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C. E. BURT

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VALVE ASSEMBLY FOR FLOATING AND CEMENTING DEVICES

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Fig. 1.

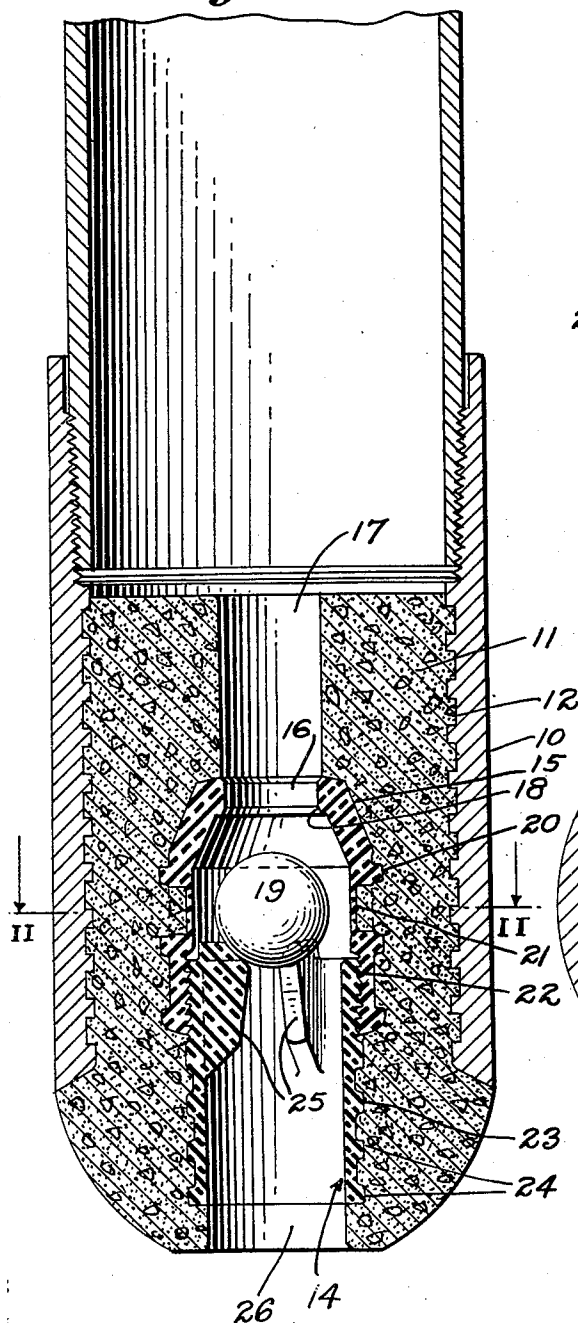


Fig. 3.

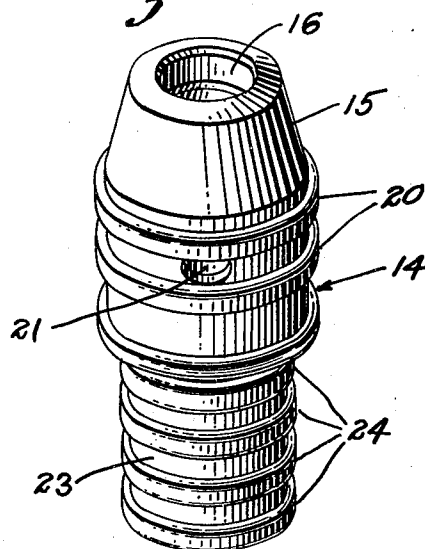
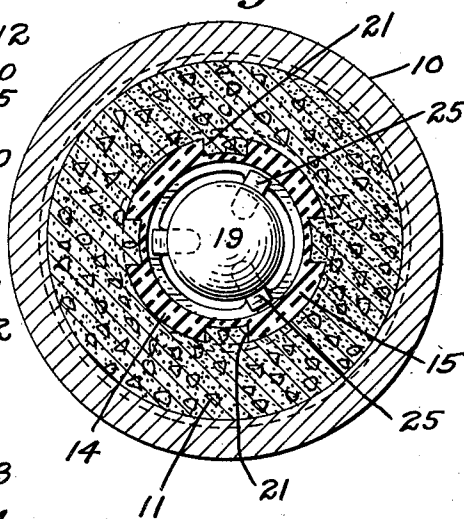


Fig. 2.



