Dec. 17, 1929. C. W. REESE 1,739,770

GAS VENT VALVE FOR OIL PUMPING EQUIPMENT

Original Filed May 5, 1924

Fig. 1.

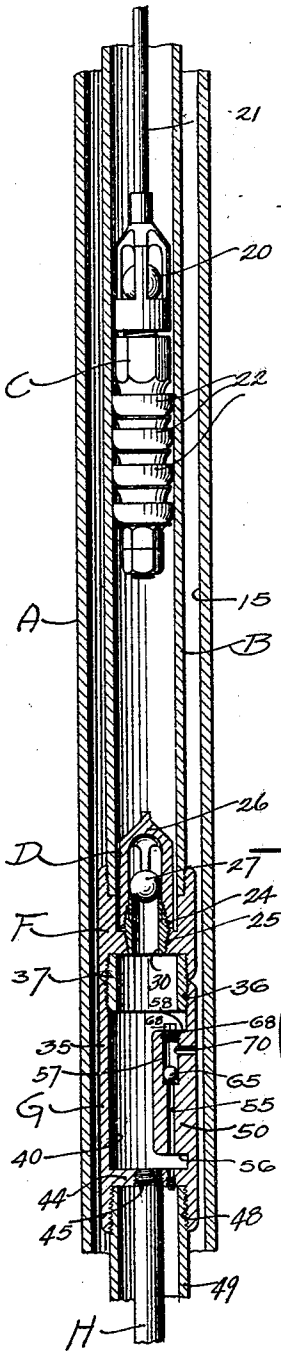


Fig. 2.

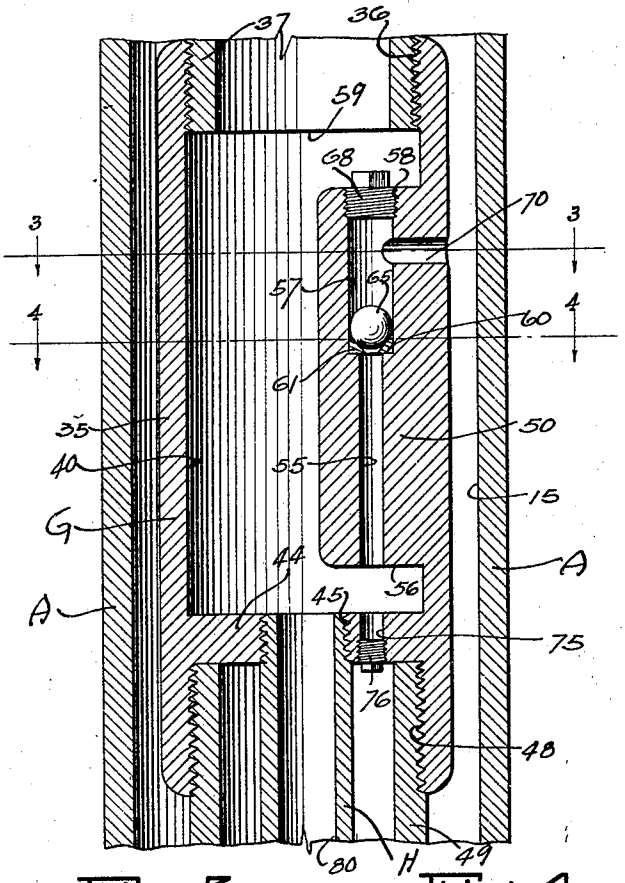


Fig. 3.

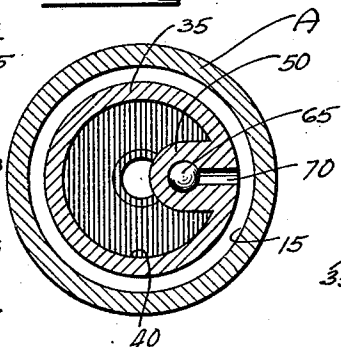
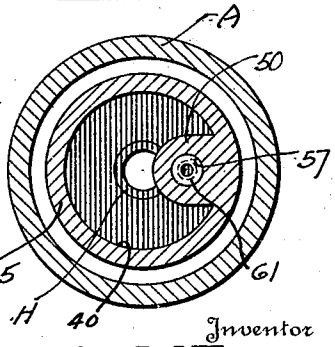


Fig. 4.



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UNITED STATES PATENT OFFICE

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GAS-VENT VALVE FOR OIL-PUMPING EQUIPMENT

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This invention relates to improvements in means to prevent the ineffective operation of the pumping equipment of oil wells, by properly controlling gas pressure within the well, so that a maximum flow of petroleum may be obtained incident to a pumping operation.

