COOPERATIVE EXTENSION WORK
IN
AGRICULTURE AND HOME ECONOMICS
STATE OF OKLAHOMA
D. P. TRENT, Director

OKLAHOMA AGRICULTURAL AND MECHANICAL COLLEGE AND UNITED STATES DEPARTMENT OF AGRICULTURE. COOPERATING

EXTENSION SERVICE
COUNTY AGENT WORK
STILLWATER, OKLAHOMA

Distributed in Furtherance of the Acts of Congress of May 8 and June 30, 1914

RUNNING WATER *in the* FARM HOME

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Circular No. 245. General Series 84.

RUNNING WATER IN THE FARM HOME

Running water in the farm home releases the farmer's wife from much unnecessary hard work. A water supply system is a low cost mechanical advantage which not only lightens the labor of house cleaning, scrubbing, cooking, dish washing, laundering, etc., but saves time on all these operations. The time saved is given to other duties which make the farm wife a more efficient, as well as a happier, working partner in the farm business. Now-a-days the farmer seeks every mechanical advantage that is offered for the conduct of his business. He should not overlook the opportunity offered through a suitable system of running water, for making his home life happier and much more effective.

It is very unlikely that any other one thing offers greater returns on the money expended than does a supply of running water in the farm home. That the money investment need not be large, is a fact which it is the purpose of this circular to illustrate. Of course, considerable outlay is necessary for a complete system of hot and cold running water under pressure in the kitchen and bathroom, but such a system can not in most cases be installed all at one time. It is well to grow into such a system.

The farmer who, instead of putting in a simple system, waits until he is able to install an elaborate water system, will handicap the productive ability of his farm much longer than is necessary. Provision for getting the waste water away from the house should be made a part of any plan for putting running water into the house. The waste water may be conducted to the kitchen-garden, the orchard or berry patch, and made to render useful service, or it may be carried to a convenient waste place and allowed to escape, care being taken to prevent a saturated condition of the soil at the point of escape.

The most important part of any water system is the source of supply. Every farmer has some source of water to draw upon, and regardless of whether he pipes the water to the house or not, every precaution should be taken to render the source of supply safe from pollution by surface or subsurface contamination. Sound advice is avail-

