saving machinery for hand-labor has proven to be one of the greatest of all benefits to the wage-earner. The opportunities for lucrative employment and rapid advancement to young men properly equipped, entering the industrial establishments to-day, are greater than at any previous time within my recollection.

ANNUAL REPORTS OF THE DIRECTORS OF THE SCHOOLS OF
DRAWING, MACHINE DESIGN, AND NAVAL ARCHITECTURE
FOR THE SESSIONS 1900-1901.

THE DRAWING SCHOOL.—It is very gratifying to see the constantly increasing evidences of the usefulness of this school. In these days of large aggregations of capital, consolidation of works, division of labor, interchangeability of parts in manufacture, and the abolition of the apprentice system, a young man of average ability has but little opportunity to learn a trade in any general sense, or to add to his knowledge or secure his own advancement, except by such instruction and information as he can obtain in the evenings, outside and independent of his place of employment. Foremen and superintendents are too busy to assist or instruct their boys, and the work the latter can do, or the position they can fill, is becoming more and more dependent on their own energy and push and on their taking advantage of the opportunities offered by night schools, and less on the experience they can gain in their daily work. They may become very expert in the latter, but the very skill thus acquired makes them so valuable in that capacity that it chains them to that one thing.

A knowledge of the geometry, technicalities and conventionalities of drawing is so fundamentally essential to all industries that it should be the very first thing for the young man to obtain, and it is pleasing to see the increasing appreciation on their part of this fact. This knowledge once attained leads to a desire for mathematics, design, and special construction, and thus the technical education is built up.

The school has been large and well attended, and is maintaining and increasing its reputation, the credit for which is largely due to the instructors, Messrs. Clement Remington, Oscar Mowry, Albert F. Griffith, John Rae, and W. W. Twining.

WM. H. THORNE,
Director.

THE FOLLOWING STUDENTS ARE ENTITLED TO HONORABLE MENTION:

In the Senior Mechanical Class.

Frederick Schwartz,
Clarence Fithian,
Joseph Roberts,
Gustavus K. Focke,
Theodore R. Johnson,
A. K. Graham,

Frank Stoertz,
William J. Borton,
E. Winfield Finkbiner,
Henry Noske,
Henry Hobbell,
Luther Krout.

In the Intermediate Mechanical Classes.

Herman J. Ruch,	William J. McFarland,
James Anderson, Jr.,	J. J. McGill,
Edwin D. Bates,	E. L. Buckwalter,
Frederick Hartmeyer,	Bernard G. Smith,
Richard Pockert,	Julian Harwood,
Charles F. Miller,	Fred. W. Wiegand.

In the Junior Mechanical Classes.

Seward G. Dobbins,	John Marshall,
Harry Hartranft,	E. H. Berry,
William T. Sellner.	

In the Architectural Class.

Duffield Ashmead, Jr.,	John L. McGarvey,
Samuel Miller.	

In the Free-Hand Class.

Alfred G. Rose,	Roy E. Blithe,
Benjamin Feldman.	

THE FOLLOWING STUDENTS ARE AWARDED SCHOLARSHIPS FROM THE B. H. BARTOL FUND, ENTITLING THEM TO TICKETS FOR THE NEXT TERM:

Walter C. Chadwick,	Harry H. Appleton,
L. Hastings Alexander,	Frank B. McDowell,
J. W. Shaffer,	Roger W. Peterson.

THE FOLLOWING STUDENTS, HAVING ATTENDED A FULL COURSE OF FOUR TERMS, ARE AWARDED CERTIFICATES:

Frank E. Mahon,	E. Winfield Finkbiner,
John Limprun,	Frederick Schwartz,
Clarence Fithian,	Edward J. Rowland,
Gustavus C. Focke,	Henry Noske,
Frank Stoertz,	Charles Weinerth,
Herman Gutsche,	Arthur G. Reinhilt,
A. K. Graham,	J. B. Stevenson, Jr.,
Harry Hobdell,	Luther Krout,
William J. Borton.	

The Germantown Junction Branch School, under the direction of Mr. Haakon Nortom, exhibits very satisfactory progress, and a large increase in the number of pupils. The following students are awarded certificates:

Edwin Kean Fagan,	Malcolm L. Baker,
Louis Ehlinger,	Walter Andrews,
Spencer Ogborn,	Frederick A. Steck.

THE SCHOOL OF MACHINE DESIGN.—The extension of the scope of the School of Elementary Mathematics to embrace subjects in a course in machine design has proved a very satisfactory step. The students who now

undertake the mathematical work offered, do so with a definite aim in view, instead of being left to their own resources after this is completed and, in consequence, evince a lively interest even in this preliminary work.

