a sum of 1,400,000 francs."

ALIMENTARY FATTY SUBSTANCES.

"The departments of Calvados, Orne, Manche, Seine Inférieure, Indre and Loire, Loiret, Nord, Pas-de-Calais, and Brittany, are the principal places of production for butter. These fatty substances are much used in France, and are extracted from the cream of the milk by means of violent agitation at a moderate temperature in a cylindrical vessel of wood or tin. Steam engines and horse mills are rarely used. The quality of the milk has a great influence on that of the butter. The pleasant odor pervading certain butters, such as those of Isigny, is produced by the plants of the natural meadow lands. The fine butters are generally of an orange color, and possess a delicate flavor; the butter of inferior qualities being of a lighter color. To insure the preservation of butter, it is placed in stone jars, after having been washed several times, and mixed with five or six per cent. of sea salt. This is salt butter. In some localities the butter is warmed, either simply over the fire or in a vessel placed in boiling water on the fire. The scum is then taken off, and when the liquid butter is clear it is poured into stone jars. No fatty substance used for food is so much in demand throughout France as butter. The quantity of this product exported in 1862 represented a sum of 28,962,142 francs, while the quantity consumed in Paris alone amounted to 24,595,850 francs in value. If it be calculated that, for the 89 departments of France, the consumption is six or seven times as large, it may be estimated that the total production exceeds 200,000,000 francs. The market price of the various descriptions of butter varies from 2 francs 20 centimes to 8 francs the kilogram. The exportation of butter and cheese has reached, during the first nine months of the year 1866, the sum of 58,100,000 francs, and the importation to 16,600,000 francs.

"Olive oil, the best of the alimentary oils, is extracted from the fruit of the olive tree, which is grown in some of the departments of the south of France, in Corsica, and in Algeria. The oil obtained by the first expression, or cold drawn, is distinguished by the name of virgin oil. The second extraction, which is effected by heat, produces a condiment much less agreeable to the taste. Œillete oil, and oil from some animal greases, are also used as articles of consumption."

HENS' AND OTHER BIRDS' EGGS.

"Hens' eggs, of which the consumption is so immense, are principally supplied by the departments of Calvados, Orne, Somme, Seine Inférieure, Oise, Aisne, Eure et Loir, Indre et Loir, Seine et Marne, and Pas-de-Calais. In 1853 the quantity of eggs received in Paris amounted to 174,000,000; but the consumption of this article is much more considerable at the present time. Ducks, Guinea fowls, geese, and turkey eggs are occasionally used."

CLASS 70.—MEAT, FISH, AND VEGETABLES.

Taking into consideration the close connection existing between the products ranged under the classes 70 and 71, which, in many cases, are shown by the same exhibitors, it was decided that these two classes should be united and submitted to the consideration of one jury, which accordingly undertook the control of the united classes and drew up the subjoined report:

"The products included in class 70 are meat, fish, and fresh fruit and vegetables. In the study of the organs which accomplish the digestive process in the human system, such as the active principles (diastasis, pepsin or gasterasis, pancreatic juice, &c.) which divide and dissolve the food, it is evident that man must depend for his nutriment upon animal and vegetable products. Besides the soil and the water, which promote the digestive and assimilative processes, it is certain that for complete nutrition the concurrence is needed of substances taken from the three natural kingdoms, and which comprehend four distinct classes of food, viz: azotic, fat, feculent or sweet, and saline. The chief characteristic of meat and fish in this respect is the abundance of azotized matter assimilated to our own tissues, and which supply the fortifying quality in our food. It is of the greatest importance at the present moment that we should encourage the reproduction of these elements, and it is the insufficient supply of them which most materially affects the strength and health of populations, particularly of those whose daily labor renders a reparative nutrition absolutely necessary to life. On investigating the average consumption of the alimentary products taken from the bovine, ovine, and porcine species, and those supplied by poultry, game, fish, eggs, and cheese, we find that each individual in the population of the eighty-nine departments of France consumes only 57 grams of these azotized alimentary products, while the average ration of an inhabitant of Paris amounts to 273 grams daily.[1]

"The flesh of slaughtered horses is being brought into use in France, when, after having been submitted to the inspection of the proper offi-

[1] On the basis of the statistical data furnished to the president of these classes by the minister of agriculture, commerce, and public works, it is estimated that the consumption of butcher's and pork butcher's meat during the year 1862, in the chief towns of departments and arrondissements, and in those towns where the population reaches 10,000, averages for each individual 53 kilograms 600c. per annum, or 146 grams a day, a fact which is still further corroborated by the following quinquennial return: Aggregate consumption: beef, 131,140,910 kilograms; cow meat, 57,994,541 kilograms; veal, 61,304,468 kilograms; mutton, 62,147,482 kilograms; lamb or kid, 5,268,614 kilograms; pork, 6,110,744 kilograms; imported meats, 43,324,711 kilograms; at an average price of 1 franc 18 centimes per kilogram for beef, 1 franc 4 centimes for cow, 1 franc 25 centimes for veal, 1 franc 27 centimes for mutton, and 1 franc 8 centimes for lamb and kid. The total weight of animal food consumed amounted to 422,288,187 kilograms among a population of 7,878,329, giving an average for each individual of 53 kilograms 60c.

cers, it is declared wholesome. This meat makes good soup, and when boiled has an agreeable flavor, although rather hard. Certain parts, above all the fillet, furnish excellent roasts. For some time past horse-flesh has been advantageously employed as food by the inhabitants of the north of Germany.

"By consulting the report of the committee of class 82, and of the committee charged with organizing the arrangement of live fish, crustacea, molluscs, &c., it will be seen what means are used for the maintenance and multiplication of marine and fresh water species, which furnish such abundant supplies of animal food for our subsistence.

"Ripe fruit exercises a favorable influence on the nutrition and health of mankind by introducing sweet, aromatic, azotized, acidulated, and saline principles into their alimentary rations, but it does much real harm when it is wrongly used in too large a proportion, or forms, as it does in some cases, nearly the whole of the habitual food.

"These alimentary substances, which help to vary and render our food more varied and wholesome, have increased to a very large extent in France since the cultivation of kitchen gardens on a large scale has so much developed on the coasts of Brittany, favored by the gentle and temperate climate of those maritime districts.

"A large quantity of the produce of this special culture has been lately exported to England; above all, since, thanks to the increased and rapid means of communication, the early vegetables of the southern districts of France, as well as the oranges, lemons, and various other productions of the Algerian orchards, have appeared in the markets of the metropolis.[1]

"It is well known that the cultivation of mushrooms in the vast quarries of Paris affords an abundant source of alimentary production, and a means of varying the appetizing flavor of our best culinary preparations. In this respect France is the most favored country for the growth of the delicioms and nutritious mushroom, which grows naturally in propitious ground under the shadow of oaks and beeches, but which, up to the present time, has bid defiance to every system of artificial culture.

"The extremely favorable influence of fresh vegetables has particularly manifested itself in the alimentary regime on board ship. It has been shown that sailors could maintain themselves in good health by making use of these productions to vary their diet, which is thus made more agreeable; and that, on the other hand, ships' crews deprived during long voyages of these precious sanitary resources suffered from special affections and particularly from scurvy."

PRESERVED MEATS AND VEGETABLES.

"Class 71 includes meat, fish, fruit, and vegetables preserved by various industrial processes. Preserved meat, fish, fruit, and vegetables are pre-

[1] In 1865 there were imported into France from Algeria: table fruits, 2,485,288 kilograms; vegetables, dried, 1,866,958 kilograms; green, 743,386 kilograms; total, 5,095,602 kilograms.

pared in four principal sections of the country. The first group has its centre in the town of Nantes, and furnishes pickled and preserved meat and fish and preserved vegetables. The second group has for its centre Bordeaux, and provides preserved fruit, vegetables, meat, and some fish. Excellent conserves of whole green olives are made in the department of Herault and Bouches-du-Rhône. The collection and preservation of truffles have extended over ten departments of France. The third group has its centre in Mans, and specially treats vegetables and some few meats. Paris is the centre of the fourth group, and prepares preserved vegetables, mushrooms, and some meats.

"The preparation of certain special products, composed of truffles and fatted goose liver, has its principal seat in Strasbourg, though the trade extends all over the southern part of the empire. All the materials employed in these preparations are produced on the soil of France or are supplied by the coast fisheries. Their nomenclature is very extensive, and their prices vary considerably from year to year. Mechanical labor is very seldom required in the preparation, which simply consists in a series of processes, nearly all of which are accomplished by manipulation. The methods of preservation are numerous. The only one which has been applied recently by the trade, besides pickling and concentration, is founded on the remarkable invention of Mr. Appert. It consists of: 1. Washing in boiling water the substances to be preserved; 2. Putting the ingredients into vessels soldered or hermetically fastened; 3. Expelling the air remaining in the closed vessel by boiling for a longer or shorter period, and at a degree varying according to the substance to be preserved. This unique system is diversified according to the nature of the products.

"The theory of preserving substances by the French method, which has been propagated in all the countries of Europe and America, appears to be founded, according to the observations of M. Pasteur, on the destruction, by exposure to a temperature of about 212° Fahrenheit, of the vitality of microphytic and microcosmic germs, which in a living state engender alcoholic, acid, putrid, and other fermentations. A new description of preserved food has latterly been introduced into France from South America; it is a concentrated extract of the meat of slaughtered animals, of which the grease and skins alone were previously used in these countries. This extract can be preserved in boxes which are not hermetically sealed, on the condition that they contain no fat, which would cause rancidity, nor gelatine, which would occasion the development of mould. It represents an amount of solid substance equal to 30 times its weight in fresh meat. It is already largely consumed in Germany, and is largely supplied to armies on service, and completes the quota of cereals and vegetables.

"The manual labor, the general expenses, and the price of the vessel are equal, on an average, to 50 per cent. of the value of the preparation when ready for use. The workmen employed in these various works are all employed in workshops belonging to manufacturers. Some of them—for instance, those engaged in cooking and preserving—are paid monthly, and are occupied permanently during the whole year; the others, such as the tinmen, work by the piece. The last category includes the peelers and others, who are paid by the day and hired by the week or the month, according to the wants or the seasons of production. The preparations produced in France are sold in the great centres of population, to the navy, and, above all, in foreign countries. The makers in the provinces sell directly to the retail dealers, and in Paris either directly or by the medium of small wholesale dealers, but to foreign countries directly or through agents.

"The production of preserved food has greatly developed since 1855, and this development is due to a more perfect knowledge of the best processes, on which depend the preservation of the alimentary substances, to their better application, and, consequently, to greater confidence on the part of the consumer, leading to the increased sale of those articles which presented before but a doubtful chance of success."

CLASS 72.—CONDIMENTS AND STIMULANTS; SUGAR AND CONFECTIONERY.

The exhibits in class 72 include sugar, confectionery, chocolate, liqueurs, condiments, and stimulants.

SUGAR.

France, Prussia, Belgium, Brazil, Austria, and the United States were the chief exhibitors of sugar. Beet-root sugar was conspicuous from the central European countries. The production of this sugar is increasing. In Belgium it is now equal to three-quarters of the whole consumption of sugar. In 1850 and 1851 there were only 28 establishments for the manufacture. In 1855–'56 there were 45, and in 1865–'66 the number had reached 100, and the production was 41,551,834 kilograms.

The following extracts from the official catalogue show in detail the condition of the manufacture of sugar and other articles in this class in France.:

"Sugars include raw and refined sugar and molasses. Raw cane sugar comes from the French and other colonies. The beet-root sugar is principally made in the departments of the north of France. The price of raw sugar is about 61 francs to 70 francs the 100 kilograms, (2 hundred weight,) to which must be added the customs duty, namely, 42 francs per 100 kilo grams for beet-root and foreign sugar, and 37 francs 50 centimes for French colonial sugar. After the juice is extracted from the cane or from the beet root it is defecated, clarified, filtered, and bleached; it is afterwards evaporated in various apparatus, to cause it to crystallize, and after that it is purified more or less, according to the quality that is desired, and raw sugar and molasses are obtained. The raw sugar passes afterwards to the refinery, where it is converted into loaf or powdered white sugar.

It is first dissolved in water, so as to form a rather thin syrup, which is afterwards clarified, filtered, bleached, evaporated, crystallized, placed in moulds, and dried in stoves, to be delivered for consumption. It then sells for about 125 francs the 100 kilograms, duty included.

"Sugar-making is conducted in works directed by superintendents and foremen. The refiners buy the raw sugar either of the shippers, of the beet root sugar makers, or of commission agents. The loaf sugar is sold to wholesale and retail dealers, and they export it to England, Switzerland, America, Algeria, Italy, and Turkey. France produces 200,000,000 kilograms of beet-root sugar, and imports about the same quantity from the French and foreign colonies. The consumption is about 250,000,000 kilograms. The difference is exported.

"Since 1857 the manufacture and the refining have made great progress, and this has had the effect of producing sugar at a lower price. The principal improvements to be pointed out are, in sugar-making, the process of double carbonization, triple-action vacuum pans, and the employment of centrifugal machines; and in refining, the improvements in the system of bleaching, the employment of centrifugal machines, and the diminution of the general expenses, by the concentration of work in large establishments."

CHOCOLATE.

"Chocolate-making has become an important trade; it gives rise to the circulation of 30,000,000 francs annually, and is continually on the increase. In the year 1832 the quantity of cocoa consumed in France was little more than 528 tons; in 1863 it had gradually increased to 5,513 tons, which represented a production of 11,000 tons of chocolate, of an average value of 3 francs per kilogram. This increase was due to the employment of machinery, with the aid of which chocolate is manufactured both more cheaply and of better quality.

"The chocolate manufactories are situated in and near Paris and also in the departments of the Nord, Somme, Gironde, Loir et Rhône, and Pyrénées, and use both hydraulic and steam power. As to the establishments where the work is carried on by manual labor, they are now few in number, and are gradually approaching entire extinction. A great number of women are employed in cleaning the cocoa and wrapping up the cakes of chocolate. They are seldom out of work. Both men and women are engaged in the factories of their employers, and the amount of their wages is estimated at about 5 per cent. of the whole value of the production. The home consumption absorbs nearly the whole quantity made. Only 188 tons were exported in 1863; but this exportation would increase rapidly if the duties on the cocoa and sugar were returned on the export of the chocolate. French chocolate is in great repute in adjoining countries.

"The committee of admission have to observe that considerable progress has been made since 1855 in the manufacture, due principally to the improvement of the machinery and plans employed, and to the special pains taken in the manipulation and the materials."

CONFECTIONERY.

"The productions of this section comprise: 1. Sweetmeats, containing almonds and liqueurs; 2. Acidulated and other drops, barley sugar, apple sugar, &c.; 3. Pastiles and lozenges of gum, burned almonds, *fondants* or cream sweetmeats, nougats, drops, bonbons, figures and fancy articles, comfits, and fruits preserved in sugar.

"The principal places of production of confectionery are Paris, Marseilles, Bordeaux, Verdun, Clermont, Ferrand, Lyons, Rouen, and Orleans. The raw materials are sugar, almonds, gums, perfumes, and fruit. The sugar, principally employed in the refined state, undergoes this preparation in France, and the average value of that employed is about 127 francs the 100 kilograms, (2 hundred weight.) Within the last five or seven years sugar obtained by the improvements in the manufacture of beet root juice of the first quality, by means of the apparatus of Cail & Co., which has been employed in confectionery. This sugar, inferior to refined, is now worth about 117 francs the 100 kilograms. The almonds are in a large proportion also of French production, and grown in the departments of the Bouches du Rhône, Herault, Vaucluse, Lower Alps, and Aveyron. The average price on the spot varies, according to quality, from 140 francs to 250 francs the 100 kilograms. Italy and Spain also have latterly contributed a considerable quantity. The price of these varies from 120 francs to 180 francs.

"The gums come exclusively from Senegal and Alexandria. The prices of these at Marseilles or Bordeaux vary, according to the abundance of the crop, from 100 francs to 280 francs the 100 kilograms. The French confectioners generally make use of the most delicate perfumes, such as vanilla, the price of which varies from 40 francs to 100 francs, rose-water, orange-flowers, raspberries, maraschino, &c., to the exclusion of strong-flavored concentrated essences. All these perfumed waters are produced in the south of France, Var, and the Maritime Alps. The price varies from 1 franc to 1 franc 50 centimes for good qualities. The most esteemed fruits are those of the centre of France and Auvergne, and the price in the fresh, unprepared state varies, according to the season, from 20 francs to 100 francs the 100 kilograms.

"The manufacture of the various products of confectionery was carried on entirely by hand until 1845. Since that time apparatus of various kinds, propelled and heated by steam, have successively replaced that primitive method, which is rapidly disappearing. Men alone are or can be employed in this work, but many preparatory operations—long, but not fatiguing—such as the shelling and blanching of almonds, the preparation of fruit and gum, and packing, are reserved for women, who in number equal, if they do not surpass, that of the men. In Paris the wages vary with the importance of the work and the skill of the workmen, from 35 centimes to 65 centimes per hour, and in the case of women from 15 centimes to 25 centimes. The labor is estimated to cost about one-eighth of the value of the whole production. The wholesale trade in confectionery amounts to about 40,000,000 francs per annum, of which three-fourths are represented by sweetmeats and one-fourth by preserved fruits, jellies and jams. Although held in high esteem abroad, these productions are only exported to a very small extent as compared with the home consumption; but the export trade would rapidly assume important proportions if, as in the case of refined sugar, the consumer's tax on sugar were refunded on the export of the goods."

LIQUEURS.

"Paris, Bordeaux, Marseilles, Isère, and, to a less extent, all the great centres of population, possess distilleries. The principal materials employed in this industry are wine spirit, refined sugar, plants, and aromatic substances. The spirit is principally obtained from Languedoc, and the price varies greatly with the season. In December, 1866, it was worth 75 francs the hectolitre, (22½ gallons,) exclusive of duty. The refined sugar is obtained from Paris, Marseilles, and Nantes, at rates varying from 127 francs to 130 francs the 100 kilograms. The aromatic plants are grown in the environs of Lyons and Grenoble, and their prices varies from 50 francs to 300 francs the 100 kilograms. The aromatic substances are vanilla, cinnamon, cloves, and nutmeg, and the prices range between 50 francs and 80 francs the kilogram. The manufacture is accomplished by distillation, with the aid of steam and a special apparatus, more or less perfect, the alembic being the model on which all are based.

"The workmen are always engaged in the establishments of their employer, and their wages range from 4 francs to 6 francs per day. The greater portion of the liqueurs made are for home consumption; still this trade gives rise to an important export, in spite of the large augmentation of price, caused principally by the duty on the consumption of spirits and sugar. The trade is so divided and disseminated that it is difficult to give the precise amount of the annual production; but taking the statistics respecting the transformation of spirits into liqueurs, as given by authority, we arrive at a proximate estimate of 45,000,000 francs."

CONDIMENTS AND STIMULANTS.

"The white wines of the Loire and of the Charente are those which give the best vinegar. The price varies with the season, from 5 francs to 20 francs per hectolitre. The preparation consists essentially in setting in action the principles of fermentation in the wine, which, to that end, is exposed to a given heat in reservoirs prepared for the purpose. For some time the use of steam for the heating, and of machinery for transferring the liquor from one vessel to another, has reduced the cost of the manual labors by two-thirds. Lastly, the theories of Mr. Pasteur on fermentation have thrown light upon many questions which were heretofore obscure. The amount of the annual production of vinegar in France is about 1,500,000 hectolitres, which at the average rate of 20 francs gives a money value of 30,000,000 francs.

"Mustard seed is cultivated in many departments, and specially in the Nord, Pas-de-Calais, the Bas Rhin, and the Charente. The annual produce is 650 tons, worth 150,000 francs. Triturated in special mills, mixed with vinegar, and flavored with various condiments, it is delivered to the trade ready for the table. The quantity produced is about 3,000 tons, of the total value of 2,000,000 francs.

"Fruits and vegetables preserved in vinegar, English sauces, capers, &c., make up a total of about 3,000 tons, and a value of 4,000,000 francs."

"Spices are all imported from America, India, and China, and make up a total of 4,250,000 francs.

"The various countries which supply France with coffee, the use of which has so largely extended, are Brazil, the West Indies, India, and Egypt. The qualities vary extremely, but of all kinds known that which is cultivated in Arabia, and known by the name of Mocha, is decidedly the finest. The prices of coffee range from 2 francs to 3 francs 50 centimes, according to the country of production. The value of the imports in 1864 reached 80,000,000 francs.

"The continental blockade rendered it necessary to find some substitute for coffee, and hence resulted the preparation of chiccory, which, although possessing none of the qualities of coffee, has held its place to the present time, and even progresses in demand, on account of its low price and the similarity in color between it and coffee. The roots of the chiccory plant, cultivated specially in the north of France, and in the Haut and Bas Rhin, are first roasted, and then, after having been properly dried in a stove, are again roasted and reduced to powder. These operations are carried on in well organized establishments on a large scale. The green roots are worth from 4 francs 50 centimes to 5 francs the 100 kilograms. Sliced and dried, they fetch 18 francs to 24 francs. The powder, when prepared, is worth 40 francs to 50 francs the 100 kilograms, and in grain from 50 francs to 60 francs. The annual produce may be estimated at 7,000 tons, of the value of 3,500,000 francs to 4,000,000 francs.

"Finally, the productions which form the subject of the preceding enumeration contribute to the annual industry of France to the following extent:

"1. Sugar, 400,000,000 francs; 2. Confectionery, 40,000,000 francs; 3. Chocolate, 30,000,000 francs; 4. Liqueurs, 45,000,000 francs; 5. Condiments and stimulants, 127,000,000 francs. Total, 642,000,000 francs."

CLASS 73.—FERMENTED DRINKS.

In class 73—fermented drinks, wines, spirits, &c.—there was a very extensive collection from every quarter of the world. The importance of the department may be inferred from the fact that there were 7,700 exhibitors and 22,000 samples shown. France, with her splendid and delicate wines, maintained her known supremacy in this manufacture. The principal particulars of the trade in France, furnished from official sources, are given below.

The German wines, manufactured according to the highest principles of the art, and the produce of wines that are raised with a care which is not bestowed on any other article of human consumption, ranked very high. The best Rhine wines are white; but two celebrated brands, Assmannshausen and Steinwein, are red, and were liberally represented. Johannisberger maintained its position as the king of German wines. It is not, however, sold in the market, except in bad years, when the princely proprietor does not care to retain the wine. There is a large district called Johannisberg, but the vines are cultivated in the usual way, while at Schloss Johannisberg the most unremitting attention, utterly regardless of cost, is paid to them. The district, however, has a good exposure, and very often produces a superior wine.

Of the wines of Spain, Portugal, Austria, and Hungary it is impossible to speak. They were displayed in infinite variety, and of qualities, it may be presumed, that represented the highest kind of production. It was stated, however, by competent judges, that no appreciable advance has of late years been made in the manufacture of wine. A practical method has, nevertheless, been discovered by which undue fermentation is avoided in the case of wines intended for exportation. The wine is subjected to 60° Centigrade of heat. The exposure only continues for a few moments, but the heat effectually destroys all germs of further fermentation, without, it is claimed, injuring the wine.

The wines and beers exhibited from the United States are noticed in the Report on the United States section.

The products shown in this class are divided into four series:

1. Wine of all kinds; 2. Alcohol, eau-de-vie, and their derivatives, kirsch, bitters, &c.; 3. Cider; 4. Beer.

WINE, ALCOHOL, AND BRANDY IN FRANCE.

"Viticultural production is one of the most important in French agriculture. It extends to over 2,287,821 hectares,[1] situated in 81 departments, the yield being, on an average, 50,000,000 hectolitres,[2] of a total value to the producers of 750,000,000 francs. In 1865 the quantity reached 68,942,931 hectolitres, and considering the development that has taken place during the last few years, it is certain, that, unless checked by the grape disease, the oïdium, the amount of 50,000,000 hectolitres will generally be exceeded.

"Vineyard property is excessively subdivided. It is held by no less than 2,200,000 proprietors, so that each property, on an average, scarcely

[1] A hectare is nearly equivalent to two and a half acres English.

[2] A hectolitre is equal to 22½ gallons English.

exceeds one hectare. The cost of cultivation varies considerably, according to the season and the rate of wages in the various districts of France. They range from 150 francs to 570 francs per hectare, which give for the rate of wages from 1 franc 90 centimes to 4 francs, and even 5 francs per day. The trade in wine is, of course, a very considerable one. The city of Paris alone consumes annually about 3,600,000 hectolitres; that is to say, an average of 183 litres (a litre is rather more than 1¾ pint) per head for each inhabitant, and this consumption would certainly go on increasing largely if it were not impeded by the present system of taxes, and by their heavy rates. The city or octroi duties, for instance, exceed in amount the value of the greater part of the wine on which they are placed. Exportation increases every year under the influence of the new treaty of commerce. In the year 1866 the exports amounted to 3,194,104 hectolitres, of the value of 308,502,000 francs, while in 1851 the total value did not exceed 195,923,000 francs. Thus, in five years, there has been an increase to the extent of 60 per cent. The value of the exports of spirits and liqueurs amounted in 1866 to 93,970,000 francs, while in 1861 it had not reached over 52,966,000 francs. It had therefore increased to the extent of 80 per cent. in the same period. The total amount of the exports of wine and spirits in 1866 was then 402,472,000 francs. In 1866 the prices were far below those of 1865. This reduction of price, combined with the changes introduced in the English tariff, which make the duty on wine introduced in bottle the same as that imported in the wood, has increased the exports of wine from France to England from 94,385 hectolitres to 205,992 hectolitres; that is to say, an augmentation of 120 per cent. between 1865 and 1866, and it is hoped that this consumption will overcome the obstacles which arise out of the organization of trade in England and the great number of local taxes.

"Sixty-five departments have taken part in the Exhibition of 1867; they are represented by 600 exhibitors. Unfortunately, the Exhibition of the great growths of the Bordelais is far from being complete. As to Burgundy, the chamber of commerce and the agricultural societies and committees have zealously competed in the organization of a most remarkable exhibition. Various processes have been proposed and experimented on recently with the view to the improvement and management of the fermentation of wine, and particularly to make it capable of bearing changes of temperature, and more especially long sea voyages; but the most important improvement to be noticed is certainly that of an illustrious chemist, Mr. Pasteur, who has shown that the greater part of the maladies in wines arise from the development of fermentation from invisible vegetable growths, the germs of which are annihilated when the wine is exposed in closed vessels to a temperature of 60 degrees Centigrade for only a few minutes. Numberless experiments have confirmed the truth of this discovery, and have proved at the same time that this operation does not injure the flavor of the wine, but, on the contrary, very often improves it.

"The production of alcohol has averaged, during the last ten years, 1,124,872 hectolitres, but the increase has latterly been very considerable. Thus, the season of 1863–4 produced 1,278,192 hectolitres; in 1864–5, 1,305,905; in 1865–6, 1,789,474, which is divided as follows: Distillation of wine, 1,200,000 hectolitres, giving in alcohol 1,010,166 hectolitres; distillation of beet-root, 283,022 hectolitres; distillation of molasses, 307,409 hectolitres; distillation of farinaceous substances, 79,648 hectolitres; distillation of lees and fruits, 53,232 hectolitres; and various substances, 55,997 hectolitres. Total, 1,789,474 hectolitres."

CIDER AND BEER.

"The average annual production of cider during the past ten years has been 9,057,570 hectolitres; in 1866 it was 11,323,745 hectolitres, and it increases every year. The railways contribute largely to this result by transporting rapidly the cider apples from the place of production to the centres of consumption. The consequence is that the price of apples has been augmented, and that the farmers find it worth their while to extend their plantations. The consumption of cider is also larger than it was, because in many districts where nothing but water was drank they now make use of cider or beer. The best cider in France is made in the neighborhood of Calvados and La Manche, but it is desirable that the proprietors should bestow the same amount of care upon the cultivation and manufacture as the wine growers.

"We have previously said that the consumption of beer increases considerably in several parts of France where its use was very restricted a few years since. In other localities its use extends even where wine or cider is the common drink of the country. The manufacture has made great progress, and we no longer go to Germany or to England for light, agreeable, and wholesome beer. This development of the brewing trade has produced a similar progress in the cultivation of hops in the northern and eastern departments, and the Vosges and Alsace. At the present time French hops are in as great demand as the best Bavarian hops, and they might pass for them in common.

"These particulars, although very incomplete, show the importance of the trade in the industry of fermented drinks in France, not only on account of the number of persons engaged or interested in the culture of the wine, but also as regards the capital engaged in the production, home consumption, and export."

GROUP VIII.

LIVE STOCK AND SPECIMENS OF AGRICULTURAL BUILDINGS.

CLASS 74. FARM BUILDINGS AND AGRICULTURAL WORKS.—CLASS 75. HORSES, ASSES, MULES.—CLASS 76. BULLS, BUFFALOES, &c.—CLASS 77. SHEEP, GOATS.—CLASS 78. PIGS, RABBITS.—CLASS 79. POULTRY.—CLASS 80. SPORTING DOGS AND WATCH DOGS.—CLASS 81. USEFUL INSECTS.—CLASS 82. FISH, CRUSTACEA, AND MOLLUSCA.

All the classes of Group VIII were represented at Billancourt by a certain number of productions which were renewed every fortnight and divided into fourteen competitive exhibitions. The exhibition was divided as follows:

EXHIBITION OF AGRICULTURAL INSTRUMENTS.

APRIL.

First fortnight.—Ploughs of all kinds, hydraulic machines, steam engines. *Second fortnight.*—Steam ploughs, harrows, extirpating rollers, scarificators, pugmills, and apparatus for making drain-pipes.

MAY.

First fortnight.—Drills for seed and manures, hemp and flax strippers, vehicles, harness, weighing machines, churns, and dairy utensils. *Second fortnight.*—Mowing machines, winnowing machines, rakes, haymaking apparatus, and apparatus for tying and the preservation of hay.

JUNE.

First fortnight.—Competition in farriery and examination of specimens of rural establishments. *Second fortnight.*—Chaff and root cutters, horse hoes, &c., mills.

JULY.

First fortnight.—Apparatus for clipping various domestic animals. *Second fortnight.*—Reaping machine and other harvesting apparatus.

AUGUST.

First fortnight.—Threshing machines and other apparatus for the cleaning and preservation of grain. *Second fortnight.*—Portable ovens, apparatus for cooking vegetables, washing linen, and manufacturing manures.

SEPTEMBER AND OCTOBER.

Examination of specimens of various agricultural industries.

ANIMALS.

APRIL.

First fortnight.—Breeding sheep. *Second fortnight.*—Fat animals.

MAY.

First fortnight.—Dairy cattle; breeders. *Second fortnight.*—Sheep for wool; breeders.

JUNE.

First fortnight.—Horses and other animals for draught. *Second fortnight.*—Poultry and small animals.

JULY.

First fortnight.—Cattle for labor; breeders. *Second fortnight.*—Saddle horses, hunters, carriage horses, ponies, &c.

AUGUST.

First fortnight.—Dogs. *Second fortnight.*—Draught oxen.

SEPTEMBER.

First fortnight.—Pigs, breeders. *Second fortnight.*—Asses, mules, &c.

OCTOBER.

First fortnight.—Fat animals. *Second fortnight.*—Animals acclimatized or capable of being so.

GROUP IX.

LIVE PRODUCE AND SPECIMENS OF HORTICULTURAL WORKS.

CLASS 83. GLASS HOUSES AND APPARATUS.—CLASS 84. FLOWERS AND ORNAMENTAL PLANTS.—CLASS 85. VEGETABLES.—CLASS 86. FRUIT TREES.—CLASS 87. SEEDS AND SAPLINGS OF FOREST TREES.—CLASS 88. HOT-HOUSE PLANTS.

CLASS 84 TO 88.—FLOWERS AND ORNAMENTAL PLANTS.

These classes were represented at the Exhibition in the French section by products renewed every fortnight, and gave rise to fourteen series of prize competitions. A special catalogue was published, and only a summary of the proceedings can be given here.

RESUMÉ OF THE FOURTEEN COMPETITIVE SERIES.

(First Series, from April 1 *to* 14, 1867.*)*

Principal exhibition.—Camelias in flower.

Minor exhibitions.—New plants reared from the seed, hot-house plants, (orchids, bromelia, ferns.) Greenhouse and conservatory plants, (erica, acacias and mimosa, herbaceous ferns, amaryllis, stocks, cinerarias, Chinese primrose, daphnes, cyclamens, mignonette.) Ligneous plants for the open air, (holly, magnolia grandiflora, yucca, ivy.) Bulbous plants, (hyacinths, tulips, saffron.) Forced shrubs, (lilacs, rose trees, and others.) Fruit and vegetables, (pine-apples, early fruits, fruits of 1866, &c.) Fruit trees pruned and trained, (pear, peach, cherry, plum, and apricot trees, vines,) standard fruit trees.

