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SUSPENDING DEVICE FOR A SUBMERSIBLE PUMP

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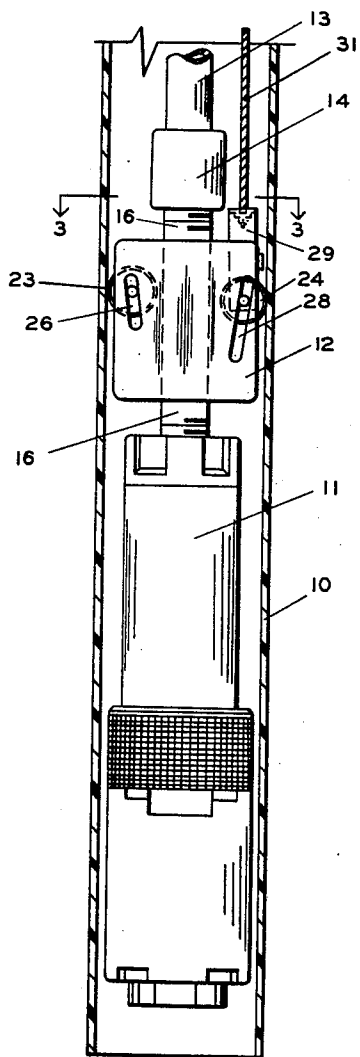


FIG. 1

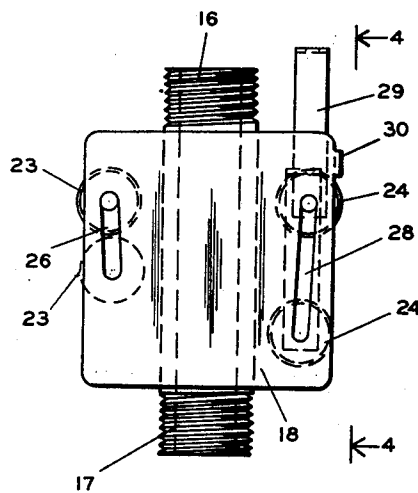


FIG. 2

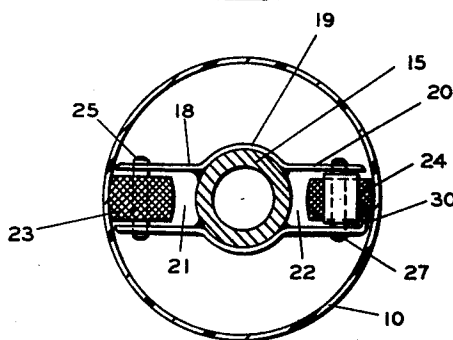


FIG. 3

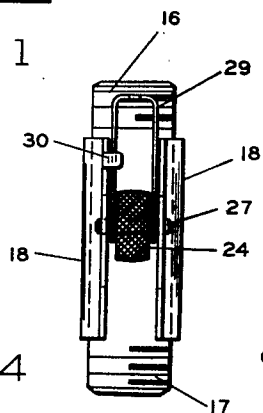


FIG. 4

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SUSPENDING DEVICE FOR A SUBMERSIBLE PUMP

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2 Claims. (Cl. 103—219)

My invention relates to a suspending device for a submersible pump. It has to do, more particularly, with a device adapted to be associated with a submersible pump in a well casing to suspend or support the pump within the casing.

Submersible pumps have come into common usage in the last few years, especially in home water systems. These pumps are suspended in submerged condition within the associated well casings. In the past, the pumps have usually been suspended by means of metal pipe which also provides the pressure or supply line leading upwardly from the pump through the well casing. Recently, plastic pipe has come into common usage in wells but although the plastic pipe has many desirable features which makes its use in wells desirable, it is not entirely satisfactory for supporting submersible pumps due to the fact that it will stretch and twist when suspending a submersible pump in a well casing.

It is the main object of this invention to provide a suspending device for use in connection with submersible pumps which will make it possible to use ordinary plastic pipe in association therewith since the device will support the submersible pump within the well casing, eliminating any stretch or torque forces on the plastic pipe.

