Dec. 4, 1934. J. PENROD 1,983,489

WELL PUMP

Filed Dec. 20, 1929 2 Sheets-Sheet 1

Fig. 1.

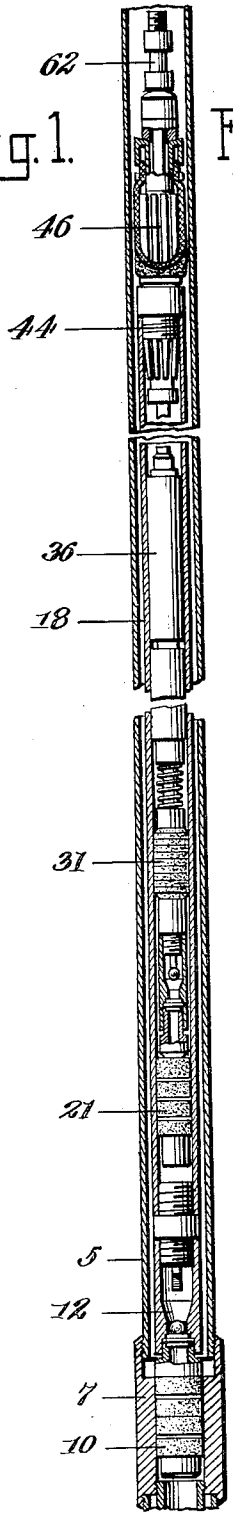


Fig. 2.

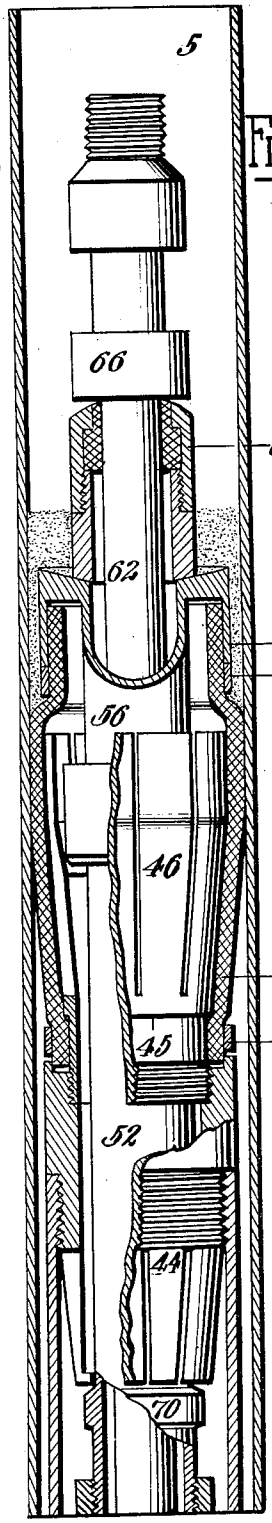
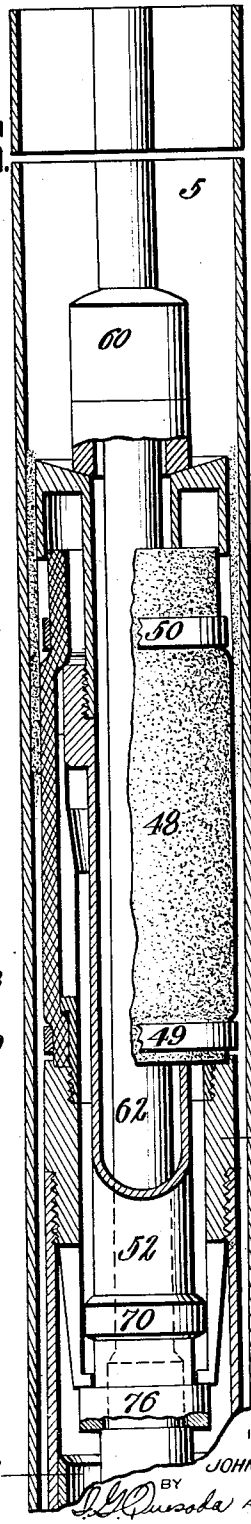


Fig. 3.



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Fig.4.

