

TESTING OF CENTRIFUGAL PUMPS.

A CENTRIFUGAL or turbine pump is not a positive displacement pump and there are no "rule of thumb" methods of arriving even approximately at its capacity. It may be, therefore, accepted that a well-equipped testing plant is one of the most important essentials for its successful manufacture.

From the manufacturer's standpoint the records of tests carefully carried out are of the utmost value, as they constitute the foundation upon which future propositions can be based, designs developed, improved and modified to suit particular requirements. From the purchaser's standpoint, on the other hand, is the absolute assurance that the hydraulic and efficiency requirements have been fulfilled and, secondly, that a trial run of several hours' duration will ensure continuous operation of the machine with no mechanical difficulties arising after leaving the works.

There are a number of testing methods in use with varying degrees of accuracy. They may be classified as

In the testing plant of Canadian Allis-Chalmers, Limited, at Rockfield, near Montreal, no one single testing method is relied upon, but any one of the three above-mentioned testing methods can be used and the volume method can be used to check either the Venturi meters or the weir. It may be stated here that a testing plant established at the Mather & Platt works, in Manchester, England, served as a basis for the design of this unique equipment at Rockfield.

Figs. 1 and 2 represent views of portions of the testing plant. The overall dimensions of the tanks alone are 34 ft. 6 in. long, 18 ft. 3 in. wide and 9 ft. 4 in. deep, of such proportions as are well able to cope with the largest pumping units. All tanks have been placed underground so that factory space is not wasted and the flooring made in such a way that the tanks can be easily uncovered. The total area has been divided into three tanks; the suction tank, 18 ft. 3 in. long, 15 ft. wide, 9 ft. 4 in. deep; the calibrated delivery tank, 18 ft. long, 11 ft. wide, 7 ft. 4 in. deep, and the weir tank, which is 18 ft. long, 5 ft. 9 in. wide, 7 ft. 4 in. deep. All tank

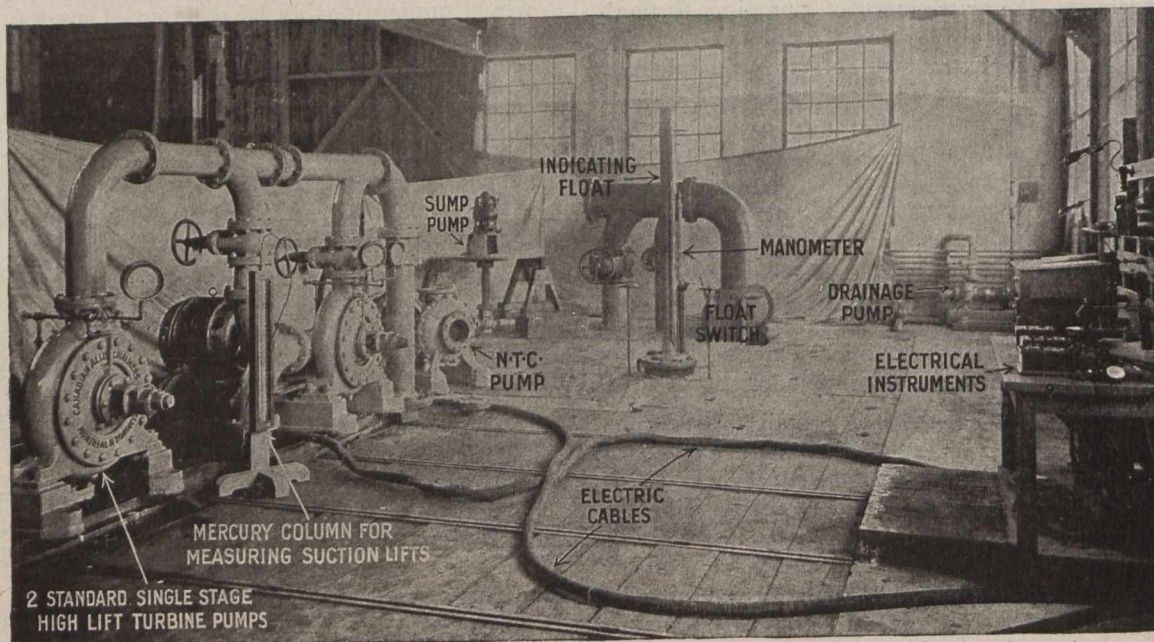


Fig. 1.

follows: Weight or volume method; weir method; velocity meters. The last group includes Venturi meters, nozzles and the Pitot tube.

The instruments required, pressure and vacuum gauges to determine the total head, wattmeters to determine input to motor, or indicator to determine horsepower of steam engines, have long been standardized and are usually accepted without question by consulting engineers and representatives of purchasers on official tests; in any case their calibration is a simple matter and ready facilities are provided for this purpose. But the measurement of the quantity of water being handled presents many difficulties because the methods generally adopted, owing to their cheapness, such as weirs, nozzles, Pitot tubes and in fact all velocity meters are open to the very strong objection that their accuracy depends on constants determined by experiment which, as far as consulting engineer or official representative is concerned, may or may not be right. A means of direct measurement either by weight or volume is an absolute necessity.

walls are made of waterproofed concrete and the bottoms carefully levelled. By raising the bottom levels of delivery and weir tanks above the suction tank, they drain by gravity through connecting valves into the suction tank. A small motor-driven centrifugal pump serves as drainage pump for all tanks. Suction pipes with foot valves and strainers of various sizes are situated in the suction tank, and little time is lost in making the suction pipe connections when pumps about to be tested are bolted to the cross rails, thus providing a firm setting-up.

The discharge connections are formed by two elbows, which connect to a 6-inch and a 12-inch Venturi meter. Following the discharge pipes, they are carried to a common large pipe, which finally connects with a water switch. By removing a blank flange, a passage can be made from the delivery tank to the weir tank. On the wall dividing the delivery tank from the weir tank is located a manometer, as shown, which, by means of pipe connections to the Venturi meter tubes, registers the amount of water flowing through the tubes. Next to this