Dec. 3, 1940. A. J. PENICK ET AL 2,223,702

PRESSURE CONTROL TUBING HEAD

Filed March 28, 1938 2 Sheets-Sheet 1

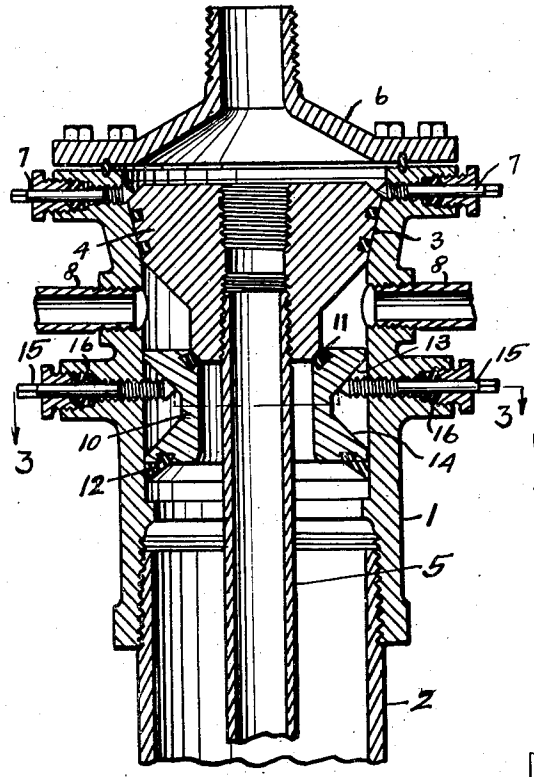


Fig. 1.

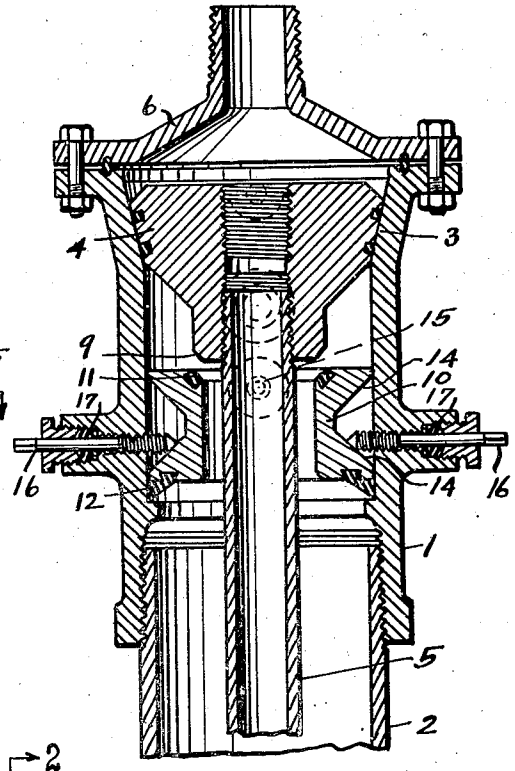


Fig. 2.

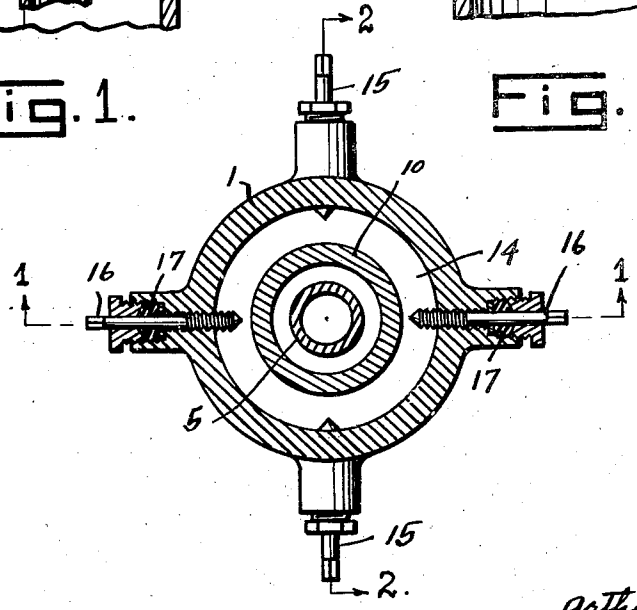


Fig. 3.

