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RUNNING WATER IN THE FARM HOME

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AGRICULTURAL ENGINEERING

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SUMMARY

Probably the most unnecessary serious discomfort in Idaho farm home life today is the lack of a plentiful supply of fresh, clean water in the house. This lack may be overcome by a very small expenditure of money and labor.

In most parts of Idaho good water may be obtained from underground sources. Shallow wells are satisfactory if carefully located and protected. Deep wells supply the safest drinking water.

Very simple systems may be used to get water into the house. These systems may cost as little as $45.00. Such systems should be considered as stepping stones to fully modern plumbing with automatic water systems and sanitary disposal of wastes.

RUNNING WATER IN THE FARM HOME

By M. R. Lewis, Professor of Agricultural Engineering in the College and Irrigationist of the Experiment Station

The lack of a plentiful supply of running water in the house is one of the great drawbacks to farm home life in Idaho. As many pounds of water are used in the average farm home daily as there are pounds of flour in several months. Roughly, the flour for the family might be carried a mile and a half with no greater labor than is used in carrying the supply of water 50 feet. Moreover, practically all the water which is carried in must be carried out after it has served its purpose.

In addition to the labor required in carrying water, there also is a serious disadvantage in the fact that the supply is necessarily more limited when it is carried in by hand than when it is available merely by opening a faucet. A limited supply of water makes such tasks as dish washing or scrubbing of floors much harder. A plentiful supply of water helps in sanitation by reason of the greater ease with which all sorts of things, from the children's hands to the cream separator, may be kept clean.

The encouraging feature of this situation is that there is probably less necessity for this particular disadvantage of farm life than for any other of equal seriousness. Water may be more easily conveyed to its place of use than almost any other material. It is possible to have the advantage of running water at the kitchen sink at very small cost in money and labor. These conveniences undoubtedly would be much more common in country districts than they are at present, if people generally realized how easily such improvements may be made. No other investment can be made on the farm which will provide more, in saving of labor, in convenience, and in comfort in the home than a reasonable sum of money expended for a water system.

The object of this circular is to describe some very inexpensive methods of getting water into the home. A start may be made in this way and more expensive systems may be installed as money becomes available. No pretense is made that anything new or original is contained herein. The material has been gathered from similar publications of the United States Department of Agriculture, other Experiment Stations, the advertising material of pumping supply houses and from observation of various farm home installations.

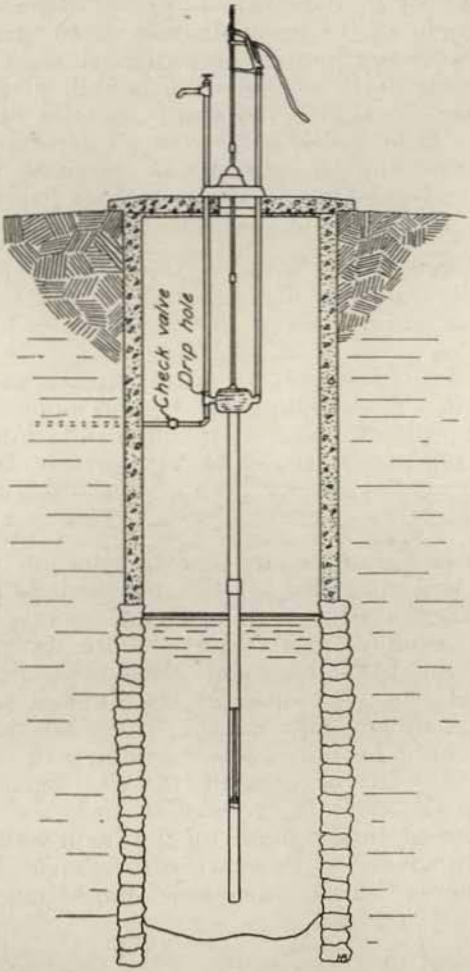

Figure 1—Dug Well with Sanitary Curb.

SOURCES OF SUPPLY

The Shallow Well.

