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A Simple Electric Water System
Michigan State University Extension Service
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A SIMPLE ELECTRIC WATER SYSTEM

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Farmers having the advantage of electric service can find many ways of using electric motors to operate equipment already on the farm. The simple electric water system is a good example of what can be done by using electric power on a standard windmill or three-way farm pump.

Figure 3 illustrates the assembly of the outfit. An underground pipe line (below frost level) conveys water to either the house or barn, or the stock tank may be supplied through the pump spout and a trough conveyor. One end of the pipe line should be left open, the higher end usually at the house.

To pump water to the stock tank in the barn, barnyard, or elevated tank for drinking cups, the valve on the pipe line to the barn is opened and the switch at the tank turned. This switch starts or stops the motor that operates the pump jack. The valve at the stock tank is kept closed except when water is being pumped to the barn.

The pipe to the house has an open end at the sink instead of a faucet. On the wall above the sink is a 3-point switch similar to the switch at the stock tank. This switch also controls the motor. When water is wanted at the house, the switch at the sink is turned, the motor starts, and a supply of water direct from the well is delivered.

In such a system no storage tank, safety relief valve, check valve, automatic switch, or air pump is necessary.

An open storage tank could easily be added to this system to provide water for the range or furnace boiler, toilet, and bath. A small 2' x 2' x 4' galvanized tank would be supplied through the pipe line to the sink, as shown in the suggested detail of Figure No. 3. In this case the delivery pipe at the sink would be equipped with a faucet and the faucet closed when pumping water to the storage tank. An overflow pipe connected to the tank about 3 or 4 inches from the top and returning to the sink would convey water to give notice when the tank was full. When the storage tank is filled, the faucet at the sink is left open so that cold water at the sink is pumped direct from the well by operating the switch, the same as before the storage tank was added. A pipe connected to the bottom of the storage tank would supply water for the range or furnace boiler, toilet, and bath.

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The Pump Jack

There are a number of pump jacks on the market designed for the high speed drive of the electric motor. The pump jack designed for gas engine drive unless equipped with a larger drive pulley will not work satisfactorily with the electric motor. The windmill type pump should operate at 25 to 35 strokes a minute.



FIGURE No. 1

This simple water system is proving satisfactory under practical farming conditions. The attachment on the pump spout feeds the cooling tank on the opposite side of the partition. An overflow from the cooling tank conveys water through an underground pipe line to the stock tank. A switch on the side wall controls the motor.

(Detail shown in Figure No. 3)

FIGURE No. 2

The switch above the sink controls the motor in the upper cut when pumping water at the house. The faucet was merely added for appearance and is always left open.



The pump jack gears should be housed to run in an oil bath and protected from the weather. It is desirable that the pumping stroke be delivered in a vertical line to eliminate side thrust on the pump rod. Belt driven jacks of the above description may be purchased from \$15 to \$20.

The Electric Motor

The electric motor used should be of the repulsion induction type, manufactured by a reputable company. Cheap and inferior motors result in increased future costs and fail to give satisfactory operation. It is advisable to secure the advice of the power company supplying service on the kind of motor to purchase.

