

obligations, assure to them a readiness on the part of legislative bodies to yield also something in return, including a more certain tenure and safer and more comprehensive protection, through legislation, and of beneficial use belonging to them as proprietors.

No one can say that the Dominion has not made rapid strides during recent years or that the public interest is not being safeguarded against improper schemes of development. The work of the Water Power Branch, Department of the Interior in the western provinces, the Hydrographic Survey of British Columbia, the Public

Utilities Commission of Manitoba, the Hydro-Electric Power Commission of Ontario, the Quebec Streams Commission of Conservation, and, as referred to last week, the joint investigations of the Nova Scotia Water Powers Commission and the Dominion Water Power Branch, bespeak a scientific solution, entirely in the interests of the people of Canada. It is certainly to be hoped that the work of investigation will suffer no retrenchment and that the work of power development will go on apace, as the disuse of our water powers means so much energy going to waste.

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BOOK REVIEWS.

Direct-Acting Steam Pumps. By Frank F. Nickel, Department of Mechanical Engineering, Columbia University. Published by McGraw-Hill Book Co., New York. First edition, 1915. 258 pages; 218 illustrations; size, 6x9 ins.; cloth. Price, \$3.00. (Reviewed by A. J. McDougall, Department of Mechanical Engineering, Toronto Power Co.)

This book commences with an interesting chapter on the early history of direct-acting steam pumps. Next, there is a chapter which thoroughly deals with rules for factors attending operation, suction and discharge sizes and velocities, pump speeds and efficiencies. The third chapter classifies the pumps and then describes several makes of single-acting pumps, ending the description with an outline of their defects, practically the only one being the pulsation due to the pause resulting from change in direction at the end of each stroke. This the makers endeavor to obviate by means of an air-chamber. The reviewer does not agree with the author's explanation of the physical changes occurring to the water in the pump and air-chamber. The objectionable statement is this: "If the air molecules are considered as filling the interstices in the water, it is evident that after compression additional room is made for more water."

There is no change in volume of the air after compression unless there is entrained air in addition to dissolved air. There will be no space left in the interstices, as the air and water, in addition to being compressed, have most of the heat of the work in them; so that air at the same pressure would have to overcome not only pressure, but heat. There are two laws to take into consideration. First, saturation increases with pressure; second, saturation decreases with heat. I think it will be found that if the water is saturated at atmospheric pressure it will not take up air after compression until it has lost its heat of work, and that all the benefits of the air-chamber come from a supersaturated water (i.e., one with entrained air), and that a saturated water does not take up or give up air in the air-chamber.

The author dismisses the single-acting pump with this difficulty and proceeds to discuss very thoroughly the duplex pump, first the water end, then steam from simple to compound, and then to triple expansion, direct-acting pumps. The chapter finishes with pumps having compensating gears to allow the use of steam expansively in the high-pressure cylinders. One is interested in this last type of pump on account of its mechanical ingenuity, but when the reviewer is in the market for a pump with a steam cutting-off he would go to the expense of the crank and flywheel pump.

Chapters 4 and 5 go into pump and steam end details and will be found a great help to those buying pumps. There are so many pumps on the market and competition is such that some manufacturers are liable to have some portions not as ample as necessary. In this connection the articles on disc valves, disc-valve pressures and valve deck calculations will come in very handy.

In service conditions vs. various types, Table 17 is good. It varies considerably from tables in pump catalogues, but the reviewer would prefer it. Pump-makers generally rate their pumps at too high a piston speed. I do not agree that high economy is not an advantage in boiler-feed pumps, as the steam is utilized to heat the feed water. If one were to figure one power plant with economical auxiliaries and another with uneconomical auxiliaries, the total number of B.T.U's. to operate will be less in the plant with the economical auxiliaries. In a less elaborate plant there is generally enough steam to heat all the feed-water without an uneconomical feed-pump.