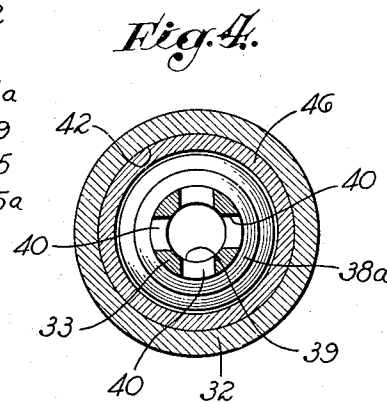
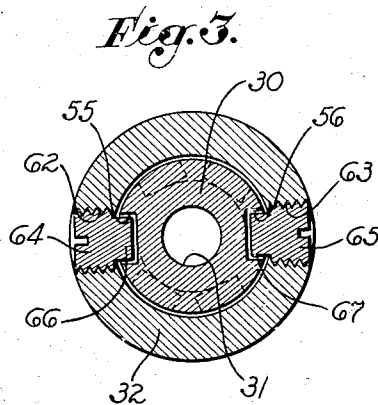
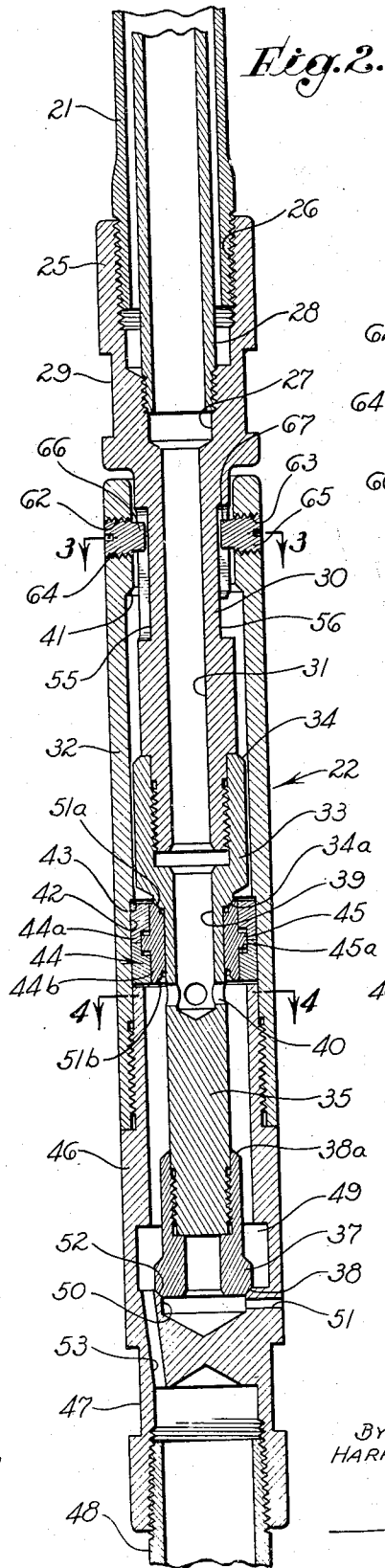
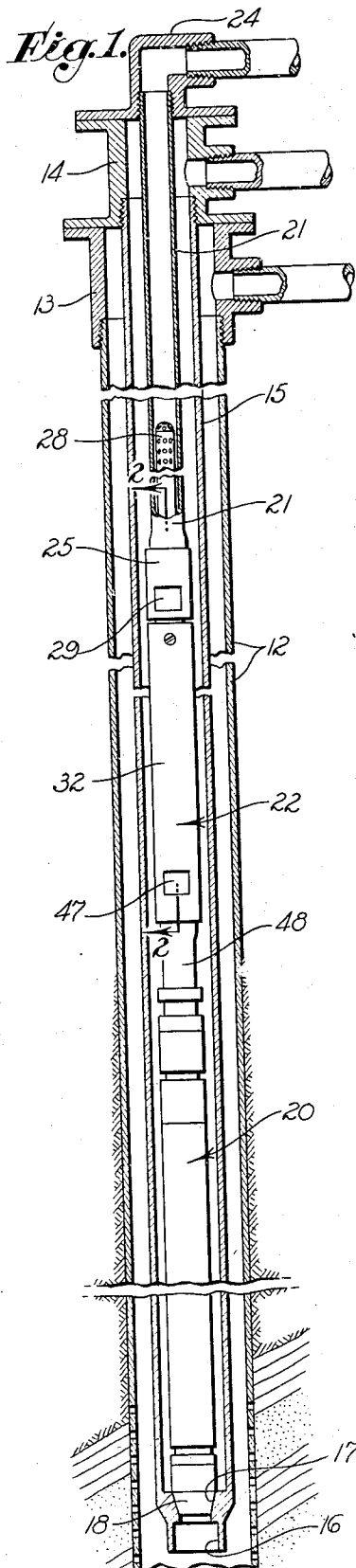


Feb. 16, 1943.

