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CASING PUMP

Filed May 2, 1960 2 Sheets-Sheet 1

FIG. 1.

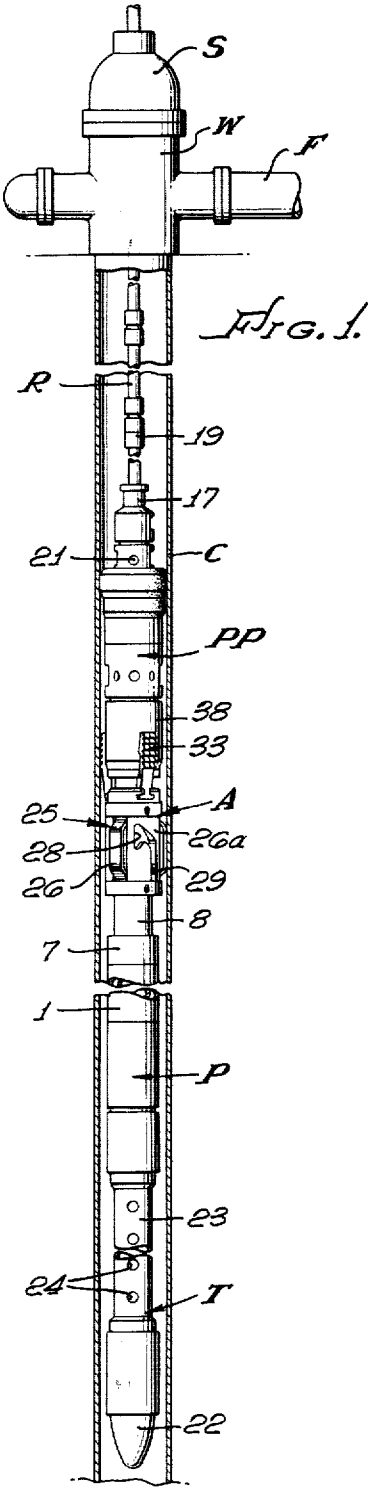
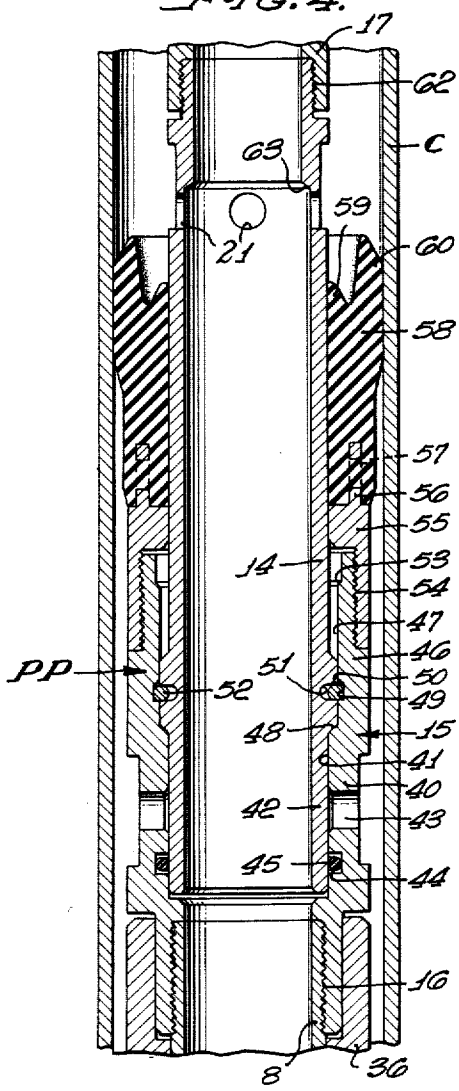


FIG. 4.