A further object of this invention is the provision of a gas vent valve adapted to be supported below the conventional traveling valve of pumping equipment for the purpose of venting gas from a body of liquid petroleum, in order that the liquid petroleum may be properly pumped in a maximum flow without interference from gas pressure.

It is well known that in pumping oil from wells, especially wells with rock and tubing that have more or less gas in them, there is a great deal of trouble experienced incident to gas pressure existing adjacent the top portion of the gas anchor pipe. In such event when the traveling valve of the pumping apparatus starts on a downward stroke, the standing valve is closed and there is no opening for the gas to vent out of the top of the gas anchor pipe, so that in the ordinary case when the traveling valve takes the upstroke, the stroke is partially or entirely ineffective in pumping the oil or petroleum into the work barrel, incident to the gas pressure which has prevented the petroleum from flowing to the point where the reciprocatory pumping equipment may act most effectively thereon. To obviate this I have provided a novel valve, which I prefer to term a gas vent valve, which will allow the gas to vent or pass out of the top of the gas anchor pipe and to the space between the working barrel and casing, so that the oil or petroleum fluid may rise to a point immediately adjacent the standing valve, so that the traveling valve on its upstroke may obtain a maximum flow of petroleum past the standing valve.

Other objects and advantages of this invention will be apparent during the course of the following detailed description.

In the accompanying drawing, forming a part of this specification, and wherein similar reference characters designate corresponding parts throughout the several views,

Figure 1 is a cross sectional view taken through certain well pumping equipment, showing conventional well structure adjacent the lower end of the well pumping equipment, and more particularly showing my improved and novel gas vent valve.

Figure 2 is an enlarged fragmentary cross sectional view showing more particularly details of the improved gas vent valve.

Figures 3 and 4 are cross sectional views on a reduced scale, taken substantially on the lines 3—3 and 4—4 of Figure 2.

In the drawing, wherein for the purpose of illustration is shown only the preferred embodiment of this invention the letter A may generally designate the oil well casing, within which the working barrel B is supported in the conventional spaced relation therewith to provide the space 15 which may exist between the casing and the barrel B. Reciprocatory pumping equipment C may be provided in the working barrel B, of a conventional nature, and at the lower end of the working barrel B a standing valve D may be supported as by means F. The improved gas vent valve structure G is supported below the standing valve, and in turn supports a conventional type of gas anchor pipe H, as will be subsequently described.

Referring to the part C of the pumping equipment, the same may include the conventional traveling valve 20, supported at the lower end of the valve stem 21, and also includes the conventional cups 22 which are slidable therewith in engagement within the working barrel B.

The standing valve D may be of the conventional construction, and includes a seat portion 24, which may be supported within an aperture 25 formed in the coupling F and upon which seat 24 a valve cage 26 is supported, to limit the amplitude of movement of the ball valve 27 as it operates upon the seat 24 for closing or opening the passageway 30 which extends through said standing valve. It is of course understood by those skilled in the art to which this invention relates that the oil or petroleum is adapted to pass through the passageway 30 from the well therebelow to the area within the working barrel B. Upon upstroke of the traveling

valve and its connected structure the ball valve 27 is opened to permit petroleum to flow into the working barrel B above the standing valve D, and upon the downstroke the pressure within the working barrel B below the sliding pump structure C will seat the ball 27. In conventional pumping equipment when the standing valve is thus closed upon the down stroke of the traveling valve, the gas pressure which exists in the well below the standing valve prevents the petroleum or oil from freely flowing up into the gas anchor pipe.

To prevent the detrimental effect ordinarily encountered, as above described, the improved gas vent structure G has been provided which consists of a substantially hollow cylindrical shaped casing 35 internally screw threaded, at 36 inwardly from the upper end thereof, adapted to receive a coupling sleeve 37 by means of which the casing portion 35 may be coupled to the lower end of the standing valve coupling F. A relatively large passageway 40 is provided through the casing 35, and adjacent the lower end of the casing 35, a web 44 is provided having an internally screw threaded opening 45 therein adapted to receive the upper screw threaded end of the gas anchor pipe. The casing 35 below the web 44 is interiorly screw threaded, as at 48, adapted to receive a suitable tube 49, which for convenient purposes may be considered an extension of the working barrel. In the space or passageway 40 between the web 44 and standing valve, plenty of stock 50 is provided, and in which the vent valve details of the improved gas vent valve structure are provided.