Second series, (from April 14 *to* 30, 1867.*)*

Principal exhibition.—Conifers.

Minor exhibition.—Hothouse plants, (orchids, cacti, lycopodium, selaginella, &c.) Plants grown in heated beds, (agave, aloe, Bonaparteæ, dasylirion, litzæa, yucca, rhododendrons, epacris, erica, cinerarias.) Herbaceous plants, grown in the open ground, (hyacinths, pansies, primroses, stocks, &c.) Ligneous plants, grown in the open ground, (magnolias, rose trees, &c.) Early vegetables.

Third series, (from May 1 *to* 14, 1867.*)*

Principal exhibition.—Azalea indica, rhododendron arboreum.

Minor exhibitions.—New plants of all kinds. Hothouse plants and plants grown in heated beds, (orchids, &c.) Plants cultivated for the decoration of apartments. Greenhouse bulbous plants, (ixia, sparaxis.)

Plants of all kinds grown in the open ground, (peonies, rose trees, clematis, Gessner tulips, pansies, auriculæ, mignonette, gladiolus, &c.) Vegetables and fruit, (vegetables in season, early vegetables, pine apples, &c.)

Fourth series, (from May 15 *to* 30, 1867.*)*

Principal exhibition.—Palms and cycadeæ.

Minor exhibitions.—Hothouse plants, (orchids, iscara.) Plants grown in heated beds and conservatories, (azaleas, calceolarias, Himalaya rhododendrons, &c.) Ligneous plants, grown in the open ground, (clematis, rose trees, &c.) Herbaceous plants, grown in the open ground, (peonies, ranunculuses, anemones, daisies, and others.) Vegetables and forced fruit, (grapes, &c.)

Fifth series, (from June 1 *to* 14, 1867.*)*

Principal exhibition.—Orchids and pelargonium in flower.

Minor exhibitions.—Hothouse plants, (caladium bulbosum, &c.) Greenhouse plants, (calceolarias, verbenas, &c.) Herbaceous plants, grown in the open ground, (rhododendrons, azaleas, kalmia, rose trees, &c.) Vegetables and forced fruit, (melons, &c.)

Sixth series, (from June 15 *to* 30, 1867.*)*

Principal exhibition.—Roses and pandanæ.

Minor exhibitions.—Pelargonium in flower. Hothouse plants, (orchids, Theophrasta, clavija, maranta, calathea, phrynium, bananas, begonias.) Plants grown in heated beds and conservatories, (orange trees, lemon trees, verbenas, calceolarias.) Herbaceous plants, grown in the open ground, (larkspurs, irises, 10-week stocks, indigenous orchids, Alpine plants, peonies, &c.) Vegetables in season. Exotic and indigenous fruits, (bananas, cherries, strawberries.)

Seventh series, (from July 1 *to* 14, 1867.*)*

Principal exhibition.—Pelargonium zonale and tree ferns.

Minor exhibition.—Hothouse plants, (exotic, useful, and officinal plants, orchids, pitcher plants, gloxinia, caladium bulbosum.) Plants grown in heated beds, (petunias, rochea, crassula, saracenia amaryllis, lilium auratum.) Plants grown in the open ground, (larkspurs, mignonette, climbing roses, roses, &c.) Vegetables in season, (mushrooms and others.) Fruit, (cherries, strawberries, &c.)

Eighth series, (from July 15 *to* 31, 1867.*)*

Principal exhibition.— Pinks and hothouse plants.

Minor exhibitions.—Hothouse plants, (exotic fruit trees, gloxinia.) Greenhouse plants, (lantana, petunia.) Herbaceous plants, grown in the open ground, (officinal plants, phlox, penstemon, shot, climbing roses, gladiolus, larkspurs, phlox Drummondii, &c.) Ligneous plants, for decoration, (hortensias, &c.) Fruit bushes, (stone fruits, berries, melons. Vegetables in season.

Ninth series, (from August 1 *to* 14, 1867.*)*

Principal exhibition.—Fuchsias and gladiolus.

Minor exhibitions.—Exotic climbing plants, (passion-flowers and others.) Greenhouse plants, (heliotropes, cape heaths.) Plants grown in the open ground, (dahlias, pinks, climbing roses, phlox decussata, lilies, zinnia, lobelia, nasturtiums, hortensias, &c.) Stone and other fruit, (berries, grapes, peaches.) Vegetables in season.

Tenth series, (from August 15 *to* 31, 1867.*)*

Principal exhibition.—Aröides.

Minor exhibition.—Hothouse plants, (orchids, Gesnera, achimenes, nagelia, sinningia.) Greenhouse and conservatory plants, (fuchsias, erythrina, pelargonium zonale and pelargonium inguinans, plants for hanging baskets.) Perennial plants grown in the open ground, (dahlias, climbing roses, penstemon, phlox, pinks, &c.) Annuals, (china asters, balsams, zinnia, and others.) Bulbous plants, (lilies, gladiolus.) Ligneous plants, grown in the open ground. Aquatic plants. Vegetables in season, (melons and others.) Fruit bushes and trees, (fruits with pips and with stones, peaches, grapes, figs.)

Eleventh series, (from September 1 *to* 14, 1867.*)*

Principal exhibition.—Dahlias.

Minor exhibitions.—Hothouse plants, (dragon trees, croton, allamanda.) Greenhouse plants, (fuchsias, veronicas, pelargonium zonale and pelargonium inguinans.) Plants grown in the open ground, (dianthus sinensis and dianthus Hedewigii, china asters, balsams, and others.) Ligneous plants grown in the open ground, (rose trees.) Bulbous plants, (gladiolus and others.) Vegetables in season. Fruits with pips and stones, (peaches, grapes, figs, pine-apples.) Trees with caducous leaves.

Twelfth series, (from September 15 *to* 30, 1867.*)*

Principal exhibition.—Araliaceæ.

Minor exhibitions.—Hothouse plants, (canna, solanum, ficus, hibiscus, musa, and others.) Greenhouse plants, (fuchsias, pelargonium zonale and pelargonium inguinans.) Plants grown in the open ground, (gramineous plants, dahlias, chrysanthemums, asters, gladiolus. Ligneous plants, (roses, bamboos.) Annuals of various kinds. Vegetables in season.

Fruit, (grapes, fruits with pips, with stones, cucurbitaceæ, strawberries.)

Thirteenth series, (from October 1 *to* 14, 1867.*)*

Principal exhibition.—Fruits of all kinds, and Indian chrysanthemums.

Minor exhibitions.—Hothouse plants, (orchids and others.) Vegetables in season, (potatoes, cabbages, mushrooms, Indian potatoes, watermelons.)

Fourteenth series, (from October 15 to 30, 1867.)

Principal exhibition.—Vegetables of all kinds.

Minor exhibitions.—Ligneous plants grown in the open ground. Various systems of multiplication for fruit trees, forest plantations, chrysanthemums, and other plants.

Special shows of bouquets and natural flowers.

GROUP X.

ARTICLES EXHIBITED WITH THE SPECIAL OBJECT OF IMPROVING THE PHYSICAL AND MORAL CONDITION OF THE PEOPLE.

Class 89. Apparatus and Methods Used in the Instruction of Children.—Class 90. Libraries and Apparatus Used in the Instruction of Adults at Home, in the Work-shops, or in Schools and Colleges.—Class 91. Furniture, Clothing, and Food from all sources, Remarkable for Useful Qualities, combined with Cheapness.—Class 92. Specimens of the Clothing Worn by the People of Different Countries.—Class 93. Examples of Dwellings characterized by Cheapness combined with the Conditions Necessary for Health and Comfort.—Class 94. Articles of all kinds Manufactured by Working Masters.—Class 95. Instruments and Processes peculiar to Working Masters.

The articles contained in Group X were of a very miscellaneous character, and in fact were borrowed from twenty-one of the preceding classes, to be massed here.

The most interesting subjects for study were the school appliances, and the cheap houses for workmen. Germany, Switzerland, and the United States excelled in the former Exhibition not only the machinery of education, but the school-houses themselves. In the matter of economical cottages for laborers there were many competitors.

The Emperor was among the number, and obtained the principal prize, which was handed to him by the Prince Imperial, the president of the commission, on the day of the distribution of rewards.

CLASSES 89 AND 90.—APPARATUS AND METHODS USED IN INSTRUCTION.

"Among the institutions which concur for the physical and moral improvements of the working classes, the Imperial Commission has placed in the first rank the educational establishments which, from the *crèches* (asylums where the infants of female operatives are taken care of during the day) to the special schools, develop in the child and the youth, the apprentice, and the workman, the qualities of intelligence and character, and initiate them in that theoretical and practical knowledge which will guide them in all the phases of their existence, and render them fitted for any position in life."

The following observations on education in France were drawn up by M. Charles Robert, one of the vice-presidents of the united juries of Group X; M. Marguerin, member of the committee of admission of class 89; M. Ph. Pompée, vice-president of class 90; M. Barbier, member and delegate of class 89, was added to the commission. The report was translated for the English official catalogue, from which it is here reproduced.

"The duty of collecting and classifying all the articles which could properly be shown as illustrating our public system of education, has been confided to the committees of classes 89 and 90. The first was designed for the admission of all the works adapted for the education of children from their birth to the time when, their intelligences being developed, they could either continue their special studies or enter immediately into apprenticeship for the callings for which they were ultimately intended.

"The committee of class 90 is charged with the investigation of all those institutions which tend either to recover lost time, to perfect the education already received in the primary schools, or to afford new acquirements to youth or adults, which would permit them at a future period to bring their works to the greatest perfection of which man's creations are capable. But, if the institutions for teaching may be theoretically divided into sections, as we have just done, they cannot be practically so separated. The education of man is a thing complete in itself, which, though it has its degrees, cannot, without great inconvenience, be subjected to change of direction, proceeding, or method. Thus, no sooner had the united committee of the two classes commenced this work, than it was found how difficult it was to determine to which class appertained certain Exhibitors who had productions interesting both to the adult classes and children's schools, and sometimes to every description of scholastic institutions. An understanding between them being indispensable, a methodical and reasonable distribution of their respective duties was arranged by a mixed commission; and while at the same time they each separately preserved their own individuality, the two committees of admission combined their efforts so as to give to this part of the Exhibition the necessary unity and completeness. It is also for this express purpose that this preface has been compiled in common by the members of the two classes.

"Before entering into details concerning the articles exhibited, we cannot help stating that the space allotted for the two classes 89 and 90 has been quite insufficient to present its whole development, or to give an adequate idea of the details and ensemble of our vast system of public instruction. However, we feel convinced that incomplete as this Exhibition is, it will prove to our own countrymen and to foreigners that public instruction has made in the last few years immense progress in France, thanks to a liberal and prolific impulse; and that our public and private establishments are worthy of a nation so enlightened and advanced as ours proves herself in all the branches of human activity.

"For the first time, at the Universal Exhibition of London in 1862, a particular class was created to receive the school requisites, works, and materials, but this was limited to infant schools and special schools for drawing.

"The French Exhibition of 1867, however, embraces, on a much more comprehensive scale, all kinds of education—that of adults as well as of children, their professional education as well as technical education; and, acting up to its universal character, presents for examination the various evidences of the intellectual activity of the country. Therefore, whereas the Exhibition of London only numbered 180 exhibitors in this class, that of Paris possesses as many as 500 exhibitors, which, however, is less than half the number who applied to the Imperial Commission for admission.

"A rapid progress has been realized during the last five years, and a still more marked advance is in process of realization, to bear fruit in no very distant future. These are the results proved by facts in the exhibition of classes 89 and 90.

"I. The hygienic condition of school buildings, the judicious disposition of the interior, the arrangement and installation of the whole, are subjects of vital importance in educational matters. These requirements are now better understood and more ably carried into effect. The new schools are better distributed, besides affording the scholars a more ample supply of air, light, and space. A large number of old buildings have been greatly improved in this respect, and arranged in accordance with this principle. The impetus has been given, and this transformation will gradually be extended to the smallest and most insignificant villages.

"II. The institution of *crêches*, or infant asylums, which has been tried for some time, is now regularly organized, and is showing a progressive development. It is the same with the *salles d'asile*, (infant schools,) which are under an august and charitable patronage. France numbers 3,572 public infant schools; 264 were founded between 1863 and 1865, and during the same period the inmates of these schools were augmented by 34,912 children. In the rapidly increasing training schools for the education of teachers, school-mistresses are taught the use of those gymnastic exercises and games which make these dwelling places of youth more gay and wholesome to the little inmates.

"III. The progress in the management of the elementary schools is still more marked in every way. From 1863 to 1865 the number of communes possessing no school was reduced from 818 to 694; 938 new schools have been founded, and the scholars, which now number 4,436,470, have been augmented by 100,102 children. The communal or free schools for girls and boys amounted in 1865 to 69,699; and they are also attended more regularly, and are less frequently abandoned by the pupils, after their first communion. The institution of cantonal examinations, and prizes and primary instruction certificates, have had a most happy and surprising influence. On the other hand, the instruction has not remained stationary, having considerably extended, inasmuch as different branches of study, which were previously optional, have now become obligatory; it is also much improved by a more intelligent direction; agriculture and horticulture are being taught with eminently satisfactory results; in a word, the general improving tendency is to make primary instruction a broad, solid basis, on which may rest the education of adults—special, secondary, and technical—in accordance with the mental capability and requirements and the future career of the students. Besides these improvements, the position of the instructors is much improved; they are better remunerated for their services; their interests are protected; elevated in the eyes of the population by public recognition of their services, and allowed to participate in all honorary distinctions. They are thus more than ever encouraged to devote themselves to the diffusion of public instruction, which is the special requirement of the times and the sincere wish of the entire French population. The improvements have been attained principally by boys' schools; with the girls' schools the results have been less marked; but, happily, the new law on female education, the project for which is now before the legislative body for approval, will soon give an impulse in the right direction. An evident and progressive improvement in the science of training teachers, and in the methods and ways of teaching, is an unmistakeable sign of the vital interest that this question of education excites in the country. Proofs of this are everywhere shown in the French Exhibition of 1867.

"IV. The science of teaching and scholastic training, which only can be an efficient auxiliary to national education when it is thoroughly imbued with the immutable principles of religion and morality, and this truth is represented by works worthy of French literature. It is not only taught in all the primary normal schools, but the taste for the study of this science is kept up among the schoolmasters by annual conferences—a system which is rapidly becoming a part of our scholastic education. The improvement in the methods and plans of instruction are manifest ever since the English Exhibition of 1862. The elementary books and treatises for the teaching of reading, writing, grammar, arithmetic, history, geography, and drawing, have gained much in simplicity and clearness; they are more practical; they are more impressed with the end they have in view, while they spare the child both time and trouble. Their progress may be appreciated by the study of the productions of the pupils. The needlework done by little girls shows that works of a fanciful and frivolous kind have given place to those of utility and family necessity.

"V. The province of education is to study the physical growth of children. To the ordinary gymnastic games must be added rational gymnastics, which may rule and complete the first. The apparatus exhibited show that there are plenty of means for physical education, but it is often impossible to organize them practically, while French habits make it more difficult here than elsewhere. If gymnastic exercises have not yet managed to bring together the youthful population with the view of public recreation, singing has had the advantage of so doing.

"The new choral societies which are daily organized, the Orphéonic gatherings which take place periodically, the cheap musical publications that have spread widely, prove that music is fully established in the tastes and habits of the people. The most distinguished French composers are now engaged for the Orphéons, and classical music begins to arrest the public attention. The Central Patronage Committee of the French Orphéons, recently inaugurated, will forward this great movement, and give it encouragement and impulse. The Exhibition gives evidence of the considerable development given to singing during the last few years.

"VI. The French educational system would not be in accordance with the charitable habits of our country if it did not endeavor to ameliorate the condition of those unfortunate beings whose infirmities have long condemned them to loneliness. The Exhibition shows us many recent improvements in the contrivances for educating the blind and the deaf and dumb. By rendering study less irksome, these contrivances facilitate their communication with the world, and the possibility of employing talents which would otherwise be rendered useless. The endeavor to educate the deaf and dumb in ordinary schools is too recent yet for the result of the trial to be appreciated; the future will show what is to be expected from it.

"Lastly, even the idiots partake of the universal progress of a civilization which becomes more humane as it becomes more liberal. These unfortunates are received into special establishments, and attended to with the most ingenious care. It is no longer a hope, but a certainty, that these poor children can often recover, with a part of their moral consciousness, somewhat of the faculty of participating in the feelings, objects, and ordinary occupations of the more favored portion of the human family.

"VII. The improvement in the ordinary means of education provided for children, and the restoration of those who may be called the disinherited of nature, were deemed scarcely sufficient by the friends of progress in France. They felt it to be necessary that a great educational system, extensive, varied, open to all those who wished to teach, as well as those desiring to learn, should be made available to adults, offering the means of repairing the errors of their parents and guardians, or the negligence of youth, the means of extending the elementary knowledge received in preparatory schools, and finding in superior instruction suited to their peculiar avocation the legitimate reward of their labors.

"The ministerial orders suggesting lectures and evening schools for apprentices and grown-up people, responded to this double want. Private efforts had, it is true, in this instance preceded official decrees. Several societies had organized in various places, especially on the behalf of town workmen, means for scientific instruction. The Polytechnic Association, which dates from 1830, numbers now 22 different sections in Paris and its environs, while it has founded and endowed a much larger number in various departments, showing that individual enterprise has been in no wise idle. However, it was only an energetic will appealing from high quarters, such as that of our minister of public instruction, to the general intelligence of the country, that could, in the brief period of two years, determine this, and inaugurate such a vast educational movement which, from the 1st of January, 1864, to the 15th of December, 1866, augmented the number of adult educational institutions from 5,623 to 28,546, and thereby created a spontaneous accession of 600,000 voluntary pupils. These institutions have adopted two different methods of instruction, each useful in its way, that of lectures to open the minds of the public and enlighten them on various important subjects, and that of lessons for the purpose of imparting precise instruction. The future can alone determine how far the system of lectures will enter into the habits of our country; but it is of paramount importance to her dearest interests, to her prosperity and her dignity, that the regular education of adults, which heretofore has only been sustained by precarious resources and by the devotion of the teachers, should be systematized and established as a great public institution. This is the object of the law on public instruction now under consideration by the legislative body, whose business it will be to place adult education on the same permanent footing as the legislation of 1833 did for the institutions for the instruction of the youthful population. The education of apprentices and adults when it passes beyond the limits of elementary instruction changes its character, and enters into the arena of applied science and art. The programmes of the various societies which have for their object the education of the working man, clearly show the spirit and the limits of the enterprise. However, the recent introduction of the teaching of living languages, commercial geography, and political and industrial economy, cannot fail to tend to generalize, and to constitute for the working classes a superior order of education, nearly analogous to that adopted in special and high-class educational institutions.

"VIII. If we except some few departmental centres where public instruction is favorably endowed, the teaching of the applied arts is much better organized and more sought after than that of sciences. The practical and successful results achieved by the system of teaching adopted in the drawing and modelling schools, secured for France an honorable position at the Exhibition of London in 1862, and it has since shown still more marked improvement. Paris, which is the chief city of the world for the manufacture of the productions of industrial art, has naturally put itself at the head of the movement and set the example. The institution of a certificate of master or mistress of arts as a reward for skilled teachers, the introduction of drawing into the primary schools for girls and boys, the reorganization of evening classes for male adults, the opening of numerous lay schools for female adults, annual competitive examinations between classes of the same degree, a more enlightened and elevated object given to instruction, the renewal of models, and the formation of collections according to the rules of the most severe taste—these are the great educational advances in which the municipality and the state both participate, and which may be fully appreciated by the contemplation of the productions of the pupils, to be seen at the Exhibition.

"The objects sent by the provincial towns also exhibit most favorable results. The workmen, as well as the manufacturers themselves, are beginning to understand that the superiority of our productions in an artistic point of view must be maintained by the increased cultivation of artistic and scientific taste.

"IX. Besides the primary schools and the educational courses for adults, which meet the wants of popular instruction concurrently with the classical colleges and collegiate institutions—the studies in which are adapted only to the demands of certain social positions and limited careers—the middle classes require a system of education more accessible in its conditions, more economical in its cost, and better suited to the wants of a community in which the sciences are constantly improving all branches of industry, and which brings up its children in a liberal manner, and prepares them at once, without any limitation, for agriculture, trade, and commerce, as well as for the arts and public employment.

"The law of the 21st of June, 1865, completing former enactments, the superior primary instruction of 1833, the special education of 1847, and the professional education of 1850, inaugurated the system referred to. At the same time that it was completely established in new schools, secondary special education rallied round it under a common denomination, but on a broader basis, the establishments which preceded it, namely, the superior primary schools, which, as a rule, are not successful, the professional schools, which remain isolated, and the commercial colleges, where primary special education has not yet attained its development. A series of supplemental arrangements have established the new system on a solid basis.

"The action of the Council of Surveillance renders it easily adaptable to the several localities without injuring its original character; the diplomas conferred at the conclusion of the course of study set before the pupils what is always necessary to sustain and stimulate them in their work; the normal school of Cluny, the certificate of capacity, and the junction of literature with science, insure the services of a body of professors who will bring into their classes the habits of method and the spirit of study under which they themselves have been formed. It is, then, not too much to hope that the system of practical secondary education—that is to say, properly speaking, the education of the middle classes—is founded in our country on a definite principle. The Exhibition presents, as it were, an inventory of all this work of formation to which, during the last 30 years, the state, the municipal authorities, the chambers of commerce, the industrial societies, and, in a marked degree, private individuals, have contributed. This multiplicity of efforts has produced a great variety of combinations in the programme of studies; still the leading ideas show themselves clearly, and indicate the current of thought and national requirements. This new system either sets aside the study of languages altogether or renders them entirely subordinate, and calls in the working element only as a means of, or preparation for, truly professional schools. In spite of its name, it is a system of general education, that is to say, theoretical, with a marked practical character. It leads to applications, but it does not insist upon them. It stops where apprenticeship begins.

"X. Primary instruction, developing itself in adult classes, gives to the apprentice and artisan notions of science which they may apply in their own occupations; secondary special instruction initiates its pupils in scientific theories, of which they will find the applications in their workshops, when they become foremen and manufacturers; neither the one nor the other does away with the necessity of apprenticeship in any case. Apprenticeship, however, has a diminishing tendency, in consequence of the conditions of modern industry. In respect of free industry, that it should produce, according to the ancient system, good apprentices, and, consequently, good artisans, would be, in respect to many professions, a complete illusion. This was clearly shown by the result of the inquiry opened by the minister of public works in 1863. The natural force of circumstances has left technical education to supply the deficiency of instruction during apprenticeship. Technical education existed, in fact, before the name was known. The government, in order to meet the varied national wants, long since organized various establishments, where real professional apprenticeship was practically carried out. The schools of agriculture and the farm schools, the schools of art and manufactures, the naval school, &c., are establishments for technical or professional education, which are here synonymous terms. Private enterprise did still more, because, being unable to incur the same expenditure as the state, it acted in a more practical manner. The inquiry has made known the useful creations of industrial societies, of large companies, of chiefs of works, of heads of free institutions, of congregational establishments, who have in opposite parts of the empire realized the apprenticeship of determined professions with more or less success. But, in face of the ever-increasing mass of wants, it was evident that it was necessary to encourage and to regulate technical education by making it general. This is the object of a bill now before the legislature. The object of technical education differs then clearly from secondary special education. The latter remains always general, leads to all the industrial professions, but only lends itself to practical work exceptionally. It is essentially an education; the former, on the contrary, is particular; it prepares pupils for a fixed profession; it has recourse to education only as an assistant; it is an apprenticeship.

"XI. The diffusion of education cannot be carried out without the diffusion of books; they are the auxiliaries of education, and are, moreover, themselves teachers. The colportage—that is to say, the sale of books by hawking or otherwise than in shops—can neither diffuse them in sufficient numbers, give adequate extension to circulation, or place them in all hands. Its business is trade, not education; and, even regulated as it is, it cannot furnish sufficient guarantees. The establishment of libraries in all the communes of France, lending or hiring out books, placing them within the reach of all, was the necessary object of the propagation of education. Set on foot by the minister of public instruction, established in the communal schools, kept by the schoolmaster, the scholars' libraries were the first established. There are at present 8,000 libraries, which lend 500,000 books per annum. But ministerial action was not enough to endow 40,000 communes with libraries, and public spirit came in aid with remarkable alacrity. A great number of free societies have been formed for this special object; some including the whole of an old province, such as Alsace, in their action; others a department, and the rest purely local in their action. Many in Paris attempt to organize for themselves centres of action from which to operate on the country around, either in giving their assistance in the formation of libraries, or in making known and encouraging good books, or by influencing the colportage. Whatever may be the extent of their operations, or the mode of their action, they all concur in maintaining a healthy agitation, which has already borne good fruit. Not only have thousands been induced to read who never before touched a book except by accident, but publishers having thus a large market open to them, and authors finding a public always ready for their works, have eliminated new features in their literary productions. The former, by more economic arrangements, have endeavored to reach the perfection of cheapness, while the latter comprehend that, in order to reach the soul of a whole nation, literature must separate itself from refined notions and elaborations of style, and that it cannot be too pure either as regards the form or the matter.

"XII. The exhibition of the progress of education in France would still be incomplete were it limited to the groups above indicated; the work would be uncrowned. Happily the Minister of the Interior has here intervened. By virtue of the Imperial decision, dated November 8, 1856, the Exhibition includes not only the acts emanating from his administration and the works of the pupils of the public schools, but also important collections from scientific missions, and a series of reports presenting a picture of the progress accomplished in France in science, as well as in letters, during the last twenty years. From the minister of the interior to the village schoolmaster, all the representatives of national education find themselves thus associated at the Exhibition of 1867 in a common responsibility, in the face of France and the whole world."

GENERAL INDEX

OF THE

GROUPS AND CLASSES

ACCORDING TO THE

CLASSIFICATION ADOPTED BY THE IMPERIAL COMMISSION.

GROUP I.

WORKS OF ART.

GROUP II.

APPARATUS AND APPLICATION OF THE LIBERAL ARTS.

GROUP III.

FURNITURE AND OTHER OBJECTS USED IN DWELLINGS.

GROUP IV.

CLOTHING, INCLUDING FABRICS, AND OTHER OBJECTS WORN ON THE PERSON.

GROUP V.

PRODUCTS, RAW AND MANUFACTURED, OF MINING INDUSTRY, FORESTRY, ETC.

GROUP VI.

APPARATUS AND PROCESSES USED IN THE COMMON ARTS.

GROUP VII.

FOOD, FRESH OR PRESERVED, IN VARIOUS STATES OF PRESERVATION.

GROUP VIII.

LIVE STOCK AND SPECIMENS OF AGRICULTURAL BUILDINGS.

GROUP IX.

LIVE PRODUCE AND SPECIMENS OF HORTICULTURAL WORKS.

GROUP X.

ARTICLES EXHIBITED WITH THE SPECIAL OBJECT OF IMPROVING THE PHYSICAL AND MORAL CONDITION OF THE PEOPLE.

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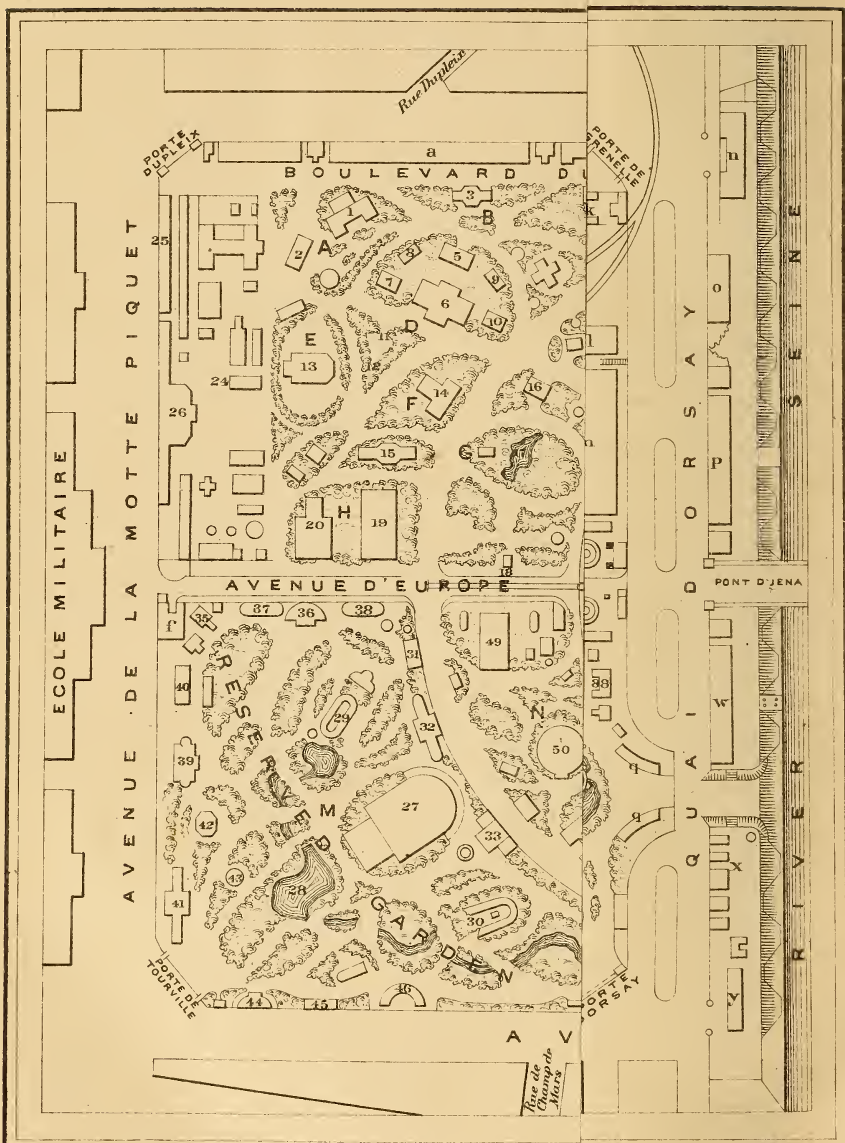

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REFERENCES

TO THE

PLAN OF THE BUILDING AND PARK.

REFERENCES TO THE UPPER LEFT HAND CORNER OF THE PLAN.

A.—Spain.—1, Moorish Farm-house; 2, Valentian Cottage.

B.—Portugal.—3, Silk-worm Nursery.

C.—Switzerland.—4, Fine Arts Annexe.

D.—Austria.—5, Bakery; 6, Restaurant; 7, Hungarian House; 8, Styrian House 9, Lower Austrian House; 10, Tyrolean House; 11, Stables; 12, Riding School.

E.—Schleswig-Holstein.—13, General Exhibition.

F.—Wurtemberg.—14, Annexe.

G.—Prussia.—15, Annexe; 16, School-house; 17, Lake; 18, Equestrian Statue.

H.—Bavaria.—19, Principal Annexe; 20, Annexe.

I.—Norway.

J.—Denmark.

K.—Sweden.—21, House of Gustavus Vasa.

L.—Russia.—22, Caucasian House; 23, Boiler.

M.—France.—24, Agricultural Exhibition; 25, Offices and Warehouses; 26, Restaurant.

Addenda.—a, Agricultural Machinery; b, Swiss Annexe; c, Russian Stables; d, Concert Hall; e, Russian Annexe.

REFERENCES TO THE LOWER LEFT-HAND CORNER OF THE PLAN.

France—Continued.—27, Conservatory; 28, Lake; 29, Marine Aquarium; 30, Fresh-water Aquarium; 31, Greenhouse; 32, Temperate Greenhouse; 33, Cold Greenhouse; 34, Greenhouse; 35, Botanical Diorama; 36, 37, 38, Greenhouses; 39, Restaurant; 40, 41, Greenhouses; 42, Orchestra; 43, Tent of Her Imperial Majesty the Empress; 44, 45, Greenhouses; 46, Botanical Diorama; 47, Greenhouse; 48, Post Office and Telegraph.

N.—Belgium.—49, Fine Arts Annexe; 50, Exhibition of Railway Plant, &c.

O.—Holland.—51, Farm-house; 52, Fine Arts Annexe; 53, Exhibition of Carriages.

Addenda.—f, Police and Firemen; g, Turnstile; h, Cloak-rooms.