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CASING PUMP

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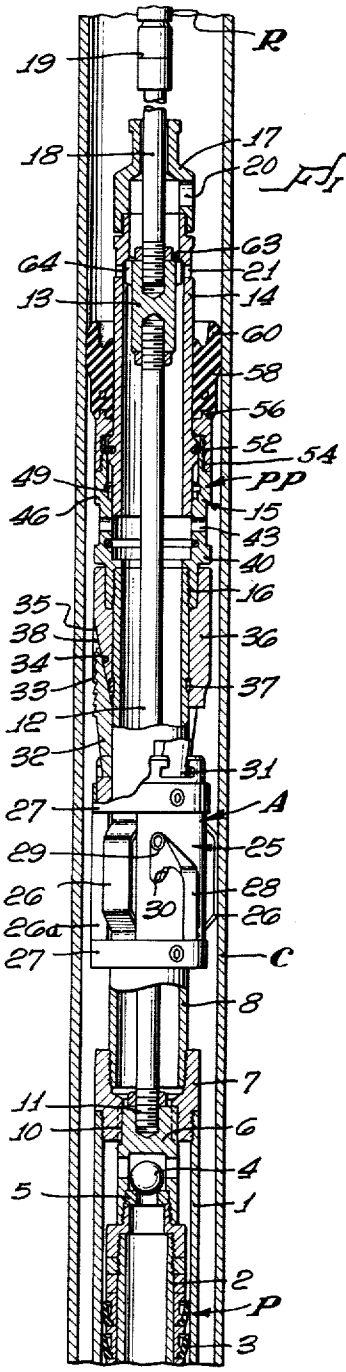


FIG. 2.

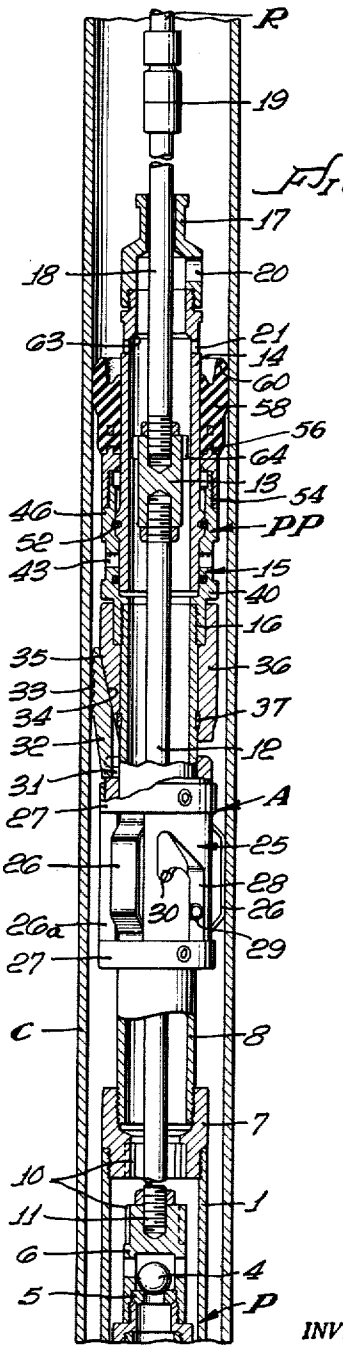


FIG. 3.

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CASING PUMP

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19 Claims. (Cl. 103—181)

The present invention relates to well pumps and more particularly to a casing type well pump adapted to be readily and efficiently set in a well casing so as to enable pumping of the well without requiring that the production fluid be conducted to the surface through production tubing, but which, instead, enables the well production fluid to be pumped to the surface through the casing lining the well bore.

The present invention satisfies the need for a high volume large bore pump adapted to be set in well casing for producing a maximum volume of well fluids through the well casing. Such a pump has typical applications in the pumping of wells being produced under the influence of a strong water drive or in other applications where it is desired to pump the well without the use of a string of production tubing leading from the pump to the surface whereby operators may readily complete wells and produce them without the expense entailed in production through tubing.

Among the primary objects of the invention is to provide a pump of the casing type which is adapted to be run into a well on the pump operating sucker rod or tubing string which is employed to effect reciprocation of the pump plunger, the pump also being retrievable on the rod or pump operating tubing string with attendant economies resulting from the absence of well production tubing and from the related economy enabled by the use of lighter rig equipment which may be employed for recovering the entire pump unit from the well casing.

Another object is to provide a novel valved packer assembly which is especially well suited but not limited to use in conjunction with the casing pump hereof, which valved packer is operated by the pump operating sucker rod or tubing string. In the practical application of the invention the pump may desirably include a so-called hook wall packer adapted to anchor the pump assembly to the well casing or alternatively, the pump may be anchored in the desired location in the well by means of a heavy depending tail pipe which may rest on the bottom of the well or on an appropriate plug or seat disposed in the well casing. In addition, the valved packer is disposed at the upper end of the assembly, and well fluids being produced through the pump pass from the assembly into the well casing at a point located adjacent the top of the assembly and just above the packing element which separates fluid in the casing being pumped to the surface from the fluid in the reservoir beneath the packing element, whereby the flow of fluid through the valved packer effectively washes the packing element to prevent the accumulation of solid materials such as sand and the like which may settle on the packing element. In those instances where such packing element is located substantially downwardly from the upper end of the assembly, such solid particles in many cases have been known to irretrievably lodge the pump unit within the well, requiring costly and time consuming recovery operations during which the well must be off of production.

