July 28, 1925. 1,547,311

C. E. FISHER

APPARATUS FOR CONTROLLING FLOW OF GAS OR OIL

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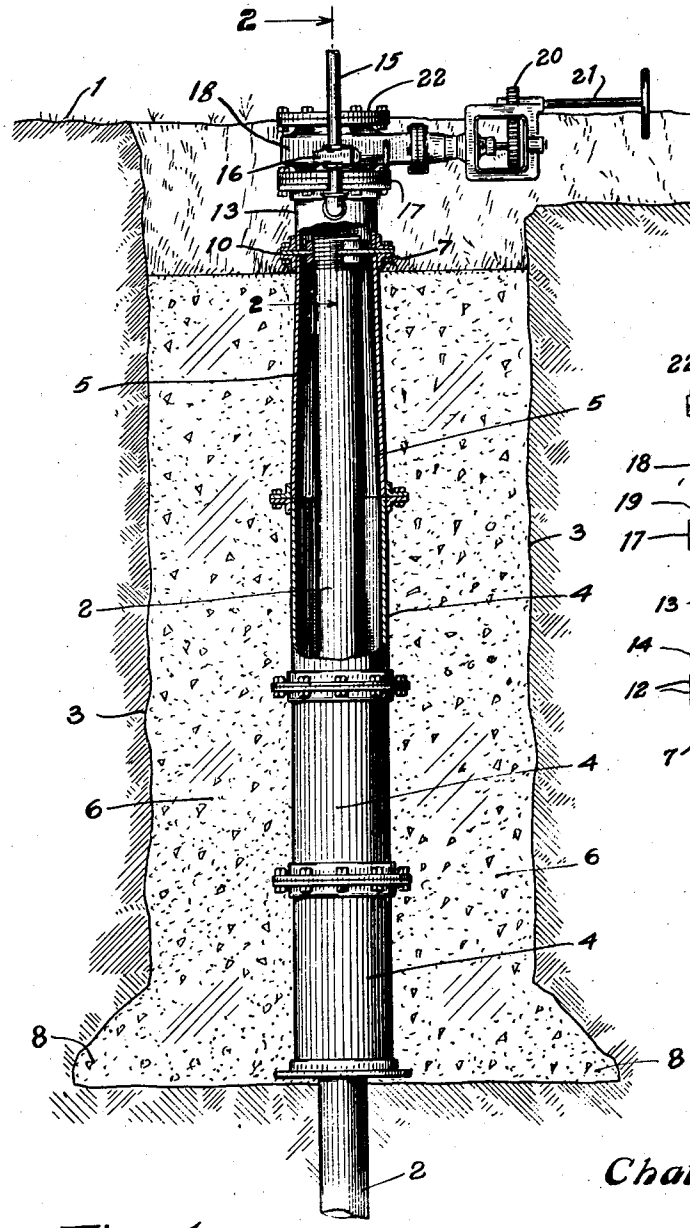


Fig. 1.

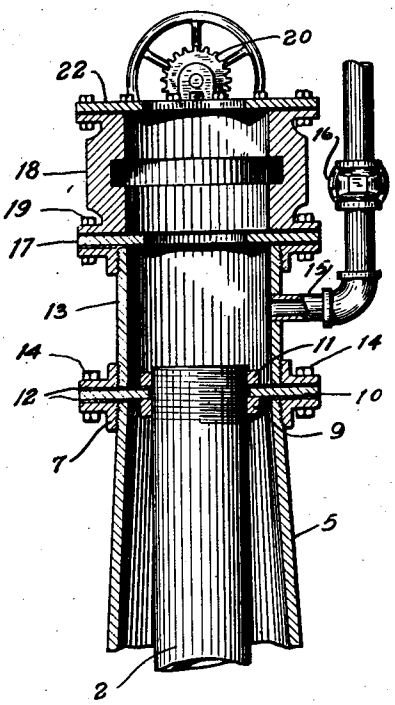


Fig. 2.

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APPARATUS FOR CONTROLLING FLOW OF GAS OR OIL.

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To all whom it may concern:

Be it known that I, CHARLES E. FISHER, a citizen of the United States, residing at 2840 W. Holden St., in the city and county of Denver, and State of Colorado, have invented certain new and useful Improvements in Apparatus for Controlling Flow of Gas or Oil; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in apparatus for controlling the flow of gas or oil from wells.

