March 21, 1950 J. O. SANDERS 2,501,237

SAND FLUSHER

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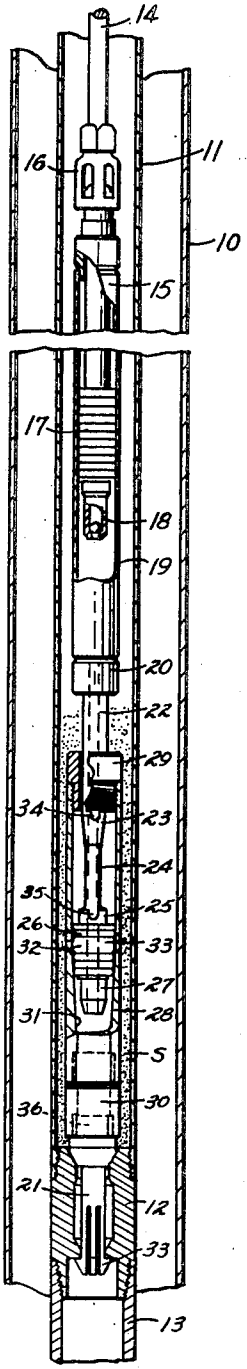


FIG-1-

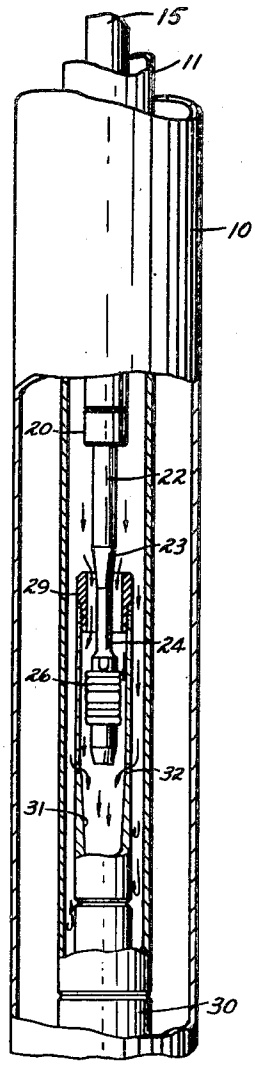


FIG-2-

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SAND FLUSHER

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4 Claims. (Cl. 103—204)

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My invention relates to oil well equipment generally, but more in particular to a device for flushing sand away from the pumping mechanism positioned at the bottom of the well.

The principal object of the invention is to provide a device for flushing accumulated sand away from the lower pump mechanism of a well whereby the same may be easily dislodged and removed from its anchorage in the tubing.

A further object of the invention is to provide a sand flushing device which anchors the pump mechanism and the string of sucker rods to the bottom of the well for the pumping operation and which may be set to permit flushing of the well by an extended, upward stroke of the sucker rods.

A still further object of the invention is to provide a sand flushing device which is easy to manufacture and install and which may be used in connection with prior types of pumps without the necessity of additional parts.

Further objects and advantages will be apparent in the following detailed description when viewed together with the accompanying drawing in which:

Fig. 1 is a cross sectional view of the lower portion of an oil well showing my invention in a sand flusher serving as an anchoring means for the lower end of a string of sucker rods and pumping mechanism.

Fig. 2 is a broken, sectional view showing the device in a released position which allows the fluid in the tubing to be drained or flushed.

In the drawing numeral 10 designates a well casing through which a string of tubing 11 is extended downwardly toward the oil strata.

At the lower end of the tubing 11 is a prior art anchoring shoe 12 which carries a lower perforated pipe 13 or screened inlet tube extending into the oil strata below.

On the lower end of the string of sucker rods 14, within the tubing 11, is a pumping unit designated generally by the numeral 15. The pumping unit 15 may be any of the prior art types, either with a stationary piston or a stationary working barrel. In the illustration shown, the pump is provided with an upper traveling valve 16 and a piston 17 which are moved up and down in pumping action by the strokes of the sucker rods 14. The pump 15 is further provided with a check valve 18 on its lower end which prevents fluid from flowing back into the oil strata during the pumping operation. The outer pump barrel 19, in this instance, is held stationary while the piston reciprocates with the sucker rods 14. The bottom end of the pump barrel 19 is provided with an

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adapter 20 which replaces the prior art mechanical hold-down device 21, now shown wedged in the anchoring shoe 12.

The above described pump and hold down device 21 do not constitute part of the present invention, but are given to clarify the features of my sand flusher which is described as follows:

Numeral 22 designates a mandrel, the upper end of which is adapted for threaded engagement with the adapter 20 positioned on the lower end of the pump 17. The mandrel 22 is hollow and is provided with a substantially sharp taper 23 on its outer wall surface which converges to a restricted shank 24, the end of which is provided with an upset head 25. On the head 25 I have placed a series of fiber washers 26 or cups held in position by a lower nut 27.