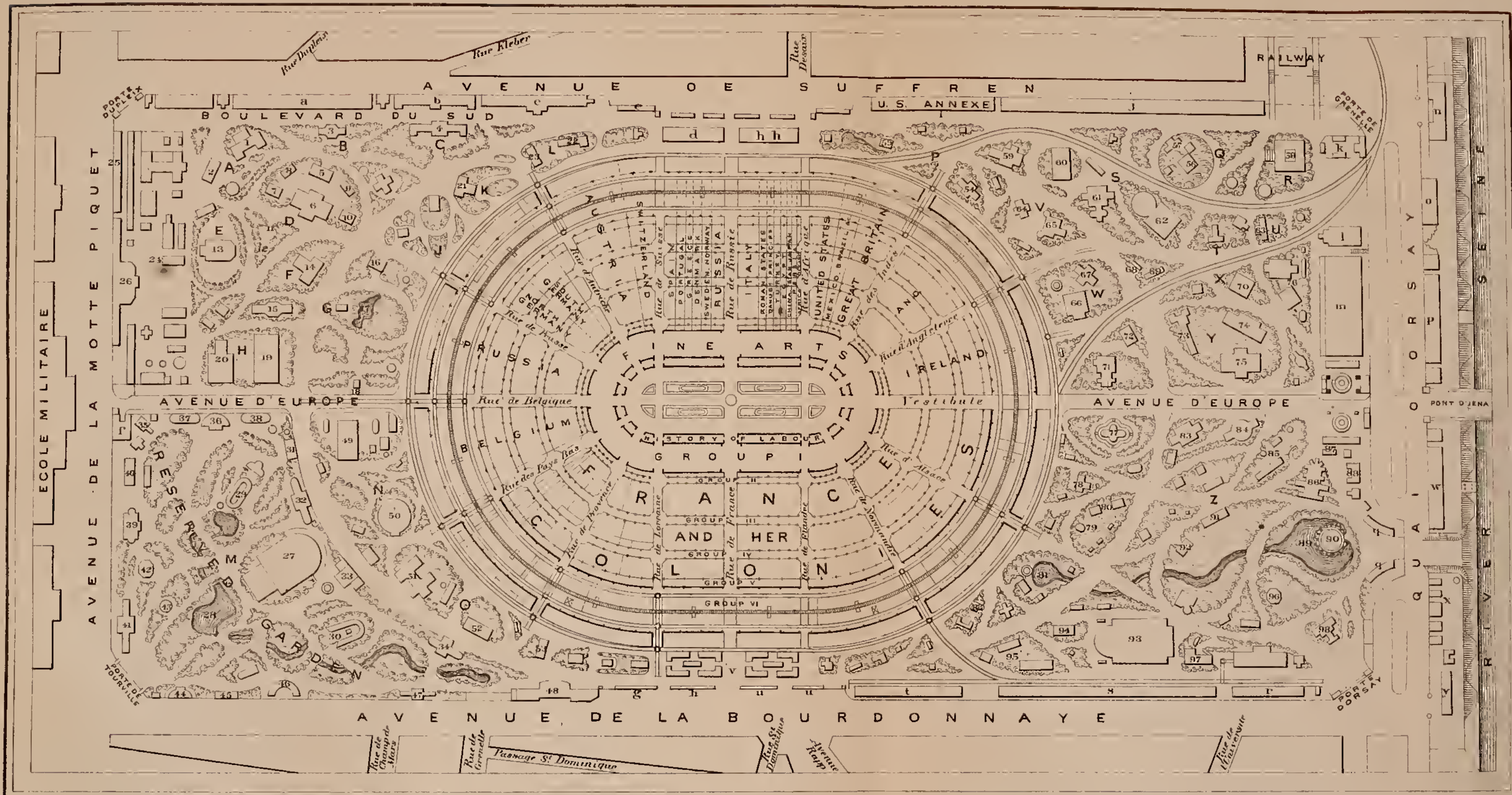
REFERENCES TO THE UPPER RIGHT-HAND CORNER OF THE PLAN.

P.—Italy.—54, Museum; 55, Boiler.

Q.—Siam, Japan, and China.—56, Chinese Tea House; 57, Theatre.

R.—Tunis.—58, Bey's Palace.

PARIS UNIVERSAL EXPOSITION 1867.



PLAN OF THE BUILDING AND PARK

To Accompany the General Report .. For Explanations see pages 13,14,15,16.

S.—Egypt.—59, Café; 60, Temple of Edfou; 61, Summer Palace of the Viceroy; 62, Exhibition of the Plan of the Suez Canal.

T.—Danubian Principalities.

U.—Morocco.—63, Imperial Tent.

V.—Turkey.—64, School-house; 65, Mosque.

W.—United States.—66, Boiler-house; 67, American Farmer's House, or Illinois Cottage; 68, United States School-house; 69, Louisiana Cottage.

X.—Mexico and Brazil.—70, Temple.

Y.—Great Britain and Ireland.—71, Testing House, (heating apparatus, &c.;) 72, Light-house; 73, Barrack Huts; 74, Public Munitions of War; 75, Private Munitions of War; 76, Exhibition of Protestant Mission.

Addenda.—hh, Jurors' Meeting Room; i, United States Annexe; j, English Annexe; k, Café and Concert-room; l, Concert Hall; m, International Club; n, Restaurant; o, Gas Works; p, Exhibition of English Marine Machinery.

REFERENCES TO THE LOWER RIGHT-HAND CORNER OF THE PLAN.

Z.—France—Continued.—77, Imperial Tent; 78, Engine; 79, Exhibition of Pottery; 80, Exhibition of Cashmere Shawls; 81, Waterfall; 82, Swiss Cottage; 83, Exhibition of Glass; 84, Exhibition of Photosculpture; 85, Windmill; 86, Church; 87, Fire Engine; 88, Police and Firemen; 89, Lake; 90, Light-house; 91, Materials for Cleansing Woollen Fabrics; 92, Leather Working Machines; 93, Theatre; 94, Refrigerating Apparatus; 95, Mills and Presses; 96, French War Office Exhibition; 97, Porcelain; 98, Photography.

Addenda.—qq, Exhibition of Fire Engines; r, Mining Exhibition; s, Machinery; t, Railway Plant, &c.; uu, Money Exchange Offices; v, Equestrian Statues; w, French Marine Engines; x, Exhibition of Pleasure Boats; y, Restaurant.

REPORT

UPON THE

CHARACTER AND CONDITION

OF THE

UNITED STATES SECTION.

17 U E

CONTENTS.

UNITED STATES SECTION.

GENERAL OBSERVATIONS AND CATALOGUE.

SPACE OCCUPIED AND NUMBER OF EXHIBITORS—NUMBER OF AWARDS TO EXHIBITORS AND OTHERS—PERCENTAGE OF AWARDS—NOTICES OF THE VARIOUS GROUPS—CATALOGUES AND OTHER PUBLICATIONS—DESCRIPTIVE CATALOGUE OF THE UNITED STATES SECTION—LIST OF AWARDS.

SPACE OCCUPIED AND AWARDS.

The space occupied by the United States was a sector of the building in the end towards the Seine. It was separated on one side from the space allotted to China and Japan by the Rue d'Afrique, (one of the transverse avenues,) and on the other side it was separated from the portion of the building occupied by Great Britain and its colonies, by a narrow sector devoted to the products of South America.

The superficial area of this sector was 38,488 square feet. In addition to this there were the constructions in the Park, the space at Billancourt, and a long rectangular building at one side of the Park, called the Annex, provided for many objects that could not conveniently be received in the building. The total space occupied was as follows:

	Square feet.
In the Palace	38, 488
In the Park	55, 769
At Billancourt	3, 880
Total	98, 137

The total number of entries in the official catalogue was 717; but this did not show the exact number of exhibitors, for some of the objects entered being broken or damaged were not set up. The same exhibits were, in some cases, entered under different classes. The total number of exhibitors whose products were present in time and competing for prizes was 536, as shown by the following résumé:

Whole number of entries in the catalogue		717
Deduct the products broken and not set up, including the *hors concours*	17	
Repetitions of the same names, and admissions at different dates through the season, after the jury work was closed	164	
		181
Present in time and competing for prizes		536

The nature of the objects exhibited is fully shown in the descriptive catalogue which forms a part of this report.

The total number of awards to the exhibitors from the United States was as follows:

Grand prizes	5
Artists' medal	1
Gold medals	18
Silver medals	76
Bronze medals	98
Honorable mentions	93
Total awards	291

Full details of the distribution of these awards are given in the list appended to this report.

From the tabular statement prepared by Mr. Beckwith and presented in the preface to the General Report, it appears that the percentage of awards to exhibitors from the United States was 52.79; the percentage to exhibitors from France was 55.57, and to those from Great Britain and colonies, 26.10. The general average percentage of awards to all exhibitors was 34.53. Next after France the United States stands highest upon the list. Mr. Beckwith observes in the preface before cited:

"The high position conceded by the verdict of the juries to American industrial products is not due in general to graceful design, fertile combinations of pleasing colors, elegant forms, elaborate finish, or any of the artistic qualities which cultivate the taste and refine the feelings by awakening in the mind a higher sense of beauty, but it is owing to their skilful, direct, and admirable adaptation to the great wants they are intended to supply, and to the originality and fertility of invention which converts the elements and natural forces to the commonest uses, multiplying results and diminishing toil.

"The peculiar and valuable qualities of our products will be adopted and reproduced in all parts of Europe, improving the mechanical and industrial arts, and it is reasonable to expect and gratifying to believe that the benefits will be reciprocal, that our products will in time acquire those tasteful and pleasing qualities which command more admiration and find a quicker and better market than the barely useful."

GENERAL OBSERVATIONS.

As a participator in this great international display the United States labored under many disadvantages. The nation had not recovered from the paralyzing effects of the disastrous war of the rebellion, and the people were not aroused in season to an appreciation of the importance of the projected Exhibition. The manufacturing industry of the country was in a transition state. Labor was scarce and dear, and many manufacturers found it difficult to fill the orders which had been received, and thus could not undertake the preparation of goods for exhibition. The remoteness of the Exhibition greatly discouraged effort, inasmuch as comparatively few of the exhibitors could be present and attend to placing and explaining their contributions. The broad Atlantic separated our artizans and producers from the Champ de Mars, while most of the great competing nations were connected by rail directly with the Exposition building. The cost of transportation within the limits of the United States to the agency in New York was considerable, and although the contributions were forwarded across the ocean by the government, no provision was made for the repacking and return of the articles, which, at the close of the Exhibition, were to be at the risk and expense of the exhibitor, and thus many persons who would have joined in the Exhibition were deterred from taking any part in it.

Yet, notwithstanding all these difficulties, the country may be congratulated upon the success of its exhibition; and that the skill, industry, and energy of the people did not suffer by comparison in the great international contest.

Our raw materials were not excelled by any in the Exposition, and by their variety, abundance, and quality, gave convincing evidence of the extraordinary natural wealth of our States and Territories. In the display of mineral products the coal of Pennsylvania, the gold and silver ores of California, Nevada, Idaho, and Colorado, the copper and iron of Minnesota, the zinc ores of New Jersey, and the emery of Massachusetts, were especially prominent. The collection was rich; but some regions and products were disproportionately represented, and it lacked that unity and completeness which can only be attained through intelligent organized effort. Almost all other prominent displays in this class were prepared with the strong aid and authority of the governments, through regularly organized corps of engineers.

In forestry and productions of the forest the display made by the United States was meagre. Much attention was given to this class by other countries; the display made by France, Brazil, Australia, and Canada, were notable features of the Exposition. Several of these collections, as also some of the collections of mineral products, had been prepared for previous great exhibitions, and may be regarded as standard displays, which are added to and improved at each new exhibition.

The exhibitions of the cereal productions and of the cotton, tobacco, wool, and other staple products, though in some instances prominent and thoroughly satisfactory, were in general fragmentary and not on a scale commensurate with the enormous capacity of the country for their production.

The most notable deficiency in the exhibition made by the United States was in Group III, including the application of the fine arts to the useful arts. This deficiency was shown by the absence of rich furnishings, upholstery, and decorative work, and manufactures depending for their excellence upon a high degree of taste and skill in design. There was no fine display of richly decorated porcelain and faïence, encaustic tiles, and marquetry; and, with the notable exception of the bronzed iron work of Messrs. Tucker & Company, no collection of artistic bronzes, bas-reliefs, and ornamental castings, nor of highly ornamented and artistic furniture.

The bronze work of the Messrs. Tucker may justly be excepted for its novelty, intrinsic excellence, and artistic value. It attracted much attention, and the articles were in demand. Some were ordered in person by the King of Prussia.

OBSERVATIONS UPON THE GROUPS.

The following observations upon the display made by the United States in several of the groups are from a report submitted by Commissioner Freese and others.

"In Group II, 'Materials and their applications in the liberal arts,' we find among the contributions made by the 86 American exhibitors much to admire and commend.[1] The specimens of typography were such as could not fail to be commended by any one conversant with the art, and we are pleased to observe that three of the exhibitors of book printing received prizes. Of specimens of stationery, book-binding, &c., the display is very limited, and out of all proportion with our immense trade in these articles, and yet of the 13 exhibitors no less than six received prizes, proving that what is lacking in quantity and variety of these articles in the Exhibition is more than made up in quality. Of plastic moulding there is but one exhibitor and three specimens, one representing what is called 'Uncle Ned's School,' another called 'Taking the Oath and Drawing Rations,' and a third called 'The Charity Patient,' representing a benevolent faced old doctor compounding a prescription for a poor woman in waiting. All these are peculiarly American, and are admirably executed. Of proofs and apparatus of photography most of the specimens are commendable, and of the ten exhibitors four received prizes.

"Of instruments of music the display, though small, adds decidedly to the character of the American exhibition. Of the nine exhibitors in this class two received gold medals, one a silver medal, and two bronze medals.

"In Group IV the contributors to the American exhibition are few in number, (only 54.) Of yarns and tissues of cotton the contributors are six, and of these five have received prizes. Of other yarns and tissues of linen, hemp, wool, and silk, the contributors are nine, of whom five have received awards. Of shawls, hosiery, and clothing, the contributors are sixteen, of whom five have received recognition. But the great feature of this group was the display of breech-loading fire-arms, metallic cartridges, and rifled cannon, of which there are fourteen contributors, of whom seven have received gold or silver medals.

[1] In this and the following enumerations of the number of exhibitors no allowance has been made for the repetitions of entries in the catalogue.

"To Group V American contributors have made most noble and appropriate contributions, embracing products (raw and manufactured) of mining industry, forestry, etc.

"In Class 40 of this group the following States and Territories have contributed from their mines and quarries: Illinois, Minnesota, Massachusetts, New Jersey, Michigan, Ohio, California, Nevada, Arkansas, Missouri, Louisiana, Alabama, Kansas, Iowa, Wisconsin, Pennsylvania, New York, Tennessee, Vermont, Georgia, West Virginia, Utah, and Idaho.

"In products of the forest, embraced in the next class, (41,) we find specimens of woods from Missouri, Kansas, Wisconsin, Illinois, New York, Massachusetts, California, Louisiana, and Utah.

"Passing to Group VI, comprising instruments and processes of common arts, we find in the American exhibition a larger number of exhibitors (227) than in any other of the groups, though this is accounted for in the fact that this group embraces a larger number of classes, (20,) and consequently a larger range of articles, than any other.

A large proportion of the contributions to this group add to the excellence of the American exhibition, and that some should fail to do so is scarcely to be wondered at, among so large a number of contributions.

"Of apparatus and methods of mining and metallurgy there are four contributors, two of whom have received prizes; of implements and processes of rural and forest work there are 25 contributors, six of whom received medals, of which two, for the best specimens of mowing and reaping machines, are of gold; of apparatus for hunting, fishing, &c., there is but one contributor, and the contribution is of no special value; of materials and method, of agricultural work, and of alimentary industry, there are 20 contributors, eight of whom have received recognition, and nearly all the contributions do credit to the genius and industrial activity of our country; of chemical, pharmaceutic, and tanning apparatus there are seven contributors, four of whom have received medals and honorable mention, and the other three are scarcely less worthy of a like recognition; of machines and mechanical apparatus in general, we have 38 contributions; that these should have been awarded no less than 21 prizes, (over 50 per centum of the number of exhibitors,) cannot be otherwise than gratifying to every American.

"Of machine tools we have 14 contributors, 10 of whom have received recognition, and the contributions of the other four are commendable; of cotton-ginning, cord-twisting, and burr-picking machines we have five contributions, all good, and two of which have received recognition; of weaving and knitting machines we have five specimens, three of which have received silver medals; of apparatus and process of sewing and making clothes, (which class includes our inimitable sewing machines, in which, as agreed upon by all impartial judges, we are far in advance of all other nations,) there are 18 contributors, of whom two have received gold medals, and one of them an imperial decoration; three have received silver medals; seven, bronze medals; and one an honorable mention, making a sum total of 13 prizes among 18 contributors. Of apparatus and methods of making furniture and household objects, there are 10 contributors, three of whom received prizes, and others of this class would, doubtless, have received high prizes could they have been present themselves to explain to the jury the peculiar working and intrinsic value of their inventions. Of machinery for paper making, printing, &c., there are but five contributors, and none of the great steam power printing presses, for which American inventors and manufacturers have become so justly celebrated, were included in this display; and of five exhibitors in this class, two have received medals, while another machine for dressing type, classified under the next head, received the award of a gold medal, and is every way worthy of it.

"Passing into the annex, we find two American buggies, and a street railway carriage, all three of which are fine specimens of skill and taste in carriage-building, and all of which received prizes. Near these are ladies and gentlemen's saddles, of good workmanship, which also received recognition from the jury. Here, too, we find the great American locomotive, which in workmanship and beauty of finish far excels all others in the Exposition, and to which the jury awarded a gold medal. There are eight other contributions to this class, though only one other—a railroad scale—received a prize.

"Of models relating to navigation and salvage there are 14 contributors to the American exhibition, four of whom received recognition from the jury, and nearly all the specimens do honor to the inventors.

"Next in review we reach Group VII, and find from the Department of Agriculture, Washington, D. C., 33 samples of wheat and other cereals, from as many different States and special localities, together with a large number of contributions of like character direct from the States. The specimens are invariably good, and have attracted a large share of attention from European agriculturists, and would have attracted more had their installation been better. Of the 17 private contributors to this class, nine have received awards. Of baking and pastry cooking we have but one contribution, and judging from the quality of bread, cake, and crackers produced we should call it first-rate, but for some cause it has received no recognition from the jury. Of prepared specimens of meat and fish, (including salt-cured and smoked hams, packed beef, pork, and lard, preserved lobster, canned oysters, &c.,) we have seven contributions, and every one has received an award.

"Of preserved fruits and vegetables, sugars, chocolates, &c., the contributors number 21, of whom 10 have received awards, and all the samples are commendable. Of fermented drinks, such as wines, brandies, ales, porters, and brown-stouts, the contributors number 25, of whom seven received awards.

"This brings us to Group X, the last, though not the least important. Here we find a specimen of a western primary school-house, school furniture, and school apparatus. It is safe to say that nothing in the

American exhibition has excited more general attention and commendation from European visitors, and no other of our exhibits tended to excite more general inquiry into the peculiar character of our political institutions, and especially as to the relations which those institutions bear toward our common school system. The school-room, in size, finish, ventilation, and furnishing, is superior to any other in the Exposition, and the apparatus within, though not in quantity, certainly in quality, equals those exhibited by any other nation. But as a report is in course of preparation, covering the whole subject of school-houses, school apparatus, &c., additional remarks are here unnecessary.

"In this same class we find books and apparatus for the use of the blind, contributed from Massachusetts, which are in every way quite equal to any others in the Exposition, and we are pleased to know that both these and the school building received awards.

"Passing to the next class, (20,) we find the articles to consist of surgical instruments, artificial limbs, hospital wagon, ambulance and relief material, medicine wagon, and camp equipage, such as were used by the United States Sanitary Commission, and all collected by one of the United States commissioners. To the United States Sanitary Commission the jury awarded a grand prize, and each of the other six exhibitors in this class received recognition.

"In the next class (93) we find three specimens of houses from the United States, namely, a western farmer's house, a Boston bakery, and a cottage made of Louisiana cypress. The first of these has deservedly attracted a large share of attention, and added much to the character of the American exhibition. It is decidedly American in its construction—plain, substantial, and convenient—representing thrift and comfort without display."

CATALOGUES AND OTHER PUBLICATIONS.

Three editions were published and circulated of an official catalogue of the products of the United States that were exhibited. This catalogue was printed in English, French, and German, and was accompanied by geographical and statistical notices in French upon the population, trade, and resources of the United States, prepared from data furnished by the Secretary of the Interior.[1]

A special catalogue in 8vo of the minerals of the United States exhibited in Group V, class 40, was also printed. This catalogue was compiled by Commissioner D'Aligny.

Numerous copies in English, French, German, and Swedish, of the report of the Commissioner of the United States General Land Office for 1866, accompanied by a map, were gratuitously distributed.

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[1] The following is the title of this catalogue in full. It was printed in 12mo, pp. 160: "Official Catalogue of the Products of the United States of America exhibited at Paris, 1867, with Statistical Notices. Catalogue in English, Catalogue Français, Deutscher Catalog. Third edition. Paris: Imprimerie Centrale des Chemins de Fer. A. Chaix et Cie, Rue Bergère, 20, près du Boulevard Montmartre, 1867."

The territorial commissioner from Colorado published a beautifully printed pamphlet descriptive of the Territory and its resources, and of the large collection of the ores of gold, silver, and copper. These books were printed in French and in English, and were gratuitously distributed to those who took an interest in the display from that portion of the United States.

The State commissioner from Nevada published a small edition of a similar pamphlet, accompanied by a map of eastern Nevada.

The Agricultural Society of the State of California sent a few sets of its transactions for distribution. Illinois also sent reports of its Agricultural Society and complete sets of the reports on the geology of the State. A small volume on the mineral, agricultural, and manufacturing resources of the State of Alabama was printed in Paris, and gratuitously distributed. The colony of Vineland, New Jersey, also circulated a descriptive pamphlet.

The descriptive catalogue of the products of the United States which follows will show the character of the exhibition made in the various groups and classes. The notices of the various objects have been prepared, in part, from data furnished by Dr. Thomas W. Evans, of Paris.

DESCRIPTIVE CATALOGUE

OF THE

PRODUCTS OF THE UNITED STATES,

EXHIBITED AT PARIS, 1867.

GROUP I.

WORKS OF ART.

CLASS 1.—PAINTINGS IN OIL.

BAKER, G. A., New York.—1. Portrait of a Child, the property of A. M. Cozzens, esq. 2. Portrait of a Lady, the property of F. Prentice, esq.

BEARD, W. H., New York.—3. The Bears' Dance, the property of Josiah Caldwell, esq.

BIERSTADT, A., New York.—4. The Rocky Mountains, the property of James McHenry, esq.

BOUGHTON, G. H., Albany, New York.—5. Winter Twilight, the property of R. L. Stuart, esq. 6. The Penitent, the property of J. F. Kensett, esq.

CASILEAR, J. W., New York.—7. Genesee Flats, the property of Shepard Gandy, esq. 8. A Swiss Lake, the property of R. M. Olyphant, esq.

CHURCH, F. E., New York.—9. Niagara, the property of J. Taylor Johnston, esq. 10. The Rainy Season in the Tropics, the property of M. O. Roberts, esq. Mr. Church received the Artists' Medal, with 500 francs in gold.

COLE, J. F., Boston, Massachusetts.—11. Pastoral Landscape.

COLMAN, S., New York.—12. View of the Alhambra.

CROPSEY, J. F., New York.—13. Mount Jefferson, New Hampshire, the property of R. M. Olyphant, esq.

DIX, C. T., New York.—14. Marine.

DURAND, A. B., New York.—15. In the Woods, the property of J. Sturgess, esq. 16. A Symbol, the property of R. M. Olyphant, esq.

ELLIOTT, C. L., New York.—17. A Portrait, the property of Fletcher Harper, esq.

GIFFORD, S. R., New York.—18. Twilight on Mount Hunter, the property of J. W. Pinchot, esq. 19. Home in the Wilderness, the property of M. Knoedler, esq.

GIGNOUX, R., New York.—20. Mount Washington, New Hampshire, the property of A. T. Stewart, esq.

GRAY, H. P., New York.—21. The Apple of Discord, the property of R. M. Olyphant, esq. 22. The Pride of the Village, the property of W. H. Osborn, esq.

HART, JAMES M., New York.—23. Landscape: Tunxis River, Connecticut, the property of S. P. Avery, esq.

HEALY, G. P. A., Chicago, Illinois.—24. Portrait of Lieutenant General Sherman. 25. Portrait of a Lady, the property of W. B. Duncan, esq.

HOMER, WINSLOW, New York.—26. Confederate Prisoners at the Front, the property of J. Taylor Johnston, esq. 27. The Bright Side, the property of W. H. Hamilton, esq.

HUBBARD, R. W., New York.—28. View of the Adirondacks, taken near Mount Mansfield, the property of Mrs. H. B. Cromwell. 29. Early Autumn, the property of H. G. Marquand, esq.

HUNT, W. M., Boston, Massachusetts.—30, 31, 32, 33, 34, 35, 36. Portraits. 37. Portrait of Abraham Lincoln. 38, 39. Italian Boy. 40. Dinan, in Brittany. 41. The Quarry.

HUNTINGTON, D., New York.—42. Portrait of Gulian C. Verplanck, esq. 43. The Republican Court, time of Washington, the property of A. T. Stewart, esq.

INNESS, GEORGE, Perth Amboy, New Jersey.—44. American Sunset, the propety of Marcus Spring, esq. 45. Landscape, with cattle.

JOHNSON, E., New York.—46. Old Kentucky Home, the property of H. W. Derby, esq. 47. Mating, the property of Major General John A. Dix. 48. Fiddling his Way, the property of R. L. Stuart, esq. 49. Sabbath Morning, the property of Robert Hoe, esq.

JOHNSON, F., Brooklyn, New York.—50. The Omelet.

KENSETT, J. F., New York.—51. Lake George in Autumn, the property of R. M. Olyphant, esq. 52. Coast, Newport Harbor, the property of G. T. Olyphant, esq. 53. Glimpse of the White Mountains, the property of R. L. Stuart, esq. 54. Morning off the Coast of Massachusetts, the property of S. Gandy, esq.

LAMBDIN, G. C., Philadelphia, Pennsylvania.—55. The Consecration, 1861, the property of George Whitney, esq. 56. The Last Sleep.

LANGDON, WOODBURY, New York.—57. The Storm. 58. Out at Sea.

LAFARGE, JOHN, Newport, Rhode Island.—59. Flowers, the property of S. F. Van Chote, esq.

LEUTZE, E., New York.—60. Mary Stuart hearing the first mass at Holyrood, after her return from France, the property of John A. Riston. esq.

LEWIS, J. S., Burlington, New Jersey.—61. The Fisher Boy.

MAY, E. C., New York.—62. Lady Jane Grey giving her Tablets to the Governor of the Tower on her way to Execution. 63. Lear and Cordelia, (King Lear, Act IV, scene 7.) 64. Portrait.

MAC ENTEE, J., New York.—65. Virginia in 1863, the property of Cyrus Butler, esq. 66. Last of October, the property of S. C. Evans, esq. 67. Autumn, Ashokan Woods, the property of Robert Hoe, esq.

MIGNOT, L. R., New York.—68. Sources of the Susquehanna, the property of H. W. Derby, esq.

MORAN, T., Philadelphia, Pennsylvania.—69. Autumn on the Conemaugh, in Pennsylvania, the property of C. L. Sharpless, esq. 70. The Children of the Mountain.

OWEN, GEORGE, New York.—71. Study from Nature, New England scenery.

RICHARDS, W. T., Philadelphia, Pennsylvania.—72. Woods in June, the property of R. L. Stuart, esq. 73. Foggy Day at Nantucket, the property of George Whitney, esq.

WEIR, J. F., New York.—74. The Gun Foundry, the property of R. P. Parrott, esq.

WHISTLER, J. MCNEIL, Baltimore, Maryland.—75. The White Girl. 76. "Wapping," or "On the Thames." 77. Old Battersea Bridge. 78. Twilight on the Ocean.

WHITE, E., New York.—79. Thoughts of Liberia, the property of R. L. Stuart, esq.

WHITTRIDGE, W., New York.—80. The Old Hunting Ground, the property of J. W. Pinchot, esq. 81. Rhode Island Coast, the property of A. M. Cozzens, esq.

WEBER, PAUL, Philadelphia, Pennsylvania.—82. Bolton Park, England.

CLASS 2.—VARIOUS PAINTINGS AND DESIGNS.

DARLEY, F. O. C., New York.—1. Cavalry Charge at Fredericksburg, Virginia, the property of W. T. Blodgett, esq.

JOHNSON, E., New York.—2. Wounded Drummer Boy, the property of the Century Club.

ROWSE, S. W., Boston, Massachusetts.—3. Crayon Portrait of Ralph Waldo Emerson, esq. 4. Crayon Portrait of J. Russell Lowell, esq.

CLASS 3.—SCULPTURE, DIE-SINKING, STONE AND CAMEO ENGRAVING.

HOSMER, Miss H. G., Boston, Massachusetts.—1. The Sleeping Faun.

THOMPSON, L., New York.—2. Statue of Napoleon, the property of C. C. D. Pinchot, esq.; cast by Mr. L. A. Amouroux. 3. Bust of a Rocky Mountain Trapper.

VOLK, L. W., Chicago, Illinois.—4. Bust of A. Lincoln.

WARD, J. Q. A., New York.—5. The Indian Hunter and his Dog, the property of the Central Park, New York; cast by Mr. L. A. Amouroux. 6. The Freedman, the property of John Baker, esq.; cast by Mr. L. A. Amouroux.

CLASS 4.—ARCHITECTURAL DESIGNS AND MODELS.

(For American Farmer's House, and School-house, see Group X, class 93.)

CLASS 5.—ENGRAVING AND LITHOGRAPHY.

MARSHALL, W. E.—Lincoln; engraving on steel. Washington; engraving on steel.

HALPIN, F., New York.—President Lincoln; engraving on steel.

WHISTLER, JAMES MCNEIL, Baltimore, Maryland.—Twelve etchings.

GROUP II.

APPARATUS AND APPLICATION OF THE LIBERAL ARTS.

CLASS 6.—PRINTING AND BOOKS.

AMERICAN BANK NOTE COMPANY, New York.—Specimens of bank-note engraving and printing.

AMERICAN BIBLE SOCIETY, New York.—Specimen copies of the publications of the society.

Since the formation of this society, in 1816, it has received from sales and donations $10,847,854, and has issued, in every known language, an aggregate of 22,118,475 copies of the Holy Scriptures. It has 17 power presses, and about 400 persons employed in the Bible House. During the late war 6,555,231 volumes were issued.

APPLETON, D., & Co., New York.—Books, including a copy of the American Encyclopædia. Bronze medal.

BAKER & GODWIN, Printing-house square, New York.—Typography, plain and in colors.

BOND, Professor G. P., Cambridge, Massachusetts.—Description of the Great Comet of 1858.

BRADSTREET, J. M., & SON, 18 Beekman street, New York.—Specimen of book printing by Hoe's press.

BREWER & TILESTON, 131 Washington street, Boston, Massachusetts.—Worcester's Dictionary.

BROUGHTON, NICHOLAS, Jr., 28 Cornhill, Boston, Massachusetts.—Specimens of typography from the American Tract Society.

BUFFORD, J. H., & SONS, 313 Washington street, Boston, Massachusetts.—Lithographic view of Mr. Bacon's bakery, in that establishment.

DEMOREST, W. J., 437 Broadway, New York.—Specimens of a monthly magazine, illustrated.

GALLAUDET, E. M., President of the Columbia Institute for the Deaf and Dumb, Washington, D. C.—Reports of that institution.

HOUGHTON, H. O., & Co., Riverside, Cambridge, Massachusetts.—Specimen books illustrated. Bronze medal.

ILLINOIS, STATE OF.—Reports of the State Geologist, Superintendent of Public Instruction, Adjutant General, State Agricultural Society, Chicago Board of Trade, &c.

KNEASS, N. B., Jr., Philadelphia, Pennsylvania.—Books for the use of the blind.

The exhibitor of these books is blind, and a graduate of the Institution of Teachers in Pennsylvania.

MERRIAM, G. & C., Springfield, Massachusetts.—Specimens of book printing. Bronze medal.

MISSOURI, STATE OF.—Books; in the Farmer's Cottage, Park.

NATIONAL BANK NOTE COMPANY.—Samples of bank note engraving and printing.

PRANG & Co., Boston, Massachusetts.—Chromo-lithographs; in the Restaurant.

STATE AGRICULTURAL SOCIETY OF CALIFORNIA.—Reports and Transactions; several sets distributed through the Commissioner, but not on exhibition except in the American Farm-house.

Many copies of these publications were distributed by exchange with those most interested in these subjects.