C. J. COBERLY
BLEEDER CONSTRUCTION
Filed Feb. 10, 1941

2,311,212

2 Sheets-Sheet 1



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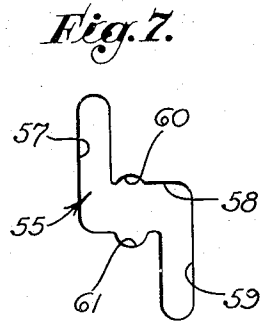
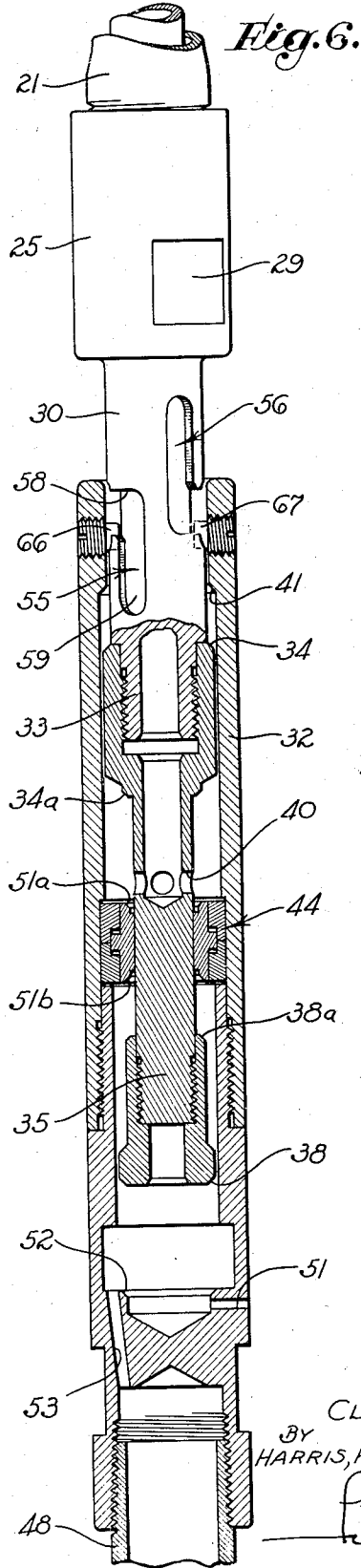
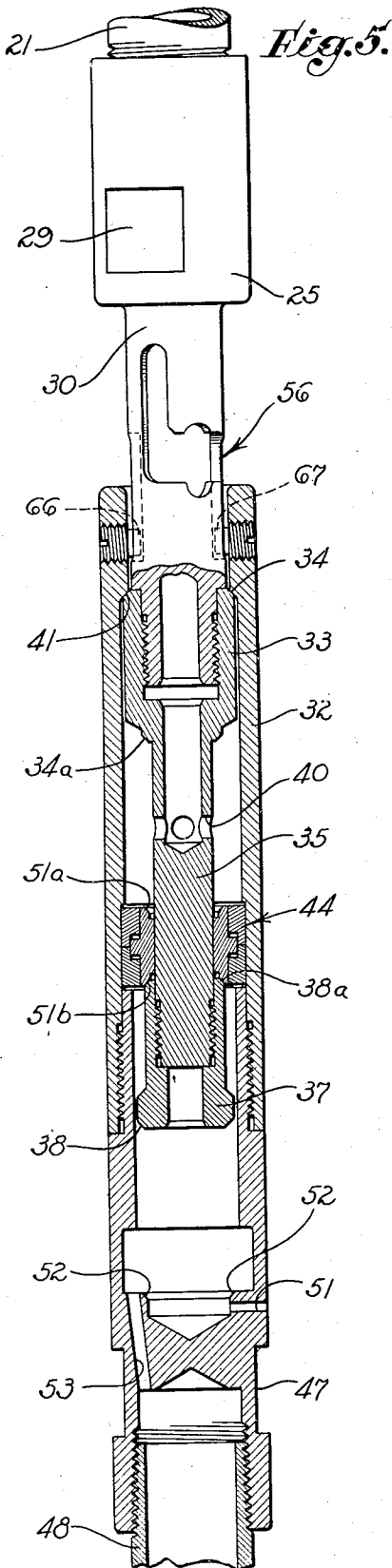
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2 Sheets-Sheet 2



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2,311,212

BLEEDER CONSTRUCTION

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Application February 10, 1941, Serial No. 378,219

18 Claims. (Cl. 166—1)

My invention relates to a deep well pump mechanism of the fluid operated type, and is an improvement on the device disclosed in my earlier Patent No. 2,053,602, issued September 8, 1936, to which reference is hereby made.

It is an object of my invention to provide a pump structure adapted to be lowered to the bottom of a well, and to provide such pump structure with a means for controlling the flow of fluids therethrough during the lowering of the same, for controlling the flow of fluids there-through after the pump structure has been brought into operative position in the well, and for controlling the flow of fluids preliminary to and during the lifting of the pump from the well.

