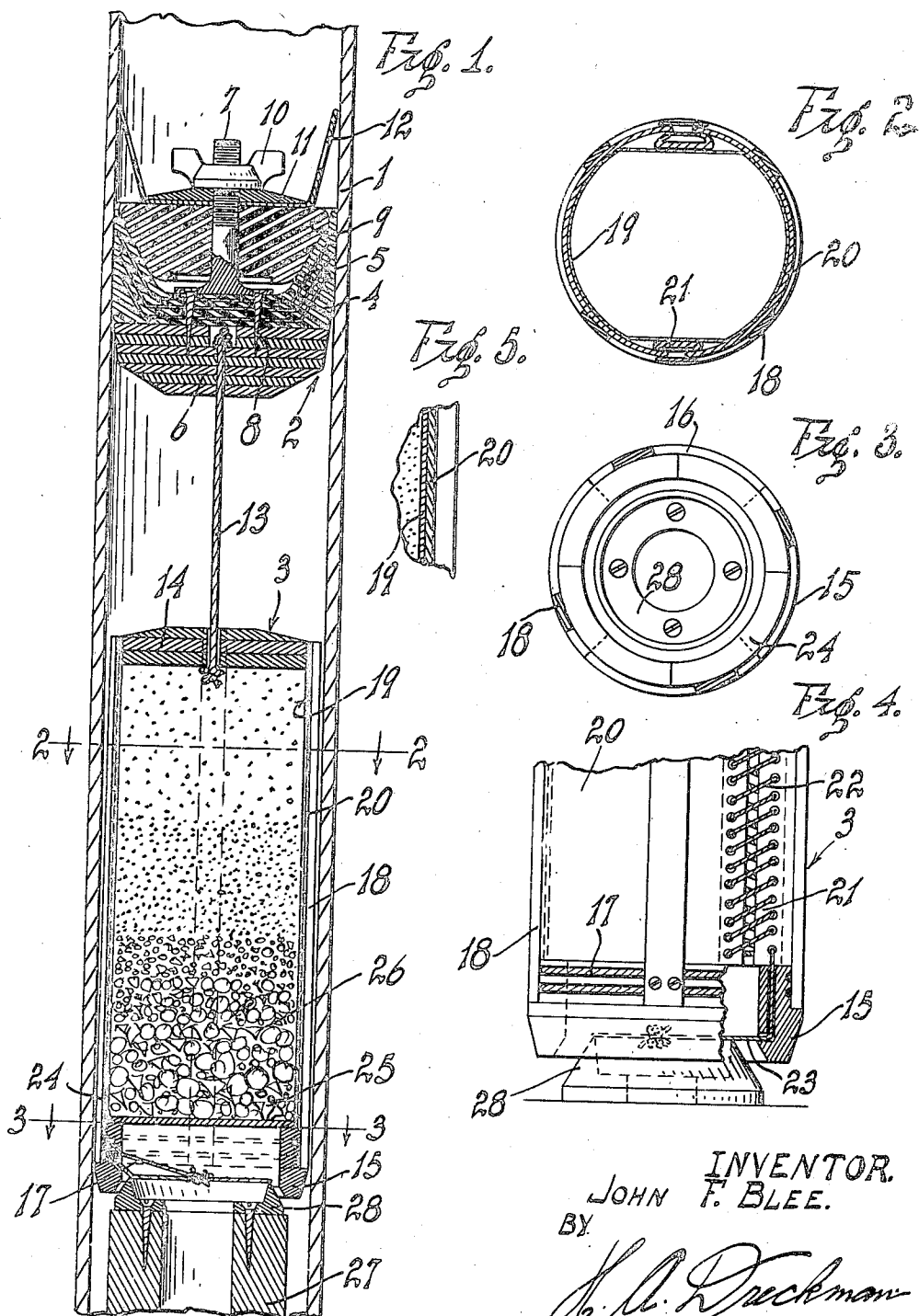


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CEMENTING PLUG

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CEMENTING PLUG

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11 Claims. (Cl. 166—1)

This invention relates to a cementing plug for use in oil wells whereby a quantity of cement is forced downwardly ahead of the plug and into the area within the well which is to be cemented.

5 An object of my invention is to provide a novel cementing plug which will be automatically stopped at the desired point in a well, and which will provide an effective seal to prevent the passage of circulating mud past the plug after said plug has come to rest.

10 Another object is to provide a novel cementing plug consisting of a piston and a depending sealing packer, the piston and the packer being joined by a flexible connection.

15 Still another object is to provide a novel means in a cementing plug to automatically permit the expansion of the sealing packer against the walls of the hole, the sealing packer containing material which will form a plug impervious to the passage of drilling mud.