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PRESSURE CONTROL TUBING HEAD

Filed March 28, 1938 2 Sheets-Sheet 2

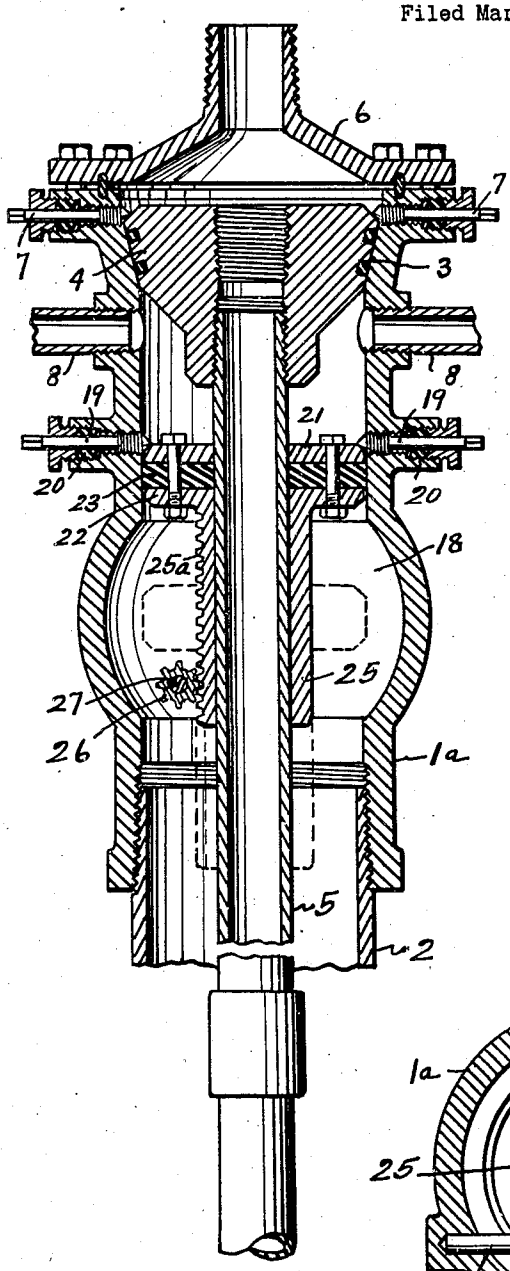


Fig. 4.