CLASS 7.—PAPER, STATIONERY, BOOK-BINDING, PAINTING, AND DRAWING MATERIALS.

AMERICAN LEAD PENCIL COMPANY, New York.—Samples of lead pencils. Bronze medal.

BACON, S. T., Boston, Massachusetts.—Office card rack; in the Bakery, Park.

DAY, AUSTIN G., Seymour, Connecticut.—Ordinary and indelible pencils in hard rubber cases. Bronze medal.

FAIRCHILD, L. W., & Co., New York.—Gold pens; pen and pencil cases. Bronze medal.

FORMAN, J. C., Cleveland, Ohio.—Specimens of work executed on the American Circular Border Ruling machine.

JESSUP & MOORE, 27 North Sixth street, Philadelphia, Pennsylvania.—Specimens of paper made from wood, straw, and hemp. Bronze medal.

MATTHEWS, W., New York.—Specimen of binding; the Colt "Memorial."

MURPHY'S, W. F., SONS, Philadelphia, Pennsylvania.—Samples of blank books. Bronze medal.

NOONAN & MCNAB, Milwaukee, Wisconsin.—Specimens of writing paper.

NORTHAMPTON INDELIBLE PENCIL COMPANY, Northampton, Massachusetts.—Indelible pencils for marking linens.

PIERCE, T. N., & Co., 427 North Eleventh street, Philadelphia, Pennsylvania.—Slates.

SAN LORENZO MILLS, San Lorenzo, California.—Paper.

SECOMBE MANUFACTURING COMPANY, 264 Broadway, New York.—Holt's improved ribbon hand stamps. Bronze medal.

CLASS 8.—SPECIMENS OF DESIGN AND PLASTIC MOULDING APPLIED IN THE ORDINARY ARTS.

ROGERS, J., New York.—Three groups of statuettes.

CLASS 9.—PROOFS AND APPARATUS OF PHOTOGRAPHY.

BEER, SIGISMUND, 481 Broadway, New York.—Stereoscopic views. Bronze medal.

DRAPER & HUSTED, Ridge avenue and Wallace street, Philadelphia, Pennsylvania.—Photographs.

GARDNER, A., Washington, D. C.—Photographs.

GUTEKUNST, F., 704 Arch street, Philadelphia, Pennsylvania.—Photographs.

LAWRENCE & HOUSEWORTH, San Francisco, California.—Photographic and stereoscopic views, comprising 22 large photographs of the Yosemite valley, California; 4 of the mammoth trees; 21 stereoscopic views of the Yosemite valley; 33 of the mammoth trees; 40 of San Francisco; 17 illustrating the art of hydraulic mining; 43 of placer mining; 158 of scenery in California, and 29 in Nevada.

At the close of the Exposition, these views were donated by the exhibitors, through the commissioner from the State of California, to various public societies and institutions, including the Photographic Society of Paris, the Jardin des Plantes, the Geological Society of France, and the British Museum.

MORVAN, A. G., (Heliotype Company,) 90 Fulton street, New York.—Photographic engraving.

RUTHERFORD, L. M., New York.—Photographs of the moon and solar spectrum.

A remarkably large and fine photograph of the moon's surface, and another of the solar spectrum showing the dark lines with great distinctness. A silver medal was awarded to Mr. Rutherford.

VISCHER, EDWARD, San Francisco, California.—Six photographic albums, containing views of California and Washoe.

The contributions of this exhibitor were duly invoiced and shipped from San Francisco, but failed to reach the exhibition, having been lost or mislaid in the transit.

WATKINS, C. E., San Francisco, California.—Photographic views of California.

Being a complete set, 30 or more, of the celebrated views of the Yosemite valley and of the great trees of Mariposa county. These views are of large size, and were sent by the exhibitor framed in *passe partout* and ready to hang. The views of the Mariposa trees were framed in the wood of the trees appropriately carved. These photographs attracted much attention, and the jury awarded a bronze medal.

WILLARD & CO., 684 Broadway, New York.—Photographic camera tubes and lenses. Honorable mention.

WILLIAMSON, C. H., 245 Fulton street, Brooklyn, New York.—Photographs.

CLASS 10.—MUSICAL INSTRUMENTS.

CHICKERING & SONS, New York and Boston.—Pianos. Gold medal. (See a notice at the end of this class.)

GEMUNDER, GEORGE, 174 East Ninth street, New York.—Stringed instruments. Bronze medal.

LINDEMANN & SONS, 2 Leroy place, New York.—Cycloid piano. (See a notice at the end of this class.)

MASON & HAMLIN, 596 Broadway, New York; Washington, D. C., and Boston, Massachusetts.—Cabinet organs. Silver medal.

METZEROTT, W. G., & Co., Washington, D. C.—Wind instruments.

SCHREIBER CORNET MANUFACTURING COMPANY, 99 Houston street, New York.—Wind instruments of brass and German silver. Bronze medal.

STEINWAY & SONS, New York.—Pianos. Gold medal. (See a notice at the end of this class.)

WRIGHT, E. G., & Co., Boston, Massachusetts.—Wind instruments of brass and German silver.

ZIMMERMANN, C. F., 238 North Second street, Philadelphia, Pennsylvania.—Accordeons.

NOTICE OF THE PIANOS EXHIBITED FROM THE UNITED STATES.

The piano manufacturers of the United States may justly claim to have gained and preserved the first reputation in the world. The principal feature upon which that reputation is founded is the introduction of the iron instead of the wooden frame, an improvement which has necessitated and been followed by various others.

Until the third decade of the present century only European instruments found a ready market in America. It was soon found, however, that no wooden framed piano could long resist the extraordinary climatic changes of the country without requiring almost constant tuning and repairs.

In the Exhibition of 1867, two firms more especially dispute the palm of pre-eminence—Messrs. Steinway & Sons, of New York, and Messrs. Chickering & Sons, of New York and Boston. The jury readily acknowledged the remarkable qualities of the pianos of these two houses, and, pronouncing them both first-class products, gave equal awards to each, and the highest in its gift, viz: the gold medal.

By a decree of the Emperor Mr. C. F. Chickering was created Chevalier of the Imperial Order of the Legion of Honor of France.

Each of these firms has, from time to time, taken out patents for improvements. Mr. Chickering claims to be the sole inventor of the circular scale, and to have made many other improvements which have been rendered necessary from time to time by the development of musical science.

Messrs. Steinway & Sons claim the application of various important improvements necessary for avoiding the thin and disagreeably nasal character of tone at first possessed by the iron frame, and for supplying that solidity of construction which the gradual extension of the musical capabilities of the piano rendered necessary. They claim also the introduction of over-stringing as well as the adoption of agraffes. It will not be presumed in this notice to judge of the respective merits of the improvements or the claims as to priority of the inventions of either party, or to attempt a technical particularization of them, but it may be said that the pianos of Messrs. Chickering & Sons and of Messrs. Steinway & Sons, not forgetting the beautiful cycloid instrument manufactured and exhibited by Messrs. Lindemann & Sons, are unrivalled, and that while these instruments have a solidity of construction which withstands the deleterious influence of any climate, their depth, volume, power and delicacy of tone are fully equal to all that can be required.

CLASS 11.—MEDICAL AND SURGICAL INSTRUMENTS AND APPARATUS.

ABBEY, CHARLES, & SONS, 230 Pear street, Philadelphia, Pennsylvania.—Dentist's gold foil. Bronze medal.

The exhibition made by this firm sustains the well-deserved reputation of their manufacture. This gold foil has all the essential requisites for filling teeth, whether it is to be used in its ordinary state, or is to be rendered adhesive by heating. It has great tenacity, coherence, and ductility, and is uniform in its thickness.

ALLEN, JOHN, & SON, 22 Bond street, New York.—Artificial teeth. Honorable mention.

The pieces of continuous gums shown by the Messrs. Allen are very beautiful, and are striking imitations of nature, but being placed upon platinum plates they are rather heavy for comfort in using.

BARNES, J. K., Surgeon General United States army, Washington, D. C.—Plans of field hospitals, surgical instruments, and hospital apparatus of the United States army. In the Annex, ambulance, medicine wagon; in the Park, hospital tent and furniture. Silver medal.

BATES, R., 730 South Eighth street, Philadelphia, Pennsylvania.—Instruments to cure stammering. Honorable mention.

This extraordinary invention consists of a metallic tube which by a simple arrangement can be attached to the upper part of the mouth, thus preventing the adhesion of the tongue, and allowing the air to pass. This is intended to assist in enunciating the lingual letters. For the labials another tube is provided, and prevents the lips closing against each other by nervous contractions. For the gutturals a small band is supplied with a screw, by which a small plate can be forced against the glottis so as to keep it open, and give passage to the sounds produced by it. The neck-band is made of silk or satin, and has the appearance of an ordinary cravat.

BEALS, J. H., Boston, Massachusetts.—Improved corset.

CUMMINGS, WILLIAM, & SON, New York.—Model of a hospital car. Bronze medal; in the international sanitary department. (See notice at the end of this catalogue.)

CRANDALL, L., & SON, 470 Grand street, New York.—Crutches.

DAVIS, T. J., 64 East Fifteenth street, New York.—Artificial eyes.

FIRMENICH, J., 7 Arcade building, Buffalo, New York.—Dermic instruments for cauterization.

HOWARD, Dr. BENJAMIN, New York.—Ambulance and relief material. Honorable mention; in the international sanitary collection. (Noticed at the end of this catalogue.)

HUDSON, Dr. E. D., New York.—Artificial limbs. A bronze medal was awarded.

This exhibition was made in the international sanitary collection, and is noticed at the end of the catalogue.

JOHNSON & LUND, 27 North Seventh street, Philadelphia, Pennsylvania.—Artificial teeth. Bronze medal.

LINCOLN, M., 19 Green street, Boston, Massachusetts.—Artificial arms.

MARKS, A. A., 575 Broadway, New York.—Artificial legs.

MOODY, Mrs. S. A., 12 East Sixteenth street, New York.—Abdominal corsets.

MOORE, J. G., New Holland, Pennsylvania.—Illustrations of teeth filling.

PEROT, T. MORRIS, Philadelphia, Pennsylvania.—Medicine wagon.—Honorable mention; in the international sanitary department. (Noticed at the end of this catalogue.)

SCOTT, J., Ocala, Florida.—Improved trusses.

SELPHO. WILLIAM, & SON, 516 Broadway, New York.—Artificial limbs. Honorable mention.

STOCKTON, SAMUEL W., Philadelphia, Pennsylvania.—Mineral teeth, with porcelain pivots and new system of transverse holes. Honorable mention.

TAYLOR, CHARLES F., 159 Fifth avenue, New York.—Therapeutic apparatus. Honorable mention.

TIEMANN, GEORGE, & CO., New York.—Surgical instruments. A silver medal was awarded to Mr. George Tiemann as co-operator.

USTICK, S., Philadelphia, Pennsylvania.—Model of an apparatus for invalids.

WESTON, J. W., 706 Broadway, New York.—Artificial leg.

WHITE, SAMUEL S., 528 Arch street, Philadelphia, Pennsylvania.—Dentist's furniture and instruments. Artificial teeth. Gold medal.

The teeth exhibited by Mr. White are of superior quality, and are remarkable imitations of natural teeth. Their smooth surface, semi-opaque and enamelled, has not that appearance of vitrification so disagreeable in most artificial teeth. Their forms are excellent, preserving not only the distinctive characters of the different teeth of the upper and lower jaw, but also of the right and left side of the mouth. Their tint is a mixture ot brown and yellow at the base, and a bright and clear enamel on the sharp part of the tooth. They are light and yet solid and strong.

The "block-teeth," with porcelain gums, also exhibited, are made different sizes, so that any mouth may be fitted. Those intended for mounting in hardened caoutchouc have a pivot, with an expanded head, which prevents the teeth being pulled away from the base.

Among the other objects is a case of dental instruments containing excellent forceps and a variety of other articles. All of these instruments are elaborate and ingenious, but they are injured by an excess of luxurious ornamentation which is misplaced, for surely it is unnecessary and undesirable to encumber instruments intended for constant use with fine stones and other ornaments.

The gold foil and spongy gold exhibited are excellent. The gold medal awarded to Mr. White is only a just recompense for the excellent services rendered to the dental art by his house, which employs a large number of operatives, and has more than 300 agents in the United States and Europe.

CLASS 12.—INSTRUMENTS OF PRECISION AND APPARATUS FOR INSTRUCTION IN SCIENCES.

BARLOW, MILTON, Richmond, Kentucky.—Planetarium. Bronze medal.

BOND, WILLIAM, & SON, 17 Congress street, Boston, Massachusetts.—Astronomical clock, chronograph and chronometer. Silver medal.

CLUM, H. A., Rochester, New York.—Aelloscope.

COCHRANE, JAMES, 64 West Tenth street, New York.—Apparatus for measuring water under pressure.

DAVIDSON, GEORGE, United States Coast Survey, Washington, D. C.—Improved sextant. Honorable mention.

DARLING, BROWN & SHARPE, Providence, Rhode Island.—Graduated rules, squares, gauges, scales, &c. Silver medal.

EDSON, WILLIAM, Boston, Massachusetts.—Hygrodeik for indicating the amount of moisture in the atmosphere. Honorable mention.

MORSE, S. E., & G. L. HARRISSON, New Jersey.—Bathometer; an instrument for measuring the depth of water.

TOLLES R. F., Canastota, New York.—Microscope and telescope glasses; eyepieces and telescope. Silver medal.

WALES, WILLIAM, Fort Lee, New Jersey.—Microscopic object glasses. Silver medal.

CLASS 13.—GEOGRAPHY, COSMOGRAPHY, APPARATUS, MAPS, CHARTS, ETC.

BACHE, A. D., Hydrographic Bureau, superintendent of the United States Coast Survey, Washington, D. C.—(Out of competition.)—Nautical charts and apparatus, deep-sea thermometers, gauging instruments.

JOHNSON, A. J., 113 Fulton street, New York.—New illustrated Family Atlas. Bronze medal.

JOSLIN, G., Boston, Massachusetts.—Terrestrial globe.

KNIGHT, E. H., Washington, D. C.—War map of the United States.

TILLMANN, S. D., 12 Clinton place, New York.—Tonometer. New system of chemical nomenclature.

SCHEDLER, JOSEPH, Hudson City, New Jersey.—Terrestrial globes. Bronze medal.

SMITH, S., & CO., Boston, Massachusetts.—Counting-room desk; in Mr. Bacon's bakery in the Park.

USTICK, S., 108 Fourth street, Philadelphia, Pennsylvania.—Water cooler.

GROUP III.

FURNITURE AND OTHER OBJECTS USED IN DWELLINGS.

CLASS 14.—FURNITURE.

BOSTON CHAIR COMPANY, Boston, Massachusetts.—Rocking-chair on a new plan.

BOYD, JOHN D., San Francisco, California.—Door of California wood.

This door was a superb piece of workmanship, being most highly finished and polished so as to bring out the beautiful natural grain of the wood of the Madona or California laurel used in its construction. This wood has a yellowish color like satin wood, but is remarkable for the ease with which it may be stained so as to look like black walnut, mahogany, or rosewood.

BUTLER, J. L., St. Louis, Missouri.—Sofa-bedstead; in the Annex in the Park.

ENGLISH & MERRICK, New Haven, Connecticut.—Folding chairs.

GLASS, PETER, Barton, Wisconsin.—Mosaic tables and table top. Honorable mention.

These tables are said to contain no less than 96,321 pieces of wood.

PHELAN & COLLENDER, 63 to 69 Crosby street, New York.—Billiard table.

It is claimed that the cushions of this table combine elasticity and correctness in the highest possible degree. The lowness of the cushion also compared with the ball affords the player unusual advantages in regard to the facility and accuracy of the stroke, advantages unattainable except by the present improved method of constructing the cushions. With the ordinary construction a low cushion causes the ball to "jump."

ROBINSON, D. T., Boston, Massachusetts.—Model of an extension dining table; in M. Bacon's bakery in the Park.

CLASS 15.—UPHOLSTERY AND DECORATIVE WORK.

SHUSTER, JOHN, 133 Court street, Brooklyn, New York.—Chimney pieces of American marbles.

Three beautiful mantles, one of Tennessee marble, one of white marble from Vermont, and the other of the beautiful stalagmitic marble from Suisun, California.

BOYD, JOHN D., San Francisco, California.—Ornamental door of California wood. (See Class 14.)

CLASS 16.—FLINT AND OTHER GLASS, STAINED GLASS.

Boston Silver Glass Company, Boston, Massachusetts.—Silvered glass table ware; in the Restaurant.

Jones, Thomas, Centre and Franklin street, New York.—Window sash of cut and ground glass, colored sidelights.

Lyon, James B., & Co., Pittsburg, Pennsylvania.—Pressed glassware. Bronze medal.

Pacific Glass Works, J. Taylor, president, San Francisco, California.—Glass bottles of various forms and colors designed for wines, preserves, pickles, sauces, &c., manufactured in California from sand obtained upon the bay of Monterey.

These samples, which compared favorably with any in the Exhibition, were donated, at the close, to the museum at Sevres.

Schwitter, Anthon, 177 Broadway, New York.—Glassware engraved by a mechanical process.

CLASS 17.—PORCELAIN, FAÏENCE, AND OTHER POTTERIES.

Boch, William, Bochtown, Newtown, New York.—Porcelain ware.

Ramsay, G. M., 23 Courtlandt street, New York.—Air-tight jars for preserving purposes, &c.

CLASS 18.—CARPETS, HANGINGS, AND OTHER FURNITURE TISSUES.

Chipman, George W., & Co., 119 Milk street, Boston, Massachusetts.—Carpet lining. Honorable mention.

Townsend, Wisner H., 20 Reade street, New York.—Samples of oil-cloth. Bronze medal.

CLASS 19.—PAPER HANGINGS.

Bigelow, J. R., Boston, Massachusetts.—Paper-hangings.

Christy, Constant & Co., New York.—Paper-hangings.

Graves, R., & Co., New York.—Paper-hangings.

Howell & Brother, Philadelphia, Pennsylvania.—Paper-hangings. Honorable mention.

CLASS 20.—CUTLERY.

Biggs, C., 57 Beekman street, New York.—Pocket cutlery from the manufactory of Booth Brothers, Newark, New Jersey.

Shaver, A. G., New Haven, Connecticut.—Erasers and pencil-sharpeners.

CLASS 21.—GOLD AND SILVER PLATE.

Meriden Britannia Company, West Meriden, Connecticut.—Plated table ware; in the Restaurant.

Tiffany & Co., 550 and 552 Broadway, New York.—Ornamental plate and silver-ware in various styles of chasing; reduction of the "America" of Crawford, decorating the cupola of the Capitol at Washington; models of the steamers "Commonwealth" and "Vanderbilt." Bronze medal.

The hull of the model of the Vanderbilt is fashioned in frosted or dead silver, with a burnished streak or gunwale. The paddles are of burnished silver, tipped with gold; the tops and bottoms of the funnels are of gold; the deck is formed of polished silver; the quarter boats of gold. The just proportion of every part is preserved in the model, and every detail, even of the minute parts, has been carefully wrought in silver or gold.

CLASS 22.—ARTISTIC BRONZES, ARTISTIC CASTINGS OF VARIOUS KINDS, AND CHASED METAL ORNAMENTS.

TUCKER, HIRAM, & CO., 59 John street, New York.—Iron ornaments bronzed by new process. Silver medal.

These objects, consisting of clock stands, vases, lamps, chandeliers, brackets, &c., were much admired.

CLASS 23.—CLOCKS AND CLOCK WORKS.

NEW HAVEN CLOCK COMPANY, New Haven, Connecticut.—Clocks. Honorable mention.

FOURNIER, S., 60 Royal street, New Orleans, Louisiana.—Clocks and clock works. Silver medal.

This exhibition consisted of several large and accurately made clocks for churches and public buildings. They were set up and running during the Exhibition, and the works were in full view in an alcove or enclosed space reserved for them.

CLASS 24.—APPARATUS AND METHODS OF WARMING AND LIGHTING.

BEIDLER, J. H., Lincoln, Illinois.—Hydro-caloric light.

CLOGSTON, T. S., & CO., Boston, Massachusetts.—Steam radiator for heating buildings.

GOUGES VENTILATING COMPANY, 254 Broadway, New York.—Atmospheric ventilator.

HASKINS, D. G., Cambridge, Massachusetts.—Gas furnace.

IVÈS, J., & CO., 18 Beekman street, New York.—Kerosene and petroleum lamps and chandeliers.

MARKLAND, T. J., 835 Ellsworth street, Philadelphia, Pennsylania.—Coal scuttle.

MUELLER, J. U., Detroit, Michigan.—Improved stove handles.

O'NEIL, A., Portsmouth, Ohio.—Sheet metal stove boiler.

PEASE, F. S., Buffalo, New York.—Gas apparatus.

PRATT & WENTWORTH, 89 North street, Boston, Massachusetts.—Cooking stove and utensils. Bronze medal.

TUCKER, H., & CO., 59 John street, New York.—Lamps and chandeliers.

USTICK, S., Philadelphia, Pennsylvania.—Model of an improved street lamp.

WHITELY, EDWARD, Boston, Massachusetts.—Cooking range and apparatus, in the American restaurant.

CLASS 25.—PERFUMERY.

TALLMAN & COLLINS, Janesville, Wisconsin.—Perfumery. Honorable mention.

WRIGHT, R. & G. A., 624 Chestnut street, Philadelphia, Pennsylvania.—Toilet soap and perfumery. Bronze medal.

CLASS 26.—FANCY ARTICLES, TOYS, BASKET WORK.

BLOODGOOD, ANNIE DE ETTA, 127 Ninth avenue, New York.—Wax flowers.

HAUXHURST, CAROLINE, Rahway, New Jersey.—Ornaments of skeleton leaves.

KALDENBERG & SON, New York.—Meerschaum pipes. Honorable mention.

LACHAUME, J., 163 Prince street, New York.—Rustic work, baskets, stands, &c.

MACDANIEL, Miss F., New York.—Natural flowers with color preserved.

SMITH, Mde. E. W., West Medford, Massachusetts.—Wax flowers, fruits, &c.

GROUP IV.

CLOTHING, (INCLUDING TISSUES,) AND OTHER OBJECTS WORN ON THE PERSON.

CLASS 27.—COTTON YARN, THREADS AND TISSUES OF COTTON.

BELL FACTORY, Huntsville, Alabama.—Cotton fabrics. Honorable mention.

CLARK THREAD COMPANY, G. A. Clark, treasurer, Newark, New Jersey.—Cotton and cotton yarns. Silver medal.

GROLL & GRUBBS, Chicago, Illinois.—Cotton batting.

HADLEY COMPANY, Holyoke, Massachusetts.—Spool cotton. Bronze medal.

NEW YORK MILLS, Walcott & Campbell, 57 Worth street, New York.—Fine muslins. Silver medal.

SLATER, S., & SON, Webster Woollen Mills, Webster, Massachusetts.—Jaconets and cotton fabrics. Bronze medal.

CLASS 28.—YARN AND TISSUES OF LINEN, HEMP, ETC.

HARVEY, W., 84 Maiden Lane, New York.—Flax, hemp, cotton, linen, and paper twine and cordage.

HALL MANUFACTURING COMPANY, Boston, Massachusetts.—Cordage made on Bazin's twisting machine.

CLASS 29.—COMBED WOOL AND WORSTED YARNS AND FABRICS.

(No exhibitors.)

CLASS 30.—YARN AND TISSUES OF CARDED WOOL.

HAYES, JOHN L., secretary National Association of Wool Manufacturers, 75 Summer street, Boston, Massachusetts.—Series of woollen fabrics, manufactured by the Washington Mills, situated in Lawrence, Massachusetts. Silver medal.

None of the pieces exhibited were made expressly for the exhibition, but were specimens of the daily products of the establishment. They were forwarded with a statement that they were intended to show the average styles and quality of the woollen goods then being made in the United States. To each sample a card was affixed showing the selling price in the United States. The goods exhibited consisted of eight varieties of shawls; carriage rugs; one piece of each of the following goods: fancy shirting, Nevada plaid, Italian cloth, American poplin, blue Esquimaux coating, black doeskin, tricot, Moscow beaver, diagonal coating, A. W. braid, Union broad beaver, Jansen silk mixture, blue, black and white silk mixture, Paris indigo blue coating, extra blue Washington coating, repellant cloaking, fancy cassimere; and three pieces of each of the following: sackings, mixed Scotch tweed.

KLAUDER, R., Philadelphia, Pennsylvania.—Dyed and printed zephyr.

MISSION WOOLLEN MILLS, San Francisco, California, D. McLennan, superintendent; Lazard Fréres, agent.—Woollen goods, comprising a large assortment of blankets, travelling shawls, cassimeres and flannels, all made from pure California wool at the company's mills at the Mission, San Francisco.

The blankets exhibited were remarkably fine and soft, of large size, and unrivalled in quality. The assortment contained blankets for family use, for miners, for the army, and for Indians. The family blankets were 86 by 94 inches in size, and weighed from 10 to 11½ pounds each. The miners' blankets were 62 by 84 inches, and weighed from 9½ to 10½ pounds each. Those for the army were 66 by 89 inches, and weighed 6 pounds each.

The cassimeres were mixed, plaid, and plain; and the flannels were both plain and colored. The collection contained a sample of the peculiar shaggy blanketing used in sluices by miners to catch and hold the fine particles of gold and sulphurets of iron flowing from stamp-batteries. A bronze medal was awarded for this display.

SHIELDS, J., Davenport, Iowa.—Woollen goods.

SLATER, S., & SON, Slater Woollen Mills, Webster, Massachusetts.—Woollen fabrics, broadcloths, doeskins, castors and moskowa. Silver medal.

STURSBERG, H., 97 Reade street, New York.—Beaver cloth. Bronze medal.

CLASS 31.—SILK AND TISSUES OF SILK.

WILLIAMS SILK MANUFACTURING COMPANY, 469 Broadway, New York.—Silk twist for sewing machines. Honorable mention.

CLASS 32.—SHAWLS, ETC.

THE WASHINGTON MILLS, Lawrence, Massachusetts.—Shawls. Honorable mention.

TORRENCE, Mrs. J. S., 111 Broadway, New York.—Worsted Affghan.

CLASS 34.—HOSIERY, UNDER-CLOTHING, AND MINOR ARTICLES.

COHN, M., 147 Chambers street, New York.—Crinolines of various descriptions.

MOODY, S. N., New Orleans, Louisiana.—Two dress shirts.

MOUNT CITY PAPER COLLAR COMPANY, St. Louis, Missouri.—Paper collars.

SACHSE, F., & SONS, Pine street, Philadelphia.—Dress shirts. Bronze medal.

CLASS 35.—CLOTHING FOR MEN, WOMEN, AND CHILDREN.

BOUVET, J., New Orleans, Louisiana.—Hats.

BURT, E. C., 27 Park Row, New York.—Machine-sewed boots and shoes. Silver medal.

DEMOREST, Mrs. ELLEN, Broadway, New York.—Corsets, patterns, &c.

FELMEDEN, J. K., New Orleans, Louisiana.—Boots and shoes made from alligator leather.

LINTHICUM, W. O., 726 Broadway, New York.—Spring overcoat. Honorable mention.

NICELY, H. C., 34 West Baltimore street, Baltimore, Maryland.—Hats and caps.

PACALIN, O., 3 Amity Place, New York. Metallic sole fastening for boots.

WHITNEY BROTHERS & CO., Chicago, Illinois.—Boots.

WINDLE & CO., New York.—Boots and shoes with wooden soles and heels, and flexible shanks.

ZALLÉE, JOHN C., 110 Olive street, St. Louis, Missouri.—Frock coat, black doeskin pantaloons, and silk vest. Honorable mention.

CLASS 36.—JEWELRY AND ORNAMENTS.

(No exhibitors.)

CLASS 37.—PORTABLE ARMS.

ARM MANUFACTURING INDUSTRY OF THE UNITED STATES.

It was found so difficult to decide upon the relative merits of the portable fire-arms exhibited in the American section, and their superiority was recognized as so indisputable, that the international jury, as a compliment, and at the same time for the purpose of avoiding what might be construed as an invidious distinction, voted a gold medal to "The Arm Manufacturing Industry of the United States."

BERDAN, COLONEL H., 30 Bond street, New York.—Breech-loading rifle.

BONZANO, A., Detroit, Michigan.—Cannon-muzzle spikers.

COLT'S FIRE-ARMS MANUFACTURING COMPANY, Hartford, Connecticut.—Colt's fire-arms; a Gatling gun. Silver medal. (See Gatling gun.)

FERRISS, G. H., Utica, New York.—Wrought-iron breech-loading rifled cannon; target perforated by it.

GATLING, R. J., Indianapolis, Indiana.—Improved battery gun.

This is a breech-loading repeating gun, in which all the operations of loading, firing, and getting rid of the debris of the case of the cartridge are preformed by a simple rotary movement. It is fed with metallic cartridges, each of the largest containing 15 musket balls and one conical ball, thus throwing 16 projectiles at every discharge. Twenty discharges can be made in eight seconds. Among other advantages may be mentioned the absence of any gas escaping by the breech; no recoil tending to divert the aim; great accuracy of aim, and rapidity of firing; and, lastly, lightness. This gun was exhibited by the Colt Fire-arms Manufacturing Company, and a silver medal was awarded to this company for its manufactures.

JENKS, A., & SON, Philadelphia, Pennsylvania.—Fire-arms, and parts of same manufactured by machinery.

MISSOURI, STATE OF.—Indian weapons, curiosities &c.

PROVIDENCE TOOL COMPANY, J. B. Anthony, president, Providence, Rhode Island.—Peabody's breech-loading fire-arms. Silver medal.

REMINGTON, E., & SON, Ilion, New York.—Breech-loading fire-arms. Silver medal.

ROBERTS, General B. F., Washington, D. C.—Breech-loading rifle.

Description: calibre, .58 inch; distance from muzzle to face of breech-lock, when closed, 37 inches; length of chamber, 1.25 inch. The chamber has a uniform taper for its entire length; maximum diameter, .64 inch, minimum diameter, .58 inch; receiver, 2 inches in length; breech block, .75 inch wide. Breech-block and all its appendages assembled from one piece, 5 inches in length.

The musket presented is of the United States "Springfield" pattern, made by machinery. The breech-loading parts, five in number, were made by hand, and constitute "the Roberts breech-loading attachment. The first piece is an iron breech frame or receiver, into which the barrel, having been cut off at proper point, is firmly screwed. This receiver is imbedded in the stock in the place of the old breach pin. The barrel is cut off about one inch in front of the cone, and a male screw cut, reaching nearly to the rear sight of the barrel. The breech block is inserted through this receiver, and supported against the rear end on a semicircular shoulder, forming the back of receiver, the centre around which this semi-circle is described being in the prolongation of the axis of the barrel. The rear of the breech block is turned to fit with exactness this semicircle, and is played around it as a fulcrum. The cheeks of the receiver support the breech block laterally. When the breech block is in place in the receiver it forms a curved lever, the handle projecting backward, and it then is moved about the solid abutment of the receiver, instead of being pivoted by any system of points or pins, thus affording great solidity and strength.

The forward end of the breech block has a semicircular groove cut trans versely through it, for the purpose of receiving a corresponding tenon formed on a block of steel, termed the recoil plate. The front face of this block is flat, so that when in position it fits squarely against the vertical face of the chamber and the rear end of the cartridge case. A small space is left between the tenon on the rear of this block and the front surface of the breech block above the transverse groove, to admit of a slight rocking motion of recoil plate, so that it will descend to expose the breech of the barrel and admit the cartridge into the chamber. This small open space permits the recoil plate to descend perpendicularly when the rear of the lever is raised, until the top of the plate passes below the axis of the barrel, after which it swings with the arc of the circle on the rear end of the receiver. When the rear of the lever is raised the recoil plate ascends to its position by the exact reverse motion, up to the axis of the barrel on a circular motion, and afterward to close the chamber, ascending vertically and closing squarely against the head of the cartridge case and the vertical face of the chamber.

The firing pin is located on the right side of the breech block, and runs through both this block and the recoil plate, directed to the centre for centre-fire cartridges and grooved into the sides for rim-fire cartridges. It s so set on a shoulder that the force of the blow of the hammer cannot drive it a greater distance than is necessary to insure fire.

The retractor is a curved lever, fixed on the left side of the chamber, with one arm behind the flange of the cartridge case and the other operating in a vertical groove on the left side of the recoil plate. When the breech lever is raised and the recoil plate descends, the arm in the groove is not touched until the top of this plate reaches the bottom of the chamber, the shoulder at the upper end of the groove then strikes the lever and ejects the cartridge case.

