Sept. 7, 1926.

1,598,794

A. E. WARREN

WELL CONTROL HEAD

Filed Jan. 26, 1926

2 Sheets-Sheet 1

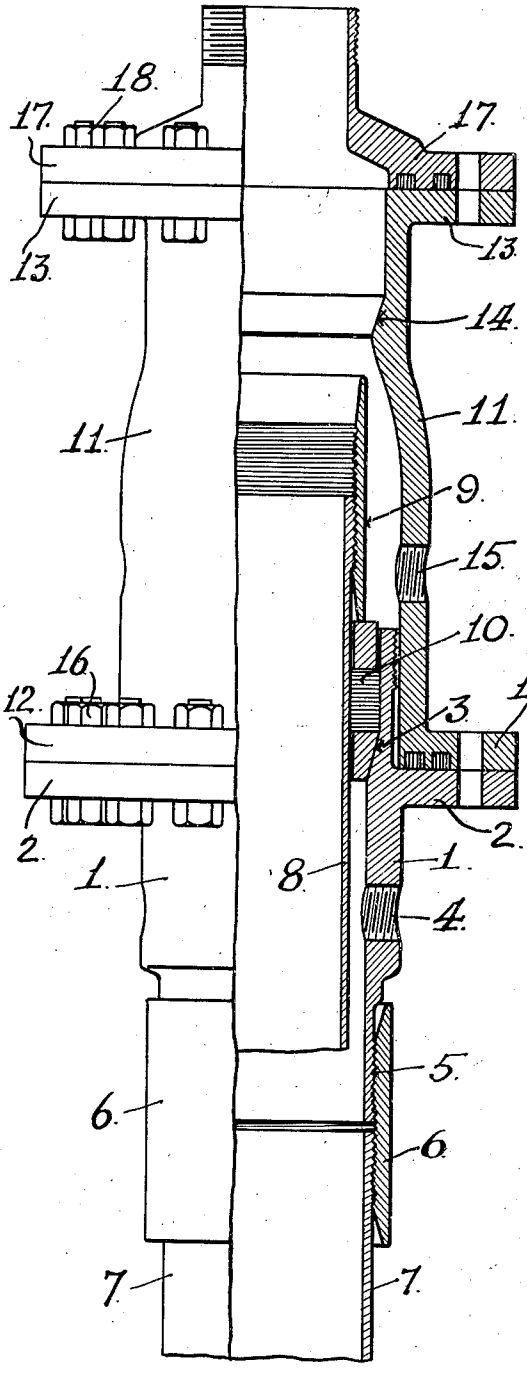
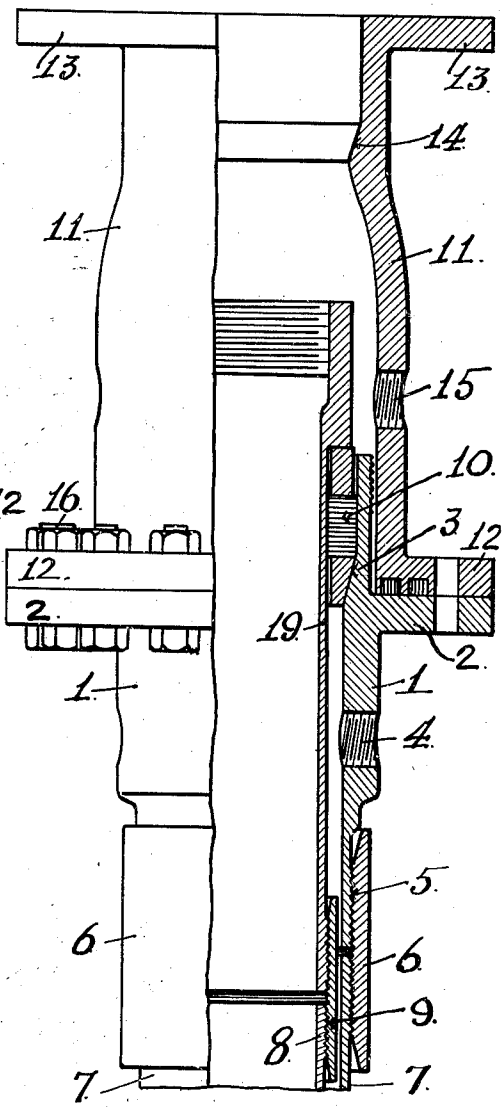


Fig. 1.