Another object of the invention is to provide a valved packer for pumps and the like which includes a hydraulically balanced shiftable valve sleeve disposed within the body of the packer and movable from a position closing ports leading through the body of the tool to a position axially spaced from the ports so as to enable the balancing of pressure across the packing element, thus facilitating removal of the packer from the well casing. Moreover, in view of the fact that the valve sleeve is hydraulically balanced, it is not necessary to offset the effect of hydrostatic pressure in the well casing which might otherwise tend to hold the valve closed or tend to open the valve when it is closed as in the case of more conventional and simple by-pass packer valve constructions and tubing unloader valves.

Other objects and advantages of the invention will be hereinafter described or will become apparent to those skilled in the art, and the novel features of the invention will be defined in the appended claims.

Referring to the drawings:

FIG. 1 is a view illustrating a casing pump and valved hook wall packer made in accordance with the present invention and operatively disposed in a cased well;

FIG. 2 is an enlarged fragmentary view partly in vertical section and partly in elevation illustrating the valved casing pump packer in condition to be set in the well casing;

FIG. 3 is a view corresponding to FIG. 2 but showing the assembly anchored in the well casing and in condition for enabling pumping of the well as in FIG. 1; and

FIG. 4 is an enlarged fragmentary view in vertical section through the pump packer showing the by-pass or unloader valve in a closed position.

Like reference characters in the several views of the drawings and in the following description designate corresponding parts.

Referring first to FIG. 1, there is shown a well casing C having disposed therein a pump P provided with a tail pipe T, the pump P being supported on a hook wall anchor mechanism A at the lower end of a pump packer generally designated PP. The entire assembly is shown after having been run into the well casing C on a string of pump operating members R which may be conventional sucker rods or small tubing, as may be desired. The rods or tubing R extend upwardly from the well through a well head W having a conventional stuffing box S and a flow line F through which production fluid passes from the well.

Referring more particularly to FIG. 2, it will be noted that the pump assembly P typically includes a cylindrical pump barrel **1** having therein a reciprocable hollow plunger **2** provided with packing rings **3** sealingly engaged with the inner wall of the barrel **1** and provided at its upper end with a traveling ball valve **4** engageable with a seat **5** secured in place by a ported cage **6** which insofar as the traveling valve is concerned is conventional, but which is provided with means for effecting a driving connection with the adjacent coupling **7** which connects the upper end of the pump barrel **1** to an elongated tubular body **8**. This driving connection is preferably provided by means of a splined clutch as generally designated at **10** including circumferentially spaced ribs and complemental grooves at the upper end of the cage **6** and in the coupling **7**.

Suitably connected as at **11** to the cage **6** and extending upwardly through the tubular body **8** is a pump rod **12** which is connected at its upper end to a coupling **13**. The coupling **13** is of such size as to be freely movable through the tubular body **8** as well as through a valve assembly including a tubular valve sleeve **14** which is axially shiftably supported in a tubular valve housing **15**. This valve housing **15** is suitably connected as by threads **16** to the upper extremity of the tubular body **8** so that the pump barrel **1**, body **8** and valve housing **15** are effectively an integrated elongated tubular body having a flow passage extending therethrough. At its upper end the valve sleeve **14** is provided with a guide **17** through which a pump rod section **18** extends for connection to the upper end of the coupling **13**. The pump rod **18** is connected as by a

coupling 19 to the rod string or tubing string R. Upon operation of the pump P, well fluids produced thereby will be discharged through radial ports 20 and 21 in the guide 17 and the valve sleeve 14 respectively.

In order to enable operation of the pump P, however, it is necessary, first, that the assembly be held stationary in the well casing C as the rod string is reciprocated and, second, that the space between the well casing C and the tool be packed off so as to separate fluid in the well reservoir beneath the pump P from the fluid produced by the pump upwardly through the tool.

Appropriate means are provided for effectively anchoring the pump in operative position and such means may typically comprise the tail pipe T which may be sufficiently weighted as to hold the assembly against upward movement through the well casing during operation of the pump and which may, if desired, be landed at the bottom of the well or on an appropriate plug or seat in the conventional manner. The tail pipe T has a nose 22 thereon for landing on the bottom of the well or on the plug or seat as afore-mentioned and an elongated hollow body 23 of any desired length provided with a suitable number of ports 24 through which well fluids may pass during operation of the pump P.