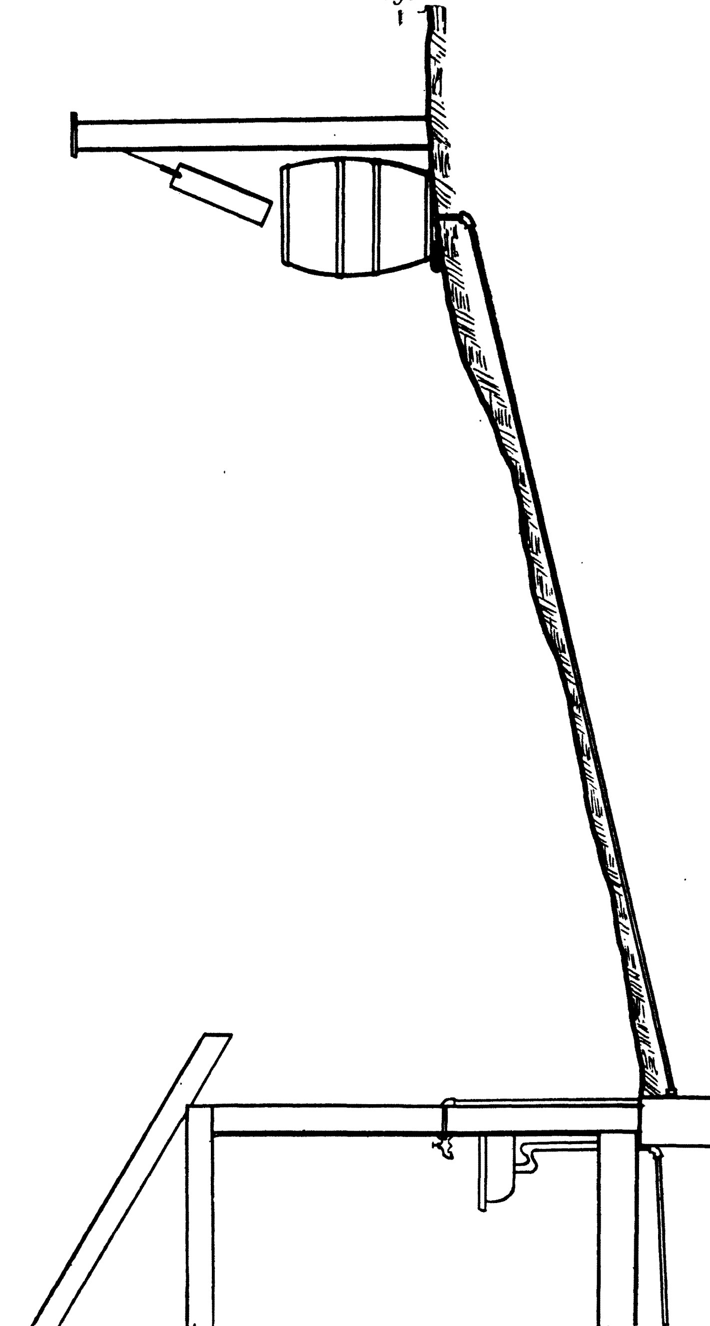


Figure 1

able on safeguarding the water supply, from your county agent, home demonstration agent, public health officials, and the U. S. Department of Agriculture Farmers' Bulletin 1448. Such advice is beyond the purpose of the present bulletin and therefore will not be treated in detail.

Wells, especially dug wells, should be located on high ground where surface water drains away from the well. They should be curbed to a safe depth, and the curbing carried above the ground surface to a height sufficient to prevent the entrance of any material capable of polluting the water. Well curbs made of lumber are not desirable or safe; they decay in time and permit the entrance of foreign material.

If cistern water is depended upon, careful construction and management of the cistern is necessary.

A very simple method of putting running water into the farm kitchen is shown in Figure 1. If the well is on rising ground as it should be, and the bottom of the barrel can be elevated at least to the height of the kitchen faucet, the housewife is assured of a supply of water as often as the barrel is filled from the well.

Three ¾ in. bends or elbows at 7c	$ .21
A 50 gal. lard barrel usually costs	.50
or a steel oil drum could be used	
(?) 50 ft. ¾ in. galvanized iron pipe at 8c a ft.	4.00
¾ in. brass faucet	.75
Total, not including sink or drain pipe	$5.46

A lead or zinc lined box can be made to serve as a sink until the family finances warrant the purchase of an enameled iron sink.

This simple outfit results in putting running water in the house and will be worth several times its cost in a few months.

Before discussing other methods of getting running water in farm homes, the subject of pumps and their action should be considered so that the right type of pump to suit the requirements of any particular system can more readily be determined.

Pumps. For the purpose of this bulletin only two types of pumps need be considered. They are the ordinary suction lift pump, and the force pump. As the name implies, the lift pump is used to lift water to the height of the pump delivery spout. A force pump is used to lift water to the pump level and then force it to a higher level, or into a tank against pressure. When we raise and lower the pump handle, the force we apply is transmitted directly to the pump cylinder which is the effective working part of a pump. Natural conditions surrounding pump cylinder action in Oklahoma are such that it is necessary to locate the pump cylinder within a vertical distance of twenty feet above the level of the water we wish to lift.

To economically meet the varying conditions of water supply, different kinds of pumps have been developed. Figure 2 represents a cut section of a common pitcher pump, showing the working parts and naming each. It will be noted that in this pump the cylinder is a part of the pump standard casting.

