

June 9, 1936.

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2,043,428

CONTROL DEVICE FOR WELLS

Filed April 15, 1935

2 Sheets-Sheet 1

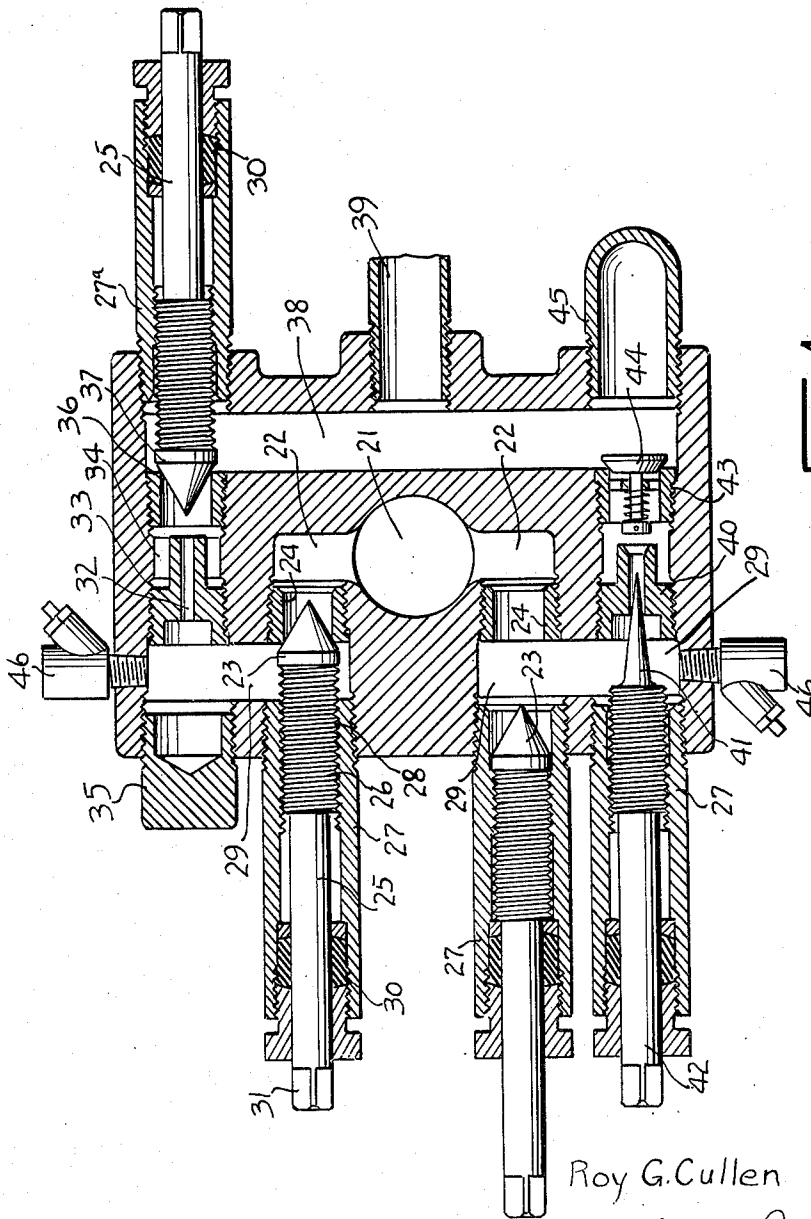


Fig. 1.

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2 Sheets-Sheet 2

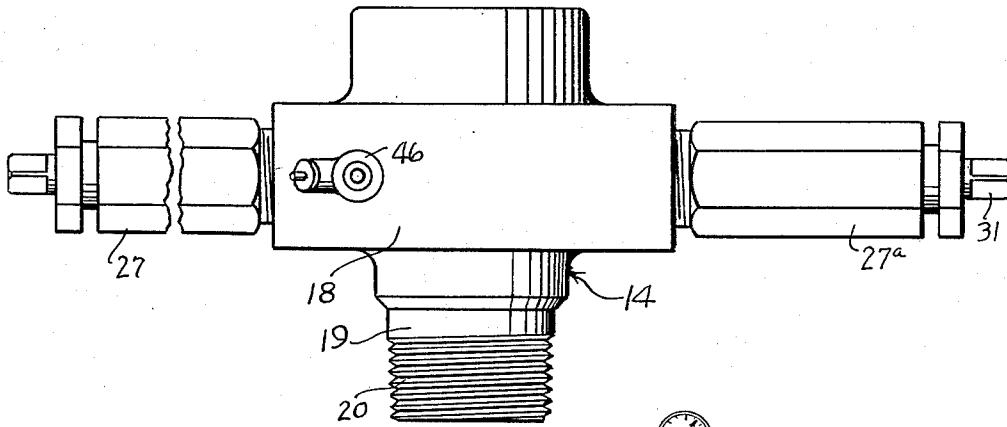


Fig. 2.