Alternatively, the assembly may be anchored in the well by the anchor mechanism A which, referring to FIGS. 2 and 3, comprises a friction drag device 25 having bow springs 26 frictionally engaged with the well casing C and supported in a body 26*a* having spring retaining collars 27, 27 at its opposite ends. These bow springs are adapted to engage the casing C with a holding force capable of supporting the assembly in the casing so as to enable operation of the anchor means which will hereinafter be described.

In an appropriate and conventional manner, means are provided for releasably latching the friction drag device 25 to the tubular body 8 for movement as a unit. In the illustrative embodiment, this releasable latch is in the form of a conventional inverted J-slot 28 formed in the body 26*a* of the friction drag device and having movable therein a pin or projection 29 carried by the body 8. When the pin 29 is at the base of the short vertical section 30 of the J-slot, it will be appreciated that downward movement of the body 8 will cause the friction drag device 25 to move therewith. However, upon elevating the body 8 slightly and rotating the same in a left-hand direction from the top of the well as will hereinafter appear, the pin will be disposed in the long section of the J-slot so as to enable downward movement of the body 8 relative to the friction drag device 25 which is securely held in the well casing C by the drag of the springs 26 on the casing.

Connected to the upper end of the friction drag device 25 as by a dove-tailed sliding fit 31 is a plurality of circumferentially spaced downwardly holding casing engaging anchor elements or slips 32 having wickers or teeth 33 thereon adapted to bite into the well casing when they are forced into engagement therewith. Engageable with the inner angularly disposed faces 34 of the slip elements 32 are expander surfaces 35 of a sleeve 36 which is appropriately secured to the body 8 as by a snap-type retainer ring 37. Preferably, the slips 32 have a dove-tailed fit in slots 38 formed in the sleeve 36 as is conventional in well anchors of the type here involved.

The valve housing 15 includes a lower section 40 having a bore 41 in which the lower end 42 of the valve sleeve 14 is slidably disposed. Extending radially through the valve body section 40 is a suitable number of circumferentially spaced ports 43, which when open establish communication between the interior of the valve housing 15 and the annulus defined between the housing 15 and the well casing C. Beneath these ports 43 the body section 40 is provided with a peripheral groove 44 in which is disposed an O-ring seal 45 providing means for effecting a seal between the lower end of the valve

sleeve 14 and the valve body below the ports 43. Above the valve body section 40 is a valve body section 46 having a bore 47 therein of a greater diameter than the bore 41 so as to provide a shoulder 48. Above the shoulder 48 the body section 46 is provided with an internal annular groove 49 having its upper surface angularly disposed or beveled as indicated at 50, the valve sleeve 14 being provided with an outer peripheral annular groove 51 in which is disposed a spring ring 52 having a normal diameter such that it tends to seat in the body groove 49 and having a radial dimension such that when it is seated in the groove 49 it also is partially disposed in the valve sleeve groove 51 so as to provide means for effecting an interlock between the valve sleeve and the valve body holding the valve sleeve in the position shown in FIGS. 3 and 4 with the ports 43 closed. Spaced upwardly from the body groove 49 in the section 46 is a shoulder or beveled ledge 53 which is also engageable by the spring snap ring 52 to provide means for effecting an interlock between the valve sleeve 14 and the body 15 when the valve is in the open position as shown in FIG. 2.

Formed on, suitably connected to, or as in the illustrative embodiment connected as by threads at 54 to the upper end of the body 46 is a packing cup supporting ring 55 having an upstanding annular flange 56 which is provided with an appropriate number of holes 57 therein and on which is molded a resilient packing cup preferably composed of rubber or rubber-like material and designated 58. This cup 58 includes an inner flexible sealing lip 59 engageable with the outer surface of the valve sleeve 14 and an outer heavier sealing lip 60 sealingly engageable with the casing C. The purpose of this cup 58 as has been previously mentioned, is to effect a seal between the casing above the packer and the well fluid reservoir below the packer so as to enable the pumping of well fluids to the surface through the casing.

It will be observed that the valve sleeve 14 has at a point just at the upper end of the packer cup 58 a plurality of the radial ports 21 through which a portion of the production fluid will pass as the well is being pumped so as to wash away from the packer cup and carry upwardly with the fluid any particles of sand and the like which might otherwise tend to settle and gather on the packer cup and inhibit recovery of the tool when such is necessary.

