

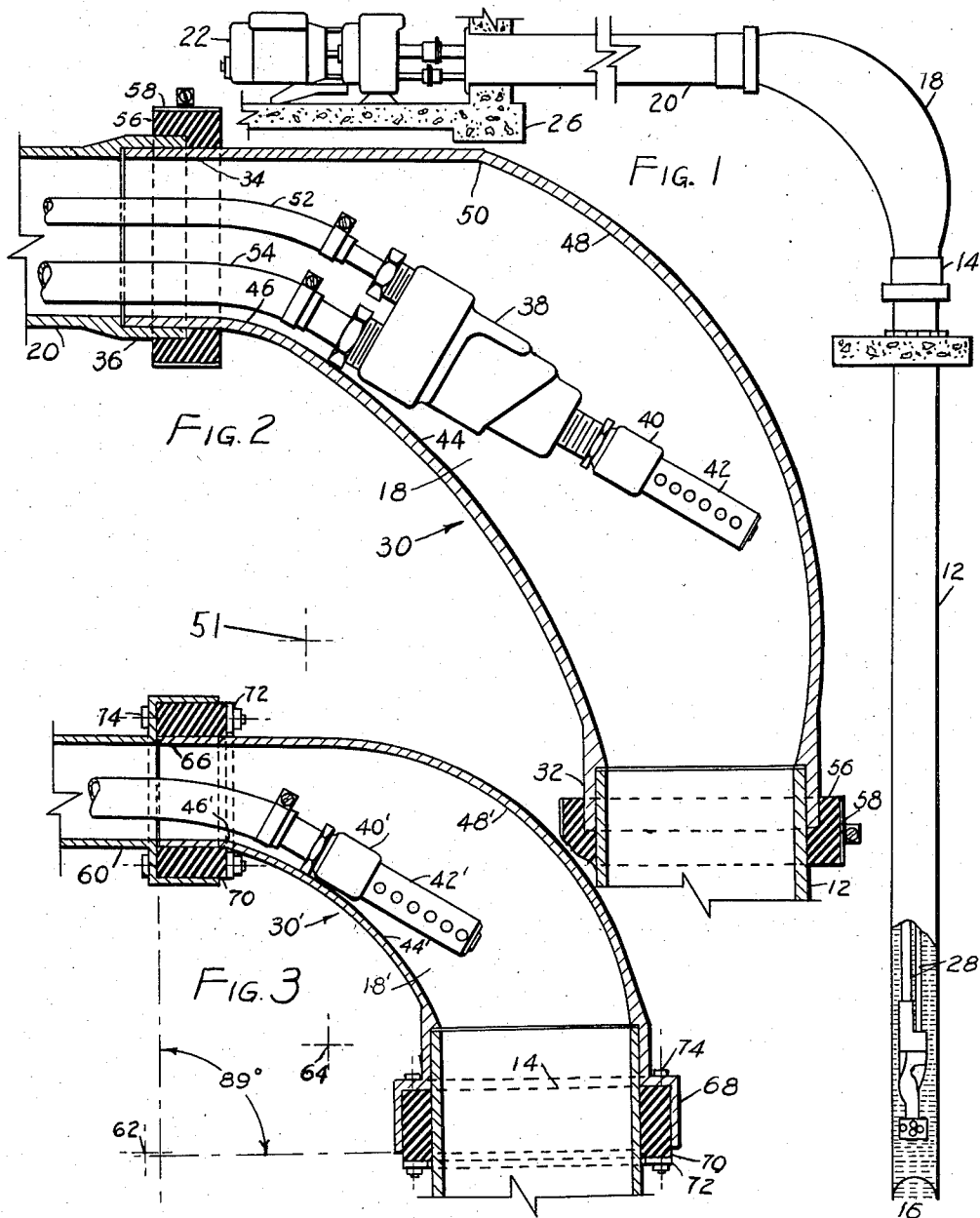
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WELL INSTALLATION

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WELL INSTALLATION

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This invention relates to well installations and more particularly to flexible piping well installations where the well is located remotely from the pump house, cellar or other location of the pumping, storage tank and related equipment.