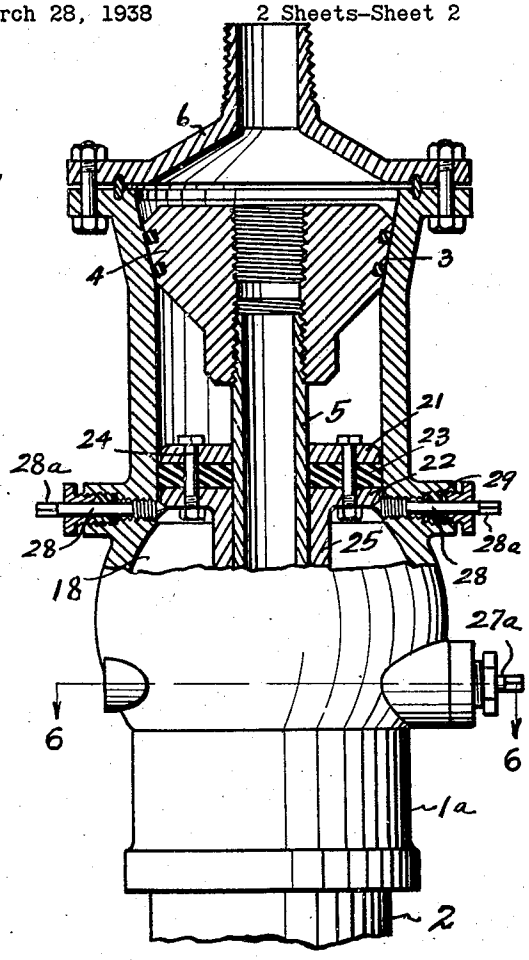


Fig. 5.

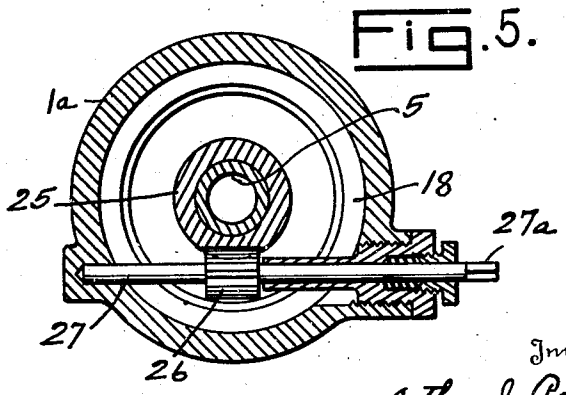


Fig. 6.

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PRESSURE CONTROL TUBING HEAD

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Application March 28, 1938, Serial No. 198,485

5 Claims. (Cl. 166—15)

This invention relates to a pressure control tubing head.

An object of the invention is to provide means for controlling the flow of fluid under pressure from a well.

In the production of oil or other fluid from a well, the flow line or lines leading from the well head are usually controlled by a valve or valves.

In case a valve, or fitting, becomes defective or leaks, it becomes necessary to make repairs or substitute a new part for the defective part. In such case, it is necessary or desirable to cut off the flow of fluid through the defective part. It is one of the main objects of the present invention to provide means whereby such flow may be cut off for the purposes stated or for any other desirable purpose.

A further object of the invention is to provide means within the head for so controlling the flow.

It is another object to provide a device of the character described, and for the purpose stated, or for similar purposes, having means accessible from without the head for actuating the flow controlling means into active or closed position or into inactive or open position.

With the above and other objects in view, the invention has particular relation to certain novel features of construction, operation and arrangement of parts, an example of which is given in this specification and illustrated in the accompanying drawings, wherein—

Figure 1 shows a vertical sectional view of a tubing head showing the flow controlling means therein in active position, taken on the line 1—1 of Figure 3.

Figure 2 shows a vertical sectional view, showing the flow controlling means in open or inactive position, taken on the line 2—2 of Figure 3.

Figure 3 shows a transverse sectional view taken on the line 3—3 of Figure 1.

Figure 4 shows a vertical sectional view of another embodiment.

Figure 5 shows a side view, partly in section, taken at right angles to the form shown in Figure 4, and

Figure 6 shows a cross-sectional view taken on the line 6—6 of Figure 5.

Referring now more particularly to the drawings, wherein like numerals of reference designate the same parts in each of the figures, the numeral 1 designates a tubing head shown attached to the upper end of an outer pipe 2 in a well. The tubing head has the inside downwardly converging seat 3 on which is seated the tubing hanger 4 which forms a fluid tight joint with the seat and which is of a general tubular form. The tubing 5 has its upper end attached to the hanger and is thereby suspended into the well. Bolted, or otherwise secured to the upper end of the head there is an adapter 6 on which the Christmas tree or other flow connections may be mounted. The adapter may be secured in seated position by means of the radially movable lock down screws 7 which have a threaded and sealed connection with the head and whose inner ends are engageable against the upper end of the hanger when the hanger is seated on the seat 3 as shown in Figure 1. The lower end of the hanger is reduced in diameter and thus spaced inwardly from the head and leading out from the head beneath the seat 3 are the flow lines 8, 8 which are controlled in the usual way by valves, not shown, and of any selected design. The lower end of the hanger is preferably formed with an annular tapering seat 9.