The upper end of the valve sleeve 14 has connected thereto the rod guide 17 as by a threaded connection 62. Just below the threaded connection 62 the sleeve 14 is provided with an internal shoulder 63 which, as shown in FIG. 2 more particularly, is engageable by ribs 64 formed in circumferentially spaced relation about the coupling 13. Moreover, it will be noted in FIG. 2 that when the ribs 64 are engaged with the shoulder 63 the clutch 10 provided by the coupling 7 at the lower end of the tubular body 8 and the upper end of the traveling valve cage 6 is engaged.

With the foregoing specific structure, the operation of the present pump and packer assembly is as follows.

As stated above, with the releasable latch mechanism comprising the pin 29 and the J-slot 28 engaged, the friction drag device 25 will travel downwardly in the well along with the assembly, and slips 32 are prevented from expanding into engagement with the casing, since expansion of the slips is limited by engagement of the pin 29 in the base of the short vertical section 30 of the J-slot. When the assembly has reached the location in the well whereat it is desired to set the same, the rod string R is lifted upwardly so as to engage the clutch 10 between couplings 6 and 7 and move body 8 upwardly relative to the drag device 25 so that as shown in FIG. 2, the pin 29 is at the top of vertical slot section 30. Subsequent rotation of the rod string R to the left at the surface, followed by downward movement of the rod string will move the pin 29 across the J-slot to the long

vertical section thereof to release the body **8** for downward movement relative to drag device **25**. Coupling **19** will thereafter engage the upper extremity of rod guide **17**, thereby pushing the valve sleeve **14** which is latched in the open position by snap spring **52** and thereby push downwardly on the valve body **15** and thence the tubular body **8** as the friction drag device remains stationary in the well casing. This will effect lateral expansion of the slips **32** from the position shown in FIG. 2 to the position shown in FIG. 3 where the slip teeth or wickers are biting into the well casing C, and the expander surface **35** of the sleeve **36** is wedging the slips **32** into firm engagement with the casing C. In order to initiate such biting action of the teeth **33** it may be desirable to impose a number of jarring blows on the rod guide **17** by reciprocation of the rod string R.

As previously mentioned, while the assembly is being run into the well the valve is in the open position as shown in FIG. 2 with the valve sleeve **14** in its upper position and the by-pass ports **43** open so that fluid is free to pass therethrough as well as through the valve sleeve and out through ports **21** and **20** in the upper end of the sleeve and in the rod guide **17**, respectively.

The snap spring **52** is so constructed that substantial downward force must be applied thereto by the rod string R to cause the spring **52** to be cammed inwardly by the beveled seat **53** in the valve body so that the valve sleeve **14** may be shifted from the position shown in FIG. 2 to that shown in FIG. 3 so as to close off the by-pass **43**. Thereafter, reciprocation of the pump rod or sucker rod string R will effect reciprocation of the pump plunger **2** to the end that oil will be pumped through the body **8** upwardly through the valve sleeve **14** and into the casing C through valve ports **21** and rod guide ports **20** and thence up through the casing C into the flow line F. As the hydrostatic head of oil in the casing above the packer **58** rises, the head pressure will be applied across the packer **58**, thus acting downwardly on the valve body **15** and forcing the wedge surfaces **35** to wedge the slips into firmer anchoring engagement with the well casing.

When it is desired to recover the assembly from the well for purposes of repairing a pump valve or the pump plunger, for example, the sucker rods R are elevated beyond the normal pump stroke so as to again bring the upper end of the traveling valve cage **6** into engagement with the coupling **7** between the pump valve **1** and the body **8**, but only after the ribs **64** on rod coupling **13** interconnecting the connecting rod **18** to the pump rod **12** have engaged the shoulder **63** in the upper end of the valve sleeve and sufficient upward strain on the rod string has been taken as to cause the snap spring **52** to be displaced by the beveled surface **50** of the spring seat **49** to enable the valve sleeve **14** to move from the closed position shown in FIG. 3 back to the open position shown in FIG. 2. Subsequently, the fluid head above the packer cup **58** will be enabled to bleed through the by-pass ports **43**, thereby balancing the pressure across the packer cup **58** and after such balancing has been accomplished, further upward pull on the rod string R will retract the slips **33** before traveling valve cage **6** is fully engaged in cooperative clutch coupling **7**.

While the J-slot releasable latch device need not be re-engaged to permit the tool to be moved to the surface, it will be appreciated that, if desired, it is only necessary to impose a slight right-hand rotative strain on the rod string and re-engagement of the releasable latch will thereby be effected.

