L. F. BILLS.

HEAVING PLUG.

APPLICATION FILED SEPT. 16, 1912.

1,055,124. Patented Mar. 4, 1913.

Fig. 1.

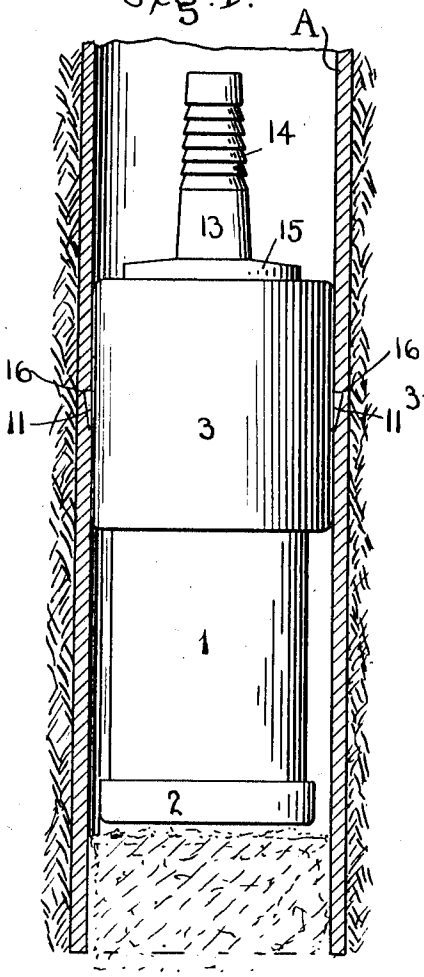


Fig. 2.

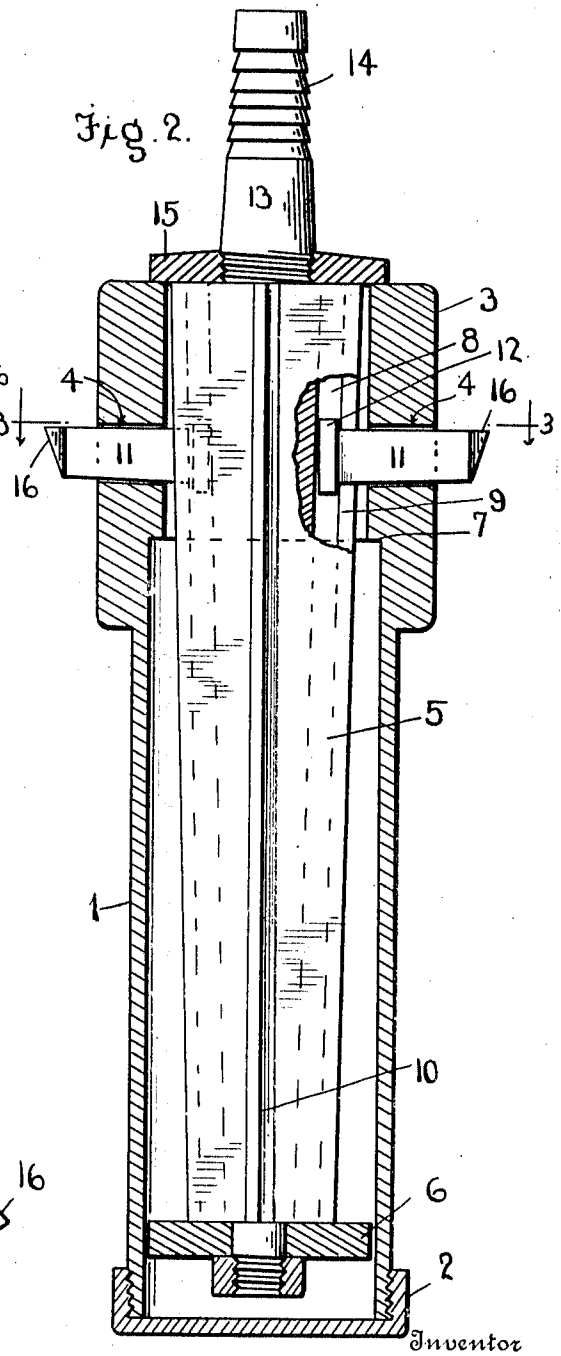
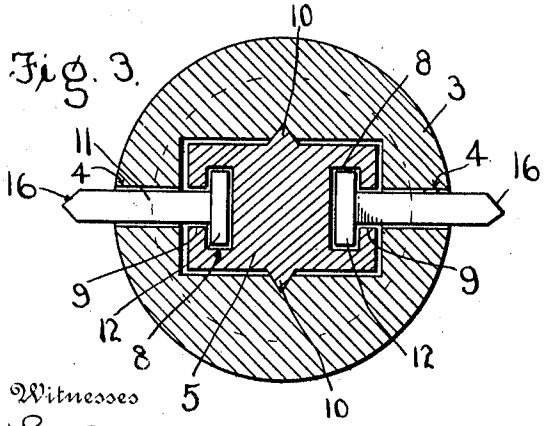