INVENTOR.
Clarence E. Burt
BY *Townsend & Loftis*
ATTORNEYS.

UNITED STATES PATENT OFFICE

CLARENCE E. BURT, OF LOS ANGELES, CALIFORNIA, ASSIGNOR TO BAKER OIL TOOLS, INC., OF HUNTINGTON PARK, CALIFORNIA, A CORPORATION OF CALIFORNIA

VALVE ASSEMBLY FOR FLOATING AND CEMENTING DEVICES

Application filed December 9, 1931. Serial No. 579,856.

This invention relates to floating and cementing equipment for oil wells and particularly pertains to floating and cementing plugs of the type disclosed in Letters Patent of the United States #1,748,007, issued February 18, 1930, and #1,823,312, issued September 15, 1931.

In general, the device disclosed in the present application comprises a cementitious plug which is cast or otherwise secured either in a casing shoe or in a casing collar. The plug is formed with a longitudinal passageway which is controlled by a check valve so that fluid may be pumped downwardly through the well casing and through the plug but not in the opposite direction. These characteristics enable the plug to be used in floating the casing into place and cementing the same in the bore.

The present invention has for its principal object the provision of an improved valve assembly for floating and cementing devices of the character referred to. The advantages of my improved valve assembly are the increased area of discharge passageway and consequently improved operation of the device in which it is employed, the construction of the cage which enables it to reinforce the guide portion of the cementitious plug and the fact that the valve assembly can be comparatively inexpensively produced.

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 view in central vertical section through a floating and cementing shoe embodying the preferred form of my invention.

Fig. 2 is a transverse section therethrough taken on line II—II of Fig. 1.

Fig. 3 is a perspective view of a valve cage assembly incorporated in the floating and cementing shoe shown in Fig. 1.

Referring more particularly to the accompanying drawing, in Fig. 1, I have illustrated a casing shoe 10 which is cylindrical and within which a cementitious plug 11 is cast. Grooves 12 are formed in the in-

terior surface of the casing shoe 10 so that interlocking connections will be formed between the plug 11 and the casing shoe so as to prevent dislodgment of the plug by extreme pressures applied to either end thereof.

It is to be understood that the present invention is for use either in a casing shoe or casing collar because the construction of the plug and its internal valve mechanism is the same for both casing shoes and casing collars.

Arranged substantially centrally within the cementitious plug 11 is a valve assembly 14 which forms the subject matter of the present application. This valve cage assembly 14 is preformed of bakelite or like non-metallic material.

This valve assembly comprises a cylindrical housing 15 having a port 16 formed coaxially through its upper end so that it may align with a passageway 17 formed coaxially through the upper end of the cementitious plug 11. Surrounding the interior end of the port 16 is a valve seat 18 with which a ball valve 19 cooperates; said ball valve 19 being contained within the valve chamber formed by the interior of the housing 15.

The housing 15 is formed with spaced circumscribing flanges 20 which extend about its outer periphery to form a binding engagement between the housing 15 and the cementitious plug 11. The housing is also formed with diametrically opposed recesses 21 for the same purpose.

The housing is cylindrical in form as illustrated and its internal surface is threaded at its lower end as at 22 to receive the threaded upper end of a cylinder 23, which cylinder is likewise formed with spaced circumscribing ribs 24 to anchor the same within the cementitious plug 11.

The interior diameter of the cylinder 23 is uniform throughout its length and is almost as great as the interior diameter of the housing 15 and is greater than the diameter of the ball valve 19. When the cylinder 23 is threaded into the lower end of the housing 15, it forms a continuation thereof.

It will be noticed that the cylinder 23 is of such length that it extends almost to the terminal of the guide nose of the cementitious plug. Therefore it reinforces the latter and insures that the same will not easily be broken off by a transversely directed blow.