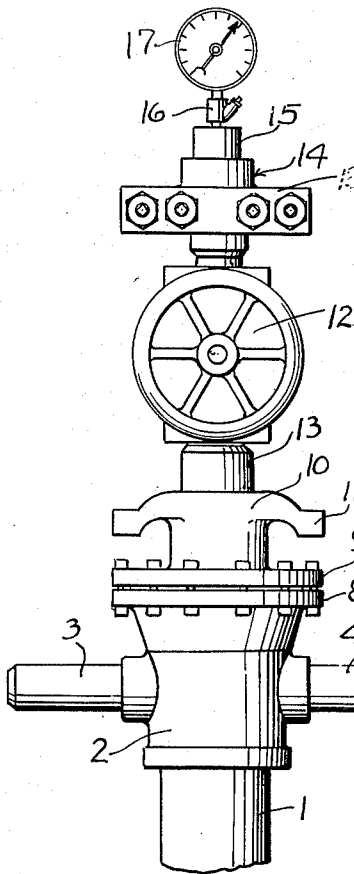


Fig. 3.

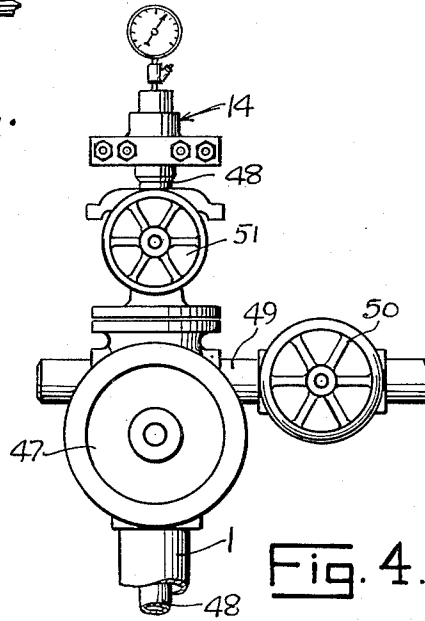


Fig. 4.

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UNITED STATES PATENT OFFICE

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CONTROL DEVICE FOR WELLS

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8 Claims. (Cl. 166-15)

My invention relates to casing head equipment employed in flowing wells and has for its object the provision of means to control the flow of fluid from the well as desired. It has particular reference to wells which have to be restricted as to the amount of flow from the well as in cases where the wells are under proration and the number of barrels per day of production is limited.

It is a further object of the invention to provide a control device of simple and economical construction which makes it possible to do away with the usual expensive flow lines ordinarily called the Christmas tree now in common use for controlling the flow from the well.

I desire to provide a unit for attachment to the outlet from the well which will enable the operator to limit the amount of flow from the well to the desired amount and to still be able to change the path of the flow from the well so as to allow the operator to make changes and renewals of parts without discontinuing the flow of oil from the well.

In the drawings herewith Fig. 1 is a transverse section in plane view of my control device.

Fig. 2 is a side elevation thereof.

Fig. 3 is a side elevation showing the usual equipment at the upper end of the well with my invention in position thereon.

Fig. 4 is a similar elevation of a slightly different well head equipment with my invention installed thereon.

The ordinary flowing well is equipped with a casing such as is shown at 1 in Figs. 3 and 4. This casing has at its upper end in the Fig. 3 embodiment a casing head 2, with a pair of lateral outlets therefrom, one of which may be closed with a bull plug 3 and the other outlet 4 having therein a hand operated control valve 5. This outlet may be opened to allow the flow of fluid from the casing, but when the well is flowing through the tubing the outer end of this branch will be closed by a plug 6 and the pressure gauge 7 and vent 16' may be provided at the outer end of said plug.

I have shown the upper end of the casing head 2 as provided with flanges 8 to which is secured the lower flanges 9 of a bonnet 10. Said bonnet has laterally projecting ears 11 for engagement by an elevator or other means whereby the said bonnet may be handled.

Above the bonnet I have shown a master valve 12 in the flow line 13 from the well. Above this

is installed my control member shown generally at 14. In this particular embodiment I have shown above the control head a plug 15 having thereon a vent 16 and pressure gauge 17.

