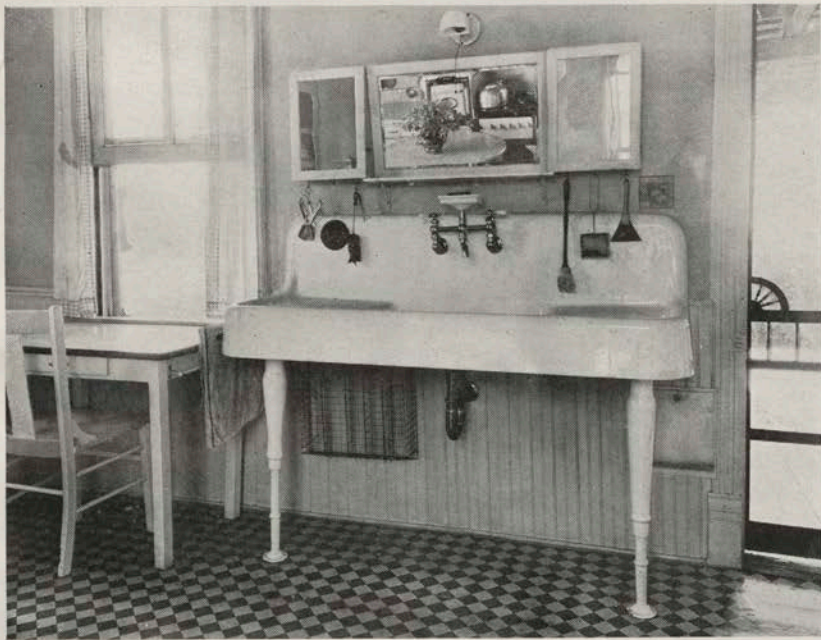


# An Electric Water System For The Farm

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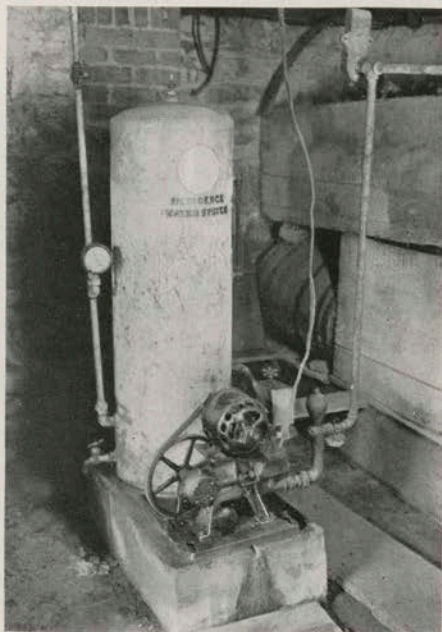
Electricity has modernized this farm kitchen in Fairfax County, Virginia, which is now equipped with the convenience of running water and a well designed kitchen sink. Note the service lamp over the sink and the image of the electric range in the mirror.

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AND THE UNITED STATES DEPARTMENT OF AGRICULTURE, COOPERATING  
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**T**HE first and most useful job that can be given to electricity on the farm is that of pumping water. Running water should be placed second only to electric lights in importance, and in many cases it should be given first choice—where a choice must be made. There is no reason why the farm family with electric service should not have the labor-saving convenience of running water just as their city cousins do. To have an abundant supply of water at the turn of a spigot is of far greater value to the farmer because there are so many essential uses for water in the operation of a farm.

Health records show that typhoid fever and other diseases induced by poor sanitation are rapidly reduced in communities where definite steps have been made to improve the farm water supply. The use of electric water systems can often facilitate better sanitation.