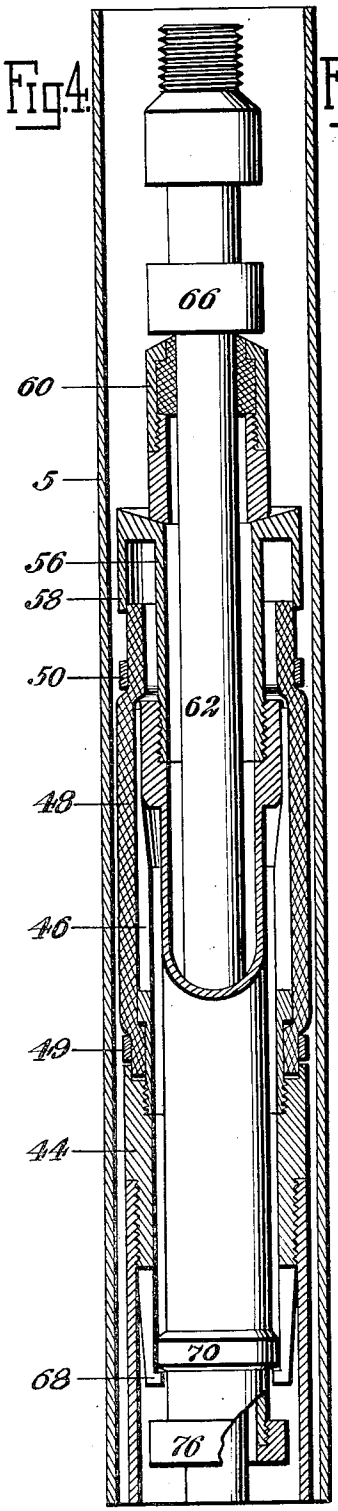


Fig.5

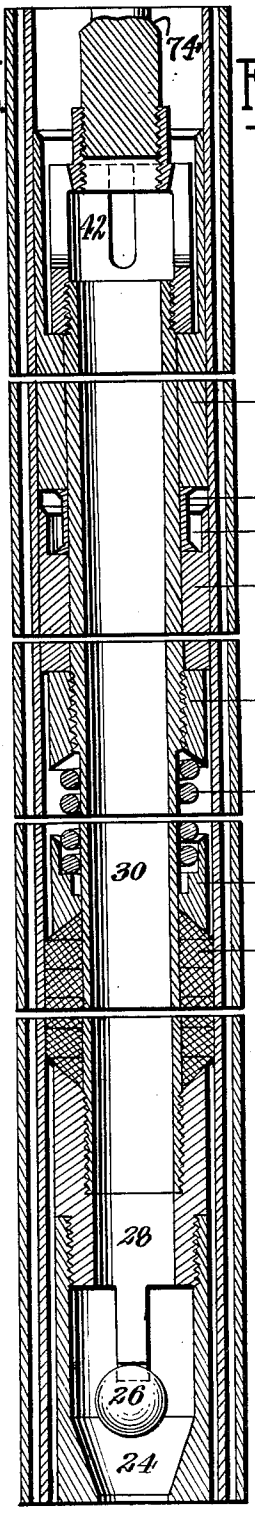
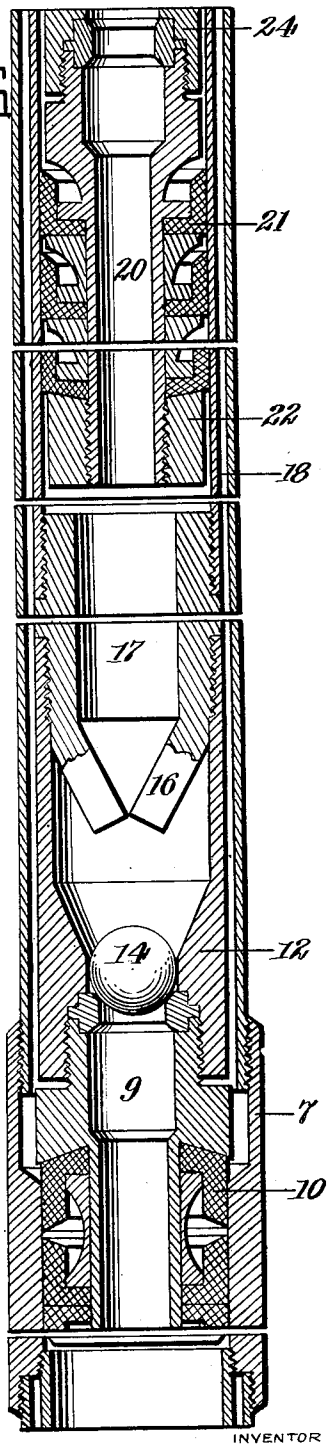


Fig.6



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UNITED STATES PATENT OFFICE

1,983,489

WELL PUMP

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Application December 20, 1929, Serial No. 415,550

14 Claims. (Cl. 103—181)

This invention relates to fluid lifts especially adapted for use in the recovery of oil and the like from wells.