Fluid operated pumps generally comprise a fluid operated motor unit, or engine, coupled to a pump unit, the whole assembly being installed in a well to pump well fluid therefrom. To operate such a fluid operated motor unit, an operating fluid under pressure, such as oil, for example, is conveyed from a suitable source of supply downwardly through the well in a supply tubing to the motor unit. Such a fluid operated motor is disclosed in my earlier Patent No. 2,081,220, issued May 25, 1937, for "Liquid operated pump," to which reference is hereby made for a detailed description of the operation thereof.

During the lowering of such a fluid operated pump into a well, since dirty well fluid frequently stands high in the well prior to pumping, there is a tendency for the well fluid to enter the discharge ports of the fluid motor mechanism to reverse the normal flow of fluid therethrough, thus permitting abrasive substances carried by the well fluid to enter the fluid motor mechanism. This is frequently fatal to subsequent operation of the motor, as the abrasive substances damage the close tolerances required for proper operation of such a device. Consequently, it is an object of my invention to provide a device responsive to control from the top of the well for preventing such a reverse flow of well fluid through the pump during the operation of lowering it into the well.

When a fluid operated pump is withdrawn from the well after operation, the supply tubing will normally be filled with operating fluid, and before such withdrawal of the pump it is very desirable to drain or bleed the operating fluid out of the supply tubing so as to prevent this operating fluid from spilling onto the derrick floor or causing what is known in the art as a "wet job." Accordingly, it is a further object

of my invention to provide a fluid operated pump device having an operating fluid supply tubing with means for draining or bleeding the operating fluid out of the supply tubing when desired. Another object of the invention is to provide such a device which may be controlled from the top of the well.

Still another object of my invention is to provide a device in a well at the lower end of the fluid tubing for closing the lower end thereof in response to control at the top of the well so as to permit the tubing to be tested for fluid tightness without removing it from the well.

It is a further object of my invention to provide a device of the character described above in which the apparatus and method for control thereof are novel.

Further objects and advantages of the invention will be apparent from the following specification and the drawings, which are for the purpose of illustration only and in which:

Fig. 1 is a vertical sectional view of a well showing my invention installed therein in combination with a fluid operated pump.

Fig. 2 is a vertical sectional view of my invention, taken on the line 2—2 of Fig. 1, and shows the device in pumping position.

Fig. 3 is a cross-sectional view taken on the line 3—3 of Fig. 2.

Fig. 4 is a cross-sectional view taken on the line 4—4 of Fig. 2.

Fig. 5 is a vertical sectional view similar to Fig. 2, but showing the device in testing or running-in position.

Fig. 6 is a vertical sectional view similar to Fig. 2, but showing the device in bleeding position.

Fig. 7 is a plan projection on a flat plane of one of the guide grooves of the invention.

Referring to the drawings, Fig. 1 shows a casing 12 extending down into a well from a casing head 13. From an intermediate fitting 14 of the casing head 13 an oil production tubing 15 extends downwardly within the casing 12 into the oil producing zone of the well. The production tubing 15 has an inlet opening 16 at its lower end which extends through a conical seat 17 adapted to receive the lower end 18 of a fluid operated pump 20 which may be of any type well known in the art, such as the device shown in my said Patent No. 2,081,220. Connected to the upper end of the fluid operated pump 20 is a fluid supply tubing 21 which extends through the production tubing 15 to the top of the well and is connected to a cap fitting 24 through which operating fluid, such as oil, under pressure is conducted from a suitable

source of supply (not shown) to the fluid operated pump 20.

As best shown in Fig. 2, the control valve means 22 includes an upper tubular member 25 having a major bore 26 into which is threaded the lower end of the fluid supply tubing 21 and having a minor bore 27 into which I prefer to thread the lower end of a tubular strainer element 28, which may, however, be omitted if desired. The upper tubular member 25 is provided with squared faces 29 adapted to receive a suitable wrench for the purpose of assembly. Formed on and projecting downwardly from the upper tubular member 25 is a tubular projection 30 having an axial bore 31 communicating at its upper end with the minor bore 27, the tubular projection extending downwardly into a central tubular member 32.

Connected to the lower end of the tubular projection 30, as by threads or otherwise, is an upper valve member 33 provided at its upper end with a conical upper valve face 34 and at its lower end with a conical lower valve face 34a, and having a stem portion 35 extending downwardly therefrom. Suitably threaded to the lower end of the stem portion 35 is an engaging element 37 provided at its lower end with a conical lower seating face 38 and at its upper end with a conical upper seating face 38a. An axial passage 39 is formed in the upper end of the stem portion 35 so as to communicate with the lower end of the axial bore 31 and is provided at its lower end with radial openings 40.