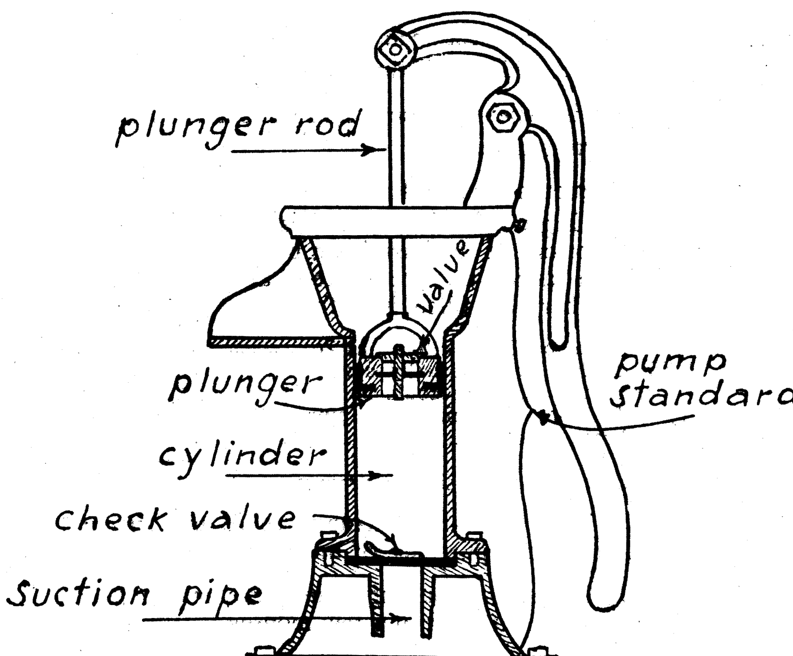


Figure 2

Because the position of the cylinder can not be changed the use of pitcher pumps is limited to suction lifts of not over twenty feet. It is not essential to place suction lift pumps directly over the source of water supply. They may be offset a short distance if the vertical lift is not increased by so doing.

When a long length of horizontal pipe is necessary to connect the pump with the source of water supply, it is necessary to decrease the vertical or suction lift one foot for every 50 feet of horizontal pipe.

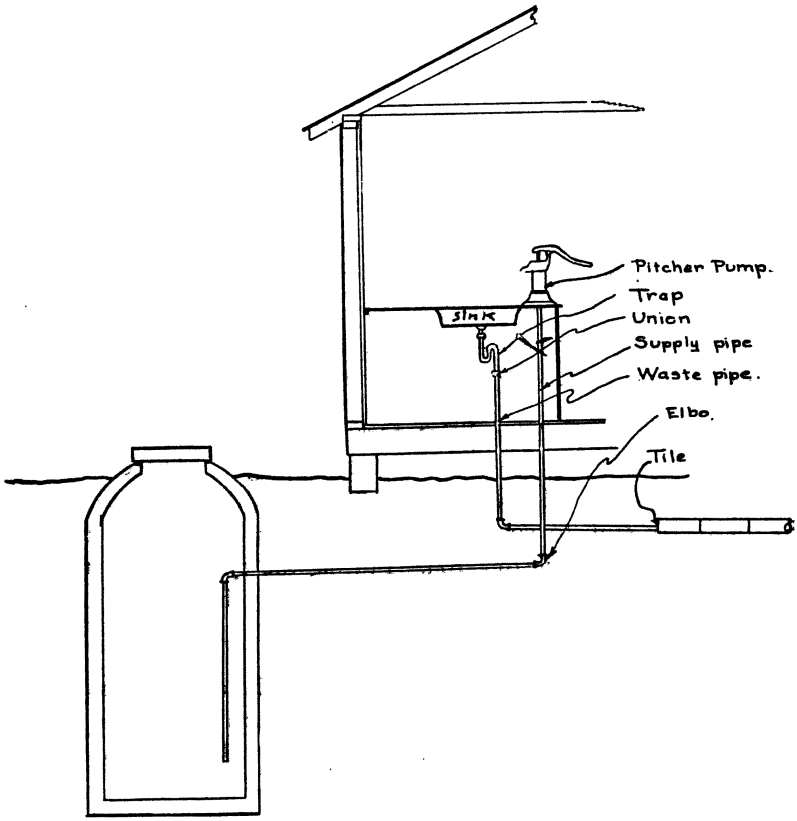


Figure 3

Figure 3 shows a simple pitcher pump water system for lifting water from a cistern.

