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G. J. ARMSTRONG

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FLOAT VALVE

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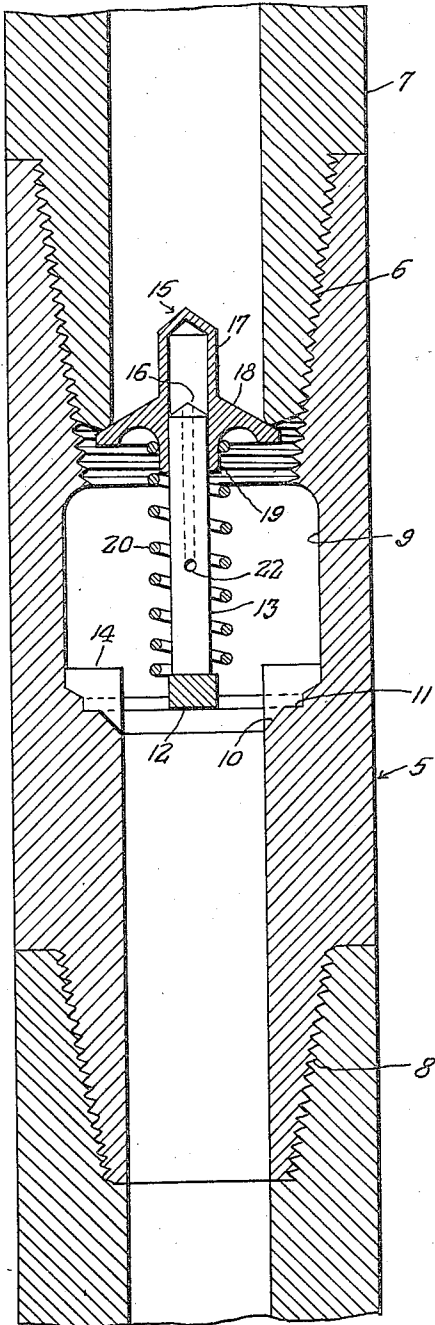


Fig. 1.

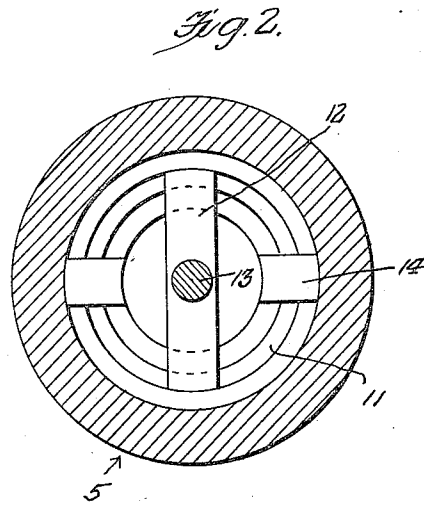
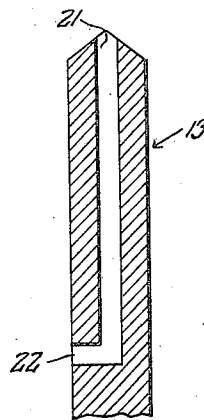


Fig. 3.



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FLOAT VALVE

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1 Claim. (Cl. 137-69)

My invention relates to an improved float valve structure for well drilling devices.

It is an important object of my invention to provide a float valve of this type which will effectively float the pipe as it is lowered into the well, and effectively prevent the entrance of air or water into the drill pipe from the lower end thereof.

It is also an important object of my invention to provide a float valve of the type described which is composed of few and simple parts which are long wearing and not likely to get out of order, and which are replaceable and removable without the use of wrenches or other tools, and which is cheaper to manufacture than existing structures of this type.

Other objects and advantages of my invention will be apparent from a reading of the following description in connection with the drawing, wherein for purposes of illustration I have shown a preferred embodiment of the invention.

In the drawing:—

Figure 1 is a central vertical section through my improved float valve structure showing it connected to the lower end of a drill pipe to the next lower section of drill pipe.

Figure 2 is a horizontal section taken through the lower part of the valve chamber.

Figure 3 is a vertical section through the movable valve stem.

Referring in detail to the drawing, wherein like numerals refer to like parts throughout the same, the numeral 5 indicates the tubular member to be installed between upper and lower sections of drill pipe. This tubular section 5 has a tapering interior screw thread 6 in its upper end adapted to receive the tapering lower end of a tubular drill pipe 7. The lower end of the tubular member 5 is provided with the tapering exterior screw-threaded portion 8 to be entered into the upper end of the next lower section of drill pipe.