The central tubular member 32 is provided adjacent its upper end with a conical upper valve seat 41 adapted to receive the upper valve face 34 of the upper valve member 33 in seating relation thereon, as will be described hereinafter. The lower end of the central tubular member 32 is counterbored at 42 so as to provide an annular shoulder 43 which engages an annular fluid sealing member 44 surrounding the stem portion 35 of the upper valve member 33. The fluid sealing member 44 is comprised of an outer annular ring 44a comprised of an upper part and a lower part and an inner annular ring 44b adapted to make a sliding fluid-tight fit with the outer annular ring and having an annular flange 45 which projects into an annular groove 45a formed in the inner wall of the outer annular ring. The flange 45 is free to move axially slightly in the groove 45a so as to permit a small degree of axial movement of the inner annular ring 44b relative to the outer annular ring 44a. The inner annular ring 44b is provided with upper and lower seats 51a and 51b, respectively, the upper seat 51a being adapted to receive the lower valve face 34a of the upper valve member 33, and the lower seat 51b being adapted to receive the upper seating face 38a of the engaging element 37. The lower end of the central tubular member 32 is internally threaded to the upper end of a lower tubular member 46, the upper end of which engages the lower face of the outer annular ring 44a so as to clamp the same under the annular shoulder 43. The lower end of the lower tubular member 46 is provided with squared faces 47 adapted to receive a suitable wrench for the purpose of assembly, and the lower end of the tubular member is internally threaded so as to receive the upper end of a connecting pipe 48, the lower end of which is suitably secured to the upper end of the fluid operated pump 20. Formed in the lower tubular member 46 is a chamber 49 communicating through a lower bore 50 and a radial passage 51 with the exterior of the

lower tubular member 46. The upper end of the lower bore 50 is provided with a conical seat 52 adapted to receive the lower seating face 38 of the engaging element 37, as shown in Fig. 2. Communicating between the chamber 49 and the interior of the connecting pipe 48 is a flow passage 53 formed in the lower end of the lower tubular member 46. Although only one flow passage 53 has been shown, it will be understood that as many such flow passages may be provided as desired.

The upper tubular member 25 is movably connected to the intermediate tubular member 32 by the following described construction. Formed in the outer surface of the tubular projection 30 is a pair of diametrically disposed grooves 55 and 56 which are identically formed but oppositely disposed, the groove 55 being projected onto a flat plane as shown in Fig. 7 for the purpose of illustration. As shown in Fig. 7, the groove 55 is formed so as to provide an upper vertical portion 57 connected by a horizontal portion 58 with a lower vertical portion 59, the horizontal portion 58 being provided with upper and lower notches 60 and 61, respectively. Threaded into a pair of diametrically disposed threaded openings 62 and 63 formed in the upper end of the central tubular member 32 are screw pins 64 and 65, respectively, having inward projections 66 and 67 thereon, respectively, projecting into the grooves 55 and 56. The screw pins 64 and 65 are preferably made readily removable, as disclosed, so as to permit the device to be readily assembled or taken apart.

In assembly, the production tubing 15 is first installed in the well in the position shown in Fig. 1. The fluid operated pump 20 and the control valve means 22 are then connected to the lower end of the supply tubing 21 in the relation shown in Fig. 1, the control valve means being manually set to the position shown in Fig. 5. In the position shown in Fig. 5, the upper valve face 34 of the upper valve member 33 engages the upper valve seat 41, the stem portion 35 being drawn upwardly through the annular fluid sealing member 44 so that the radial openings 40 are positioned above the sealing member. In this position, also, it will be noted that the upper seating face 38a of the engaging element 37 is seated in the lower seat 51b of the fluid sealing member 44 forming a fluid-tight engagement therewith. It will thus be understood that in the position shown in Fig. 5, fluid communication is shut off between the supply tubing 21 and the connecting pipe 48. In this position, also, the inward projections 66 and 67 of the screw pins 64 and 65, respectively, are positioned in the lower vertical portion 59 of each of the grooves 55 and 56, but it will be noted that in this position the inward projections are spaced upwardly from the lower ends of the lower vertical portions 59 of the grooves, and that the weight of the central tubular member 32 and parts connected therebelow rests solely on the upper valve face 34 of the upper valve member 33, which is an important feature of my invention. The unit is then lowered into the well through the production tubing 15 with the control valve means 22 in the position shown in Fig. 5, and since the fluid communication between the upper end of the fluid operated motor 20 and the supply tubing 21 is closed by the control valve means, well fluid normally standing in the well cannot flow to any appreciable extent into the fluid operated pump 20 through any of the external ports thereof. This

is an important feature, as pointed out hereinabove, since it prevents dirty oil from causing a reverse flow through the fluid operated motor 20 as it is being lowered into the well, with the attendant disadvantages incident thereto. In this connection, however, it may be noted that with the control valve means 22 adjusted to the position shown in Fig. 5, the engaging element 37 is raised off its conical seat 52 so as to open fluid communication through the radial passage 51 between the connecting pipe 48 and the fluid in the well. If, under these circumstances, the lower end of the control valve means 22, the connecting pipe 48, and the upper end of the fluid operated pump 20 are initially filled with clean liquid, substantially no dirty liquid from the well will flow through the radial passage 51 into the control valve means, and, consequently, I have found it preferable in practice to initially fill the upper end of the fluid operated pump 20, the connecting pipe 48, and the lower portion of the control valve means 22 with clean operating fluid before the device is run into a well containing dirty well fluid. Even if this precaution is not taken, however, very little, if any, well fluid will enter the control valve means 22 through the radial passage 51, as the area of the radial passage is small and the gas within the control valve means will be quickly compressed to prevent any appreciable inflow of well fluid through the radial passage.

