C. MOORE.

AUTOMATIC OUTLET VALVE FOR OIL WELL CASINGS.

APPLICATION FILED MAR. 23, 1921.

1,407,562. **Patented Feb. 21, 1922.**

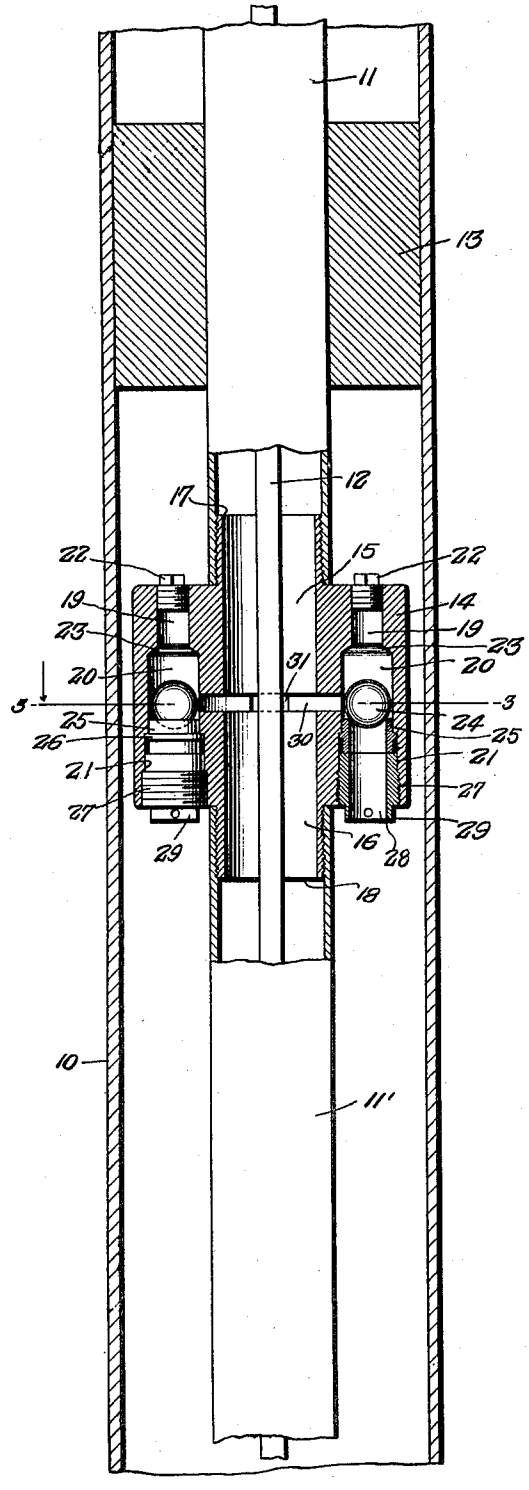


Fig. 1.

Fig. 2.

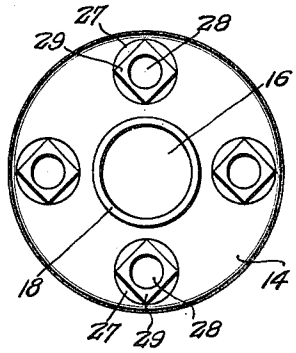
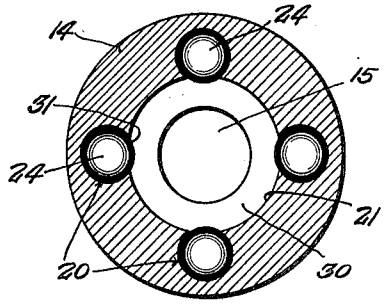


Fig. 3.



Inventor

Clyde Moore,

By

Geo. P. Kimmel. Attorney

UNITED STATES PATENT OFFICE.

CLYDE MOORE, OF HOMINY, OKLAHOMA, ASSIGNOR OF ONE-HALF TO HOWARD B. LONGSWORTH, OF HOMINY, OKLAHOMA.

AUTOMATIC OUTLET VALVE FOR OIL-WELL CASINGS.

1,407,562. Specification of Letters Patent. Patented Feb. 21, 1922.

Application filed March 23, 1921. Serial No. 454,786.

To all whom it may concern:

Be it known that I, CLYDE MOORE, a citizen of the United States, residing at Hominy, in the county of Osage and State of Oklahoma, have invented certain new and useful Improvements in an Automatic Outlet Valve for Oil-Well Casings, of which the following is a specification.