The particular construction of my control member 14 is shown in Figs. 1 and 2. As will be seen from Fig. 2, I provide a housing 18 which is approximately rectangular in plan view and is materially wider than the lower end 19 which is threaded at 20 for engagement with the upper end of the flow tube. There is a central passage upwardly through the housing and in the upper end of said passage I may screw a plug 15 with the pressure gauge thereon as previously noted.

Referring particularly to Fig. 1, it will be seen that I have a central longitudinal passage 21 through the device which may be understood as being the extension therethrough of the flow line. Within the housing this passage is connected with two lateral passages 22, which extend to each side of the passage forming chambers or channels through which the fluid may pass from the well. The two ends of the housing may be equipped alike if desired but I have shown at the upper end of the housing, as seen in Fig. 1, a valve 23 adapted to fit within a seat 24 removably screwed within the passage leading from the chamber 22. This valve 23 is at the inner end of a valve stem 25 threaded at 26 for longitudinal screwing action within a sleeve 27. Said sleeve 27 is threaded on its outer surface and engaged within an opening 28 leading from the valve chamber 29.

At the outer end of the valve stem 25, and within the sleeve 27, I provide a stuffing box indicated generally at 30 for making a fluid tight seal about the stem 25. The projecting end of the valve stem is squared at 31 for engagement with a hand wheel or wrench by means of which the valve may be rotated to move the same toward or from the seat 24.

A valve chamber 29 is extended laterally from the valve so that the chamber is directed toward the side of the housing to connect with a restricted passage 32 from the chamber. This restricted passage is formed with a choke member 33, which is screwed within a passage 34 in the housing. Said choke member may be unscrewed and removed from its position in the passage 34 by the removal of a plug 35 closing the side of the valve chamber 29.

After passing through the restricted choke passage 32 liquid from the well may pass a valve seat 36 controlled by the valve 37 similar in all

respects to the valve member 23 previously described. This valve is screwed within a sleeve 27a, which is secured in the side of the housing in the same manner as is the sleeve 27 in the previously described valve. This valve controls the passage from the housing to the laterally extending channel 38 leading to the flow line 39.

It will be seen that the fluid coming from the well and taking this passage to the outlet 39 is under the control of two separate valves 23 and 37, and is also restricted as to its flow by the choke passage 32. This line of flow may be closed off simply by closing the valve 23 and when the valve 23 is closed the plug 35 may be removed and access may be had to the choke member 33, so that it may be removed and replaced when worn. While this is being done the valve 37 will also be closed so that fluid from the channel 38 may not reach the downstream end of the choke 33.

The fluid from the well may also find an outlet through the opposite side of the housing through the other chamber 22 and through a valve seat 24 into a chamber 29 and under the control of a valve 23 mounted for operation within the sleeve 27 exactly as in the passage at the other side of the housing. This valve in the drawing, Fig. 1, is shown as being open.

After having passed this valve the fluid takes a route similar to that described at the other side of the valve. However, instead of a choke 33 a similar choke 40 is provided, said choke being adapted to cooperate with the needle valve 41 by means of which the passage of fluid through the choke may be regulated. This needle valve is formed at the forward end of a valve stem 42 operable within the sleeve 27, secured in the housing in the same manner as were the other valves previously described. By the movement of this needle valve the flow of fluid from the well may be regulated with some degree of accuracy.

After having passed the choke I have provided a valve seat 43 similar to the valve seat 36, but instead of a valve 37 therein I have shown a check valve 44 of ordinary construction which is arranged to allow the flow of fluid from the well to the outlet 39 but to prevent any return of fluid back toward the direction of the choke 40. It is to be understood that this valve seat 43 may accommodate a valve identical with the valve 37 if desired. In such case the valve sleeve 27a would be screwed within the opening which is shown as closed by the bull plug 45. The operator has his choice of using either a valve 37 or a check valve 44 as desired.

In each of the valve chambers 29 I have shown lateral outlets from the side of the housing by way of a vent 46. This vent is of ordinary construction and is arranged to be opened to allow the release of pressure within the chamber 29 when changes in the structure are desired.

Referring particularly to Fig. 1, it will be noted that the outlet from the passage 21 from the well to the flow line 39 may be from either or both ends of the housing. However, normally only one route for the oil will be desirable. The use of two separate routes from the well to the flow line 39 enables the operator to make repairs and changes in the structure whenever desired without in any way interfering with the continuous flow of fluid from the well. Thus if the choke 33 becomes worn or needs replacing it is only necessary to close the valve 33 and the valve 37, remove the plug 35 and withdraw the choke member for re-

newel or repair, allowing the fluid to flow through the opposite end of the housing. On the other hand, if the choke 40 becomes worn and needs replacing the valves at the other end of the housing may be opened, the valve 23 adjacent the needle valve 41 may be closed, and the sleeve 27 in which the needle valve operates may be unscrewed and withdrawn together with the needle valve and the choke member 40 removed and replaced without interfering in any way with the operation of the well. If a new choke valve 41 is desired it can also be replaced. The vent members 46 at the sides of the chamber 29 may be open when the valves at each side of the chamber 29 are closed. Thus, if the choke member 33 is to be removed there may be pressure fluid confined in the chamber 29 when the valves 23 and 37 have been closed. In order to release this pressure the vent is available so that the operations thereafter may be conducted without trouble or danger to the operator.

