July 8, 1941. D. SCARAMUCCI 2,248,125

WASH-DOWN AND CEMENTING ATTACHMENT FOR WELL CASINGS

Filed Oct. 4, 1939

Fig. 1.

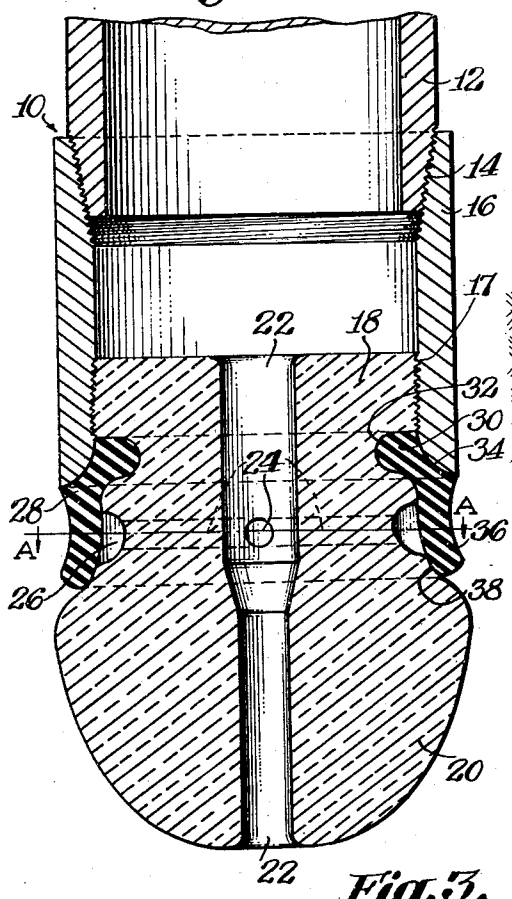



Fig. 2.

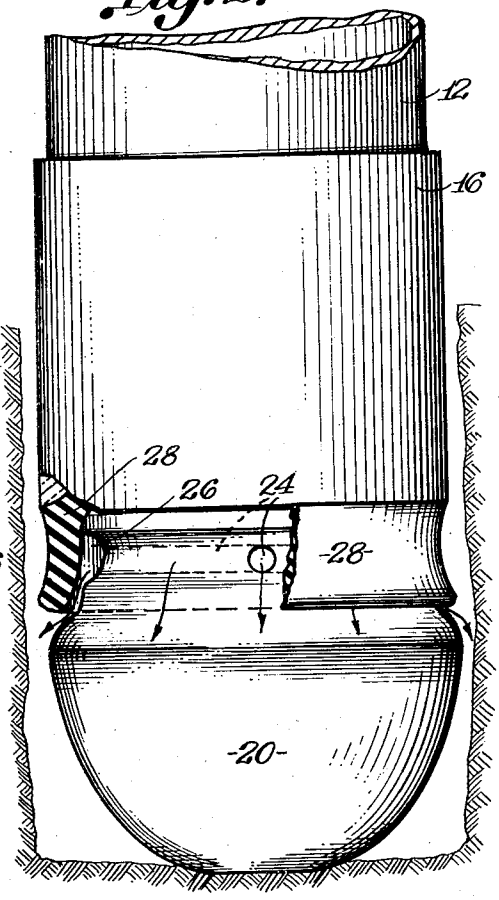
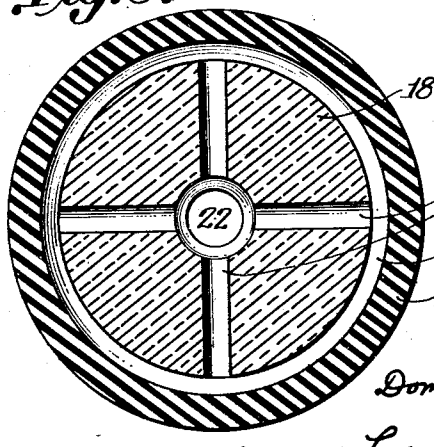



Fig. 3.




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## WASH-DOWN AND CEMENTING ATTACHMENT FOR WELL CASINGS

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7 Claims. (Cl. 166—9)

The invention herein to be described relates to wash-down and cementing attachements for well casing.

It is a primary purpose of this invention to provide a well casing attachment having a novel arrangement of discharge openings for pressure fluid and cement.

