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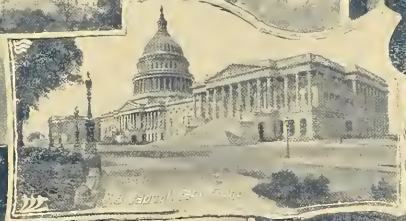
VIEWS OF WASHINGTON.



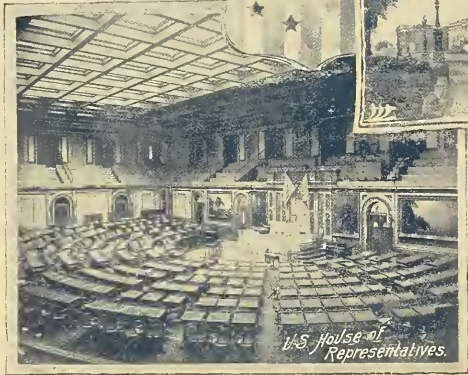
*U.S. Capitol
West Front*



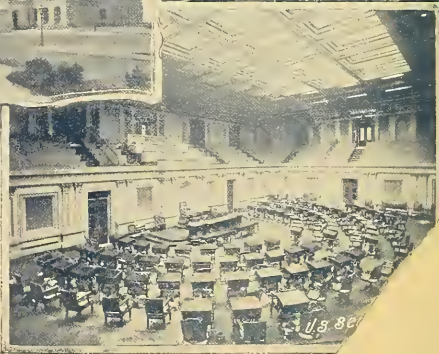
*U.S. Supreme Court Room.
Originally the Senate*



*U.S. Capitol
South Front*



*U.S. House of
Representatives*



U.S. 86



National Correspondence Institute,

INCORPORATED.

WASHINGTON,

DISTRICT OF COLUMBIA.

OFFICERS:

J. W. MCKINLEY, LL. M., President and Manager.
D. OLIN LEECH, M. D., Vice-President.
J. S. JOHNSON, A. M., Ph. D., Secretary.
MORRIS BIEN, Ph. B., Treasurer.

References—BY PERMISSION:

Second National Bank,
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DEPARTMENTS

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Shorthand and Typewriting;
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Engineering;
Journalism;
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CONSIDER THIS: You can take a complete course in any of the above departments at your home for one-fourth what it would cost you to go to a college, and at the same time continue your present employment.

OUR GUARANTEE—FIVE YEARS OF SUCCESS.

Communications for all Departments should be addressed to THE NATIONAL CORRESPONDENCE INSTITUTE,
Second National Bank Building, Washington, D. C.

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FACULTY 

OF THE

National Correspondence Institute.

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N 44

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BIEN, MORRIS, *Ph. B.* (University of California). Formerly Topographer U. S. Geological Survey.

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MENAUGH, WALTER L., Expert Printer and Proof-reader of twenty years' experience in the largest newspaper, book and miscellaneous printing offices.

ROBINSON, C. BARNWELL, *V. S.*, Dean of United States College of Veterinary Surgeons.

SCHWARTZ, GEO. W., Author of "Office Routine and Bookkeeping," bookkeeper, expert accountant and teacher of wide experience.

THOMPSON, GEO. G., Instructor in Pitman systems of Stenography. Expert reporter, convention, court and Government work.

WEST, HENRY LITCHFIELD, Formerly Managing Editor *Washington Post*.

What They Think of Us at Home.

Correspondence education is a field that is being rapidly filled. All educational branches are being as successfully taught by mail as in the colleges. To many this may be news, but it is not an experiment, as it has been in existence in this country for the past twenty years. Our city, which we proudly call the political and educational center of the Nation, has not been behind in this, as the National Correspondence Institute, with its corps of specialists, has been furnishing to the homes of the young men and women instruction which they possibly could never have obtained in any other way.—**The Star, Washington, D. C.**

The National Correspondence Institute of this city offers a striking example of what is being done by correspondence in an educational line. A few years ago such a thing was almost unheard of, although it had its origin in this country in 1873. At first it was confined to courses of reading, and no attempt was made to give instruction. Of recent years correspondence schools of law, languages, sciences, business, shorthand, and in fact, the teaching of all subjects of an educational nature, has met with flattering results, and thousands of young men and women have received an education at home that otherwise would have been beyond their reach.—**The Post, Washington, D. C.**

The National Correspondence Institute of this city is one of the best in the country. The instructors are all specialists in their respective branches and of high standing in educational circles.—**The Capital, Washington, D. C.**

The National Correspondence Institute of this city is meeting with deserved success. Ably managed, and conscientiously conducted by a faculty of our best educators, it is in the front rank of correspondence schools. * * * —**National Democrat, Washington, D. C.**

The National Correspondence Institute of this city is one of the best correspondence schools in the country. It is managed and operated by a corps of our best educators and citizens. * * * —**Republic, Washington, D. C.**

* * * This is a high-class school on the correspondence plan located in our city, and the men connected with it are of high standing in educational circles. The Institute is thoroughly reliable and has met with deserved success.—**Fourth-Class Postmaster, Washington, D. C.**

* * * This institution has, by five years successful work, established a reputation for stability, honesty and fair dealing, and we take pleasure in recommending the Institute to our readers.—**National Tribune, Washington, D. C.**

* * * The National Correspondence Institute is a regular incorporated company. It has been doing business for five years, which is a sufficient guaranty of its standing and reliability.—**National Bimetallist, Washington, D. C.**

* * * After a careful investigation of the business methods of the National Correspondence Institute and mode of teaching, the Inventive Age is pleased to announce that we are satisfied that this school is in every way thoroughly reliable.—**Inventive Age, Washington, D. C.**

The Religious Press.

* * * This is a reliable concern.—**Christian Work, New York City.**

* * * For five years the National Correspondence Institute, Washington, D. C., has been before the public and made for itself a high character for square and honest dealings with its correspondents.—**Epworth Herald, Chicago, Ill., and New York City.**

The National Correspondence Institute, Washington, D. C., has won fairly by honest work the reputation it now enjoys as one of the established and reliable institutions of the country.—**Christian Endeavor World (formerly Golden Rule), Boston, Mass., and Chicago, Ill.**

* * * This Institute now issues a very handsome Announcement containing much valuable information.—**Interior, Chicago, Ill.**

* * * Is justly entitled to its widespread reputation and success in educating.—**Baptist Union, Chicago, Ill.**

* * * It has been truthfully stated that "confidence is a plant of slow growth." The National Correspondence Institute, Washington, D. C., has made this growth, and now ranks among the best in the country for trustworthiness and reliability.—**Advance, Chicago, Ill.**

* * * We can recommend the National Correspondence Institute, Washington, D. C., as being thoroughly reliable in every respect and entitled to public confidence.—**Ram's Horn, Chicago, Ill.**

The National Correspondence Institute, Washington, D. C., justly takes the front rank among institutions of the kind, whether we consider its high character for reliability, its able corps of instructors in its various departments, or the successful work it has performed during its five years of activity.—**Examiner, New York City.**

Much has been said about extending the sphere of higher education by means of correspondence. It has the endorsement of the best educators and has been found to work admirably in practice. The representative of the "Inland," while in Washington on a recent visit, called at one of these institutions, the National Correspondence Institute. * * * He found this Institute thoroughly reliable, endorsed by the most trustworthy and intelligent people, doing a large and legitimate business, working on scientific and systematic lines, and giving entire satisfaction to all its patrons. * * * —**Inland, St. Louis, Mo.**

* * * Is unique in its scope and very satisfactory to its clients.—**New York Freeman's Journal, New York City.**

Stands in the first class for ability, industry, progressive methods, success and reliability.—**Congregational Work, Philadelphia, Pa.; Boston, Mass.; Chicago, Ill., and New York City.**

Its students by the thousands from Maine to California, and the reputation it has acquired for substantial work and honest methods, have established it as one of the permanent institutions of the country.—**Assembly Herald, Rochester, New York.**

The Educational Press.

Has proved its claim to be able to teach successfully by the correspondence plan by the actual work which it has successfully performed. It numbers students in every State in the Union and its enrollment list is steadily increasing.—**Public School Journal, Bloomington, Ill.**

The reliable character it has fairly won, both at home and throughout the entire country, the faithful and efficient work it has performed, its financial responsibility, and the manner in which it has availed itself of all that is valuable in new methods of education since it began its career, entitle it to the confidence of the public.—**Western School Journal, Topeka, Kans.**

The character of the institution is established on a high grade.—**Normal Instructor, Dansville, N. Y.**

* * * The National Correspondence Institute, Washington D. C., has been incorporated and in successful operation for five years, and has demonstrated its high character and usefulness by the first-class work which it has done.—**Teacher's Institute, New York City.**

* * * It is noted for its honorable dealings and straightforward methods.—**American School and College Journal, St. Louis, Mo.**

* * * Is thoroughly reliable and has met with marked success.—**American Journal of Education, St. Louis, Mo.**

* * * There is no better correspondence school in the country.—**Popular Educator, Boston, Mass.**

* * * Its instructors stand high in educational circles.—**American School Board Journal, Milwaukee, Wis.**

* * * Its instructors are gentlemen of high attainments.—**Teacher's World, New York City.**

* * * An institution commended by letters from thousands of its pupils in every part of the United States, endorsed by banks and business men, conducted by scholars and scientists and in successful operation for five years, is to be depended upon. Such is the National Correspondence Institute, Washington, D. C.—**Bookkeeper, Detroit, Mich.**

* * * Has already reached a degree of efficiency rarely attained under a decade.—**National Stenographer, Chicago, Ill.**

* * * It is incorporated the same as the leading universities of the country.—**Journal of Education, Boston, Mass.**

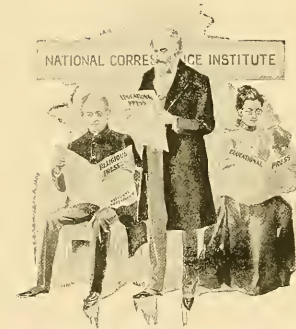
* * * Is worthy of every confidence.—**American Teacher, Boston, Mass.**

Miscellaneous Press Notices.

Its methods are the result of long experience and careful judgment in training its pupils.—**N. Y. Ledger, New York City.**

* * * The National Correspondence Institute, Washington, D. C., is a well established, efficient and reliable institution for giving instruction by mail, not only in the scholastic branches, but also in sciences as applied to some of the useful arts.—**Comfort, Augusta, Me.**

* * * A "Record" representative personally visited the Institute, which occupies two commodious floors in the Second National Bank building, to ascertain the scope and extent of its work and the satisfaction it is giving. Mr. J. W. McKintley, the manager, is a cultured gentleman, who stands high in the esteem of the leading citizens of the National Capital. He afforded the writer every facility to fully inform himself on the object of his visit.—**Evening Record, Allegheny, Pa.**



The Institute is conducted by a combination of specialists.—**Scientific American, New York City.**

* * * This young but already famous University of Toilers is surely and purposely practical. It does not concern itself with sculpture or painting, with theology or metaphysics, or with anything that might be classified as ornamental rather than utilitarian. Its seven departments are devoted to such eminently businesslike branches as Bookkeeping and Business, Shorthand and Typewriting, Science, Journalism, Engineering, Drafting and Civil Service Examinations—all under the direction of specialists whose names are guarantees.—**Railway Agent and Station Agent, Cleveland, Ohio.**

* * * This National Correspondence Institute occupies a peculiar field and in its way has been eminently successful. The management of it is thoroughly reliable. * * * —**Irish World, New York City.**

* * * It employs the latest up-to-date forms and may be relied upon.—**Industrial Printer, Chicago, Ill.**

This Announcement is devoted to the interests of the

Department of Engineering,

MORRIS BIEN, Ph. B.,
Principal.

FACULTY.

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Member American Society Civil Engineers; formerly Asst. Examiner,
U. S. Patent Office, Division of Hydraulics.

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U. S. Geological Survey.

LOUIS D. BLISS. President Bliss School of Electricity, Washington, D. C.

C. W. H. BROWNE, B. M. E., (University of Maine). Formerly Draftsman,
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Creek Ry., District of Columbia; and Engineer-in-Charge, Maintenance
and Way, Eastern Division Wabash R. R. Co.

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of Mechanical Engineers; formerly Resident and U. S. Asst. Engineer,
Muscle Shoals Canal, Alabama.

National Correspondence Institute,

(INCORPORATED.)

Department of Engineering.



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| 1. <i>Surveying and Mapping.</i> | 11. <i>Practical Steam Engineering.</i> |
| 2. <i>Higher Surveying</i> | 12. <i>Architecture.</i> |
| 3. <i>Railroad Engineering.</i> | 13. <i>Architectural Drawing and
Designing.</i> |
| 4. <i>Electrical Engineering.</i> | 14. <i>Architectural Drawing.</i> |
| 5. <i>Structural Engineering.</i> | 15. <i>Complete Mechanical and Topo-
graphical Drawing.</i> |
| 6. <i>Hydraulic Engineering.</i> | 16. <i>Mechanical Drawing.</i> |
| 7. <i>Sanitary Engineering.</i> | 17. <i>Higher Mathematics.</i> |
| 8. <i>Municipal Engineering.</i> | 18. <i>Advanced Mechanics.</i> |
| 9. <i>Mechanical Engineering.</i> | |
| 10. <i>Steam Engineering.</i> | |



THOROUGH PREPARATION AT YOUR OWN HOME
OUTSIDE YOUR WORKING HOURS,

For a successful career in any of the numerous
branches of Engineering.



THE QUALIFICATIONS

For Enrollment :

The ability to read and write English.

For Successful Study :

The desire to learn.

WE DO THE REST by methods that have proved so successful with the thousands who have already had the advantages of the instruction of the National Correspondence Institute, and have gratefully testified to the benefits they have received from our careful and judicious instruction.

ARE YOU SATISFIED with your present place? Would not a knowledge of the principles governing the operations that form your daily work open a way for your future advancement? You must see plainly that many places of responsibility are beyond your reach merely because you have not had the chance to get the education in scientific and technical matters which those who occupy such places have had. And yet there is very often no difference in natural ability; in fact, it sometimes happens that the subordinate is the superior in natural gifts, yet he finds the lack of scientific education a **very wall** that prevents him from passing on to the higher places.