From the foregoing it will be recognized that the present invention provides a pump which may be of a large size, substantially filling the well casing, and that the pump need not be run into the well in a string of production tubing which will require expensive and heavy rig equipment to recover the pump and tubing, and accordingly, a large production volume may be accomplished through the casing. Yet, the apparatus is easy to run in and set and recover on the pump operating rod string R. As previously mentioned, the string R may be composed of small diameter tubing if desired, and through such tubing a diluent may be supplied to facilitate the production of very viscous crudes by reducing the viscosity of the crudes as the diluent mixes therewith just above the pump, thereby reducing friction as the production fluids pass upwardly through the valve casing to the surface.

While specific structural details have been shown and described, it should be understood that changes and alterations may be resorted to without departing from the spirit of the invention as defined in the appended claims.

I claim:

1. A well pump adapted to be installed in a well casing on a reciprocable pump operating string comprising: a pump barrel; a valve body connected to said barrel; a valve sleeve shiftably disposed in said valve body for axial movement; a packing element on said valve body engageable with the well casing for effecting a seal therewith; a pump plunger reciprocably disposed in said barrel; a pump rod connected to said plunger and extending upwardly toward said valve body; means for connecting the pump rod to said pump operating string and for shifting said valve sleeve in opposite directions upon reciprocation of said pump operating string; and means for holding said pump barrel stationary in said casing during reciprocation of said pump operating string; said valve body having a port therein disposed so as to be closed by said sleeve when said sleeve is in one position and open when said sleeve is in the other position.

2. A well pump adapted to be installed in a well casing on a reciprocable pump operating string comprising: a pump barrel; a valve body connected to said barrel; a valve sleeve shiftably disposed in said valve body for axial movement; a packing element on said valve body engageable with the well casing for effecting a seal therewith; a pump plunger reciprocably disposed in said barrel; a pump rod connected to said plunger and extending upwardly toward said valve body; means for connecting the pump rod to said pump operating string and for shifting said valve sleeve in opposite directions upon reciprocation of said operating string; means for holding said pump barrel stationary in said casing during reciprocation of said pump operating string; said valve body having a port therein disposed so as to be closed by said sleeve when said sleeve is in one position and open when said sleeve is in the other position; and means on said sleeve and said body for releasably holding said sleeve in each of said positions.

3. A well pump adapted to be installed in a well casing on a reciprocable pump operating string comprising: an elongated pump barrel, a valve body at the upper end of said barrel; a valve element shiftable in said valve body; a passage in said valve body leading to said casing from said pump barrel and located to be closed by said valve element and open, respectively, upon movement of said valve element from one position to another position; means for holding said pump barrel stationary in said casing; means connectable with said pump operating string for moving said valve element to said positions; a pump plunger having means connectable to said pump operating string and operable to pump fluid through said barrel upon reciprocation of said pump operating string; and sealing means between said valve body and said casing above said passage in said valve body.

4. A well pump adapted to be installed in a well casing on a reciprocable pump operating string comprising: a pump barrel; a valve body connected to said barrel; a valve sleeve shiftably disposed in said valve body for axial movement; a packing element on said valve body engageable with the well casing for effecting a seal therewith; a pump plunger reciprocably disposed in said bar-

rel; a pump rod connected to said plunger and extending upwardly toward said valve body; means for connecting the pump rod to said pump operating string and for shifting said valve sleeve in opposite directions upon reciprocation of said operating string; means for holding said pump barrel stationary in said casing during reciprocation of said pump operating string; said valve body having a port therein disposed so as to be closed by said sleeve when said sleeve is in one position and open when said sleeve is in the other position; and means for releasably holding said valve sleeve in one of said positions.

5. A well device anchorable in well casing comprising: an elongated tubular body having a flow passage therethrough; a pump plunger reciprocable in said body; a pump rod extending longitudinally in said body and connected to said plunger; laterally shiftable slip means and slip expander means on said body; releasable latch means for interconnecting said slip means and slip expander means to said body to hold said slip means away from said casing; coengageable means on said pump rod and said body for operating said releasable latch means to release said slip and expander means for movement of said slip means laterally into engagement with said casing; and means on said pump rod and said body for moving said expander means relative to said slip means to shift the latter into engagement with said casing.

6. A well device anchorable in well casing comprising: an elongated tubular body having a flow passage therethrough; a pump plunger reciprocable in said body; a pump rod extending longitudinally in said body and connected to said plunger; laterally shiftable slip means and slip expander means on said body; releasable latch means for interconnecting said slip means and slip expander means to said body to hold said slip means away from said casing; coengageable means on said pump rod and said body for operating said releasable latch means to release said slip and expander means for movement of said slip means laterally into engagement with said casing; means on said pump rod and said body for moving said expander means relative to said slip means to shift the latter into engagement with said casing; and packer means on said body engageable with said casing for effecting a seal between said body and said casing.