Specifically, provision is to be made for a guide or float shoe which has side-delivery openings adapted to produce a uniform, circular downward discharge of fluid. Important features of the side-delivery means are an annular header and a resilient baffle or valve ring.

Hitherto, it has been the practice to utilize a shoe having separate side ports which are always open to create an objectionable wall washing effect as the casing is landed, and which tend to remove the protective wall layer, causing the hole to cave. In such prior devices, the side jetting action has been combined with a straight downward one, with the result that the effectiveness of the main or downward jet in removing bridges has been reduced because of flow division. Therefore, it is intended to provide an attachment of this type in which the resilient baffle means will effect at least a partial fluid seal of the side-delivery openings to avoid any wall washing when the main passage is open, and which after landing on bottom will open for the discharge of cement. By limiting the cement discharge to a lateral one, contamination of oil sand below the shoe will be prevented.

The novel construction to be described provides a valved side-delivery attachment which requires no sliding parts and spring means which are difficult to drill up, or any other external device which would increase the overall diameter of the attachment to an objectionable extent.

A further specific object of this invention is the elimination of the possibility of uneven distribution of the cement or channeling by providing a header conduit which produces a uniform circular discharge.

Further novel features of improvement contributing to the ease of manufacture and efficient operation of the attachment will be perceived and readily understood from reading the following detailed description of a preferred embodiment of the invention in connection with the accompanying drawing, in which

Fig. 1 is a longitudinal section view of the attachment;

Fig. 2 is a corresponding side elevation, partly sectioned to show a different position of one of the parts; and

Fig. 3 is a cross-section taken on the line A—A of Fig. 1.

Referring to Fig. 1 of the drawing, numeral 10 indicates generally the well casing attachment which is in the form of a guide shoe attached to the end of a well casing section 12 by means of a threaded connection 14 between a cylindrical, tubular member 16 and said casing section 12. The tubular member 16 is in the form of a steel shoe and has an internal threaded connection 17 at its lower end with a drillable plug 18 of material such as Bakelite, cementitious material or aluminum. It will be noted that plug 18 has an end 20 projecting below the shoe 16 which is pointed or rounded for guiding purposes.

A longitudinal passageway 22 of relatively large diameter extends centrally through the drillable plug 18 and is in open communication with a plurality of relatively small, laterally extending passages 24 which open exteriorly of the plug 18 to serve side-delivery means described hereinafter. A little below the lateral passages 24, the passageway 22 is reduced somewhat in diameter to give greater kinetic energy to the pressure fluid in its downward flow.

Particular attention is directed to an annular header or groove 26 in the outer surface of plug 18 which connects with the adjacent ends of the peripherally spaced lateral passages 24. The illustrated and preferred embodiment of the invention is provided with four such lateral passages 24 which are spaced at 90 degrees, but this particular number and arrangement may be varied. A resilient valve or baffle ring 28 closely encircles and is secured to the attachment in a position to cover the header 26 and thus to prevent discharge from the lateral passages 24 unless sufficient pressure is applied on its inner side to flex it away from the plug means 18, in the manner illustrated by Fig. 2.

An inwardly extending mounting shoulder 30 on the upper end of ring 28, which may be molded of rubber, is received in a complemental recess 32 of the plug 18 above the header or groove 26. Further note is made of a concaved recess groove 34 in the upper end of ring 28 for cooperation with the lower end of shoe 16, and of the fact that the effective part of said ring may be substantially uniform in thickness.

The flexibility of the lower edge of the resilient ring 28 may be enhanced by concaving or inwardly curving its outer face 36, as shown by the cross-section of this element in Fig. 1. Adjacent the header 26 and baffle or valve ring 28, the plug 18 has a narrow or necked portion 38

to accommodate the ring within the outside diameter of the shoe 16 and the guide end 20, as is desirable.