WE UNDERTAKE TO REMOVE THAT BARRIER and will educate you, if you are willing to study, so that this lack of knowledge will not prevent your progress to the highest places that your ability and your industry can carry you.

OUR METHODS are simple and failure is practically impossible if the student will do his share in careful and honest work. We send him lectures and questions in clear, simple language, accompanied by illustrations and drawings whenever they are necessary to explain the work. The course proceeds gradually, step by step, from the simplest beginnings of Arithmetic to the various technical subjects of each branch. The student is kept supplied with lectures and questions in advance of the work on which he is engaged, to be taken up when he has sent us the answers to the questions on the last lecture he has learned. While we examine his answers, he is engaged upon the work next in order, which has been previously sent to him. If his answers are satisfactory they are returned to him with the lecture and questions next in order to those on which he has meanwhile been engaged. We comment on his work and point out the matters requiring further attention. If his work is not satisfactory, the faults are pointed out, and complete careful explanations and suggestions are given so that the difficulties may be mastered. In such cases new work is not sent until that which is in hand has been thoroughly learned. If the student finds any difficulty in the lectures or questions which he is unable to overcome without assistance, we urge him particularly to submit the trouble to us, and we take great pains to explain the matter, so as to clear away his doubts and difficulties. This we do most cheerfully, for we propose to leave no weak points behind us in our progress with the student.

Each student is thus **A CLASS BY HIMSELF**. All explanations are directed toward his own difficulties, and his time is not taken up in discussing matters which he fully understands, in order to help some other student, as must always be the case in class-work. He begins the course whenever it suits him; he goes through it just as fast as he learns it and no faster. He may finish in less time than the average, or he may take three times as long. **We willingly continue the instruction until he has learned the whole course.**

The student's work is always ready for him. If he has a few minutes he can sit down to it in his own room, or he can study

while travelling. In the early morning or late at night, at every minute of the day, his instructor is at his elbow ready to take up the lesson. The hours and sessions of the class, the length of the terms and the vacations all suit themselves to the student's own necessities. His course of instruction proceeds with exactly the speed that he learns it. He will be surprised to find how much can be accomplished by using every minute of his spare time. He will soon come to value most highly the many ten minutes of waiting when nothing else can be done.



A GENERAL EDUCATION is an incidental part of the course, for we note the student's faults in spelling, punctuation, writing, and use of the English language. No student can complete our course without improvement in his use of language and great additions to his general knowledge.

Very often a man, anxious to improve himself, will take up some book upon his daily work. He finds its pages bristling with strange combinations of letters and unfamiliar signs, and soon gives up in despair. We start every student at the very beginning, with ordinary arithmetic, and in a surprisingly short time those meaningless signs become to him as clear and simple as a child's primer.

No one is too old, no one is too slow, if he is willing to give his spare time and do earnest work with the course, to acquire a thorough working knowledge of the profession which he is studying under our care.

Our courses are intended to give to those who cannot spare the time and money necessary for a college course, and who are willing to work for it, a practical knowledge of a profession, and such thorough acquaintance with its scientific principles that he will be prepared to make his way in it, as well as any other person of equal ability and industry. **In short, to bring the College right into his very home.**



There are many professions in which a workingman, familiar with its practical operations will, with the aid of our course, find himself better equipped for advance than many a college graduate. The man who has worked at the construction of bridges, or is an expert in the practical operation of a steam engine, after completing our course in structural engineering, or steam engineering, will be the possessor of a working knowledge that would be the envy of many men highly educated in the theory, but with little knowledge of the practical features of his profession. Even where the student is not engaged in work connected with his course our instruction qualifies him for the work of his profession.



This valuable equipment for the student's life-work can be acquired at SMALL EXPENSE and without interfering with the student's daily work. The course costs less than is required to purchase the text-books in a college course, for no text-book is needed in studying by our methods. Our lectures and questions, furnished without extra charge, constitute thorough text-books in every branch.

To put it entirely within the reach of any one who really desires to improve himself, the National Correspondence Institute will receive the instruction fee in monthly installments of \$2 or \$5 each at a slight advance on the cash price.

No.	COURSES.	Cash in advance.	Installments \$5 per month.	Installments \$2 per month.
1	SURVEYING AND MAPPING.....	\$25	\$30	\$34
2	SURVEYING, MAPPING AND HIGHER SURVEYING.....	50	55	60
3	RAILROAD ENGINEERING.....	40	45	50
4	ELECTRICAL ENGINEERING.....	35	40	44
5	STRUCTURAL ENGINEERING.....	40	45	50
6	HYDRAULIC ENGINEERING.....	50	55	60
7	SANITARY ENGINEERING.....	50	55	60
8	MUNICIPAL ENGINEERING.....	50	55	60
9	MECHANICAL ENGINEERING.....	35	40	44
10	STEAM ENGINEERING.....	35	40	44
11	PRACTICAL STEAM ENGINEERING...	20	24	28
12	ARCHITECTURE.....	50	55	60
13	ARCHITECTURAL DRAWING AND DESIGNING.....	35	40	44
14	ARCHITECTURAL DRAWING.....	25	30	34
15	COMPLETE MECHANICAL AND TOPOGRAPHIC DRAWING.....	30	35	39
16	MECHANICAL DRAWING.....	25	30	34
17	HIGHER MATHEMATICS.....	50	55	60
18	ADVANCED MECHANICS.....	50	55	60

The cost of instruction is so low that anyone who earnestly desires to do the work will find it possible to take a course. WE ARE WILLING TO HELP, IF YOU WILL CONSCIENTIOUSLY DO YOUR PART.



A description of each course separately is given in the **Second Part of this book.** There will be found the various subjects taught, and other matters of value to those considering the advisability of taking a course of study.



In addition to the cost of instruction, as given in the preceding table, the expense to the student comprises only three items: Cost of paper, postage on matter which he sends to us (we prepay postage on all matter sent from the Institute), and the materials and instruments required in the work in drawing.

Cost of paper cannot be accurately stated, but it will average \$2 to \$3 for the course. Postage will average from \$2 to \$3 for the course. Cost of drawing instruments and materials will be from \$8 to \$12. Paper, drawing instruments, and material will be furnished by the Institute at reasonable prices if desired.

Envelopes and necessary blanks are furnished by the Institute without charge.

If the student, when making his application is proficient in the preliminary subjects of a course, he will, after passing the examinations necessary to satisfy us of the fact, be permitted to take up the more advanced subjects. But no deduction can be made on this account, as there is no saving of any consequence to us. See page 13.

Failure to pay any installment when due, will interrupt the instruction of the student, unless satisfactory arrangements have been made in advance, but as soon as he has paid up his arrears he will be permitted to continue, and we will carry on the instruction until he has properly completed the course.

If from sickness or other reasonable cause the student is compelled to cease work on his course for a time, he will, upon stating his case to the Institute, be permitted to suspend work until such time as he is able to take it up again.

MONEY PAID FOR INSTRUCTION WILL NOT BE REFUNDED IN ANY CASE, as we stand ready to carry out our part of the agreement and furnish the instruction. But the student may transfer his right to instruction to another person on the payment of a fee of \$1 if the latter is capable of continuing from the point where the former left off.

But if it is found necessary to review any part of the work with the new student, a moderate charge will be made for such extra instruction.



OUR INSTRUCTORS are all experts in the branches they teach; they have all had extensive experience in their lines of instruction and are familiar with all the practical and theoretical features of the courses they conduct. Examine the list on page 5 and you will see that they have all occupied responsible positions in one branch or another of Engineering Work. They are prepared to aid you in acquiring the subjects by every effort in their power, and with all the resources of a complete acquaintance with the principles and practice of the professions you are trying to learn. We want every student when he has finished his course to be thoroughly taught in the branches he has taken. For that will do us more good than to turn out twice as many who are but half-instructed.

We rely upon the results of the instruction we give our students for our most effective advertisement.

At the end of the work a thorough examination must be passed to obtain the Certificate which is awarded for proficiency in the course which has been pursued.



DEGREES.

The National Correspondence Institute is authorized by law to confer degrees upon its graduates. The degrees of Civil Engineer (C. E.), Mechanical Engineer (Mech. E.), Electrical Engineer (E. E.), and Bachelor of Philosophy (Ph. B.) will be conferred upon students who have taken the necessary courses in this Institute, as below, and passed the required examinations.

For the degree of CIVIL ENGINEER (C. E.) the following courses must be completed :

Surveying, Mapping, Higher Surveying, Higher Mathematics, Railroad Engineering, and Structural Engineering.

For the degree of MECHANICAL ENGINEER (Mech. E.) the following courses must be completed :

Mechanical Engineering, Higher Mathematics, Advanced Mechanics, Structural Engineering, and Hydraulic Engineering.

For the degree of ELECTRICAL ENGINEER (E. E.) the following courses must be completed :

Electrical Engineering, Higher Mathematics, Mechanical Engineering, and Structural Engineering.

For the degree of BACHELOR OF PHILOSOPHY (Ph. B.) the student will be allowed to select a set of courses, which, however, must be approved by the Institute as sufficiently extended in scope before it can be accepted as a proper preparation for the degree.

Students taking the course for a degree will be allowed a liberal discount on all courses after the first.

Students may take each of the courses necessary for a degree separately, and will be entitled to the degree upon completing them. The aggregate cost will be the same as if the student had entered for the degree in the beginning. See pages 13, 42 and 43.

There is no extra charge for the expenses connected with the conferring of the degrees.

In conclusion we would once more impress upon students, artisans and wage-earners of all classes the great value of these courses. **Remember always that nothing sticks like the thought you put in black and white. What you read and what you write.**

To the worker in metals, such as those employed in foundries, machine shops, or bridge works, our courses in Structural Engineering, Mechanical Engineering, Steam Engineering and Electrical Engineering offer an opportunity of gaining a more thorough knowledge of that particular development of his work to which his tastes most strongly incline. These courses, together with our other courses in Surveying, Hydraulic, Sanitary, Municipal and Railroad Engineering, Architecture and Drawing open a wide field of choice to all who desire to make an effort to qualify themselves to take a higher place among their fellowmen. A field in which we are sure that every earnest worker can find a subject suitable to his abilities and in accord with his preference; while our five years of experience in correspondence work, and our corps of instructors, fully equipped experts in both the theoretical and practical branches of their subjects, are positive assurances that the student will attain the greatest possible results from the work he does under our direction.



❖ PART II. ❖

Course in Surveying and Mapping.

ALSO A 

Course in Higher Surveying.



THE foundation for the study of this course is mathematics, and in this subject we give thorough instruction covering all the matters necessary to an understanding of the operations and computations of surveying. The surveyor must also be a draughtsman, and our course will give him a valuable training in the different classes of work which a surveyor is called upon to do. This part of the course not

only fits him for the drawing necessary for the surveyor, but also gives him a considerable acquaintance with the general principles of mechanical drawing.

The study of Surveying itself will cover the methods in common use, from those employed in the simple surveying of farm boundaries to the more exact and complicated methods of railroad, mining and hydrographic surveying. The modes of keeping field-notes for the different classes of work will be thoroughly discussed, and

the student will receive valuable information on this subject, one that is seldom treated as its importance deserves.

The methods of platting and computing the results of the different kinds of surveys will be fully and carefully explained.

The student will be made acquainted with the methods of mapping considerable areas; that is topographic surveying and drawing, including a discussion of triangulation, stadia work, and the determination of heights.

Exercises in surveying without the use of the ordinary instruments will be given, and the student will have an opportunity to become familiar with and apply in practice many methods and operations of actual field and office work.

This course presents a favorable opportunity for surveyors' assistants, such as rodmen, chainmen, etc., who wish to advance themselves in the profession of surveying by learning the subject properly, instead of picking it up haphazard by experience. The latter method produces the many incompetent surveyors we find everywhere, who are able to do a few things, those they have seen others do; but are hopelessly lost when confronted by some

unusual condition or are called upon to do some work, simple enough in principle, but new to them. By our thorough and systematic instruction the student can learn the whole subject, and be ready to apply his knowledge to meet every new problem that arises in his work.

Working with a competent surveyor may give good results; but more often it does not. For the surveyor seldom has the time or the inclination to give the necessary instruction, while it often happens that he does not have the knack to impart his information in such a systematic way as to do any good to the learner.

There are many professional draftsmen who need a course in surveying to enable them to properly perform the work of platting field notes which they are called upon to do from time to time.

There are many others who have a great desire to become surveyors, but cannot give up their present employment to study in a college. To such persons our course offers the very chance they need to attain the knowledge of their chosen profession.

Higher Surveying.

The course in Higher Surveying is added so that the student may obtain a knowledge of the most accurate methods, such as are used in the operations of the U. S. Coast and Geodetic Survey and the U. S. Geological Survey. In this course will be taken up the various branches of Geodetic Sur-

veying, that is, surveying in which the true spheroidal shape of the earth is taken into consideration.



While the surveyor is not often required to do work of this kind outside of the Government surveys, yet a knowledge of it is often a matter of great importance to him. The accuracy of his own work may frequently depend upon his thorough understanding of the methods used in this higher class of work; as, for instance, when it becomes necessary for him to use the results obtained by it.

The importance and in fact the necessity of this higher course for the proper rounding out of the surveyor's knowledge of his profession can be judged from the following synopsis:

Measurement of base lines, observation of angles for primary and secondary triangulation, observations for determining latitude and longitude, with sufficient instruction in Astronomy to enable the student to understand the methods employed, and the computation and adjustment of geodetic observations.

Further instruction is given in the methods of surveying as applied to these more extensive operations, with instruction in the use of the plane table, and the methods of precise levelling.

Course in Surveying and Mapping.

Mathematics—Arithmetic, Algebra, Geometry, Trigonometry.
Drawing and Mapping.

Land Surveying—U. S. Public Land Surveys.
Computations.

Level and Grade Lines.
Stadia Rod.

Railroad, Mine, City and Hydrographic Surveys.
Laying out Streets, Towns, Roads and Parks.
Topographic Surveys and Triangulation.

Heights by angle and barometer.

Field-notes and platting—general discussion.

Projections and Map work.

Higher Surveying.