The cost of this system is made up of the following items which are quoted here at average prices less freight.

Sink 18 x 30, enameled and fittings	$ 7.10
(?) 50 ft. 1¼ in. galvanized supply pipe	7.50
(?) 50 ft. 1¼ in. galvanized waste pipe	7.50
3 1¼ in. bends or elbows	.36
1 1¼ in. union for waste pipe connection	.50
(?) 50 ft., 4 in. clay tile for water at 6c per ft.	3.00
Total	$25.81

Pump bracket or drain board cost must be added.

Standard lift pumps differ from pitcher pumps in design and size. There are two common types of standard lift pumps which differ only in the location of the cylinder. The one known as the set length lift pump has the cylinder connected to the pump base with sufficient pipe and plunger rod to place the bottom of the cylinder 4 feet below the base of the pump standard. In set length lift pumps the location of the cylinder is fixed; this limits the use of such pumps to wells not over 24 feet deep. The other type is known as the common lift pump and is shown in cut section in Figure 4. It will be noted in Figure 4 that the location of the cylinder may be varied to any position in the supply pipe line. Common lift pumps may be used in very much deeper wells, the pump being placed directly over the well.

Water can be raised by direct force of the plunger more easily than it can be pulled by the suction of the plunger. Therefore, it is advisable to lower the cylinder of the pump to within a few feet of the water, or better still, to submerge it. This can be done by using a sufficient length of connecting rod. Putting the cylinder under water assures that the pump is always primed, and keeps the cylinder leathers pliable.

A drip hole drilled in the supply pipe above the cylinder, and a few feet below the pump platform, allows the water to drop back to that point and prevents freezing and bursted pipe, providing the pump platform is tight.

As stated before, lift pumps will raise water only to the height of the pump delivery spout, and for this reason force pumps have a wider application than common lift pumps in running water systems. A lift pump could be used in the simple system shown in Figure 1 to replace the well bucket shown, but could not be used in the simple system shown in Figure 5 where a force pump is necessary to raise water above the level of the pump.