In the modern type of well installation in order to permit automatic operation it is necessary to provide, at the bottom of the well on the water line a foot valve and strainer and in addition in the deeper wells a pumping mechanism. As is well known it is also necessary in installing a well to seal outer casing adjacent the top thereof (which is usually located several feet beneath the surface of the ground) so that dirt and surface water can not enter and contaminate the water supply. This has usually been done by a cap or cover known as a "well head" which tightly seals the top of the casing and also allows connection thereto of the necessary pipes to bring the water from the supply in the ground to a pump located remotely from the top of the outer casing. Also with this type installation it has been necessary to provide a separate vent pipe to prevent a vacuum being created in the casing which would render the pumping mechanism inoperative. When the well is located some distance from the pump and storage tank location as is customary this has necessitated digging to the well head and unsealing it to remove the foot valve and so forth for cleaning and repair. This involves considerable excavation particularly in the colder climates where the well head and line to the pump house must be below the frost line.

According to the present invention I have eliminated the separate vent pipe and all digging for cleaning and repairing after the initial installation of the well by providing a novel cap or cover for the top of the outer well casing which may advantageously be called a "continuous well top" that seals the outer casing against entrance of contaminating waters and yet permits ready insertion and withdrawal of the necessary pumping mechanism from and to the bottom of the well casing.

It is a primary object of the present invention to provide a well installation in which any mechanism at the foot thereof may be removed and installed without the necessity of digging up any portion of the well installation. It is another object to provide a continuous well top for flexible piping type well installations. It is another object to provide a well installation that is easy and economical to install and maintain. It is another object to provide a well installation in which flexible piping may be used to its fullest advantage. It is another object to provide a flexible piping well installation wherein the pumping mechanism located at the foot of the well may be removed and replaced merely by attaching the pumping mechanism to one end of the flexible piping and withdrawing or inserting the flexible piping into the outer casing. It is another object of the present invention to provide a continuous well top of a configuration such that any pumping mechanism located at the foot of the well may be readily passed therethrough. It is

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still a further object of the present invention to provide a continuous well top that permits installation of the well structure with less excavation than heretofore necessary. These and other and further objects will be in part pointed out and in part apparent in the following specification.

In the drawings:

Figure 1 is a side elevation of a well installation according to the present invention.

Figure 2 is a sectional view of a continuous well top according to the present invention.

Figure 3 is a sectional view similar to Figure 2 of another embodiment of the present invention.

Referring now to Figure 1 a well installation according to the present invention comprises generally a well casing 12 extending downwardly to the source of water 16 from a point generally located several feet below the surface of the ground, continuous well top 18, lead-in casing 20, pumps 22, and a storage tank not shown and associated equipment located in a pump house or cellar 26. Positioned in casings 12 and 20 are one or more flexible pipes 28 through which the water 16 is brought by pump 22 to the storage tank not shown. As indicated in the drawing the upper end 14 of outer casing 12 may be located any desired distance from pump 22 which is normally located nowadays in the cellar 26 of the home. The usual length for casing 20 is from eight to ten feet up to fifty feet and it is normally located well below the frost line for the given locality so that there is no danger of freezing of the water in the pipes therein. Casings 12 and 20 are normally about six inches in diameter although other sizes may be used.

In deep well installations over about twenty-five feet it is generally necessary to use an auxiliary pumping mechanism at the foot of the well. This usually comprises, in addition to the foot valve and strainer, a jet body which has the usual jet assembly operated by water pumped down from the pump house through a small line to force water up a larger line to a storage tank. The detailed operation of this mechanism is of a conventional type and is not explained in full in the interests of simplicity.