Geodetic Surveying—Base lines, Primary Triangulation, Astronomy, Latitude and Longitude, Computation and Adjustment.

Secondary Triangulation.

Topography.

Plane Table.

Precise Levelling.

Terms for the Course.—**\$25 in advance; or \$30 in \$5 installments**, as follows: \$5 with application and five additional monthly payments of \$5 each; or \$34 in \$2 installments, as follows: \$2 with application and 16 additional monthly payments of \$2 each.

Higher Surveying, **\$25 in addition to the above**, or five additional monthly payments of \$5 each; or 13 additional monthly payments of \$2 each. Certificates of proficiency are awarded to students satisfactorily completing the courses.

The degree of **Civil Engineer** (C. E.) will be conferred on students who complete the courses of Surveying, Higher Surveying, Higher Mathematics, Railroad Engineering and Structural Engineering.

For further information as to degrees see page 10.

Any further information desired will be cheerfully furnished.

I know that the work you've given me to do has been of the greatest benefit and help to me. You will find the Institute honest and upright in all their dealings. I have found them so, from experience. I can, and am glad to speak in the highest praise and best wishes for the Institute and would urge again that no one should miss enrolling for a course with you. The Institute can use my full name for reference with perfect freedom. Would also say that to any one who doubts this letter as genuine just enclose a *self-addressed, stamped envelope* to me and I'll convince you that this is not trumped up but a real fact.—JAMES WARREN LITTLE, 1101 West Stoughton Ave., Urbana, Champaign Co., Ill.

DEGREES.

If you have done work elsewhere equivalent to any of our courses and wish to take a degree, you can complete your work with us and obtain your degree. It will of course be necessary to pass an examination in the corresponding work of our courses before you will be allowed to omit them in your preparation for a degree. See pages 10, 42 and 43.

Our Students say—

I have been greatly benefited by your course so far, and it has been of a great benefit to me and I will highly recommend it to any one.—H. M. MOLEK, care Cross Press & Sign Co., 206 Illinois St., Chicago, Ill.

I owe you thanks for your excellent instruction. I can now see that your method is the best that can be obtained.—M. C. MOMMSEN, 819 W. Chicago Ave., Chicago, Ill.

Again thanking you for the assistance received from your institute, I remain, * * * I sincerely thank your institute for the benefit I derived. You have done everything you claimed.—PAUL C. SCHWANTES, 895 W. 21st Place, Chicago, Ill.

I will now gladly say that the money I spent, to receive instruction from you, is a mere drop in the bucket when compared with the benefits I received.—WM. A. SHEK, 106 S. Amity St., Baltimore, Md.

I have been very much pleased by the result of my study with your Institute, and have recommended the course to many of my friends, several of whom have enrolled. * * * —E. J. CHEEVER, Lowell, Middlesex Co., Mass.

* * * And if ever it lies in my power to help or say a good word for you you can certainly depend on me for that. * * * —JAS. GAGAN, 139 Chestnut St., Chelsea, Suffolk Co., Mass.

Gentlemen: I must praise you again for your valuable assistance and instruction I have received from you. I now know that I cannot help making a success in the near future with your valuable assistance.—EDWARD GOETHE, 1327 Blair Ave., St. Louis, Mo.

Permit me to heartily thank you for your warm personal interest in me and my welfare. Some day I hope I may be able to repay you in a measure for your kindness.—GODLOVE C. SEIBERT, 170 Ridgewood Ave., Glen Ridge, Essex Co., N. J.

It gives me great pleasure to acknowledge the promptness of all your communications. You may rely on me to use my influence among my friends and do so to the best of my ability.—LEONARD FISCHER, 154 S. 3d St., Brooklyn, N. Y.

I have the most implicit confidence in your institution, and am willing to take your advice on anything.—BRANWELL C. HOLWICK, 1003 W. 4th St., Canton, Stark Co., Ohio.

Course in Railroad Engineering.



THE railroads have an important part in the development of our country, and the work of constructing railroads continues through all periods, whether of good times or bad. The building of railroads within our cities, and from one to another for the development of the country lying between them, has created a considerable demand for railroad engineers in the

East, while the development of the newer country of the West has added to the demand, so that the future of railroad engineering is most promising.

Many of the larger railroad companies employ from fifty to five hundred men in their engineering departments, and in most of them, notably the great Pennsylvania Railroad Company, promotion from the lowest grades to the highest is based entirely upon the industry and ability of the employe. It is a great encouragement to railroad engineers to know that the late President of this company began in its service as a rod man, and gradually worked his way upward through the engineering force, till at last his ability placed him in the presidency; and this instance does not stand alone, for in all companies the Engineering department is one of the most important, and many of the highest offices are filled from that branch of the force.

Our course in Railroad Engineering will give the student a sound foundation for the technical work of the profession, and will render him capable of entering upon the practical duties of railroad engineering.

Mathematics.—In this subject the student will begin with arithmetic, and continue with algebra, geometry and trigonometry making a course in mathematics which will qualify him to thoroughly understand the computations generally required of the railroad engineer.

Mechanics.—The student will take a thorough course in elementary mechanics and physics in which he will be carried far enough to take up the special subjects of railroad construction which are based on these studies.

Drawing.—The work in drawing will cover preliminary instruction in the general principles of mechanical drawing, followed by instruction and exercises relating specially to railroading.

The student will then take up the subject of **Railroad Engineering** itself, going thoroughly over its various branches; starting with the preliminary office work and passing through the entire location, construction and equipment of a railroad; giving also some attention to the important questions of maintenance.

The following outline of the course will show the completeness with which the subject is covered:

Railroad Engineering.

Mathematics—Arithmetic, Algebra, Geometry, Trigonometry.
 Mechanics and Physics.
 Mechanical Drawing.
 Surveys—Reconnaissance, Party Organization, Instruments,
 Projection of Line, Field-notes, Transit and Triangulation
 work, Levelling, Topography.

Location—Grades, Curves, Preliminary Estimates, Specifications, Contracts.

Construction—Cross-section, Slope, Staking out and calculating work, Drainage, Frame structures, Steam shovel work, Auxiliary work, Estimates, Track work.

Maintenance—Line work and repair, Yard arrangement, Maintenance in general.

Terms for the Railroad Engineering Course.—\$40 in advance; or \$45 in \$5 installments, as follows: \$5 with application and eight additional monthly payments of \$5 each; or \$50 in \$2 installments, as follows: \$2 with application and twenty-four additional monthly payments of \$2 each.

Certificates of proficiency are awarded to students satisfactorily completing the course.

The degree of **Civil Engineer (C. E.)** will be conferred upon students

completing the courses of Railroad Engineering, Surveying, Higher Surveying, Higher Mathematics and Structural Engineering.

For further information as to degrees see page 10.

Any further information desired will be cheerfully furnished upon application.



A Chance for Everyone.

Hundreds of men who have distinguished themselves in literature, art, science and statesmanship have done so without the help of colleges but by their own unaided efforts; we are not all Lincolns to do this without help. But the opportunity offered to all by this Institute leaves no obstacle in the way of any sincere worker.

We Have Helped These—We Can Help You.

As for your work you have given me, I think no other institute could have done better. I am very well satisfied and thank you for what you have done.—J. D. NONKEN, JR., BOX 34, Golden Gate, Alameda Co., Cal.

I am very well pleased with your system, and am sorry that I did not get to work on it sooner.—JOHN M. LITTLE, 767 Castor St., Oakland, Alameda Co., Cal.

I must say your instruction is most thorough and as you now have guided me I shall resume my studies on the lines laid out by you.—J. M. DELIVERY, 77 Main St., Hartford, Conn.

When I started studying under your directions I was awfully rusty. I can see a great improvement, not only that but I feel a desire to keep to work and improve still further. I trust you will at any rate accept my sincere thanks for the work you have done.—JAMES STRETCH, 90 Meridian St., Meriden, New Haven Co., Conn.

I am more than satisfied with the instruction I have received from you, and feel grateful for the constant interest you have taken in me, and am satisfied that I can send in other names to you which you can get to enroll.—W. A. SMALL, 46 Mohr St., Chicago, Ill.

* * * I think your school is strictly as you represent it to be, * * *—BURT E. LEW, 11 High St., Huntington, Ind.

I never had dealings with any one who carried out his agreement more faithfully than you have, and will ever be ready to put in a good word for you.—FRANCIS BRADY, 4 Fourth St., E Cambridge, Suffolk Co., Mass.

Am ever so much pleased with your course of instruction, and consider that the money could not have been used for a better purpose. * * * The instruction is cheap at double the price.—FRED C. PULLIN, 28 Lemon St., Newark, N. J.

I must take this opportunity of thanking you for the interest you take in me, and also to express my admiration of your manner of instruction.—Wm. MERRIFIELD, 207 King St., Brooklyn, N. Y.

I want to do just the right thing by you as you have so far done with me. Once more I thank you a hundred times, and any one you wish to refer to me I will cheerfully correspond with.—GEO. S. SABIN, 4 Grove St., Rochester, Monroe Co., N. Y.

I am very much pleased with your instruction.—HENRY M. BOHLEN, 535 E. 5th St., New York City.

Course in Electrical Engineering.



HERE is a constantly increasing demand for men skilled in designing, constructing, installing, testing, and operating electrical machinery of every conceivable nature, and as the demand increases there is not an equal increase in the supply of skilled labor. The reasons are obvious. Many would fit themselves for holding these positions were it not that their business will not permit them to leave their homes or they are financially

unable to take such a course in institutions established to teach by personal attendance.

Those who fit themselves by the correspondence method for the electrical profession, will find without much difficulty some opening either as Wiremen, Foremen, Contractors, Linemen, Motormen, Central Station Superintendents or Constructing Engineers, where they all may obtain a foothold; which, while it may be small from a remunerative standpoint at the beginning, is sure to develop in the future into some position of a far more satisfactory character than could be held by any one not versed in the science of electricity.

Those who are now employed in electrical establishments should be well acquainted with the principles underlying the construction of the machines which they may handle. By studying an infinite number of books one might eventually find the information he sought, but in our method of instruction no books are necessary, our instruction papers giving in a clear and comprehensive manner a thorough explanation of the principles of all apparatus of an electrical nature, whether it be the simplest electric bell or the most complicated alternating current dynamo.

No education is complete to-day without an understanding of electricity and this can only be obtained by careful instruction under the direction of those who have spent years in studying the principles involved in electricity and magnetism, and are thus competent to direct the study of one who seeks an education in this science.

There are men in the electrical business to-day who are no farther advanced than they were ten years ago, whose daily round of duties never takes them out of the old route, and the marvelous strides made in electricity in the past few years are almost entirely unknown to them. Unless these persons avail themselves of the opportunities for advancement along electrical lines, they will be in the same position ten years hence that they are now. Dynamo Tenders, Wiremen, Engineers, Mechanics, men from every position in life, young and old, can alike avail themselves of these advantages on the plan we offer. The Dynamo tender may become a Central Station Manager, the Motorman a Railway Superintendent, the Lineman a Testing Chief, the Wireman a Constructing Engineer, and one and all become practical intelligent Electrical Engineers by careful following the course as mapped out by this Institution.

The foundation for the work of the course is laid by careful preliminary instruction in Mathematics, Mechanics and Mechanical Drawing.

After this we give the student a course of instruction calculated to lay a foundation in the first principles of **Magnetism**; for without magnetism, the lighting of our cities, electric propulsion of our

railways and the direction of our ships' courses would alike be an impossibility.

After dwelling at some length upon the laws of natural magnetic induction, various laws of attraction and repulsion, etc., we take up Sources of Electricity, pointing out their nature and properties. Under this head a thorough explanation of the modern accepted theories is given, and the student is next instructed in the class of phenomena embraced under **Static Elec-**

tricity. Here the difference between conductors and insulators, the meaning of certain electrical terms, the action of electrified bodies upon each other, an explanation of the various electro-static machines, properties of atmospheric electricity and the value of lightning rods are thoroughly explained.

Current Electricity is next discussed in a very thorough manner, showing the difference existing between electrical currents and electrical charges; what constitutes an electrical circuit; different types of batteries, such as: LeClanché, Gravity, Daniell,

struct or install electrical apparatus of any character, is thoroughly dealt with in all its various forms.

Electro-Metallurgy is treated in a simple manner and the various methods employed, salts used, solutions and different types of current for electro-plating and electrotyping are clearly explained.

Under **Electro-Magnetism** the relation existing between magnets and electrical currents is clearly pointed out, and the action of currents on each other and upon iron, the calculation of magnetic circuits, and the determination of the lifting power of magnets are thoroughly dealt with.

The subject of Electric Bells is taken up and various types of annunciators, alarms, clock devices, automatic, pendant and static gas-lighting apparatus are dealt with. The complex methods of wiring for these various devices and ingenious combinations to produce the desired results in the most satisfactory manner are given. Our instruction in **Electrical Units and Definitions** is sufficient to enable a man to intelligently use all of the technical terms and definitions that are involved in the electrical profession to-day for practical work.

We devote considerable time to Electrical Measurements, pointing out the different types of Galvanometers, Voltmeters, Ammeters and Wattmeters, with detailed explanation of their parts, and then take up a series of measurements with the Wheatstone Bridge, calculated to enable any one to use this valuable piece of apparatus intelligently in making simple or elaborate tests.

The subject of **Dynamos** is very carefully treated. The principles of operation and the essential parts are first pointed out and then an explanation of the various details is given. Following upon this the rectification of current by commutator, methods of exciting the fields, the different types of armatures, the various methods of winding, the losses that are met with, lamination of core, resistance of the air gap, the distortion of field, the *Many*



Bunsen and Edison.

A complete and comprehensive series of lessons is also given upon the Storage Battery commencing at the time of its inception and gradually leading up to the most improved and perfected apparatus in use to-day.

Ohm's Law, which governs the operation of all electric circuits and without a knowledge of which no one can intelligently con-

Causes of Sparking at the Brushes and the Remedies, rheostats and various forms of regulators, series, shunt and compound wound machines, the theory of alternating currents, the construction and operation of commercial alternators, the most approved methods concerning care, operation and maintenance of dynamo-electric machinery, Dynamo Calculation and Design, all of these subjects are treated with the greatest care in a manner at once so simple that the most obtuse can understand and yet so complete that the most advanced or exacting can find nothing omitted.