Numeral 28 designates an outer barrel, its upper end being threadedly engaged by a hollow cap 29 which slidably receives the mandrel 22. The lower end threadedly reecives an adapter 30 which also threadedly engages the prior art mechanical hold-down 21.

The inner wall surface of the barrel 28 is provided with a taper 31 which converges to a diameter slightly smaller than the outside diameter of the washers 26 on the mandrel end. I have also provided a multiplicity of holes 32 in the wall of the barrel 28 at such a position that when the washers 26 are forced downwardly in the barrel they will become wedged against the taper 31 at a point where the wide, central washer 33 covers the holes 32 to prevent fluid from flowing back down into the well.

As can be seen in Fig. 1, my sand flushing device is adapted to be interposed between the lower end of a pump 15 and the hold-down device 21, whatever type might be used. When the pumping unit and its related mechanism are lowered into the well by the string of sucker rods 14, the hold-down device 21 anchors itself to the anchoring shoe 12 by means of notched fingers 33 which are forced under a suitable shoulder on the anchoring shoe 12. In a well where there is no sand accumulation this means of holding is sufficient for pumping and still allows the hold-down 21 to be dislodged and removed by an extra, upward pull on the string of sucker rods 14. In sand wells, however, the hold-down many times fails to dislodge due to the fact that a small amount of sand has accumulated around the hold-down; and, with the weight of the oil standing in the tubing resting upon it, the pressure is too great for a winch unit at the surface to lift without severing the tubing or rupturing some part of the pumping

mechanism. In such an unfortunate circumstance the entire string of tubing must be pulled up and disconnected a joint at a time in order to reach the pumping unit for necessary repairs. Since there is no way to release the oil that is standing in the tubing and allow it to flow back into the strata below, the tubing must be pulled "wet." When each joint is disconnected at the well surface, the oil it contains is necessarily spilled over the surrounding area creating eminent danger to both workmen and equipment. Not only is the danger present, but much expensive crude is wasted since there is no known means of saving it.

The accumulation of sand at the well bottom creates a still further hazard in that it eventually seeps upward into the pump mechanism where its abrasive action destroys the working life of the pump cups and scores the inner walls of the working barrel.

It is readily apparent, therefore, that a device made according to the teachings of the present invention is highly advantageous to completely overcome such situations as described above.

It has also been proven that where the sand has been properly flushed and the tubing drained, the mechanical hold-down is removed with comparative ease.

Prior art mechanical hold-downs such as illustrated in Fig. 1 usually require about 600 pounds pressure to anchor them in the anchoring shoe 12. When such pressure is exerted at the top of the well, the same pressure will wedge the anchoring cups 26 in my invention against the tapered wall 31 of the barrel 28. After wedging, the upper pump mechanism is free to operate to pump the oil to the surface in the conventional manner.

When it is desired to flush the accumulated sand S away from the lower working members of the well, the string of sucker rods 14 is raised above the normal pumping stroke to release the cups 26 of my invention from their wedged position in the barrel 28. It is apparent that the cups 26 will release before the fingers 33 of the hold-down 12 since the cups are only subject to the sliding friction between themselves and the smooth surface of the inner walls of the barrel 28. In actual tests made, a pressure differential of approximately 300 pounds was found to exist between the releasing of my cups 26 and the releasing of the hold-down fingers 33. Variations in this differential may also be made by expanding or releasing the fiber cups 26 by means of the lower nut 27.

When the well is being flushed, my invention will assume the position as shown in Fig. 2 of the drawing. The string of sucker rods is raised just enough to bring the larger end of the mandrel 22 out of the barrel 28 through the cap 29 to create an open area around the shank 24 and the inner wall surface of the barrel 28. The weight of the head of oil standing in the tubing 11 causes a turbulent action along the outside of the barrel 28 to pick up all of the sand S and flow it in the top of the barrel and through the holes 32 as shown by the directional arrows, to completely flush the well. When the tubing has been drained, and the well properly flushed of the sand, the mechanical hold-down is free from all obstructions and may be dislodged and removed from the tubing with comparative ease. When the necessary repairs have been made, the pump unit and flushing device are again lowered into the tubing and the operations are resumed.