As soon as the lower end 18 of the fluid operated pump 20 seats in the conical seat 17 at the lower end of the production tubing 15, the fluid operated pump is in operating position. Upon continued lowering of the supply tubing 21, the upper tubular member 25 and the tubular projection 30 formed thereon move downwardly relative to the central tubular member 32, the inward projections 66 and 67 riding upwardly in the lower vertical portions of the grooves 55 and 56 until they engage the upper ends of the vertical portions. The supply tubing 21 is then rotated in a counterclockwise direction, as seen in Fig. 3, until the inward projections 66 and 67 are vertically aligned with the lower ends of the upper vertical portions 57 of the grooves 55 and 56, and then the supply tubing is further lowered until the inward projections approach the upper ends of the vertical portions 57 of the grooves, and the engaging face 38 seats on the conical seat 52, as shown in Fig. 2. In this position, also, it will be noted that the lower valve face 34a seats on the upper seat 51a to form a fluid-tight seal between the upper valve member 33 and the central tubular member 32.

In the operating position, shown in Fig. 2, the radial openings 40 in the stem portion 35 are positioned below the annular fluid sealing member 44, so as to open fluid communication between the supply tubing 21 and the fluid operated pump 20 through the connecting pipe 48. Operating fluid may then be conveyed downwardly through the supply tubing 21 under pressure, through the tubular strainer element 28, the liner bore 27, the axial bore 31, the axial passage 39, the radial openings 40, the interior of the lower tubular member 46, the lower valve chamber 49, the flow passages 53, and the connecting pipe 48 to the upper end of the fluid operated motor 20. As will be noted from Fig. 2, when the device is in this operating position, the weight of the supply tubing 21 and connected parts rests on the lower valve seat 52, and not on the inward projections 66 and 67

which, in the position shown in Fig. 2, are downwardly spaced from the upper ends of the upper vertical portions 57 of the grooves 55 and 56, and this is another feature of the invention.

It is to be noted that when my control valve 22 is adjusted to the operating position shown in Fig. 2, the under side of the engaging element 37 is open through the radial passage 51 to the fluid pressure in the production tubing 15 around the control valve. As soon as operating fluid is admitted to the interior of the lower valve member 46, a fluid pressure differential is established on the engaging element 37, tending to keep it tightly seated on the conical seat 52, due to the fact that the pressure of the operating fluid is always substantially higher than the pressure of the pumped fluid in the production tubing 15. This pressure differential may be, for example, 5000 lbs. per square inch in some installations, and its use in maintaining the parts in the operating position shown in Fig. 2 is a feature of the invention.

When it is desired to drain fluid from the interior of the supply tubing 21 into the production tubing 15, as when the fluid operated pump 20 is to be pulled from the well, the control valve means 22 is adjusted to the bleeding position shown in Fig. 6. To accomplish this, the supply tubing 21 is raised and rotated so as to align the inward projections 66 and 67 with the upper and lower notches 60 and 61 of the grooves, and an upward pull is then taken on the supply tubing 21 so that the inward projections enter the lower notches 61 of the grooves 55 and 56, in which position the device may be raised from the well. In the position shown in Fig. 6, the upper valve face 34 of the upper valve member 33 has been moved downwardly away from the upper valve seat 41, and fluid in the supply tubing 21 may then drain therefrom through the radial openings 40 above the annular fluid sealing member 44 and flow upwardly through the interior of the central tubular member 32, between the upper valve member 33 and the interior of the upper tubular member, around the tubular projection 30, and into the production tubing 15. Thus, as the supply tubing 21 is raised from the well, fluid therein may drain back into the production tubing so as to prevent what is known in the oil industry as a "wet job."

As previously indicated, the inner annular ring 44b of the sealing member 44 is permitted a small amount of axial movement relative to the outer annular ring 44a, and due to this the inner annular ring forms a floating sealing means in my invention. For example, with the parts adjusted to the operating position shown in Fig. 2, the pressure of the operating fluid bears on the lower end of the inner annular ring 44b to cause it to move upwardly slightly to effect a fluid-tight engagement between the upper seat 51a and the valve face 34a. Similarly, with the parts adjusted to the running-in position shown in Fig. 5, the pressure of the operating fluid bears on the top of the inner annular ring 44b to cause it to move downwardly slightly to effect a fluid-tight engagement between the seating face 38a and the seat 51b. Such a floating sealing means is desirable in view of the fact that sufficient clearance must be provided between the external surface of the stem 35 and the internal bore of the inner annular ring 44b to permit relative axial movement between the stem and the annular ring,

and if such clearance is provided it is desirable to provide a sealing means for preventing leakage through the clearance in the running-in and operating positions, shown in Figs. 5 and 2, respectively. This is another feature of my invention.