Under **Electric Motors** the student will obtain a knowledge of the first early types of motors, the principles upon which they operate, the methods of regulation, system of connection, manner of starting, how they are wound and the distinctive features as compared with dynamos and their adaptability to various requirements. Diagrams accompanying this instruction are of such a nature that the student would have but little difficulty in connecting up any make of motor that might come under his notice.

Transformers and Induction Coils are treated with a special view to their use on alternating current circuits, the methods of construction and the principles of operation being clearly pointed out.

Incandescent and Arc Lamps are thoroughly explained, special attention being given to the latest types, the latest improvements in both kinds in use by the electrical world to-day.

Transmission of Power is discussed thoroughly and all the various wiring tables and formulas for calculating the sizes of wires for different purposes in transmitting electricity are given.

In pointing out the principles of **Electric Railways** a thorough explanation of the various over-head, under ground and surface systems are given, and the different types of motors, generators and appliances made clear.

"**Central Stations**" is a subject which is entered into at some length in order that the student may not only understand all

the connections and the operation of the various appliances therein, but may be able to successfully care for a generator, and design, construct and repair any piece of apparatus which may become injured.

The Operation of Telephone and Telegraph Apparatus is thoroughly taught so that any one can readily understand the principles involved, as well as the practical apparatus.

Electrical Engineering Course.

Mathematics—Arithmetic, Algebra, Geometry, Trigonometry.
 Mechanics and Physics.
 Mechanical Drawing.
 Static Electricity.
 Current Electricity.
 Electro Magnetic Apparatus.
 Batteries.
 Dynamos.
 Motors.
 Transmission of Power.
 Central Stations.
 Light and Power Wiring.
 Alternating Current Machinery.
 Electric Railways.
 Specifications and Superintendence.

Terms for the Course—**\$35 in advance; or \$40 in \$5 installments**, as follows: \$5 with application and seven additional monthly payments of \$5 each; or \$44 in \$2 installments, as follows: \$2 with application and twenty-one additional monthly payments of \$2 each. Certificates of proficiency are awarded to students satisfactorily completing the course.

The degree of **Electrical Engineer** (E. E.) will be conferred on students who complete the courses of Electrical Engineering, Higher Mathematics, Mechanical Engineering, Structural Engineering.

For further information as to degrees see page 10.

Any further information desired will be cheerfully furnished.

Course in Structural Engineering.

A STRUCTURAL engineer, in the broad sense of the term, is one who understands and knows how to control the forces of nature, so far as they affect structures, by making his designs accord with scientific principles. In preparing our course of lectures on Structural Engineering we have kept this definition in mind, and have endeavored to present this subject to the student in its most attractive form; to bring out in bold relief the primary principles, and to aid the student to reason practically and with system, without losing himself in a mist of mathematical formulas. In other words, the student is drilled in facts and principles, and taught to use his knowledge so as to arrive at practical results.

In planning a structure, the designer must consider many things,—the best and most economical arrangement of its parts to meet the specified requirements, the methods of joining the parts together and the material to be used. He must have the structure strong enough, at the same time must not go to the expense of using more material than is necessary. Especially is it important in planning large structures of steel, that the designer should know what character of trusses to use, how to estimate the strain on each component part and the best methods of making joints. In fact since steel has been used to such a large extent as a structural material, it has become evident to all engaged in building operations that a technical knowledge of the principles of engineering is essential to him who hopes to succeed and keep abreast of his profession.

Therefore this course is recommended to men who are in the architectural, engineering, and building professions, either as a review, or for the purpose of gaining a further acquaintance with the scientific side of their professions. It will also be an advantage to students who propose to continue the subject at college or by private study; while to the ambitious young men who are engaged in this line of business, or to others who desire to qualify themselves to enter upon it, this course offers a most favorable opportunity.

We begin with a thorough drill in mathematics, elementary mechanics and physics. In mastering the work given him in these subjects the student becomes acquainted with the foundation principles of the profession, and is taught how to use them. Instruction in drawing follows, through which the student will be qualified to make plans and detailed drawings for structural work.

Analysis of Framed Structures—Under this head are included the graphical and analytical methods of determining the bending moments and shearing forces in loaded beams, and the principles and methods of determining the stresses in the separate members of trusses. By studying the graphical and analytical methods in conjunction with each other the student will find that the one method aids him in understanding the other, and he will learn to decide in what cases each method is to be preferred.

Strength of Material.—Physical characteristics of iron and steel, brick, stone and timber. Determinations of center of

gravity, moments of inertia and radii of gyration. Methods of designing beams, girders and columns. Designing riveted joints. These subjects will receive careful treatment, will be made clear to the student, and will be dealt with in the most practical way.

Design of Structures.—Under this head we deal with the determination of stresses in the different types of roof and bridge trusses, and the relative merits of the various kinds in general use; with the treatment for uniform and concentrated load systems; with the effect of wind on structures, with the designing of columns and the merits of the different forms of steel columns; and with the use of steel in fire-proof buildings.

Bridges.—This subject, one of the most important of the course, will include a thorough discussion of the principles involved in the designing of bridges of wood, masonry, and steel; with a study of

standard examples of each class, and practical instruction in designing structures of each kind.

Estimates, Specifications, Superintendence and Inspection.—Under these heads will come a discussion of the methods of preparing estimates and specifications; of the duties of the superintendent of construction and his relation to contractors;

and of the inspection of material and work, and the determination of the character of material and the quality of work.

The practical problems in this course will include the complete design of a steel roof truss, a plate girder bridge, and a railroad truss bridge with computations and detail drawings.

Structural Engineering Course.

Mathematics—Arithmetic, Algebra, Geometry, Trigonometry.
Elementary Mechanics and Physics.
Mechanical Drawing.
Analysis of Framed Structures.
Strength of Material.
Design of Structures.
Estimates and Specifications.
Superintendence and Inspection.


Terms for the Course.—\$40 in advance; or \$45 in \$5 installments, as follows: \$5 with application and eight additional monthly payments of \$5 each; or \$50 in \$2 installments, as follows: \$2 with application and twenty-four additional monthly payments of \$2 each. Certificates of proficiency are awarded to students satisfactorily completing the course.

The degree of **Mechanical Engineer** (Mech. E.) will be conferred on students who complete the courses of Structural Engineering, Higher Mathematics, Mechanical Engineering, Advanced Mechanics and Hydraulic Engineering.

For further information as to degrees see page 10.

Any further information desired will be cheerfully furnished.

Course in Hydraulic Engineering.



OUR course is designed to give the student a good working knowledge of the principles and theories necessary for an intelligent solution of everyday problems in hydraulics and kindred subjects; as for instance, the selection of suitable sources of water-supply, calculation of probable rain-fall and 'run-off' and the design of dams, reservoirs and distribution systems; the design, erection and test of hydraulic motors, pumps and other machinery; the improvement of rivers and harbors, the design of canals, locks, flumes and

irrigation systems; in fact, all manner of problems involving the use or control of water for the benefit of mankind.

To pursue these subjects intelligently, a good working knowledge of arithmetic, elementary algebra, geometry and trigonometry is absolutely necessary; and these subjects together with mechanical drawing, surveying, a study of the strength of materials, elementary mechanics and theoretical hydraulics are taken up as a preliminary to, and a preparation for, the consideration of the subjects relating more particularly to hydraulic engineering. The use of steam and air as mechanical agents is also treated in the preliminary course.

Having mastered this preparatory work the student reaches what will prove, no doubt, the most interesting part of the course.

The first subject considered under the head of applied hydraulics is the design and construction of new, and the improvement of existing, water-works systems, a matter of vast and constantly

growing importance. Following is a brief outline of the order in which the several branches will be taken up: A consideration of the quantity of water required, based chiefly on statistics of actual consumption in cities and towns in different parts of the country; the conditions governing the selection of a suitable watershed and the methods used in arriving at a safe estimate of the amount of rain-fall and the proportion of this amount which may be expected to reach the reservoirs; the design and construction of dams, reservoir embankments, settling and storage basins, conduits and distribution systems; filtration and the pumping of water to higher levels. The subject of pumps will be considered here only in a general way, being taken up in detail under the head of hydraulic machinery.

Hydraulic Motors.—After a brief consideration of the principles governing the construction of the old-fashioned over-shot, under-shot, and breast wheels, the use of which is still advisable under certain conditions, we reach the subject of turbines, by far the most important of the hydraulic motors. The principal types of existing turbines will be described fully, and particular attention will be given to the principles governing their action as well as to the details of erection and the methods of conducting tests for the determination of capacity and efficiency.

In this connection will be described in detail the design and construction of head-gates, flumes, gratings, penstocks, draft tubes and tail race, with explicit practical directions for the construction and use of dynamometers for measuring the power actually delivered, and for the design and manipulation of hook-gauge, weir, etc., for determining the amount of water used, and so computing the effi-

ciency of the machine. Impulse wheels will also receive careful attention, and the principles governing their design and use fully explained. Motors of the Three-cylinder or Brotherhood type will be considered under the head of hydraulic machinery. Among the motors will be included meters for the measurement of water; for these, while not used for the generation of power, are none the less prime-movers. Here again much space will be given to directions for practical tests and installations.



Hydraulic Machinery—Pumps.—After a brief review of so much of theoretical hydraulics as may be directly applicable to pump design, the study of pump detail will be taken up, illustrations being drawn from the best examples of modern construction; among the types considered are hydraulic-pressure pumps, direct-acting duplex, direct-acting compound and

triple-expansion fire pumps, rotary and centrifugal pumps, etc. A special chapter is also devoted to the standard methods of conducting duty trials of pumping engines.

Other hydraulic apparatus, of which lack of space here prevents more than the briefest mention, are; accumulators, presses, elevators, cranes, jacks, riveters, forging presses, etc., an almost endless list, extending into every branch of mechanical industry, and offering a limitless field for the exercise of mechanical industry and skill.

Steam Engines and Boilers.—Having already considered the theories relating to the generation of steam for use as a mechanical agent, this division will be devoted to a discussion of the different types of boilers and engines, and the factors affecting their strength and efficiency. The use of the steam engine indicator for setting valves, and for determining the horse-power and steam consumption of the engine, will receive the fullest consideration, as will also the standard methods of boiler and engine tests as recommended by the American Society of Mechanical Engineers. The whole subject will be treated from the point of view of the hydraulic engineer, who, while not expected to engage in the design of steam engines, should have a sufficient theoretical and practical knowledge of the subject to enable him to choose, test and use to the best advantage the machines adapted to his needs.

Rivers, Harbors, Canal, etc.—Under this heading will be considered the methods pursued in deepening river channels, by dredging, rock excavation and contraction of flow; the protection of caving banks by the use of mattresses, rip-rap, spur-dams and dykes; the design of ice harbors; construction of breakwaters and piers; the building of canal embankments and locks; and many other problems relating to the control of water for the uses of navigation.

Irrigation Engineering.—This subject, while having much in common with water supply, has also many features peculiar to itself, as for instance, the design and construction of regulators, measuring weirs and timber flumes; the design of distributaries, methods of applying water to the land, etc., all of which will be considered in their proper place. Attention will also be given to the laws and regulations of the Government concerning the subject of irrigation, with which the irrigation engineer should be acquainted.

Hydraulic Engineering Course.

Mathematics—Arithmetic, Algebra, Geometry, Trigonometry, Mechanics and Physics.
 Mechanical Drawing and Mapping.
 Strength of Materials.
 Surveying—with special reference to reconnaissance and hydrographic work.
 Air and Steam as mechanical agents.
 Theoretical Hydraulics.
 Water Supply, Storage and Distribution.
 Hydraulic Motors—Water wheels, Turbines, Impulse wheels, Meters, etc.
 Hydraulic Machinery—Pumps, Elevators, Cranes, Forging presses, etc.
 Rivers, Harbors, Canals and Docks.
 Irrigation.
 Steam Boilers and Engines,
 Contracts and Specifications.

Terms for the Course.—**\$50 in advance**; or **\$55 in \$5 installments**, as follows: \$5 with application and ten additional monthly payments of \$5 each; or \$60 in \$2 installments, as follows: \$2 with application and twenty-nine additional monthly installments of \$2 each. Certificates of proficiency are awarded to students satisfactorily completing the course.

The degree of **Mechanical Engineer** (Mech. E.) will be conferred on students who complete the courses of Hydraulic Engineering, Higher Mathematics, Structural Engineering, Mechanical Engineering and Advanced Mechanics.

For further information as to degrees see page 10.

Any further information desired will be cheerfully furnished.

Compliments from Our Students.

* * * I hold the highest respect for your institute and shall never miss an opportunity to say a good word in your behalf.—R. E. DAVIS, Thornton, Cook Co., Ill.

You have done all you promised and perhaps more. * * * —CHAS. SCHARINGHAUSEN, 29 S. Orange Ave., Newark, N. J.

I would not hesitate to recommend your studies to any one, and say to you with all candor that your instructions are the best.—THEO. HARBOUT, Titusville, Mercer Co., N. J.

* * * I shall not hesitate to recommend your esteemed Institute to my friends.—A. L. LEVIN, 214 Bergen St., Brooklyn, N. Y.

Thanking you again for the kindly interest which you have taken in my behalf, and wishing your institution the success which it justly deserves.—A. H. SHULTES, 55 Nassau St., Brooklyn, N. Y.

Thanking you for all the good you are doing for me, believe me, sincerely yours, * * * —FELIX CASTAGNERI, 977 Eighth Ave., New York City.

I am already very much indebted for the help you have given me.—MARY E. SMITH, Fifteenth Ave., near Water Front, Bath Beach, Brooklyn, Kings Co., N. Y.

Thanking you for all the valuable instruction I have already received, I remain, * * * —W. F. TOWNE, Mendou, Worcester Co., Mass.

I am sure your system will be of great value to me. I think your course of instruction is excellent, and I will recommend it whenever I can.—WILL G. CAREY, 4251 Wabash Ave., Chicago, Ill.

Thanking you for your help, and assuring you that I will do all I can to increase your enrollment, I remain, * * * My work from the school was a great help to me.—FRANK BALTIMORE, 128 Dearborn Ave., Chicago, Ill.