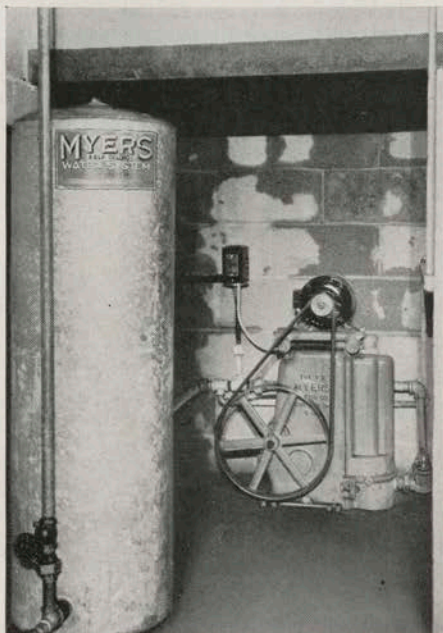


This shallow well pump was installed with a farm light plant on a Montgomery County, Virginia, stock farm fourteen years ago. Service from the power company was made available ten years later and an alternating current motor was installed in place of the D. C. motor. It is still good for many years of dependable service.

The "hired hand" is generally referred to as the person doing most of the water pumping on the farm. This "hired hand," however, is usually the mother or housewife. Few people realize the time and labor required for farm women to hand-pump and carry the water for the household. Actual studies show that the average American farmwife carries 20 tons of water each year and takes over 200,000 steps doing the task. This means an equivalent of 30 eight-hour days spent each year just carrying water. In many cases this same job is being done by an electric pump at less than one cent a day or about \$3.50 a year for operating costs.

Tests at Iowa State College show that dairy cows with free access to water in drinking cups in the barn produce 6.14 percent more milk and 12.12 percent more butter fat than cows offered water twice a day at drinking troughs. The cup-watered cows drank 18.37 percent more water than the others. Records of dairy farm experiments further prove these tests to be consistently true.

An egg contains 73.2 percent water and it can therefore readily be seen that better egg production results from having a constant supply of drinking water before the hens at all times.



A typical deep well pump installation supplying water from a well 125 feet deep. An abundance of water is always available for the residence, livestock and for lawn and garden irrigation on this farm.

The following are outstanding advantages of having water available under pressure on the farm :

1. A safer and purer water supply, helping to protect the health of the family.
2. More efficient production of dairy, poultry, and other farm products with less labor.
3. Good protection of farm buildings and property from the ever present danger of fire.
4. Complete modernization of the farm home made possible.

It is surprising to note that less than 30 percent of the farm homes in Virginia that have electric service have been provided with water under pressure when it can be so easily and economically obtained. The cost of this farm improvement is so little that every electrified farm should at least provide running water in the kitchen. Pipes can later be extended to other points about the farmstead, including a serviceable bath, as farm finances will permit.

The purpose of this circular is to explain the installation and operation of electric pumps on the farm, hoping that it will be of assistance to many Virginia farmers in obtaining the comforts and satisfaction of running water.

### Types of Electric Pumps for Farm Use

There are two main types of automatic electric pumps as applied to farm use: the cistern or shallow well pump, and the deep well pump. The shallow well pump is for wells or cisterns where the suction lift (vertical distance from water level to pump cylinder) is not over 20 feet. This type of pump may be installed at any convenient location in the house basement, outbuilding, or pump house. It is designed to maintain automatically a pressure of 20 to 40 pounds per square inch in the service pipes and is obtainable in capacities of 200 to 1,000 gallons per hour, using motors of  $\frac{1}{8}$  to 1 horsepower.

The other type is known as the deep well pump and will satisfactorily pump water from any well. This type is larger and more expensive and is used where