Surrounding and spaced from the tubing 5, but fitting closely within the head 1, there is an annular valve 10. Countersunk into the upper end of the valve there is an annular seal ring 11, preferably formed of rubber or other suitable sealing material and positioned to fit closely against the seat 9 when the valve 10 is in its upper or active position, as shown in Figure 1. When in its lower position as shown in Figure 2, the seal ring 10 is spaced beneath the seat 9 so as to allow the well fluid to flow upwardly between the valve 10 and the tubing and to reach the outflow lines 8. The lower end of the valve 10 has an annular lip 12 suitably anchored thereto which fits closely against the inside of the head 1. This lip is held firmly against the inside wall of the head under the influence of the pressure fluid to prevent the escape of said fluid around the valve 10 and when the valve 10 is in closed position, the pressure fluid will be prevented from flowing upwardly through said valve and will thus be cut off from the outflow lines 8 to the end that the valves or fittings or other connections of said outflow lines may be removed, repaired and replaced.

The valve has the external upwardly flared face 13 and the external downwardly flared face 14.

There are the radial actuating screws 15, 16 having a threaded connection with the head 1 and whose inner ends are tapered and engage the face 13. Upon screwing these screws 15 inwardly, they will operate against the face 13 to move the valve 10 upwardly, or into active or closed position as shown in Figure 1. The screws 15 are surrounded by suitable stuffing boxes 16,

to form seals beteween them and the head. When the screws 15 are reversed or screwed outwardly they will release the face 13 to permit the valve 10 to move downwardly or into open position. In order to cause such downward movement, the radial actuating screws 16, 16 are provided, which have threaded connections with the head and have tapering inner ends to engage the tapering face 14 when screwed inwardly as shown in Figure 2, whereby the valve 10 will be moved downwardly. The actuating screws 16 are surrounded by the stuffing boxes 17, which form seals therearound and which are located in the head as shown. When the screws 16 are moved inwardly the valve 10 will be moved to open position. When it is desired again to close the valve 10 the screws 16 may be retracted or moved outwardly and the screws 15 moved inwardly to effect the desired purpose. Preferably, the screws 15 are located opposite each other and at right angles to the screws 16, although their location and number are matters of selection.

In the embodiment shown in Figures 4 to 6, inclusive, the head 1*a*, attached to the upper end of the outer pipe, is enlarged, or bowl-shaped, intermediate its ends providing the enlarged, internal chamber 18. In this form the head is also provided with the inside seat 3 to support the hanger 4 as shown in Figures 1 and 2. With the adapter 6, for the Christmas tree bolted on to the head and beneath the seat 3 are the outflow lines, as shown in said Figures 1 and 2.

Beneath the outflow lines 8 there are the oppositely disposed radially movable screws 19, 19, having a threaded connection with the head and surrounded by the stuffing boxes 20.