Fig. 2.



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Fig. 3.

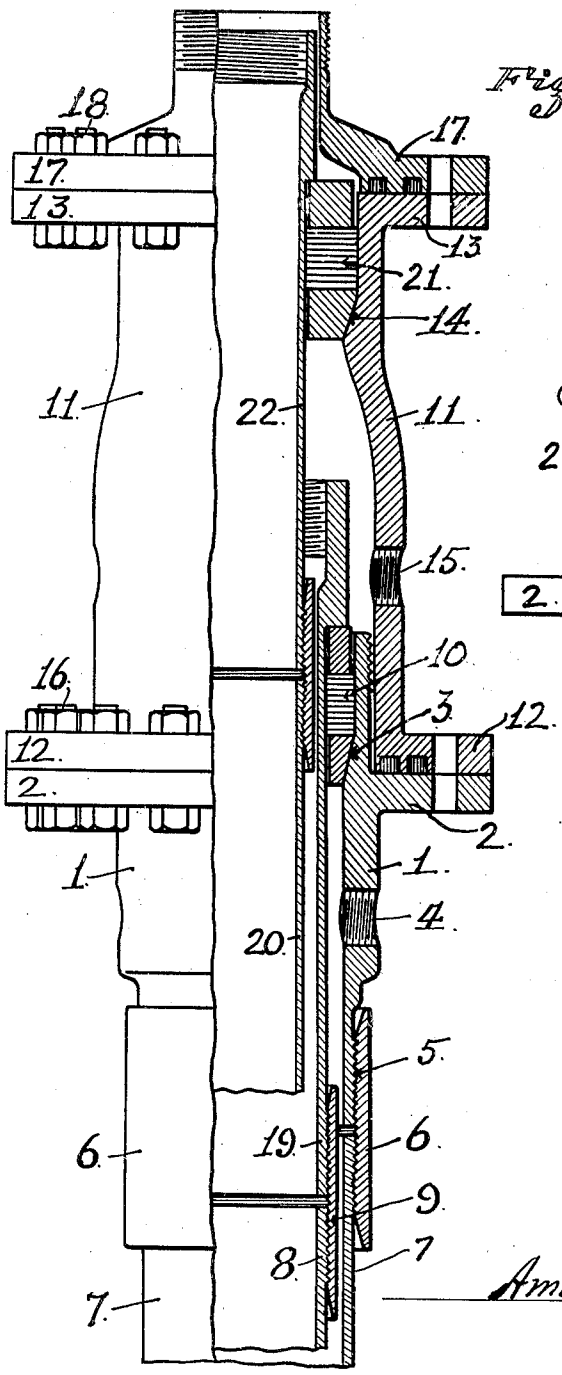
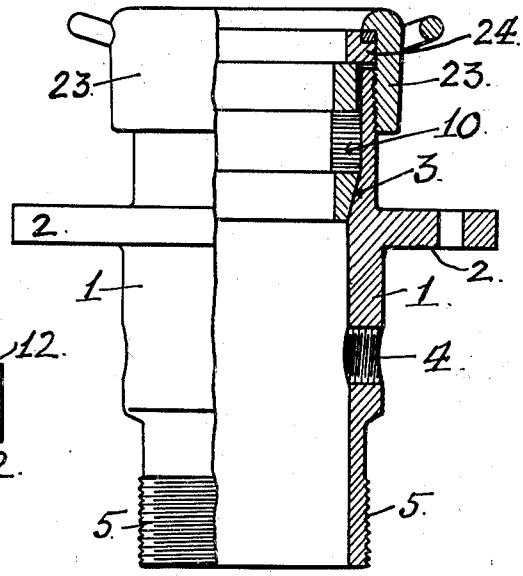


Fig. 4.