SMITH & WESSON, Springfield, Massachusetts.—Fire-arms and metallic cartridges. Silver medal.

SPENCER REPEATING RIFLE COMPANY, Boston, Massachusetts.—Spencer rifles. Breech-loading, capable of being fired seven times in twelve seconds. Silver medal.

UNITED STATES SANITARY COMMISSION.—Camp material. in the international sanitary department. (See a notice at the end of this catalogue.) Honorable mention.

WINDSOR MANUFACTURING COMPANY, Windsor, Vermont.—Ball's patent repeating fire-arms. Silver medal.

WHIPPLE, H. B., Faribault, Minnesota.—Arms, curiosities, &c., of the Ojibwa and Dakota tribes.

CLASS 38.—ARTICLES FOR TRAVELLING AND FOR ENCAMPMENT.

BAIRD, H. S., Green Bay, Wisconsin.—Indian curiosities.

COLLINS, Mrs. L., New Orleans, Louisiana.—Embroidered flags in the Louisiana cottage.

MEIGS, M. E., Quartermaster General in the United States army Washington, D. C., (out of competition.) In the park.—Material in use in the United States army for transportation, clothing, and equipment in camp and in garrison.

NOYES, J. H., Oneida, New York.—Traveller's lunch bag.

PADDOCK, W. S., Albany, New York.—Fastenings for trunks, arranged on a model trunk.

PIERCE, CARLOS, Boston, Massachusetts.—The Frémont army tent, in the Park.

This tent is so constructed that during rain storms, when the canvass shrinks from wetting, it can be lowered a little from the inside instead of loosening the pegs outside to provide for the shrinkage.

PULLAN, R. B., Cincinnati, Ohio.—Model tents.

SHORT, J., Salem, Massachusetts.—Army knapsack.

CLASS 39.—TOYS AND GEWGAWS.

MUELLER, T. U., Detroit, Michigan.—Toy puzzle.

GROUP V.

PRODUCTS, RAW AND MANUFACTURED, OF MINING INDUSTRY, FORESTRY, ETC.

CLASS 40.—MINING AND METALLURGY.

The display of mineral productions of all kinds from the vast metalliferous regions of the United States was one of the most important features of the Exposition. The most distant States were represented there by samples of their ores and minerals. California, Nevada, Idaho, Colorado, Arizona, Montana, Dakota, New Mexico, Oregon, and Washington, with a united area equal to the whole of Europe, nearly all sent specimens indicative of their marvellous resources in gold, silver, copper, lead, iron, coal, petroleum, and other minerals. The most prominent collections were from California, Colorado, and Nevada.

ALABAMA, STATE OF.—Minerals from that State.

ARKANSAS, STATE OF.—Minerals from that State.

AVERY, R. D., Petite Anse, Louisiana.—Rock salt.

BALTIMORE AND CUBA SMELTING AND MINING COMPANY, C. Levering, president, Baltimore, Maryland.—Ingot and sheet copper. Bronze medal.

BARR & COX, Beloit, Wisconsin.—Hammers and hatchets.

BARR, J., Licking county, Ohio.—Minerals, samples of coal.

BIGELOW, H., Boston, Massachusetts.—Rocks, ores, and minerals from Michigan. Silver medal.

This collection included a variety of specimens of native copper, from Lake Superior, and of the various interesting materials which accompany it.

BIGLEY, N. J., Pittsburg, Pennsylvania.—Samples of coal, limestone, fire clay.

BLAKE, WILLIAM P., California, Commissioner from the State to the Exposition.—A collection of the ores and minerals found in California and the adjoining States and Territories, intended to illustrate the mineral resources of the Pacific coast region of the United States. Silver medal.

This collection contained over 300 specimens of good size, taken from the principal gold-bearing veins of California, and from the copper, quicksilver, lead, and iron veins. The borax, salt, petroleum, and building materials were also shown. All the specimens were properly classified and labelled.

BURT, J., Detroit, Michigan.—Iron ores, iron, steel, samples of iron made from Lake Superior specular and magnetic ores.

CHESTER IRON COMPANY, (J. B. TAFT,) Chester, Massachusetts.—Emery and minerals from Chester, Massachusetts. Silver medal.

This was a very interesting and instructive suite of specimens of the massive emery stone and the minerals which are usually associated with it, together with the crushed and prepared emery and the emery cloths and papers. The presence of emery at this locality was discovered by Dr. Charles T. Jackson, of Boston, when giving some samples of iron ore found there a scientific examination. This important service was recognized by the class jury, and a bronze medal was awarded to Dr. Jackson as co-operator, for "Discovery of emery in the United States."

CHILDS, T., & CO., Hartford, Connecticut.—Skates.

CONNELL, S. G., & SON, Buffalo, New York.—Pure white lead.

DIXON, J., & CO., Jersey City, New Jersey.—Plumbago crucibles and stove polish.

DOUGLAS, J. L., 158 Broadway, New York.—Minerals from the Territory of Nevada.

DOUGLASS AXE MANUFACTURING COMPANY, D. D. Dana, treasurer, Boston, Massachusetts.—Edge tools. Silver medal.

DOUGLASS MANUFACTURING COMPANY, 70 Beekman street, New York.—Edge tools. Bronze medal.

ELSBERG, Dr. L., 123 West Fifteenth street, New York.—Prepared peat fuel. Honorable mention.

GAUJOT, R. C. E., Tamaqua, Pennsylvania.—Samples of coal, rocks, and iron ores.

GOODENOUGH HORSESHOE COMPANY, W. C. Colgate, president, 1 Dey street, New York.—Horseshoes. Honorable mention.

GOULD, J. D., Boston, Massachusetts.—Mica. Honorable mention.

This was a fine assortment of mica, in large, clear sheets, suitable for stoves, lanterns, and for roofing.

GREEN, JAMES D., Cambridge, Massachusetts.—A column of Winooski marble, (Vermont.)

HALLIDIE, A. S., & Co., San Francisco, California.—Wire rope.

Samples of the various sizes of wire ropes, cables round and flat for mining purposes, sash cords of various sizes, &c., &c., all manufactured in San Francisco, and proving great skill in this art. These samples, at the close of the Exposition, were donated to the Museum of Arts and Manufactures.

HARRIS, J., Sturgeon Bay, Wisconsin.—Samples of native copper from Lake Superior.

HERRING, FARRELL & SHERMAN, 254 Broadway, New York.—Crystallized iron—"Franklinite."

ILLINOIS, STATE OF.—Collection of minerals, building stones, fossils. Silver medal.

IOWA, STATE OF.—Specimens of the mineral productions of that State.

JACKSON, J. H., 155 Broadway, New York.—Minerals and fossils. Honorable mention.

KANSAS, STATE OF.—Specimens of the mineral productions of that State.

KASE, S. P., Danville, Pennsylvania.—Coal from the Beaver Creek Coal Company.

KASSON, A. C., Milwaukee, Wisconsin.—Patent auger bits.

LALANCE & GROSJEAN, 273 Pearl street, New York.—House furnishing hardware. Chairs, in the Annex. Honorable mention.

MCCORMICK, J. J., Williamsburg, New York.—Skates. Honorable mention.

MERRITT, W. H., North Anthracite Coal-field, Luzerne county, Pennsylvania.—Anthracite coal.

MINNESOTA, TERRITORY OF.—Collection of minerals from that Territory.

MISSOURI, STATE OF.—Minerals from that State.

NEVADA, TERRITORY OF.—Silver ores. Silver medal.

This was a splendid display of rich ores of silver from eastern Nevada, collected chiefly by a committee appointed by the citizens, and represented at the Exposition by David E. Buel, esq. Many of the masses were over 18 inches in diameter, and were from the newly-discovered districts in the southeastern portion of the State.

NEW JERSEY ZINC COMPANY, G. A. Bell, president, 64 Maiden Lane, New York.—Specimens of ores, and products manufactured therefrom.

This series contained masses of the red zinc ore, of the Franklinite, and of the silicate of zinc, all from the company's mines at Stirling Hill and at Mine Hill, in Sussex county, New Jersey. These ores are worked chiefly into oxide of zinc for paints and into pig iron, known as Franklinite iron.

PARK BROTHERS & CO., Black Diamond Steel Works, Pittsburg, Pennsylvania.—Cast-steel edge tools.

A very interesting display of superior tools, for which a silver medal was awarded.

PATTERSON, S., Mauch Chunk, Pennsylvania.—Anthracite coal.

This was an enormous single block of coal weighing three and a half tons, taken from the colliery of W. Johns. It occupied a prominent place in the mineral collection, and a bronze medal was awarded. (See following entry.)

PENNSYLVANIA, STATE OF.—Anthracite coal. (S. Patterson's.) From colliery of W. Johns, as noted above. Bronze medal.

PORTAGE LAKE SMELTING WORKS, E. D. Brigham, treasurer, Boston, Massachusetts.—Ingots and cakes of copper. Bronze medal.

PRENTICE, F., Nevada.—Ores from Nevada.

PIGNÉ, Dr. J. B., San Francisco, California.—Collection of minerals from California. Silver medal.

This was a very complete collection of ores of gold, silver, copper, lead, iron, quicksilver, &c., &c., from the principal mines of the Pacific States, all neatly classified, labelled and catalogued, and intended for the collection of the *Ecole Imperiale des Mines* at Paris.

PIONEER AND INSKIP MILL AND MINING COMPANY, D. H. Temple, secretary, 8 Pine street, New York.—Minerals and silver ores from Nevada.

RANDALL, SAMUEL H., New York.—Specimens of mica, feldspar, beryl, quartz, &c. Bronze medal.

ROBINSON, E., & SON, Boston, Massachusetts.—House hardware, in Mr. Bacon's bakery, Park.

SAFFRAY, C., 26 East Fourth street, New York.—Agglomerated coal.

SHAUB, G., superintendent of the Southern Porcelain Company, Augusta, Georgia.—Kaolin.

SHELTON COMPANY, Birmingham, Connecticut.—Iron, copper, and tinned tacks.

SHUSTER, J., 133 Court street, Brooklyn, New York.—Samples of California, Tennessee, New York, and Vermont marbles.

SIBLEY, F. K., Auburndale, Massachusetts.—Samples of emery and crocus cloths.

TEXAS CHROME MINING COMPANY, Texas, Pennsylvania.—Chromic iron ore in large masses as taken from the quarry.

THOMAS IRON WORKS, Hokendauqua, Pennsylvania.—Iron and iron ores.

UTAH, TERRITORY OF.—Minerals.

WALDRIDGE, W. D., 51 Exchange Place, New York.—Samples of gold, silver, tin, and copper from Idaho. Large masses of silver ore from the Poorman lode in Idaho. These blocks contained large quantities of ruby silver ore. Gold medal.

WARNER, G. F. & Co., New Haven, Connecticut.—Malleable iron castings.

A very great variety of small objects, chiefly carriage hardware, all neatly arranged upon a large square tablet. Bronze medal.

WEST VIRGINIA, STATE OF.—Minerals from that State; building stone.

WETHERBEE, SHERMAN & CO., Port Henry, New York.—Magnetic iron ore, iron.

WHARTON, JOSEPH, Philadelphia, Pennsylvania.—Ores and metals, nickel, cobalt, zinc. Honorable mention.

WHITNEY, J. P., Boston, Massachusetts.—Gold and silver ores and minerals from Colorado Territory. Gold medal.

A very large and brilliant collection of the pyritic gold-bearing ores of Colorado, accompanied by maps of the region, photographs, and statistics, published in three languages.

WILKINSON, A. S., Pawtucket, Rhode Island.—Horseshoes.

WISCONSIN, STATE OF.—Minerals, ores, building stones, and metals from Wisconsin. Bronze medal.

CLASS 41.—PRODUCTS OF THE FOREST.

ANDREWS, HARRIS & CO., St. Louis, Missouri.—Black moss from Louisiana

BOYD, JOHN D., San Francisco, California.—Samples of cabinet woods from California.

This exhibition consisted of masses of the trunk of the madrona, and of bundles of veneers cut from it, also of a series of panels veneered, stained, and polished, showing a grain of remarkable beauty.

CARTER, G. W., 98 Hudson street, New York.—Fret, scroll, and ornamental sawing.

EDWARDS, D., Little Genesee, New York.—Specimens of wood and clapboards.

HALL, E., Athens, Illinois.—Collection illustrating the botany of Illinois.

KANSAS, STATE OF.—Specimens of wood. Honorable mention.

LEAVITT & HUNNEWELL, Boston, Massachusetts.—Prepared peat fuel.

MEARS, C., & CO., Chicago, Illinois.—Shingles.

MISSOURI, STATE OF.—Specimens of wood from Missouri.

PAUL, J. F., & CO., 441 Tremont street, Boston, Massachusetts.—Wood mouldings, oval frames, specimens of wood. Honorable mention.

PERSAC, A., New Orleans, Louisiana.—Illustrations of American forests.

UTAH, TERRITORY OF.—Specimens of wood.

WISCONSIN, STATE OF.—Samples of wood.

CLASS 42.—PRODUCTS OF HUNTING AND FISHERIES, AND UNCULTIVATED PRODUCTS.

BELL, J. G., 335 Broadway, New York.—Stuffed birds.

GUNTHER, C. G., & SONS, 502 Broadway, New York.—Stuffed animals. Silver medal.

ILLINOIS, STATE OF.—Stuffed game birds from the Chicago Academy of Sciences.

KANSAS, STATE OF.—Furs, antlers, and skins.

WISCONSIN, STATE OF.—Furs, antlers, and skins.

CLASS 43.—AGRICULTURAL PRODUCTS (NOT USED FOR FOOD) OF EASY PRESERVATION.

ALABAMA, STATE OF.—Samples of cotton. Silver medal and honorable mention.

BOURGEOIS, E., New Orleans, Louisiana.—Perrique tobacco. Honorable mention.

CAROLL, J. W., Lynchburg, Virginia.—Tobacco. Bronze medal.

COZZENS, FREDERIC S., 73 Warren street, New York.—Cigars.. Honorable mention.

DELPIT, A., & CO., New Orleans, Louisiana.—Snuff and smoking tobacco. Silver medal.

DIEHL, I. S., 80 Broadway, New York.—Specimens of Angora wool from different parts of the United States and articles manufactured from the same.

HUMPHRIES, JOHN C., parish of Rapides, Louisiana.—Samples of cotton. Bronze medal.

ILLINOIS CENTRAL RAILROAD COMPANY.—Hemp, flax, cotton, and tobacco. Silver medal.

JOHNSON, C. G., New Orleans, Louisiana.—Specimen of cotton; in the Louisiana cottage.

JOHNSON, O., Galba, Illinois.—Samples of broom corn.

KANSAS, STATE OF.—Agricultural products from Kansas.

LEHMAN, NONGASS & CO.—New Orleans, Louisiana.—Wool.

LILIENTHAL, C. H., 221 Washington street, New York.—Snuff and tobacco. Bronze medal.

MAGINNIS, A. A., New Orleans, Louisiana.—Cotton seeds.

MEYER, VICTOR, parish of Concordia, Louisiana.—Sample of cotton. Gold medal.

MISSOURI, STATE OF.—Cotton, hemp, cashmere wool.

MONTAGNE & CARLOS, New Orleans, Louisiana.—Black moss for upholsterers. Honorable mention.

RICHARD RICHARDS, Racine, Wisconsin.—Specimen of wool. Bronze medal.

ST. LOUIS LEAD & OIL CO.—Seed and seed oils.

SARRAZIN, J. R., New Orleans, Louisiana.—Samples of tobacco. Bronze medal.

SCHERR, T., San Francisco, California.—Bale of hops.

These hops were grown on the grounds of Wilson Flint, esq., in the Sacramento valley, and were of superior quality. Samples of them were freely distributed during the exhibition.

TAMBOURY, A., parish of St. James, Louisiana.—Samples of tobacco. Bronze medal.

TOWNSEND, J., Edisto Island, South Carolina.—Superfine sea island cotton.

TRAGER, LOUIS, Black Hawk Point, Louisiana.—Samples of cotton. Gold medal.

WILLIAMS, THOMAS C., & Co., Danville, Virginia.—Samples of tobacco. Bronze medal.

WISCONSIN STATE AGRICULTURAL SOCIETY.—Specimens of wool and of seed oils. Bronze medal.

CLASS 44.—CHEMICAL AND PHARMACEUTICAL PRODUCTS.

BABCOCK, JAMES F., Boston, Massachusetts.—Rosin oil. Bronze medal.

BECKER, H. C., New York.—Extracts for culinary use.

BELMONT OIL COMPANY, 333 Market street, Philadelphia, Pennsylvania.—Crude and refined petroleum, benzine, gazoline. Bronze medal.

BRANDON KAOLIN AND PAINT COMPANY, J. W. Prime, president, Brandon, Vermont.—Specimens of paints. Honorable mention.

BUTLER, T. S., Cincinnati, Ohio.—Oil blacking.

CALIFORNIA, STATE OF.—Oils. Samples of petroleum, both crude and refined, from localities in various parts of the State.

The refined oils were from the establishments of Messrs. Hayward & Coleman, Stanford Brothers, and Charles Stott, in San Francisco.

CHICAGO GLUE WORKS, Chicago, Illinois.—Samples of glue.

DAY, AUSTIN G., Seymour, Connecticut.—Samples of hard, semi-hard, and soft India-rubber, and artificial rubber. Honorable mention.

DIEHL, J. S., 80 Broadway, New York.—Petroleum; silicated copper.

DUNDAS, DICK & Co., 110 Reade street, New York.—Capsulated medicines.

FRIES, ALEXANDER, Cincinnati, Ohio.—Flavoring extracts. Honorable mention.

GLEN COVE STARCH MANUFACTURING COMPANY, W. Duryea, secretary, 166 Fulton street, New York.—Maize starch.

GLIDDEN & WILLIAMS, Boston, Massachusetts.—Soluble Pacific guano.

HALE & PARSHALL, Lyons, New York.—Oil of peppermint.

HERZBERG, I., & BROTHER, Philadelphia, Pennsylvania.—Chronometer and watch oil.

HESS, BECKER & Co., St. Charles, Missouri.—Sample of ultramarine.

HIRSCH, JOSEPH, Chicago, Illinois.—Glycerine, albumen, &c. Honorable mention.

HOLLIDAY, T. & C., 194 Broadway, New York.—Dyes made from aniline, pigments and colors, chemicals. Honorable mention.

HOTCHKISS, H. G., Lyons, New York.—Samples of essential oils. Bronze medal.

HOTCHKISS, L. B., Phelps, New York.—Specimens of oils of peppermint and spearmint. Bronze medal.

KIEFFER, N., New Orleans, Louisiana.—Bitters.

LOUISIANA PETROLEUM AND MINING COMPANY, A. L. Fields, secretary, New Orleans, Louisiana.—Specimens of petroleum.

MAGINNIS, A. A., New Orleans, Louisiana.—Cotton seed oil, soap, and oil cake.

MARIETTA AND GALES FORK PETROLEUM COMPANY, R. K. Shaw, director, Marietta, Ohio.—Crude lubricating petroleum. Honorable mention.

MCROBERTS & DICK, New Orleans, Louisiana.—Soap.

MORGAN'S, E., SONS, 274 Washington street, New York.—Family soap.

PEASE, F. S., Buffalo, New York.—Illuminating and lubricating oils, paraffine. Silver medal.

RHODES, B. M., & Co., Baltimore, Maryland.—Superphosphate of lime for manure.

SMITH, R. M., Baltimore, Maryland.—Refined burning and lubricating petroleum oils. Honorable mention.

STANDARD SOAP COMPANY, San Francisco, California.—Soap and washing powder.

The soap is represented to be made in San Francisco exclusively from materials produced in the State of California. The alkali is said to be made from the ashes of the ice plant, which grows in Santa Barbara county.

VANDERBURGH, G., 24 Vesey street, New York.—Specimens of alkaline silicates.

VAN DEUSEN BROTHERS, Kingston, New York.—Oil of wintergreen.

VOLCANIC OIL AND COAL COMPANY, of Western Virginia, Philadelphia, Pennsylvania; H. G. Moehring, agent.—Lubricating mineral oil. Honorable mention.

WAHL, C., Milwaukee, Wisconsin.—Specimens of glue.

WESTON, H., 706 Broadway, New York.—Concentrated aqueous solution of iodine.

WEST VIRGINIA, STATE OF, J. H. Diss Debar, agent.—Crude and refined petroleum. Bronze medal.

WHITE, G. E., New York.—Swan Island guano.

WHITE, M. J., parish of Plaquemines, Louisiana.—Extract of red Tobasco pepper.

UREN, DUNSTONE & BLIGHT, Eagle River, Michigan.—Water proof safety fuse.

CLASS 45.—SPECIMENS ILLUSTRATING THE CHEMICAL PROCESSES IN BLEACHING, DYEING, PRINTING, AND DRESSING FABRICS.

HOLLIDAY, T. & C., 194 Broadway, New York.—Woollen, cotton, and silk goods, dyed and printed with aniline dyes.

CLASS 46.—LEATHER AND SKINS.

BACON, S. T., Boston, Massachusetts.—Vulcanized rubber.

BROWNE, D. JAY, Park street, Roxbury, Massachusetts.—Enamelled leather, manufactured by a new process. Honorable mention.

GUNTHER & SONS, 502 Broadway, New York.—Furs for ladies' and gentlemen's wear, sleigh robes.

KORN, CHARLES, 19 Ferry street, New York.—Calfskin leather. Honorable mention.

McDONALD & HURD, Winchester, Massachusetts.—Calfskin leather.

MEYER, C. F. W., Union Hill, New Jersey.—Piano-forte buckskins.

PAGE, M. W., Franklin, New Hampshire.—Samples of belt lacing made by a new process of tanning.

SCHORR, T., New Orleans, Louisiana.—Alligators' skins tanned for shoe leather.

SMITH, LYMAN, & SON, Boston, Massachusetts.—Samples of leather for cotton factory rollers.

WISCONSIN, STATE OF.—Leather and skins.

GROUP VI.

APPARATUS AND PROCESSES USED IN THE COMMON ARTS.

CLASS 47.—APPARATUS AND METHODS OF MINING AND METALLURGY.

ELSBERG, L., 123 West Fifteenth street, New York.—Model peat fuel machine.

GAUJOT, R. C. E., Tamaqua, Pennsylvania.—Apparatus and methods of mining and metallurgy.

HALLIDIE, A. S., San Francisco, California.—Samples of round and flat wire cables for mining and other purposes.

Donated, at the close of the Exposition, to the Museum of the *Conservatoire des Arts et Metiers.*

HARRINGTON, J. R., Brooklyn, New York.—Self rarefying tuyere.

HAUPT, HERMAN, Philadelphia, Pennsylvania.—Steam drill tunnelling machine. Bronze medal.

This machine is the result of the experience of ten years. The attempt has been made to construct a machine which is strong, light, compact, and cheap; so mounted as to be placed and secured at any desired elevation, and which does not occupy a great space in the tunnel of a mine. All these desirable qualities are claimed for this machine.

STEAM STONE CUTTER COMPANY, G. F. W. Wardwell, superintendent, 18 Wall street, New York.—Stone channelling and quarrying machine, full size and model of the same.

This machine was exhibited in the Annex, in the Park, near the Avenue Suffren, and received a silver medal.

CLASS 48.—IMPLEMENTS AND PROCESSES USED IN THE CULTIVATION OF FIELDS AND FORESTS.

The exhibits in this class were placed in the Annex, in the Park, near the Avenue Suffren.

ALDEN, M., & SON, Auburn, New York.—Horse hoe.

BIDWELL, J. C., Pittsburg, Pennsylvania.—Comstock's rotary spader; ploughs.

BRINKERHOFF, J., Auburn, New York.—Hand Indian corn sheller, separator and cleaner.

BROWN, J. S., Washington, D. C.—Harpoon fork, for lifting hay.

COLLINS & COMPANY, 212 Wall street, New York.—Steel ploughs. Silver medal.

The special good qualities claimed for these ploughs are, that the soil does not adhere to them, that they do not require as much power as other ploughs, and that they last longer. Any part of one of these ploughs that becomes broken or worn can be replaced without difficulty.

CLIPPER, MOWER, AND REAPER COMPANY, 189 Water street, New York.—Combined clipper, mower and reaper, and other agricultural machines.

DEERE & COMPANY, Moline, Illinois.—Steel ploughs. Bronze medal.

EMERY & COMPANY, Chicago, Illinois.—Hog tamer.

EMERY, H. L., & SON, Albany, New York.—Horse power.

FREE, J. W., Richmond, Indiana.—Fanning mill, clover sower.

FULLAM, A. T., Springfield, Vermont.—Machine for shearing sheep and clipping horses.

HALL & SPEER, Pittsburg, Pennsylvania.—Iron centre plough.

HALL, J. A., Columbus, Ohio.—Cotton clipper, strawberry cultivator and drill.

HERRING, S. C., 251 Broadway, New York.—Bullard's patent hay tedder.

LANGSTROTH, L. L., Oxford, Ohio.—Bee hives.

MCCORMICK, C. H., Chicago, Illinois.—Reaping and mowing machines.

The reaping and mowing machines of Mr. McCormick are well known. Although invented as early as 1831, they were not brought to the notice of Europe until the Universal Exhibition at London, in 1851, when the Council medal was awarded to the exhibitor. In 1855 Mr. McCormick received the medal of honor at the Paris Exhibition, and in 1857 the gold medal of the Agricultural Society of New York. He has also received prizes at London, Lille, and Hamburg. About 10,000 of his machines have been made and sold in two years. Several machines have been purchased for use on the Emperor's farms. Gold medal, also, Grand prize, gained in the field trials of agricultural machines.[1]

Mr. McCormick, by a decree of the Emperor, was created Chevalier of the Imperial Order of the Legion of Honor of France.

MUNROE, H. H., & COMPANY, Rockland, Maine.—Rotary harrow.

PARTRIDGE FORK WORKS, Leominster, Massachusetts.—Hay forks, rakes, potato diggers. (Palace.) Bronze medal.

PERRY, JOHN G., Kingston, Rhode Island.—Mowing machine. Bronze medal.

SEYMOUR, J. B., Pittsburg, Pennsylvania.—Corn planter.

SEYMOUR, MORGAN & ALLEN, New York.—Reaper.

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[1] See List of Awards.

WELLINGTON, A. H., & COMPANY, Woodstock, Vermont.—Root cutter.

WHEELER, MELICK & COMPANY, Albany, New York.—Palmer's excelsior horse pitchfork.

WOOD, W. A., MOWING AND REAPING MACHINE COMPANY, Hoosick Falls, New York.—Mowing and reaping machines.

The value of the mowing and reaping machines of Mr. W. A. Wood is shown by the large number of prizes obtained by him at the principal exhibitions in England, France, and America, as also by the immense number of machines sold—no less than 40,000 during five years, to 1867. He has wisely adhered to the wooden frame, believing that it renders a machine more elastic than when made exclusively of iron. By the admirable proportions and balance of his machines he has been able to secure that lightness of draught, power of close cutting, and portability, for which they are so remarkable. Several machines have been purchased for use on the Emperor's farms. Gold medal, also, a gold medal with a work of art. This last medal and prize was gained in the field trials of agricultural machines.[1]

Mr. Wood, by a decree of the Emperor, was created Chevalier of the Imperial Order of the Legion of Honor of France.

WOOLDRIGE, S. H., Venice, Illinois.—Plough.

AMERICAN PLOUGHS AT THE EXPOSITION.

The following notice of American ploughs at the Paris Exposition was translated for the monthly report of the Department of Agriculture:[2]

"American ploughs at the Paris exhibition, 1867, were few in number, but furnished a complete illustration of the excellent construction and solid execution of farming implements in the United States. With but few exceptions all the ploughs were furnished with beams and handles of wood, but this was of such excellent quality that wood in this instance, on account of its extraordinary toughness, withstanding the utmost amount of tear and toil, is to be preferred to iron most decidedly. With us, such an excellent material (white oak and hickory) is wanting entirely, otherwise it ought to be substituted for iron at once.

"The form of the American smoothing board has been applied with us long ago, and wherever the soil is too cohesive for the Ruchadlo plough, it always has proved to be the best, as it holds a middle place between the long, sharp, and screw-like English board and that of the Ruchadlo plough, composed of two straight sides uniting above in form of a triangle. As the English board excels in heavy, tough clay soil, while the latter is adapted best to loose, falling ground, the American share is the best for a medium soil to be turned entirely upside down. All these ploughs exhibited were swing ploughs, sometimes with a stilting-wheel attached to the fore part of the beam, as also frequently used with us, while fore-carts, (running on two wheels to rest the beam,) such as are

[1] See List of Awards.

[2] Monthly Report of the Department of Agriculture, May and June, 1868, p. 286.

used in England and on the continent, seem to be but of little use in America.

"The cutter is peculiar in most American ploughs; either a common cutter like ours, attached to the beam or to the share, in form of a vertical blade, as high as the plough is to go down into the ground, one piece with the share itself; or at last a revolving cutter, attached below the beam. The latter arrangement seems excellent to cut turf and roots in marshy ground that is to be broken up.

"The most interesting ploughs from America were exhibited by:

"1. Collins & Company, Hartford, Connecticut. Collins & Company's ploughs are of different sizes, from three inches to one and a half feet in depth, otherwise built on the very same plan; thus the connecting irons, screws, etc., of one size will do for all the others. Their steel smoothing-boards, cast, according to statements, in polished forms, are highly polished, so as to warrant easy work. Their extraordinary lightness is another advantage, those for seven inches depth weighing forty, and those ploughing fourteen inches deep no more than ninety-five pounds.

"2. Deere & Company, Moline, Illinois. The same as the former, except as to double or Ruchadlo shares with some numbers, on the Bohemian plan, of German, probably Westphalian steel, as the manufacturers assure us. Sometimes the whole lower part of the share and both smoothing-boards are formed of one single piece. Their depth is very uniform, from 12 to 14 inches, (destined for prairie soil.)

"3. Hall & Speer, Pittsburg, Pennsylvania, whose ploughs showed some essentially different qualities from those of other firms; rod-iron strongly-bent beams, shares with attached blade for cutter, and also a peculiar connection of the beam with the body of the plough, giving great firmness to the latter. The connection of all these parts is effected by means of screws, the heads of which are sunk so as to afford an even surface. These ploughs are constructed of very different sizes, ranging from 60 to 150 pounds each, and from 10½ to 17 dollars, respectively.

"4. Canadian ploughs, by Mahaffy in Brampton, Gray in Edmondville, and Duncan in Markham, all having rod-iron or cast-steel smoothing-boards, more like the English than like the American patterns, and instead of being concave they were convexed like those by Hornsby in England, and had very long handles. Those ploughs exhibited by Mahaffy and Gray had wooden handles and beams, while Duncan's were entirely composed of iron. Concerning their construction and technical execution, these Canadian ploughs were by no means inferior to those from the United States; their workmanship every way being worthy of imitation."

CLASS 49.—APPARATUS AND INSTRUMENTS FOR FISHING, HUNTING, AND FOR COLLECTING NATURAL PRODUCTS.

ONEIDA COMMUNITY, J. H. Noyes, agent, Oneida, New York.—Traps.

CLASS 50.—MATERIALS AND METHODS OF AGRICULTURAL WORKS AND OF ALIMENTARY INDUSTRY.

BACON, S. T., Boston, Massachusetts.—Cracker, bread, and cake machinery; (in the bakery, Park.) Honorable mention.

The principal parts of this apparatus, which is capable of preparing 5,000 pounds' weight per day, is protected by European patents and comprises: 1. A mechanical revolving oven capable of receiving and holding a continuous supply of 600 pounds of bread or crackers. It is claimed that this oven with a given amount of fuel, time, space, and labor, will bake at least twice as much as any oven in Europe. 2. A smoke and gas consuming furnace, the invention of Jonathan Amory, of Boston, which has been put into practical operation by Mr. Bacon. The combustion is so perfect that no smoke issues from the chimney. 3. Various machines used in mixing, kneading, and cutting. 4. A sectional steam generator, exhibited by T. S. Clogston & Company, of Boston. This generator consumes only 48 pounds of coke per day, and will bear, if required, a pressure of 900 pounds per square inch. This generator supplies the Root trunk engine which drives the machinery in Mr. Bacon's establishment. 5. Clark's steam and fire regulator. 6. Grate bars by L. B. Tupper, New York, which, from their peculiar shape, effect a saving in cost of one-fifth compared with the ordinary grate bar. 7. Root's trunk engine, from J. B. Root, of New York.

BAKER, GEORGE R., St. Louis, Missouri.—Dough-kneading machine. Honorable mention.

BASSETT, J. B., & Co., Minneapolis, Minnesota.—Wooden buckets.

CHAMPLIN, J. R., & Co., Laconia, New Hampshire.—Ice cream freezer. (In the American restaurant.)

