running; but its first cost and repairs are expensive, and involve a large outlay in investment. The direct acting engine requires a larger running expense, but a much smaller investment. The answer to this question depends, as above stated, upon the work to be done, but may be replied to for almost every case in favor of the direct acting. The conditions necessary for favorable working of the rotative engine must be a large amount of water to be pumped constantly and continuously. Whenever these conditions are much departed from, the direct acting can do the work cheaper, because requiring less interest on investment involved and on repairs. There are, it is believed, only three cases on record in which the rotative pumping engines are cheaper in the end than the direct acting.

Various forms of direct acting pumping engines are made, designed especially with reference to the work to be performed. In cases where pumping is required at irregular intervals only, such as in fire pumps, for example, the most economical engines are those whose first cost is least, and generally, high-pressure pumps are used, without compounding or condensation. When more regular action is required, the work can be done more economically by pumps whose steam cylinders are compounded, and in which condensation is employed. The regularity and constancy of the work to be done thus exercises an important control over the most economical class of machines for any given case. In all cases, the cardinal rule to be followed is: Do the work as economically as possible, first cost and expense of operating considered.

For the determination of the size and class of steam pumping engine necessary in any given case, the following data is required: A careful determination of the daily quantity to be pumped, or the maximum quantity in any given time, the constancy and regularity necessary in pumping, the use for which the pumps are required, the height to which the fluid is to be raised, the length, size and maximum elevations and depressions in the pumping main, and the nature of the fluid to be pumped, whether hot or cold, clear or turbid, water or other fluid.

With such facts, designs and estimates can be furnished for any given case by any reliable pump firm. Such estimates are usually made for the pumping plant, so called, which generally includes pumping engines, boilers, feed pump, and all connections within the pump house and above the foundations.

The Moon Island Sewer.

An invitation from the Department of Improved Sewerage of this city, to visit the pumping station at Dorchester and outlet at Moon Island, having been extended to the Senior Civils, a very enjoyable excursion was made Monday afternoon, April 20. The party, consisting of the Senior Civils with Mr. Sewall, were met by Mr. Stearns of the Improved Sewerage Department, who accompanied them and explained the various arrangements.

The first point visited was the pumping station at Dorchester. Here the sewerage is delivered through a ten and one half foot sewer from the intercepting sewers to the pumps. The first building reached is the filth hoist, where are arranged four iron cages which strain the sewerage and remove all matter which would obstruct the pump valves. Notwithstanding the large quantity passing these cages, some 25,000,000 gallons per day, the quantity of matter thus collected is only about one half a cubic yard per day, and is not especially offensive, consisting of paper principally. From the filth hoist, the conduits and machinery are duplicated throughout, to the entrance of the tunnel. The sewerage passes from the filth hoist to the pump well, beneath the pumps, which are below low tide.

Four pumping engines are at present provided in the pumping station, and are employed in raising the sewerage to a height sufficient to deliver it at Moon Island, making a lift of about thirty-six feet. The pumping engines consist of two Leavitt vertical compound beam and flywheel engines, each working two single acting plunger pumps; and two Worthington compound, duplex condensing engines. Each Leavitt engine has a nominal capacity of 25,000,000 gallons per day, a stroke of nine feet, and a fly