In this stock portion 50 a reduced passageway 55 is provided, extending upwardly from the lower surface 56 thereof; it being a feature of the invention that the lower surface 56 is spaced above the web 44 so that the reduced passageway 55 opens at the lower end thereof just above the web portion 44. The reduced passageway 55 extends upwardly through the stock portion 50, and at its upper end outlets into an enlarged passageway 57 in axial alignment with the passageway portion 55, the passageway 57 at its upper end opening at the top surface 58 of the stock portion 50; said top surface 58, of course, being disposed in spaced relation below the lower edge 59 of the coupling sleeve 37. At the juncture of the passageway portions 55 and 57 an annular shoulder 60 is provided, which is adapted to receive an annular seat 61 therein; said seat being of such nature that it may be inserted from the upper end of the passageway portion 57 into the location described. A ball valve 65 is adapted to play upon the seat 61, and the upper end of the passageway 57 is interiorly screw threaded adapted to receive a screw plug 68 therein so that the ball valve 65 may reciprocate in the passageway 57 between its seat 61 and the plug 68. A port or vent duct 70 is provided transversely through the casing portion 35 of the gas vent valve structure G; this port 70 being arranged at right angles to the passageway 57 and at one end communicating with said passageway 57 and at its outer end outletting into the space between the casing 35 and casing A. It is preferred that a small passageway 75 be provided in the web portion 44, immediately below and in alignment with the passageway 55, and through which a suitable tool may be inserted for the purpose of forcing the valve seat 61 off of the shoulder 60 if it should be desired to displace the same from the gas vent valve structure for replacing or for other purposes. A screw plug 76 normally seats in this passageway 75 to seal the same.

Referring to the operation of this invention upon the upstroke of the sliding pumping equipment C the standing valve D will open, as can readily be understood, and which will create a suction within the passageway 40 of the gas vent valve structure and which suction will be transmitted to the passageway 55 and act upon the valve 65 to seat the same, and which will close communication of the port 70 with the passageway or compartment 40 in the casing 35, so that the suction is transmitted through the passageway 80 of the gas anchor pipe H for the purpose of drawing any oil or petroleum which may be in the casing 35 and in the gas anchor pipe H up past the standing valve into the working barrel. Upon the downstroke of the traveling structure the standing valve member 27 will be seated. This will permit the gas in the well to build up pressure below the standing valve, and in such event the gas pressure will unseat the gas vent valve member 65 and force the same upwardly so that the gas pressure will be vented through the port 70 into the space between the working barrel and the casing A, and the gas pressure then being reduced the liquid oil or petroleum is permitted to flow up through the gas anchor pipe H into the gas vent valve casing 35. Should any of the petroleum pass through the port 70 it will immediately return by gravity to the bottom of the well.

From the foregoing description of this invention it is apparent that a novel process and apparatus for the pumping of oil from oil wells has been provided which will overcome that in which many instances is a serious drawback to pumping operations. Not only will it operate to permit effective pumping, and a greater flow of petroleum fluid, but incident to the proper venting of the gas through the space between the working barrel and the casing, the gas is effectively segregated from the body of liquid petroleum and the polish rods do not become heated so quickly as has heretofore been the case,

thus preventing frequent shut downs due to burning out of stuffing boxes and the like.

Various changes in the shape, size, and arrangement of parts may be made to the form of invention herein shown and described, without departing from the spirit of this invention or the scope of the claims.

I claim:

1. In a gas anchor valve of the class described a casing having a main passageway therethrough and providing a portion of material extending into said main passageway, said portion of material having a reduced passageway portion therethrough opening at one end of the material and an enlarged passageway portion in alignment and in communication with the reduced passageway portion opening at the opposite end of said material into said main passageway, a seat supported at the junction of the passageway portions through said stock material, a duct extending through the casing from the outside into the larger passageway in said material, a valve operating in the larger passageway portion of said material, and a plug normally limiting the amplitude of movement of said valve member in the enlarged passageway portion of the material.

2. In a gas anchor valve of the class described a tubular casing having a compartment therein with an upper screw threaded attaching end, the compartment at the top thereof being open, an annular web in the bottom of the tubular casing, an anchor tube detachably supported by said web and having a passageway therethrough directly communicating into the compartment of the tubular casing, said tubular casing having a stock portion integral therewith projecting into the compartment part way, said stock portion having a vertical passageway open at the bottom thereof above the said web and providing a seat therein, a valve on said seat, said tubular casing having a transverse port to the vertical passageway of the stock portion above said valve seat, said web having a transverse port therethrough in alignment with the vertical passageway of the stock portion of the tubular casing, a plug detachably seated in said port of the web for closing the same, said compartment of the tubular casing being open straightway therethrough from the anchor tube passageway to the top opening of the tubular casing.

CHARLES W. REESE.