Perhaps the most common source of supply for water on Idaho farms is the shallow well. Unless the location of the shallow well is carefully planned and it is properly safeguarded from the entrance of surface contamination, it does not make a very safe source of water for drinking and cooking. If the well is located at some distance from out-houses, barn-yards and other sources of infection and if the top is tightly sealed and the curb for at least eight feet below the surface is made of concrete or other impervious material, it ordinarily is satisfactory.

Figure 1 shows a properly protected open well. The concrete curbing extends to a distance of several feet below the ground surface, protecting the well from the entrance of ground squirrels or other burrowing animals. The tight top prevents dirt, which might be carried on to the well platform by animals or by soiled shoes or boots, from being washed into the well by water dripping from the pump.

Another type of shallow well which is often more satisfactory from a sanitary point of view is the driven or "sand point" well. Where the ground water is within 15 or 20 feet of the surface and is carried in a stratum of sand or fine gravel, these wells are more easily constructed than any others. As in the case of the open type, driven wells should be located at a considerable distance from, and if possible above rather than below, barn yards or similar sources of infection. A tight platform should be constructed around the top of the driven well so that drippings from the pump can not carry infection down along the pipe and so into the water supply.

Deep Water Bearing Strata.

Probably the next most common sources of domestic water supply are deep water bearing strata tapped by drilled wells and these are very satisfactory as there is a minimum of bacterial infection. If the top of the drilled well is properly protected so that surface waters and dirt can not enter and if they are cased to a considerable depth, preferably to bed rock, they are pretty sure to be perfectly safe. Exceptions should be made in the case of wells drilled in geological formations that have open channels thru which underground waters flow. Such open channels may permit water to carry disease organisms for considerable distances. The more usual rocks of this type are the lava flows and limestone formations.

Figure 2 shows a type of construction which is very satisfactory for the deep well. The pit at the head of the well as shown in this figure is made so large that an automatic water system may be installed at some future time, and be far enough below the ground surface to be safe from frost. It will be noted that the pumps shown in both Figures 1 and 2 are of the type provided with an under-

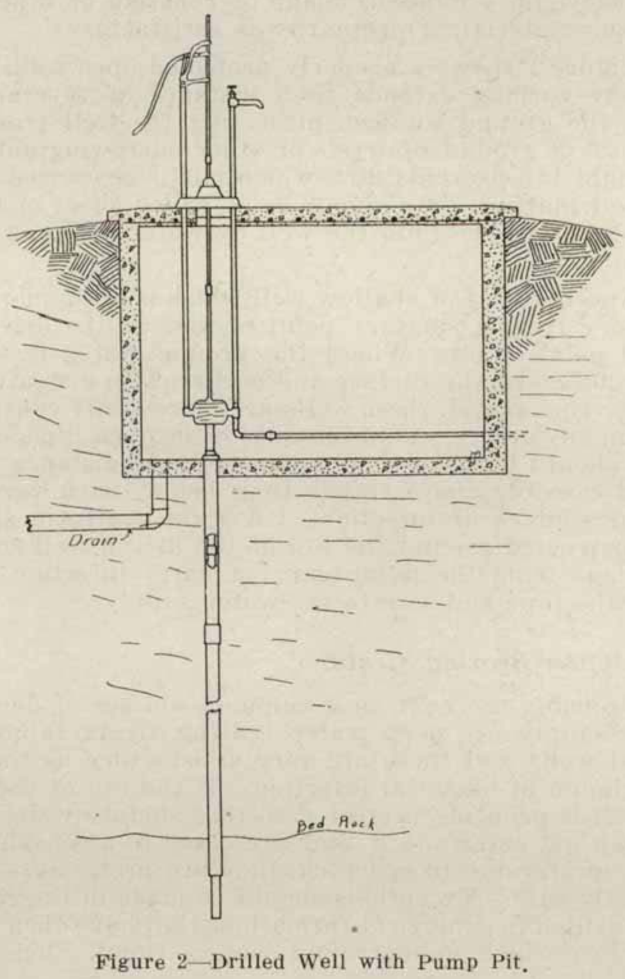

Figure 2—Drilled Well with Pump Pit.

ground discharge pipe. With this type of pump, water may be delivered to a considerable distance without danger of frozen pipes.