7. A well device anchorable in well casing comprising: an elongated tubular body having a flow passage therethrough; a pump plunger reciprocable in said body; a pump rod extending longitudinally in said body and connected to said plunger; casing engaging friction means shiftably disposed on said body; anchor slip elements and a slip expander interconnected with said body and said casing engaging friction means; releasable latch means for interconnecting said body to said casing engaging friction means; and means on said pump rod and said body for releasing said latch means responsive to manipulation of said pump rod to permit expansion of said slip elements by said expander.

8. A well device anchorable in well casing comprising: an elongated tubular body having a flow passage therethrough; a pump plunger reciprocable in said body; a pump rod extending longitudinally in said body and connected to said plunger; casing engaging friction means shiftably disposed on said body; anchor slip elements and a slip expander interconnected with said body and said casing engaging friction means; latch means for connecting said body to said casing engaging friction means against relative longitudinal movement and releasable upon relative rotation therebetween to permit such movement; and clutch means on said body and said pump rod for rotating said body.

9. A well device anchorable in well casing comprising: an elongated tubular body having a flow passage therethrough; a pump plunger reciprocable in said body; a pump rod extending longitudinally in said body and connected to said plunger; casing engaging friction means shiftably disposed on said body; anchor slip elements and a slip expander interconnected with said body and said casing engaging friction means; latch means for connecting said body to said casing engaging friction means against relative longitudinal movement and releasable upon relative rotation therebetween to permit such movement; and clutch means on said body and said pump rod for rotating said body; said clutch means including a pair of splined parts movable into engagement upon movement of said pump rod to the limit of its movement in one direction longitudinally of said body.

10. A well device anchorable in well casing comprising: an elongated tubular body having a flow passage therethrough; a pump plunger reciprocable in said body; a pump rod extending longitudinally in said body and connected to said plunger; casing engaging friction means shiftably disposed on said body; anchor slip elements and a slip expander interconnected with said body and said casing engaging friction means; latch means for connecting said body to said casing engaging friction means against relative longitudinal movement and releasable upon relative rotation therebetween to permit such movement; clutch means on said body and said pump rod for rotating said body; said clutch means including a member in said body having a plurality of splines; and a coupling between said pump rod and said pump plunger having complemental splines.

11. A well device anchorable in well casing comprising: an elongated tubular body having a flow passage therethrough; a pump plunger reciprocable in said body; a pump rod extending longitudinally in said body and connected to said plunger; casing engaging friction means shiftably disposed on said body; anchor slip elements and a slip expander interconnected with said body and said casing engaging friction means; latch means for connecting said body to said casing engaging friction means against relative longitudinal movement and releasable upon relative rotation therebetween to permit such movement; clutch means on said body and said pump rod for rotating said body; said clutch means including a member in said body having a plurality of splines; and a coupling between said pump rod and said pump plunger having complemental splines; said coupling including travelling valve means for said plunger.

12. A well pump assembly adapted to be run into a well on a reciprocable pump operating string comprising: an elongated body having a flow passage therethrough; a pump plunger reciprocable in the lower end of said body; a pump rod extending through said body and connected to said plunger; laterally expansible and retractable means on said body; releasable means connecting said expansible and retractable means to said body and retaining said expansible and retractable means retracted and releasable upon rotation of said body relative to said expansible and retractible means; and means on said pump and on said body coengageable upon movement of said pump rod in one direction and operable by said pump rod for rotating said body and releasing said releasable means.

13. A well pump assembly adapted to be run into a well on a reciprocable pump operating string comprising: an elongated body having a flow passage therethrough; a pump plunger reciprocable in the lower end of said body; a pump rod extending through said body and connected to said plunger; well wall engaging means shiftably mounted on said body; means releasably latching said well wall engaging means to said body and releasable upon longitudinal and rotative movement of said body relative to said well wall engaging means; laterally expansible and retractable means operatively engaged with said well wall engaging means; means on said body also operatively engaged with said laterally expansible and retractable means on said pump rod and on said body coengageable upon movement of said pump rod in one direction and for effecting expansion and retraction of the latter upon movement of said body relative to said well wall engaging means; and means operable by said pump rod for rotat-

ing said body and releasing said latch means to enable such movement of said body relative to said well wall engaging means.