Another object of my invention is to provide a device for suspending a submersible pump in a well casing which is of such a nature that the pump can be easily moved to a predetermined location in the casing and then the device can be operated from the surface to lock it in that position until it is desired to pull the pump from the casing.

Another object of my invention is to provide a device for supporting a submersible pump within a well casing which is so designed that the weight of the pump will aid in locking the device to hold the pump in a predetermined position within the casing.

A further object of my invention is to provide a device of the type indicated which is of simple and inexpensive structure, which is composed of a minimum number of parts and the operation of which will not be adversely affected by corrosion or electrolytic action when submerged in a water well.

Various other objects will be apparent.

In the accompanying drawing, I have illustrated the preferred embodiment of my invention but it is to be understood that specific details may be varied without departing from the principles of my invention.

In this drawing:

Figure 1 is a vertical sectional view through a well casing showing my device supporting a submersible pump therein.

Figure 2 is a side elevational view of my supporting device illustrating unlocked and locked positions thereof.

Figure 3 is a horizontal sectional view taken substantially along line 3—3 of Figure 1.

Figure 4 is an edge view of the device taken along line 4—4 of Figure 4.

With reference to the drawing, in Figure 1 I have illustrated a well casing 10 in which a submersible pump

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11 of a suitable type is suspended by means of my suspending device 12. This device 12 is connected between the upper end of the pump 11 and the lower end of a supply line in the form of a plastic pipe 13. The pipe 13 is provided with a coupling 14 to couple the pipe to my suspending device 12.

The suspending device 12 comprises a vertically disposed pipe section or nipple 15 of substantial length which has threads 16 on its upper end for cooperating with the plastic pipe fitting 14 and threads 17 on its lower end to permit the nipple to be threaded into the outlet at the upper end of the pump 11.

Welded to each side of the nipple 15 is a metal cam plate 18. Each plate 18 intermediate its ends is curved, as indicated at 19, to snugly fit the sides of the nipple 15. The oppositely projecting flat sections 20 of the two plates 18 are disposed parallel to each other. Therefore, at diametrically opposed sides of the nipple 15 vertically extending roller guide spaces 21 and 22 are formed.

In the space 21 there is mounted for vertical movement a knurled metal roller 23 and in the space 22 there is mounted for vertical movement a knurled metal roller 24. The roller 23 is carried by a pin 25 extending transversely of the space 21 and having its outer ends mounted in cam or guide slots 26. The slots 26 are angled upwardly and outwardly. The roller 24 is carried by the transverse pin 27 which is mounted in the guide slots 28 that are also angled upwardly and outwardly. It will be noted that the slots 28 are of considerably greater extent than the slots 26 but that all slots terminate upwardly at substantially the same level. As shown in Figure 2, when the rollers 23 and 24 are in their lowermost positions, the roller 24 is within the outer edges of the associated plates 18 but the roller 23 projects slightly beyond such edges. However, when they move in the guide slots 26 and 28, respectively, to the upper ends thereof, they project at diametrically opposed points outwardly beyond the associated edges of the plates 18. Connected to the pin 27 of the roller 24 is an actuating member bail 29. This bail is mounted for swinging movement in the space 22 about the axis of the pin 27 but a stop lug 30 on the edge of one of the plates 18, adjacent its end, normally prevents the bail from swinging outwardly and keeps it in the vertical position shown in Figure 2. The bail is of sufficient extent that when the roller 24 is in its lowermost position, its upper end will still be engaged by the stop 30.

In the use of this device, it is coupled to the upper end of the pump 11 and to the associated end of the plastic pipe 13 and an actuating cable 31 is attached to the upper end of the bail 29. Then, the entire assembly is lowered within the well casing. At this time the rollers 23 and 24 will be in the lower ends of their respective guide or cam slots 26 and 28 and no tension will be applied to the actuating cable 31. During this lowering operation, the weight of the pump will be supported by the pipe 13. As soon as the pump reaches the predetermined level, a pull is applied to the cable 31. This will move the roller 24 upwardly and outwardly into engagement with the casing 10 and the settling of the pump 11 will also move the roller 23 outwardly into engagement with the casing, it being understood that it initially in its lowermost position projects slightly outwardly beyond the edges of the plates 18. This will cause both of the rollers 23 and 24 to wedge against the casing. The weight of the pump will serve to increase this wedging action. Thus, no pull will be exerted on the plastic pipe 13. Furthermore, it will be noted from Figure 3 that the rollers 23 and 24 are of barrel form so that the surfaces of the rollers which engage the casing will substantially fit the circular contour thereof. Therefore, rotation of the pump 11 within the casing