Springs

In some parts of the state, springs furnish water for rural domestic use. There is a great difference in the safety of spring water. If the spring comes directly from deep underground sources it is pretty sure to be safe. However, in some cases what appear to be springs are really reappearances of surface streams which have flowed for some distance underground. In these cases the spring water is not apt to be much better than was the surface stream from which it came. The spring should be protected from surface contamination in much the same manner as open wells.

Natural Surface Streams

Natural surface streams furnish water for domestic use in some parts of the state. There is always some danger that these streams will be contaminated. Unless they are so situated that the danger of contamination by human wastes is extremely small they should be avoided for domestic use. The same reasoning applies to irrigation canals. As these latter always flow thru populated districts, water from them is never safe for drinking without some treatment. Such water may be made safe by treatment with chlorine or by boiling. Filteration will also improve the quality of the water as far as its appearance and the presence of solid particles such as silt are concerned. However, unless filters are very carefully operated they do not guarantee the absence of harmful bacteria in the water which may be drawn from them.

HOUSEHOLD SYSTEMS

A number of simple water systems which may be installed at low cost, are described herewith.

Pitcher Pump and Sink.

The simplest system, shown in Figure 3, consists of a pitcher pump mounted on a driven well at the kitchen sink. A drain pipe for carrying off waste water is shown. Waste water from the sink should be carried a consider-