One of the features of the invention resides in the provision of a special sealing or packing means designed to bridge the space between the tubing or other fluid conduit and the upper portion of the working barrel, to the end that the settlement of sand into binding engagement with the working barrel and the foot valve thereof is inhibited, it being noted in this connection that the collection and impaction of sand about these parts of the conventional pump has the effect of freezing the pump in place and thereby preventing the later unseating of the pump.

More specifically, the invention will be found to provide simple means by which the sealing element of the packer is expanded radially into pressure engagement with the wall of the tubing or the like after the pump has been seated, without the necessity of compressing the sealing element longitudinally.

Another feature of the invention resides in the means by which, during the unseating of the packer, prior, of course, to the unseating of the pump, the radial expansive force on the sealing element is relieved and a longitudinal stretching force applied to the sealing element from the upper portion thereof to bring about sufficient reduction in the diameter of the sealing element to allow the sealing element to be passed freely through the accumulated annular body of sand, if any, above the same, and to allow of the unobstructed movement of the pump through the tubing.

Another aim of the invention is to provide a packer in which the sealing element thereof or such other parts as may become worn from time to time may be renewed at the well without the exercise of unusual skill or the aid of special tools.

The invention forming the subject of this application will also be found to embody a novel form of valve assembly in which the free flow of fluid about all sides of the spherical valve element is allowed and in which excessive wear on the ball stop is avoided.

The invention contemplates a novel arrangement by which, after the pump has been unseated, the cups or other sealing devices of the foot valve are protected from damage by the descending sand or tubing fluid above.

Other objects and advantages will become apparent as the description of the invention proceeds.

In the accompanying drawings forming a part of this application and in which like numerals are employed to designate like parts throughout the same,

Figure 1 is a fragmentary vertical sectional view through the improved fluid lift, the various parts of the packer being shown in the positions occupied immediately before the radial expansion of the sealing element thereof,

Figure 2 is a vertical detail sectional view through the packer, the view illustrating the sealing element expanded radially into pressure engagement with the wall of the tubing,

Figure 3 is a detail sectional view through the packer, the sealing element of the same being stretched longitudinally from the upper portion thereof preparatory, of course, to the unseating of the pump,

Figure 4 is a vertical detail sectional view through the upper portion of a pump equipped with the improved packer,

Figure 5 is a vertical sectional view through the intermediate portion of the pump,

Figure 6 is a vertical sectional view through the lower portion of the pump.

In the drawings wherein for the purpose of illustration is shown a preferred embodiment of the invention, the numeral 5 designates a tubing which, of course, is positioned within the usual casing not shown. Figures 1 and 6 illustrate that a foot valve shoe 7 has connection with the tubing and is provided at the lower portion thereof with suitable means by which fluid inlet means of any nature may be connected thereto.

The foot valve body 9 is provided with pairs of opposed cups 10 adapted for reception in the foot valve shoe for pressure engagement with the side wall thereof to establish a fluid tight seal between the foot valve and the shoe. It will be seen with reference to Figures 1 and 6 that each of the several pairs of cups 10 embodies a lower upwardly presented cup and an upper inverted or downwardly presented cup, the upper downwardly presented cup of each pair having the lower edge thereof spaced only a slight distance above the upper edge of the lower cup of that pair so that when the pump is unseated and the fluid previously admitted to the tubing is rushing back into the well, the upwardly presented cups will be protected by the inverted cups immediately above.

In other words, the very slight distance between the opposed edges of the upper and lower cups of each pair of cups prevents the admission of the descending fluid in destructive volume

into the space between the cups with the result that the upwardly presented cups are prevented from being turned outward and thereby rendered unfit for further efficient use. The cups of each pair may be spaced by more or less conventional followers which are, of course, mounted on the valve body 9 as illustrated in Figure 6.