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UNITED STATES PATENT OFFICE.

AMOS E. WARREN, OF VENTURA, CALIFORNIA.

WELL CONTROL HEAD.

Application filed January 26, 1926. Serial No. 83,782

My invention relates to the class of packing-heads for the control of wells, and is especially intended for use with oil wells having a heavy gas pressure.

The object of my invention is to provide a device capable of keeping the well under perfect control during drilling, or while it is being "brought in" or while it is a flowing well on production, said device making all operations in connection with the control of a well, simple, accurate, and fast.

To this end, my invention consists in the novel control-head hereinafter described, and comprising essentially an improved packing-head member adapted for connection with the water string in the well, and a novel head cap member adapted for connection at one end with said packing head member, and at its other end for connection with a fluid control member.

The nature of my control head will be fully understood by reference to the accompanying drawings in which

Fig. 1 is a view, partly in section and partly in elevation, of the assembly of said head as used under the condition of the oil string being run in at a time when the well starts to flow.

Fig. 2 is a similar view showing a like condition, but with a modification in the means for landing the oil string on the packing rubber.

Fig. 3 is a similar view showing a condition in which a tubing string is run in through the oil string.

Fig. 4 is a view, partly in section and partly in elevation, showing the improved packing head member in its primary use in well drilling.

Referring first to Fig. 1, the numeral 1 is a packing-head comprising a pipe section having an exterior flange 2, an interior packing seat 3, a vent 4 and exterior foot threads 5.

6 is a coupling by which the water-string 7 is connected to the packing head.

8 is the oil string having a coupling 9.

10 is a packing rubber between the packing-head seat 3 and the oil string 8, and upon this rubber the coupling 9 of the oil string is landed.

11 is the packing-head cap, comprising a pipe section having a foot flange 12, a head flange 13, an interior packing seat 14 and a vent 15. The flange 2 of the packing head 1, and the flange 12 of the head-cap 11 are secured together by the bolts 16. 17 is the flange of a member known as the "Christmas tree", the function of which is to establish fluid flow connections from the well; and by means of control valves it can be connected, to flow lines or pumps or both, and thus cause the fluid to flow through small orifices in the usual manner of control.

The parts as assembled in Fig. 1, show the adaptation of the control head attached to a water string, and is for the purpose of inserting an oil string into a well, without danger of blow-outs between strings of casing, and to expedite the immediate capping of the well in case a blow-out should occur through the oil string while the latter is being placed in the hole.

This will be better understood from the following explanation more in detail. It should be stated preliminarily that the packing-head member 1 has been previously used in drilling the well as will presently be described in connection with Fig. 4, and its use continued up to the time the oil-string is started into the well, which is the condition shown in Fig. 1. The vent 4 of the packing head 1 may be supposed to have flow connections screwed into it, so that, either while drilling, or while running in the oil string, or at any time thereafter, if a gas pressure should develop, the pressure between the water string and the oil string can be regulated.

Assume that the well starts to flow while the oil string is being run into the well, and that it is therefore necessary to bring the well under control. The packing rubber 10 is dropped to its seat 3 in the head 1, and around the oil string 8. The oil string is lowered and landed on the packing rubber 10 by the coupling 9. The weight of the oil string compresses the packing rubber against its seat and the oil string, and thus seals off the space between the oil string and the water string.

The head cap 11, previously attached to the "Christmas tree" by bolting the flanges 17 and 13 together, as shown at 18, is then lowered and bolted upon the packing head 1, by the bolts 16 through the flanges 12 and 2. The control valves on the "Christmas tree" (not shown) can now be connected to

flow lines or pumps or both. Either way that the Christmas tree flow lines are connected up will permit the well to be placed under control by causing the fluid to flow through small orifices. When this is done the pressure on the well will rise and, therefore, the pressure between the oil string and the water string will rise, and it may be necessary to relieve this pressure through the flow connections which are screwed into the vent 4 in the packing-head 1. It will, of course, be understood that the vent 15 in the head cap 11 has been previously plugged, as it is not necessary in this condition of the well control.