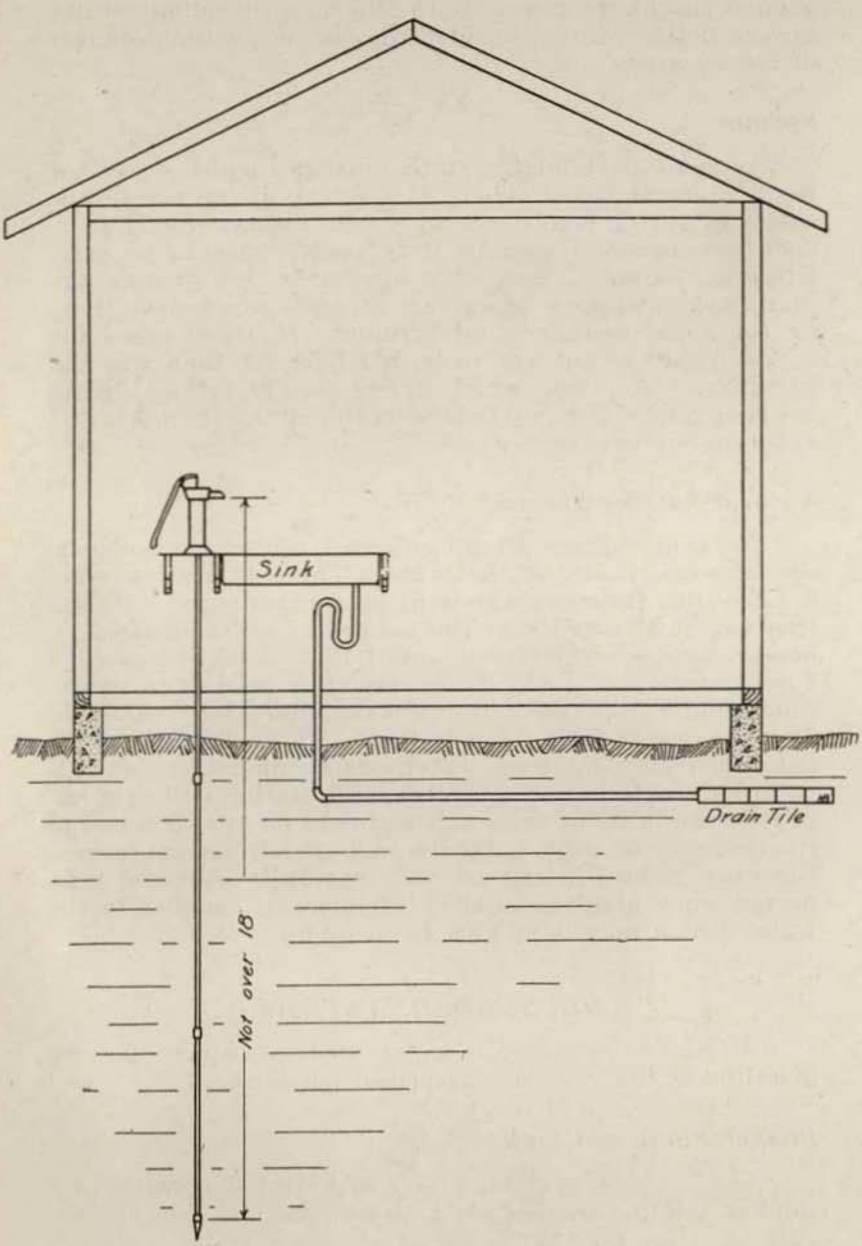

Figure 3—Pitcher Pump at Kitchen Sink

able distance from the house and may then be discharged into a natural drainage way. If the soil is sandy the waste from the kitchen may be disposed of by laying a short length of drain tile with open joints and allowing the water to seep out into the soil. While this system—also some of the other systems shown herein—does not provide running water at the turn of a faucet it does do away with the necessity of carrying water from an outside well. Also, it provides a means of getting rid of waste water from the sink without the use of a disagreeable slop pail. It does away with the need of going outdoors, perhaps into a rain or snow storm, whenever the water bucket becomes empty.

The materials for the system as shown will cost about $45.00. There will be required:

- 25 to 30 feet of 1¼″ pipe
- 1 drive point for the well
- 1 pitcher pump
- 1 kitchen sink, which should be about 18″ by 30″ fitted for iron pipe
- 1 1½″ cast iron S trap
- 20 to 30 feet of 1½″ galvanized pipe
- 4 brackets for sink and pump
- 30 to 50 feet 4″ drain tile
- 1 1½″ elbow.

The labor required to install this system will be insignificant and all the work can be done by any man with a very limited supply of tools. If the length of pipe is determined in advance it can be bought already cut to the proper lengths and threaded.

In case the well is already constructed and is not too far from the kitchen it will be possible to use this same system, provided the total vertical distance thru which the water must be lifted from the surface of the water in the well to the pitcher pump does not exceed 18 feet. In this case more fittings and a longer length of pipe to bring the water from the well to the kitchen will be required.

Running Water at Sink.

In case the depth to water is more than 15 to 18 feet, or the well is at a considerable distance from the house, it will be necessary to use a force pump of some kind. Figure 4 shows a slightly more expensive system which will provide running water at the kitchen sink. This system consists of a force pump at the well, a pipe from the well to a small tank in the attic of the house, a faucet at