It is also illustrated in Figure 6 that a closed valve cage 12 is threaded on to the reduced upper portion of the valve body 9 and is provided with a spherical valve element 14 adapted to be elevated by the ascending fluid into engagement with the converging stop arms 16 of a stop connector in the nature of a bushing, the lower end of which is threaded into the closed cage 12, while the upper end is threaded into the lower portion of the working barrel 18.

In further adverting to the formation of the stops 16, it is pointed out that the same are formed integral with the member 17 and that the lower ends thereof are disposed in intersecting planes cooperating in the formation of a sort of centrally located V-shaped recess adapted to receive the upper portion of the spherical valve element 14. When the spherical valve element 14 is received within the V-shaped recess defined by the angularly disposed lower ends of the arms 16, the ball is held thereby in a central position in the cage to allow of the free ascent of fluid about all sides of the ball valve element and at the same time to prevent the ball valve from beating out the side walls of the cage. It is thus seen, that the arms 16 perform the dual purpose of allowing of the relatively free ascent of fluid through the cage and at the same time protecting the side walls of the cage from destructive contact by the ball valve. The vertical passage of fluid about all sides of the spherical valve element in substantially uniform volume has the effect of holding the ball valve centrally with the upper surface thereof in engagement with the angularly disposed lower ends of the arms 16. In this manner, the fluid conducting capacity of the closed cage 12 is increased and the life of the cage 12 and the stops is prolonged greatly.

The plunger which reciprocates within the working barrel 18 has at the lower portion thereof a traveling valve body 20 of tubular formation and upon which a suitable number of cups 21 or other suitable sealing devices are mounted for fluid tight contact with the wall of the working barrel. The cups 21 and the customary followers thereof are held firmly on the body 20 by a combined fastening and bumping nut 22. The nut 22 is shown in Figure 6 to be positioned immediately above the connector 17 so that by lowering the plunger, the nut 22 is caused to have striking engagement with the connector or bushing 17 to prevent further expansion of the packer to be described.

The upper portion of the packing body 20 is externally threaded for connection with the closed traveling valve cage 24 within which a spherical valve element 26 operates. The upward movement of the spherical valve element 26 is limited by a pair of converging stop arms corresponding in construction to the arms 16 and depending from a connector or bushing 28.

As shown in Figure 5, the member 28 is internally threaded for connection with a tubular piston or plunger body 30 upon the lower portion of which a packing device 31, preferably embodying a number of packing rings, is mounted. The packing device 31 is confined between the upper end of the connector 28 and the underside of a thimble 32. The thimble 32 is urged downward into pressure engagement with the packing 31 by an expansion spring 33, the upper end of which abuts a nut 34 threaded on the intermediate portion of the piston body 30. It might be noted that the upper surface of the thimble 32 is recessed not only for the purpose of receiving the lower convolutions of the spring 33, but to collect such sand as may work by the parts above.

The piston body 30 carries upper and lower piston sleeves or liners 36 and 37 respectively, spaced by a spacing sleeve 39 mounted on the piston body between the opposed ends of these parts. Figure 5 illustrates that the upper terminal of the piston sleeve 37 is spaced below the opposed end of the upper piston sleeve 36 and cooperates therewith in the formation of an annular oil receiving groove to the end that a fluid seal is established between the intermediate portion of the plunger and the wall of the working barrel.

Particular attention is directed to the fact that the annular groove thus defined between the opposed ends of the piston sleeves 36 and 37 provides an entrance to an annular sand receiving pocket 40, in the upper portion of the lower piston sleeve. Such sand as may work its way down between the working barrel and the upper piston sleeve 36 is caused to enter the annular sand trap 40 by way of the annular groove immediately above this trap with the result that the sand is held against further descent and destructive wear on the pump parts located below.

The upper ends of the sleeves or liners 36 and 37 are bevelled to sharp edges for scraping engagement with the wall of the working barrel to combat the descent of sand between the plunger and the barrel.

The major portion of the sand settling from the tubing fluid is directed by the bevelled upper end of the sleeve 36 into the piston or plunger body 30 by way of the open upper end thereof. Of course, such sand as is received within the piston body 30 is pumped out when the operation of the pump is resumed.

