

# PUMPING EQUIPMENT FOR WATER SUPPLIES

H. C. Schwalen, M.S.

## Types Of Water Supply Systems Suitable For A Farm; Points To Consider In Selecting A Suitable System

**I**N CONSIDERING the classification of pumping machinery, there are, in general, two rather broad classes of pumps; displacement and centrifugal or screw. Each class is subdivided into types, having certain features in common but differing in the matter of design of details. Some of these types are not particularly adapted to pumping under Arizona conditions and only brief mention will be made of them. During the last twenty years, most of our small municipal pumping plants have replaced the direct acting steam pumps and the heavy fly-wheel type of pump engine with more modern equipment.

Single, duplex, and triplex power pumps in which the cylinders are located in the bottom of a pit, are sometimes used. The efficiency of this type of pump is high, it is long lived but it does require considerable repairs and upkeep, particularly when pumping sand, as the pistons and stuffing boxes need frequent attention. Pumps of this type may be either belt, chain or gear driven.

Rotary pumps of either the cam gear, or screw type, are quite common in the smaller sizes, but their use is limited, as they are slow speed, and therefore, not adapted to direct connection, and must be placed close to the water surface. They are larger than centrifugal pumps of the same capacity and to maintain their high efficiency must be kept in close adjustment. The capacity of this type of pump varies directly as the speed and it is not affected by any change in pumping head.

The type of pump most commonly used in supplying water to the individual home, is the single-stroke plunger pump. This pump usually consists of a brass lined cylinder with foot valve and plunger, pump rods, drop pipe, and a pump jack or powerhead. It may be used in either shallow or deep wells, which are dug or drilled. The same pump may be used for pumping at different lifts; that is, into an elevated tank and also to the ground surface. Since, in many cases, these pumps are cheaply made, they require considerable attention in replacing worn parts, in renewing the leathers, and in repack-



Large California Type Tractor Rig.

ing the stuffing box in the powerhead. For low lifts, forty strokes per minute is about the limit, and as the lift increases, the number of strokes must be decreased until at lifts of from ninety to a hundred feet, the limit is about thirty strokes per minute. The capacity of pumps of this type is limited because of the slow speed at which they operate, about fifty gallons per minute may be secured from a six-inch cylinder on a medium lift.

Double and triple plunger pumps working in a single cylinder are used for pumping larger quantities of water and for greater depths. The discharge from pumps of this type is fairly constant and to further decrease the pulsation in flow, some manufacturers have patented designs whereby an overlapping of the strokes takes place. This type of pump is adapted to the raising of comparatively small quantities of water from great depths. Its efficiency is higher than that of almost all other types of pumps and if properly cared for, gives very little trouble. The first cost of pumps of this type is high, and, where sandy water is pumped, the cylinders, valves and leathers

often need replacement at considerable expense and loss of time. They are adapted to the raising of water to different heights as neither the efficiency nor the capacity is affected by the changes in lift. A pump of this type was installed at the University Farm where it is used for irrigating purposes with a lift of about forty feet to the ground surface and one hundred ten feet to a large elevated tank. The Mesa Experiment Station installed the same type of pump of a different make to meet a similar condition. The smaller sizes of these pumps, up to 100 gallons per minute capacity, may be installed in wells as small as six inches in diameter. Most drilled wells are crooked, to some extent at least, and it is unwise to plan on an installation of this type unless the well has been checked for straightness and verticality. If the pump is forced into a crooked hole, the result is excessive wear on the rod coupling and greatly increased friction losses. Since the power and head is on the top of the well, either belt, gear, or chain drive may be used.

When its use is limited to those

(Continued on page 10)

**Expert Watch  
Repairing**  
**E. G. CAPO**  
Watches - Clocks - Diamonds -  
Jewelry - Silverware  
Latest Novelties in Gold and  
Sterling Silver  
Phone 748 215 E. Congress  
Tucson, Arizona

**YALE DAIRY**  
  
Grade "A" Milk  
Cream and Buttermilk  
  
PHONE 1462

Watch and Jewelry  
Repairing a Specialty  
  
Columbia Phonographs  
and Records  
**Diaz Pulido Bros.**  
JEWELERS & WATCH MAKERS  
Diamond - Watches - Jewelry  
63 S. Meyers St. 86 W. Congress  
Phone 2426

There Are Two Places To Eat  
  
**Here and Home**  
  
This Is A Little Better Than  
Home  
  
**White House Cafe**

**PUMPING EQUIPMENT FOR  
WATER SUPPLIES**  
(Continued from page 4)

conditions for which it is adapted, the horizontal centrifugal pump with volute case, of single stage construction, is the lowest priced, and one of the most efficient and satisfactory of all the different types of pumps. It must be placed close to the water table so that its suction lift will not exceed twenty feet; higher efficiency will result if the suction lift is kept under fifteen feet. This is not the suction limit at this altitude, for at Tucson pumps have been operated under a suction lift as high as twenty-seven feet. However, this practice is not recommended. The horizontal centrifugal is not adapted for use where there is either a fluctuating water table or a drawdown of over twenty feet. Since the pump must be placed in the bottom of the pit at the water surface, the ideal drive is the direct connected electric motor. If engine drive is used, it is not practicable to have the pump set at a greater depth than twenty-five feet, because of the extremely long inclined belt which is required. Where only a small quantity of water is required, between 100 and 200 gallons per minute, the small direct connected horizontal pump and motor, installed in a pit, form an ideal system for the small country home, supplying water for both irrigation and household purposes. To many people, the fact that the pump and motor are at the bottom of a pit precludes their use; however, for low first cost, long life, freedom from repairs, and economical operation, no other pumping system can compare with it. Thirteen years ago the University put down a concrete lined pit to a depth of about eighty feet in the bottom of which a drilled hole was put down. This well was equipped with a horizontal centrifugal pump direct connected to a 740 h.p.m. motor. The pump operates under a head of 120 feet and has been in continuous service for over twelve years without any repairs beyond the replacing of one set of shaft sleeves. This pump has more than paid for the cost of the concrete lined shaft through the saving in maintenance, repairs, and replacements which would have been necessary on almost any other type of pump.

(Continued in next issue)

Floating ribs should be kept in drydock.



**A** CAR that will hold  
your confidence and respect for many years and  
many many thousands of miles, and your admira-  
tion for a life time.

**GRAHAM-PAIGE**  
**LOVETT MOTOR CO.**  
Tucson, Arizona  
509 East 9th St. 517 N. 4th Ave.