It will thus be appreciated that my control valve means 22 may be adjusted from the top of the well by rotation of the supply tubing 21 so as to be in any one of the three positions described, i. e., the running-in or testing position, shown in Fig. 5, the operating position shown in Fig. 2, or the bleeding position shown in Fig. 6. It is also to be noted that in the running-in or testing position, shown in Fig. 5, the entire weight of the fluid operated pump 20 is carried on the relatively wide upper valve seat 41 and that in the operating position shown in Fig. 2 the entire weight of the supply tubing 21 is carried on the relatively wide lower valve seat 52.

Although I have described my invention as applied and used in connection with a fluid operated pump, with which it may be used to particular advantage, it is to be understood that my device may be used in other capacities without departing from the spirit of my invention. It will also be appreciated that although I have described a preferred embodiment of my invention, I do not intend to be limited to the particular construction shown but desire to be afforded the full scope of the following claims.

I claim as my invention:

1. In a control valve for use in a well, the combination of: a lower valve member adapted to be connected to a lower well tubing; an upper valve member cooperating with said lower valve member and adapted to be connected to an upper well tubing, said valve members being so constructed and arranged that said upper valve member is adapted for vertical movement relative to said lower valve member to selectively occupy either an upper position in which fluid communication is closed through said valve members between said upper and lower well tubings and through said valve members between said upper well tubing and the exterior of the control valve, or an intermediate position in which fluid communication is opened through said valve members between said upper well tubing and the exterior of the control valve, or a lower position in which fluid communication is opened through said valve members between said upper and lower well tubings but closed through said valve members between said upper well tubing and the exterior of the control valve; and means operable from the surface of the ground for moving said upper valve member relative to said lower valve member so as to cause said upper valve member to occupy any desired one of said positions.

2. In a control valve for use in a well, the combination of: a lower valve member adapted to be connected to a lower well tubing and having a first fluid passage adapted to communicate with the lower well tubing; an upper valve member cooperating with said lower valve member and adapted to be connected to an upper well tubing, said upper valve member having a second fluid passage adapted to communicate with said upper well tubing, one of said valve members having a third fluid passage communicating with the exterior of the control valve, said valve members being so constructed and arranged that said upper valve member is adapted for vertical move-

ment relative to said lower valve member to selectively occupy either an upper position in which fluid communication is closed through said valve members between said passages, or an intermediate position in which fluid communication is opened through said valve members between said second and third passages, or a lower position in which fluid communication is opened through said valve members between said first and second passages but closed through said valve members between said second passage and said third passage; and means for causing relative movement between said upper valve member and said lower valve member so as to cause said upper valve member to occupy any desired one of said positions.

3. In a control valve for use in a well, the combination of a lower valve member adapted to be connected to a lower well tubing; an upper valve member cooperating with said lower valve member and adapted to be connected to an upper well tubing, said valve members being so constructed and arranged that said upper valve member is adapted for vertical movement relative to said lower valve member to selectively occupy either a first position in which fluid communication is closed through said valve members between said upper and lower well tubings and through said valve members between said upper well tubing and the exterior of the control valve, and the weight of said lower valve member is supported on said upper valve member, or a second position in which fluid communication is opened through said valve members between said upper well tubing and the exterior of the control valve, or a third position in which fluid communication is opened through said valve members between said upper and lower well tubings but closed through said valve members between said upper well tubing and the exterior of the control valve, and the weight of said upper valve member is supported on said lower valve member; and means operable from the surface of the ground for moving said upper valve member relative to said lower valve member so as to cause said upper valve member to occupy any desired one of said positions.

4. In a control valve for use in a well, the combination of: a lower valve member adapted to be connected to a lower well tubing; an upper valve member adapted to be connected to an upper well tubing; an upper valve seat formed on one of said valve members and an upper valve element formed on the other of said valve members, said upper valve element being adapted to seat on said upper valve seat so as to support said lower valve member on said upper valve member when said members are in a first position relative to each other; means for closing fluid communication between said upper and lower well tubings when said members are in said first position; a lower seat element formed on one of said valve members and a lower engaging element formed on the other of said valve members and adapted to seat on said lower seat element so as to support said upper valve member on said lower valve member when said members are in a second position relative to each other; means for opening fluid communication between said upper and lower well tubings when said members are in said second positions; and means for selectively relatively moving said members to either of said positions.

