Casing Float Collar

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Fig. 1.

Fig. 2.

Fig. 3.

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This invention relates to casing float collars or shoes adapted for use in lowering casing into oil wells or the like and in the cementing of the well.

It is desirable, when lowering a long string of pipe into a well, to maintain a seal in the bottom thereof so that the mud pressure or pressure of other fluid in the well will relieve the strain on the well equipment to some extent due to the buoyancy of the empty string. The use of float collars or float shoes for this purpose is well known to those skilled in the art. The present invention relates to a novel construction which has certain advantages over the similar devices heretofore employed for the same purpose, the chief advantages of the present construction being the provision of a float collar or shoe which may be readily drilled out and which will yet maintain an effective seal at a desired point in the casing or pipe.

It is one object of the invention, therefore, to provide a float collar with a valve therein which is made of non-metallic parts so that it may be readily drilled out.

It is another object of the invention to provide a float collar with a valve and in which an effective seal is maintained around the valve seat.

Other objects and advantages reside in certain novel features of the construction, as will be apparent from the following description taken in connection with the accompanying drawing, in which:

Fig. 1 is a vertical cross-sectional view of a portion of an oil well with a casing and float collar constructed in accordance with the present invention shown therein in vertical cross-section;

Fig. 2 is an enlarged vertical cross-sectional view of the float collar shown in Fig. 1; and

Fig. 3 is a transverse cross-sectional view of the float collar shown in Fig. 2, the view being taken on the line 3-3 of Fig. 2.

Referring to the drawing in detail, and first to the arrangement of Fig. 1, it will be seen that a well bore is there illustrated at 11. The lower end of one string of casing is shown at 12 and a portion of a second string of casing 13 is shown located within the string 12. The string of casing 13 is provided with a float collar 14 constructed in accordance with the present invention.

As shown in Figs. 1 and 2, the float collar 14 is provided with threaded portions 15 and 16 at its upper and lower ends respectively, to provide means for attaching it to the sections of casing 13. The inside of the collar 14 has a number of 17 grooves cut therein to aid in securing cement or concrete plugs to the collar. Two concrete plugs are provided, the upper one of which is designated 18 and the lower one of which is designated 19. These plugs are molded into the steel collar 14 in constructing the apparatus. The upper plug 18 is provided with a central fluid passage 20, this passage being centrally disposed within the plug.

The lower plug 19 is preferably provided with several fluid passageways. Three such passageways are shown in the drawing at 21 and extend from top to bottom of this plug.

The lower plug 19 acts as a cage for the valve member 22 and for this purpose is provided with a centrally located pit 23. The plug 19 is so molded that the pit 23 does not extend the full depth of the plug but has a bottom portion 24 which prevents the valve member 22 from falling out of the collar. The pit 23 is connected to the passages 21 throughout its length, as best shown in Fig. 3.

The valve member 22 is preferably made of hard rubber or bakelite and may be ball-shaped, but is preferably cylindrical so as to be guided by the wall portions 25 around the pit 23 and in between the passageways 21. The upper end of the valve member is tapered, as shown at 26.

The valve seat against which the tapered portion 26 of the valve member 22 may abut is preferably made of rubber and forms an integral part of the cup-shaped member 27 which serves the double function of sealing the valve body 22 and sealing the upper concrete plug 18 to the collar 14. The entire cup 27 may be made of live rubber but is preferably so constructed that the central portion which constitutes the valve seat is harder than the rest of the cup. As best shown in Fig. 2, the central portion of the rubber cup 27 extends upwardly slightly and is fitted along the tapered portion of the passageway 20 in the upper plug 18. In this way pressure of the valve body 22 against the seat tends to press the rubber between the valve body and the plug 18 thus maintaining an effective seal at that point.

The rubber cup 27 is provided with a flange 28 depending from the main body thereof. Since this flange is of elastic material it tends to maintain an effective seal against the collar 14 and prevent the passage of fluid upwardly around the outside of the concrete plug 18.

With the construction illustrated it is obvious that as the casing 13 is lowered into the well filled with mud or other fluid the valve will close and remain closed as long as the pressure beneath the float collar is greater than that above.
the float collar in the casing. The arrangement may be used in cementing a well by lowering the assembly thereto as above indicated and then pumping cement through the casing 13. As soon as the pressure above the float collar is sufficiently high the valve body 22 will fall down into the cage and the cement will flow through the passageway 21 in the lower plug 19. After a sufficient quantity of cement has been forced into the well the pressure may be relieved and valve 22 will then close and the cement will be retained in position until it sets. After the cement has hardened the entire valve assembly inside of the collar 14 may be readily drilled out since it contains no metal.

It will thus be apparent that while only one embodiment of the invention has been described herein, various changes may be made without departing from the spirit of the invention or the scope of the annexed claims.

I claim:

1. Apparatus for floating a string of casing into an oil well or the like and including a metallic member adapted to be made up with the casing, and valve means securely mounted in said member, said valve means consisting of an upper plug and a lower plug made of cementitious material, a valve body of drillable material confined between said plugs and adapted to have limited movement with respect thereto, a cup member of non-metallic, resilient yieldable material mounted beneath the upper of said plugs and constituting a seat for said valve body and also constituting sealing means for preventing the flow of fluid upwardly between said upper cementitious plug and said metallic member, the arrangement being such that when the valve is seated the resilient material is pinched between the valve body and the upper cementitious plug.

3. Apparatus for floating a string of casing into an oil well or the like and including a metallic member adapted to be made up with the casing, and valve means securely mounted in said member, said valve means consisting of an upper plug and a lower plug made of cementitious material, a valve body of drillable material confined between said plugs and adapted to have limited movement with respect thereto, a cup member of non-metallic, resilient yieldable material mounted beneath the upper of said plugs and constituting a seat for said valve body and also constituting sealing means for preventing the flow of fluid upwardly between said upper cementitious plug and said metallic member, the arrangement being such that when the valve is opened the valve body is retained by said lower cementitious plug while permitting fluid to flow downwardly around the same.

4. In floating equipment for use in oil wells or the like, a valve seat structure comprising a block of cementitious material mounted in a metallic member and having an opening there through and a rubber cup located on one side of said block, said cup having an opening corresponding to the opening in said block and having a flange extending away from said block and resiliently contacting the metallic member to maintain a seal between said block and the member.

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