STEAM ENGINEERING.

(Continued on page 21.)

the gas engine and gas producer. The temperature entropy diagram is used to a considerable extent in the solution of problems. To enable the student to apply his thermodynamics, various points are illustrated by applications to practical problems, and the student in the course of his work is made to solve a great number of such problems.

About fifteen lectures in the course are given to the discussion of gas engines and gas producers. The subject of steam boilers is also included in the course. The different types of boilers are discussed, and the students shown how to select the proper type of boiler for a certain set of conditions. The thermal efficiency of boilers, boiler settings, boiler staying, the effect of scale and the methods of removing scale, are treated at considerable length. It the intention to bring before the student in this course, practically every type of problem along steam engineering lines, which he may meet in practice, and it is felt that the student, after taking such a course, is able to grapple successfully with any problem whih may confront a steam engineer.

STEAM TURBINES.

(Continued from page 20.)

methods that can be advantageously used for education, and which give substantially the results that are known to be atained by turbine builders. Fortunately turbine builders have recently found it possible to give sufficient information to insure that methods, which in themselves are valid, are so controlled as to give results that closely parallel thase that have been found advantageous in practice.

The temperature-entropy table was computed for use in steam-turbine computation at the Institute and has proved to be rapid and accurate in use, and allow of the development of certain methods that could not otherwise be used. Among these may be mentioned a method for determining directly the proper distribution of pressure in compound steam turbines, taking account of the increase of entropy due to friction. A direct analytical solution is given of the determination of the angles for nozzles, blades and guides of velocity compound turbines, allowing for friction; this method is used for a construction which has two moving wheels in the same pressure stage. For constructions with three or four wheels, this method does not give convenient forms of blades and guides; consequently a graphical method has been devised which gives control of the form of those elements and at the same time ensures high efficiency.

Well-known types of turbines are selected for computation, such as the De Laval, the Rateau, the Curtis and the Parsons. The simplest type is considered first, and the problems are further simplified by restricting attention at first to the more essential details. After some facility in computation is attained secondary details are also considered. This gives admirably progressive character to the work, especially as the more complex types are naturally the ones in which the details lead to greater intricacy.

The more essential details of each type considered are worked out in the drawing room, and for the later problems more attention is given to construction and to consideration of strength.

MACHINE DESIGN

Teaches Application of Applied Mechanics to Design.

By PROF. PETER SCHWAMB.

Comparatively few machines are of such a character that they can be designed from a purely scientific basis, the stresses are often very complex and sometimes indeterminate and successful precedent in such forms our most reliable guide.

The main object of the course, comprising 150 hours of lecture and drawing room work, is to teach the application of the principles already learned to the solution of problems in design. For each design the constructive details are discussed and carefully studied and such analysis of the problems is made as will enable the student to determine the dimensions of each part by principles already mastered rather than by the application of empirical rules. The scope of the problems is such as to include most of the elementary principles of machine design, and yet is sufficiently limited to enable all the necessary calculations and a complete working drawing to be made for each design. It is believed that only by close attention to details and through thorough work can real benefit be obtained.

The work begins with the design of a horizontal multitubular boiler, including a careful discussion of riveted joints,

PROF. PETER SCHWAMB.

bolts, and bolting flanges, methods of staying flat surfaces, design of beams of non-uniform section, and reinforcing rings. Then follow the design of a large transmission shaft with its couplings, bearings, pulleys, and gears, involving a consideration of compound stresses; the design of a crane, a power pump, etc.

MECHANICS ARTS

Training of Mind and Eye as Important as Proper Knowledge of Tools.

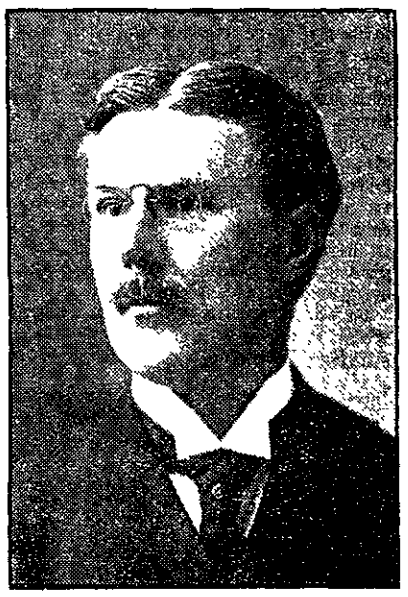
By PROF. PETER SCHWAMB.

The instruction in the mechanic arts at the Institute has two main objects in view:—

1 The training of the hand and eye, and through them the mind, by means of the operations in the mechanic arts.

2 The acquisition of a knowledge of the ordinary materials of construction, of the proper use and familiarity with the hand and machine tools used in the various arts and what can be accomplished with them.

The aim of the instruction is not to teach a trade, but to give a systematic training in the fundamental typical operations involved in each art by means of a carefully planned series of projects or models. The instruction is not confined to explaining how the work should be done, but why as well, thus giving mental as well as manual train-



PROF. GEORGE B. HAVEN.

ing. The systematic training and rapid advance of the student, precision, diligence, the cultivation of the powers of observation, judgment and foresight, and orderly habits, rather than manual dexterity, are the main ends sought: yet sufficient practice is always given to enable good work to be done. Instruction is mainly oral, each new operation being discussed and carried out be-

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