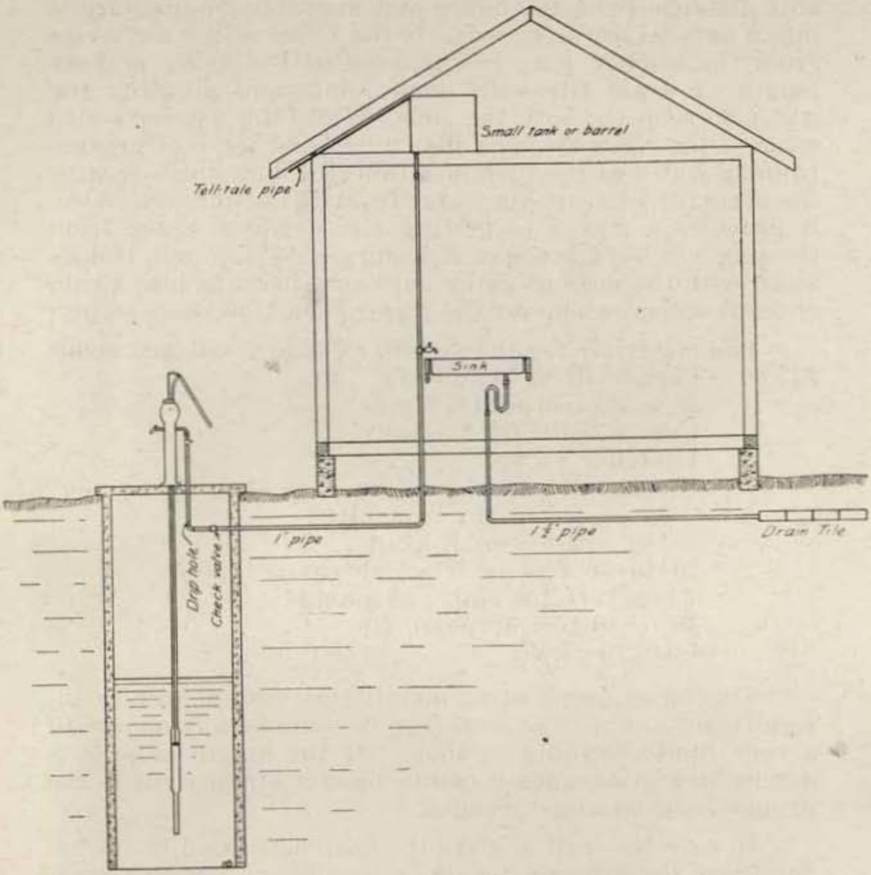

Figure 4—Force Pump with Gravity Tank

the kitchen sink, and a drain pipe similar to that shown in the former system. The materials required will cost about $70.00. This system may be put in with little more difficulty than the smaller one and it has this advantage: the daily supply of water may all be pumped at one time and drawn off as needed. The materials required are as follows:

40 to 60 feet of 1" galvanized pipe for line from well to attic tank and for overflow pipe from tank.

1 force pump

1 sink, 18" x 30" fitted for iron pipe

1 1½″ cast iron S trap
2 brackets for sink
1 small tank or barrel (in attic) fitted with 1″ outlet
1 ¾″ faucet
2 1″ unions
1 1″ check valve
2 or more 1″ galvanized elbows
1 1½″ galvanized elbow
1 1″x1″x¾″ Tee
20 to 40 feet 1½″ galvanized pipe and
30 to 50 feet 4″ drain tile.

The force pump for this system should be so arranged that water may be forced thru an underground pipe to the tank in the attic of the house or may be taken directly from the spout of the pump. The underground pipe should be provided with a check valve and with a drip hole as indicated in the figure so that it will drain and be protected from freezing.

If a tank is installed in the attic, care must be taken that the ceiling joists are strong enough to carry the load. It takes only about 12 gallons of water to weigh 100 pounds. A day's supply of water for a family of five, where there is hot and cold water and an inside toilet, will require about 125 gallons and will weigh more than 1,000 pounds. Some method of taking care of overflow must be provided in all cases. It also will be necessary to provide means of catching and disposing of water which may condense on the outside of the tank in warm, damp weather. Condensation will not occur on the outside of wooden tanks. However, these may leak if for any reason they are allowed to remain empty, or partly so, long enough for the wood to dry and shrink.

Hot and Cold Water.

Figure 5 shows an inexpensive system by which both hot and cold water may be supplied to the kitchen sink and to the bath room. In this system water is drawn from a shallow well by a kitchen force pump located at the kitchen sink. The pump discharges thru a three-way valve. This valve may be operated so that the cold water from the pump is discharged directly into the sink or so that it flows into the hot water tank and displaces hot water which is discharged thru the faucet at the sink. By the third setting warm water from near the middle height