The small amount of sand that may find its way between the liner 36 of the working barrel is directed by the bevelled upper end of the liner 37 into the annular sand trap 40 where it is held against destructive wear on the pump parts located below.

Figure 5 illustrates that the upper portion of the piston body 30 is externally threaded for connection with an outlet cage 42, the outlet cage being formed with a plurality of longitudinally extending radially disposed outlet ports discharging into the recessed or cupped upper end of the liner 36.

It is important to observe that the working barrel and the plunger therein are introduced into the tubing and are withdrawn therefrom as a unit so that the working barrel itself is caused to protect the relatively thin and bevelled scraping upper edges of the piston sleeves 36 and 37 from damage by contact with the joints of the tubing or by such obstructions as may be present in the wall of the tubing.

Coming now to the packer embodied in the invention, attention is invited to Figures 2, 3 and 4 in which it is shown that a tubular latching or clutching member 44 is threaded into the upper portion of the barrel and serves as a sup-

port for a mandrel sleeve 46, the said mandrel sleeve being provided with a plurality of spaced more or less parallel incisions opening out through the upper end thereof to define an annular series of leaf springs adapted to be brought into pressure engagement with the surrounding sealing element 48. The sealing element 48 is of tubular formation and may be of any one of a number of materials found adaptable for the purpose. For example, rubber or leather may be employed or if desired a composition of rubber and a fabric may be used.

In carrying out the invention, the upper portion of the latching member 44 may be provided with an annular flange or lip spaced outwardly from the lower portion of the mandrel sleeve 46 and cooperating therewith in the formation of an annular groove receiving the lower portion of the tubular sealing element 48. The lower portion of the mandrel sleeve 46 is reduced externally in diameter to define an annular shoulder 45 into which the lower portion of the sealing element 48 is pressed by a retaining ring 49. Otherwise expressed, the retaining ring 49 which is slipped easily on to the lower portion of the sealing element 48, constricts the diameter of the lower portion of the sealing element 48 and thereby forces the sealing element into pressure engagement with the shoulder 45 with the result that the lower portion of the sealing element is anchored to the adjacent portion of the mandrel sleeve.

The upper portion of the tubular sealing element 48 is shown to be surrounded by a retaining ring 50 which has the effect of constricting the upper portion of the sealing element and thereby forming an annular stop shoulder performing a major part in the longitudinal stretching operation as will be described.

As illustrated in Figures 2 and 3, the wall of the bore of the mandrel sleeve 46 is flared outward at a point between the ends of the mandrel sleeve to define an intermediate internal cam-like surface for engagement by the diametrically enlarged upper portion or head of a tubular mandrel 52. Also, by forming the mandrel sleeve 46 with the internal annular cam-like surface, the annular series of leaf springs constituting a major portion of the mandrel sleeve have the upper portions thereof reduced in thickness and consequently rendered more yieldable.

In preparing the various parts for installation into the well, the head or enlarged upper portion of the mandrel 52 is positioned within the internally enlarged upper portion of the mandrel sleeve 46 with the result that, until further adjustment is made, the mandrel sleeve 46 will remain in the normal unexpanded position disclosed in Figure 4 and the sealing element will occupy a position spaced inward from the wall of the tubing 5.

The mandrel 52 carries a combined cap and contact member 56 having a skirt 58 adapted to receive the upper portion of the sealing element 48 to exclude settling sand from the space within the sealing element. When the device is set as disclosed in Figure 2, the depending skirt 58 has a generous overlap with the upper portion of the sealing element so that the incursion of sand into the space within the sealing element is inhibited.

No effort has been made to provide a fluid tight seal between the depending skirt 58 and the upper portion of the sealing element 48 for the reason that the fluid pressure prevailing within the sealing element 48 will be the same or approximately the same as that prevailing within the tubing with the result that there will be no circulation of fluid through the sealing element.

In Figure 4 it is shown that the latching springs of the member 44 are prevented from being fouled by settling sand first, by the fact that the same are received within and are protected by the upper portion of the working barrel and second, by the fact that the latching springs extend inward at an angle from the working barrel. Also, the spaces between the latching springs are open at the lower ends thereof to allow of the free descent of such sand as may enter the barrel by way of the packer.