As an additional safety feature of my invention I have provided the upper cap 29 with a pair of diametrically opposed lugs 34 formed on the bottom side thereof. These lugs are adapted for engagement with corresponding slots 35 formed in the head 25 of the mandrel 22. The engaging thread of the cap 29 and the barrel 28 is of a left hand helix. In the event, therefore, that such an amount of sand has accumulated at the well bottom that even flushing will not remove; or some foreign body has become wedged between the sealing cups 26 and the barrel 28 that the flow of fluid cannot be shut off, or for any other unforeseen reason the device cannot be made to pump or cannot be removed from the well; the upper cap 29 may be removed as a last resort. By lifting the mandrel 22 by the string of sucker rods 14 and engaging the lugs 34 with the slots 35, the string of sucker rods 14 may be turned in a right hand rotation to release the cap 29 in its left hand threaded engagement with the barrel 28. After the pumping unit is removed from the well, the string of sucker rods may be again lowered into the well where the lower end of the same may be threadedly engaged in the upper threaded end 36 of the hold-down 12. In this manner the maximum pull may be exerted against the hold-down 12 to remove it from the well without subjecting the pump mechanism to undue elongation or distortion which might injure the working parts thereof.

From the above description it can be seen that my invention in a sand flusher may be used with any prior art type pump mechanism and interposed between the same and any type of prior art mechanical or friction hold-down. While I have described my invention in detail as illustrated in the accompanying drawing, it is to be understood that this has been by way of example only, and that various component parts may be changed or altered without departing from the spirit and scope of the invention as defined by the following claims.

I claim:

1. A sand flusher for use in connection with a well pump having a mechanical hold-down means for anchoring the same to the bottom of a string of tubing, comprising a hollow body member adapted to be interposed between said well pump and the mechanical hold-down means for the same, means for attaching an end of said hollow body member to said mechanical hold-down means to form a common fluid passageway therewith, a hollow mandrel having one end adapted for threaded attachment to said pump and its other end slidably inserted in said hollow body, means for locking said mandrel to the inner side wall surface of said body to permit fluid flow through said mandrel and said pump, a plurality of inlet ports in the side wall surface of said body communicating with the fluid reservoir area inside said tubing, said ports adapted to be closed by said locking means when the same is in a locked position, means for opening said ports by raising said mandrel from its locked position to permit oil standing in said tubing to flush accumulated sand around said body through said ports and back into the well.

2. In a sand flusher, the combination, with a well pump having a mechanical hold-down means, of a hollow body member adapted to be interposed between said well pump and the hold-down means for the same, the lower end of said body adapted for threaded attachment to said hold-down, a hollow mandrel having its upper

end adapted for attachment to the lower end of said pump and its other end slidably inserted in said hollow body, a series of friction cups removably mounted on the lower end of said mandrel, said hollow body having a portion of its inner wall surface converging inwardly in cone-shaped fashion, means for locking said mandrel in a lowered position to anchor said pump by applying pressure in a vertical direction to wedge said friction cups against the cone-shaped portion of hte inner wall surface of said body, a multiplicity of oil inlet ports in said body communicating with the oil reservoir area inside the tubing in which said pump is placed, said ports adapted to be closed by said friction cups when said mandrel is in the locked position in said body, said mandrel adapted to be unlocked to open said inlet ports by an upward pull on said pump to permit oil standing in the tubing to be drained back into the well.

3. In a sand flusher, the combination, with a well pump having a hold-down means for anchoring the same to the bottom of a string of tubing, of a hollow body member adapted to be interposed between said pump and the hold-down means for the same, the lower end of said body member adapted for threaded attachment to said hold-down means, a mandrel positioned in said body member and having its upper end adapted for attachment to the lower end of said pump, a cap removably mounted on the upper end of said body member and adapted to slidably receive said mandrel, a multiplicity of cups mounted on the lower end of said mandrel, the inner wall surface of said body member being cone-shaped for a portion of its length, means for wedging

said cups against said cone-shaped wall surface to lock said mandrel in a lowered position, oil inlet ports positioned in the side wall of said body member adapted to be closed by said cups when the same are wedged against the wall surface of said body, means for raising said mandrel from its locked position to open said oil inlet ports, said mandrel being provided with a restricted shank portion adapted to permit oil to flow by the same and through said cap when said mandrel is in the unlocked position and means on said mandrel for removing said cap from said body member.

4. The device as claimed in claim 3 wherein means for removing said cap from said body member consists in a threaded engagement of said cap and said body member oppositely formed with respect to the threaded members of said pump, lugs positioned on the lower side of said cap and corresponding slots formed on the lower end of said mandrel, said slots adapted to be engaged by said lugs and removed from said body member by rotative movement imparted to said pump.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
976,071	Hahn	Nov. 15, 1910
1,958,016	Penrod	May 8, 1934
1,983,489	Penrod	Dec. 4, 1934