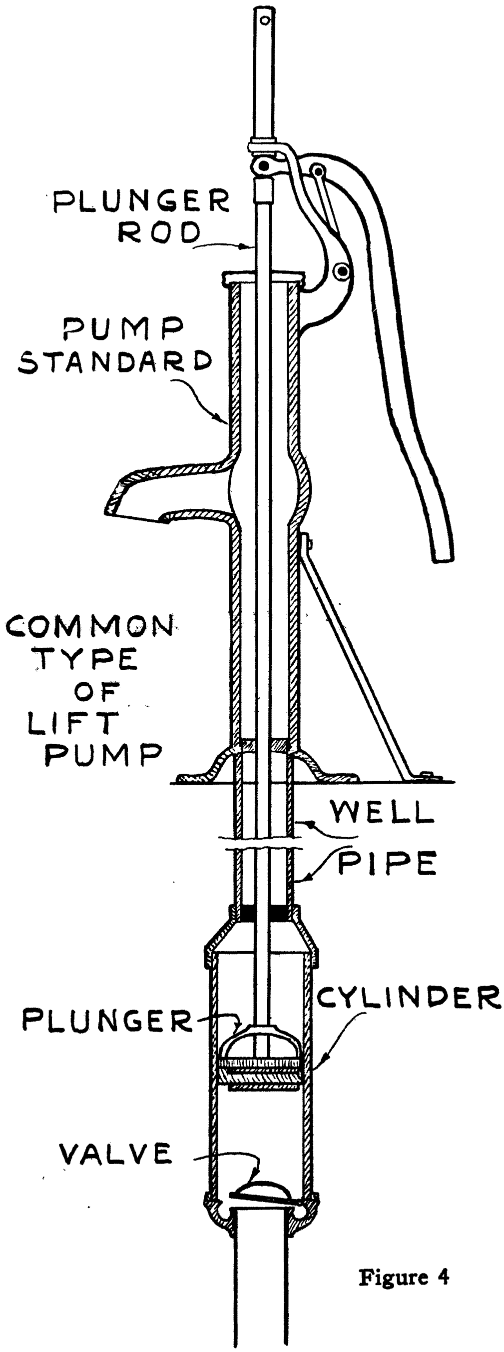

PLUNGER
ROD
PUMP
STANDARD
COMMON
TYPE
OF
LIFT
PUMP
WELL
PIPE
CYLINDER
PLUNGER
VALVE

Figure 4

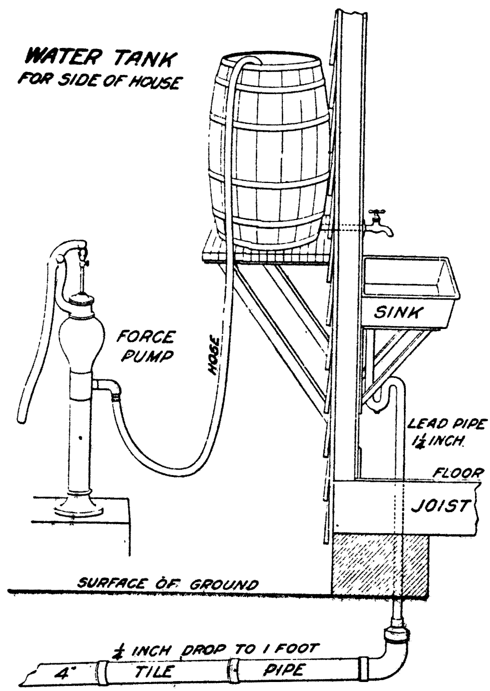


Figure 5

The cost of the system shown in Figure 5 will vary as the completeness of the system varies. As shown in the figure the cost includes

Force pump and cylinder	$ 8.60
(?) 30 ft. 1¼ in. galvanized supply pipe	4.50
1 ft. ¾ in. iron pipe and ¾ in. brass faucet	.82
(?) 10 ft. ¾ in. rubber hose	1.00
One barrel or steel drum	.50
Enameled sink 18 x 30 and fittings	5.20
Lead S trap 1¼ in. and 3 ft. lead pipe 1¼ in.	2.30
One 4 in. bend or elbow (clay tile)	.50
(?) 50 ft. 4 in. clay tile for waste at 12½c a ft.	4.25
Total	$27.67

The pump may be any distance from the house, by using iron pipe connections, and an outside elevated tank or an attic tank could replace the barrel shown, at slight additional cost.

Figure 6 represents an ordinary force pump. By comparing Figure 6 with Figure 4 the essential difference between a force pump and a lift pump will be noted. In Figure 7 the long sleeve of the pack-