A sand arrester 60 is movably located on the valve rod 62 and when resting on the member 56 will prevent the descent of sand through the space between the valve rod and the mandrel 52. The member 60 not only serves as a means for arresting the descent of sand but as a motion transmitting means during the seating of the pump and the subsequent expansion of the sealing element of the packer into pressure engagement with the wall of the tubing 5. In explaining this latter purpose of the member 60, it is pointed out that the valve rod 62 is formed with an annular enlargement 66 or other contact means adapted to engage the member 60 at the upper end thereof and thereby force the same downward into driving engagement with the cap 56 of the mandrel 52. As will be described, the downward force thus imparted to the mandrel is transmitted through the working barrel 18 to seat the foot valve of the pump.

In Figures 2, 3 and 4 is it illustrated that the latching member 44 depends into the upper portion of the working barrel and has the barrel encircled portion formed with an annular series of longitudinal incisions opening out through the lower end thereto form an annular series of longitudinal leaf springs, the lower portions of which are extended inwardly to define latching dogs 68.

The mandrel is shown to be provided at a point spaced at a slight distance from the lower end thereof with an annular shoulder 70, the lower surface of which is slightly bevelled to rest on the annular series of latching dogs 68 before the seating of the foot valve.

In preparing for the installation of the pump, the various parts thereof are positioned as disclosed in Figures 1, 4, 5 and 6 in which the annular enlargement or shoulder 70 of the mandrel is held in a relatively elevated or retracted position by the inwardly extending spring dogs 68. Of course, with the parts in this position the sealing element 48 is in its unexpanded position so that during the lowering of the pump into the well, the sealing element will freely pass the joints of the tubing and such obstructions as may be present on the wall of the tubing.

Now, continued descent of the pump during the installation thereof, will result in the entrance of the foot valve into the shoe 7 and during such entrance of the foot valve into the shoe, the seating force is transmitted through the valve rod 62, the enlargement 66 thereof, the sand arrester 60, the cap 56, the mandrel 52, the spring dogs 68, the working barrel 18, and the foot valve, all in the order mentioned.

It will be seen that when the foot valve is seated and is thereby prevented from further descent, the continuing downward force trans-

mitted through the valve rod 62 will result in overcoming the strength of the spring pressed dogs 68 with the result that the annular shoulder 70 will descend to the position shown in Figure 2. Before going on with the description of the manner in which the packer is expanded, it might be noted that the resistance to the seating of the foot valve in the shoe 7 is substantially less than the combined strength of the spring dogs 68: Thus during the seating of the foot valve the shoulder 70 will remain in engagement with the upper sides of the dogs 68 in the manner disclosed in Figure 4.

However, when the foot valve is fully seated as disclosed, the spring dogs 68 are sprung outwardly to allow of the descent of the mandrel 52 under the influence of the weight above and the enlarged head of the same will engage the intermediate cam-like surface of the wall of the bore of the mandrel sleeve 46 and thereby expand the sealing element radially into pressure contact with the wall of the tubing.

As the enlarged head of the mandrel 52 reaches or approaches the limit of its effective down stroke with respect to the mandrel sleeve 46, the annular shoulder 70 of the mandrel will occupy a position immediately beneath the inwardly projecting latching dogs 68 with the result that the mandrel is held in this position by such dogs until released preparatory to the unseating of the pump.

It might be noted that before the mandrel 52 can descend to a point sufficient to damage the surrounding parts, the bumper nut 22 carried by the lower portion of the plunger will engage the upper end of the member 17 to limit further descent of the plunger.

With the pump thus seated, and the sealing element of the packer expanded radially into pressure engagement with the wall of the tubing, the descent of sand to the region of the foot valve of the pump is prevented so that the later unseating of the pump is simplified and rendered much less uncertain than has heretofore been the case. Particular attention might be directed to the fact that the pressure tight contact of the sealing element 48 of the packer with the tubing is effected without endwise pressure on the packer or perceptible change in the positions of the ends of the sealing element.

When it is desired to unseat the pump, for any one of a number of reasons, the first step is to withdraw the packer from pressure engagement with the wall of the tubing and to accomplish this, the upstroke of the pump is exceeded a sufficient extent to bring the shouldered lower portion 74 of the valve rod 62 into bumping engagement with the bumper nut 76 threaded on the lower portion of the mandrel 52. This has the effect of raising the mandrel 52 to the position disclosed in Figure 3. It might now be pointed out that the bevel or angle of the upper surface of the shoulder 70 is greater than that of the lower surface of the shoulder so that less resistance is offered to the upward movement of the mandrel than was offered to the downward movement thereof.