will be prevented and there will be no torque applied to the plastic pipe 15. When it is desired to remove the pump from the well casing, an upward pull on the plastic pipe 13 will automatically release the supporting device 12, assuming that there is no pull exerted on the cable 31, since the roller supporting pins 25 and 27 will be moved inwardly in the slots 26 and 28, respectively, by such pull.

It will be apparent from the above description that I have provided a suspending device for submersible pumps which will effectively support the pump within the well casing and will prevent stretching and twisting forces from being applied to the outlet pipe associated therewith which is especially important when plastic pipe is used. The device will not interfere with lowering the pump into the casing and can be actuated easily and positively from the surface when the pump reaches a predetermined level. Furthermore, the device can be easily released from the surface and there is no danger of it jamming.

According to the provisions of the patent statutes, the principles of this invention have been explained and have been illustrated and described in what is now considered to represent the best embodiment. However, it is to be understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

Having thus described my invention, what I claim is:

1. In combination with a submersible pump disposed in a well casing along with a supply conduit leading from the pump upwardly through the casing, a suspending device comprising a pipe section connected between the supply conduit and the pump, said suspending device comprising a pair of opposed plates secured to the pipe section and extending from opposite sides thereof to form diametrically opposed guide channels, a pair of diametrically opposed rollers disposed in said guide channels for movement vertically thereof, each of said rollers being carried by a pin which operates in aligning cam slots formed in said opposed plates which form the walls of said guide channels, said cam slots being directed upwardly and outwardly so that the roller supported in each of said guide channels will move upwardly and outwardly beyond the outer edges of the walls thereof so that the casing will be gripped at diametrically opposed sides of said device by said rollers, one of said rollers when in its lowermost position determined by its carrying pin being in the lowermost ends of the opposed cooperating cam slots having its outer surface projecting beyond the adjacent outer edges of the walls of its guide channel but the other roller when in its lowermost position determined by its carrying pin being in the lower ends of the opposed cooperating cam slots being within the adjacent outer edges of the walls of its guide channel, and an actuating member connected to said last-mentioned roller-supporting pin whereby the roller may be pulled upwardly in the

channel in which it is disposed, said actuating member comprising a bail connected to said roller-supporting pin for swinging movement about the axis thereof, and a stop on the edge of one of said plates for limiting outward swinging movement of said bail about said axis.

2. In combination with a submersible pump disposed in a well casing along with a supply conduit leading from the pump upwardly through the casing, a suspending device connected to the pump for suspending in it the casing, said suspending device comprising a guide plate attached to said pump and adapted to fit within the casing for movement axially therein so that its outer edges are disposed on opposite sides of the axis of said casing and adjacent the inner surface thereof, a pair of diametrically opposed rollers mounted on said plate for upward and outward movement beyond said outer edges of said plate, each of said rollers being carried by a pin which operates in a cam slot formed in said plate adjacent the one edge thereof, the cam slots in said plate being directed upwardly and outwardly toward the respective edges of said plate so that each roller will move upwardly and outwardly beyond the respective outer edges of said plate in order that the casing will be gripped at diametrically opposed sides of said device by said rollers, one of said rollers when in its lowermost position determined by its carrying pin being in the lowermost end of the cooperating cam slot having its outer surface projecting beyond the adjacent outer edge of said plate but the other roller when in its lowermost position determined by its carrying pin being in the lower end of the cooperating cam slot so that said roller is within the adjacent outer edge of the guide plate, and an actuating member connected to said last-mentioned roller-supporting pin whereby it may be pulled upwardly in said slot in which it is disposed to move the roller upwardly so that its surface is beyond said outer edge of the plate, said actuating member comprising a bail member connected to said roller-supporting pin for swinging movement about the axis thereof, and a stop on the adjacent edge of said plate for limiting outward swinging movement of said bail member about said axis.

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