5. In a control valve for use in a well, the combination of: a lower valve member adapted

to be connected to a lower well tubing; an upper valve member adapted to be connected to an upper well tubing; an upper valve seat formed on one of said valve members and an upper valve element formed on the other of said valve members, said upper valve element being adapted to seat on said upper valve seat so as to support said lower valve member on said upper valve member when said members are in a first position relative to each other; means for closing fluid communication between said upper and lower well tubings when said members are in said first position; a lower seat element formed on one of said valve members and a lower engaging element formed on the other of said valve members and adapted to seat on said lower seat element so as to support said upper valve member on said lower valve member when said members are in a second position relative to each other; means for opening fluid communication between said upper and lower well tubings when said members are in said second position; means for selectively relatively moving said members to either of said positions; and fluid pressure differential means for holding said lower engaging element on said lower seat element when said valve members are in said second position.

6. In a control valve for use in a well, the combination of: a lower valve member adapted to be connected to a lower well tubing; an upper valve member adapted to be connected to an upper well tubing; an upper valve seat formed on one of said valve members and an upper valve element formed on the other of said valve members, said upper valve element being adapted to seat on said upper valve seat so as to support said lower valve member on said upper valve member when said members are in a first position relative to each other and so as to close fluid communication between said upper well tubing and the exterior of the control valve through said lower valve member, said valve members being relatively movable to an intermediate position in which said upper valve element is unseated from said upper valve seat so as to open communication between said upper well tubing and the exterior of the control valve through said upper valve seat; means for closing fluid communication through said valve members between said upper and lower well tubings when said members are in said first position; a lower seat element formed on one of said valve members and a lower engaging element formed on the other of said valve members and adapted to seat on said lower seat element so as to support said upper valve member on said lower valve member when said members are in a second position relative to each other; means for opening fluid communication through said valve members between said upper and lower well tubings when said members are in said second position; and means for moving one of said valve members relative to the other selectively to any one of said positions.

7. In a control valve adapted to be connected in a line of well tubing in a well, the combination of: a first tubular member having a first fluid passage therein communicating with the well tubing on one side of the control valve; a second tubular member telescoped into said first tubular member and having a second fluid passage therein communicating with the well tubing on the other side of the control valve; a valve seat formed in said first tubular member; a valve element associated with said second tubular member and adapted to seat on said valve seat in a first position so as to support the weight of said first tu-

bular member on said second tubular member and so as to close fluid communication between said second fluid passage and the exterior of the control valve through said valve seat, said tubular members being relatively movable to an intermediate position so as to open fluid communication between said second fluid passage and the exterior of the control valve; means for closing fluid communication between said first and second passages when said tubular members are in said first position; a seat element formed in said first tubular member; an engaging element associated with said second tubular member and adapted to seat on said seat element so as to support said second tubular member on said first tubular member when said members are in a second position relative to each other; means for opening fluid communication between said first and second passages when said tubular members are in said second position; and means for selectively relatively moving said tubular members to any one of said positions.

8. In a control valve adapted to be connected in a line of well tubing in a well, the combination of: a first tubular member having a first fluid passage therein communicating with the well tubing on one side of the control valve; a second tubular member telescoped into said first tubular member and having a second fluid passage therein communicating with the well tubing on the other side of the control valve; a valve seat formed in said first tubular member; a valve element associated with said second tubular member and adapted to seat on said valve seat in a first position so as to support the weight of said first tubular member on said second tubular member and so as to close fluid communication between said second fluid passage and the exterior of the control valve through said valve seat, said tubular members being relatively movable to an intermediate position so as to open fluid communication between said second fluid passage and the exterior of the control valve; means for closing fluid communication between said first and second passages when said tubular members are in said first position; a seat element formed in said first tubular member; an engaging element associated with said second tubular member and adapted to seat on said seat element so as to support said second tubular member on said first tubular member when said members are in a second position relative to each other; means for opening fluid communication between said first and second passages when said tubular members are in said second position; means for selectively relatively moving said tubular members to any one of said positions; and fluid pressure differential means for holding said engaging element on said seat element when said tubular members are in said second position.

9. In a control valve adapted to be connected in a line of well tubing in a well, the combination of: a first tubular member having a first fluid passage therein communicating with the well tubing on one side of the control valve; a second tubular member telescoped into said first tubular member and having a second fluid passage therein communicating with the well tubing on the other side of the control valve; a valve seat formed in said first tubular member; a valve element associated with said second tubular member and adapted to seat on said valve seat in a first position so as to support the weight of said first tubular member on said second tubular member and so as to close fluid communication between said

second fluid passage and the exterior of the control valve through said valve seat, said tubular members being relatively movable to an intermediate position so as to open fluid communication between said second fluid passage and the exterior of the control valve; means for closing fluid communication between said first and second passages when said tubular members are in said first position; means between said tubular members for holding them in said intermediate position; a seat element formed in said first tubular member; an engaging element associated with said second tubular member and adapted to seat on said seat element so as to support said second tubular member on said first tubular member when said members are in a second position relative to each other; means for opening fluid communication between said first and second passages when said tubular members are in said second position; and means for selectively relatively moving said tubular members to any one of said positions.