It is well known to those who are familiar with the drilling of oil and gas wells that the apparatus that is available today for controlling the flow of gas and oil from wells is extremely defective with the result that gas wells often flow for weeks before they are brought under control and sometimes catch fire which greatly increases the difficulty of controlling them. When an oil gusher is brought in, trouble is likewise experienced in controlling the flow, with the result that large quantities of oil is wasted and immense damage is done to the surrounding country.

It is the object of this invention to produce a simple and cheap means for conveniently and positively controlling the flow of gas or oil from high pressure wells.

My invention, briefly described, consists in first concreting in place, in the ground, a safety casing, or anchor pipe having a diameter sufficiently large to receive the largest casing that is to be employed. The drill tools are operated through this anchor pipe and when the well is cased the upper end of the well casing is attached to the upper end of the anchor pipe by means of an annular ring cut from a piece of steel plate so as to seal the opening from the well casing to the space between it and the anchor pipe. A short section of pipe is secured to the upper end of the anchor pipe and to the upper end of this a gate valve is attached. A steel plate, having an opening of sufficient diameter to receive the smallest casing, is interposed between the short section of the anchor pipe and the gate valve for the purpose of protecting the latter against injury from stones and other solid particles that might be projected upwardly by the escaping gas or oil.

In order better and more clearly to describe my invention, I shall have reference to the accompanying drawing in which my invention is shown in its present preferred form and in which:

Fig. 1 shows a section through the ground near the upper surface of the ground showing my safety anchoring and controlling device in place, part thereof being broken away to better disclose the construction, and

Fig. 2 is a section through the top of the device, taken on line 2—2 Fig. 1.

In the drawing numeral 1 represents the surface of the ground and 2 a well casing which, in this illustration, may be considered as the smallest casing that has been employed. The larger casings of which there may be one or more have been omitted in the interest of clearness. When the well is first started or any time before the completion thereof, a hole represented by the numeral 3 is dug. This hole may be of any suitable diameter as, for example, six feet and may be as deep as desired but may, for the purpose of this disclosure, be considered as 18 to 20 feet. After the hole has been dug, an anchor pipe consisting of of a number of separate cylindrical sections 4 of flanged steel pipe to the upper section of which I secure a tapering section 5 of similar pipe is put in place in the hole. The anchor pipe, consisting, as described, of a plurality of sections is put in place concentrically of the well and the space between it and the wall of the hole 3 is filled in with concrete 6. The concrete may extend to within a few inches of the flange 7 of the tapering section 5 and may have its base enlarged in diameter as indicated by the numeral 8. It is evident that by the means described the anchoring pipe may be so securely attached to the earth that it will require a greater force than that ordinarily developed by a gas or oil well to move the same. The casing 2 projects a short distance over the top of the section 5 and has a nut 9 threaded thereonto. A round steel plate 10 has a central opening of such a diameter that it will receive the casing 2 and an outer diameter substantially the same as the outside diameter of the flange 7. This round plate 10 is clamped against the nut 9 by means of a similar nut 11. Copper

gaskets 12 may be applied to each side of plate 10 if desired. A short section 13 of pipe similar in construction to sections 4 and 5 is placed on top of plate 10 and secured to flange 7 by bolts 14. This section has a four-inch pipe 15 tapped into the side thereof. This pipe is provided with a gate valve 16. A plate 17 similar in shape and size to plate 10 is placed on the upper end of pipe 13 and clamped in place between it and the valve 18 by means of bolts 19. This plate is intended to serve as a guard for the valve and to protect the latter from injury due to stones that may be projected upwardly from the escaping gas. The valve 18 may be any standard form of gate valve of the proper size and is preferably provided with gears 20 for decreasing the force required to operate it. The operating means for valve 18 may include a long stem 21 by means of which the valve may be closed or opened from a considerable distance, thereby making it possible to close the valve in case the gas should catch fire. As it is the intention to operate the drill after the device has been assembled, it is essential that the valve 18 shall be protected against injury and for this purpose I bolt a steel protector plate 22 to the upper end of the valve. In drilling it is, of course, impossible to keep the parts free from dirt grit and sand and unless some means is provided for preventing it, the mechanism of valve 18 will become clogged with dirt and inoperative. It is also well understood that a gas that is permitted to expand adiabatically from a high pressure to a lower one, produces a low temperature, therefore, if the valve 18 were full of water or of wet mud, it would freeze solid if a gas well should come in. This would, of course, make it impossible to close off the gas flow. To guard against the valve becoming inoperative for any of the above reasons, it should be packed with a hard oil or grease that will prevent water or moist dirt to enter and which, at the same time, will not itself become unduly hard at low temperatures.

