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E. GRAY

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CHECK VALVE FOR DRILL STEMS

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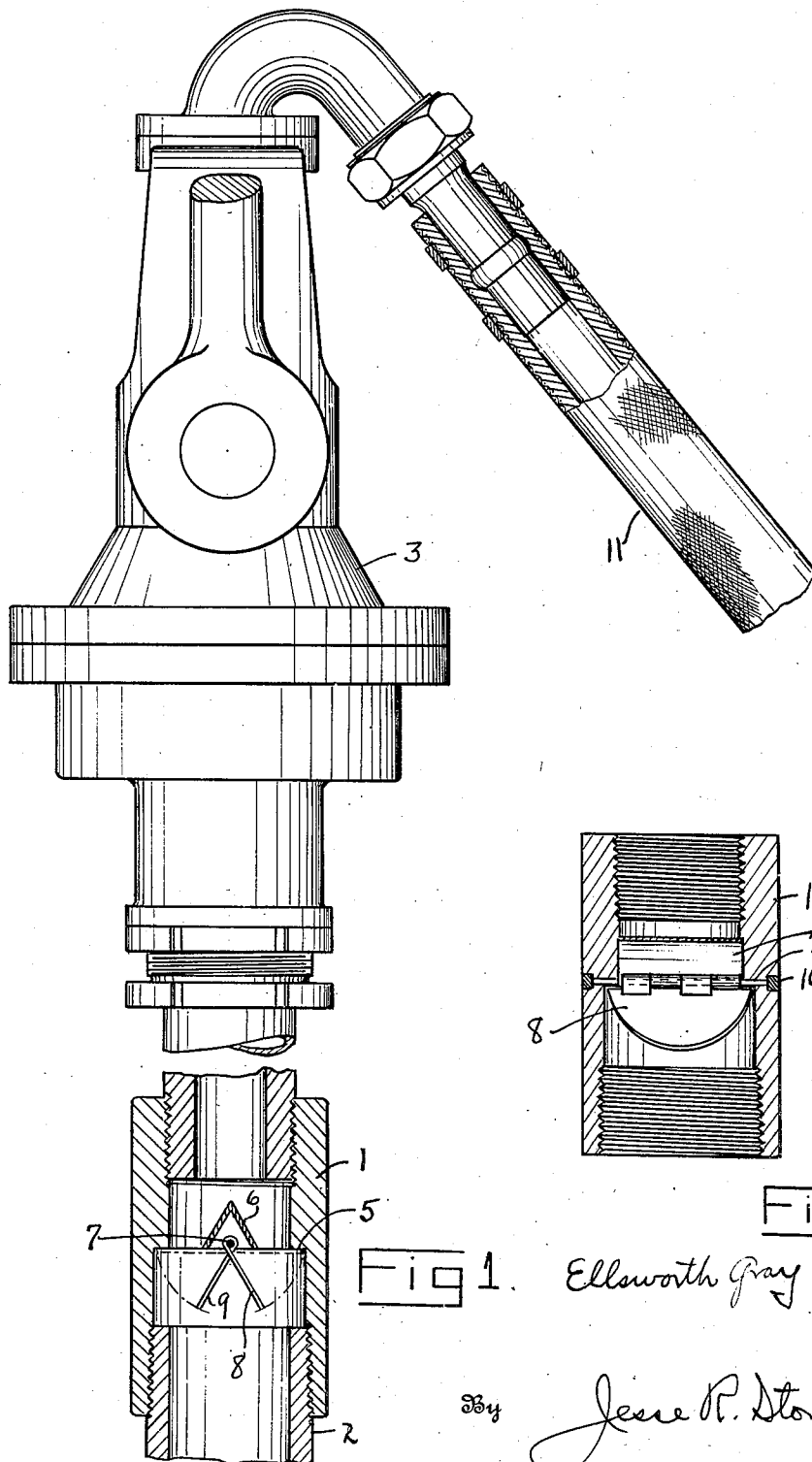


Fig 1.

Fig 2.

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CHECK VALVE FOR DRILL STEMS

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My invention relates to a means of preventing back pressure of the flushing fluid in the operation of drilling wells by the rotary system of drilling.

5 In drilling wells by the rotary system, the drill is rotated in the well by means of a hollow drill stem. Material disintegrated at the bottom of the hole by the drill is washed away from the drill and carried in suspension to the surface of the ground by a stream of flushing fluid pumped downwardly through the drill stem and through passages in the drill by pumps at the surface. The connection between the pump and the upper end of the rotating drill stem is made through the supporting swivel. A strong hose of flexible material connects the pump outlet to a nipple or goose neck on the swivel.