10. In a control valve for use in a well, the combination of: an upper valve member adapted to be connected to an upper well tubing; a lower valve member adapted to be connected to a lower well tubing, said valve members being relatively movable to selectively occupy a first position in which fluid communication is closed between said upper and lower well tubings, or a second position in which fluid communication is opened between said upper and lower tubings; and fluid pressure differential means for retaining said valve members in said second position.

11. In a control valve for use in a well, the combination of: an upper valve member adapted to be connected to an upper well tubing; a lower valve member adapted to be connected to a lower well tubing, said valve members being relatively movable to selectively occupy a first position in which fluid communication is opened between said upper well tubing and the exterior of the control valve, or a second position in which fluid communication is opened between said upper and lower tubings; and fluid pressure differential means for retaining said valve members in said second position.

12. In a control valve, the combination of: an outer tubular member adapted to be connected to a first tubing; an inner tubular member telescoped into said outer member and having a longitudinal passage therein adapted to be connected to a second tubing, said tubular members being adapted for relative axial movement to occupy selectively either a first position in which fluid communication is closed between said passage and said first tubing, or a second position in which fluid communication is opened between said passage and said first tubing; and sealing means between said inner and outer tubular members for forming a fluid-tight seal therebetween, including an annular sealing ring concentric with said members and axially movable in response to fluid pressure supplied through one of said members to engage in sealing relation an annular seating element formed on one of said members.

13. In a control valve, the combination of: an outer tubular member adapted to be connected to a first tubing; an inner tubular member telescoped into said outer member and having a longitudinal passage therein adapted to be connected to a second tubing, said tubular members being adapted for relative axial movement to occupy selectively either a first position in which fluid communication is closed between said pas-

sage and said first tubing, or a second position in which fluid communication is opened between said passage and said first tubing; and sealing means between said inner and outer tubular members for forming a fluid-tight seal therebetween, including an annular sealing ring concentric with said members and axially movable in response to fluid pressure supplied through one of said members to engage in sealing relation an annular seating element formed on one of said members, and means on the other of said members for limiting axial movement of said sealing ring.

14. In a control valve, the combination of: an outer tubular member adapted to be connected to a first tubing; an inner tubular member telescoped into said outer member and having a longitudinal passage therein adapted to be connected to a second tubing, said tubular members being adapted for relative axial movement to occupy selectively either a first position in which fluid communication is closed between said passage and said first tubing, or a second position in which fluid communication is opened between said passage and said first tubing; and sealing means between said inner and outer tubular members for forming a fluid-tight seal therebetween, including an annular sealing ring concentric with said members and axially movable in response to fluid pressure supplied through one of said members to engage in sealing relation either a first annular seating element formed on one of said members on one side of said sealing means, or a second annular seating element formed on said one member on the other side of said sealing means.

15. In a device of the character described, the combination of: an outer tubular member; an inner tubular member telescoped into said outer member, one of said members being axially movable relative to the other, said inner member having a longitudinal passage therein adapted to communicate with the interior of said outer member and adapted to carry fluid under relatively high fluid pressure; sealing means between said inner and outer members, including an axially movable, annular sealing ring having a seating face on one end thereof; and an annular seating element on one of said members adapted to form a fluid-tight joint with said seating face, said sealing ring being axially moved into sealing relation with said seating element by the application of fluid pressure to the other end of said sealing ring.

16. In a device of the character described, the combination of: an outer tubular member; an inner tubular member telescoped into said outer member, one of said members being axially movable relative to the other, said inner member having a longitudinal passage therein adapted to communicate with the interior of said outer member and adapted to carry fluid under relatively high fluid pressure; sealing means between said inner and outer members, including an axially movable, annular sealing ring having a seating face on one end thereof; and an annular seating element on one of said members on each side of said sealing means, either of which is adapted to form a fluid-tight joint with said seating face, said sealing ring being axially moved into sealing relation with either of said seating elements by the application of fluid pressure to one end of said sealing ring.

17. In a device of the character described, the combination of: an outer tubular member; an

inner tubular member telescoped into said outer member; an annular shoulder on one of said members between said members; an annular sealing ring on said inner member and axially movable to engage said shoulder to form a seal between said members; and hydraulic means for moving said sealing ring axially into sealing engagement with said shoulder.

13. In a device of the character described, the combination of: an outer tubular member; an inner tubular member telescoped into said outer member; a first annular shoulder on one of said

members between said members; a second annular shoulder on one of said members between said members and longitudinally spaced from said first shoulder; an annular sealing ring on said inner member between said shoulders and axially movable in either direction to selectively engage either of said shoulders to form a seal between said members; and hydraulic means for selectively moving said sealing ring axially into sealing engagement with either of said shoulders.

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