My training under your instruction has been a great deal of help to me.—L. F. SCRIBNER, Sau Pedro (Box 1830), Los Angeles Co., Cal.

I cannot speak too highly of the N. C. I. and its system.—WM. P. JOHNSON, 748 Hancock St., Brooklyn, N. Y.

I am very thankful for the information which I received from you, and I know it helped me in a good many ways.—E. R. SPALKE, 15 Howard St., Lawrence, Essex Co., Mass.

I wish to say that I am very well pleased with your instruction, and thank you for assisting me, and I will gladly recommend you to all my friends.—JAS. T. DUNN, 902 E. Chase St., Baltimore, Md.

Your instructions have been invaluable to me.—G. E. CRAMER, 418 Emerald Ave., Chicago, Ill.

I can now see the great benefit of your instruction.—H. M. ASHBY, San Bernardino, San Bernardino Co., Cal.

All I have to say is, that I beg to express great gratitude for the instruction received, because I don't think I ever spent money for anything that I gained as much satisfaction from as the money I spent for your instruction.—THOS. V. GILMARTIN, 161 Clifton St., Sta. B, New York City.

I take this opportunity to express to you my sincere thanks for the great benefit I derived from your system.—J. J. HICKIE, 310 W. 18th St., New York City.

Course in Sanitary Engineering.



THE work of the Sanitary Engineer may be broadly defined as having for its object the improvement of the public health by supplying pure water and fresh air to our houses and the removal from them of all injurious wastes.

As soon as the progress of civilization tended to the concentration of population within areas of limited extent, it became necessary to make provision for the removal of noxious refuse from the vicinity of habi-

tations. The importance of sanitary works was early recognized, a fact well attested to this day by the ruins of the aqueducts and sewers of ancient Rome. It is, however, within the last sixty years that sanitary science has clearly demonstrated the dangers to human life which exist in a vitiated atmosphere, a polluted soil or an infected water supply.

What more interesting and vital problems can be solved by the trained engineer than those presented in intelligently designing and skillfully constructing in our cities and dwellings suitable means for decreasing or removing the harmful effects of these unseen agents?

The preliminary portion of our course includes thorough training in fundamental mathematics and mechanics as needful preparation for the further studies of the special course. These are followed by a concise discussion of the air we breathe and the soil on which we tread, treating briefly of the composition of air, its more common impurities and the resultant deleterious effects. Also of

the simpler characteristics of the virgin soil, how it becomes infected, and the serious and enduring effects of its pollution.

The subject of **Water Supply**, next taken up, considers among other topics, the character and capacity of water-sheds, the quantity of water required for the supply of cities and towns, the impurities to which water is liable, methods of purification and aeration, as well as its storage and distribution through pressure or gravity systems.

As a natural sequence to the subject of water supply we pass to studies bearing on the removal and treatment of the liquid wastes. Under the heads of **Sewerage, Drainage and Sewage Disposal**, attention is first given to general problems, as the comparison of the water carriage system with other methods of disposal, the application of the separate system of sewers, the size of storm water conduits, formulas for computing discharges, and the important methods of sewage treatment, after which the student is brought to consider the construction of various detailed types of work and their care and maintenance.

The teaching of these matters will be from the practical standpoint, looking to results to be attained rather than the discussion of impracticable theories.

There will next be taken up **House Plumbing and Drainage**, combining instruction in the practical design of internal piping systems for the removal of the liquid household wastes with a connected review of the best American practice as to ventilation and fixtures. There will also be given, as an allied subject, a succinct course in house distribution systems for gas-lighting, com-

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PHOTO BY BELL & CO.

prising the design and practical construction of lines of piping for this purpose.

The subject of **Heating and Ventilation**, which has so much to do with the health and comfort of every community, will be treated systematically, teaching first the general principles on which sound design is based, then taking in order the different systems of heating by steam, hot water and hot air, each combined with adequate ventilation, followed by

studying the conditions and class of buildings for which each system is best suited.

Under the general topic of **Village and City Sanitation**, attention will be devoted to a study of the collection and treatment of those less noticeable wastes such as garbage, builder's rubbish, and street refuse, which it is desirable to remove from the immediate locality of our dwellings.

In addition, the location and construction of cesspools and privy vaults, and the removal of surface

and ground water will be examined.

The work of this course is carefully planned in its several branches so as to render it attractive and profitable alike to the foreman or skilled mechanic, to the rodman and chainman in a field party, to the college graduate desirous of obtaining a further training in technical lines, and to the experienced engineer employed, perhaps with low compensation, in some overcrowded branch of the profession. To each of these we offer a ready means of instruction, at a price within his reach and in time at his own

disposal, in a working knowledge of one of the most alluring and growing branches of engineering science.

Sanitary Engineering Course.

Mathematics—Arithmetic, Algebra, Geometry and Trigonometry.

Mechanics and Physics.

Mechanical Drawing and Mapping,

Surveying.

Strength of Materials.

Air and Soil.

Water Supply, Storage and Distribution.

Drainage, Sewerage and Sewage Disposal.

House Drainage, Plumbing and Gas Fitting.

Heating and Ventilation.

Village and City Sanitation.

Terms for the Course.—**\$50 in advance ; or \$55 in \$5 installments**, as follows: \$5 with application and ten additional monthly payments of \$5 each ; or \$60 in \$2 installments, as follows: \$2 with application and twenty-nine additional monthly payments of \$2 each. Certificates of proficiency are awarded to students satisfactorily completing the course.

For information as to degrees see page 10.

Any further information desired will be cheerfully furnished.



Course in Municipal Engineering.



THE demand for the services of the engineer in most localities may be justly said to be dependent upon the concentration of population which has taken place in those localities.

But slight need is felt for the trained engineer in a sparsely settled rural community, demanding inferior means of communication only, having fords at its stream crossings, living in simple dwellings, depending upon springs

and wells for its supply of water and requiring only nature as its scavenger.

When such a community becomes a village or town, it proceeds to construct improved highways, provided with bridges and culverts, and possibly a surface railroad. Its sanitary needs are met by building simple systems of water-mains and sewers and the introduction, to the homes of the well-to-do, of house plumbing. All these improvements, if well planned and economically carried out, call for the skill of the Civil Engineer.

If now, this typical hamlet, favored by the smiles of Fortune, expands into a city, its need of the engineer is greatly increased. We now find well-paved streets, marked by a radiating network of street railways, and underlaid by an honeycomb of mains and conduits. The valleys are spanned by massive viaducts, which stretch for miles above our heads, to end at last in mammoth stations. The lofty buildings, seen on every hand, rival the Tower of Babel in height, and almost cut off sun and sky, a loss hardly noted, so used are we to seeing the night illumined like the day.

This transformation of farm lands into the sites of thriving towns

and even of cities has occurred in many instances within the memories of a single generation. That such changes will continue, necessitating the employment of thousands of engineers and the expenditure of additional millions of dollars, is the fixed belief of all close observers of the progress of civilization on our continent.

The reflex influence of the concentrated activities found in metropolitan centers is also beginning to be manifested in suburban districts in the current agitation for improved roads, in the promotion of rapid transit, the extension of sanitary control, and the application of scientific methods for bettering the conditions of village and town life.

The intelligent direction of these potent forces of development and extension will require and engage all who have anticipated the call for such services and made due preparation for rendering them. The opportunities offered by this course will enable many to acquire the necessary knowledge who could not otherwise, by reason of the limitations of time and cost, hope to do so.

Our course of **Municipal Engineering** will, at the outset, prepare the student by the pursuit of the required preliminary studies to profitably undertake the advanced and technical portion of the work. He will then be taught the theory and practice of the important branches of civil engineering as applied to city works.

The first technical topic—**Water Supply, Storage, and Distribution**—will be mainly concerned with the consideration of the amounts of water required for cities, the collection of a supply, its quality, its storage, and its distribution to meet specified conditions of use.

This will be followed by the subjects of **Drainage, Sewerage and Sewage Disposal**, in the discussion of which general principles controlling the quantities of rainfall and sewage, the type of system most desirable, and the size of conduits, etc., will first be laid down, to be later succeeded by detailed statements of methods of construction and examples of efficient completed works. The chapters on Sewage Disposal will be devoted to the principal means and apparatus used for purification with special attention to results attained in this country.

Under the head of **Streets and Pavements** the important problems involving the relation of topography to the lines, grades and cross-sections of streets will be taken up. The treatment of pavement foundations and the laying and maintenance of the most satisfactory and durable surfaces will be studied, in connection with illustrative examples suited to the subject.

Consideration will then be directed to the principal types of **Street Railways** including cable lines, the elevated and underground trolley, compressed air motors, and track and conduit design and building.

The subject of **Public Lighting** will develop the application of naphtha, gas and electric systems of lighting to roads and parks.

The course will conclude with a study of **Municipal Organization, Assessments and Franchises**. Much interest is manifested, at the present time, in the administrative methods

of city government and in the important questions respecting the distribution of taxation and the control of the large enterprises incident to city growth. The discussion of these matters will be practical, and highly valuable to all thoughtful students.

Municipal Engineering Course.

Mathematics—Arithmetic, Algebra, Geometry and Trigonometry.
 Mechanics and Physics.
 Mechanical Drawing and Mapping.
 Surveying.
 Strength of Materials.
 Water Supply, Storage and Distribution.
 Drainage, Sewerage and Sewage Disposal.
 Streets and Pavements.
 Street Railways.
 Public Lighting.
 Municipal Organization, Assessments and Franchises,

Terms for the Course.—**\$50 in advance**; or **\$55 in \$5 installments**, as follows: \$5 with application and ten additional monthly payments of \$5 each; or \$60 in \$2 installments, as follows: \$2 with application and twenty-nine additional monthly payments of \$2 each. Certificates of proficiency are awarded to students satisfactorily completing the course.

For information as to degrees see page 10.

Any further information desired will be cheerfully furnished.

Course in Mechanical Engineering.



OUR industrial organizations are each year demanding men of higher education for employees. The knowledge that was our father's is no longer sufficient. The intelligent mechanic must know more than simply how to place a piece of work in the lathe or planer, or how to place the pattern when making the mold. The man who knows only that is a mere tool, like the lathe or planer which he operates, and like them also he will never become any thing else.

It is the men of intelligence and learning who are chosen for the desirable positions. No man is fitted to be foreman or superintendent of a shop who does not know the principles of mechanics, strength of materials, and machine design.

But if he knows these subjects he can correct errors and suggest improvements in the designs. Such a man will be chosen as designer, and his knowledge of drawing and kinematics will then enable him to design machinery by the modern methods, without the expense of experimenting on two or three botch machines.

The foreman should understand the principles of the construction and operation of all kinds of machinery. He must be able to calculate what forces act in any one piece of the machine, how to properly design that piece to resist those forces, and how the forces are transmitted from one piece to another.

Mechanics, as a rule, are men of ambition and natural intelligence, but many of them not having had the advantage of a mechanical education, find themselves at a great disadvantage in the close competition of our present day. They realize if they

could but obtain a technical education they could win prominence. Many of the best Mechanical Engineers of the present day are those who studied Mechanical Engineering after they had learned their trade.

It is the purpose of the Institute to provide such men with the opportunity they have so long desired. The door is open to any one who will study the course in Mechanical Engineering. In order, however, that the student may be able to easily understand all the technical subjects, it is necessary for him first to master the preliminary subjects of Mathematics, Physics, and Mechanical Drawing.

The student need only know how to read and write in order to take this course, as he is started at the very beginning of Arithmetic. He is given thorough instruction in all the rudiments of the subject, including all the operations ordinarily required. Algebra, Geometry and Trigonometry are treated in very much the same way. Great care is taken to give only that which is of most practical use, and yet give an adequate and comprehensive idea of the subject. In Algebra, the student is taught to solve intricate problems by the use of symbols. In Geometry, he is taught the forms and proportions of plane figures, and the measurements of areas, angles, etc. In Trigonometry, he is taught the solution of the triangle and the use of trigonometric and logarithmic tables.

No one can hope to learn to design machinery who does not have a thorough knowledge of **Mechanical Drawing**. Therefore considerable importance is given to this part of the course. After being taught the general principles, the student will make working drawings of various machine parts from sketches and dimensions.

The course in **Physics** begins with elementary mechanics, and takes up in succession hydrodynamics, pneumatics, and heat. The course throughout is illustrated and explained by simple experiments with which the student is already familiar, or which he can easily perform with the simplest home-made apparatus. After a preliminary study of the properties of matter, the laws of motion are given and illustrated. The composition and resolution of forces are studied, and work and energy are explained.

Hydrodynamics treats of the action of forces and motion in liquids. The study of the forces when they are balanced, and the liquid is not in motion, is called Hydrostatics. Hydrokinetics deals with the energy of liquids in motion. The theory of rams, water wheels and turbines is fully explained.

The laws governing the action of gases are studied under the head of Pneumatics. The application of these laws to air pumps, compressors, and like machinery is clearly illustrated.

The subject of Heat completes the preliminary part of the course. In addition

to studying the nature and effects of heat, the student is made sufficiently acquainted with the principles of chemistry to understand combustion.

Throughout the preliminary, as well as the advanced subjects, numerous tables and charts will be given, which will be of inestimable value to the student in his future practice. The text will be copiously illustrated, as often a simple illustration will teach more than a page of text. Every lesson in each subject will close

with numerous practical examples, in order to test the student's understanding of that lesson before he proceeds.

The advanced course begins with the study of **Strength of Materials**. The object of studying this subject is to familiarize the student with the properties of the various materials used in machine constructions, with their behavior under stress, and with the usual methods and formulas for calculating the proper dimensions to safely resist any given stress.

Before undertaking the more complex problems, the student is drilled in the principles of **Graphical Statics**. Graphical methods of calculating are so exact, rapid and suggestive, that they are largely replacing analytical methods in engineering practice. Beginning with a few examples in graphical arithmetic, and hastily reviewing the principles of the triangle of forces, studied in physics, the student is taught to apply this method to the determination of stresses in engineering structures.