14. A well pump assembly adapted to be run into a well on a reciprocable pump operating string comprising: an elongated body having a flow passage therethrough; a pump plunger reciprocable in the lower end of said body; a pump rod extending through said body and connected to said plunger; well wall engaging means shiftably mounted on said body; means releasably latching said well wall engaging means to said body and releasable upon longitudinal and rotative movement of said body relative to said well wall engaging means; laterally expansible and retractable means operatively engaged with said well wall engaging means; means on said body also operatively engaged with said laterally expansible and retractable means for effecting expansion and retraction of the latter upon movement of said body relative to said well wall engaging means; means on said pump rod and on said body coengageable upon movement of said pump rod in one direction and operable by said pump rod for rotating said body and releasing said latch means to enable such movement of said body relative to said well wall engaging means; and means on said pump rod and said body for effecting such relative movement of said body.

15. A well pump assembly adapted to be run into a well on a reciprocable pump operating string comprising: an elongated body having a flow passage therethrough; a pump plunger reciprocable in the lower end of said body; a pump rod extending into said body and connected to said plunger; well wall engaging means shiftably mounted on said body; means releasably latching said well wall engaging means to said body; laterally expansible and retractable means operatively engaged with said well wall engaging means; means on said body also operatively engaged with said laterally expansible and retractable means for effecting expansion and retraction of the latter upon movement of said body relative to said well wall engaging means; means operable by said pump rod for releasing said latch means to enable such movement of said body relative to said well wall engaging means including valve means on said body operable by said pump rod; said valve means including a valve housing ported to establish communication between said body flow passage and the well outside said body; and a shiftable valve member on said body and engageable by said pump rod for movement to positions closing and opening the port in said housing.

16. A well pump assembly adapted to be run into a well on a reciprocable pump operating string comprising: an elongated body having a flow passage therethrough; a pump plunger reciprocable in the lower end of said body; a pump rod extending into said body and connected to said plunger; well wall engaging means shiftably mounted on said body; means releasably latching said well wall engaging means to said body; laterally expansible and retractable means operatively engaged with said well wall engaging means; means on said body also operatively engaged with said laterally expansible and retractable means for effecting expansion and retraction of the latter upon movement of said body relative to said well wall engaging means; means operable by said pump rod for releasing said latch means to enable such movement of said body relative to said well wall engaging means including valve means on said body operable by said pump rod; said valve means including a valve housing ported to establish communication between said body flow passage and the well outside said body; a shiftable valve member on said body and engageable by said pump rod for movement to positions closing and opening the port in said housing; and means for releasably interconnecting said shiftable valve member and said housing in one of said positions to enable operation of said expansible and retractable means.

17. A valved well pump packer device comprising: an elongated tubular member; means on said member for holding said member stationary in a well bore; means for forming a seal between said member and the well wall; said member having a port below said seal means; a valve sleeve slidable in said member to positions opening and closing said port; a pump rod shiftable through said valve sleeve; and means on said pump rod and said valve sleeve for moving said sleeve to said positions.

18. A valved well pump packer device comprising: an elongated tubular member; means on said member for holding said member stationary in a well bore; means for forming a seal between said member and the well wall; said member having a port below said seal means; a valve sleeve slidable in said member to positions opening and closing said port; a pump rod shiftable through said valve sleeve; and a ported rod guide on said sleeve; said rod extending through said rod guide and having couplings at opposite sides of said guide and engageable therewith for moving said sleeve to said positions.

19. A well casing pump comprising: an elongated tubular body having a pump barrel at its lower end and adapted to be disposed in a well casing; a pump plunger reciprocable in said barrel; casing engaging friction means shiftably disposed on said body; means releasably latching said friction means to said body for movement therewith; laterally shiftable slip means and expander means interposed between said friction means and said body for expansion of said slip means into anchoring engagement with said casing upon movement of said body relative to said friction means; a tubular valve housing at the upper end of said body having a port leading from said body into said casing; a packer element on said housing above said port and sealingly engageable with said casing; a valve sleeve shiftable in said housing to positions opening and closing said port; a pump rod reciprocable in said body and connected to said plunger; means on said pump rod engageable with said body for releasing said latch means upon manipulation of said pump rod; and means for manipulating said pump rod including a member coupled to said rod and having portions engageable with said valve sleeve for shifting the latter to said positions.

References Cited in the file of this patent

UNITED STATES PATENTS

2,363,603	Lucas	Nov. 28, 1944
2,604,945	Page	July 29, 1952
2,831,439	Blood	Apr. 22, 1958