COLBY, D. C., Washington, D. C.—Flour sieve; coffee mill and can.

ELTING BOLT AND DUSTER COMPANY, Cincinnati, Ohio.—Bolt and duster machine.

GOODELL, D. H., Antrim, New Hampshire.—Apple parer. Bronze medal.

HUDSON, C. H., 5 Barclay street, New York.—Washing machine.

LOW, D. W., Gloucester, Massachusetts.—Ice crusher. (In the American restaurant.)

METROPOLITAN WASHING MACHINE COMPANY, R. C. Browning, agent, 32 Courtland street, New York.—Clothes wringers. Honorable mention.

MORRIS, TASKER & Co., Philadelphia, Pennsylvania.—Wringing machine. Bronze medal.

PALMER, S. W., & Co., Auburn, New York.—Clothes wringers, mangles, and ironers.

PURRINGTON, G., Jr., 5 Barclay street, New York.—Carpet sweeper. Honorable mention.

SARGENT, E. H., Boonton, New Jersey.—Alarm coffee boiler.

SEDGEBEER, J., Painesville, Ohio.—Grinding mills for corn and spices.

SOMERS, D. M., Washington, D. C.—Self-acting tumbler washer. (In the American restaurant.)

TILDEN, HOWARD, Boston, Massachusetts.—Flour and sauce sifter; R. Smith's tobacco cutter; champion egg beater. Honorable mention.

WARD, J., & Co., 457 Broadway, New York.—Clothes wringer. Honorable mention.

WINDLE & Co., 56 Maiden Lane, New York.—Carpet sweeper.

CLASS 51.—CHEMICAL, PHARMACEUTIC, AND TANNING APPARATUS.

BUTLER, J. L., St. Louis, Missouri.—Soda water fountain. (In the Annex.)

DOWS, CLARK & VAN WINKLE, Boston, Massachusetts.—Ice cream soda water apparatus and fountains, carbonic acid gas generators.

HOGLEN & GRAFLIN, Dayton, Ohio.—Tobacco-cutting machine. Bronze medal.

METROPOLITAN WASHING MACHINE COMPANY, R. C. Browning, agent, 32 Courtland street, New York.—Doty's clothes washer. Honorable mention.

PRENTICE, J., Sixth avenue, New York.—Cigar-making machine. (Shown in the Annex in the Park.) Honorable mention.

SCHULTZ & WARKER, New York.—Soda water apparatus and fountains. Silver medal.

One of the fountains was tested by a pressure of 15 atmospheres.

WARD, J., & Co., 457 Broadway, New York.—Washing machine. Honorable mention.

CLASS 52 AND 53.—MACHINES AND MECHANICAL APPARATUS IN GENERAL.

AMERICAN STEAM GAUGE COMPANY, Boston, Massachusetts.—(In M. Bacon's bakery, Park.) Pressure steam gauge; Bourdon's patent with T. W. Lane's improvement. Honorable mention.

ANDREWS, WILLIAM D., & BROTHER, 414 Water street, New York.—Centrifugal pump and oscillating engine. Honorable mention.

AUTOMATIC BOILER FEEDER COMPANY, G. A. Riedel, director, 945 Ridge Avenue, Philadelphia, Pennsylvania. — Automatic boiler feeder. Bronze medal.

BACON, S. T., Boston, Massachusetts.—(In the bakery, Park.) "Anti-incrustator," for steam boilers.

BROUGHTON & MOORE, 41 Centre street, New York. — Oilers, cocks, &c. Honorable mention.

BRYANT, F., Brooklyn, New York.—Grinding mill.

BRYANT, J., Brooklyn, New York.—Bushing for ship's blocks; anti-friction journal boxes.

CLARK'S STEAM AND FIRE REGULATOR COMPANY, New York.—(In M. Bacon's bakery, Park.) Steam and fire regulator. Honorable mention.

CLOGSTON, T. S., & COMPANY, Boston, Massachusetts.—(In M. Bacon's bakery, Park.) Cast-iron sectional steam generator, steam indicator and fire regulator combined.

COCHRANE, JAMES, 64 West Tenth street, New York.—Model balancing slide valve, showing method of lubricating.

COLUMBIAN METAL WORKS, J. P. Pirrson, President, 40 Broadway, New York.—Seamless copper and brass tubes.

CORLISS STEAM ENGINE COMPANY, G. H. Corliss, president, Providence, Rhode Island.—Steam engines. Gold medal.

The 30-horse power steam engine exhibited by this company was one of the most prominent objects in this class. It was much admired and appreciated, not only for its elegant and elaborate finish, but its perfect and noiseless automatic motion and the wonderful sensitiveness of its "cut-off." Its proportions and features were closely studied by many noted European engine builders.

CROSBY, BUTTERFIELD & HAVEN, 22 Dey street, New York.—Roper's hot air engine.

DART, HENRY C., & Co., New York.—Behren's patent rotary engine and pump. Honorable mention.

This remarkable invention may be used either as a motor or pump. It consists of three principal parts: a cylinder and cylinder head, two pistons with their shafts, and two gear wheels to connect the pistons. It is not liable to break down or get out of order, and, as the pump is without either valves or air-chamber, it is particularly well adapted for feeding, bilge, air, and wrecking purposes. This engine can be worked by compressed air or explosive gases. As it measures accurately the quantity of water passing through it at every revolution, it may be used as a water meter.

DOUGLASS, W. & B., Middletown, Connecticut.—Pumps of various descriptions. Bronze medal.

DWIGHT, GEORGE, Jr., & Co., Springfield, Massachusetts.—Steam. Honorable mention.

FAIRBANKS E. & T., & Co., St. Johnsbury, Vermont.—Weights and weighing machines. (In the Annex.) Silver medal.

The weighing machines shown by this company were of all sizes and descriptions, from letter-balances and apothecaries' scales up to those used for weighing canal boats and loaded trains.

HARRISON, C. H., San Francisco, California.—Steam pump.

This pump is used chiefly for wrecking, and is remarkable for the large quantity of water it will raise in a given time. It was kept running during the Exhibition, and was a conspicuous object at the entrance to the building by the Rue d'Afrique.

HICKS ENGINE COMPANY, C. D. Kellog, treasurer, 88 Liberty street, New York.—Steam engines. Honorable mention.

A report and description in detail will be found in the Report on the Steam Engineering of the Exposition. The following notice is extracted from the company's circular:

"This engine, invented by Mr. William C. Hicks, is patented in the United States, (February 21, 1865, and May 22, 1866,) and in nearly all European countries and their dependencies.

"It has many advantages over any engine now in use, its chief feature being its intrinsic and matchless simplicity. While retaining the entire principle and action of the best approved reciprocating-piston engines, and doing no violence to the convictions of our most intelligent engineers that this principle and action cannot be superseded as long as the present mode of applying steam continues, the details are so far simplified that the pistons connected directly to the crank form the only moving parts, and these with the cylinders compose the whole machine. This is done by making the pistons of suitable form and arrangement to enable them to perform also the offices of valves and cut-offs, dispensing not only with these contrivances, but also with the whole array of valve-rods, eccentrics, rock-shafts, packing-boxes, slides, levers, cross-heads, and external attachments of every kind which they necessitate. The action of the pistons is alike simple and uniform, each being a slide-valve for the one beside it. This invention, therefore, forms the most radical and entire change in steam engines which has occurred since the days of Watt, and enables us to offer a better machine, simple, compact, light, durable, accurate, and economical in operation beyond all comparison with the past, and at far less original cost than ever before attained.

"Four single-acting pistons working in the four cylinders marked B, B, B, B, are all connected to cranks on one shaft by suitable connecting rods, each piston taking steam before the next succeeding one has finished its stroke, thereby insuring a uniform and continuous motion, and avoiding the dead points which render ordinary engines so variable in their motions and difficult to start, if stopped or caught on the centre. This is in fact a double cut-off engine, without the friction of a double set of valves with their multiform attachments.

"The pistons are provided with proper ports and passages, which act in combination with ports and passages in the cylinders, to admit and release the steam, thus combining a slide-valve with the piston in one and the same piece, each piston admitting and exhausting the steam for its neighbor cylinder, as well as cutting off its own supply of steam from the boiler at any desired point. By this means the expansive force of the steam is used, and the exhaust allowed to remain open during the entire return stroke.

"These ports and passages are arranged opposite each other in such a manner that a perfect balance to the pressure of the steam is effected, and the ordinary wear and friction of cylinders, pistons, and valves almost entirely obviated. It will also be observed that the motions of the valve and cut-off are equal in rapidity to the speed of the piston, and that the cut-off works in the closest possible proximity to the piston.

"The pistons are effectually packed by a simple and convenient method, and can be tightened at pleasure. All the working parts are encased in one casting, and are in no way exposed to the action of the weather, or to an accumulation of dirt.

"The number of parts and the wearing surface being so vastly reduced, tends of course to the same decrease of wear and tear, and of the risks and costs of repairs. In this connection, the facility of repairs deserves especial notice, every part being accessible by the removal of a few bolts, and the whole machine being capable of dissection and reconstruction in a few minutes; and the parts also being interchangeable, any portion can be quickly and cheaply replaced.

"The reduction of friction; the diminished length of the steam-ports and clearances; the decrease of the surface exposed; the facility for casing the whole engine; the accuracy and perfection of the valve motions and cut-offs; the extent to which the expansion of the steam may be carried to advantage—all combined, necessarily give an unequalled economy in the consumption of steam."

HILL, W. E.—Furnace grate bars.

HOWE SCALE COMPANY, Brandon, Vermont.—Scales of various sizes. (Also in the Annex.) Bronze medal. A large and excellent assortment of well-finished and useful instruments.

JENKINS, N., Boston, Massachusetts.—Globe valves, cocks, faucets, &c.

JONES, T. J., chief engineer, United States navy, Brooklyn navy yard, New York.—Piston packing spring.

JUDSON, J., Rochester, New York.—Graduating governor for steam engines.

OLMSTEAD, L. H., Stamford, Connecticut.—Friction clutch pulley. Bronze medal.

PEASE, F. S., Buffalo, New York.—Pump for petroleum. Honorable mention.

PICKERING & DAVIS, New York.—Marine and stationary engine regulators. Bronze medal.

PLATT, J. L., Kewanee, Illinois.—Coal chute.

ROBINSON, J. A., 164 Duane street, New York.—Ericsson's hot air engine. Honorable mention.

ROOT, J. B., New York, (in M. Bacon's bakery, Park.)—Root's trunk engine. Bronze medal. See a notice under "Boston Cracker Bakery."

ROOTS, P. H. & F. M., Connersville, Indiana.—Rotary blower. Bronze medal.

SELLERS W., & Co., Philadelphia, Pennsylvania.—Injectors, dies, stocks, &c.

SHAW, PHILANDER, Boston, Massachusetts.—Hot air engine. (Special installation in the Park.) Bronze medal.

This engine is made with two vertical cylinders, with single acting trunk pistons, hung from the extremities of an overhead working beam. The beam centre on the side next the furnace is sufficiently prolonged to receive a fixed arm, from which the connecting rod runs to the crank of the main shaft. From the furnace, which is hermetically closed, the heated air and products of combustion pass over to the cylinders (to which they are admitted by suitable valves) with an average pressure of 14 pounds per square inch. While one piston is making the upward stroke, its annular face acts as an air pump for forcing cold air into a heater, whence the air passes under the grate to sustain combustion. The succeeding down stroke draws cold air into the annular space, and expels the gases just used through the tubes of the heater to the stack. By an ingenious arrangement the fine cinders are prevented from cutting the cylinders, and the cylinders are kept sufficiently cool.

Mr. Shaw's engine, though not constructed with that regard to handsome finish and elaborate polish which characterize many of the machines forwarded from the United States, was nevertheless much admired and esteemed for its originality.

SHELDON, J., New Haven, Connecticut.—Water-pressure regulator. Honorable mention.

STEAM SYPHON COMPANY, H. S. Lansdell, superintendent, 48 Dey street, New York.—Steam syphon pump, and model of a railroad station pump. Honorable mention.

STILLWELL, D., Fall River, Massachusetts.—Brushes for cleaning tubular boilers.

TUPPER, L. B., New York, (also in Mr. Bacon's bakery, Park.)—Furnace-grate bars. (See notice under head of Bacon's cracker bakery.)

WEBSTER & Co., 17 Dey street, New York.—Webster's patent ordinary wrench.

CLASS 54.—MACHINE TOOLS.

AMERICAN TOOL AND MACHINE COMPANY, G. H. Fox, president, Boston, Massachusetts.—Fox's screw-cutting lathe, with Nason's screw attachment.

BEMENT & DOUGHERTY, Philadelphia, Pennsylvania.—Bolt and nut-threading machine, with opening dies. Silver medal.

BERGNER, T., co-operator, engineer of Messrs. Sellers & Company, of Philadelphia, Pa.—Exhibitors of machine tools, who received a gold medal for their exhibition of tools; a silver medal was awarded to Mr. Bergner as co-operator.

BROWN J. R., & SHARPE, Providence, Rhode Island.—Revolving head screw machine; milling machine. Silver medal.

It was stated that five or more of these machines were sold in Europe during the Exhibition in Paris.

COOL, FERGUSON & Co., Glen's Falls, New York.—Barrel machines. Silver medal.

GREGG, ISAAC, Philadelphia, Pennsylvania.—Model of a brick machine, and specimen bricks.

A full-sized machine in operation was shown in the Annex of the Exhibition, Nos. 100 and 102 Avenue Suffren, and was said to be capable of making from 35,000 to 40,000 bricks in ten hours. A bronze medal was awarded.

HARRIS, D. L., & Co.—Improved engine lathe, with Van Horne's patent tool elevator and screw cutter. Bronze medal.

JUSTICE, P. S., Philadelphia, Pennsylvania.—Power hammer. Bronze medal.

It is claimed that this hammer, with half-a-horse power, will work faster and better than those of the old style requiring the power of ten horses. It is a very compact machine; the hammer is suspended by a flexible attachment to a cast-steel spring moving between guides and receiving an alternate movement from a crank.

LYON & ISAACS, 9 Jane street, New York.—Self-feeding hand and power drill.

MORRIS, TASKER & Co., Philadelphia, Pennsylvania.—Pipe-cutting machines. Honorable mention.

OLMSTEAD, L. H., Stamford, Connecticut.—Machine tools. Honorable mention.

SELLERS, WILLIAM, & Co., Philadelphia, Pennsylvania.—Machine tools. Gold medal.

This house exhibits perhaps the finest collection of machine tools to be found in the Exposition. Their large planer is 24 feet long and 8 feet broad, with a carriage 8 feet high; it cuts one way only, and the carriage goes back with double-quick motion. The novelty in principle is that the bed is fixed, and the frame or carriage carrying the cross-head and two lateral tool-posts travels on V slides, and is moved by racks and pinions actuated by two worm wheels from above. The forward and backward movements are given by racks and pinions along the sides at the end of the strokes; the reversal of motion takes place by a ring, at the end of the worm shaft, being driven in by a projecting stud from the wall, the lever gearing thus throwing off the drawing belt from a large wheel to a small one, and *vice versa*, as the motion is required to be quick backwards or slow forwards, for the cut of the tools, which are all three (one vertical and two lateral) self-acting.

The length of the stroke is given in a very ingenious way by a movable jam-nut on a vertical screw-shaft.

A small planing machine, with moveable plate seven feet long, planes the whole length of its table; and this, like all the rest of Mr. Seller's machines, has an automatic outlift of the tool, so that in the backward motion it travels clear, and the point is not ground by trailing along the work. The feed motion is peculiar, the limits of motion being attained by means of a segment piece attached by a rod to the crank, and adjustable by a screw from central to any degree of eccentricity—the amount of eccentricity being the limit of the feed motion. The change of movement from the quick to the slow is effected by two pivoted levers traversing within an irregularly shaped iron circular ring, by means of which each of the belts, working in opposite directions, is turned, as required, over one of the three divisions of the vertical driving pulley. The two outside pulleys run free; the middle one actuates the travelling plate, which works in V slides, and is moved by bevel gearing actuating a worm wheel set diagonally to the length of the plate. The rack is cut diagonally to suit the thread of the worm.

The automatic gear cutter is adapted for cutting cylindrical as well as bevel wheels of any size, from the smallest in ordinary use to wheels five feet in diameter. The cuts are made by interchangeable tools of the required dimensions for the tooth. The machine is fixed in an L-shaped frame upon the carriage, on which the wheel to be cut is pivoted. The cut is made by a milling tool, and after each operation the wheel is turned automatically to the required pitch for the cut, and so on, one cut at a time, turning out a finished tooth.

The 25-inch lathe has the peculiarity of friction disks for moving the carriage for ordinary turning, and for cutting special gear, which can be put in or out of contact at the will of the operator; also, a rest for long, thin work, which requires support to prevent vibration. The face plates are cast solid, in one piece, and further stiffened by ribbing at the back, so that there is never any spring.

Mr. Sellers also exhibits an excellent 500 pounds' weight hammer, of which he is the lessee, remarkable for its simplicity and easy management. By means of a handle a workman may instantly alter the height, rapidity, or force of the blow, or render the valve motion manual or self-acting.

The self-adjusting injector is an improvement upon that of Giffard, and is provided with a handle which regulates the steam supply, the increase or decrease of which corresponds to that of the water delivery. The water supply also corrects itself at all variations of steam pressure independent of the handle movement.

Mr. Sellers exhibits in addition a variety of shafting, hangers, and couplings, which show a direct saving of first cost, from their diminished weight, as well as perfection in construction. The double cone vice-couplings are easy of detachment, with double-traced ball and socket hangers, the bearings of which are light and easily adjustable; the journal boxes are long, with uniform pressure and length of bearing. Iron, not brass, is used in the pulley castings. The whole presents a very neat appearance.

UNION VICE COMPANY, A. H. Brainard, Boston, Massachusetts.—Cast iron vices.

WICKERSHAM NAIL COMPANY, A. L. Wood, treasurer, Boston, Massachusetts.—Nail cutting Machine. Bronze medal.

It is claimed that this machine can be worked at a less cost than other machines now in use, while at the same time it produces a nail superior in its holding property to those generally manufactured. As the nail is pointed like a chisel and tapers gradually through its whole length, it is easily driven and does not break the grain of the wood like a blunt or roughly jointed nail. In the second place this machine, instead of manufacturing one nail at a time, as is done by machinery now in use, can cut from a 20-inch iron plate eight two and a half inch nails at one blow, and can make three blows per second, thus giving 24 nails headed and jointed in a second. The same machine will make 160 half-inch brads per second, 40 at a time, or about 3,600 pounds per day, including all sizes of small finishing nails. As a comparison between the Wickersham machine and those ordinarily in use at other factories, it is said that a large factory with 50 machines will produce 50,000 kegs of nails per annum, whereas 50 Wickersham machines will make the enormous quantity of 75,000 per annum.

WINSOR, H., Philadelphia, Pennsylvania.—Shot and shell polishing machine.

CLASS 55.—APPARATUS AND METHODS OF SPINNING AND ROPE-MAKING.

BATES, HYDE & CO., Bridgewater, Massachusetts.—Power cotton gin; hand cotton gin.

EMERY, H. L., & SON, Albany, New York.—Cotton gin.

GODDARD, C. L., 3 Bowling Green, New York.—Mestizo burring picker. Bronze medal.

HALL MANUFACTURING COMPANY, Boston, Massachusetts.—Bazin's cord twisting machine.

SOUTHERN COTTON GIN COMPANY, Bridgewater, Massachusetts.—Saw and roller cotton gins. Bronze medal.

CLASS 56.—APPARATUS AND METHODS OF WEAVING.

CROMPTON, GEORGE, Worcester, Massachusetts.—Loom for weaving fancy woollen casimeres, two yards in width. Silver medal.

This machine will make 82 picks per minute while the others rarely exceed 65.

LAMB, J. W., Rochester, New York.—Knitting machine. Silver medal.

OPPER, M., Convex Weaving company, New York.—Power loom. Silver medal.

PROUTY, A. B., Worcester, Massachusetts.—Card setting machine.

SHAW, C. A., Biddeford, Maine.—Card grinding machine and model of the same.

CLASS 57.—APPARATUS AND PROCESSES OF SEWING AND MAKING CLOTHES.

AMERICAN BUTTONHOLE COMPANY, Philadelphia, Pennsylvania.—Buttonhole, cording, braiding, and embroidery sewing machines. Silver medal.

BARTLETT SEWING MACHINE COMPANY, 569 Broadway, New York.—Sewing machines.

BARTRAM AND FANTON MANUFACTURING COMPANY, Danbury, Connecticut.—Sewing machines. Bronze medal.

BRUEN MANUFACTURING COMPANY, J. L. Lilly, secretary, 371, Broadway, New York.—Sewing machine attachments.

CONTINENTAL MANUFACTURING COMPANY, E. H. Smith, secretary, 18 Beekman street, New York.—Sewing machines.

ELLIPTIC SEWING MACHINE COMPANY, 543 Broadway, New York.—Sewing machines.

EMPIRE SEWING MACHINE COMPANY, T. J. MacArthur, secretary, 536 Broadway, New York.—Sewing machines. Honorable mention.

FLORENCE SEWING MACHINE COMPANY, 505 Broadway, New York.—Sewing machines. Silver medal.

FOLSOM, J. S., Winchenden, Mass.—Sewing machines.

GRISWOLD & SHELDON, New York.—Hat blocking machine.

HOOPER, N. B., Newark, New Jersey.—Hat finishing machine.

HOWE, A. B., 437 Broadway, New York.—Sewing machines. Bronze medal.

HOWE MACHINE COMPANY, E. G. Sterling, secretary, 629 Broadway, New York.—Sewing machines.

A gold medal was awarded to Mr. Elias Howe, jr., as promoter, and by a decree of the Emperor he was created a Chevalier of the Imperial Order of the Legion of Honor of France.

MUMFORT, FOSTER & COMPANY, Detroit, Michigan.—Boot trees and lasts. Bronze medal.

SHAW, C. A., Biddeford, Maine.—Knitting machine. Bronze medal.

UNION BUTTONHOLE AND EMBROIDERY COMPANY, Boston, Massachusetts.—Button hole and embroidery machine. Bronze medal.

WEED SEWING MACHINE COMPANY, 506 Broadway, New York.—Sewing machines. Silver medal.

WHEELER AND WILSON, 625 Broadway, New York.—Buttonhole machines; sewing machines. Gold medal.

Bronze medals were also awarded to Messrs. A. J. House and A. H. House as co-operators.

It is useless here to review the history, progress, and advantages of sewing machines. Every one understands their importance and appreciates their services. The various modes of construction exhibited by American manufacturers at the Champ de Mars have already been presented in preceding Universal Exhibitions, and have been explained and discussed either in the reports of the juries or in industrial publications. To Mr. Elias Howe redounds the credit of the original invention from which, with progressive variations, all the other systems are derived.

Mr. Howe's invention, in its relation to labor, is analogous to that of the Jacquard loom, effecting an enormous saving of hand labor, and although, like the loom in question, looked upon at first with distrust by the working classes, it has in the course of time equally proved itself one of the greatest benefits ever offered them; the increased facility of labor more than making up the loss occasioned by the diminution in the price of the article manufactured—a benefit falling in turn to the lot of the consumer—so that Mr. Howe may be considered not only in the light of a promoter of industry, but as a benefactor of humanity in general.

The original machine, for which Mr. Howe has obtained the gold medal, decreed by the international jury in honor of his long and useful researches in this line, was exhibited. The improvements made up to this time refer rather to perfection of form than to any great development of the actual principle. Mr. Howe, although possessing the exclusive patent for all sewing machines during a certain period of time, has generously allowed the right of fabrication to all parties inventing remarkable improvements in special branches.

Since 1855, the sewing, embroidering, and braiding machines have been considerably simplified and perfected. The only really new inventions since 1862 are those for making button holes. These complete the revolution operated by sewing machines. The machines for button holes are of two kinds, designated under the heads of special and mixed. The special ones are represented by two systems, both of which are automatical.

1st. The system of Wheeler & Wilson, invented by two brothers, James and Henry House, all the mechanism of which is enclosed in a case placed underneath the work table, and moved, like all sewing machines, either by the treadle or steam. The machine on exhibition operates with wonderful rapidity; the needles moving backwards and forwards along the button hole until the work is completed. Under the eyes of the jury it made three button holes, on heavy winter cloth, in the short space of 24 seconds. Its advantages over many other machines consist in avoiding the necessity of turning or moving the cloth along by hand. It makes button holes of every size and form; and by an ingenious arrangement can be adapted to sewing tents, sacks, and, in a word, all work which requires the solid and uniform stitching of two straight or curved borders.

The second system is that exhibited by the "Union Button Hole and Embroidery Company," Boston. In this machine the upper or superior needles move vertically, while the lower mechanism makes the button hole stitch. The system is the inverse of Wheeler & Wilson's; the cloth or material moving and turning, and the needle operating in a fixed place. The cloth is attached upon a turning plate which, first, by a rectilinear, then rotary, and, lastly, another rectilinear movement, brings all the parts of the button hole under the vertical needle. It is a very ingenious machine, and makes excellent button holes of all sizes. The only inconveniences which have been spoken of respecting it are, that it is heavy and complicated, and requires the cloth or garment to be turned and put in movement during the work.

The mixed machines are ordinary sewing machines which, by a change of certain pieces, or by certain transmissions, can be transformed into button hole machines. There are three systems under this class:

1st. Wheeler & Wilson's, which is also due to the invention of Messrs.

House, consisting in replacing the platform of the ordinary sewing machine by a particular plate, which has a double movement of oscillation and translation. The oscillating movement, combined with the action of the upper needle, serves to form the button hole stitch, while the translatory movement advances the work under the same needle. The button holes thus obtained are made fast at the two ends, and are similar to those made in linen drapery. With this system buttons may be secured on garments, not, however, with sufficient rapidity to guarantee much economy of hand labor.

2d. The system of Bertram & Fanton applied, and applicable exclusively, to the sewing machines of Wheeler & Wilson. The plate or button hole guide undergoes the same movements before mentioned, but by different transmissions.

3d. The system of the "American Button Hole Company," of Philadelphia. The machine exhibited by this company is so made that it can be used either for ordinary sewing or for button hole making. This machine makes very good button holes for the use of tailors, &c., but cannot be employed in linen drapery.

For various improvements and modifications of sewing machines we may notice among the exhibitors the names of the Florence Sewing Machine Company, New York; the Bruen Manufacturing Company, New York; the Weed Sewing Machine; the Continental Manufacturing Company; the Bartlett Sewing Machine Company, and the Empire Sewing Machine Company, of New York; as also J. S. Folsom, Massachusetts.

Special machines for shoemaking are contributed by two houses: The Howe Machine Company, which has obtained a silver medal for its machines, and the house of A. B. Howe, New York, to which the jury decreed a bronze medal. These machines, in the construction of which the Howe type is the most generally adopted, are used for all kinds of sewing on leather.

In comparing the execution of the sewing machines exhibited at the Champ de Mars, one is particularly impressed with the superior finish and the uniform accuracy of every part of the American machines. This is due to two causes:

1st. To the immense impetus which has been given to the manufacture of sewing machines in the United States.

2d. To the system of manufacture there observed. Every piece is separately made by machinery, so that any two complete machines of the same calibre are strictly identical in size and form in almost every particular, and the pieces of one accord perfectly with those of the other.

Statistics of the progressive march of this industry would be interesting; unfortunately, however, the committee is not in possession of anything like complete documents on the subject. The following table, showing the number of machines made by only one establishment, may serve to give an idea of the importance of this industry in America.

The house of Messrs. Wheeler & Wilson have manufactured sewing machines as follows:

Years.	Machines.	Years.	Machines.	Years.	Machines.
1853	799	1858	7,978	1863	29,778
1854	956	1859	21,306	1864	40,062
1855	1,171	1860	25,102	1865	39,157
1856	2,210	1861	18,556	1866	50,132
1857	4,591	1862	28,202		

All the machines sent from the United States possess indisputable merits, and establish the fact that the country is still far in advance of Europe in the construction and improvement of these great labor-saving inventions.

CLASS 58.—APPARATUS AND METHODS USED IN MAKING FURNITURE AND HOUSEHOLD OBJECTS.

AMERICAN SAW COMPANY, S. W. Putnam, secretary, 2 Jacob street, New York.—Emerson's patent saw.

DAVENPORT, H., New York.—Armstrong's dovetailing machine.

FENN & FELBER, St. Louis, Missouri.—W. Zimmermann's mortising and slotting machine.

GRANIER, ÉMILE.—Dovetailing machine

MILLER, W. P., San Francisco, California.—Adjustable teeth for saws.

It is undoubtedly true that there is no one tool used in the mechanical arts of more practical utility than the circular saw. Notwithstanding their high cost and the daily expense incurred in keeping them in order, they are used almost without limit.

Formerly all saws were made by forming solid teeth on the periphery of the plate. Teeth thus made do good work, but are liable to be, and frequently are, broken off. There is no means of restoring them when broken, except by reducing all the other teeth to the same radius.

A circular saw, thirty inches in diameter, presents a cutting edge more than seven and a-half feet in extent. To reduce the saw one-eighth of an inch, and relieve the teeth the same as before, necessitates the filing away of a strip of steel one-eighth of an inch in width, by the thickness of the plate, and seven feet and ten inches in length, and by such operation the saw will be reduced one-fourth of an inch in diameter. Each filing of a solid tooth saw is attended with a like corresponding expenditure of labor and files.

To obviate this difficulty, several plans for attaching teeth to saw plates have been devised and put in use, but with little or no success, for the following reasons: First, all insertable teeth heretofore used require a thicker plate to support them than do the solid teeth. And, secondly, what is saved in labor and files by the use of insertable teeth is absorbed in their purchase. For the above, and other reasons incidental therewith, insertable teeth are not much used except in connection with large saws, and it is asserted by practical saw makers, and not a few mill men and sawyers, that there is no economy in the use of insertable teeth as heretofore made and applied.

Miller's saw teeth are annular disks with a portion cut out so as to make a cutting edge or point to the tooth. The teeth thus have the shape of a flattened ring with a portion removed. They are inserted in circular openings, or sockets, made in the periphery of the saw. This circular socket allows the teeth to be turned outward or backward within the outer edge of the saw plate.

Among the many advantages claimed for these teeth above all others the following may be cited: They are stronger even than solid teeth formed on the plate; there is more room for the chips; the saws require less power, and will make from eight to ten per cent. more of inch boards from a log than can be made by other insertable teeth saws; the teeth are self adjusting; being round, they may be turned in a lathe and be easily duplicated; they can be quickly inserted; they cannot be thrown out of their sockets, and, finally, they will last longer and thus accomplish more work than other forms.

ROGERS C. B., & Co., Norwich, Connecticut.—Wood working machines. Gold medal.

WHITNEY, BAXTER, D., Winchendon, Massachusetts.—Wood working machines. Silver medal.

WINSLOW, J. B., 110 East Twenty-ninth street, New York.—Serpentine wood moulding machine. Honorable mention.

WINSOR, H., Philadelphia, Pennsylvania.—Model of a machine for sawing timber for ships.

WRIGHT & SMITH, Newark, New Jersey.—Scroll sawing machine.

CLASS 59.—APPARATUS AND METHODS OF PAPER-MAKING, COLORING, AND STAMPING.

DEGENER & WEILER, 111 Fulton street, New York.—Printing presses. Bronze medal.

Forms may be corrected on this press without being removed. It can be worked by the foot or by steam power. From 1,000 to 2,500 impressions can be taken from this press in an hour, according to the capability of the workman.

GALLOUPE, NICHOLSON & WOODBURY, Boston, Massachusetts.—Paper collar machinery.

MCLAUGHLIN, R., Boston, Massachusetts.—Morse's improved bed plate for paper making machinery.

SWEET, J. E., Syracuse, New York.—Composing machine. Bronze medal.

WELCH, PATRICK, 356 East Fourth street, New York.—Improved lower case for compositors.

CLASS 60.—MACHINERY, INSTRUMENTS, AND METHODS USED IN VARIOUS WORKS.

SMITH, H., Salem, Massachusetts.—Spring power machines.

VAN DENBURGH, G., 24 Vesey street, New York.—Emery wheels.

WELCH, PATRICK, 356 East Fourth street, New York.—Machine for dressing printing types. Gold medal.

CLASS 61.—CARRIAGES, WAGONS, AND WHEELWRIGHTS' WORK.

BLANCHARD, A. V., & Co., Palmer, Massachusetts.—Bent wood.

HALL, JAMES, & SON, Boston, Massachusetts.—Top buggy. Silver medal.

RUCKER, Major General, Washington, D. C.—United States army wagon, harness, &c.