The invention relates to improvements in automatic valves generally, and more particularly to the type of the same adapted for use in the tubes and casings of oil wells, whereby to facilitate maximum output therefrom with a minimum loss in the amount of oil ultimately delivered to the usual supply or storage tanks to which the well is connected.

It is a well known fact that, in many oil wells, gas, oil and water, have been found in the same or contiguous earth strata, and as a consequence of such objectionable condition, it has been extremely difficult to effect the delivery of the oil to the storage tanks, to which the well is connected, up to the maximum or possible production of the well, this being primarily due to the fact that suitable provision has not heretofore been made for the free up-flow of the gas and oil through the water and to the storage tanks, or, in other words, the pressure of the gas, under such conditions, is not sufficient to cause the free flow of the oil upward of the casing and tubing, in the absence of suitable means permitting of the separation of the oil from the water, and confining the gas within the lower portion of the casing until its pressure is sufficient for the purpose of causing the desired free up flow of the oil, to the storage tanks.

The principal object of the invention, therefore, is to provide a means within the casing of an oil well for overcoming the foregoing objectionable conditions, and for otherwise accomplishing the desired purposes of effecting maximum output to all oil wells regardless of the presence of water in the same or contiguous strata in which the oil is located.

Another object of the invention is to provide a novel form of automatic valves, and one of a nature adapting the same to be positioned within the casing of an oil well whereby to act as the main adjunct to the means for accomplishing the purposes and objects of the invention.

With the foregoing and other objects in view, the invention resides in the certain novel and useful construction and arrangement of parts as will be hereinafter more fully described, set forth in the appended claims, and illustrated in the accompanying drawing, in which:—

Figure 1 is a fragmentary vertical section through a well casing, with the tubing thereof partly in section, and showing the preferred embodiment of the invention as associated therewith.

Fig. 2 is a bottom plan view of the automatic valve per se, and,

Fig. 3 is a section through the body of a valve taken on the line 3—3 of Fig. 1.

Referring to the drawing, wherein similar characters of reference designate corresponding parts in the several views thereof, the numeral 10 indicates a section of the casing of an oil well, 11 and 11′ a pair of tube sections disposed concentrically of the casing in vertical alinement one with the other, and 12 a usual form of sucker rod extending concentrically downward of the tubing, all being of usual construction now common in oil wells under operation.

For the accomplishment of the desired purposes of the invention, the adjacent ends of the tubing sections 11 and 11′ are spaced apart and connected one to the other through the medium of an automatic valve body which is to be hereinafter fully described, the upper of the sections 11 of the tubing being passed through an annular packing ring or collar 13 whereby the bore of the casing is closed at a point immediately above the valve body.

The automatic valve comprises a solid cylindrical body 14 of cast metal having a main central bore formed to provide upper and lower alining sections 15 and 16 and coextensive with these bores are outwardly projecting annular flanges 17 and 18, respectively, formed integrally at the opposite ends of the body. Passing lengthwise of the body and spaced equi-distantly around the annular wall thereof are a series of valve bores, each comprising an upper bore section 19 of a relatively small diameter, an intermediate bore section 20 of a greater diameter than the bore section 19, and a lower bore section 21 of a still greater diameter than that of the bore sections 19 and 20. The ends of the bore sections 19 open

through the top end wall of the valve body 14 and are normally closed by means of threaded closure screws 22, while the shoulders formed at the point of connection of the bore sections 20 with the bore sections 19 are each formed to provide inclined non-sticking abutments 23, which act to limit the upward movement of the ball valves 24 which are retained within the intermediate bores 20 by and between the shoulders or abutments 23 and the opposed ends or valve seating members 25 which are inserted into the larger bore sections 21 from the lower end of the valve body 14. These valve seating members 25 are in the form of annular sleeves or collars each having medially formed annular peripheral flanges 26 adapted to abut the shoulders formed at the points of connection of the inner ends of the bores 21 with the bore sections 20, and are retained in position by means of annular adjusting screws or members 27 which are threaded into the open ends of the bore sections 21 for the purpose. These sleeves or members 27 have bores 28 in alinement with the valve seat bores of the collars or members 25, and are in open communication with the bore of the well casing 10. The lower or outer ends of the sleeves or members 27 are each formed to provide tool or wrench engaging portions 29, as shown in Fig. 2, whereby to facilitate the tightening of the same inwardly of the bore sections 21 for the retention of the valve seat members or collars 25 in position. Formed on the transverse center of the valve body and in the wall of the bores 15 and 16 thereof is an annular groove or channel 30 into which opens an outlet port 31 from each of the intermediate bore sections 20 of the valve bores, which ports 31 allow for the flow of the oil from the casing 10 to the tube sections 11 and 11′ when the ball valves 24 move to open position upwardly of the bores of the valve body.