Referring now to Figure 2 continuous well top 18 comprises a curved tubular body portion 30 carrying flange 32 at the bottom thereof for engagement with well casing 12 and a coupling neck portion 34 at the upper end for engagement with a flange 36 of the lead-in or pump house casing 20 as is readily seen in Figure 2. Body portion 30 does not have a uniform cross-section but rather has a special shape to permit passage therethrough of jet body 38, together with foot valve 40 and strainer 42. The lower wall 44 of body 30 starts to curve downwardly at 46 well before upper wall 48 starts to curve at 50. Wall 44 extends from point 46 downwardly on a gentle curve to flange 32 with an approximate center of curvature located just off the left of the drawing about opposite "Figure 3." This permits jet body 40 to drop downwardly without hitting wall 48 on insertion and also on withdrawal prevents premature tipping up which might wedge it against wall 48. It will also be noticed that there are no sharp breaks in wall 44 so that a smooth continuous supporting surface is provided for pipes 52 and 54 when in the installed position. This prevents the formation of kinks in the pipe or other obstructions that would interfere with the flow of water through the pipes.

Wall 48 starts to curve at 50 which is displaced outwardly to the right in Figure 2 from point 46 and then curves somewhat more sharply than wall 44 until it joins flange 32, the approximate center of curvature being located at 51. There is thus formed a bow or bulge that will prevent jamming of jet body 40 in top 18 and also guide it smoothly into casing 12 upon insertion. As may

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be readily seen in Figure 2 this results in a cross-sectional area at the center portion of approximately twice the cross-sectional area of either end portion.

The total included angle of curvature from the upper to lower end of body 30 is limited to 89 degrees (i.e. the angle between a line perpendicular to the axis of neck 34 and a line perpendicular to the axis of flange 32). This it has been found permits a slight rise in casing 20 which allows any trapped air in pipes 52 and 54 to rise and escape so that the system will not develop an air lock and become inoperative. This is particularly important in the priming of the pump for initial operation. It will thus be noted that there is provided a tubular well top that is larger in the middle than at either end and which is specially shaped to insure easy and snag-proof insertion and removal of the jet body, foot valve and strainer to and from the well foot for easy and economical cleaning and repair without excavation by simply pulling up or pushing down the water pipes with the pumping mechanism attached.

Positioned about flanges 32 and 36 are gaskets 56 and drawbands 58. Gaskets 56 are made of a resilient material such as neoprene, plastic or the like and are compressed about the joints of flanges 32 and 36 to form a water tight seal. This prevents the entrance of undesired surface waters that might contaminate the underground water supply.

Thus according to the present invention the well casing 12 is sunk as the well is drilled until the desired water supply is found. It is then cut off at the proper height and continuous well top 18 is slipped on and gasket 56 tightened. The trench to the pump house or cellar can be dug and the lead-in casing 20 slipped over well top 18 and the gasket tightened providing a sealed passage directly into the house. The necessary pumping mechanism is then fitted on the end of pipes 52 and 54 and fed into casing 20, through top 18, into casing 12 and then water 16 as described above. This permits a much shallower excavation about the well head since it does not need to be threaded after it is cut and also accomplishes the change in direction in a shorter vertical distance all in a superior manner over anything heretofore known.

Referring now to Figure 3 there is shown another embodiment of the present invention. In this embodiment continuous well top 18 comprises a body portion 30' that is similarly curved through an arc of 89 degrees and tapers from well head 14 to a smaller diameter at the other end to join a smaller size lead-in casing 60. As in Figure 2 lower wall 44' starts to curve first at 46' and has a somewhat longer radius of curvature than upper wall 48', the centers of curvature being displaced from one another at 62 and 64 respectively. Wall 48' does not bow or bulge as much as wall 48 but is curved to provide substantially the same clearances for installation involving only a foot valve 40' and strainer 42'.

In relatively shallow wells as is well known only a foot valve and strainer are required for proper automatic operation. These, as may be seen are considerably smaller than the mechanism of Figure 2 and permit the use of a smaller lead-in casing. With continuous well top 18' according to my invention these facts may be taken advantage of to save money both in cost of lead-in casing and in cost of excavation, well top 18' taking even less vertical space than top 18.