20 A feature of my invention resides in the novel construction and arrangement of parts and also in the novel materials used in the plug so that a drilling bit can subsequently drill thru the plug.

25 Other objects, advantages and features of invention may appear from the accompanying drawing, the subjoined detailed description and the appended claims.

30 While I have shown the preferred embodiment of my invention, it is in a sense diagrammatic and it is understood that other forms of my invention are included within the scope of the appended claims.

In the drawing:

35 Figure 1 is a longitudinal sectional view of my cementing plug.

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

40 Figure 3 is a sectional view taken on line 3—3 of Fig. 1.

Figure 4 is a fragmentary side elevation of the sealing packer with parts broken away to show interior construction.

45 Figure 5 is a fragmentary sectional view of the wall of the sealing packer.

In cementing an oil well, the required amount of cement is dumped into the well and then a plug is placed in the well and is forced downwardly by the pressure of the drilling mud. The plug is forced downwardly until the foot plug is reached, whereupon operation of the mud pumps should cease and the cement should be allowed to harden. However, in cementing plugs heretofore in use, the drilling mud would by-pass the plug due to the pressure under which the mud

was placed, whereupon the circulating mud would press against the unset cement and circulate this cement to the surface, thus destroying the cement and resulting in a material loss to the operator. With my cementing plug, the possibility of this loss is obviated.

Referring more particularly to the drawing, the numeral 1 indicates the casing in which the cementing operation is to occur. My cementing plug consists of a piston 2 and a sealing packer 3. 10 The piston includes a rubber cup 4 which is reinforced by a plurality of layers of fabric 5. This cup is of sufficient size to press tightly against the wall of the casing. A base 6, preferably made of laminated wood, is positioned below the cup 4. A bolt 7 is mounted in the cup and is held in position by a plurality of screws or bolts 8 which extend thru the base of the bolt 7, thru the cup and into the wooden base 6.

An expander disc 9, preferably made of hard rubber, is arranged within the cup 4 and slips onto the bolt 7. The disc 9 is forced downwardly into the cup for the purpose of pressing the cup outwardly against the wall of the casing. The outer wall of the discs is tapered inwardly, substantially 25 ly as shown in Fig. 1.

A wing nut 10 screws onto the bolt 7 and bears against a washer 11 which washer rests on top of the disc 9. Each of the bolts, wing nut and washer is preferably constructed of cast iron 30 which will easily break up under the impact of the bit. By screwing down on the wing nut 10 the disc will expand the cup to exert a pressure against the casing so that there is small likelihood of the drilling mud by-passing the cup while the plug is being forced downwardly in the casing. 35

A fabric handle 12 is also clamped under the washer 11, this handle being utilized while the plug is being set in the casing and while the wing nut is being screwed down to tightly press 40 the cup against the casing.

The sealing packer 3 is hung from the piston 2 by a rope or similar flexible connection 13. This rope extends downwardly thru the base 6 and is attached to the top of the sealing packer, 45 as will be further described.

The sealing packer 3 includes a head 14 preferably made of laminated wood, and a segmental ring 15 at the lower end of the packer. The ring 15 is formed of a plurality of arcuate segments 16, 50 the purpose of which will be further described. These arcuate segments are held in position to form a complete ring by a cord 17 which is wrapped around the segments and then extends transversely across the ring and is knotted, sub- 55

stantially as shown in Fig. 1. A plurality of ribs 18 extend between the head 14 and the ring 15 and are attached to both for the purpose of holding these members in spaced relation.

5 A paper tube 19 extends between the head 14 and the ring 15. A canvas or fabric sheath 20 closely encircles the tube 19. This canvas sheath is folded at a plurality of points, as shown at 21, and is placed together by the cord 22 to tightly encircle the paper tube 19. The cord 22 also extends across the ring 15, as shown at 23 in Fig. 4. The purpose of this arrangement—of the cords 17 and 22 will be further described.

A plurality of arcuate plates 24 are placed on top of the ring 15 and these plates cover the joints in the ring. A solid disc 25 rests on top of the segments 24 and this disc is also formed of some frangible material.

The entire sealing packer is filled with successive layers of aggregate 26, starting with coarse stone at the bottom and terminating with fine sand at the top. The usual foot plug 27 in the casing is provided with an annular blade 28 which is fastened to the top thereof.

