

VENTILATION OPTION

How the Subject of Heating and Ventilation Has Progressed.

By PROF. S. H. WOODBRIDGE.

A conservative estimate of the costs of heating and ventilating equipments annually installed in the United States is \$18,000,000.00. Previous to the time when a course of study in heating and ventilating was made a part of the curriculum of the Institute the character of the systems for which such sums were expended was determined very largely by the rule-of-thumb methods of contractors and shop "engineers." The nature and results of their work are matters of history. The prevailing methods were those of coarse approximation involving large factors of safety stated in terms of a more or less erratic personal equation. The resulting products were more like a big Indian blanket wrapped about the user than like a civilized garment, cut and made to closely fit the form, and to flexibly adapt itself to the motions and requirements of the wearer. All that meant waste, clumsy and costly misfits, with only here and there a nice adjustment of furnishment to requirements.

The problems of ventilation became in such hands a series of expensive and discouraging failures. So late as the early eighties, the Institute was emphatically advised by experienced "engineers," as also by some of their victims, against any serious attempt to provide an effective ventilating system for a projected new building, because "it will prove only one more costly experiment foredoomed to failure."—"costing a mint of money to install and requiring a mine of coal to run." The Institute took the matter into its own hands and designed and furnished a system which for a decade stood as an object lesson in effectiveness and economy in ventilating work, and played no insignificant part in the evolution which has redeemed theory and practice in the realm of heating and ventilation from the longtime thralldom of a capricious art, and established them on a sound engineering basis.

For two centuries men of note as physicists, chemists and physicians took a leading part in elucidating and applying self evolved principles to the solution of ventilating problems, particularly in connection with the Parliament Buildings in London. These men, such as Desaguliers, Hale, Gurney, Faraday, and Percy of England, most able in their several vocations, were, seemingly, not gifted as aerial engineers. The practical difference between the civil engineer and the aerial engineer is that the sure footing of one is on terra firma, while the tentative footing of the other is in the air. To transpose the former without due preparation into the field of the latter is to impose on him an unwonted task, and to invite embarrassment and failure.

General Meigs, a late chief of engineers of the United States Army, under whose charge the Library of Congress was begun and the Washington Monument, the State, War and Navy building, and the House and Senate Wings of the U. S. Capitol were built, while engaged upon the last-named work, incorporated in his report to his superior, the Secretary of War, a significant statement to the effect that of all the various labors undertaken by him, he found those pertaining to heating and ventilating the most complex and difficult, requiring a knowledge of the nature and laws of heat and its transmission, of the physics and mechanics of gases and vapor, the dynamics of steam, the theory and application of mechanism and an amount of laborious computation uncalled for in his other engineering work, and strongly hinting his purpose to spare his Government that long history of lavish expenditure and lamentable failure which, he asserted, has characterized nearly two centuries of attempts to satisfactorily ventilate the English Parliament Chambers.

The purpose of the courses of study in Heating and Ventilation as pursued at the Institute, on the sides of Hygiene, Architecture, Heat, Pneumatics, Mechanics and allied subjects, is to so equip the graduate engineer who shall have taken the full course that no such confession and humiliating record can be justly written of his professional undertakings.

In modified and mollified form that record might more aptly be written of the work done by the afore named able critic himself and by his accom-

plished associates, than of that done by an Institute graduate, Course II, Option 4, who has furnished Boston, in the new Opera House, with what is believed will prove to be the finest example of auditorium ventilation the world affords.

DRAWING

How Drawing is Taught and the Aims of the Course.

By PROF. C. P. PARK.

The aim of the courses in Mechanical Engineering Drawing is to give the student ability to make accurate solution of engineering problems by graphical methods, facility in clear expression of his thoughts and constructive ideas by means of drawings, and ease in correct interpretation of ideas of others expressed through the same medium; in order that he may meet the requirements in this direction that will come to him in active engineering practice. The courses, which extend through the student's second and third years, may be considered of two general types,—Machine Drawing and Graphical Solution of Problems.

The work of the second year supple-



PROF. CHARLES F. PARK.

ments the lecture course in Mechanism, and consists very largely of the solution of problems in kinematics and mechanism design by graphical methods. Much importance is placed on this work; and the problems are of a practical nature, such as problems in belting and quick-return motions, the design of cams, gear-teeth, plain-slide and double valves for steam engines, and the Stephenson link, etc. The study of velocities by means of curves is made largely from data on machines in actual operation so that the student may gain a clear conception of some of the results which are being obtained in modern machine construction. By varying the proportions of such problems in making the assignments to different members of the same class, the student is enabled to see the effects produced by such changes, and investigations of this character carried through several years by the department, give considerable valuable information. The problems in the design of gear-teeth, aside from their importance as such, are considered of great value in teaching accurate use of the drawing instruments; the particularly valuable feature lying in the fact that in such problems the student himself is able to judge of the accuracy of his work, and he soon learns that care and accuracy are necessary to gain results of real value. Besides, the spirit of getting a drawing finished, right or wrong, is discouraged by such problems. In valve-gear design the student becomes acquainted with the practical construction and lay-out of both plain-slide and double valves through the process of the solution of his problem. Furthermore, by the use of wooden models, which the student makes for himself and uses on the drawing board with his other instruments in solving problems on the Stephenson link, he learns the value of special drawing appliances; and an effort is made to impress upon him the wide application of such devices to the solution of engineering problems.

At the beginning of the course, before the student is prepared to take up a problem depending on the principles

(Continued on page 20.)

COBB, BATES & YERXA COMPANY,
SELL CIGARS, CIGARETTES,
SMOKING TOBACCO
AND ALL SMOKERS' MATERIALS

AT

55 SUMMER ST., CORNER OF CHAUNCY

and woollens that are specially selected for college men can be seen at either of my stores at any time, and opposite Tech. Union Tuesday's from 12 to 2.30. A students' tailor 14 years.

L. Pinkos
9 STATE STREET BOSTON HARVARD SQUARE CAMBRIDGE

BACK BAY BRANCH

State Street Trust Co.

130 MASSACHUSETTS AVENUE, BOSTON

Credits interest monthly on accounts of \$300 and over.

MAIN OFFICE: 33 STATE STREET

GEM SHOP

601 Boylston St., Copley Sq.
BOSTON.

Christmas Gifts

Unique designs in pendants, scarf pins, brooches, rings, bracelets, hat pins, necklaces in gold and silver.

Odd stones from all over the world.
Abalone jewelry set in sterling silver.

Kuyler's

Confectionery

146 TREMONT STREET,

BOSTON.

Telephone Oxford 3280.

Thos. F. Galvin
ROSES

124 Tremont St., opp. Park St. Church

Telephone Oxford 1737

Conservatories:

Boylston and Fairfield Sts., Back Bay

Telephone Back Bay 2323

Established 1850

SMULLEN & CO.

— TAILORS —

51 SUMMER ST., cor. Chauncey St.

Highest Grades : Popular Prices