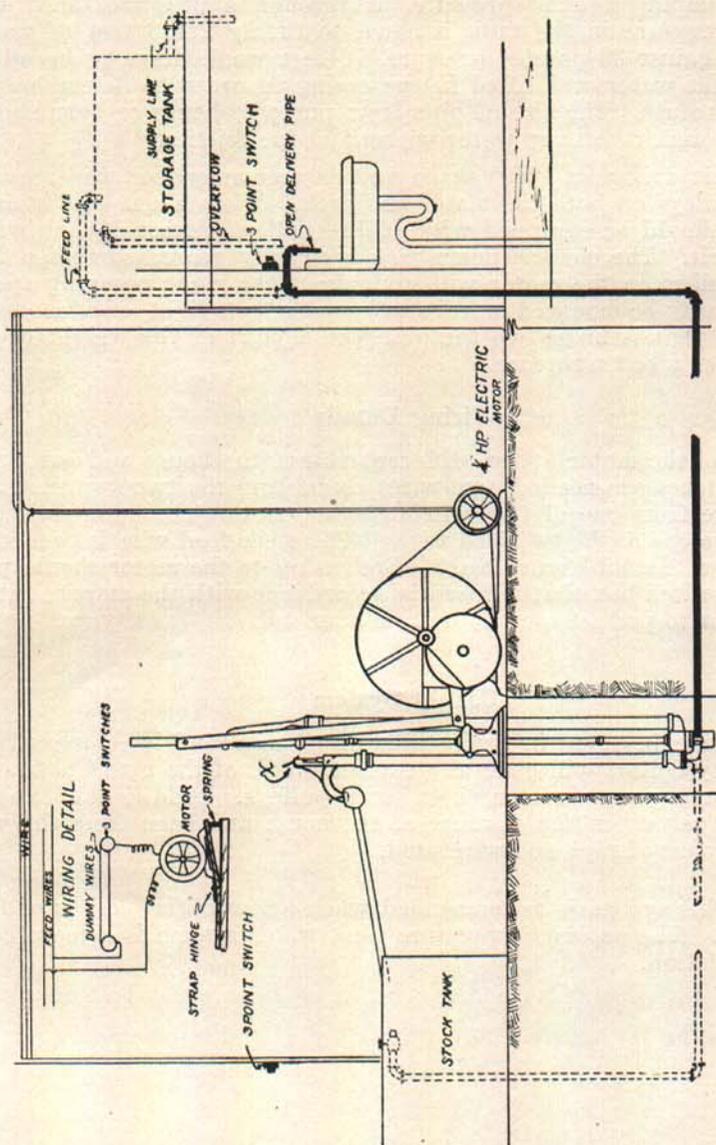


FIGURE No. 3

A simple electric water system that may be used on either deep or shallow wells.

Under general farm conditions, a one-quarter horse power motor can be used on the pump jack on any shallow well installation (where water level is within 20 feet of the top of the casing).

On deep wells (water level below 20 feet of the top of the casing), a one-quarter horse power motor can be used to a depth of 60 feet. Where water is lifted in the casing more than 60 feet, a one-half horse power motor should be used. (One-quarter horse power per 60 foot lift, size of cylinder three inches diameter, length of stroke six inches, 35 strokes per minute. Power requirements increase with larger cylinders, with longer strokes, and with a greater number of strokes per minute.)

When pumping against pressure, as through a pressure tank, each pound of pressure in the tank is equal to lifting $2\frac{1}{3}$ feet of water. To pump against 30 pounds pressure, 70 feet would have to be added to the height water was lifted in the casing in order to determine the size motor to use. The size of pipe from pump to house or barn should be large enough to convey water without undue friction.

When belt driven, a "V" shape belt is recommended, this requires grooved pulleys on both the motor and jack. When a flat belt is used, the motor should be equipped with a fibre pulley at least $\frac{1}{2}$ -inch wider than the belt. The electric pump jack is usually geared so that a 2 to $2\frac{1}{2}$ -inch pulley on the motor will give about the right pumping speed. The motor may be mounted on rails to keep the belt tight, or, if mounted on a board that is hinged to the platform, a part of the weight of the motor acts as a belt tightener.

Wiring Details

To control the motor at two different places, the house and barn, two 3-point switches are needed, two wires connecting the two switches, and a third wire from one of the switches to the motor; the other switch is connected to one of the two feed wires. The other feed wire is connected to the motor. Detail Figure No. 3. Both wires to the motor should pass through a switch box that is fused in accordance with the ampere rating of the motor to protect the motor from overload.

Cost of System

The expense involved in an installation of this kind is comparatively small. Fifty dollars will generally cover the cost of the pump jack, one-quarter horse power motor, belt, and pulleys. Additional expense depends largely upon the distance of the house and barn from the well and the amount of pipe and wire used.

Note: This system is recommended when a low initial cost is of first importance. The automatic pressure tank water system is a more complete installation.