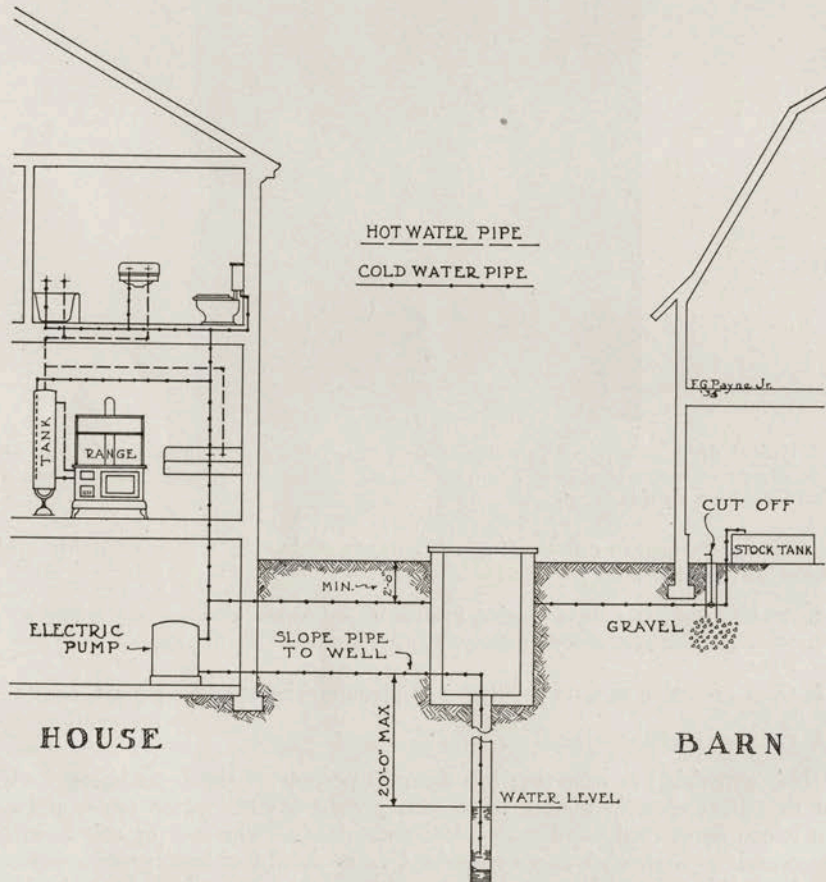


Fig. 1.—Typical shallow well pump installation.

the suction lift is over 20 feet. Deep well pumps are available in capacities of 100 gallons per hour and up, and require motors of  $\frac{1}{3}$  H. P. and larger, depending on the pump capacity and lift.

There are some cases where an electric motor can be applied to operate a pump already installed, in connection with a pressure tank or elevated storage tank, but each installation of this type presents individual problems which are so varied that no further discussion of them will be attempted.

### Location of the Pump

The shallow well type pump may be installed in any convenient location. Care should be taken to see that it is well protected from freezing, and this one reason makes the house basement a very desirable location. (See Fig. 1.) The

