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DETAILED FLOAT PLUG
Filed Nov. 1, 1937
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Fig. 4

Fig. 5

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This invention relates to an improvement in detachable float plugs which are used in connection with cementing casings in wells, particularly oil wells.

Another object of this invention is to provide a non-metallic plug that may be detachably affixed to a casing of the usual type. Another object of this invention is to provide a detachable plug that may be made in varying lengths to accommodate varying conditions, while at the same time being made to attach to a variety of different casings.

Another object of this invention is to provide a detachable, non-metallic casing plug having a valve therein, which is composed of material that is fairly easy to break up by drilling, yet is of sufficient strength to withstand the pressure to which it is normally subjected. It is to be understood that while the drawings illustrate a preferred embodiment of the invention together with modifications thereof, the design may be varied and changes made in the minor details of construction to meet specific needs and requirements, within the scope of the invention as claimed without departing from the spirit thereof.

In the drawings:

Fig. 1 is a vertical section through the lower portion of a casing, having the invention applied thereto, parts being in elevation; Fig. 2 is a top plan view of the float shoe plug, detached; Fig. 3 is a side elevation thereof; Fig. 4 is a vertical sectional view, partly in elevation, of a modified form of float plug installed in the casing at a coupling; and Fig. 8 is a similar view of another form of plug, detached.

The numeral 5 designates a well casing, to the lower end of which is attached a shoe 6 by a screw-threaded connection, as shown in Fig. 1. The shoe 6 normally has an internal shoulder 7 intermediate the upper and lower ends thereof. A casing shoe plug 8, preferably molded of concrete, has a reduced upper end portion 10 which fits snugly into the lower end of the shoe 6, with a gasket 11 between the lower edge of the shoe 6 and the plug 8 to insure a tight joint therebetween.

The plug 8 is molded separately and independently of the shoe 6 and has bolts 9 cast therein and extending upwardly therefrom. A cross-bar 12 extends transversely in overlying relation upon the shoulder 7 through which cross-bar the bolts 9 extend, securing the plug 8 to the shoe 6.

The cross-bar 12 has a hole 13 therein.

The plug 8 has a passageway 18 therethrough, the lower end portion of which is enlarged at 16, to receive a valve 15. The valve 15 is adapted to engage and seat on a shoulder 17, being supported by a spring 14 which extends upwardly through the passageway 18, and has its upper end attached to a cross-pin 19 resting on the end of the plug 8, the hole 13 permitting access thereto. The lower outer edge of the plug 8 is preferably rounded at 20 to prevent its engagement with the side walls as the casing 5 is being lowered into the well.

By providing the valved passageway through the plug 8, fluid or liquid cement may be pumped downward past the valve 15, but said valve prevents any upward or backflow therethrough.

The plug 8 may be made in varying lengths to accommodate varying conditions, and at the same time, it may be made to attach to a variety of different casing shoes 6 for attachment or detachment therefrom. By molding the plug of concrete, it may be broken up by drilling, and yet is of sufficient strength to withstand the pressure to which it is normally subjected. However, any material may be used that may be easily crushed, such as "Bakelite" or other molded plastic, or the like.

The plug 8 is used in the usual manner of a plug on a cementing casing, having the cementing material forced downward through the casing 5, shoe 6 and plug 8, past the valve 15 therein, and out around the casing to cement the well, the valve preventing any backflow therethrough.

A modification of this detachable float plug may be provided to leave a cement column below the float plug, thereby leaving the cement "tailings" in the casing. This insures that good cement will be forced out between the walls of the casing and the well.

In the modified form of the invention shown in Fig. 4, the plug is shown installed within the casing 5 at a collar 21. The cement plug is designated 22 and has a cast iron or metallic ring 23 molded therein around the same, and said ring fits between the upper and lower joints of the casing 5. A gasket 24 may be imbedded within a recess in the cement plug 22 to prevent the passage of cement upward between the casing 5 and plug 22. A passageway 18' is provided through the plug and is enlarged at the lower end 16' to receive valve 15'. A spring 14' carried by pin 19' holds the valve 15' closed until opened by the pressure of the liquid cement passing downwardly therethrough. The valve seats on face 17' of plug 22.
In the further modification of the detachable float plug as shown in Fig. 5, this is substantially the same as shown in Fig. 4 except that a shoulder 25 is molded of cement integral with the plug 27 and has soft metallic ferrules 26, such as lead, which form gaskets when the casing is joined together, the casing will cut into these ferrules and prevent leakage between plug and the sections of the casing 5.

I claim:

1. In combination with a casing shoe, of a valved non-metallic detachable plug fitted to the lower end of the casing shoe, means for engaging the casing shoe, and a detachable fastening connecting said engaging means with the plug.

2. In combination with a casing shoe having an internal shoulder, of a non-metallic valved plug, means for engaging said shoulder, and means for detachably connecting said engaging means with said plug for detachably connecting said plug with the shoe.

3. In combination with a casing shoe having an intermediate peripheral portion of uniform diameter than said end portions and in position to fit between the ends of said casing sections, having an intermediate peripheral portion of uniform diameter than said end portions and in position to fit between the ends of said casing sections.

4. In combination with a casing shoe having an internal shoulder, of a valved non-metallic plug inserted into said shoe and slide longitudinally relative thereto, and releasable means connecting said plug and shoulder in assembled relation and permitting release and longitudinal removal of the plug from the shoe.

5. In combination with a casing shoe having an internal shoulder, of a valved non-metallic plug inserted into said shoe and slide longitudinally relative thereto, and releasable means connecting said abutment means with the plug for release thereof from the shoulder for removal of the plug from the shoe.

6. A casing plug having a passageway therethrough, said plug having end portions adapted to be received in casing sections, and having an intermediate peripheral portion of uniform diameter than said end portions and in position to fit between the ends of said casing sections.

7. The combination with well casing sections and a coupling joining the sections together, of a casing plug having a passageway therethrough, said plug having end portions slidably and removable received in said adjacent ends of said casing sections, and a peripheral enlargement on said plug of greater diameter than said end portions and fitting between the adjacent ends of said sections.

8. In combination with a casing shoe having an internal shoulder, of a valved non-metallic plug inserted into said shoe and slide longitudinally relative thereto, and releasable means connecting said plug and shoulder in assembled relation and permitting release and longitudinal removal of the plug from the shoe.

9. In combination with a casing shoe having an internal shoulder, of a valved non-metallic plug inserted into said shoe and slide longitudinally relative thereto, and releasable means connecting said abutment means with the plug for release thereof from the shoulder for removal of the plug from the shoe.

10. The combination of a casing section, a casing plug slidably telescoped with said casing section and having a passageway therethrough, holding means engaging the casing section, and a detachable fastening connecting the holding means with the plug.

11. The combination of a casing section, a casing plug slidably telescoped with said casing section and having a passageway therethrough, holding means engaging the casing section, and a bolt connecting the holding means with the plug.

12. The combination of a casing section, a casing plug slidably telescoped with said casing section and having a passageway therethrough, a plate or plates having interlocked engagement with the casing section, and bolt means detachably connecting the plate or plates with the plug.

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