While I have shown a needle valve 41 in only one of the passages it is to be understood that a similar needle valve may be substituted in place of the plug 35 in the other passage. Also check valves 44 may be used in both passages instead of only one or, on the other hand, valves 37 may be used in both passages eliminating altogether the use of the check valve. It is to be understood therefore that these obvious changes in the assembly shown in Fig. 1 may be made without departing in any way from the spirit of the invention.

In Fig. 4 I have shown my device as being installed on the well head where said head is differently equipped. In this view the casing is secured to the lower end of a blowout preventer 47. This blowout preventer is to be understood as being of ordinary construction whereby rams may be closed about the tubing shown at 48. By means of the blowout preventer the passage of fluid from the lateral outlet 49 can be closed off while any repairs necessary on the branch line 49 are made. This line may, however, be closed by a valve 50 if desired. At the upper end of the blowout preventer I have shown a master valve 51, at the upper end of which is connected my control head 14. In this particular device I am enabled to control the flow from the tubing 48 in the same manner as it was controlled in the embodiment shown in Fig. 1.

By the use of my structure the usual Christmas tree consisting of branch lines and a plurality of expensive control valves may be dispensed with. I am enabled by the use of this device to control the flow of fluid from the well and I am still enabled to make repairs and changes in connection with the parts subject to wear without interfering in any way with the production from the well. The device is much simpler and cheaper than the usual control apparatus, thus enabling the operator, while the well is under production and the flow limited, to produce all the desired amount of fluid from the well without the installation of the usual expensive equipment.

What is claimed as new is:

1. A well head control including a well casing, a casing head thereon, a flow tubing extending from said casing head, a housing adjacent the upper end of said tubing, a flow pipe from said housing, a plurality of passages in said housing from said tube to said flow pipe, two valves in each passage between said tube and pipe, and a choke device between said two valves.

2. A well head control including a well casing, a casing head thereon, a flow tubing extending from said casing head, a housing adjacent the upper end of said tubing, a flow pipe from said housing, a plurality of passages in said housing from said tube to said flow pipe, two valves in each passage between said tube and pipe, the upstream one of said two valves being manually operated, and a choke device between said two valves.

3. A well head control including a well casing, a casing head thereon, a flow tubing extending from said casing head, a housing adjacent the upper end of said tubing, a flow pipe from said housing, a plurality of passages in said housing from said tube to said flow pipe, two valves in each passage between said tube and pipe, and a choke device between said two valves, said choke device being removable from said housing when both said two valves are closed.

4. A well flow tubing, a housing on said tubing, an outlet flow pipe from said housing, a pair of opposed passages in said housing between said tubing and said pipe, a choke device in each passage, and means on each side of said choke device to close off the flow of liquid through said passage.

5. A well flow tubing, a housing on said tubing, an outlet flow pipe from said housing, a pair of opposed passages in said housing between said tubing and said pipe, a choke device in each passage, valves in said housing operable to close each

of said passages upon both the upstream and downstream sides thereof and means to operate said valves.

6. A well flow tubing, a housing on said tubing, an outlet flow pipe from said housing, a pair of opposed passages in said housing, between said tubing and said pipe, a choke device in each passage, means to regulate the amount of fluid which may pass one of said choke devices, and means on each side of said choke device to close off the flow of liquid through said passage.

7. A well flow tubing, a housing on said tubing, an outlet flow pipe from said housing, a pair of opposed passages in said housing between said tubing and said pipe, a choke device in each passage, and means on each side of said choke device to close off the flow of liquid through said passage, and a vent from each passage on the upstream side of said choke.

8. A casing head, a tubing extending upwardly therethrough, a master valve in said tubing, a housing above said master valve on said tubing, an outlet pipe from said housing, a plurality of passages in said housing from said tubing to said outlet pipe, a choke device threadedly engaged in each of said passages, a valve seat secured in said passage on opposite sides of said choke device, a valve in each of said seats, and a normally closed opening in said passage on the upstream side thereof through which said choke device may be removed.

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