Within its upper end, the cylinder is formed with a plurality of radially inwardly projecting lugs 25; three lugs being illustrated in the present instance. These lugs are formed integral with the cylinder 23 and are spaced equal distances apart about the perimeter of the interior of the cylinder 23. These lugs 25 act to maintain the ball valve 19 within the housing 15 so that when fluid or cement slurry is pumped downwardly through the passageway 17 in the plug 11, the ball valve 19 will abut against the upper ends of the lugs 25 and permit the slurry to pass around the ball valve between the lugs and downwardly through the cylinder 23. It will be noticed that the lowermost end of the cementitious plug 11 is formed with a passageway 26 which is of the same diameter as the interior diameter of the cylinder 23 and aligns therewith.

Due to the fact that the interior diameter of the cylinder 23 is almost as great as the interior diameter of the housing 15, the fluid will freely pass and discharge through the housing and the cylinder. In other words, there will be no restriction in the housing tending to cause clogging or plugging of the valve chamber. If the interior diameter of the cylinder 23 is restricted with respect to the interior diameter of the housing 15, there is tendency at certain times for clogging material to accumulate in the housing 15 and prevent proper operation of the device, but by the present construction the possibility of clogging is absolutely eliminated.

In operation of the device, the housing 15, the cylinder 23 and the ball valve 19, which is of the flotation type, are preformed of bakelite or like friable non-metallic material. The ball valve is then positioned in the housing 15 and the cylinder 23 is threaded into the lower end of the housing as illustrated in the drawing. The entire valve cage assembly is then correctly positioned in a mold concentrically with the casing shoe or collar and in the proper position longitudinally with respect thereto. Suitable cores are provided for the passageways 17 and 26 in the cementitious plug. The cementitious material utilized is then poured into the mold and allowed to set. When it has set, it will be securely interlocked with both the valve cage and the casing shoe or collar. The cores may then be washed out or otherwise removed and when the cement has sufficiently hardened, the device is ready for use.

In practice, the casing shoe or collar is then united with the string of well casing and while the latter is being lowered into the hole, the pressure will be greatest below the ball valve 19 and the latter will float to its seat 18, preventing the flow of material upwardly through the cementitious plug. This will enable the casing to be floated into place in the hole.

When the casing is properly positioned, the cement slurry is pumped downwardly through the passageway 17, causing the ball 19 to rest on the lug 25. This unseating of the ball enables the cement slurry to pass through the housing 15 around the ball 19 between the lugs 25 and through the cylinder 23 and the passageway 26 in the lower end of the plug. When the pump pressure is relieved, the ball 19 will float to its seat and prevent the cement from passing upwardly through the plug into the casing.

When the cementing has firmly set, the entire cementitious plug and valve cage assembly may be readily drilled out due to the fact that the valve assembly is formed of nonmetallic material which may be readily drilled out with the cementitious plug 11.

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

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

A floating and cementing shoe for well casings comprising a cylindrical member, a plug of cementitious material cast in said member, said plug of cementitious material projecting beyond the lower end of said cylindrical member and shaped to form a guide, a valve cage secured centrally within said plug of cementitious material and including a cylindrical housing, a valve member disposed within the housing and of a diameter considerably less than the interior diameter of the housing, said housing having a port formed concentrically through its upper end, said cementitious plug having a passageway formed through its upper end in register with said port, a valve seat surrounding the inner end of said port for co-operation with said valve member, the opposite end of said housing being open and interiorly threaded, a cylinder having an interior diameter just slightly less than the interior diameter of the housing, one end of said cylinder being exteriorly threaded whereby it may be threadedly telescoped into the housing, the length of said cylinder being such that it projects to a point just short of the guide portion of the plug which extends beyond the lower end of the cylindrical member, radially inwardly projecting lugs

formed interiorly of the cylinder at the end thereof which projects within the housing, said lugs being spaced apart circumferentially and being adapted to engage said valve 5 when the same is unseated, said housing, cylinder and valve being formed of non-metallic friable material.

CLARENCE E. BURT.

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