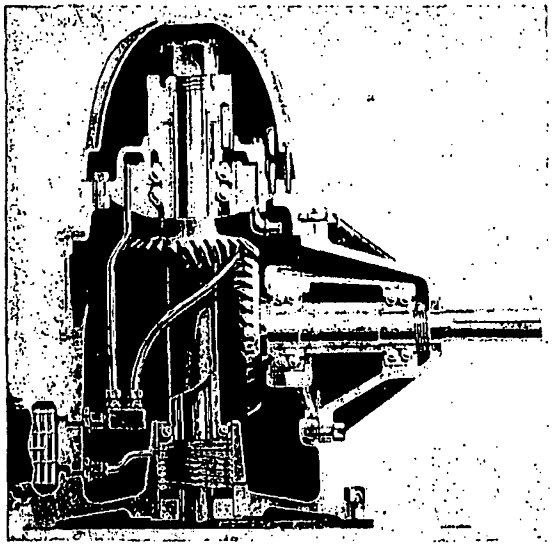
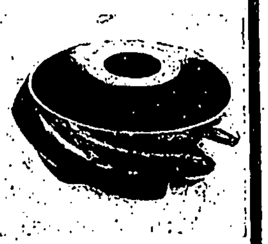


3 Cutaway of an angle gear driving head for a vertical-shaft turbine deepwell pump. The power unit connects to the horizontal shaft in two ball bearings

4 Single-suction enclosed impeller in which waterways are shrouded



5 Single-suction semiopen impeller which has a shroud on top only

they are widely used in wet-pit and closed-suction systems. Drivers are mounted on the vertical axis of the pump, Fig. 1 and 2, minimizing space requirements. These pumps usually are installed with the impellers submerged, so that no priming is required, and suction problems are simplified, or practically eliminated.

Q 4—How are these pumps driven?

A—By electric motors, steam turbines or engines. Direct-drive vertical motors, Fig. 1 and 2, may have either hollow or solid shafts. Vertical-shaft turbines in a limited horsepower range are also used. Power from horizontal-shaft prime movers is transmitted through flat belt, multi-V belts, or right-angle gear drives directly coupled to the pump's vertical shaft.

Q 5—What is the performance range of these pumps?

A—Capacities vary from about 25 to 15,000 gpm or larger, for discharge heads up to about 1000 ft.

Q 6—What are the structural elements of these pumps?

A—A vertical-turbine pump contains three major assemblies, bowl *B*, column *C*, and driving head *H*.

Q 7—What standard construction variations are available?

A—Discharge opening may be above or below the foundation elevation. Lineshafts may be open to and lubricated by the liquid being pumped, Fig. 1, or enclosed in a tube and provided with lubrication from an outside source, Fig. 2.

Q 8—How are pump sizes listed?

A—Since these pumps were originally designed for installation in wells, their size is usually stated in that of the well casing in which the pump can be installed. For example, a 6-in. pump has an outside diameter of about 5½ in. and will go into a 6-in. well casing. An 8-in. pump is about 7½-in. OD and is intended to be installed in an 8-in. well casing.

Q 9—What is the bowl assembly?

A—It is the pumping element *B* of a vertical-turbine pump. Fig. 1 and 2. It contains the suction case, impellers, intermediate bowls and a discharge connection arranged for coupling the bowl assembly to the discharge column *C*. This assembly is sometimes called the working barrel or impeller section. Staging is done by increasing pump-shaft length and adding the required number of duplicate intermediate bowls and impellers.

Q 10—What is the suction case?

A—This is the pump's inlet *S*, Fig. 1 and 2. It guides the liquid at correct velocities to the eye of the first-stage impeller. The suction case contains straight vanes, which prevent prerotation of the liquid and support the bearing housing *A* of the bottom pumpshaft bearing. This bearing may be grease packed or lubricated by the liquid being pumped.

Q 11—What are the intermediate bowls?

A—These are castings, Fig. 1 and 2, with diffusion vanes *V*, which guide liquid flow from one impeller's discharge to the suction of the next. Each bowl has bearings to support the pumpshaft. These bearings are lubricated by the liquid pumped.

Q 12—What types of column assemblies are used?

A—They may have either threaded or flanged joints. This pipe connects the bowls to the driving head and serves as the discharge pipe. It is usually furnished in lengths of about 10 ft. Line