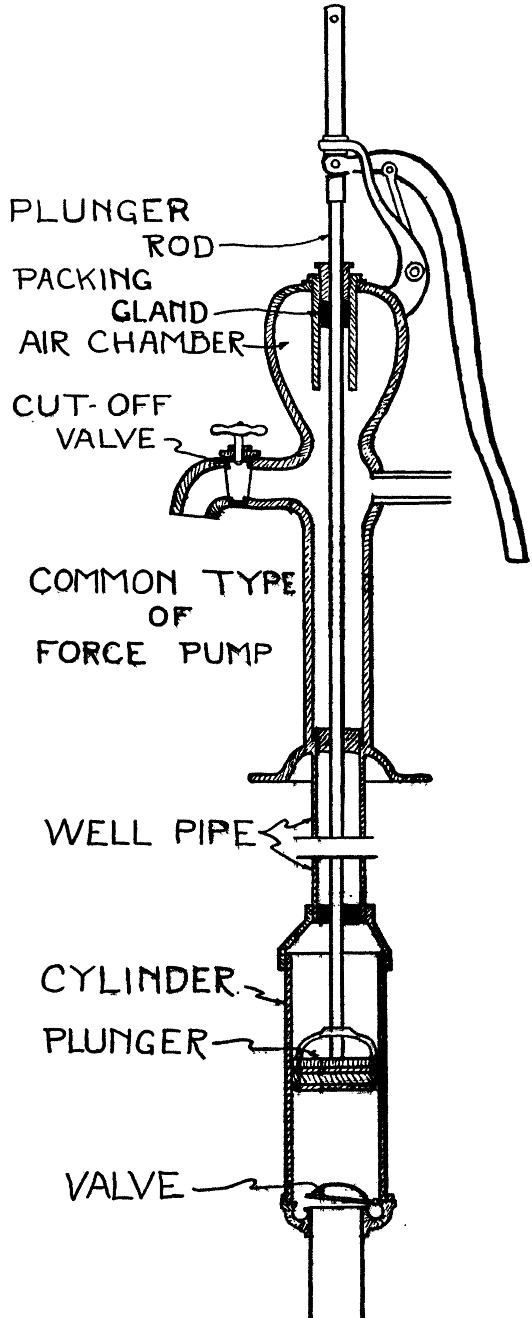

PLUNGER ROD
PACKING GLAND
AIR CHAMBER
CUT-OFF VALVE
COMMON TYPE OF FORCE PUMP
WELL PIPE
CYLINDER
PLUNGER
VALVE

Figure 6.

ing gland assembly has been omitted. Compare Figure 7 with Figure 6 where the long sleeve is shown.

Force pumps are equipped with an air chamber and stuffing box. Figure 6 shows a type of force pump in common use over this state, while Figure 7 shows in cut section the details of a typical air chamber and stuffing box. The purpose of the well packed stuffing box is to prevent the escape of air or water at that point, and at the same time permit movement of the pump rod. The construction of the stuffing box and gland is such as to force the packing against the pump rod. Pump packing or candle wicking is generally used. It should be wound around the pump rod in the same direction as that in which the gland screws. When so wound, screwing the gland in place tightens the packing instead of unwinding it.

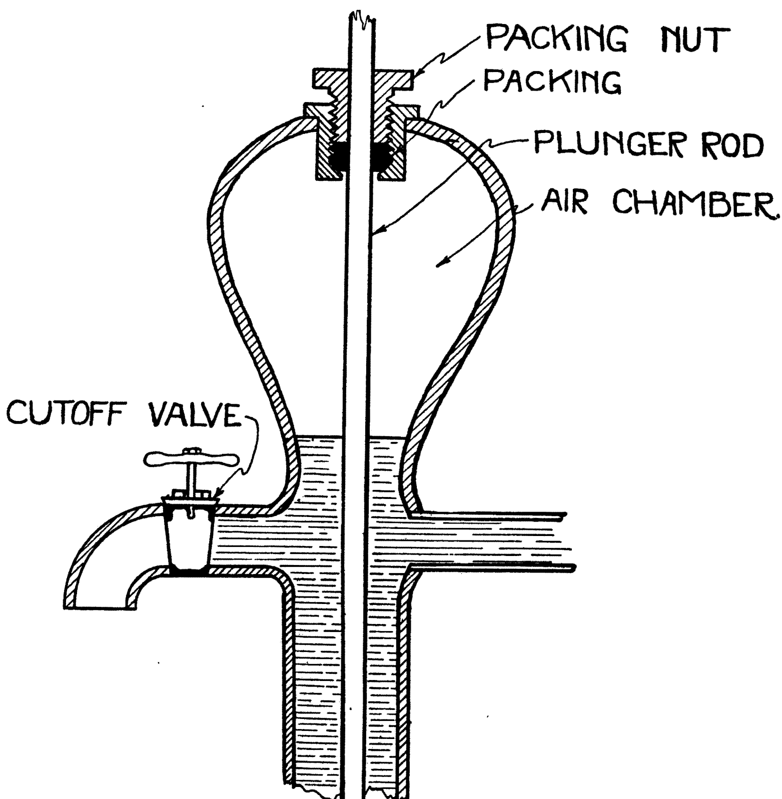


Figure 7

Air is compressible, while water is not. Advantage is taken of this fact in the construction of force pumps. The purpose of the air chamber is to maintain a constant flow of water through both the up and down stroke of the pump, and to prevent undue strain on the pump and its operating mechanism. During the work stroke of the pump, water is forced into the discharge pipe faster than it can escape. The excess water passes into the air dome or chamber, compressing the air there. During the back stroke of the pump, the compressed air in expanding to regain its normal volume, maintains a steady flow at the discharge pipe.