The subjects comprising the course in machine design proper are offered not merely as a feeder to the course in mathematics, but for their own intrinsic value to those who are interested in the design and construction of machinery, and no effort has been spared to make them of practical value and to present them in a logical and systematic manner. Indeed, the subjects, analytical mechanics and strength of materials, have been treated with unusual thoroughness for a course in which no higher mathematics is used, and many theorems, usually taken for granted in elementary works on these subjects, have been satisfactorily proved by the aid of special methods. It is unfortunate, in connection with this course, that the Institute does not possess the necessary laboratory equipment for carrying on tests of the strength of materials and of the efficiency of transmission devices; laboratory training of this kind being of undoubted value to the designer.

Next year the course is to be carried on substantially as already outlined and the only material change in view may be the cutting out of some of the work in mechanics and the addition to that in the strength of materials.

That the school bids fair to well serve its purpose, there seems very little doubt, if the interest shown by the students and their progress are an indication.

LUCIEN E. PICOLET, *Director*.

THE FOLLOWING PUPILS ARE AWARDED CERTIFICATES:

Charles Stone,

William Williams,

Herbert E. Ives.

THE SCHOOL OF NAVAL ARCHITECTURE.—The School of Naval Architecture had, during the first half-term, thirty-one students, and during the second half-term twenty-five students. Six of these have attended the full term of two years, and will be graduated at the end of this term. The attendance at the lectures each week has always been up to the maximum.

The Senior Class has studied and examined all kinds of general arrangements and the details of fittings for same, and completed the necessary calculations that are required for the proper and efficient design of any vessel. They have made themselves proficient in the use of the integrator, estimating costs, calculating weights of material and centres of gravity, strength of structure of the hull under different conditions, as well as the powering of ships. Their home-work has shown wonderful energy, considering that the drawings, etc., are made without the help of the usual adjuncts of a drawing office. In fact, the graduating class has exhibited more than ordinary intelligence, and its members are neat and careful draughtsmen, zealous and painstaking.

The Junior students have progressed rapidly in both theoretical and practical naval architecture, and have also shown marked zeal in their work both in class and home work, numerous drawings and tracings having been made from blue prints which are beyond the average in neatness and accuracy.

A. J. MACLEAN,
Director.

THE FOLLOWING STUDENTS ARE AWARDED CERTIFICATES:

William H. Balls,
Gabriel Hofgaard,
Henry J. Hack,

Fred'k Austin Coolidge,
James A. Kelley,
Joseph Rilatt.

BOOK NOTICES.

Report of the Geological Survey of North Dakota. (First biennial report.)
By E. J. Babcock, State Geologist, Grand Forks, N. D. State Print.
1901. 8vo. Pp. 101, with numerous illustrations.

This is the first official contribution from the lately established Geological Survey of North Dakota, and the author wishes it to be regarded as a preliminary bulletin. It deals with the topography and geology, the clays of economic value, the coal deposits, and the water supplies of the State. W.

Experiments Arranged for Students in General Chemistry. By Edgar F. Smith (Professor of Chemistry, University of Pennsylvania), and Harry F. Keller (Professor of Chemistry, Central High School, Philadelphia). Fourth Edition. Enlarged with forty-one illustrations. Philadelphia: P. Blakiston's Son & Co. 1900. 12mo. Pp. 88. (Price, 60 cents.)

The plan of this work consists in the formulation of a progressive series of experiments in general inorganic chemistry, with problems appended, under each head, to accompany the regular course of class instruction.

The present edition (the fourth) has been improved by the introduction of new experiments, the modification of others described in the former editions, and a general revision of the text. W.

Analyse Chimique et Purification des Eaux Potables. Par P. Guichard, Membre de la Société Chimique de Paris, etc.

L'Industrie des Matières Colorantes Azoïques. Par George F. Joubert, Dr.-ès-Sciences, etc. Paris: Gauthier-Villars, Masson et Cie. (Price, 2,50 francs in paper, 3,00 francs, pasteboard covers.)

These contributions to the valuable technical series issued by the publishers under the general title, "Encyclopédie Scientifique des Aide-Mémoire." Each is edited by an acknowledged expert, and concisely cover the subjects which are treated. W.

Traction and Transmission. A monthly supplement to *Engineering*. London, Eng. Vol. I. No. 1. April, 1901. (Price, 2 shillings net.)

The publishers of *Engineering* have issued the first impression of a monthly supplement to their widely-known journal, to be devoted to subjects relating to traction and power transmission. The new publication is issued in quarto form, and comprises fifty-six pages with numerous illustrations admirably printed on heavy paper in large type. The subjects treated are all useful contributions of a high order of merit. W.