Thus, in a simple and direct way, the well is brought under control.

Referring now to Fig. 2, similar parts to those of Fig. 1 are designated by like numerals. In the assemblage here shown the condition is such that the well has not started to flow, so instead of landing the oil string on the coupling 9 as in Fig. 1, it is landed on the packing rubber by a steel landing bushing 19 which is screwed into the coupling 9. This landing bushing is an added safety measure. It overcomes the possibility of having the packing rubber pinch the casing hard enough to loosen the coupling 9 as in Fig. 1. It is made to the same dimensions as the oil string casing, so that if it later becomes desirable, as will presently be seen, to run tubing into the well, it can be run through this bushing into the oil string.

Referring to Fig. 3, similar numerals again indicate similar parts hereinbefore described. In this case the oil string 8 is landed by means of the bushing 19, as in Fig. 2. Tubing 20 inserted in the oil string is landed upon a packing rubber 21 in the head cap 11 by a landing bushing 22 in the same way.

After the oil string 8 has been landed, and provided the well is quiet or "dead", the head cap 11 is flanged on to the packing head 1. Then suitable connections are screwed into the vent 15 in the head cap 11, similar to those fitted to the vent 4 of the packing head, and serve a similar purpose. The tubing 20 is then run in the well and landed on the packing rubber 21 in the head cap 11, by tubing bushing 22, the latter being similar to the landing bushing 19 and serves a like purpose. After the tubing 20 has been landed, the "Christmas tree" is attached to the head cap 11.

All that then remains to be done, to bring the well in, is to make the usual connections to the flow tanks and pumps, and circulate the fluid in the well until it starts to flow.

Referring to Fig. 4, I indicate an initial condition, namely that of drilling the well, in which the packing-head member of my improved and combined device in its several developments is very much the same as packing-heads now in use; that is to say, it is a pipe section with an interior packing seat, a vent and means to connect it with the water string. It has also the common form of compression clamp 23, split ring 24, and packing rubber 10, which is adapted to be compressed against the drill pipe to seal the space between said pipe and casing. Its use in this connection is well known and need not be further explained. But I have for my invention and to adapt this packing-head for association with and as a constant member and factor of the combined device in the several situations described in connection with Figs. 1, 2 and 3, formed said head with the exterior flange 2, by which it is enabled to enter the combination with the head-cap 11 for the variety of purposes and conditions which I have set forth. This control-head, therefore, may be used during the drilling of the well, and while it is being brought in, and while it is on production; in short, all the control needed on any well is capable of being exercised by the use of this device.

I claim:—

1. A control-head for wells comprising a packing-head member adapted to be fitted to a water string in the well, said member having a seat on its inner face for a packing rubber, and a vent in its side below said seat for pressure regulating connections; a head-cap member, adapted at one end for connection with a member controlling the fluid flow, and at the other end for connection with said packing-head member; and a packing rubber fitted in said seat for suspending an oil string landed upon it and sealing off the space between said strings.

2. A control-head for wells comprising a packing head member adapted to be fitted to a water string in the well, said member having a seat on its inner face for a packing rubber and a vent in its side below said seat for pressure regulating connections and said member being also provided with an exterior flange; a head-cap member having a flange at one end for connection with a member controlling the fluid flow, and having at the other end a flange for connective association with the flange of the packing head member; and a packing rubber fitted in said seat for suspending an oil string landed upon it and sealing off the space between said strings.

3. A control-head for wells comprising a packing-head member adapted to be fitted to a water string in the well, said member having a seat on its inner face for a packing rubber and a vent in its side below said seat for pressure regulating connections; a head-cap member adapted at one end for connection with a member controlling the fluid flow and at the other end for connec-

tion with said packing-head member, said head-cap member having a seat on its inner face for a packing rubber and having also a vent in its side below said seat for pressure regulating connections; and packing rubbers fitted in said seats for suspending an oil string and an inner tubing string landed upon them respectively, and sealing off the spaces between said strings.

In testimony whereof I have signed my name to this specification.

AMOS E. WARREN.