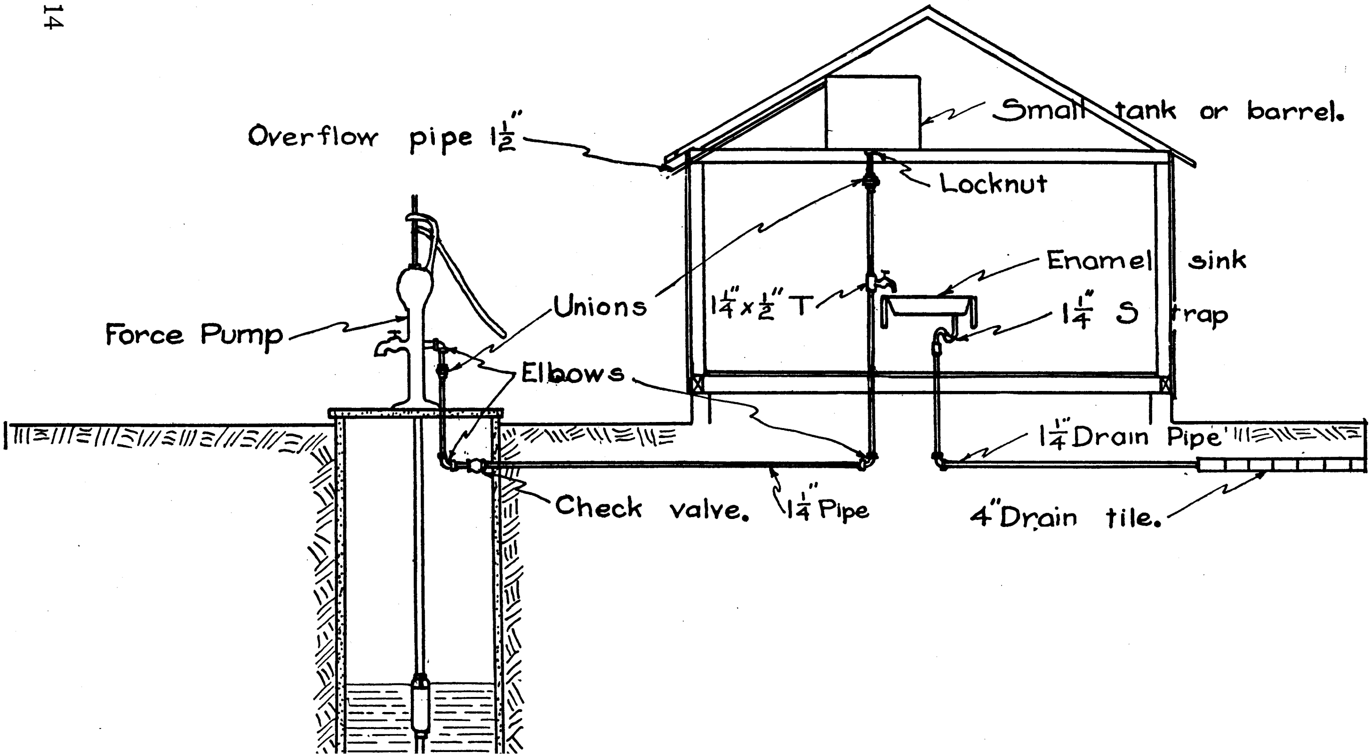
Figure 8 shows a simple force pump water system which may be expanded to meet all the requirements of farm home life. As money becomes available, windmill or other power may be used with this pump, and hot water fittings installed for kitchen and bath room use. The cost of this system will vary according to the amount of pipe used, etc.