Let us now suppose that the well is nearing oil or gas sands and that the smallest casing is connected to the anchor pipe by the means described. A gas tight seal is formed between the inner space in the casing 2 and the space between the casing and the anchor pipe. If a flow of gas is obtained, the tools are withdrawn, and the valve 18 closed, thereby cutting off the flow. By means of the pipe 15 with its valve 16 connection may readily be made to the well. If the gas should catch fire before the valve 18 is closed, the latter can still be readily closed as the rod 21 may be made as long as necessary. If the well should prove to be a "duster" the valve 18 pipe section 13 and plates 10 and 17 as well as the nuts 9 and 11 may be removed for use in some other place. This leaves the casing in position to be drawn. In this manner the only loss in case the well proves unproductive will be the sections 4 and 5, the labor and the concrete, while in case of an oil or gas well the saving will be immense. The plate 10 forms a seal that positively prevents the gas or oil from passing downwardly and escaping between the casings and from coming upwardly and escaping between the casings as nearly always happens when a valve is attached to the smallest casing used. It is, of course, understood that the largest as well as the smallest casing terminate within the anchor pipe.

Having now described my invention what I claim as new is:

1. Means for controlling the flow from gas and oil wells comprising in combination, a well casing, an anchor pipe surrounding said casing, means for anchoring said pipe to the earth, means for sealing the annular space between the casing and the anchor pipe and a valve for closing said anchor pipe, said valve being located above the top of the casing and the seal.

2. Means for controlling the flow from gas and oil wells comprising in combination, a well casing whose lower end projects into the earth, an anchor pipe embedded in the earth and enclosing the upper end of the casing, said anchor pipe being of greater diameter than the casing and concentric with the latter whereby an annular cylindrical space is formed between the two, means for connecting the casing with the anchor pipe so as to form a seal that will prevent a fluid from passing and a valve secured to the anchor pipe above the seal, said valve being adapted to close the anchor pipe so as to prevent the exit of gas therefrom.

3. Means for controlling the flow from gas and oil wells comprising in combination, a well casing whose lower end projects into the earth, an anchor pipe embedded in the earth and enclosing the upper end of the casing, said anchor pipe being of greater diameter than the casing and concentric with the latter whereby an annular cylindrical space is formed between the two, the anchor pipe being formed of sections, the upper end of one of which terminates a short distance below the upper end of the casing, an annular disk secured to the upper end of the casing so as to form a seal and a valve secured to the anchor pipe above the seal, said valve being adapted to close the exit from the casing.

4. Means for controlling the flow from gas and oil wells comprising in combination, a well casing whose lower end projects into the earth, an anchor pipe embedded in the earth and enclosing the upper end of

the casing, said anchor pipe being of greater diameter than the casing and concentric with the latter whereby an annular cylindrical space is formed between the two, the anchor pipe being formed of sections, the upper end of one of which terminates a short distance between the upper end of the casing, an annular disk secured to the upper end of the casing so as to form a seal, a valve secured to the anchor pipe above the seal, said valve being adapted to close the exit from the casing and a valve controlled pipe opening into the space between the valve and the sealing means.

5. Means for controlling the flow from gas and oil wells comprising in combination, a well casing whose lower end projects into the earth, an anchor pipe embedded in the earth and enclosing the upper end of the casing, said anchor pipe being of greater diameter than the casing and concentric with the latter whereby an annular cylindrical space is formed between the two, the anchor pipe being formed of sections, the upper end of one of which terminates a short distance below the upper end of the casing, an annular disk secured to the upper end of the casing so as to form a seal, a section of pipe secured to the upper end of the anchor pipe so as to clamp the annular disk between it and the upper end of the anchor pipe, a valve controlled pipe connected to the said section and a valve secured to the upper end of the pipe section so as to open and close the exit from the latter.

6. Means for controlling the flow from gas and oil wells comprising in combination, a well casing whose lower end projects into the earth, an anchor pipe embedded in the earth and enclosing the upper end of the casing, said anchor pipe being of greater diameter than the casing and concentric with the latter whereby an annular cylindrical space is formed between the two, the anchor pipe being formed of sections, the upper end of one of which terminates a short distance below the upper end of the casing, an annular disk secured to the upper end of the casing so as to form a seal, a section of pipe secured to the upper end of the anchor pipe so as to clamp the annular disk between it and the upper end of the anchor pipe, a valve controlled pipe connected to the said pipe section, a valve secured to the upper end of the pipe section so as to open and close the exit from the latter and an annular disk clamped between the top of the pipe section and the valve, said disk forming an inwardly extending flange to form a guard for the valve.

In testimony whereof I affix my signature.

CHARLES E. FISHER.