At the lower termination of the screw thread 6 there is an expanded, counterbored recess or chamber 9, which is the valve chamber. The lower end of the chamber is beveled as indicated at 10, which beveled portion is provided as indicated at 11 with a squared shoulder.

Upon the shoulder 11 is adapted to rest a cross member 12 carried by the lower end of a valve stem 13 to which it is rigidly secured. Upstanding bosses 14 are placed at diametrically opposite points on the beveled portion 10 and rise above the beveled portion 10 and the shoulder 11 so as to support above the shoulder the valve

generally designated 15, so as not to cut off fluid communication through the tubular member 5 in the event of the breaking of the cross member 12 with a consequent descent of the valve 15, which would otherwise close or obstruct fluid communication through the lower end of the valve chamber 9.

The valve stem 13 is a cylindrical, vertical rod provided with a conical formation 16 on its upper end.

The valve 15 comprises an erect tubular portion 17 with a closed upper end provided with an interior conical formation to correspond with the conical formation 16 which is adapted to seat therein when the valve is depressed. Projected laterally from the lower end of the tubular portion 17 of the valve is a wide, skirt-like portion 18 which slants uniformly downwardly to provide a conical upper surface adapted to abut and engage and seat with the lower end of the upper drill pipe section 7. The valve stem 13 is adapted to act as a guide and support for the valve, as the valve receives the stem slidably in the tubular portion 17 as well as in a depending neck 19 formed below the skirt portion 18. This neck is formed sufficiently long, and the valve stem 13 proportioned adequately to provide the proper relationship between the valve and the valve stem, considering the distance from the shoulder 11 to the lower end of the drill pipe section 7.

A coiled spring 20 surrounds the valve stem and the depending neck 13 and engages under the skirt portion 18 and abuts the cross member 12, so as to normally force the valve 15 upwardly so as to close the lower end of the upper drill pipe section 7.

The valve stem 13 has a central passage therein as indicated at 21 which opens in the top of the stem and is extended downwardly to an intermediate point where it opens as at 22 through the side of the stem. This passage is provided to permit proper exhaustion of air or fluid which may have collected in the tubular portion 17 of the valve, so as to act as a breather or bleeder for this part of the structure.

It is believed obvious that the resistance of the spring 20 and the upward pressure of air or fluid from the well, when overcome by fluid pumped down through the upper drill pipe section 7, will permit the valve 15 to slide downwardly on the valve stem 13, whereby to permit fluid communication downwardly through the lower end of the upper drill pipe section 7. Of course, in the event that the downward pressure

is insufficient to overcome the resistance of the spring 20 and the upward pressure mentioned, the valve 15 will remain seated, so as to prevent upward travel of the upwardly moving pressure beyond the valve.

It will be noted that the structure of my invention consists only of the following parts, the tubular member 5, the valve 15, the valve stem structure 13, and the spring 20. It will also be observed that no special valve seat, or packing means is required or desired, and that the entire assembly can be removed or replaced without aid of tools.

Though I have shown and described the preferred embodiment of the invention, it is to be understood that changes in size, structure and arrangement of parts as well as in materials, may be made without departure from the spirit of the invention or the scope of the subjoined claim.

What is claimed is:—

In a float valve structure including a tubular body connectible between an upper and a lower section of tubing and receiving the lower end of the upper section, a valve chamber in the tubular body, valve means in the chamber, said valve means comprising a cross member normally resting across the lower end of the valve chamber,

a vertical guide on the cross member, a valve slidable on the guide, spring means on the guide for urging the valve into closing relation with the lower end of the upper section, said valve being depressible on the guide against the tension of the spring means to open the lower end of the upper section, vertical projections on the lower end of the valve chamber for supporting the valve to prevent its closing the lower end of the chamber in case of breakage of the supporting cross member, said valve comprising a vertical tubular body having closed upper end, a downwardly and outwardly flaring flange on said tubular body, said tubular body slidably receiving said vertical guide, and said flange being adapted to engage and close the lower end of the upper section of tubing when elevated and to rest upon said vertical projections when depressed upon breaking of the cross member, and bleeder means for the closed space defined by the upper end of the guide and the closed end portion of said tubular body, said bleeder means comprising a passage in the guide communicating with the said space and with a lower portion of the guide below said valve.

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