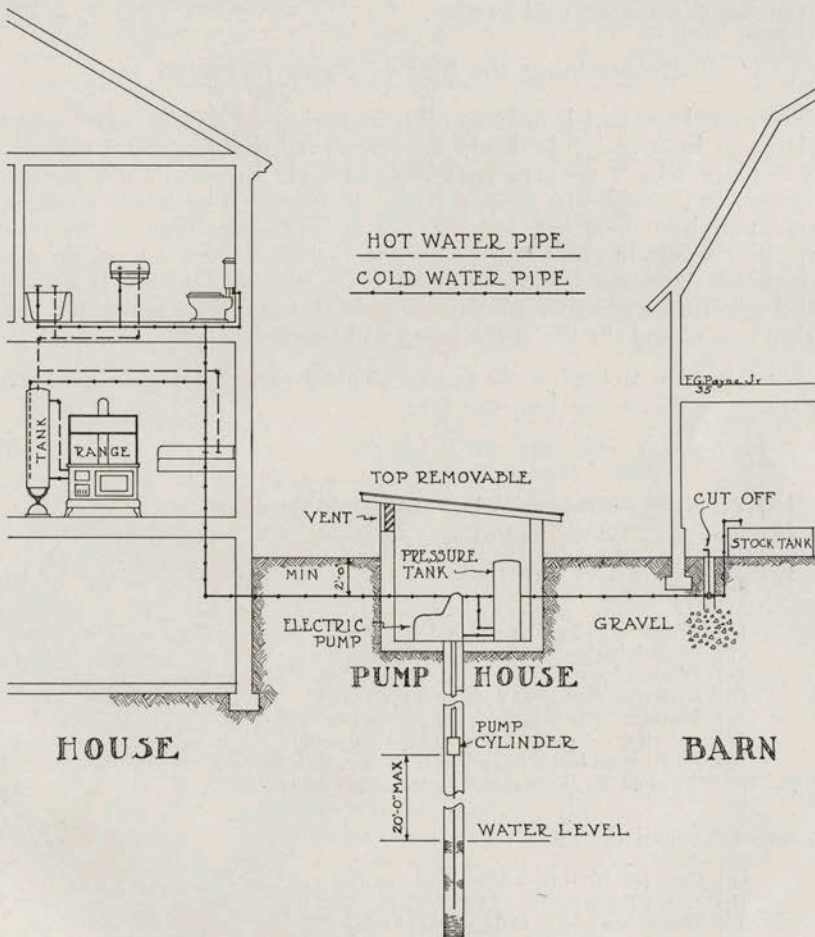


Fig. 2.—Typical deep well pump installation.

electric wires and switch to the pump should be placed where they will be least likely to be damaged in case of fire on the premises, because one of the most valuable assets in having the water system is its value in fighting fire. It must be remembered that any machine requires some attention, and therefore the pump should be installed where it will be easily accessible for lubrication and maintenance.

The deep well pump must be located immediately over the well and therefore it will usually require a pump house. In planning this, the same points should be observed as in the installation of the shallow well pump. The best plan to follow is to build a pit over the well, as shown in Fig. 2, so that the pump and tank will be below ground level. Concrete or brick construction make the best type of pit. Some pumps are equipped with special equipment which places the discharge pipe below freezing level, thereby making a pit unnecessary. All pipes under ground should be placed deep enough to eliminate the possibility of freezing and all exposed pipes should be equipped with shut-off valves and drains for use in extremely cold weather.

### Determining the Size of Pump to Install

The most important item to consider in buying an electric water pump is pumping capacity or size. It should be remembered that in general the operating costs are practically the same for a 200 gallon per hour and a 300 gallon per hour pump, in pumping the same quantity of water. The larger pump costs more while it is running but does not run as long or as often as the smaller pump. The small difference in price is more than justified in having the added capacity available for fire fighting purposes, if for no other reason. If a pump is installed larger than present requirements demand, future increased requirements are taken care of and the life of the pump will be much longer.

The following table gives the average amount of water used in the average household or on the average farm per day:

#### 1. Household services—

- (A) Per person—with complete bath room—20 to 40 gallons
- (B) Per person—without bath room—15 to 20 gallons
- (C) The following are requirements for various fixtures which are included in (A) and (B)
  - (a) Closet—3 to 5 gallons each time flushed
  - (b) Shower bath—4 to 6 gallons per minute
  - (c) Washing machine—2 to 3 gallons per lb. of dry clothes
  - (d) Bath tub—8 to 20 gallons each time used
  - (e) Kitchen—8 to 15 gallons per person per day
  - (f) Lavatory—1 to 1½ gallons each time used
  - (g) Hydrant on lawn, ¾ inch hose nozzle, with the pressure tank operating at 20 to 40 lbs., uses about 5 gallons per minute

#### 2. Livestock requirements—

- (a) Cow (each)—10 to 15 gallons per day
- (b) Horse (each)—10 to 15 gallons per day
- (c) Hog (each)—1½ to 2 gallons per day
- (d) Sheep (each)—1 to 2 gallons per day
- (e) Chickens (per 100)—5 gallons per day

From this table an estimate can be made of approximately how much water will be used on any farm under normal circumstances. It is wise and good practice to use the figure thus obtained as gallons per hour capacity rating of the pump that should be installed. In no case, however, is it advisable to install a pump smaller than 250 gallons per hour on a farm.

### Cost of the Water Pump

The prices of water systems, like all other commodities, vary with the size of the equipment and with the manufacturers. Reliable shallow well pumps are available for as little as \$40 complete with motor and having a capacity of 250 gallons per hour. Pumps of greater capacities increase in price. Deep well pumps of 100 gallons per hour capacity and 25 feet suction lift, complete with the proper size electric motor, are available at \$100 and up. It is always advisable to buy equipment that is known to be reliable and for which replacement parts can be easily obtained.

