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FLOATING AND CEMENTING SHOE

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Fig. 1.

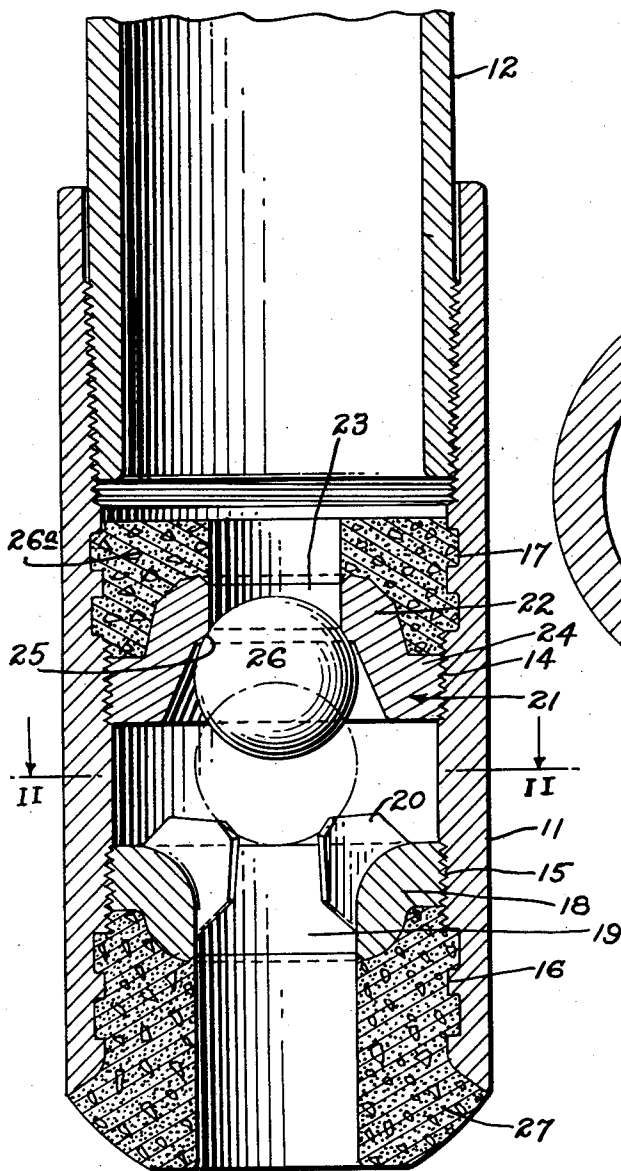
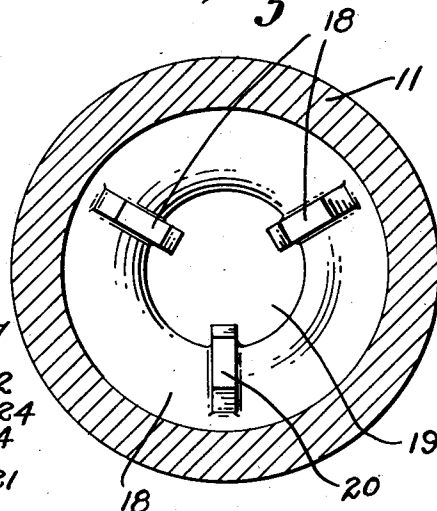


Fig. 2.



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FLOATING AND CEMENTING SHOE

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This invention relates to floating and cementing equipment for oil wells and particularly pertains to cementing and floating devices of the character disclosed in Letters Patent of the United States No. 1,748,007, issued February 18, 1930 and No. 1,823,312, issued February 15, 1931.

The device disclosed in these prior United States patents referred to include a cementitious plug which is cast or otherwise secured in a casing shoe or collar. The cementitious plug is fitted interiorly with a check valve mechanism which enables fluid to be pumped downwardly through the casing and through the plug, but prevents the return of fluid upwardly through the plug and into the casing.

In the small sizes of float shoe and collar, for example, those which are less than $5\frac{3}{4}$ inches outside diameters, the construction of the devices disclosed in the prior United States patents referred to somewhat restricts the circulation through the plug and it is the principal object of the present invention to provide a device of the character referred to which is simple and inexpensive to construct and which may be embodied in extremely small diameters and provide for maximum area of circulation.

One form which the invention may assume is exemplified in the following description and illustrated by way of example in the accompanying drawing, in which:

Fig. 1 is a central vertical section through a float shoe embodying the preferred form of my invention.

Fig. 2 is a transverse sectional view taken on line II—II of Fig. 1.

Referring more particularly to the accompanying drawing, I have there illustrated a float shoe for a well casing. It is to be understood, however, that the present invention is equally adaptable to a float collar.

The cementing and floating shoe illustrated includes a casing shoe 11 which is cylindrical

and which is adapted to be connected at its upper end to the well casing 12.

The bore of the casing shoe 11 is formed with two threaded sections 14 and 15 which are spaced apart. The threaded section 15 is spaced from the lower end of the shoe, while the threaded section 14 is spaced from the upper end of the shoe.

Immediately below the threaded section 15, the bore of the shoe is grooved as at 16 and immediately above the threaded section 15, the bore of the shoe is grooved as at 17. The bore of the shoe immediate the threaded sections 14 and 15 is slightly less than the interior diameters of the threaded sections 14 and 15.