Slidably mounted on the tubing 5, which is suspended from the hanger, there is a disc-shaped valve composed of the upper and lower annular discs 21, 22 with an annular sealing disc 23 between them which is formed of rubber or similar resilient material, said discs 21, 22 and 23 being clamped in a similar relation in any preferred manner as by the clamp bolts 24. This valve is of a diameter to fit closely within the head above the chamber 18. The inner ends of the screws 19, when the latter are screwed inwardly, form abutments to limit the upward movement of the valve, when the valve is in closed position, as shown in Figure 4. The screws 19 may be screwed outwardly to clear the valve to permit its insertion or removal. The valve plate 22 has a depending sleeve 25 which fits closely around the tubing 5 and one side of which is formed with a rack face 25*a* which is in mesh with a spur gear 26 locked within the chamber 18 and splined on the actuating shaft 27. This shaft is mounted in suitable transversely aligned bearings in the head 1*a* and has an extended polygonal end 27*a* to receive a wrench whereby it may be turned to shift the valve into closed position as shown in full lines in Figure 4 or to open position as indicated in dotted lines in Figure 4. When in open position the fluid flowing upwardly through the pipe 2 will readily pass by said valve and reach and flow out through the lines 8, 8. Should the valves or other connections on said outflow lines require renewal, or replacement, the screw 19 may be screwed inwardly and the valve moved upwardly by an appropriate rotation of the shaft 27 into abutting relation with the inner ends of the screws 19 and the valve thus closed and the flow cut off for making the required repairs. The valve may be locked in said closed position, as shown in Figure 5, by the radially movable locking screws 28, 28 which have a threaded connection with the head and is surrounded by the stuffing boxes 29 and whose outer ends 28*a* are formed polygonal to receive a wrench by means of which they may be turned. When screwed into inner or active position their inner ends will engage underneath the valve to locate it tightly against the inner ends of the screws 19 whereby the valve will be securely held in closed position. It is obvious that the screws 28 may be retracted to permit the actuation of the valve into open position when the repairs have been made and it is desired to permit resumption of the flow.

The drawings and description disclose what is now considered to be preferred forms of the invention, by way of illustration only, while the broad principle of the invention will be defined by the appended claims.

What we claim is:

1. A tubular head for a well, adapted to be connected to the top of a well pipe and having an outlet, a pipe hanger supported in the head, a pipe depending from the hanger, a valve fitted into the head around the pipe, means accessible to an operator for actuating the valve toward the hanger to prevent the flow of well fluid to the outlet and means accessible to the operator for actuating the valve away from the hanger and into open position to permit such flow.

2. A control head for wells having an outflow line leading therefrom, tubing-suspending means in the head, and closing the head above the outflow line, a tubing suspended from said suspending means, a valve slidable on the tubing, said head and valve being shaped so that when the valve is moved to active position it will close the passageway through the head and when moved to inactive position it will open said passageway, means accessible to an operator and operatively connected with the valve whereby the valve may be actuated into open or closed position, a radially movable abutment on the head arranged to limit the movement of the valve upon movement of the valve to closed position and a radially adjustable locking device on the head engageable with the valve and effective to lock the valve in said closed position.

3. A control head for wells having an outflow line leading therefrom, pipe suspending means in the head, and closing the head above the outflow line, a pipe suspended from said suspending means and spaced from the head, a valve in the head around the pipe and vertically movable into upper and lower positions being formed to fit closely within the head and close the space between said pipe and the head when in the upper position and being spaced from the head to open the space when in the lower position, and means accessible to an operator adapted to move the valve into either of said positions independently of movement of said pipe and head.

4. In a control head for wells having an outlet therefrom and a tubing hanger in the head adapted to support a tubing in the head; an annular unitary valve in the head positioned around the tubing and movable longitudinally in the head into upper and lower position, said positions of the valve being below the outlet, the valve being effective to close the head to flow of fluid therethrough to the outlet when in the upper position and to allow flow of fluid therethrough when in lower position, means accessible from without the head to actuate the valve into either of said positions.

5. In a control head for wells having an outlet therefrom and a tubing hanger in the head adapted to support a tubing in the head; an annular unitary valve in the head positioned around the tubing and movable longitudinally in the head into upper and lower position, said positions of the valve being below the outlet, the valve being effective to close the head to flow of fluid therethrough to the outlet when in the upper position and to allow flow of fluid therethrough when in lower position, means accessible from without the head to actuate the valve into either of said positions and a radially moveable abutment on the head arranged to limit movement of the valve upon movement of the valve to upper position and a radially adjustable locking device on the head engageable with the valve and effective to lock the valve in said closed position.

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