In the study of **Mechanics of Materials** both the analytical and graphical methods are used, the former that the student may obtain a more thorough *understanding* of the conditions existing in any piece under stress, and the latter that he may learn how to quickly make the necessary computations. The stress in beams, long columns and shafts are determined and illustrated by examples. The moment of inertia, radius of gyration, and moment of resistance are explained and their use illustrated.

Kinematics treats of the motions peculiar to machinery, considered as change of position solely. It teaches the nature and equivalence of mechanisms and how to combine the kinematical elements in designing new machinery. The subject is studied mostly by aid of the drawing board. The student makes skeleton drawings of a number of mechanisms and determines the velocity ratios of their parts. Problems in link, valve, and differential motions, as well as high-speed engine governors, are investigated.



Dynamics of Machinery deals with the forces acting in and transmitted by machinery. Cranes, hoisting machinery and other simple examples are first studied, and the forces acting in each part under a given load and condition are determined. As the student progresses the subject of friction is taken into account and the forces as modified by this factor are accurately determined. Starting with an assumed steam diagram, all the forces acting in an engine at each point of the stroke are determined. Other practical examples are also solved. Under this head the student completes his study of the governor by determining the actuating forces. Illustrative examples are taken from well-known engines.

A thorough understanding of these subjects forms a basis for the rational **Designing and Invention of Machines**. The student learns to design machinery by actually designing it from data furnished as it would occur in practice. Simple fastenings, bearings, shafts, levers, and connecting rods are designed, both analytical and graphical methods being used. Special attention is given to gearing, and practical methods are given for constructing the correct tooth profiles.

The student then undertakes the design of special machinery. The work covers a wide range, the intention being to fit the student for any kind of machine designing. He begins with the design of steam engines from an assumed diagram, carefully determining the play of forces in all its parts, and calculating their proper dimensions. Machine Tools, Hydraulics, Electrical and Mill machinery are each studied and designed.

In considering machine plants, instruction is given in the selection and advantageous arrangement of machinery and accessories. The building of foundations and erecting of machinery is also treated thoroughly.

The student is taught the elements of electricity and the principles of dynamo-electrical machinery, which is coming into such general use wherever machinery is employed. Particular attention

will be paid to the use of electricity as a mode of transmission of power in a shop.

It should be borne in mind that our courses are not superficial. It will require hard work to satisfactorily complete a course, but the student will have *learned* something.

He can feel assured that his money and time have been well spent.

Course in Mechanical Engineering.

Mathematics—Arithmetic, Algebra, Geometry, Trigonometry.
Mechanical Drawing.

Physics—

Elementary Mechanics,
Hydrodynamics—Hydrostatics, Hydrokinetics.
Pneumatics.

Heat.

Applied Mechanics—

Part I. Strength of Materials, Graphical Statics, Mechanics of Materials.

Part II. Kinematics of Machinery, Dynamics of Machinery.

Machine Design—

Elements of Machines.

Special Machinery—Steam Engines and Boilers, Hydraulic Machinery, Machine Tools, Electrical Machinery.

Construction of Plants.

Electricity—Dynamo-Electrical Machinery.

Terms for the Course.—**\$35 in advance ; or \$40 in \$5 installments**, as follows: \$5 with application and seven additional monthly payments of \$5 each ; or \$44 in 82 installments, as follows : \$2 with application and twenty one additional monthly payments of \$2 each. Certificates of proficiency are awarded to students who satisfactorily complete the course.

The degree of **Mechanical Engineer** (Mech. E.) will be conferred on students who complete the courses of Mechanical Engineering, Higher Mathematics, Advanced Mechanics, Steam Engineering, Hydraulic Engineering and Structural Engineering.

For further information as to degrees see page 10.

Any further information desired will be cheerfully furnished.

Course in Steam Engineering.



VERY year the demand from our industrial organizations for men of higher education increases. The test for promotion is becoming more and more an educational one. "It is the individual who reaches the highest round of the ladder, not the many." He who would gain the top must supplement his practical knowledge with a technical education.

Steam-plant owners are just beginning to realize the enormous waste of fuel which annually occurs. They are learning that it is far preferable to pay an educated engineer a good salary and have a small coal bill, than to have a cheap engineer and a large coal bill. The development of the steam engine has progressed so rapidly in the past twenty-five years that the best results are only obtained by a thorough understanding and intelligent application of the theoretical principles on which it operates. It is not sufficient that the engineer should know enough to open and close the throttle, to oil the bearing, to watch his gage glass, and to shovel in sufficient coal to keep up the steam. He must understand how steam is formed; what are the best conditions for the economical application of the heat of the furnace to the production of steam; how he can reduce priming and produce dry steam; and, above all, he must understand the chemistry of combustion and how he can produce the necessary heat with the least coal. He must be able to tell if his boiler has the proper grate area, and his chimney is the right size, and to make a complete boiler trial to see if he is obtaining sufficiently good results. He must understand the action of

the steam in the cylinders, the effect of lap and lead on this action and how an indicator card tells the story of the setting or the leakage of the valves, and of the amount of steam consumed. He must understand how the forces are transmitted from the piston to the shaft, and how to calculate the strength of all the parts, and as most plants now contain a small lighting equipment, he must understand the general principles of electricity.

The man who knows all this will be a very valuable employee and certain of promotion. He will take pride in reducing his coal bill to the lowest notch. If any part of his plant is not giving economical results he will know it and know how to improve it. If any part of the boiler or engine is subject to excessive strains he will know it and guard against accidents. If any repairs are needed he can make a drawing of the required parts and order them made. If any additional machinery is required, he can determine the proper size of engine and boiler, and calculate all pulleys, gears, shafting, etc. In most cities and some States, engineers are required to obtain a license by passing a technical examination. Other States are being urged to pass similar laws, and it will not be long until every State will require educated engineers. Every marine engineer must now pass an examination before he can obtain a license.

It is the purpose of the Institute to furnish all this knowledge and much more to any one who will study the course here outlined. In order, however, that the student may be able to understand all the technical subjects, it is necessary for him first to master the preliminary subjects of **Mathematics, Physics and Mechanical Drawing**. The student need only know how to read and write

in order to take this course. He is started at the very beginning of arithmetic, and is given thorough instruction in all the rudiments of the subject. Algebra, Geometry and Trigonometry are treated in very much the same way. Great care is taken to give only that which is of most practical use, and yet to give an adequate and comprehensive idea of the subject. In Trigonometry the student is taught the use of the trigonometric and logarithmic tables in the solution of problems.

In Mechanical Drawing the student is taught how to make shop drawings. Working drawings are made from sketches of various machine elements.

The course in Physics begins with elementary mechanics, and takes up in succession hydrodynamics, pneumatics and heat. The course throughout is illustrated and explained by simple experiments with which the student is already familiar, or which he can easily perform with the simplest home-made apparatus.

The theory of hydraulic machinery and air compressors is fully explained.

The subject of Heat completes the preliminary part of the course. Radiation, conduction and convection are studied with special reference to steam engineering problems. The student is made sufficiently acquainted with the principles of chemistry to understand combustion, and how to calculate the heat due to the combustion of any fuel when its analysis is known.

Throughout the preliminary, as well as the advanced subjects,

numerous tables and charts will be given, which will be of inestimable value to the student in his future practice. The text will be copiously illustrated, as often a simple illustration will teach more than a page of text. Every lesson in each subject will close with numerous practical examples in order to test the student's understanding of that lesson before he proceeds.

The advanced special course begins with the study of **Strength of Materials**. The object of studying this subject is to familiarize the student with the properties of various materials used in Machine construction; with their behavior under stress, and with the usual methods and formulas for calculating the proper dimensions to safely resist any given stress.

Before undertaking the more complex problems, the student is drilled in the principles of **Graphical Statics**. Graphical methods of calculating are so exact, rapid, and suggestive that they are largely replacing analytical methods in engineering practice. Beginning with a few examples in graphical arithmetic and hastily reviewing the principles of the triangle of forces studied in physics, the student is taught to apply this method to the determination of stresses in engineering structures.

In the study of the **Mechanics of Materials** both the analytical and graphical methods are used, the former that the student may obtain a more thorough understanding of the conditions existing in any piece under stress, and the latter, that he may learn how to quickly make the necessary computations. The stresses in beams, long columns, and shafts are determined and illustrated by examples.

The student is now prepared to design the details of **Steam Engines** such as cylinder body, piston, piston rod, connecting rod, crank pin, crank-shaft and fly-wheel. Under this head are also considered the subjects of friction, lubrication, and wear of parts.



The details of construction of Steam Boilers are studied, and the sides, ends, seams, and stays are calculated for strength and safety.

Thermodynamics or the Mechanical Theory of Heat, is the science which treats of the relations existing between heat and work. It is necessary that the engineer should have a thorough knowledge of this science in order that he may understand the properties of steam and its action in producing work. By means of it he determines the efficiency of an engine compared with the calorific power of the fuel; he may design the volume of cylinder to do a given amount of work and determine the fuel required; and he is led to appreciate the importance of saving heat, and to see where and how it may be accomplished.

With this knowledge the student is able to design engines and boilers. He is taught how to calculate the proper size of cylinders for simple, compound, and triple expansion engines. Valves and valve-gears are studied by means of Zeuner's diagrams. The principle of the governor is explained and illustrated by examples. The losses in the cylinder are considered, and the effect of jacketing discussed. The action and use of the condenser are explained. The student is taught to calculate the proportions of a boiler setting and chimney on scientific principles. The value of mechanical stokers, feed-water heaters, and other accessories are discussed, and the theory of the injector is fully explained.

Full instructions are given for making complete boiler and engine tests according to standard methods, and for calculating the results. The determination of the approximate steam consumption of an engine from the indicator card direct is explained. The peculiarities of locomotive, marine and other engines are described and their operation explained.

In the construction of plants the engineer is given points in the

selection of an engine and boiler for the work to be performed; the arrangement of the machinery and accessories in the building; the building of foundations and the erecting of both engine and boiler.

The student is taught the elements of electricity, and the principles of dynamo-electric machinery sufficient for an intelligent care of same.

It should be borne in mind that this course in Steam Engineering is thorough and not a superficial one. It will require hard work to satisfactorily complete the course, but the student will have learned something.

Course in Practical Steam Engineering.

A **short course** may be taken by those who for various reasons cannot take the full course. It is short in that it omits some of the subjects; but in the subjects taken, the text and instruction for the two courses are identical. The short course of study comprises Mathematics, Mechanical Drawing, Heat, Thermodynamics, Steam Engine and Boiler designs, Steam Engine and Boiler trials, and Construction of Plants.

This shorter course omits the subjects relating to Mechanics and Machine design, and confines itself strictly to the theory of the steam engine. It will be of great value to the practical mechanic or engineer who wishes to acquire a thorough understanding of the principles of combustion, the production of steam and its action in the cylinder, the use of the indicator, the method of making and computing boiler and engine trials, and the theory of compounding engines.

Course in Steam Engineering.

Mathematics—Arithmetic, Algebra, Geometry, Trigonometry.
Mechanical Drawing.

Physics—

Elementary Mechanics.

Hydrodynamics—Hydrostatics, Hydrokinetics.

Pneumatics.

Heat.

Applied Mechanics—

Part I. Strength of Materials, Graphical Statics, Mechanics of Materials.

Steam Engineering—Steam Engine details, Steam Boiler details, Thermodynamics, Steam Engine and Boiler Designs, Steam Engine and Boiler Trials, Locomotives, Marine and other Engines.

Construction of Plants.

Electricity—Dynamo-Electrical Machinery.

Course in Practical Steam Engineering.

Mathematics—Arithmetic, Algebra, Geometry, Trigonometry.
Mechanical Drawing.

Steam Engineering—Heat, Thermodynamics, Steam Engine and Boiler Design, Steam Engine and Boiler Trials, Locomotives, Marine and other Engines.

Construction of Plants.

Terms for the Course in Steam Engineering. — **\$35 in advance ; or \$40 in \$5 installments**, as follows : \$5 with application and seven additional monthly payments of \$5 each ; or \$44 in \$2 installments, as follows : \$2 with application and twenty-one additional monthly payments of \$2 each.

Terms for the Shorter Course in Practical Steam Engineering.— **\$20 in advance ; or \$24 in \$5 installments**, as follows : \$5 with application, three additional monthly payments of \$5 each and a final payment of \$4 ; or \$28 in \$2 installments, as follows : \$2 with application and thirteen additional monthly payments of \$2 each.

Certificates of proficiency are awarded to students who satisfactorily complete the courses.

The degree of **Mechanical Engineer** (Mech. E.) will be conferred on students who complete the courses of Steam Engineering, Mechanical Engineering, Higher Mathematics, Advanced Mechanics, Hydraulic Engineering and Structural Engineering.

For further information as to degrees see page 10.

Students taking the course for a degree will be allowed a liberal discount on all courses after the first.

Any further information desired will be cheerfully furnished.

A Few More Remarks from Students.

I thank you for your kindness in the past.—CARL J. ROLPH, 994 W. 4th St., Pomona, Los Angeles Co., Cal.

My thanks are due you for the help you have given me.—J. W. BEACH, Cheshire, New Haven Co., Conn.


I feel very thankful to you for your instruction, which I consider very complete, for I feel I have derived benefits from it that will aid me in the future.—L. E. COLE, 160 Loomis St., Chicago, Ill.

I think my money is well invested and thank you very much.—HOWARD S. BURNELL, BOX 358, Haverhill, Essex Co., Mass.

A Reflection.

What future is there for the man who labors only with his hands ? He may gain much skill and be of great value, but *there* is the end. The man who adds to the skill of his hands the equally skillful use of his brain finds no limit to the possibilities of his future.

Courses in Architecture.



ARCHITECTURE is daily growing to be one of the most important of the professions. This is exemplified by the increasing demand for well-equipped draftsmen. To supply this demand our various technical schools are yearly turning out increasing numbers of graduates prepared to fill responsible positions. It is not possible for every one to have all the advantages of college training but, "where there is a will, there will be a way," and the Correspondence

School in Architecture comes to your assistance and will enable you to accomplish by diligent and faithful work what many who have the best of training fail to do.

It is possible to learn drawing and designing by our method of correspondence instruction.

A thorough knowledge of drawing is the basis of all architecture as well as of all other branches of Mechanical Science.

This being the case, drawing must be the principal subject and groundwork of these courses.