It is impossible to give an estimate on the cost of the electrical installation of the pump because no two installations are alike. The best plan is to call on the local power company's agricultural engineer or a local electrical or plumbing contractor for information on the particular installation in question. Either of these agencies will gladly furnish the information without obligation.

The cost of piping can be closely estimated after it is known where the water is to be used about the farmstead. Lines between farm buildings supplying water for normal uses can be of  $\frac{3}{4}$  inch pipe, where the lines are not over 250 feet in length. Short service pipes within the house or other buildings can be of  $\frac{1}{2}$  inch pipe. One-inch pipe should be used for main lines of over 250 feet in length or where large quantities of water are to be used as in sprinkling large lawns or watering gardens.

### Operating Costs

Numerous tests have been made on electric water pumps in practical operation on farms in all sections of Virginia. These tests show that a shallow well pump will consume from 1 to  $1\frac{1}{2}$  units (kilowatt-hours) of electricity in pumping 1,000 gallons of water. The same types of tests made on deep well pump installations show that from  $1\frac{1}{2}$  to  $2\frac{1}{2}$  units of electricity are consumed in pumping 1,000 gallons of water. The variation in the amount of current consumed in different installations is due to differences in well depths, pressures maintained in the storage tank, and the efficiencies of pumps. By referring to the table on page 6 the amount of water to be used on a particular farm can be estimated, and also the cost of pumping it. The following example illustrates this procedure: Suppose that the well on the farm in question required a deep well pump using  $1\frac{1}{2}$  units of electricity per 1,000 gallons and water is to be pumped for the following:

5 people @ 30 gallons each per day .....	150 gallons
8 cows @ $12\frac{1}{2}$ gallons each per day .....	100 gallons
4 horses @ $12\frac{1}{2}$ gallons each per day .....	50 gallons
30 hogs @ 2 gallons each per day .....	60 gallons
30 sheep @ 1 gallon each per day .....	30 gallons
200 chickens @ 5 gallons per 100 per day .....	10 gallons
<hr/>	
Total daily water consumption .....	400 gallons

For one month's water consumption :

$$400 \times 30 = 12,000 \text{ gallons per month}$$

Total units of electricity used per month :

$$12,000 \times 1\frac{1}{2} \text{ units per thousand} = 18 \text{ units or Kwhrs.}$$

Assume the cost of electricity for the pumping to be 4 cents per unit or Kwhr (the average cost to Virginia farmers in 1934) :

$$4 \text{ cents} \times 18 = 72 \text{ cents per month or } 2\frac{1}{3} \text{ cents per day}$$

It would require from one to two hours to pump 400 gallons of water with a good hand pump and much additional time and labor is involved in walking to the pump and carrying the water to the place where it is used. It would be difficult to employ a hired hand to do this job for  $2\frac{1}{3}$  cents, the cost of operating the electric pump.

### Care and Maintenance

It is very important that the electric pump be properly installed, according to manufacturers' recommendations. Most newer model pumps are designed to operate in an oil bath and require no lubrication except the changing of this oil once or twice each year. Pumps properly installed with ample frost protection require practically no attention other than lubrication and will give continuous service for many years with negligible maintenance cost or attention. When repairs or adjustments are needed, they should be made by the pump dealer, power company rural service man, or someone familiar with the operation of the equipment.

### Conclusion

When an electric water system has been installed on the farm the first and most important step has been taken in modernizing the farm home. Complete bath room outfits are available for as little as \$50 and the necessary approved sewage disposal system can be installed cheaply, using a homemade septic tank. Plans for these tanks are available through the county farm and home agents, utility agricultural engineers, local health officers, and the V. P. I. Extension Division. These agencies are also glad to give assistance in planning the entire water system and sewage disposal plant. No improvement can be made on the farm that will pay larger dividends in health, happiness and convenience, than the installation of an automatic water system.