10 The hose is strong enough to support the pressure set up by the pump without breaking, but in deep well drilling, pressures in excess of the pump pressure are set up by the act of spudding with the drill. Thus, when the drill is not advancing, due to an accumulation of mud about the drill or for other reasons, it is customary to "spud" the drill clear of mud and start it to cutting, by raising the drill stem and drill for a short distance and then letting them drop. When this is done the muddy bit acts as a piston. There is little space about the drill for the fluid in the bottom of the hole to get past the bit and between it and the walls of the hole cut by the drill, and hence the fluid below the drill is forced back up through the drill and drill stem and exerts a back pressure upon the drill stem, the swivel and the hose. Such pressures may not act to burst the hose in shallow wells, but when the wells are deep, and hence the weight of the drill stem great, the said pressure acts on the piston formed by the muddy bit to force the fluid up through the drill stem with great violence and it becomes a serious problem to provide a hose which will not break under the strain. Furthermore, the joints in the drill stem and the packing in the swivel are injured and may become leaky. The pumps employed have had to be made extraordinarily heavy at the outlet and steel wound

hose is now constructed to meet the pressures encountered in deep well operations.

It is an object of my invention to provide a valve, so placed in the flushing system of the drilling apparatus as to prevent back pressure acting upon the swivel, hose, or pump to cause injury thereto.

Such a valve may be placed at the upper end of the drill stem adjacent the swivel, or may, if desired, be placed at any convenient point above the drill.

Referring to the drawing herewith, Fig. 1 is a side elevation of a swivel showing an adaption of my invention thereto, the device being in central vertical section. Fig. 2 is a vertical section through the valve, taken at right angles to the view shown in Fig. 1. Like numerals of reference are applied to like parts in all the views.

The valve construction which may be employed is preferably mounted in a housing adapted to be coupled in the drilling string at any desired point. The housing is constructed in the form of a collar or coupling 1 threaded internally at both ends for connection with the drill stem 2 and adjacent members such as the swivel 3. Said housing has its walls of greatest thickness at the upper portion. About midway of the length of the housing, the internal diameter is abruptly increased forming a shoulder 5 which acts as a valve seat.

A diametrical guard and support for the valve is formed by the member 6 which is triangular in cross sectional shape with the apex directed upwardly toward the direction from which the fluid flows. Centrally of its base is a cross pintle 7 upon which the two flap valves 8 and 9 are hinged. This pintle may be extended into the walls of the housing if desired, as shown in Fig. 2 and may be secured in position by any desired expedient such as solder 10. The two valve members when dropped into open position are shielded by the member 6 as shown best in Figs. 1 and 2. When a backflow of fluid is occasioned in spudding, the valves are thrown upwardly into their seats and close the passage, thus shutting off the fluid pressure from the swivel and hose 11.

While I have shown a particular formation of valve member, it will be obvious that various modifications of the inventive idea may be employed, all coming within the spirit of my invention. It is not understood that the use of check valves in fluid conducting pipes is new, but the use of a means for preventing the bursting and destruction of hose in the combination employed in drilling is believed to be novel.

Having thus described my invention, what I claim as new is:

1. In a device of the character described including a rotary drill stem through which flushing fluid is pumped, a valve housing connected in said drill stem, a downwardly opening valve therein, and means above said valve to divert the fluid from said valve when open, and protect it from erosion.

2. In a device of the character described including a rotary drill stem through which flushing fluid is pumped, a valve housing connected in said drill stem, a downwardly presented shoulder in said housing, valve plates pivoted centrally of said housing and adapted to close against said shoulder, and means transversely of said housing, above said valves, to divert the fluid laterally away from said valves when said valves are open.

3. A drill stem coupling having a longitudinal passage therethru for the flow of flushing fluid, a shoulder on said coupling, a flap valve mounted adjacent said shoulder and adapted to seat thereon in closed position, and a flushing fluid deflector mounted across said passage and above said valve to prevent erosion on said valve.

4. A drill stem coupling having a longitudinal passage therethru for the flow of flushing fluid, a shoulder on said coupling, a flap valve mounted adjacent said shoulder and adapted to seat thereon in closed position, and a flushing fluid deflector mounted across said passage and above said valve to prevent erosion on said valve, said deflector including an inverted V member.

5. A drill stem coupling having a longitudinal passage therethru for the flow of flushing fluid, a shoulder on said coupling, a flap valve mounted adjacent said shoulder and adapted to seat thereon in closed position, and a flushing fluid deflector mounted across said passage and above said valve to prevent erosion on said valve, said deflector including an inverted V member; and supporting means for said valve arranged within and protected by said deflector.

6. A device of the character described including a rotary drill stem coupling, a passage thru said coupling to permit the flow of flushing fluid, a back pressure valve in said passage, a support therefor, a shoulder merging different diameters of said passage and adapted to form a seat for said valve, a diametrically rigidly mounted inverted V-shaped de-

flector for said valve adapted to deflect the flushing fluid from the valve support to prevent erosion of said support.

In testimony whereof I hereunto affix my signature this 21st day of February, A. D. 1925.

ELLSWORTH GRAY.