25 In operation, the sealing plug—arranged substantially as shown in Fig. 1—is first lowered into the casing on the rope 13; the piston 2 is next inserted in the casing. Due to the length of the complete cementing plug, it is desirable to provide the flexible connection 13 so that the sealing packer can be first inserted and afterwards, the piston 2. When the piston is inserted in the casing, the cup 4 is expanded to tightly grip the casing with sufficient pressure so that the complete assembly will not drop into the well of its own weight. The mud pumps are now started and the cementing plug is gradually forced downwardly. When the foot plug 27 is reached, the blade 28 will engage and cut both of the cords 30 17 and 22. This permits immediate expansion of the segmental ring 15 and this ring will then move outwardly and downwardly and will wedge into the space around the foot plug. When the cord 22 is severed, the folds 21 will extend where-
45 upon the walls of the sealing packer will expand outwardly and tightly press against the casing. The aggregate within the sealing packer will then be distributed in a mass above the foot plug and even though drilling mud should by-pass the piston, the character of the aggregate—consisting of
50 fine to coarse particles—will form a mass impervious to the passage of the drilling mud. A positive seal is thus provided above the mass of cement which is arranged around and below the
55 foot plug and the operator—due to the increase of pressure within the wall, will stop the mud pumps, and the cement will be allowed to harden. The paper tube 19 will burst when the canvas sheath expands, thus permitting the aggregate
60 in the sealing packer to expand outwardly and to sift into all crevices or irregular corners, thus effectively sealing the casing, as previously described. The cement to which previous reference is made, is dumped into the well prior to running
65 the cement plug as here described.

Having described my invention, I claim:

1. A cementing plug including a piston, a cup on the piston, a sealing packer below the piston, and a flexible connection extending from the piston to the sealing packer whereby the piston and sealing packer are coupled together.
2. A cementing plug including a piston, a cup on the piston, a sealing packer below the piston, a flexible connection extending from the piston to the sealing packer whereby the piston and

sealing packer are coupled together, said sealing packer containing an aggregate.

3. A cementing plug including a piston, a cup on the piston, a sealing packer below the piston, a flexible connection extending from the piston to the sealing packer whereby the piston and sealing packer are coupled together, said sealing packer containing an aggregate, said sealing packer being extensible transversely, and means automatically releasing said sealing packer for transverse distension.

4. A cementing plug including a piston, a rubber cup, an expansion block in the rubber cup, a sealing packer, flexible means coupling the piston to the sealing packer, said sealing packer being filled with an aggregate.

5. A cementing plug including a piston, a rubber cup, an expansion block in the rubber cup, a sealing packer, flexible means coupling the piston to the sealing packer, said sealing packer being filled with an aggregate, the walls of said sealing packer being distensible, means holding said walls in contracted position, and automatic means to release said walls for distension.

6. A cementing plug including a sealing packer, a head, a bottom ring, a fabric sheath extending between the head and the ring, lacing extending longitudinally of the sheath, said sheath being folded under the lacing, a means to sever said lacing whereby the sheath is permitted to expand, and an aggregate within the packer.

7. A cementing plug including a sealing packer, a head, a bottom ring, a fabric sheath extending between the head and the ring, lacing extending longitudinally of the sheath, said sheath being folded under the lacing, a means to sever said lacing whereby the sheath is permitted to expand, an aggregate within the packer, said ring comprising a plurality of arcuate segments, and a cord wrapped around the segments whereby the ring is held in concentric position, said cord being severable by said means.

8. A cementing plug including a sealing packer, a head, a bottom ring, a fabric sheath extending between the head and the ring, lacing extending longitudinally of the sheath, said sheath being folded under the lacing, a means to sever said lacing whereby the sheath is permitted to expand, an aggregate within the packer, and a paper tube arranged inside of the fabric sheath, said paper tube substantially the length of the sealing packer.

9. A cementing plug including a sealing packer, a head, a bottom ring, a fabric sheath extending between the head and the ring, lacing extending longitudinally of the sheath, said sheath being folded under the lacing, a means to sever said lacing whereby the sheath is permitted to expand, an aggregate within the packer, a piston including a rubber cup, means to extend said rubber cup, and flexible means connecting the piston and the sealing packer.

10. A cementing plug including a sealing packer, a head, a bottom ring, a fabric sheath extending between the head and the ring, lacing extending longitudinally of the sheath, said sheath being folded under the lacing, a means to sever said lacing whereby the sheath is permitted to expand, an aggregate within the packer, said ring comprising a plurality of arcuate segments, a cord wrapped around the segments whereby the ring is held in concentric position, said cord being severable by said means, a piston including a rubber cup, means to extend said

rubber cup, and flexible means connecting the piston and the sealing packer.

5 11. A cementing plug including a sealing packer, a head, a bottom ring, a fabric sheath extending between the head and the ring, lacing extending longitudinally of the sheath, said sheath being folded under the lacing, a means to sever said lacing whereby the sheath is per-

mitted to expand, an aggregate within the packer, a paper tube arranged inside of the fabric sheath, said paper tube substantially the length of the sealing packer, a piston including a rubber cup, means to extend said rubber cup, and flexible 5 means connecting the piston and the sealing packer.

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