When the mandrel is thus moved upward preparatory to the unseating of the pump, the outward pressure on the mandrel sleeve 46 is relieved and the sealing element 48 allowed to contract. However, it may be that as a result of prolonged radial expansion of the sealing element, the elasticity thereof is impaired to a point where the sealing element will not of its own accord resume its original smaller diameter.

To provide for such a contingency, the enlarged upper portion of the mandrel, upon nearing the completion of its upstroke, is caused to engage the internally shouldered or constricted upper portion of the sealing element and thereby stretch the sealing element from the upper end thereof. This stretching force applied to the sealing element from the upper portion thereof will first, detach the sealing element from engagement with the wall of the tubing and second, will elongate the sealing element sufficiently to cause the same to resume its original diametrical formation.

It is important to observe that the longitudinal stretching of the tubular sealing element, as referred to in the immediately preceding paragraph, is limited by reason of the fact that continued upward movement of the valve rod 62 will cause the bumper nut 76 on the lower end of the mandrel to engage the lower end of the latch member 44. This, of course, exerts an upward pull on the working barrel to withdraw the foot valve from the shoe 7.

Adverting again to the advantage of stretching the sealing element 48 and thus reducing the diameter of the same, preparatory to unseating the pump, it is pointed out that the packing is allowed to travel up through the wall of accumulated sand immediately above. In explaining this point, attention might be directed to Figures 2 and 3 in which it is illustrated that during the use of the pump a wall of sand accumulates and tightly packs between the cap 56 and the tubing and interferes with the removal of the pump unless, of course, the sealing element has a diameter less than that of the opening through the sand, the said opening being formed by the hood 58 of the cap 56.

When the pump is withdrawn to the surface for repair or any other reason, it is a simple matter to detach the cap 56 and latch 50 and then to unscrew the mandrel sleeve 46 from the latching member 44 so that the retaining ring 49 may be removed from the lower end of the sealing element. This allows of the quick disconnection of the sealing element 48 and of the substitution of a new one. This may be done at the well without the exercise of special skill or the aid of special tools.

Having thus described the invention, what is claimed is:

1. In a structure of the character described, a working barrel, a latching member attached to the working barrel and having leaf springs depending into the working barrel for protection thereby and being formed with dogs, a packer having a sealing element and a mandrel for expanding the sealing element, said mandrel being formed with a shoulder defining upper and lower contact surfaces adapted for engagement by said dogs.

2. In a structure of the character described, a barrel, a latching member attached to the barrel and having a plurality of leaf springs depending into the barrel and formed with dogs, a sealing element, a mandrel for expanding the sealing element and having a shoulder defining upper and lower contact surfaces adapted for engagement by said dogs, a plunger in said barrel, there being means associated with said plunger to engage said mandrel and move the same endwise and to subsequently move the barrel endwise.

3. In a structure of the character described,

a working barrel, a latching member carried by the working barrel and having a plurality of spring members depending into the barrel and formed with dogs, a mandrel extending through the latching member and having means for motion transmitting engagement with the upper surfaces of said dogs to move the barrel downward, and a lowering mechanism engaged with said mandrel.

4. In a structure of the character described, a barrel, a latching member having spring members depending into the barrel and formed with dogs, a mandrel extending through the latching member and having means for motion transmitting engagement with the upper surfaces of said dogs to move the barrel downward, a lowering mechanism engaged with said mandrel, and means associated with said lowering mechanism to move the mandrel upward.

5. In a structure of the character specified, a barrel, a latching mechanism carried by the barrel and having separate spring arms depending into the barrel and formed with dogs, a mandrel having an annular enlargement defining upper and lower contact surfaces for engagement with said dogs, a sealing element associated with said mandrel, a foot valve carried by said barrel, and a lowering mechanism to move said mandrel, the latching mechanism and the barrel downward to seat said foot valve, the strength of said spring arms being superior to the resistance to the seating of the foot valve whereby the foot valve is seated prior to the yielding of the spring arms and the consequent operation of said mandrel to expand said sealing element.