Approximate bill of materials for system shown

Force pump	$12.00
(?) 50 ft. of 1¼ in. galvanized iron supply pipe	7.50
(?) 50 ft. of 1¼ in. galvanized waste pipe	7.50
4 1¼ in. elbows	1.20
1 globe valve 1¼ in.	2.25
3 1¼ in. unions	1.20
1 1¼ in. check valve	1.60
1 reducer 1¼ in.—¾ in.	.40
1 small tank or barrel	5.00
1 sink and trap	3.50
(?) 50 ft. 4 in. drain tile	4.00
Total	$46.15

Iron piping, black or galvanized, may be purchased in any desired lengths already threaded. This makes it possible to install any of the systems shown with only a few simple tools. Two good pipe wrenches should be available and some red or white lead to insure air tight joints. Provision for draining above ground pipes should be made by inserting a waste cock in the pipe line at its lowest point. This is to prevent freezing and bursting pipes. When a storage tank is made a part of the system a gate valve just under the tank will prevent draining the tank when the pipes are drained, the gate valve being closed before opening the waste cock. If a tank is installed in the attic it should, if possible, be placed on a platform built over a division wall where the 2 x 4 studding may be depended upon to carry the load. Water is heavy; 125 gallons will weigh more than 1,000 pounds, therefore, strong support for the tank must be assured.

Under certain weather conditions water will condense on the outside of metal tanks. Some provision for catching and disposing of this water should be made. Note in Fig. 8 the overflow pipe extending


Small tank or barrel.
Overflow pipe 1 1/2"
Locknut
Enamel sink
Unions
1 1/4" x 1/2" T
1 1/4" S trap
Force Pump
Elbows
1 1/4" Drain Pipe
Check valve.
1 1/4" Pipe
4" Drain tile.

under the eaves. This is a necessary provision also and must not be overlooked. Some form of trap should be installed in the waste pipe line to provide a water seal and prevent the rise of bad odors or vermin, such as roaches, through the waste pipe and into the kitchen. While it is not the purpose of this circular to discuss all the different methods of installing farm water systems, mention should be made of some of the improvements now available.

A gasoline engine can be used to pump water at a great saving of time and money, as compared to the hand method, when the quantities of water required warrants the use of this form of power. A pump jack can be secured for most force pumps which permits the use of the pulley and belt. No man, woman, or boy can compete with a gas engine when it comes to a question of applied horse power. For a few cents an hour a gas engine will do the work of a number of men.

The wind is another source of power which in this state is largely made use of for pumping water. Records show that we have comparatively few periods of long duration when sufficient wind to operate a windmill is not available. With all windmill installations provision for adequate storage should be made to insure a continuous supply through periods when the wind movement is not strong enough to turn the mill.

The rapid extension of electricity into the farming sections which is now under way provides another dependable source of power for pumping which is clean, quiet and efficient.

Commercial manufacturing concerns of individual water systems have been quick to see the advantages offered by the several sources of power now available and, through constant striving and competition, have developed complete water systems which offer all the desired features to be found in the larger community installations.

The hydro pneumatic, or air and water, system is one of these developments. This system makes use of a large tank often located in the basement of the house or in an outside cellar. Water and air is forced into the tank until a desired air pressure is indicated on an air guage provided. The air pressure delivers water to any part of the premises until the displaced water lowers the air pressure when the pump is again put in action and the tank recharged.

Pumps equipped with small gasoline motors which stop automatically when a certain tank pressure is reached may be bought at prices ranging upward from $150. Windmills may be used in connection with air pressure systems or electricity may be employed.

One of the more recent developments in electrically operated systems is the direct no-storage system. These make use of a small powered motor to operate the pump. A small tank or air chamber is part of the system to automatically control the motor. By opening a faucet the pressure is lowered which brings the motor into action. By closing the faucet pumping stops as soon as the correct pressure is obtained.

The manufacturers of these more modern systems are, generally speaking, reliable and large concerns who maintain service agents in various parts of their trade territory. It is to their interest to see that their customers are satisfied customers. To that end they usually offer expert advice and help regarding installations, actual or prospective.

No two water systems will call for the same expenditure of money. To exactly meet individual requirements careful measurements and planning are necessary to insure a wise investment of money and labor. The Extension Division of the Oklahoma A. and M. College will be glad to advise anyone regarding the installing of running water in farm homes.