The student begins by drawing lines and curves and learning the simple problems in constructive drawing such as, how to bisect a line or an angle, how to construct simple geometrical figures and the theory and practice of drawing to various scales. As the student progresses he becomes familiar with the best methods of working and is gradually led from simpler constructive drawing to the more complex methods of projection.

Architectural drawing is of course founded on mechanical drawing, but it is in itself a special branch. To the architectural drafts-

man, architectural forms must be familiar, so the student is very soon put to work drawing out plans, elevations and sections of cornices and other architectural details in order that he may become familiar with them.

The five orders of architecture must be carefully drawn out. Throughout an architectural career these five orders, or the various modifications of them, will be found to be indispensable, so their careful study is absolutely necessary.

Details of classical architecture will accompany the orders and a thorough knowledge of classical architecture will thereby be gained.

The successful architect of to-day is the one who can design in the classical styles, whether it be a hotel, theatre, store, office building or private residence.

The popular style of to-day, yesterday, and to-morrow is and will always be some modification of them as they seem to meet the various conditions of living more completely than any others.

It is important that one should be familiar with all styles, but they are so varied it is impossible to obtain more than a speaking acquaintance with them in a course of this character. Having mastered the classical styles, the student will find that the others will come naturally by observation and study.

Next, the designing of simple structures will be taken up and the student taught the essentials of good planning. At first small buildings will be designed, but they will lead to larger and more complicated ones.

As the student's horizon becomes more extended he will be

shown how to construct his buildings and make the details for them.

It is deemed of great importance that a thorough knowledge of construction be imparted, as a well-designed building poorly constructed will be of very little credit to the designer and less to the owner.

As the course in architectural drawing progresses, other branches of drawing essential to the good draftsman will spring up and must be mastered. A proper knowledge of shades and shadows naturally succeeds simple projection, and perspective will follow as a matter of course.

Every architect should be able to make a perspective drawing of his design in order that he may see just how it will look in reality, and that others may see it, too. One thing leads to another, and the student will find almost before he is aware of it that he has a knowledge of Stereotomy and will be able to draw out in isometric projection details of arch-stones, window-sills and other peculiarly-cut pieces of stone, and, if

necessary, be able to cut them out of paper and paste together so as to form an exact reproduction to a smaller scale of the particular piece he may be working on.

By this time the student will be very well advanced and can devote himself almost entirely to designing and free-hand drawing and sketching. A knowledge of these subjects makes designing easy, as a facile pencil facilitates ideas and will prove of immense value to a draftsman in more ways than one.

The Course in Architecture.

This course is complete in that it comprises all the subjects, both practical and artistic, necessary to make a thoroughly equipped architect.

A preliminary training, such as one would get in the average high school, is essential, and is provided for in the course.

A knowledge of the elementary studies, such as Arithmetic, Geometry, Trigonometry, and the simpler forms of Algebraical formulas, Physics, History, etc., is given as a ground-work upon which to build a thorough knowledge of the profession. Beginning with mechanical drawing and the theory of projection, shades and shadows, the student is introduced to architecture proper by a study of the five orders of Classical Architecture.

Each order will be carefully drawn and the various proportions studied.

Order of Subjects.

Architectural History will be begun and will be continued through the course. Free-hand drawing will go hand in hand with the more precise mechanical drawing. Stereotomy, or the developing and drawing of the various odd-shaped stones which form the arch and vault, will follow shades and shadows, and will be followed by graphical statics, or the graphical method of discovering the stresses and strains in beams, trusses, girders and the like. The principles and the simpler forms of architectural design will then be taken up.

The course in Geometrical Drawing will be concluded by perspective, a knowledge of which will enable the draftsman to make a picture of the building or object he may have designed.

Materials and the principles of the different kinds of construction as practised to-day will precede the subject of specifications and working drawings; then follow the subjects of building stones,



strength of materials, plumbing and drainage, heating and ventilation, and estimating, in the order named.

The subject of Architectural Design will include the planning of the simplest structure as well as the most complicated, and will fully explain the problems to be met with in practice and their legitimate solution along artistic lines. To finish the course of Architectural Design, the student will be required to select a subject for a final design, or thesis, which will be of a monumental character, such as a museum of fine arts, a public library, or other building of similar nature, and he will be shown how to study and finish the drawings in a manner to satisfy the requirements of any public competition.

Competitions provide a sure means of acquiring a reputation of the best sort, and when a young man wins one his professional career is most favorably begun.

The Course in Architecture is intended as a review for those who are more or less familiar with the subject and for those who may have the necessary preliminary training.

Students, mechanics, builders, clerks, etc., can, by taking this course, obtain sufficient knowledge of architecture, both practical and artistic, to enable them to fill responsible positions. It will give them such a foundation that they can easily solve the more difficult problems which will constantly occur. This course will prove of great advantage to those who are interested in architecture but who may be unable to pursue the study of it in the ordinary way.

Course in Architectural Drawing and Designing.

This course is, as its name implies, a partial course. Some of the less important subjects are omitted, giving only the essential ground-work. The bright student will be able to continue his

studies unassisted after having taken this course. It is of especial value to draftsmen generally.

The Course in Architectural Drawing.

Mechanics and artisans too often are unable to thoroughly understand and read drawings. When they wish to express their ideas on paper they are generally unable to do so, owing to their lack of knowledge. By taking this course they will be able to comprehend drawings at a glance, saving time and trouble and possible loss to their employers. A man who has this knowledge of drawing is of especial value to his employer and can command higher wages in proportion to his greater worth.

Course in Architecture.

Mathematics—Arithmetic, Algebra, Geometry, Trigonometry.
 Mechanics and Physics.
 Mechanical Drawing.
 Elementary Architectural Drawing.
 Shades and Shadows.
 Free-hand Drawing.
 Stereotomy.
 Architectural Design and Planning.
 Working Drawings.
 Graphical Statics.
 Perspective.
 Heating and Ventilation.
 Architectural History.
 Materials and Construction.
 Strength of Materials.
 Building Stones.

Specifications.
 Plumbing and Drainage.
 Business relations.
 Contracts.
 Estimating.

Course in Architectural Drawing and Designing.

Mathematics—Arithmetic, Algebra, Geometry, Trigonometry.
 Mechanics and Physics.
 Mechanical Drawing.
 Elementary Architectural Drawing.
 Shades and Shadows.
 Free-hand Drawing.
 Stereotomy.
 Architectural Design and Planning.
 Working Drawings.
 Perspective.
 Architectural History.

Course in Architectural Drawing.

Mathematics—Arithmetic, Algebra, Geometry.
 Mechanical Drawing.
 Elementary Architectural Drawing.

Terms for the Course in Architecture.—**\$50 in advance; or \$55 in \$5 installments**, as follows: \$5 with application and ten additional monthly payments of \$5 each; or \$60 in \$2 installments, as follows: \$2 with application and twenty-nine additional monthly payments of \$2 each.

Terms for the Course in Architectural Drawing and Designing.—

\$35 in advance; or \$40 in \$5 installments, as follows: \$5 with application and seven additional monthly payments of \$5 each; or \$44 in \$2 installments, as follows: \$2 with application and twenty-one additional monthly payments of \$2 each.

Terms for the Course in Architectural Drawing.—**\$25 in advance; or \$30 in \$5 installments**, as follows: \$5 with application and five additional monthly payments of \$5 each; or \$34 in \$2 installments, as follows: \$2 with application and sixteen additional monthly payments of \$2 each.

Certificates of proficiency are awarded to students satisfactorily completing any of these courses.

For information as to degrees see page 10.

Any further information desired will be cheerfully furnished.

Who is Master?—Man or Machine?

Every day new machines take up the work which was before done by hand. The man displaced, too often merely laments his fate, accepts the situation and settles down, content merely to feed the machine. But if he undertakes to study it, he sets the machine in his head to going. If he keeps that machine—his brain—at work he will find that his brain will help him conquer the man-made machine, make him independent of it, and open the way for him to do more than merely nurse some machine. With the most wonderful power at his command, man too often neglects the advantage it gives. But he must learn how to use it.

The food of the brain is study; a little of such nourishment creates a craving for more, and properly directed study produces wonderful results. The man is then able to use his brain, and the machine is no longer his master.

Courses in Mechanical and Topographic Drawing.



INSTRUCTION in Mechanical or Topographic Drawing forms a very important part of each of the different courses of the Department of Engineering. The work done in connection with these courses affords the student valuable training in the general principles and the fundamental practice of mechanical drawing, with special instruction in the particular branch of drawing suitable to the needs of the particular course. The instruction is

the same for all courses, up to the point where a substantial foundation has been laid for further progress in the drawing of machinery for the Mechanical Engineering Course, structures of all kinds for the course in Structural Engineering, Architectural Designs, Topography, etc., depending on the line of work the student is pursuing.



For the benefit of those who prefer to omit, or to postpone to some more convenient period, a study of the technics and theory of Engineering; and also for those who propose to devote their entire attention to drawing, we have prepared two courses in drawing, separate from the Engineering Courses. These are: first, the Complete Mechanical and Topographic Drawing Course for those who desire to become thoroughly capable in all the varieties of technical drawing; second, the Course in Mechanical Drawing for those who wish a thorough training in technical drawing, but desire instruction in those particular branches only that are more commonly employed.

In the following description of the line of instruction pursued in the course of Complete Mechanical and Topographic Drawing, the preliminary work is that given in all courses of which drawing forms a part. Then in our other courses we give the student work in the kind of drawing particularly applicable to that course, while our complete drawing course includes some work from all the technical courses.

As a preliminary we will state that **any one may become a good draftsman**; to some it may come more easily than to others; but with patience and care any one may acquire that most valuable art.

Course in Complete Mechanical and Topographic Drawing.

The subjects of mathematics and the elementary mechanics are first taken up, as they are the foundation of all technical drawing.

This is followed by a discussion of drawing instruments and materials, their selection and use, together with hints of great value to the student in actual practice.

We take great pains to start him right, so that he may not acquire faulty habits, which in time become very difficult to correct, and which may interfere with his development as a draftsman or injure his eyes. Illustrations are freely used to make clear the proper handling of the draftsman's tools and material. The work in actual drawing begins with the lines and curves, followed by easy constructions with the necessary geometrical and mechanical problems.

After this the student will take up the construction of sections and projections. Then will come line shading of curved surfaces and section lining, followed by instruction and practice in the use of water-colors, with instruction and practice in such free-hand drawing as is found necessary in Mechanical and Topographic Drawing. Instruction in tracing and blue prints will conclude what may be considered the preliminary drawing work of all the courses.

After this will be taken up more complex work of machine drawing, truss and bridge work, or structural drawing in general, architectural drawing, map making, and topographic drawing.

Upon the completion of this course the student will be fully equipped as a professional draftsman, ready to take up work of any character.

In going through this course the student will work from carefully finished plates, or from rough sketches with measurements, as the needs of the different parts of the course may require. Throughout all the work close attention is paid to the subject of lettering, and the student is carefully trained in this most

important detail.

The course will include thorough training in the preparation of drawings for the **United States Patent Office**. The rules of the Office are very strict; and 50,000 applications for patent are

filed annually, accompanied by an average of two sheets of drawing each; a considerable number of these drawings are rejected each year, and must be re-drawn. These drawings come from all parts of the United States, and a large field of work is open in each of our principal cities to those who are expert in the preparation of drawings for the Patent Office. Our instructor has had extensive experience in this line, and the instruction in it will be thorough.

The **Course in Mechanical Drawing** differs from that above described only in extent, the training is just as careful and thorough and the instruction is just as complete; but there are not so many special classes of work taken up. An examination of the following synopses of the courses will show fully the difference between them:

Course in Complete Mechanical and Topographic Drawing.

Mathematics—Arithmetic, Algebra, Geometry, Trigonometry.
 Elementary Mechanics.
 Drawing Instruments and Materials and their use.
 Practical Hints.
 Simple Lines and Curves.
 Simple Constructions and Problems.
 Sections and Projections.
 Section Lining.
 Lettering.
 Coloring.
 Free-hand Drawing.
 Tracing and Blue Prints.
 Machine Drawing.
 Structural Drawing.
 Architectural Drawing.
 Patent Office Drawings.
 Platting Surveys.
 Map Drawing.
 Topographic Drawing.



Course in Mechanical Drawing.

Mathematics—Arithmetic, Algebra, Geometry, Trigonometry.
 Elementary Mechanics.
 Drawing Instruments and Materials and their use.
 Practical Hints.
 Simple Lines and Curves.
 Simple Constructions and Problems.
 Sections and Projections.
 Section Lining.
 Lettering.
 Coloring.
 Free-hand Drawing.
 Tracing and Blue prints.
 Examples of several classes of more complex mechanical drawings.

Terms for the Complete Mechanical and Topographic Course.—**\$30 in advance; or \$35 in \$5 installments**, as follows: \$5 with application and six additional monthly payments of \$5 each; or \$39 in \$2 installments, as follows: \$2 with application, eighteen additional monthly payments of \$2 each and a final payment of \$1.

Terms for the Course in Mechanical Drawing.—**\$25 in advance; or \$30 in \$5 installments**, as follows: \$5 with application and five additional monthly payments of \$5 each; or \$34 in \$2 installments, as follows: \$2 with application and sixteen additional monthly payments of \$2 each.

Certificates of proficiency are awarded to students who satisfactorily complete the courses.

For information as to degrees, see page 10.

Any further information desired will be cheerfully furnished.

A Mystery Unveiled.

To the man who does not understand Mechanical Drawing, it seems a mysterious art, beyond the power of the average man to understand. Yet what is it all? Nothing but straight lines and curves and nearly all made by machine. The handling of most machinery looks complicated to those ignorant of the principles of its working; but yet the average man with practice and teaching can master it. So with drawing—ordinary shop drawing can be learnt by any one who makes a fair trial at it. And while it is not possible for everyone to become a draftsman of the highest grade, excellence in this line is within reach of a far greater number of people than most persons would suppose. You may be sure that if you try **you can become a draftsman**, possibly even a very good draftsman. In our experience we have seen remarkably fine work developed from very poor beginnings.

Our Students are Satisfied.

I am more than pleased —RALPH H. PEIRCE, 5025 Lake Ave., Chicago, Ill.