SCHUTTLER, P., Chicago, Illinois.—Lumber wagon.

This wagon is capable of bearing a load of 4,000 pounds. The box may be removed and a rack placed upon the wagon that will hold a large load of hay or straw. Loads of timber or lumber can be drawn without box or rack. It is furnished with a spring seat, which is moveable, and can be placed to suit the convenience of the driver. The ends of the box may be removed when desired, and, lastly, the wood of the wagon is of the very best seasoned and most durable material.

SCOTT, J., Ocala, Florida.—Carriage wheel.

STEPHENSON, JOHN, & Co., 47 East Twenty-seventh street, New York.—Street railway carriage. Honorable mention.

This beautiful and highly finished vehicle, intended for India, has the wheels placed underneath, and is so constructed as to bear with ease and safety a very great weight. The carriage, which is fitted up in rich style with exquisitely painted panels, is capable of containing from 30 to 40 persons.

WOOD BROTHERS, 596 Broadway, New York.—Phæton and buggy. Silver medal.

CLASS 62.—HARNESS WORK AND SADDLERY.

SMITH, T. S., Boston, Massachusetts.—New system of bit.

STATTMAN, C., Natchez, Mississippi.—Ladies' saddles.

WELLMANN, C., 932 Broadway, New York.—Ladies' saddles; gentlemen's saddles. Honorable mention.

CLASS 63.—MATERIALS FOR RAILROADS AND CARS.

CREAMER, W. G., 15 Platt street, New York.—Railroad brake and ventilator.

EASTMAN, Z., United States consul at Bristol, England.—Model of street railway and carriage track.

FAIRBANKS, E. & T., & Co., St. Johnsbury, Vermont.—Railroad scale. Bronze medal. See a notice, also, in Class 51.

FOSTER, A., 50 John street, New York.—Graham's locomotive spring balance.

HALL, T. S., Stamford, Connecticut.—Electric switch alarm.

This invention is intended to remedy the mischief which too frequently occurs on railways in consequence of the misplacement of a switch. It has an alarm and a signal, and is worked by electricity. When the switch is on the main line the electric current is broken, but if displaced the circuit is complete and an alarm is given by the vibration of a hammer against a gong. In addition to this the lines are connected with a magnet, which operates a red and white signal, as the switch is right or wrong, displaying in the night time a red or white light. Both the alarm and the signal operate at the same time by the movement of the switch, thus affording a double security by an alarm for the switch tender and a signal for the engineer.

MYERS, G., Upper Sandusky, Ohio.—Railroad journal boxes of "silicated copper."

STAR METAL COMPANY, E. E. Childs, president, New York.—Star metal railroad journal boxes.

THE GRANT LOCOMOTIVE WORKS, Paterson, New Jersey.—In the Annex, Park. Locomotive and tender, the "America." Gold medal.

The weight of the engine, in running order, is 27½ tons, of the tender, when empty, 9 tons, or 18 tons when loaded. The engine frame is composed of the best American iron, and is light and strong. The truck of the engine is simply used to guide it, and at the same time carry the small amount of overhanging weight. The driving wheels bear the main weight of the engine, and, by means of equalizing levers, distribute it equally upon each wheel, giving the entire adhesive power of the engine. The side valves are what are termed roller valves; the boiler is composed of 5-16th iron, and is double riveted. The usual load for this class of engine is 200 tons at a speed of 40 to 50 miles an hour. An engine built by the Grant works and similar to the "America," has drawn 400 tons at a speed of 25 miles per hour during the last 14 months without as yet requiring repair. All the various operations required in the conduct of the engine can be carried on in the apartment of the engineer and fireman; and the engine, even if running at the rate of a mile per minute, can be reversed, the reversing brake being capable of being managed by a child. A signal bell communicates with the conductor as usual in American railways, and a powerful reflecting light is placed in front of the engine, and can be seen, it is said, at five miles distance. The wheels of the engine are of cast-iron and hollow, and its grate bars are composed of hollow iron tubes through which the water passes.

WARNER, H. W., Greenfield, Massachusetts.—Cast-iron railroad rail chair.

CLASS 64.—APPARATUS AND METHODS OF TELEGRAPHING.

CATON, J. D., Ottawa, Illinois.—Pocket field telegraph apparatus.

This instrument consists of a pair of helices, each two inches long and three-fourths inch in diameter, incased in a thin cylinder of hard rubber. They are wound with No. 36 insulated copper wire. The armature is $1\frac{5}{8}$ inch long, $\frac{1}{20}$ inch thick, and $\frac{1}{4}$ inch wide. The sounding lever, of brass, is $1\frac{1}{2}$ inch long, is placed horizontally, from the centre of which drops a perpendicular arm to which the armature is attached. The free end of the sounding lever plays between the milled heads of two set screws, the upper of which is inserted in the lower. This connects with a branched anvil, the two legs of which rest upon a brass sounding board, $1\frac{3}{8}$ inches diameter, which is concave beneath and is attached with three screws to the bottom of the case, a diminutive adjusting spring, actuated by a milled headed adjusting post with milled headed connecting screws. At the opposite end of the magnet is a key of very thin tempered brass, $\frac{1}{4}$ inch wide and $1\frac{3}{4}$ inch long, with ivory finger piece, connecting points of platinum, and a current breaker with ivory handle. This completes the mechanical contrivances, and the whole is enclosed in a hard rubber case, with a cover like a snuff box.

The external dimensions when shut are, length 5 inches, breadth $2\frac{1}{4}$ inches, height $1\frac{1}{4}$ inch. The ends of the box are semi-circular. The case stands upon four brass legs, $\frac{3}{8}$ inch diameter and $\frac{3}{8}$ inch long. Entire weight $10\frac{1}{4}$ ounces.

Here are all the instruments necessary for a complete telegraph office where the operator receives by sound, which is now almost universally the case in this country. No local circuit is required, but it is operated on the main circuit. The report is as clear, distinct, and audible as that of an ordinary sounder actuated by a local circuit. It is designed for use in the field or out of doors. A telegrapher will attach it to the main line anywhere in the country in five minutes, when he can send and receive messages with the same facility and accuracy that he can in a regular telegraph office. During the war Mr. Caton supplied the government with a large number of these instruments, but was unable to fill all of the orders of General Stager, who had charge of the government telegraph department. Nearly all telegraph superintendents are supplied with them, as well as very many operators, who never travel without them. Their invaluable services in case of railroad accidents may be readily appreciated, and at the West they are in constant use. An account of their services thus rendered each year would fill a volume, and really no train should ever move without one in the hands of a competent operator. These instruments are only made at Ottawa, Illinois, under the superintendence of that accomplished mechanic, Mr. Robert Heming.

COSTON, Mrs. M. J., Washington, D. C.—Coston's telegraphic night signals.

FARMER, M. G., Boston, Massachusetts.—Thermo-electric battery.

FIELD, CYRUS W., THE ANGLO-AMERICAN COMPANY, New York.—Transatlantic telegraph. Grand prize.

HUGHES, DAVID E., New York.—Printing telegraph. Grand prize.

MORSE, S. E. and G. L., Harrison, New Jersey.—Model of a new mode of laying and raising submarine cables.

WARD, A. F., Philadelphia, Pennsylvania.—Combination of colors for signals.

CLASS 65.—CIVIL ENGINEERING, PUBLIC WORKS, AND ARCHITECTURE.

BACON, S. T., 1010 Washington street, Boston, Massachusetts.—Door fastener.

BACON, S. T., Boston, Massachusetts.—Challenge lock.

BANKER & CARPENTER, Boston, Massachusetts.—Paints, for buildings.

BELCHER BROTHERS, St. Louis, Missouri.—Plan of an artesian well at St. Louis.

BOARD OF PUBLIC WORKS OF CHICAGO, A. W. Tinkham, secretary, Chicago, Illinois.—Drawing of a tunnel constructed under Lake Michigan. Silver medal.

BRADSTREET, J. R., Boston, Massachusetts.—Rubber mouldings and weather strips.

CHAPIN & WELLS, Chicago, Illinois.—Model of swing bridge. Silver medal.

DANA, J., Boston, Massachusetts.—Faced or pressed brick.

DAY, H. H., 23 Courtland street, New York.—Model of a system of canals without locks, for steamers, &c.

DERROM, A., Paterson, New Jersey.—Model trestle bridge.

DODDS, MACNEALE & URBAN, Cincinnati, Ohio.—Bank locks.

GREGG, ISAAC, Philadelphia, Pennsylvania.—Brick-making machine, in operation, to be seen in the Annex of the Exhibition, Nos. 100 and 102, Avenue Suffren. Silver medal.

HERRING, FARREL & SHERMAN, New York.—Fire and burglar-proof safes. Bronze medal.

HUSTIN, A., Bristol, Massachusetts.—Mitre box, with scale.

JOHNSON, J., Saco, Maine.—Dredging and excavating machine.

JOHNSON'S ROTARY LOCK COMPANY, 18 John street, New York.—F. G. Johnson's rotary locks.

JOHNSON, W., Milwaukee, Wisconsin.—Bank lock.

LA MOTHE, J. B., 5 Wall street, New York.—Model of a house with tube frame.

LOUISVILLE CEMENT AND WATERPOWER COMPANY, Louisville, Kentucky.—Cement.

MILWAUKEE BRICK COMPANY, Milwaukee, Wisconsin.—Building bricks.

MORRIS, TASKER & CO., Philadelphia, Pennsylvania.—Steam-coils, pipes, &c.

NEWMANN, H. J., Andover, Massachusetts.—American woods painted in oil and distemper.

NICHOLSON, S., Boston, Massachusetts.—Model of wooden pavement.

PEASE, C. F., Boston, Massachusetts.—Spring-balance curtain fixture.

ROBINSON, E., & SON, Boston, Massachusetts.—Metallic roofing.

SMITH, H., 255 East Thirtieth street, New York.—Window blind and shutter fasteners.

VANDERBURGH, G. E., 24 Vesey street, New York.—Artificial building-blocks.

WASHBURN, B. D., Boston, Massachusetts.—Kingman's paint roofing. Exhibited in Mr. Bacon's bakery in the Park.

WEBSTER, W., Rochester, New York.—Plans of parks.

WESTON & PUTNAM, Boston, Massachusetts.—Graining, in imitation of American woods.

YALE AND WINN MANUFACTURING COMPANY, Sherbune Falls, Massachusetts.—Locks. Silver medal.

CLASS 66.—NAVIGATION, LIFE-BOATS, YACHTS, AND PLEASURE BOATS.

BECKWITH, E. P., New London, Connecticut.—Model of a fishing smack.

BROWN & LEVEL, Wall street, New York.—Tackle for disengaging ship's boats. Bronze medal.

This apparatus has been adopted upon many vessels and steamer lines in the United States. It is simple, reliable, cheap, and can be easily adapted to boats without change of rig. By its aid, one man, standing in the centre of a loaded boat, can detach it instantaneously from the ship, even while it is under full speed.

DABOLL, C. L., New London, Connecticut.—Fog whistle. In the Annex, Park. Silver medal.

DUFFY, J., Paterson, New Jersey.—Sectional model of iron-clad ship containing various improvements.

HUDSON, Captain J. M.—The ship "Red, White and Blue."

This little vessel, constructed by Mr. Ingersoll, of New York, which crossed the Atlantic with the two daring men, Captain Hudson and Captain Fitch, was, by special permission of the Emperor, installed in the Park. It was rigged as a three-master, 26 feet long, 6 feet beam, and registered 2 tons 28 cwt.

LEPELLY, N. D., Cleveland, Ohio.—New construction of rudder.

MANLEY, W. R., New York.—Model of a paddle wheel for steamers, with vertical floats.

PAGE, E. W., 69 West street, New York.—Oars. Honorable mention.

PERRY, E. F., New York.—Life-saving raft.

PRATT, H. D. J., Washington, D. C.—Model of a propelling apparatus attached to a small metallic vessel.

The propelling screw in this apparatus is placed under the keel.

REED, J., San Francisco, California.—Model of a life boat.

REIM, W. O., Springfield, Ohio.—Hydrostatic scale.

ROLLE, H., Boston, Massachusetts.—Model of a propelling apparatus for steamships.

VANDEUSEN, J. B., 274 Seventh street, New York.—Model of the American yacht "Fleetwing." Bronze medal.

GROUP VII.

FOOD, FRESH OR PRESERVED, IN VARIOUS STAGES OF PREPARATION.

CLASS 67.—CEREALS AND OTHER FARINACEOUS EDIBLES, WITH THEIR DERIVATIVES.

The cereal productions of the United States on exhibition were by no means sufficient to give one an adequate idea of the great grain-growing capabilities of the country. A resolution passed by both Houses of Congress in January, 1867, instructed the Commissioner of Agriculture "to collect and prepare, so far as practicable, and with as little delay as possible, suitable specimens of the cereal productions of the several States of the Union for exhibition at the Paris Exposition."

It was naturally expected that such a proposed exhibition of the finest samples of the best varieties of wheat, corn, and other cereals, would command the admiration of Europe, as it would assuredly arouse the pride of all Americans.

Notwithstanding the commendable activity of the Commissioner of Agriculture, the short time authorized for making the collection, and the multitude of unforseen difficulties which presented themselves, prevented the assembling of such an imposing variety of cereals as was desired and originally intended.

AGRICULTURE, DEPARTMENT OF, Washington, D. C.—Products from the following States: Wheat from Ohio, Indiana, Minnesota, Virginia, Michigan, Pennsylvania, New York, Washington, Vermont, Massachusetts, Michigan winter wheat; wheat from Boyer valley, Maine, Iowa, Wisconsin, Tennessee, Missouri, and Nebraska; barley from Maryland and Connecticut; cotton seeds from Georgia; wheat from North Carolina, Minnesota, Texas, Kansas, Massachusetts, and Georgia; oats from Baltimore county, Maryland; peas from Illinois, Michigan, and Vermont; beans from New York and Maine. Bronze medal.

BABILLON, HINCHMAN & Co., Detroit, Michigan.—Indian corn meal, white and yellow.

CALIFORNIA, STATE OF.—Cereals. Silver medal.

The exhibition of cereals of California production was made by Mr. Campbell, of San Francisco, Mr. Peters, of Stockton, and Mr. Perkins, of Oakland. The two former exhibited samples of remarkably fine wheat. A silver medal was awarded to the State, as above.

CAMPBELL, J. W. H., San Francisco, California.—Cereals.

A large sack, about two bushels, of California "high mixed white wheat," weighing about 120 pounds. This wheat attracted much attention and was greatly desired for seed by agriculturists. Agreeably to the directions of the exhibitor, it was donated, at the close of the Exhibition, to the Royal Agricultural Society of England.

CARPENTER, WILLIAM S., Harrison, New York.—Indian corn in the ear. Bronze medal.

GLEN COVE STARCH MANUFACTURING CO., W. Duryea, secretary, 106 Fulton street, New York.—"Maizena," a preparation of Indian corn for puddings, custards, &c. Silver medal.

Maizena is made from the Indian corn grown in the Atlantic States. It is remarkable as well for its nutritive qualities as for the many different and useful ways in which it may be employed. The exports of this article to Australia are said to amount $60,000 annually, while England demands as much more, and on the continent it is rapidly coming into favor as an article for table use. Large quantities are also shipped to Japan and other portions of the world. It is estimated that the exportation of maizena now amounts to $400,000 a year, while in the United States perhaps even more is consumed. Three articles are manufactured from the corn: 1st, the fine flour called maizena; 2d, corn starch; 3d, a starch made from the refuse, and employed for laundry purposes.

ILLINOIS, STATE OF.—Cereals, grain in the ear, and flour. Bronze medal.

IOWA, STATE OF.—Cereals and flour. Honorable mention.

KANSAS, STATE OF.—Cereals and flour. Bronze medal.

MINNESOTA, STATE OF.—Cereals. Honorable mention.

MISSOURI, STATE OF.—Corn, wheat, barley, oats, corn in the ear.

OHIO, STATE OF.—Cereals. Bronze medal.

PERKINS, D. L., Oakland, California.—A collection of seeds of cereals and vegetables grown in California, 120 varieties in all, classified and labelled, and packed in glass.

Donated at the close of the Exposition to the *Imperial Societé de Acclimatation.* This collection was accompanied by a photograph showing the variety of vegetables grown in California.

PETERS, J. D., San Joaquin county, California.—Specimens of wheat grown in California.

SAMORY, H., Gentilly, Louisiana.—Pecan nuts.

URQUHART, J. M., New Orleans, Louisiana.—Samples of rice.

WARDER, J. A., Hamilton, Ohio.—Samples of various kinds of Indian corn.

WESTERN VIRGINIA, STATE OF.—Cereals.

WISCONSIN, STATE OF.—Cereals and flour. Bronze medal.

CLASS 68.—BREAD AND PASTRY.

BACON, S. T., 1010 Washington street, Boston, Mass.—Crackers; bread and cakes; ærated bread, Dauglish's system. Establishment in the Park. See a notice under Class 50.

CLASS 69.—FATTY SUBSTANCES USED AS FOOD, MILK AND EGGS.

CLASS 70.—MEAT AND FISH.

BORDEN, GAIL, 36 Elizabeth street, New York.—Extract of beef. Honorable mention.

BRAY & HAYES, Boston, Massachusetts.—Preserved lobster. Honorable mention.

CAPE, CULVER & CO., New York.—Manhattan hams. Silver medal.

CULBERTSON, BLAIR & CO., Chicago, Illinois.—Packed beef, pork, and lard. Silver medal.

DUFFIELD, CHARLES, Chicago, Illinois.—Salt cured, and smoked hams. Silver medal.

PORTLAND PACKING COMPANY, Portland, Maine.—Preserved oysters and lobsters. Honorable mention.

TOWNSEND BROTHERS, 79 Water street, New York.—Canned oysters. Honorable mention.

CLASS 71.—VEGETABLES AND FRUITS.

MOTT, R. C., New Orleans, Louisiana.—Sample of filé, powdered sassafras root; gumbo powder for soups.

ONEIDA COMMUNITY, J. A. Noyes, agent, Oneida, New York.—Preserved fruits. Honorable mention.

PORTLAND PACKING COMPANY, Portland, Maine.—Preserved vegetables.

SQUIRE, JOHN J., New London, Connecticut.—Preserved fruits and vegetables. Bronze medal.

TOWNSEND BROTHERS, 79 Water street, New York.—Canned fruits.

CLASS 72.—CONDIMENTS AND STIMULANTS, SUGAR AND SPECIMENS OF CONFECTIONERY.

AVERY, D. D., Petite Anse, Louisiana.—Crushed rock salt. Honorable mention.

DAVIDSON, JOHN, St. Bernard Parish, Louisiana.—Refined yellow sugar. Honorable mention.

GERMANIA SUGAR COMPANY, Chatsworth, Illinois.—Beet sugar.

IOWA, STATE OF.—Sorghum syrup and sugar.

JOHNSON, BRADISH, Louisiana.—Sugar. Bronze medal.

LAURENCE, E., Louisiana.—Sugar. Silver medal.

LOPEZ, D., New Orleans, Louisiana.—Chocolate.

PECK, O. E., Vermont.—Maple sugar.

SABATIER, G., Plaquemines Parish, Louisiana.—Sugar. Honorable mention.

STANFORD, W. L., Plaquemine parish, Louisiana.—Clarified sugar.

THOMPSON, A., New Orleans, Louisiana.—Samples of powdered and crushed sugar, and golden syrup.

TOWNSEND BROTHERS, 79 Water street, New York.—Canned fruits.

WALTEMEYER, JACOB, Baltimore, Maryland.—Preserved fruits. Honorable mention.

WALTER BAKER & Co., Dorchester, Massachusetts.—Cocoa and chocolate. Silver medal.

WILLIAMS, C. C., 314 Dean street, New York.—Hermetically sealed fruit in syrup. Honorable mention.

WISCONSIN, STATE OF.—Sorghum syrup and sugar.

CLASS 73.—FERMENTED DRINKS.

AMERICAN WINE COMPANY, Saint Louis, Missouri.—Wines. Honorable mention.

ANDERSON, W. F. & J. P., Cincinnati, Ohio.—Longworth's sparkling and still Catawba, Catawba brandy, red wine from Norton seedlings. Honorable mention.

BACON, S. T., & D. JAY BROWNE, Boston, Massachusetts.—Sorghum brandy, and brandy made from American wines and wild grapes.

BOTTLER, CHARLES, Cincinnati, Ohio.—Dry and sparkling wines. Honorable mention.

BREHM, F. C., Waterloo, New York.—Wines and brandies.

BUENA VISTA VINICULTURAL SOCIETY, San Francisco, California.—Sparkling Sonoma wine.

Two cases of quart bottles, sample of the wine put up by this society at its establishment in Sonoma valley. This wine was much liked by the committees and experts, and received the diploma of honorable mention. The company commenced operations in 1863, and in 1866 they put up 40,000 bottles, and in 1867, 90,000 bottles. The California grape is used. Honorable mention.

COZZENS, FREDERIC L., 73 Warren street, New York.—Wines and liquors.

DOWS, GUILD, CLARK & VAN WINKLE, Boston, Massachusetts.—American bar and restaurant. Restaurant gallery.

GRIFFITH, W. M., North East, Pennsylvania.—American red and white wines; brandies made from wine and lees.

HELLMAN, A., 202 Broadway, New York.—Sparkling Catawba, made from grapes growing in the State of New York.

HUSMANN, G., Hermann, Missouri.—Wines.

ILLINOIS, STATE OF.—Wines.

KELLER, M., Rising Sun and Los Angeles vineyards, California.—California wines, brandy and bitters.

KOHLER & FROHLING, San Francisco, California.—Wines. White and red wines produced from the California grape at the vineyards, Los Angeles, California.

LE FRANC, C. H., New Almaden, California.—Red and white wines.

Four cases, of 12 bottles each, of wine made by Mr. Le Franc at his vineyards seven miles south of San José, upon the road to New Almaden.

LEICK, G., Cleveland, Ohio.—Wines.

METAYÉ, F., Jefferson parish, Louisiana.—Rum.

PLEASANT VALLEY WINE COMPANY, C. D. Champlin, secretary, Hammondsport, New York.—Sparkling wines and brandy. Honorable mention.

ROWLEY, J. & S., Hastings-on-the-Hudson, New York.—Hastings wine.

ST. LOUIS PARK OF FRUITS, St. Louis, Missouri.—Catawba wine.

SANSEVAIN BROTHERS, Los Angeles, California.—Wines.

Red and white, of several vintages, made from grapes grown in their vineyards in Los Angeles county.

SMITH, MCPHERSON & DONALD, West Eighteenth street, New York.—Pale ale, porter, and brown stout. Bronze medal.

SYLVESTER, E. W., Lyons, New York.—Wine made from the American Oporto grape.

UNDERHILL, R. T., Clinton Hall, 7 Astor Place, New York.—Wines.

WERK, M., & SON, Cincinnati, Ohio.—Dry and sparkling wines. Honorable mention.

CLASS 74 TO 89.

(No exhibitors.)

GROUP X.

ARTICLES EXHIBITED WITH THE SPECIAL OBJECT OF IMPROVING THE PHYSICAL AND MORAL CONDITION OF THE PEOPLE.

CLASS 89.—MATERIALS FOR, AND METHODS OF, TEACHING CHILDREN.

HOWE, S. G., Director of the Perkins, Institute for the Blind, Boston, Massachusetts.—Books and apparatus for the use of the blind. Silver medal.

ILLINOIS, STATE OF.—Specimen of a western primary school and school furniture.

The United States school house was intended to be an exact reproduction of one of the numerous free primary schools which are erected in the country districts of Illinois. It was about 32 by 50 feet, with an entrance porch, and a place for hanging up hats and bonnets, and could accommodate 50 pupils. This modest structure attracted great attention from those interested in popular education, and it was specially noticed by M. H. Ferte, late chief of primary instruction in Paris, in a contribution to the Manuel General de l'Instruction Primaire, from which the following descriptive extract is translated: "Let us enter this modest structure of which we have spoken. We find a large room, which at first appears like all those built for educational purposes; but let us examine the details attentively, and we soon notice the excellent conditions under which it is established. First, the ceiling is twelve feet above a good floor—very necessary in a place where many children are to be gathered. In the second place, the ventilation is perfectly provided for by means of sash windows upon each side and at the ends, which we designate in France as 'guillotine;' but however they may be called, these windows have the immense advantage over ours that they give ventilation at pleasure, from the top or bottom, as may be found desirable. Besides, they allow a free circulation, which, among us, is prevented by our poor system of windows, opening inside, and which take off for this reason nearly two feet of passage room. Let us add that with the American windows the breaking of glass is made less frequent, and that the drafts produced with ours by the windows opening in the middle, by their arrangement are easily avoided. If, after the windows, we examine the desks for the teachers and pupils, we find them very much preferable to those in use in France. While we have long tables accompanied by long benches for accommodating ten or twelve pupils, who crowd, elbow, and hinder each other; in this American school we find the desks or tables neatly arranged for either one or two scholars, with a seat having a support for the back of the pupil. The teachers who read this will understand at once the advantages of such an arrangement. Does a scholar need to leave his seat, he can do so without disturbing his neighbor, or without being obliged, to the great detriment of discipline, to pass before seven or eight of his fellow students, who never fail to make good such an occasion for mischief. It would be highly desirable to have these American desks introduced in our schools. The discipline would be benefited by it, the children could prosecute their studies without disturbance, and be very much more comfortable. We wish the same for the introduction of the inkstand with which each table is provided. The calculators, geometrical figures, globes, charts, and other school apparatus resemble much those in our best schools. Among the books we have examined we find many deserving of high commendation. We notice improved methods of teaching penmanship, excellent and simple spelling, reading and drawing books, quite superior in every respect, and also conveniences for cleaning blackboards, carrying books, and methods of object teaching, quite unknown with us. The desks, maps, globes, books, and school apparatus exhibited we find were contributed by the Messrs. Sherwood and A. H. Andrews, two large and enterprising dealers in these articles in Chicago, the principal city of Illinois and the northwest."

MISSOURI, STATE OF, J. L. Butler, agent.—Collection of books, papers, photographs, maps, &c., illustrating the resources of the State of Missouri. (In the Illinois cottage.)

CLASS 90.—LIBRARIES AND APPARATUS USED IN THE INSTRUCTION OF ADULTS AT HOME, IN THE WORKSHOP, OR IN SCHOOLS AND COLLEGES.

(No exhibitors.)

CLASS 91.—FURNITURE, CLOTHING, AND FOOD FROM ALL SOURCES, REMARKABLE FOR USEFUL QUALITIES COMBINED WITH CHEAPNESS.

(No exhibitors.)

CLASS 92.—SPECIMENS OF THE CLOTHING WORN BY THE PEOPLE OF DIFFERENT COUNTRIES.

(No exhibitors.)

CLASS 93.—EXAMPLES OF DWELLINGS CHARACTERIZED BY CHEAPNESS, COMBINED WITH THE CONDITIONS NECESSARY FOR HEALTH AND COMFORT.

FLINT & HALL, Boston, Massachusetts.—Sectional building, containing M. Bacon's bakery establishment.

GOTTHEIL, EDWARD, New Orleans, Louisiana.—Portable cottage building, made of Louisiana woods.

ILLINOIS, STATE OF.—Specimen of a western farmer's house. Silver medal.

In the section of the Park assigned to the United States the State of Illinois exhibited the western farmer's home, or "American cottage." It was constructed by Colonel Lyman Bridges, of Chicago, from plans furnished by O. L. Wheelock, esq., architect, of that city, and was forwarded in sections by railway to New York, and was installed among other types of residences and palaces in the Champ de Mars.

The object was to show the kind of dwelling much used in the agricultural regions of the United States—a dwelling which, while combining beauty and comfort, is within the reach of all prudent and industrious persons. It was intended also to make known the fact that the farming population of the United States may, and do very generally, own a similar or comfortable home, and that the laws give them liberal protection in the ownership.

The building did not conform to any special order of architecture. The plan was such that one of the rooms on the ground floor could be first constructed and occupied as a temporary home by a new settler at an expense of not over $300, and so that the other rooms and the spacious hall could be added after at the convenience of the owner. It was constructed of Wisconsin and Michigan pine lumber, in part generously contributed by two companies, represented by Hon. W. B. Ogden, and by Messrs. Wood & Lawrence. The capacity of the house was sufficient for a family of six or eight persons, it having three rooms on the first floor and five chambers on the second floor.

The cottage occupied a conspicuous and favorable position in the Park, and a low terrace around it was adorned with shrubs. It became a centre of attraction also by the distribution of documents and information there relating to the extent and resources of the United States. The walls were lined with maps and photographic views of prominent places, and many statistical works relating to the productions and agriculture and geology of the country were ranged upon the shelves of one of the rooms. Information of this nature was eagerly sought by, and was freely given to, thousands of European visitors.

This interesting and valuable addition to the United States section was secured through the exertions of James H. Bowen, of Chicago, United States commissioner.

INTERNATIONAL EXHIBITION OF WEIGHTS, MEASURERS AND COINS.

IN THE PAVILLION IN THE CENTRE OF THE CENTRAL GARDEN.

THE UNITED STATES TREASURY DEPARTMENT, Washington, D. C.—Weights, measures and coins, (in the central pavillion,) scales, (in the Palace.)

INTERNATIONAL SANITARY DEPARTMENT.

Collection of objects from the United States made by Dr. T. W. Evans. (See also classes 11 and 38.)

THE UNITED STATES SANITARY COMMISSION.—Material used in the late war. Grand prize.

During the terrible civil war which desolated the United States for four long and bloody years, public feeling was forcibly aroused to the necessity of devising effective means for mitigating the sufferings and improving the sanitary condition of our armies. Laudable and philanthropic efforts were set on foot for the realization of that noble purpose. All parts of the country were interested in the construction of apparatus, and the assembling of material which should contribute to the attainment of the desired end, and render the scenes and sufferings of the battle field less terrible. As a natural consequence of these efforts the United States sanitary societies and commission sprung into existence and rendered incalculable services to the nation.

It is almost impossible to arrive at a just appreciation of the great good accomplished by the sanitary and relief societies of the United States. They mark a new era in the history of the world, as organizations based upon acts and impulses of the noblest philanthropy ever conceived by humanity.

The happy influence of these institutions has been felt in the Old World, and relief societies, animated with the same noble and generous feelings, have been established in Europe upon the exact model of those existing in America, and have also rendered immense services during the late wars.

Many of the objects, apparatus, and inventions used by the United States sanitary societies were collected together after much effort, and exhibited on the Champ de Mars, in the name of the United States Sanitary Commission.

To mention in detail the many very useful objects composing this collection would fill of itself a considerable volume, only brief notices of some of the leading articles will therefore be given.

Under the head of Ambulances of Transport, may be noticed:

1. The Howard ambulance; made from plans furnished by Dr. Benjamin Howard, of New York. It is a light, two-horse, four-wheeled carriage, designed to carry four persons besides the driver, two recumbent and two sitting, or eight persons sitting. The body of the ambulance is mounted on elliptic springs, and the stretcher mattresses are furnished with inferior and lateral counterpoise springs, which modify or altogether prevent concussions, and contribute greatly to the safety and comfort of the patients transported. There is also connected with it a special mechanical contrivance—a "sling"—for the suspension of wounded limbs when necessary.

2. An ambulance known as the Wheeling ambulance, improved by T. Morris Perot, of Philadelphia. This is a light, two-horse, four-wheeled vehicle, intended to convey four persons besides the driver, two recumbent, two sitting, or eight persons sitting. Perot's improvement consists in the employment of springs of caoutchouc. It is claimed that this improvement secures for the carriage an easy and agreeable movement, and an almost entire absence of concussion, even over the roughest roads. Aside from Perot's improvement, the ambulance is similar in its construction to those which, under the same name, were extensively used by the United States government during the late war.

3. An ambulance made by G. Brainard, Boston. This ambulance is intended to carry six persons besides the driver, four recumbent, two sitting, or eight persons sitting. The body is mounted on "platform springs;" the mattresses and seats are arranged on what is known as the "Rucker plan," the back of the seats being hinged on the top, so as, when opened inward, and locked, to form an upper tier of mattresses. The ambulance on exhibition was employed during the war in the hospital service for several months.

4. An ambulance, one of 30 of similar construction, given by the citizens of Philadelphia to as many fire companies of that city, and employed in the late war in conveying sick and wounded soldiers across the city from station to station. Not less than 3,000 soldiers were thus transported in this ambulance.