Threadedly connected to the threaded section 15 is a valve stop member 18 which is formed with a central coaxial circular opening 19. This member 18 is formed of bakelite or other non-metallic but readily drillable material.

Formed as an internal part of the member 18 are three lugs 20 which are arranged radially and spaced apart circumferentially at a point where they will project slightly into the bore 19 and above the upper face of the member 18.

Threadedly connected to the threaded section 14 is a valve seat member 21 which is formed of a substantially cylindrical portion 22 having an opening 23 formed there-through. The cylindrical member 22 is formed with an annular portion 24 which is exteriorly threaded to engage the threaded section 14. The diameter of the annular portion 24 is somewhat greater than the exterior diameter of the cylindrical portion of the valve seat member.

It will be noticed from Fig. 1 that the lower portion of the opening 23 is enlarged and is frusto-conical. The upper portion of the opening 23 is somewhat less in diameter than the lower portion and a valve seat 25 is formed intermediate the two diameters of the

opening 23. The valve seat 25 is adapted to cooperate with a flotation type of ball valve 26 which is adapted to be disposed between the two members 18 and 22. The two members 18 and 22 in effect form a valve chamber within the shoe within which the ball 26 is caged.

Above the valve seat member 21 a cementitious section 26^a is cast which embraces the cylindrical portion of the valve seat member 21 and is keyed or anchored in the shoe through the medium of the grooved portion 17. Similarly beneath the member 18 is a cementitious section 27 which embraces a portion of the member 18 and is securely anchored or keyed to the shoe through the medium of the grooved section 16.

Inasmuch as the illustration is of a casing shoe, the cementitious portion 27 extends beyond the lower end of the shoe and is formed in the shape of a guide.

It will be noticed that in the case of the cementitious portion 26^a, the same is formed with a circular opening registering with the opening 23 in the valve member 21. The cementitious portion 27 is formed with an opening therethrough registering with the member 19 in the member 18.

In construction of the device, the casing shoe is first formed and the valve member 21 and the member 18 are threaded into place therein with the valve member 26 positioned between them. By the use of suitable forms, the cementitious material of the sections 26 and 27 are then cast. The cementitious sections 26 and 27 re-enforce the valve member 21 and the member 18 so that they will be able to withstand tremendous pressures exerted at either end of the shoe or collar.

In operation of the device it is connected to the well casing and when the well casing is being lowered in the hole, the mud fluid in the hole will cause the valve to seat on the seat 25 preventing the passage of fluid upwardly through the casing. This causes what is termed a floating action which relieves the derrick of part of the weight of the casing being lowered.

When the casing is positioned in the hole the cement is pumped downwardly through the casing with sufficient pressure to unseat the valve 26 so that the cement slurry may travel through the passageway 23 and thence through the lower end of the shoe through the passageway 19. When the pump pressure on the cement slurry is relieved, the ball 26 will immediately seat on the seat 25 to prevent the passage of the cement back into the casing. When the valve 26 is unseated it will not obstruct the opening 19 due to its engagement with the lugs 20 on the stop member 18.

It is to be understood that the appended claims are directed to cover not only my improved construction in a float shoe, but in a

float collar as well. The term tubular member in the claims being used to denote either a casing shoe or a casing collar. It is also desired to point out that the entire mechanism arranged in the shoe or collar is non-metallic and readily drillable so that after the cementing operation is complete the interior mechanism of the shoe or collar may be readily removed by drilling.

While I have shown the preferred form of my invention, it is to be understood that various changes may be made in its construction by those skilled in the art without departing from the spirit of the invention as defined in the appended claims.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. A device of the character described comprising a tubular member, a valve seat member arranged interiorly of the tubular member and threadedly connected thereto, a valve stop member arranged interiorly of the tubular member at a spaced distance below the valve seat member and threadedly connected to said tubular member, a valve member disposed intermediate said valve seat member and valve stop member, said valve seat member and stop member having an opening formed centrally therethrough, said valve seat member having a valve seat for cooperation with the valve member whereby the latter when seated on the seat will prevent passage of the fluid upwardly through the tubular member, cementitious sections cast in said tubular member and anchored thereto, one section being disposed at the upper end of the valve member in intimate contact therewith, the other section being disposed below the valve stop member in intimate contact therewith, said cementitious sections having openings formed therethrough in register with openings through the valve seat and valve stop member.

2. A device of the character described comprising a tubular member, the interior portion of which is formed with two threaded sections arranged at a spaced distance apart, a valve seat to be threadedly connected to the upper threaded section, said valve seat member having an opening formed centrally therethrough, said opening being of two different diameters, a valve seat interposed between said diameters, a valve stop member threadedly connected to the lower threaded section in said shoe, said valve stop member having an opening formed therethrough, lugs on said valve stop member projecting into said opening and to a point above said stop member, a ball valve interposed between said valve stop member and valve seat member, said ball valve to seat on said seat when it is in its uppermost position to prevent the passage of fluid upwardly through the valve seat member, said ball valve being adapted

to engage said lugs when in its lowermost position and being held thereby from obstructing the flow of fluid through the opening in the stop member, a cementitious section cast in said tubular member and securely anchored thereto above the valve seat member and engaging the same, a cementitious section cast in the tubular member beneath the valve stop member in contact therewith, said section being securely anchored to said tubular member, said cementitious section serving to reenforce said valve seat member and valve stop member.

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