I hope you may enjoy a prosperous business and continue in the good work.—MABEL B. CRATTREE, Natick, Middlesex Co., Mass.

I am pleased and satisfied, and shall ever recommend your methods.—C. A. KING, 163 Arlington St., Chelsea, Suffolk Co., Mass.

* * * Will close by saying that I will always have a good word to say for the National Correspondence Institute, and that I am greatly pleased with my investment.—THOS. A. CONLIN, rear 26 Jefferson St., Worcester, Worcester Co., Mass.

I wish to thank the National Correspondence Institute for the manner in which I have been treated in the course of my studies —THOMAS STEAD, 191½ Clason Ave., Brooklyn, N. Y.

I owe a deal to the National Correspondence Institute for what I have received, for it is of great advantage to me in the business I am in at present. If any one desires any information of your Institute, I am at liberty any time to give them what it truly deserves.—JAMES S. HOWE, 321 E. 29th St., New York City.

If there is one point that you can use in aiding others I shall feel that my time has not been thrown away, or if you ever have applicants from New York wanting reference, you may refer them to me, and I will tell them in no uncertain way how much you did for me.—WM. B. TREADWELL, 5th St., Williamsbridge, New York City.

Courses in Higher Mathematics and Advanced Mechanics.

Terms for each.—\$50 in advance; or \$55 in \$5 installments, as follows: \$5 with application and ten additional monthly payments of \$5 each; or \$60 in \$2 installments, as follows: \$2 with application and twenty-nine additional monthly payments of \$2 each.



WITH these courses the more complicated and difficult questions of the subjects of Mathematics and Mechanics are taken up. These courses may be taken separately by those who are acquainted with subjects properly preliminary to them. One or both of these courses form a necessary part of the instruction of candidates for degrees. The holder of a degree from the **National Correspondence Institute** will be equipped with all the theoretical knowledge that is required for the same degree in any

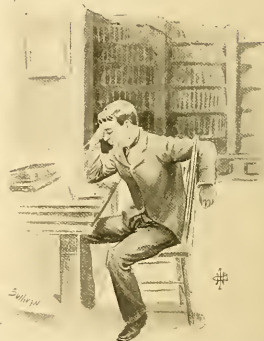
college in the country. See pages 10, 13 and 43.

The instruction of the regular courses prepares the student to understand these more abstruse matters; he will find himself fully able to conquer them; and so crown his efforts toward the acquisition of a profession by qualifying himself for the solution of the problems which call for the services of engineers of the highest standing.

In submitting this description of the courses of our Engineering Department for your consideration, we wish to state that it has been carefully prepared, having constantly in view the omission of everything that might confuse the average reader in examining the instruction we offer with the intention of understanding how it will benefit him. But we realize that there may be points, differing in each case, upon which further information may be desired.

Therefore, we ask **you** to advise us if there is anything in this book that needs further discussion on account of the special circumstances of your own situation. We will be very glad to answer any questions you wish to ask, or to give you advice about the course most suitable to you, or to assist you to overcome any difficulties and doubts that may be in the way of your efforts to improve yourself.

Address,



NATIONAL CORRESPONDENCE INSTITUTE,
ENGINEERING DEPARTMENT,

Second National Bank Building,

WASHINGTON, D. C.

A reproduction, greatly reduced, of the heading of our Diploma issued to those who complete one of the courses for the degrees of C. E., Mech. E., E. E., or Ph. B. ; see pages 10, 13 and 42.



This Seal, attached to our Diploma awarded to those who take Degrees, and to our Certificates of Proficiency awarded to those who complete single Courses, shows that we endorse the holder as having been thoroughly instructed. Our careful teaching of all students has established our reputation; and by constant effort to maintain and elevate our already high standard, we will ever maintain the high guarantee which our seal carries to all who may contemplate the employment of any of those whom we have instructed.

English Course for Engineering Students.



COURSES in English have been arranged for our different Departments in accordance with the regular practice of the National Correspondence Institute (that of giving exactly what the students need and only that); and our Engineering students will find this course well adapted to their needs if they require training in the

English Branches.

The engineer is frequently called upon to submit reports concerning enterprises which may be under consideration. Not only must these reports be clear, exact and definite in their explanation of technical matters, but also the language used must be such that the meaning intended will be easily apparent. A poor presentation will surely affect the employer's opinion of such a report, no matter how great its professional merit. Consequently, it will sometimes happen that an opportunity for employment in an important work will be lost because of the unfavorable impression made by the engineer's report.

In all other matters which it may be necessary to put in writing, an ability to use good English is just as essential. The engineer is expected to be a man of education, and most persons, unable to judge of the technical part of his education, will judge him by his knowledge of the common English branches.

No student (who stands in much need of instruction in English) can complete a course in our Department of Engineering without more or less improvement of his English, but, of course, only a passing attention can be paid to language in a scientific study, and those who are deficient in the English branches should take ad-

vantage of the opportunity offered by the Institute to perfect themselves in this respect. The work of English may be carried on without interference with the engineering studies; and the student will find it a pleasant change to turn from one to the other.

The English course for engineering students consists of orthography, punctuation, capitalization, grammar (especially construction of sentences) and elements of rhetoric. In orthography, the students will be drilled in the spelling of some twenty-five hundred or more words of common usage, in which will be included most of the technical words which the engineer will need in his profession. The drill in punctuation will be in the correct use of the various punctuation marks: period, comma, semicolon, colon, dash, etc. In capitalization, the correct use of capitals will be explained and practice in their use will be given. The instruction in grammar will not go deeply into theoretical grammar, but will aim to familiarize the students with the use of correct English so that they will think grammatically and, therefore, will express themselves in irreproachable language unconsciously and without labored effort to that end. It will be the aim in rhetoric to instruct our students in those matters which pertain to the appearance of the written page and to the form in which to cast one's ideas: the paragraphing, the best method of presenting thought, the essentials of a description, etc.

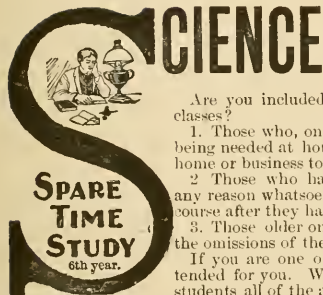
Arithmetic is not a part of the English Course for Engineering Students, because that subject is very thoroughly gone over in the Engineering courses.

The terms for this course are \$8 cash in advance; or \$10 in monthly installments of \$5 each; or \$12 in installments of \$2 each.

There will be no text-books to buy, as we supply all reading matter needed in the course.

Department of Science.

In Charge of JOHN SCOTT JOHNSON, B. S., A. M., Ph. D.



TAUGHT
BY
MAIL.

Are you included in one of these three classes?

1. Those who, on account of youth or of being needed at home, are unable to leave home or business to attend college.
2. Those who have been compelled, for any reason whatsoever, to give up a college course after they have begun it.
3. Those older ones who wish to supply the omissions of their earlier education.

If you are one of those, this page is intended for you. We are not offering to give students all of the advantages of a course in

college; we rather advise all who can do so, to enter some good university and to complete their courses there. But to those who, for some reason, are not able to attend a university during the four years necessary for a degree, we offer a substitute which has much to commend it. This is a **thorough education by correspondence, with a degree at its close to attest it.**

The chief advantages of a course by correspondence may be summed up as follows:

Money is Saved.—Expenses of travel and of board away from home are cut off, and the expense of tuition is reduced.

Time is Saved.—The student does not have to attend lectures at certain specified hours, with the consequent loss of time owing to preparations to leave his boarding house, the tramp to the college, the tramp back (or expense of carfare), the resuming of his house coat and slippers for work again and the taking up again of the train of thought which was interrupted a couple of hours before.

Business is Saved.—The student may study at home, making his study hours suit his convenience, which enables him to maintain his business while he pursues his studies.

The Student Gains a more personal, individual attention than is possible to instruction in classes.

The Student Progresses more rapidly, because he is not held back by the one or two dull or lazy or negligent pupils, who are nearly always present in every class.

Special Courses are given in Astronomy, Botany, Chemistry, Geodesy, Geology, Meteorology, Mineralogy, Physics and Zoology.

Graduation Courses leading to the degree of **Bachelor of Science (B. S.)** consist of elective studies from the above with certain required studies in English, Modern Languages (French and German), History, Mathematics, Drawing and Philosophy. Those who enter for a degree must pass satisfactory examinations at the completion of every subject, and must, at the close of the course, pass a satisfactory examination on all of the subjects of the course.

Our method is different from those built upon the University Extension, Cosmopolitan or Chautauqua plans. Our assistance is not limited to outline, suggestion, and "keeping tab" on the student, but it includes, also, active, personal instruction wherever the student needs it. It differs from the regular college work in that ours is written, while the class recitation is oral.

Our Faculty is a collection of bright, brainy, college men, who know what students need and how to supply those needs. We invite correspondence from all who have a desire for academic honors or who wish to pursue some special line of study.

Address—

**National Correspondence Institute,
Second National Bank Building,
Washington, D. C.**

Department of Science.

DEPARTMENT OF JOURNALISM.

In Charge of MR. HENRY LITCHFIELD WEST, Formerly Managing Editor Washington Post.

JOURNALISM

Students
Assisted to
Positions.



Among all modern professions **Journalism** is the most powerful, the most fascinating, the most remunerative. The steadily-increasing demand for well equipped writers has led the **National Correspondence Institute** to provide a new and attractive plan for preparing students in journalistic work, the most beneficial returns being assured for the least expenditure of time and money.

All the great authors of to-day first entered the journalistic field. The path which they have trod to fame and financial success is open to thousands of men and women who need only to have their latent talents developed and

directed. The Schools of Journalism in the large cities, which compel the actual attendance of the pupil, do not meet the requirements of the situation. They are unsatisfactory and expensive. In teaching **Journalism by Mail** we have solved the problem of imparting complete knowledge of the journalistic art to each individual student. Your **Spare Moments** are the rounds of the ladder upon which you can mount to success. The plan is endorsed by practical journalists.

Mr. West, who has personal charge of the Department of Journalism of the National Correspondence Institute, is one of the most accomplished, successful and versatile journalists at the National Capital. Mr. West has had long experience in training journalists, and many of the most noted members of the profession have graduated from under his instruction. He is commended by the most distinguished of the brilliant corps of Washington correspondents and has himself achieved a high reputation as a magazine writer. He is admirably capable of imparting the results of his long experience and knowledge to the students of the National Correspondence Institute. He will be assisted in his work by a corps of specially-selected assistants.

Courses of Instruction.

The courses are divided as follows:

Practical Course.—Acquaints the student with every detail of Journalistic Work; this includes Rhetoric and Style; How to begin work as a Reporter or Correspondent; Methods of Journalistic Work; The Art of Interviewing; Editorial Writing, etc.

Complete Course.—Embraces all of the *Practical Course* and in addition Book Reviewing; Dramatic Criticism; Essay Writing; Short Story Writing; City and Managing Editors' Work, etc.

Select Course.—Embraces subjects selected from the *Practical and Complete Courses* and designed for Teachers, Lawyers, Doctors—in fact, all professional and business men and women who desire instruction in composition and literary work as an accomplishment and who do not wish to follow journalism as a profession.

Special Course.—For those who have endeavored to secure acceptance of literary work, but have failed to gain a foothold in the ranks of successful authors. Publishers have neither the time nor inclination to criticise the manuscripts which they find unavailable. Our Department of *Rejected Manuscripts* in this course, supplies this need, making *story writing* a lucrative employment.

The system which we have adopted is thorough, practical and successful. It teaches **Journalism** by methods which are easy to understand and certain in their results. There is no time-limit to the courses, but each pupil is given ample opportunity to become proficient without interfering with the regular work in which he or she may be otherwise engaged.

The Diploma which will be finally awarded will be of value in securing employment. Students with adaptability and talent can easily make their expenses by journalistic work while engaged in acquiring a complete knowledge of all the details of the profession.

Our Plans provide practical assistance in securing employment.

Tuition, \$20 and upward; cash or installments.

Write for our announcement of the **Department of Journalism, National Correspondence Institute, Second National Bank Building, Washington, D. C.**

Sent free on request.

DEPARTMENT OF BOOKKEEPING AND BUSINESS.

In Charge of GEO. W. SCHWARTZ,
Author of "Office Routine and Bookkeeping," bookkeeper, expert
accountant and teacher of wide experience.

B O O K K E E P I N G



**SPARE
TIME
STUDY.**
6th year.

Students
Assisted to
Positions.

Our Department of Bookkeeping and Business is thorough, practical, up-to-date, and conducted in the most satisfactory manner. The system of bookkeeping which we use is taught by the Author and is especially adapted for instruction by mail.

By devoting your spare time, odd hours, long evenings, rainy days, etc., to it, a few months will be sufficient to give you a good, practical drill in our business course, including Bookkeeping by single and double entry, Business Practice, Business Arithmetic,

Commercial Law, Letter-writing, Penmanship, etc., and prepare you for the business establishment or the counting-house. Graduation course will require proportionately longer time.

Degrees.—Graduates of this Department receive the degrees of B. Acct and M. Acct. This Institute is incorporated by law, with power to confer degrees the same as the leading Colleges and Universities of the country, and in this has a decided advantage over the ordinary Business College.

Not a "Feeder."—The instruction in this Department is complete in itself and *exclusively by correspondence*. A student in California is instructed in the same manner as one in Baltimore or this city. This Department is not a side issue and a "feeder" for a business college run in connection, with the object of securing students ostensibly for correspondence instruction, and then drawing them to the College to "finish the course" at extra expense, nor is it run for the purpose of selling text-books.

Tuition, \$15 and upward, cash or installments. Full particulars free. Address—

National Correspondence Institute,
Second National Bank Building,
Washington, D. C.

Department of Bookkeeping and Business.

DEPARTMENT OF SHORTHAND AND TYPEWRITING.

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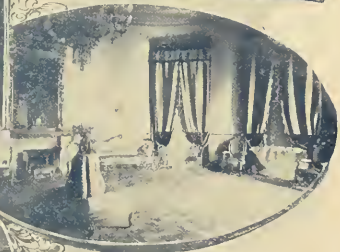
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