5. A model of a railway ambulance, or hospital car, made by Messrs. Cummings & Sons, Jersey City, from plans furnished by Dr. Elisha Harris, of New York. This model is a fac simile of the hospital cars employed during the war by the United States Sanitary Commission, on the railway between Washington and New York, as well as on several other military railways in other portions of the country. The model, constructed on a scale of one-fourth, shows in detail every thing—couches, dispensary, wine closet, water closet, systems of ventilation and heating, &c., employed in the construction and equipment of the sanitary com-

mission cars, while at the same time externally it perfectly represents the construction of an ordinary American passenger car. To it is attached a patent safety break, as well as a set of self-acting ventilators, furnished by W. Creamer, of New York.

The Evans ambulance, constructed at Paris by Dr. Thomas W. Evans, was made with the view of uniting a possible capacity for four persons recumbent, with lightness, easiness of movement, facility of loading and unloading, and simplicity. It was not finished until the last of August, so late as to be even *hors de concours* in the competition for the special prizes offered for the best ambulance by the *Société de Secours aux Blessés*. Nevertheless, such were its merits that the jury of the society saw fit to award to it a second prize of 500 francs, accompanied with an expression of regret that they were unable, in consequence of the fixed condition of the *concours*, to award it the first prize.

This ambulance can carry ten persons seated, besides the driver and one or two attendants, or four lying down and two seated, besides the driver and attendants, as in the first-named instance. The seats can be used each as a mattress upon the floor of the wagon, the iron wheels with which they are furnished resting, when in position, upon springs beneath the floor, the object being to place these supplementary springs out of the way, and where when once fixed they would be secured against accidents. For the upper tier four rings of caoutchouc are attached in front and rear to the sides of the wagon, two feet nine inches from the floor, two rings to an upright in the centre of the wagon, immediately behind the seat of the driver, and two rings to a hook which may be dropped from the rear centre. By means of this arrangement, so very simple as scarcely to be observed, unless special attention is directed to it, two ordinary French, English, or American stretchers can be suspended whenever necessary, and two additional wounded transported in the most comfortable manner. This ambulance, weighing about 1,300 pounds, is slightly heavier than the other American ambulances. The forward wheels turn readily under the body of the wagon; the top is covered with enamelled cloth, and folding seats are placed at the rear end, outside, for one or two attendants. It is furnished with a double tank for ice and water, and a box for a few necesssary supplies. Two stretchers are carried overhead inside and a supplementary one outside.

AMBULANCES OF SUPPLY.

1. A medicine wagon, known as Autenreith's, the fixtures having been furnished by G. Autenreith, of New York. The wagon is intended to carry for field service a full complement of the medicines authorized by the "supply table" of the medical bureau; also a set of hand litters, as well as a light, compact amputating table. Wagons of this kind were favorably regarded and extensively employed by the United States government during the war.

2. A medicine wagon, known as Perot's, constructed by T. M. Perot,

Philadelphia. In this wagon the drawers and compartments are adapted to carrying medicines in bulk, in parcels, and in bottles; the system of packing being such as to secure the latter against fracture, in certain instances by the employment of springs, in others by the employment of columns of compressible air, obtained by a simple device. A set of hand litters is carried, as also a strong amputating table.

3. An ambulance kitchen, invented by Mr. Pinner, of New York. The special purpose of this kitchen is to furnish soldiers, particularly the sick and wounded, while on the march, or on the battle field, with hot coffee, soup, and cooked food of various kinds. While possessing all the necessary apparatus of a well organized kitchen, it can be used with great advantage at all temporary encampments and hospital stations, and is so made and furnished as to be used, if needed, as an ambulance of transport.

4. A coffee wagon, invented by J. Dunton, of Philadelphia. The wagon exhibited designs to furnish the soldier on the march and on the field of battle with hot coffee and tea, was one of several in the service of the United States Christian Commission during the last months of the war, furnishing hot coffee and tea to the wounded of both armies.

HOSPITAL TENTS.

Several square tents are exhibited, similar to those generally used by the United States army.

The hospital tent, called the "umbrella tent," made by William Richardson, Philadelphia, is claimed to occupy less space when packed, to be more readily unpacked and erected, and when erected to be more convenient and secure, than either the square wall or Sibley's tent, which have hitherto been regarded with most favor.

An officers' "umbrella tent," made by N. Walton, St. Louis, is also exhibited, and claims to possess the same advantages as the one already mentioned. Its height is 11 feet, diameter at base 13½ feet, form octagonal. It is supported by a telescopic centre pole, slender T-iron rafters, and eight light wooden props.

In this collection appear a number of horse and hand litters on improved principles; pack saddles, old and new pattern; models, plans and lithographic views of various hospitals; a great variety of beds, stools, tables, mess chests, mess kits, surgical instruments and apparatus, invalid beds, mess panniers, hospital and field knapsacks, splints, fracture and amputating apparatus, artificial limbs, clothing used by the commission, food of all kinds, liquors, &c., bandages, comforts, cotton batting, crutches, and, in a word, everything necessary for the comfort and convenience of the sick and wounded soldier.

Under the head of material, historical and co-ordinate, are exhibited a number of books, pamphlets, and documents relating to the sanitary work, &c., &c.

A grand prize was awarded by the international jury, which was handed over to the United States Sanitary Commission.

LIST OF AWARDS

BY THE INTERNATIONAL JURIES TO EXHIBITORS AND OTHERS, FROM THE UNITED STATES AT THE PARIS UNIVERSAL EXPOSITION OF 1867.

For convenience of reference this list of awards has been alphabetically arranged. In the French official catalogue[1] the names are not placed in alphabetical order.

Each medal issued was accompanied by a framed diploma, which certified that a medal had been awarded. When two or more awards of medals were made to one person or association the number of diplomas issued corresponded with the number of awards, but only one medal was issued, and this medal was always of the highest denomination decreed to the exhibitor. No medals were issued with the diplomas of Honorable Mention.

NEW ORDER OF RECOMPENSES.

For persons, establishments, or localities, which, by organizations or special institutions, have developed harmony among co-operators, and produced, in an eminent degree, the material, moral, and intellectual well-being of the workmen.

Agricultural Society of Vineland, Charles K. Landis, New Jersey.—An Honorable mention, unaccompanied by a medal.

Chapin, William C., Lawrence, Mass.—Grand Prize, a Gold Medal of the value of 1,000 francs, and 9,000 francs in gold.

ARTISTS' MEDAL.

Church, F. E., New York city.—The Artists' Medal, with 500 francs in gold.—Landscape paintings in oil.

GRAND PRIZES.

Field, Cyrus W., and Anglo-American Transatlantic Telegraph Company.—Transatlantic cable.

Hughes, David E., New York.—Printing telegraph.

McCormick, C. H., Chicago, Illinois.—Reaping machines. See, also, Gold Medal.

By a decree of the Emperor, Mr. McCormick was created Chevalier of the Imperial Order of the Legion of Honor.

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[1] Catalogus officiel des Exponants Récompennés par le Jury International. 8vo. Paris: E. Deutu, Libraire-Editeur de la Commission Impēriael.

UNITED STATES SANITARY COMMISSION.—Ambulances, materials, instruments, &c., for the relief of the wounded, used in the late war. See, also, Honorable Mention.

GOLD MEDAL, WITH WORK OF ART.

WOOD, WALTER A., Hoosick Falls, New York.—Mowing machines. See, also, Gold Medal.

By a decree of the Emperor, Mr. Wood was created Chevalier of the Imperial Order of the Legion of Honor of France.

GOLD MEDALS.

CHICKERING & SON, New York and Boston.—Pianos.

By a decree of the Emperor, Mr. C. F. Chickering was created Chevalier of the Imperial Order of the Legion of Honor of France.

CORLISS STEAM ENGINE COMPANY, Providence, Rhode Island.—The Corliss engine.

FIRE-ARM MANUFACTURING INDUSTRY OF THE UNITED STATES.—Fire-arms.

GRANT LOCOMOTIVE WORKS, Paterson, N. J.—Locomotive and tender.

HOWE, ELIAS, Jr.—"Promoter of the sewing machine."

By a decree of the Emperor, Mr. Howe was created Chevalier of the Imperial Order of the Legion of Honor of France.

McCORMICK, C. H., Chicago, Illinois.—Reaping and mowing machines.

According to the rule of the Imperial Commission this medal is absorbed in the Grand Prize.

MEYER, VICTOR, Parish of Concordia, Louisiana.—Short staple cotton.

ROGERS, C. B., & Co., Norwich, Connecticut.—Wood-working machines.

SELLERS, WILLIAM, & Co., Philadelphia.—Machine tools.

STEINWAY & SON,[1] New York city.—Pianos.

TRAGER, LOUIS, Blackhawk Point, Louisiana.—Short staple cotton.

WALBRIDGE, WELLS D., New York city.—Gold and silver ores from Idaho.

WELCH, PATRICK, New York city.—Type-dressing machine.

WHEELER & WILSON MANUFACTURING CO., New York city.—Sewing and button-hole machines.

WHITE, SAMUEL S., Philadelphia.—Artificial teeth, and dentists' instruments and furniture.

WHITNEY, J. P., Boston, Massachusetts.—Silver ores from Colorado.

WOOD, WALTER A., Hoosick Falls, New York.—Reaping and mowing machines.

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[1] By the adoption of the alphabetical arrangement of the names in this list, already explained, the name of the firm of Steinway and Sons is here made to follow that of Chickering & Sons, but in the French official catalogue of awards the sequence is the reverse.

According to the rule of the Imperial Commission this medal is absorbed in the first accompanied with a work of art.

SILVER MEDALS.

ALABAMA, STATE OF.—Short staple cotton. See Honorable Mention.

AMERICAN BUTTON-HOLE COMPANY, Philadelphia.—Sewing and button-hole machines.

BAKER, WALTER, & CO., Dorchester, Massachusetts.—Chocolates.

BARNES, Surgeon General J. K., United States army, Washington.—Surgical instruments, hospital apparatus, &c.

BEMENT & DOUGHERTY, Philadelphia.—Machine tools.

BERGNER, THEODORE, Philadelphia.—Co-operator—engineer of Messrs. William Sellers & Co.

BIDWELL, J. C., Pittsburg, Pennsylvania.—Comstock's rotary spader.

BIGELOW, H., Boston, Massachusetts.—Copper and minerals from Lake Superior.

BLAKE, WILLIAM P., San Francisco, California.—California minerals.

BOND, WILLIAM, & SON, Boston, Massachusetts.—Astronomical clock and chronograph.

BROWN, J. R., & SHARPE, Providence, Rhode Island.—Screw-cutting and milling machines.

BURT, EDWIN C., New York city.—Machine sewed boots and shoes.

CALIFORNIA, STATE OF.—Cereals.

CAPE, CULVER & CO., New York city.—Hams.

CHAPIN & WELLS, Chicago, Illinois.—Model of a swing bridge.

CHICAGO BOARD OF PUBLIC WORKS, Chicago, Illinois.—Design of the lake tunnel.

CLARK THREAD COMPANY, Newark, New Jersey.—Cotton yarns.

COLLINS & CO., New York city.—Steel ploughs.

COLT'S PATENT FIRE-ARMS MANUFACTUING COMPANY, Hartford, Connecticut.—Fire-arms.

COOL, FURGUSON & CO., Glen's Falls, New York.—Barrel machines.

CROMPTON, GEORGE, Worcester, Massachusetts.—Loom for cloths.

CULBERTSON, BLAIR & CO., Chicago, Illinois.—Salted meats.

DABOLL, C. L., New London, Connecticut.—Fog-signal.

D'ALIGNY, H. F. Q.—Co-operator in the organization of the United States section.

DARLING, BROWN & SHARPE, Bangor, Maine, now of Providence, Rhode Island.—Steel measures.

DELPIT, A., & CO., New Orleans, Louisiana.—Snuff.

DIXON, JOSEPH, & CO., Jersey city, New Jersey.—Plumbago crucibles.

DOUGLAS AXE MANUFACTURING COMPANY, Boston, Massachusetts.—Edge tools.

DUFFIELD, CHARLES, Chicago, Illinois.—Hams.

FAIRBANKS, E. & T., & COMPANY, St. Johnsbury, Vermont.—Scales. See, also, under Bronze Medals.

FLORENCE SEWING MACHINE COMPANY, New York city.—Sewing machines.

FOURNIER, S., New Orleans, Louisiana.—Electric clocks.

GLEN COVE STARCH MANUFACTURING COMPANY.—New York city.—"Maizena" and starch.

GOTTHEIL, EDWARD, New Orleans, Louisiana.—Co-operator, services rendered to agriculture in Louisiana.

GREGG, ISAAC, Philadelphia.—Brick-making machine. See, also, Bronze Medal.

GUNTHER, C. G., & SONS, New York city.—Furs.

HALL, JAMES, & SON, Boston, Massachusetts.—Buggy.

HOWE, Dr. SAMUEL G., Boston, Massachusetts.—Works for the blind.

HOWE MACHINE COMPANY, New York city.—Sewing machines.

ILLINOIS CENTRAL RAILROAD COMPANY, Chicago, Illinois.—Agricultural products.

ILLINOIS, STATE OF.—Collection of minerals; farmer's house; schoolhouse. See, also, Bronze Medal.

JACKSON, Dr. CHARLES T., co-operator.—Discovery of emery.

LAMB, J. W., Rochester, New York; now of Ann Arbor, Michigan.—Knitting machine.

LAWRENCE, E., Louisiana.—Sugars.

MASON & HAMLIN, New York and Boston.—Cabinet organs.

NEVADA, STATE OF.—Silver and copper ores.

NEW YORK MILLS, New York.—Muslins.

OPPER, MORRIS, New York.—Loom for corsets.

PARK BROTHERS & COMPANY, Pittsburg, Pennsylvania.—Cast steel and edge tools.

PARTRIDGE FORK WORKS, Leominster, Massachusetts.—Steel hayforks, rakes, &c. See, also, Bronze Medal.

PEASE, F. S., Buffalo, New, York.—Petroleum oils. See, also, Honorable Mention.

PERRY, JOHN G., Kingston, Rhode Island.—Mowing machine.

This prize was gained in the field trials of agricultural machines. See, also, Bronze Medal.

PIGNÉ, Dr. J. B., San Francisco, California.—Minerals.

PROVIDENCE TOOL COMPANY, Providence, Rhode Island.—Peabody's patent fire-arms.

REMINGTON, E., & SONS, Ilion, New York.—Fire-arms.

RUTHERFORD, LEWIS M., New York city.—Astronomical photographs.

SCHULTZ & WARKER, New York city.—Mineral water apparatus.

SCHUTTLER, PETER, Chicago, Illinois.—Wagon.

SLATER WOOLLEN MILLS, Webster, Massachusetts.—Woollen fabrics.

SMITH & WESSON, Springfield, Massachusetts.—Fire-arms and cartridges.

SPENCER REPEATING RIFLE COMPANY, Boston, Massachusetts.—Spencer rifles.

TAFT, JOHN B., Boston, Massachusetts.—Emery from Chester, Massachusetts.

TIEMANN, GEORGE, & CO., New York.—Surgical instruments.

TOLLES, R. F., Canastota, New York.—Microscopes.

TUCKER, HIRAM, & COMPANY, Boston.—Iron ornaments, imitation of bronze.

UNITED STATES GOVERNMENT.—Specimen of frame house for settlers.

WALES, WILLIAM, Fort Lee, New Jersey.—Optical instruments.

WARDWELL, GEORGE J., Rutland, Vermont.—Stone-quarrying machine.

WASHINGTON MILLS, Boston, Massachusetts.—Woollen fabrics. See, also, Honorable Mention.

WEED SEWING MACHINE COMPANY, New York city.—Sewing machines.

WHITNEY, BAXTER D., Winchendon, Massachusetts.—Wood working machines.

WINDSOR MANUFACTURING COMPANY, Windsor, Vermont.—Ball's patent fire-arms.

WOOD BROTHERS, New York city.—Phæton.

YALE & WINN MANUFACTURING COMPANY, Shelburne Falls, Massachusetts.—Yale locks.

BRONZE MEDALS.

ABBEY, CHARLES, & SONS, Philadelphia.—Dentists' gold foil.

AMERICAN LEAD PENCIL COMPANY, New York city.—Lead pencils.

APPLETON, D., & COMPANY, New York.—Books.

BABCOCK, JAMES F., Boston, Massachusetts.—Rosin oil.

BALTIMORE AND CUBA SMELTING AND MINING COMPANY, Baltimore, Maryland.—Copper.

BARLOW, MILTON, Richmond, Kentucky.—Planetarium.

BARTRAM & FANTON MANUFACTURING COMPANY, Danbury, Connecticut.—Sewing and button-hole machines.

BEER, SIGISMUND, New York city.—Stereoscopic views.

BELMONT OIL COMPANY, Philadelphia.—Oils.

BRIGHAM, E. D., treasurer Portage Lake Smelting Works, Boston, Massachusetts.—Lake Superior copper.

BROWN & LEVEL LIFE-SAVING TACKLE COMPANY, New York city.—Disengaging tackle for boats.

CARPENTER, WILLIAM S., New York city.—Collection of corn.

CARROLL, JOHN W., Lynchburg, Virginia.—Smoking tobacco.

CUMMINGS, WILLIAM, & SON, Jersey City, New Jersey.—Model of a hospital car.

DAY, AUSTIN G., Seymour, Connecticut.—Indelible pencils and lead pencils in India-rubber cases. See, also, Honorable Mention.

DEERE & CO., Moline, Illinois.—Steel ploughs.

DEGENER & WEILER, New York city.—Printing presses.

DEPARTMENT OF AGRICULTURE, Washington.—Collection of cereals.

DISS DEBAR, J. H., Parkersburg, West Virginia.—Petroleum oils.

DOUGLASS MANUFACTURING COMPANY, New York city.—Edge tools.

DOUGLAS, W. & B., Middletown, Connecticut.—Pumps.

FAIRBANKS, E. & T., & Co., St. Johnsbury, Vermont.—Railroad scale. See, also, under Silver Medals.

FAIRCHILD, LE ROY W., & Co., New York city.—Gold pens and cases.

GEMÜNDER, GEORGE, New York city.—Stringed instruments.

GODDARD, C. L., New York city.—Mestizo burring picker.

GOODELL, D. H., Antrim, New Hampshire.—Apple parer.

GOODENOUGH HORSESHOE COMPANY, New York city.—Horseshoes. See, also, Honorable Mention.

GREGG, ISAAC, Philadelphia.—Model of a brick machine. See, also, Silver Medal.

HADLEY COMPANY, Holyoke, Massachusetts.—Sewing cotton.

HARRIS, D. L., Springfield, Massachusetts.—Engine lathe.

HAUPT, HERMAN, Philadelphia.—Tunneling machine.

HERRING, FARREL & SHERMAN, New York city.—Fire and burglar proof safes.

HOGLEN & GRAFFLIN, Dayton, Ohio.—Tobacco-cutting machine.

HOTCHKISS, H. G., Lyon, New York.—Oils of peppermint, &c.

HOTCHKISS, L. B., Phelps, New York.—Oils of peppermint, &c.

HOUGHTON, H. O., & Co., Riverside Press, Cambridge, Massachusetts.—Books.

HOUSE, HENRY A., Bridgeport, Connecticut.—Co-operator in the establishment of Wheeler & Wilson.

HOUSE, JAMES A., Bridgeport, Connecticut.—Co-operator in the establishment of Wheeler & Wilson.

HOWE, AMASA B., New York city.—Sewing machines.

HOWE SCALE COMPANY, Brandon, Vermont.—Scales.

HUDSON, E. D., New York city.—Artificial limbs.

HUMPHRES, JOHN C., parish of Rapides, Louisiana.—Short staple cotton.

ILLINOIS, STATE OF.—Cereals and flours. See silver medals.

JESSUP & MOORE, Philadelphia.—Papers.

JOHNSON, A. J., New York city.—Johnson's Family Atlas.

JOHNSON, BRADISH, Louisiana.—Sugars.

JOHNSON & LUND, Philadelphia.—Artificial teeth.

JUSTICE, PHILIP S., Philadelphia.—Power hammer.

KANSAS, STATE OF.—Collection of cereals.

LILIENTHAL, C. H., New York city.—Snuff and tobacco.

LILIENTHAL, THEODORE, New Orleans, Louisiana.—Photographic views.

LOUISIANA, STATE OF.—Portable cottage.

LYON, JAMES B., & Co., Pittsburg, Pennsylvania.—Pressed glassware.

MERRIAM, G. & C., Springfield, Massachusetts.—Webster's Illustrated Dictionary.

MISSION WOOLLEN MILLS, San Francisco, California.—Woollen fabrics.

MOODY, S. N., New Orleans, Louisiana.—Shirts.
MORRIS, TASKER & CO., Philadelphia.—Wringing machine.
MUMFORD, FOSTER & CO., Detroit, Michigan.—Boot-trees, lasts, &c.
MURPHY'S, WILLIAM F., SONS, Philadelphia.—Blank books.
OHIO, STATE OF.—Collection of cereals.
OLMSTEAD, L. H., New York.—Friction clutch pulley. See, also, Honorable Mention.
PARTRIDGE FORK WORKS, Leominster, Massachusetts.—Agricultural hand tools. See, also, Silver Medal.
PENNSYLVANIA, STATE OF.—Anthracite coal.
PERRY, JOHN G., Kingston, Rhode Island.—Mowing machine. See, also, Silver Medal.
PICKERING & DAVIS, New York city.—Engine governors.
PRATT & WENTWORTH, Boston, Massachusetts.—Heating apparatus.
RANDALL, SAMUEL H., New York city.—Mica.
RIEDEL, G. A., Philadelphia.—Automatic boiler feeder.
RICHARDS, RICHARD, Racine, Wisconsin.—Wool.
ROOTS, F. M. & P. H., Connersville, Indiana.—Rotary blower.
ROOTS, JOHN B., New York city.—Steam engine.
SACHSE, F., & SON, Philadelphia.—Shirts.
SARRAZIN, J. P., New Orleans, Louisiana.—Tobacco.
SCHEDLER, JOSEPH, Hudson city, New Jersey.—Terrestrial globes.
SCHREIBER, LOUIS, New York city.—Brass instruments.
SECOMBE MANUFACTURING COMPANY, New York city.—Ribbon hand stamps.
SHAW, CHARLES A., Biddeford, Maine.—Knitting machine.
SHAW, PHILANDER, Boston, Massachusetts.—Hot-air engine.
SLATER, SAMUEL, & SON, Webster, Massachusetts.—Cotton fabrics.
SMITH, MCPHERSON & DONALD, New York city.—Ales and porter.
SOUTHERN COTTON-GIN COMPANY, Bridgewater, Massachusetts.—Cotton-gins.
SQUIRE, JOHN J., New London, Connecticut.—Preserved fruits and vegetables.
STURSBERG, H., New York city.—Beaver cloths.
SWEET, JOHN E., Syracuse, New York.—Composing machine.
TAMBOURY, A., parish of St. James, Louisiana.—Tobacco.
TIFFANY & CO., New York city.—Silverware.
TOWNSEND, WISNER H., New York city.—Oil-cloths.
UNION BUTTON-HOLE AND EMBROIDERY COMPANY, Boston, Massachusetts.—Button-hole machine.
VAN DEUSEN, J. B., New York city.—Model of the yacht Fleetwing.
WARNER, G. F., & CO., New Haven, Connecticut.—Malleable iron castings.
WATKINS, C. E., San Francisco, California.—Photographs, landscapes.
WICKERSHAM NAIL COMPANY, Boston, Massachusetts.—Nail-cutting machine.

WILLIAMS, THOMAS C., & CO., Danville, Virginia.—Chewing and smoking tobacco.

WISCONSIN STATE AGRICULTURAL SOCIETY.—Agricultural products.

WISCONSIN, STATE OF.—Collection of minerals.

WISCONSIN, STATE OF.—Collection of cereals and flours.

WRIGHT, R. & G. A., Philadelphia.—Perfumery.

HONORABLE MENTIONS.

ALABAMA.—Short staple cotton. See No. 30.

ALLEN, JOHN, & SON, New York city.—Artificial teeth.

AMERICAN STEAM GAUGE COMPANY, Boston, Massachusetts.—Steam gauges.

AMERICAN WINE COMPANY, St. Louis, Missouri.—Sparkling wines.

ANDREWS, WILLIAM D., & BROTHER, New York city.—Oscillating steam engine.

AVERY, D. D., Petite Anse, Louisiana.—Rock salt.

BACON, S. T., Boston, Massachusetts.—Cracker machinery.

BAKER, GEORGE R., St. Louis, Missouri.—Dough-kneading machine.

BATES, R., Philadelphia.—Instruments to cure stammering.

BELL FACTORY, Huntsville, Alabama.—Cotton fabrics.

BUENA VISTA VINICULTURAL SOCIETY, San Francisco, California.—Sparkling Sonoma wine.

BORDEN, GAIL, New York city.—Extract of beef.

BOTTLER, CHARLES, Cincinnati, Ohio.—Sparkling Catawba wine.

BOURGEOIS, E., New Orleans, Louisiana.—Tobacco.

BRANDON KAOLIN AND PAINT COMPANY, Brandon, Vermont.—Specimens of paints.

BRAY & HAYES, Boston, Massachusetts.—Preserved lobster.

BROUGHTON & MOORE, New York city.—Oilers, cocks, &c.

BROWNE, D. JAY, Roxbury, Massachusetts.—Enamelled leather.

CHIPMAN, GEORGE W., & CO., Boston, Massachusetts.—Carpet lining.

CLARK STEAM AND FIRE REGULATOR COMPANY, New York city.—Steam and fire regulator.

COHN, M., New York city.—Crinoline.

COZZENS, FREDERICK S., New York city.—Cigars.

DART, HENRY C., & CO., New York city.—Rotary steam engine.

DAVIDSON, GEORGE, Washington.—Sextant.

DAVIDSON, JOHN, New Orleans, Louisiana.—Sugars.

DAY, AUSTIN G., Seymour, Connecticut.—Artificial India-rubber. See, also, No. 120.

DUFFY, JOSEPH, Paterson, New Jersey.—Designs for improvements in iron-clad vessels.

DWIGHT, GEORGE, Jr., & CO., Springfield, Massachusetts.—Steam pump.

EDSON, WILLIAM, Boston, Massachusetts.—Hygrodeik.

ELSBERG, Dr. LOUIS, New York city.—Specimens of peat fuel.

EMPIRE SEWING MACHINE COMPANY, New York city.—Sewing machines.

FRIES, ALEXANDRE, Cincinnati, Ohio.—Flavoring extracts.

GLASS, PETER, Barton, Wisconsin.—Mosaic tables.

GOODENOUGH HORSESHOE COMPANY, New York city.—Horseshoes. See, also, Bronze Medal.

GOULD, J. D., Boston, Massachusetts.—Mica.

HERRING, SILAS C., New York city.—Bullard's hay tedder.

HICKS ENGINE COMPANY, New York city.—Steam engine.

HIRSCH, JOSEPH, Chicago, Illinois.—Albumen, glycerine, &c.

HOLLIDAY, T. & C., New York city.—Aniline colors.

HOWARD, Dr. BENJAMIN, New York city.—Ambulance, &c.

HOWELL & BROTHER, Philadelphia.—Wall papers.

IOWA, STATE OF.—Collection of cereals.

JACKSON, J. H., New York city.—Minerals and fossils.

KALDENBERG & SON, New York city.—Meerschaum pipes.

KORN, CHARLES, Wurtsboro', New York.—Calf-skin leather.

LALANCE & GROSJEAN, New York city.—House-furnishing hardware.

LINTHICUM, W. O., New York city.—Cloth clothing.

LONGWORTH'S WINE-HOUSE, Cincinnati, Ohio.—Sparkling wines.

MCCORMICK, J. J., Williamsburg, New York.—Skates.

MARIETTA & GALE'S FORK PETROLEUM COMPANY, Marietta, Ohio.—Petroleum oil.

METROPOLITAN WASHING MACHINE COMPANY, New York city.—Clothes wringers.

METROPOLITAN WASHING MACHINE COMPANY, New York city.—Washing machines.

MINNESOTA, STATE OF.—Collection of cereals.

MOEHRING, H. G., agent of the Volcanic Oil and Coal Company of West Virginia, Philadelphia.—Volcanic lubricating oil.

MONTAGNE & CARLOS, New Orleans, Louisiana.—Black moss for upholsterers.

MORRIS, TASKER & CO., Philadelphia.—Pipe-cutting machine.

NEW HAVEN CLOCK COMPANY, New Haven, Connecticut.—Clocks.

OLMSTEAD, L. H., New York.—Machine tools. See, also, Bronze Medals.

ONEIDA COMMUNITY, Oneida, New York.—Preserved fruits.

PAGE, E. W., New York city.—Oars.

PAUL, J. F., & CO., Boston.—Specimens of wood.

PEASE, F. S., Buffalo, New York.—Pneumatic pump. See, also, No. 82.

PEROT, MORRIS T., Philadelphia.—Medicine wagon.

PLEASANT VALLEY WINE COMPANY, Hammondsport, New York.—Brandy.

PORTLAND PACKING COMPANY, Portland, Maine.—Preserved lobster and vegetables.

PRENTICE, J., New York city.—Cigar machine.

PURRINGTON, GEORGE, Jr., New York city.—Carpet sweeper.

ROBINSON, JAMES A., New York city.—Ericsson hot-air engine.

SABATIER, G., Plaquemine parish, Louisiana.—Sugars.

SELPHO, WILLIAM, & SON, New York city.—Artificial limbs.
SHELDEN, JOSEPH, New Haven, Connecticut.—Water-pressure regulator.
SMITH, ROBERT M., Baltimore, Maryland.—Petroleum oils.
STEAM SYPHON COMPANY, New York city.—Steam syphon pump.
STEPHENSON, JOHN, & COMPANY, New York city.—Street railway carriage.
STOCKTON, SAMUEL W., Philadelphia.—Artificial teeth.
TALLMAN & COLLINS, Janesville, Wisconsin.—Perfumery.
TAYLOR, CHARLES F., New York city.—Therapeutic apparatus.
TILDEN, HOWARD, Boston.—Sifter, tobacco-cutter, and egg-beater.
TOWNSEND BROTHERS, New York city.—Preserved fruits and oysters.
UNITED STATES SANITARY COMMISSION.—Camp material. See Gold Medal.
WALTEMEYER, JACOB, Baltimore, Maryland.—Preserved fruits.
WARD, J., & CO., New York city.—Clothes wringers.
WARD, J., & CO., New York city.—Washing machines.
WASHINGTON MILLS, Lawrence, Massachusetts.—Shawls. See, also, Silver Medals.
WELLMAN, C., New York city.—Saddles.
WERK, M., & SON, Cincinnati, Ohio.—Sparkling wines.
WHARTON, JOSEPH, Philadelphia.—Nickel, cobalt, and zinc.
WILLARD MANUFACTURING COMPANY, New York city.—Photographic camera tubes and lenses.
WILLIAMS, C. C., New York city.—Fruits preserved in syrup.
WILLIAMS SILK MANUFACTURING COMPANY, Bridgeport, Connecticut.—Silk twist for sewing machines.
WINSLOW, J. B., New York city.—Wood-moulding machine.
YOUNG, ISAAC, Leavenworth, Kansas.—Specimens of wood.
ZALLÉE, JOHN C., St. Louis, Missouri.—Clothing.

SUMMARY.

Grand prizes	5
Artist's medal	1
Gold medals	18
Silver medals	76
Bronze medals	98
Honorable mentions	93
Total awards	291

CHEVALIER OF THE LEGION OF HONOR.

By a decree of the Emperor the following gentlemen were created Chevaliers of the Imperial Order of the Legion of Honor of France:

C. H. MCCORMICK, Chicago, Illinois.
WALTER A. WOOD, Hoosick Falls, New York.
CHICKERING, C. F., New York.
ELIAS HOWE, Jr.

ERRATA.

Page 24, for Troyou, read Troyon.
Page 59, *et infra*, for furniture and other objects for the use of dwellings, read furniture and other objects for use in dwellings.
Page 64, 8th line from the bottom, insert comma after "this."
Page 80, for Montague, read Montagne.
Page 101, for Vienna, read Vienne.
Page 102, for Vanguelin, read Vauquelin.
Page 102, for National Association of Wool Growers, read National Association of Wool Manufacturers.
Page 103, for Oiseet Ere, read Oise-et-Eure.
Page 105, for fuchshine, read fuchsine.
Page 133 to 146 the head lines should be changed to conform to the classes.
Page 149, 5th line, for *pounds*, read *poods*.
Page 153, for Lannet, read Lannes.
Page 154, for usages, read uses.
Page 265, for Madona, read Madrona.
Page 287, for steam, read steam pump.
Page 315, at the foot of the page, the title of the catalogue should be corrected to read as follows: Catalogue Officiel des Exposants Récompensés par le Jury International. Paris. E. Dentu, Libraire-Éditeur de la Commission Impériale.