6. In a structure of the character specified, a barrel, a latching mechanism carried by the barrel and having separate spring arms formed with dogs, a mandrel having an annular enlargement defining upper and lower contact surfaces for engagement with said dogs, a sealing element associated with said mandrel, a foot valve carried by said barrel, a lowering mechanism to move said mandrel, the latching mechanism and the barrel downward to seat said foot valve, the strength of said spring arms being superior to the resistance to the seating of the foot valve whereby the foot valve is seated prior to the yielding of the spring arms and the consequent operation of said mandrel to actuate said sealing element, said mandrel being provided with means to stretch said sealing element from the upper portion thereof.

7. In a structure of the character specified, a sealing element of tubular formation, a radially expansible mandrel sleeve within the tubular sealing element and increased in internal diameter toward the upper end thereof thereby defining an intermediate cam, a mandrel having a spreader initially positioned in the internally enlarged portion of said mandrel sleeve and adapted for movement into engagement with the cam surface of the sleeve to expand the sleeve and the sealing element radially, the upper portion of said sealing element being provided with means in the path of travel of and adapted to be engaged by said spreader when moved upward to stretch the sealing element from the upper end thereof.

8. In a structure of the character specified, a sealing element, a radially expansible mandrel sleeve within the sealing element and increased in internal diameter toward the upper end thereof thereby defining an intermediate cam, a mandrel having a spreader initially positioned in the internally enlarged portion of said mandrel sleeve and adapted for movement into engagement with said cam surface to expand the sleeve and the sealing element radially, the upper portion of said sealing element being provided with means in the path of travel of and adapted to be engaged by said spreader when moved upward to stretch the sealing element from the upper end thereof, a latching mechanism having means restricting endwise movement of the mandrel in both directions, there being means limiting upward movement of the mandrel and consequent stretching of the sealing element.

9. In a structure of the character specified, a sealing element of tubular formation, a retaining ring detachably embracing the upper portion of said sealing element thereby constricting the same and defining an internal shoulder, a mandrel movable within said sealing element to expand the same and having means to detachably engage said internal shoulder of the sealing element to stretch the sealing element from the upper end thereof, and a latching member to engage the mandrel to releasably secure the mandrel in advanced or retracted position.

10. In a structure of the character specified, a body, a mandrel sleeve on the body and formed with spring arms having the inner surfaces thereof formed with cams, a sealing element surrounding the mandrel sleeve, a mandrel having a spreader to engage said cams and thereby expand the sealing element radially, a retaining ring positioned detachably on the upper portion of said sealing element to constrict the same, the spreader of said mandrel being adapted to engage the constricted upper portion of said sealing element to stretch the sealing element from the upper portion thereof, a barrel below said sealing element and having a foot valve, and means acting through the mandrel to seat said foot valve.

11. In a pump, a working barrel having a foot valve, a latching mechanism carried by the barrel, a sealing element carried by said latching mechanism, a mandrel sleeve carried by the latching mechanism, a mandrel within said sleeve and having a spreader to expand the same and the sealing element radially, said mandrel being provided with means engaged by said latching mechanism and yieldingly held in a retracted position thereby, and a lowering device acting through said mandrel, the latching mechanism and said barrel to seat said foot valve.

12. In a pump for use in wells, a barrel, a plunger in said barrel and provided with a sharpened edge, a latching mechanism depending into the barrel, a mandrel extending through said latching mechanism and restrained thereby, a sealing element in operative relation to the mandrel, and means associated with the plunger to engage the mandrel and to space said scraping edge from said latching mechanism.

13. In a pump for use in recovering fluid from wells, a tubing, a working barrel movable through the tubing, a latching member attached rigidly to the working barrel and having spring dogs depending into the working barrel and protected thereby, and a mandrel having a shoulder provided with inclined contact surfaces for engagement by said dogs, one of said contact surfaces having a greater degree of incline than the other contact shoulder to offer less resistance to movement of the mandrel than does the other con-

tact surface, and a sealing element associated with said mandrel.

14. In a pump for use in recovering fluid from wells, a tubing, a working barrel removable through the tubing, a latching member attached rigidly to the working barrel and having spring dogs depending into the barrel and protected thereby, a mandrel having a shoulder for engagement by said spring dogs, a sealing element associated with said mandrel, and a valve rod movable through said mandrel and having means to retract the mandrel.

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