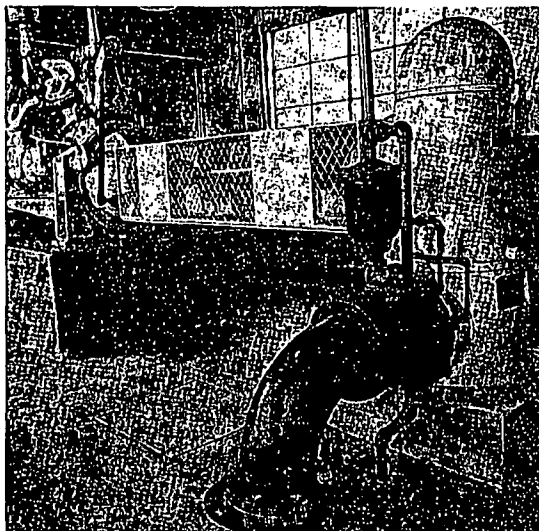




6 Vertical-shaft 1000-gpm turbine deepwell pump operating under 293-ft total head, and driven at 1750 rpm through an angle gear by 100-hp diesel engine

STANDARD MATERIALS IN VERTICAL TURBINE PUMPS

Bowl Assembly

Parts	Material
Bowls	Cast iron
Impellers	Brass or cast iron
Wearing rings	Brass
Bowl bearings	Brass or rubber
Pumpshaft	Stainless steel

Column Assembly

Column pipe	Steel
Lineshaft and couplings	Steel
Shaft-enclosing tube	Steel
Enclosing-tube stabilizer	Rubber or bronze
Open-line shaft-bearing retainer	Brass
Enclosed lineshaft bearings	Brass
Open lineshaft bearings	Rubber
Open lineshaft sleeve	Monel or stainless steel

Head Assembly

Discharge head	Cast iron
Stuffing box	Cast iron
Stuffing-box gland	Brass or cast iron
Top shaft: enclosed-shaft construction	Steel
Top shaft: open-shaft construction	Stainless steel or steel with stuffing-box sleeve

shafts usually come in 10-ft length connected by couplings, threaded so they cannot uncouple while pumping.

With open-shaft construction, Fig. 1, bearing retainers *R* support the bearings usually located at the end of each column-pipe section. Thus, if pipe

lengths are 10 ft long, shaft-bearing spacing becomes 10 ft. With enclosed-shaft construction, Fig. 2, the shaft is enclosed in a tube, usually half the shaft's length and connected by bronze bearings threaded to serve as tube couplings. For example, if shafts are

10 ft long, bearings are spaced 5 ft apart.

Q 13—What determines shaft and column size?

A—Power requirements and thrust loads determine shaft sizes. Maximum allowable combined shear stress is 6000 psi, and maximum allowable combined tensile stress is 9000 psi as usually applied. Friction-head loss determines column-pipe size. Increasing column pipe size reduces friction-head loss. While this saves power, first cost is increased.

Q 14—What is the pump's driving head assembly?

A—This is the portion of a vertical turbine pump located above foundation level. When discharge is above ground, a discharge head containing a discharge elbow is included. This unit supports the pump driver and provides a base from which column and bowl assemblies are suspended.

When discharge is underground a simple motor support, similar to a spool piece, substitutes for the discharge head just described, and a discharge tee is placed in the column pipeline at the required location.

Q 15—Does type of shaft construction affect design of head assembly?

A—Yes, open-shaft construction requires a stuffing box and packing around the revolving shaft, whereas with an enclosed shaft, a stuffing box is not needed.

The shaft-enclosing tube keeps water from the shaft and since there is no rotation, a simple gasketed joint is used where the tube passes through the head assembly. Bottom end of the shaft-enclosing tube is vented to the well at *T*, Fig. 2, immediately below where it connects to the pump's discharge case or bowl. This vent prevents high-pressure water entering the shaft tube; consequently no pressure exists where the rotating shaft passes through the head assembly.

Various methods are used to admit lubricant to the enclosing tube, some of these use single- or double-ring packing to prevent lubricant overflow where it enters the tube. Such a stuffing box, however, does not come in contact with the pumped liquid.

Q 16—Does shaft construction affect bowl-assembly design?

A—Yes, with open-shaft construction the discharge connection is threaded or flanged for connecting to the bowl and column assemblies. When an enclosed shaft is used, the top bowl or discharge

(Continued on page 146)

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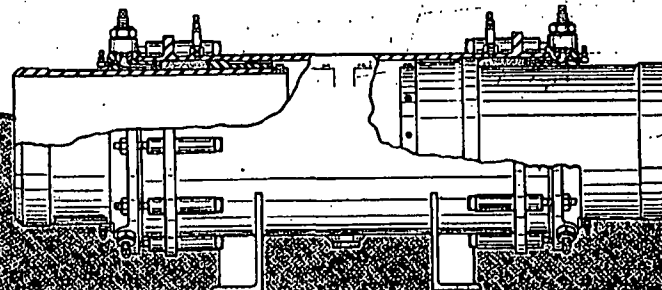
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