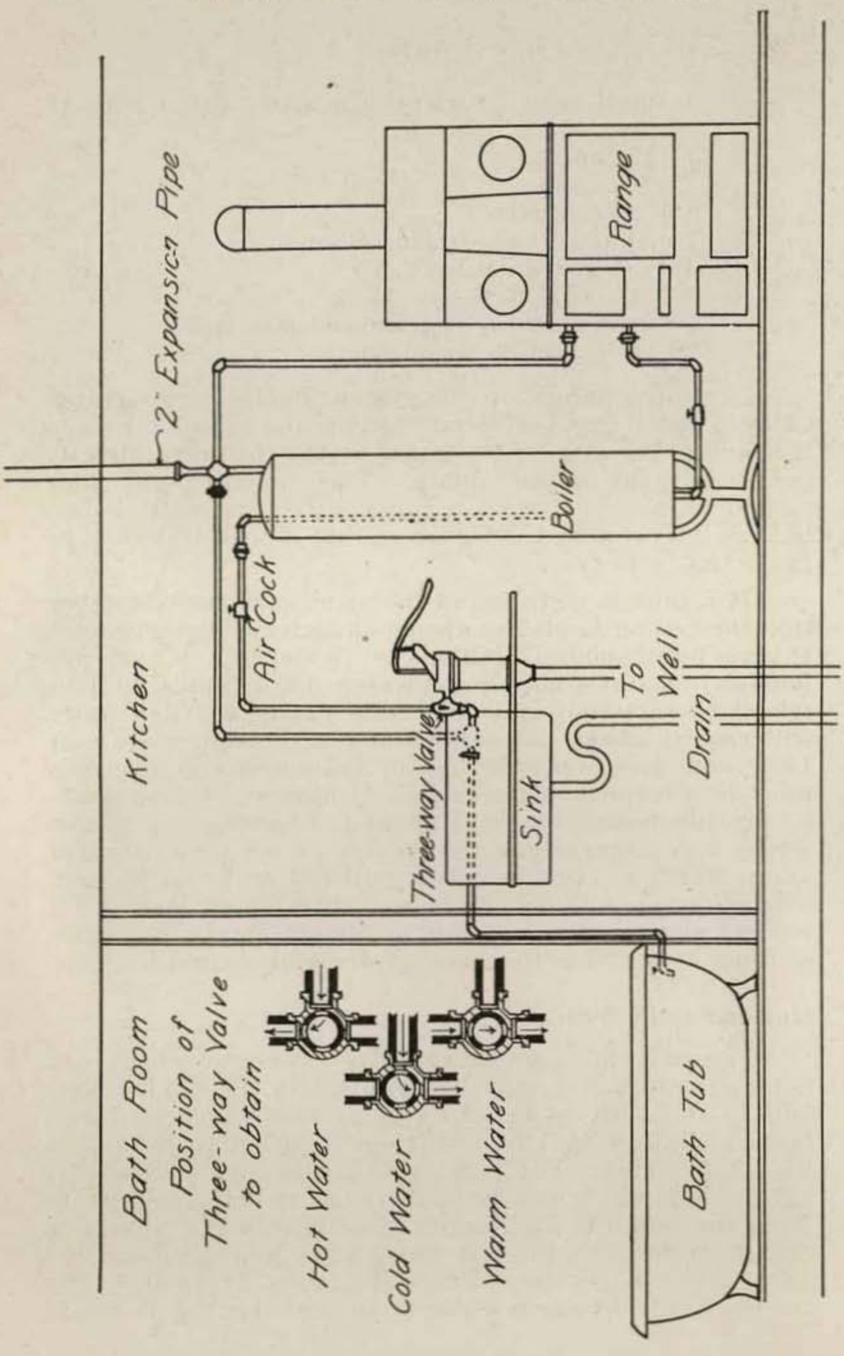

Figure 5—Hot and Cold Water from the Kitchen Pump

of the hot water tank or boiler is syphoned out into the sink. If this plan is used the cold water tube in the range boiler should not have a hole drilled in it near the top. In the usual plumbing installation such a hole is provided so that water will not be syphoned out of the boiler when the pipes are drained. The two-inch expansion pipe shown in the figure should extend thru the roof of the house. Any excessive amount of water which may be in the boiler will then be discharged thru this pipe. It also will take care of the expansion due to heating and will act as a safety valve in case both the faucets are closed at any time.