In the operation of the valve arranged within a well casing and associated with the tubing therein, as shown in the drawing, gas rising within the casing will be confined therein by reason of the packing collar 13 closing the bore of the same above the valve body 14, and upon the proper manipulation of the sucker rod 12, the gas within the tubing will become lighter in density, so that the gas within the casing will correspondingly increase in density until its pressure forces the ball valve upwardly in the bore sections 20 of the valve body 14 for the uncovering of the ports 31 whereby communication is established between the casing 10 and the tubing 11—11′, when oil will be carried upwardly through the valve with the gas flow therethrough and be discharged from the tubing into the storage tank (not shown) connected thereto. When water is present in the well, it, being heavier than the gas and oil, will settle to the bottom of the tubing to a point below the valve body 14, so that the gas and oil will always have comparatively free flow upward of the casing through the valve body and thence upward of the tubing, the water being pumped upwardly of the casing, upon the actuating of the sucker rod, through the valve body 14, and settling downwardly of the tubing 11 through the lower bore 16 of the latter for the purpose.

From the foregoing, it will be readily apparent that the invention provides for a comparatively simple valve construction, and the arrangement of the same within an oil well casing, whereby oil is continually delivered from the well up to its maximum supply, and that the delivery of the same is facilitated by separating water therefrom, the presence of which ordinarily acts to retard the flow of gas and oil into the casing and consequently, the combined flow of the same upward of the latter to the storage tank.

It is to be understood that, while the invention has been described and illustrated in specific terms and details, that various changes in the construction and arrangement of the parts thereof, and the size of such parts, may be resorted to without departing from the spirit and scope of the same.

Having thus fully described the invention, what is claimed, is:—

1. The combination with an oil well casing, of a tubing extending concentrically of the casing and communicating therewith at a point upwardly of its lower end, and a valve normally closing communication between the tubing and casing substantially as for the purposes set forth.

2. The combination with an oil well casing, of a tubing extending concentrically of the casing and communicating therewith at a point upward of its lower end, means for closing the casing at a point above the point of communication of the tubing with the same, and an outlet valve normally closing communication between the casing and the tubing, substantially as for the purposes set forth.

3. The combination with an oil well casing, of a tubing extending concentrically of the casing and communicating therewith at a point upward of its lower end, means for closing the casing at a point above the point of communication of the tubing with the same, and a pressure actuated valve normally closing communication between the casing and the tubing, substantially as for the purposes set forth.

4. The combination with an oil well casing, of a tubing extending concentrically of the casing and communicating therewith at a point upward of its lower end, means for

closing the casing at a point above the point of communication of the tubing with the same, and an automatic outlet valve normally closing communication between the casing and the tubing, substantially as for the purposes set forth.

5. In a valve of the class described, a valve body having a centrally disposed bore extending therethrough, and a series of valved inlets opening through the bottom wall of the body and communicating with the central bore thereof at points within the same.

6. In a valve of the class described, a cylindrical valve body of cast metal having a central bore extending therethrough, and a series of equi-distantly spaced inlets opening through the bottom wall of the body and communicating with the central bore thereof at point within the same.

7. In a valve of the class described, a cylindrical valve body of cast metal having a central bore extending concentrically therethrough, a series of valve bores extending through the body parallel to the central bore thereof and communicating the latter at points medially of their lengths, means for closing the upper ends of the valve bores, and gravitating valves within the valve bores and normally closing the lower inlet ends thereof.

8. In a valve of the class described, a cylindrical valve body of cast metal having a central bore extending concentrically therethrough, a series of equi-distantly spaced valve bores extending through the body in parallel relation with respect to the central bore thereof and communicating the same at points inwardly of their opposite ends, means for closing the upper ends of the valve bores, removable valve seats in the lower inlet ends of the valve bores, and ball valves within the valve bores and normally resting on the valve seats thereof for closing the inlet ends of the same.

In testimony whereof, I affix my signature hereto.

CLYDE MOORE.