The operation of the attachment comprising this invention will now be summarized. As the casing 12 is lowered through the well bore, it will be guided by the rounded or pointed end 20 extending below the shoe 16 and any bridges or other impediments will be removed by the action of a jet of pressure fluid through the main, longitudinal passageway 22. By reason of the relatively small flow area provided by the lateral passages 24, their arrangement with respect to the passageway 22, and the suction effect produced by the rapid flow of fluid downwardly through said passageway, a partial fluid seal will be obtained at the annular header 26 which will be sufficient to prevent any objectionable wall washing. Of course, the side-delivery means is normally closed by the resilient action of valve or baffle ring 28, although the groove 26 provides a circumferential passage connecting the outer ends of the lateral passages 24 even when the ring 28 is unflexed. When the casing is landed on bottom, the side-delivery means comprising passages 24, header 26, and the rubber valve or baffle ring 28 will be opened so that cement may be discharged diagonally downward in a ring form of jet, due to the closing of the bottom opening of the passageway 22 by the formation.

Accordingly, it will be recognized that the attachment which this invention provides is capable, in an improved manner, of washing down a well wall, removing bridges ahead of the casing to be landed, guiding the casing, and discharging cement laterally after the casing is on bottom. From the standpoint of construction, it is extremely simple and economical.

While only a guide shoe construction is illustrated and described, conventional check valve means may be incorporated therein so that it will function as a float and guide shoe. It is to be noted further that the principles of this invention may easily be adapted to side-delivery float collar construction. Obviously, numerous variations can be made in the details of construction which will come within the spirit and scope of the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. In combination with a wash-down, cement and guide shoe having communicating downward and lateral discharge openings therein and an annular header groove joining the lateral discharge openings, a resilient valve ring secured in position around said shoe so as normally to cover the lateral discharge openings and annular groove, and having one edge free to flex away from the shoe, said annular header groove and valve ring being constructed and arranged to provide a circumferential passage connecting the outer ends of the lateral discharge passages when said ring is unflexed.

2. In combination with a wash-down, guide, and cementing shoe having a longitudinal passageway with a reduced diameter lower end extending therethrough and lateral discharge passages communicating with said longitudinal passageway above the reduced diameter end, a resilient baffle ring arranged over the outer ends of said lateral passages and secured by one end to the shoe, so that its other end will be free to flex away from the outer ends of said passages.

3. In combination with a wash-down, guide, and cementing shoe having a longitudinal passageway therethrough and lateral discharge passages communicating with said longitudinal passageway, a continuous, resilient baffle ring arranged over the outer ends of said lateral passages and secured by one end to the shoe, so that its other end will be free to flex away from the outer ends of said passages, said shoe being reduced in diameter adjacent the outer ends of the lateral passages to accommodate the baffle ring.

4. A wash-down and cementing attachment for well casing comprising a tubular member adapted for connection to the end of a casing section; a drillable plug retained within the tubular member, said plug being formed with a large longitudinal passageway, lateral passages extending from the passageway to its outer surface, and an annular header groove connecting the outer ends of said passages; and a rubber valve ring secured by its upper edge only to the plug and arranged normally to close the annular groove therein.

5. A cementing attachment for well casing, comprising, a tubular shoe member adapted to be connected to the end of a casing; a drillable plug provided with a longitudinal passageway extending into and secured within the shoe member and having a pointed guide end projecting therefrom, the plug having also a plurality of lateral passages communicating with the passageway and an annular header groove joining the outer ends of its lateral passages; and a resilient baffle ring secured by its upper edge exteriorly of the plug for closing the header groove, the lower edge of said ring being arranged to flex outwardly to permit a downward, lateral discharge therefrom.

6. A wash-down and cementing attachment for well casing comprising a tubular member adapted for connection to the end of a casing section; a drillable plug extending into and retained within the tubular member, said plug being formed with a large longitudinal passageway, lateral passages extending from the passageway to its outer surface, and an annular groove connecting the outer ends of said passages; and a rubber valve ring having an inwardly extending shoulder on its upper edge secured to the plug, and arranged normally to close the annular groove therein.

7. A cementing attachment for well casing, comprising, a cylindrical, tubular shoe member adapted to be connected to the end of a casing; a drillable plug provided with a longitudinal passageway, said plug extending into and secured within the shoe member and having a pointed guide end projecting therefrom, the plug having also a plurality of lateral passages communicating with the passageway and an annular header groove joining the outer ends of its lateral passages; and a resilient baffle ring exteriorly of the plug for closing the header groove, the upper end portion of said ring being secured between the lower end of the shoe member and the plug and the lower edge of said ring being arranged to flex outwardly to permit a downward, lateral discharge therefrom.

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