This plan is devised for those who can not put in an entire system at one time. Later, an automatic water plant or a supply from an elevated tank may be connected up to this system and very little of the equipment will have to be discarded. This installation will require approximately the same amount of pipe to bring water from the well and discharge it into the drain as in the other systems. There will be required, in addition, a kitchen force pump, a three-way valve, a kitchen sink either with or without back, a hot water back in the range or stove, a bath tub and the necessary pipe and fittings. The length of pipe and number of fittings will depend on arrangements of equipment. Expenditure for materials will total approximately \$135.00. This outfit is a little more difficult to install but it should be possible for almost anyone to put it in without serious difficulty. A very similar arrangement is possible if a barrel is substituted for the range boiler.

More Elaborate Systems.

More elaborate systems will, of course, cost more money. The material for a system comprising a force pump, small tank in the attic, hot water tank or boiler, kitchen sink, bathroom equipment including lavatory, bath tub, and toilet, with the necessary supply, drain and ventilation pipes and fittings will cost approximately \$225.00 Such a system will be considerably more difficult to install and will require more careful planning in each individual case. However, information which should enable any man who is handy with tools to put in this system may be obtained in United States Department of Agriculture Farmers' Bulletin Number 1426, "Farm Plumbing", which will be sent free, upon request to the United States Department of Agriculture, Washington, D. C.

Manufacturers and distributors of plumbing supplies also issue bulletins describing in detail methods of installing their equipment.

Figure 6 shows one of the convenient and useful automatic water systems for farm homes, which are manufactured by a number of concerns. These systems vary considerably in capacity and also in price. The better types, however, are entirely satisfactory for home use and are worth the cost.

There are several types of these plants. Some are driven by gasoline engines and must be started by hand but will stop when the tank is full. Those run by electric motors are usually entirely automatic, both starting and stopping without attention. Some of the automatic systems store no water at all but pump directly from the well each time a faucet is opened while others use a tank partly filled with air in which to store water for several hours' or days' use.

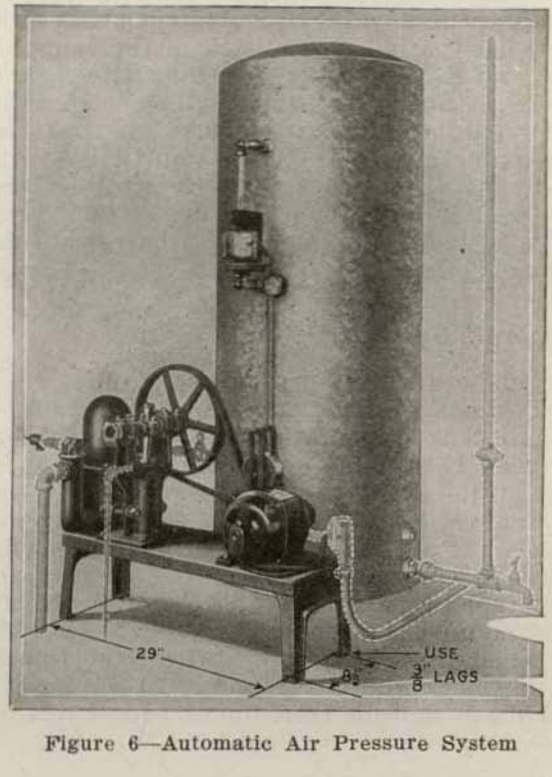

Figure 6—Automatic Air Pressure System

The pneumatic principle used on many of these power driven systems may be employed where the water is pumped by hand. The chief advantage of the air pressure system as compared to an attic tank is that the tank may be installed in the basement of the house or in the pump pit at the well head where it is safe from freezing in winter and remains cool in summer.

If bathroom equipment is installed, some sanitary method of waste disposal will be required. Under most Idaho conditions a septic tank will prove to be most satisfactory. Idaho Agricultural Experiment Station Bulletin No. 128, "The Farm Septic Tank", by Wooley and Gibbs, gives detailed instructions for the construction and operation of septic tanks. This bulletin may be obtained by request to the Agricultural Experiment Station, University of Idaho, Moscow.