

economy than ever before at a moderate cost in proportion to the results obtained. It may be that profits are less; but production is certainly less expensive; several factors no doubt combining to help the buyer.

In drawing up specifications for pumping engines general data should be stated for information of intending bidders, arranged in a convenient form so that those at a distance need not go amiss in preparing a proposal, or be put under the actual necessity of sending some one to investigate. Cases of course differ, whether the machinery is to go into an old building or a new one is to be built for its accommodation, so it may not be practicable to lay down a hard and fast rule, but the general data from an actual case may give some idea of the requirements.

#### GENERAL DATA.

Static water pressure at level of engine room floor.

Static water pressure from floor to level of water in well.

Allowance added for friction in force main.

Allowance added for friction in suction pipe.

Total working load upon plungers.

Steam pressure at throttle.

Available clear height above engine room floor.

Engine room floor to basement floor, vertical.

Available distance across engine room.

Wall to wall of engine room, inside, across.

Available on floor, lengthwise of engine room.

Available in basement, lengthwise of engine room.

Then it seems to be desirable to state, at least approximately, the required lengths, or stopping place on the contractor's part, of the suction and delivery main and steam pipe and in this and other items remove to the utmost extent any and all uncertainties, so that the builder of pumping engines may be able to figure on some exact basis; in fact, a clean and comprehensive statement of the work which the buyer wants done will help greatly in the matter, and save a great deal more money than it will cost to make such a statement. A general outline of the work to be done, modified, of course by conditions in different cases, would call for the making of the design, furnishing general and detail drawings or blue prints for approval, and erecting in the pumping stations upon foundations to be furnished by the purchaser in accordance with the detail blue prints and templates, and anchor bolts, furnished by the engine builder. A pumping engine of the desired class or type, together with appurtenances, connections, piping and fixtures within the engine room, complete ready for continuous service.

Some of the first things needed to be known by the builders