Flanges 66 and 68 are provided to properly couple well top 18' and have therein gasket 70 and rings 72 which are drawn tight by bolts 74 to form a sealed joint as above.

There is thus provided a continuous well top that requires a minimum of space and provides a smooth transition that prevents jamming of the foot valve and strainer against the walls thereof upon passing therethrough in either direction.

While there are given above certain specific examples

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of this invention and their applications in practical use, it should be understood that this is not intended to be exhaustive or to be limiting of the invention. On the contrary, these illustrations and explanations herein are given in order to acquaint others skilled in the art with this invention and the principles thereof and a suitable manner of its application in practical use, so that others skilled in the art may be enabled to modify the invention and to adapt and apply it in numerous forms each as may be best suited to the requirement of a particular use.

I claim:

1. In a well installation of the type having a substantially vertical well casing, at least one flexible inner pipe positioned therein, a pump mechanism having a part thereof positioned at the foot of the well and the balance positioned above ground remotely from the top of said vertical casing; and wherein it is desired to install and remove said portion of the pumping mechanism at the bottom of the well without access to the top of said vertical well casing: a continuous well top comprising a curved body portion having coupling flanges on each end thereof adapted to be connected at one end to the top of the vertical well casing and at the other end to a lead-in casing extending from adjacent the top of said vertical well casing to said above ground pump mechanism; the inner surface of said body portion including said coupling flanges being smoothly curved from said lead-in casing to said well casing to form a smooth supporting surface for flexible pipe positioned therein; said body portion having a cross-section in its plane of curvature such that the radius of curvature of the lower wall thereof is greater than the radius of curvature of the upper wall and the lower wall curvature starts before the upper wall curvature, whereby when the portion of the pumping mechanism at the bottom of the well is being withdrawn by pulling on the flexible inner piping the said pumping mechanism will not jam against the walls of said continuous well top.

2. In a flexible piping well installation of the type having a well casing, a lead-in casing, at least one flexible inner pipe positioned therein, a pump mechanism having a part thereof positioned at the foot of the well and the balance positioned above ground remotely from the top of said vertical casing and wherein it is desired to install and remove said portion of the pumping mechanism at the foot of the well without access to the top of said well casing, a continuous well top comprising in combination a hollow body portion of non-uniform cross-section, one end of said body being adapted to fit over the top of said well casing and the other end of said body being adapted to engage said lead-in casing, said body portion having an overall curvature in the vertical plane when said well top is installed of a maximum of 89°, the lower wall of said body portion forming a smoothly curving supporting surface from said lead-in casing to said vertical well casing for said flexible inner pipe positioned therein and said body portion having a cross-section, in said vertical plane such that the lower wall starts to curve downwardly before the upper wall and reaches said maximum curvature before said upper wall and said upper wall extends substantially horizontally from the end of the continuous well top adapted to engage said lead-in casing from one-third to one-half the distance between said coupling and the axis of said well casing.

3. In a well installation of the type having a substantially vertical well casing, a lead-in casing, at least one flexible inner pipe positioned therein, a pump mechanism having a part thereof positioned at the foot of the well and the balance positioned above ground remotely from the top of said vertical casing; and wherein it is desired to install and remove said portion of the pumping mechanism at the bottom of the well without access to the top of said vertical well casing; a continuous well

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top comprising in combination a smoothly curved body portion joining said vertical well casing and said lead-in casing and extending smoothly through an overall arc of a maximum of 89°; the lower wall of said body portion forming a smoothly curving supporting surface from said lead-in casing to said vertical well casing and starting to curve downwardly before the upper wall and reaching said maximum curvature before said upper wall said body portion having a cross-section in the plane of curvature when installed wherein the approximate centers of curvature of the lower and upper walls thereof are angularly and linearly displaced relative to one another so that the cross sectional area of the center portion

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of said body portion is approximately twice the cross-sectional area of either of the end portions.

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