Fig. 3.



Witnesses

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UNITED STATES PATENT OFFICE.

LEROY FRANCIS BILLS, OF COALINGA, CALIFORNIA, ASSIGNOR OF ONE-FOURTH TO FRANK M. NEVINS AND THREE-FOURTHS TO JOSEPH LACOSTE, BOTH OF COALINGA, CALIFORNIA.

HEAVING-PLUG.

1,055,124. Specification of Letters Patent. Patented Mar. 4, 1913.

Application filed September 16, 1912. Serial No. 720,639.

To all whom it may concern:

Be it known that I, LEROY FRANCIS BILLS, a citizen of the United States, residing at Coalinga, in the county of Fresno and State of California, have invented certain new and useful Improvements in Heaving-Plugs; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to a plug for closing the lower end of an oil well casing to prevent the entrance into the casing of sand, gravel and the like caused by heaving.

The principal object of the invention is to provide a plug of this class which is simple in construction and may be fastened when in place without danger of being dislodged by changing conditions in the well below the plug and which may be automatically loosened or unfastened from above when an upward pull is exerted thereon.

With this and other objects in view, the invention consists of certain novel features of construction, and the combination and arrangement of parts as will be more fully described and claimed.

In the accompanying drawings: Figure 1 is a side elevation of a heaving plug constructed in accordance with this invention shown applied with the casing of the well in section. Fig. 2 is a vertical section through the plug with parts broken out. Fig. 3 is a horizontal section taken on the line 3—3 of Fig. 2.

In the embodiment illustrated a well casing A is shown of ordinary construction within which this improved plug is designed to operate.

This improved plug comprises, as shown, a sleeve or casing 1 having a cap 2 removably secured to its lower end and a head 3 formed on its upper end said head being preferably made integral therewith. This head 3 is provided with a plurality of radially extending openings 4 for the passage of casing engaging elements to be described. Any desired number of said openings may be employed two being here shown arranged at diametrically opposite points.

A mandrel 5 is slidably mounted within the sleeve 1 and is preferably composed of cast steel tapering from its upper toward its lower end for a purpose to be described. A stop plate 6 is secured to the lower end of said mandrel by any suitable means and is adapted to engage a shoulder 7 formed within the head 3 at a suitable point below the openings 4 to prevent the withdrawal of the mandrel from the sleeve. When the mandrel has been raised a sufficient distance to cause the stop plate 6 to engage the shoulder 7, a further pull exerted thereon will cause the upward movement of the sleeve within which the mandrel is mounted and by means of which the plug is withdrawn from the well casing. This mandrel 5 is provided with a plurality of longitudinally extending grooves 8 having contracted mouths 9 to receive the heads and shanks of casing engaging elements to be described. Two of these grooves 8 are herein shown arranged at diametrically opposite sides of the mandrel and the other two sides of said mandrel are provided with projections 10 here shown as being triangular in shape and which are slidably mounted in correspondingly shaped grooves formed in opposite side walls of the head 3 by means of which the mandrel is guided in its movement within the sleeve.

Casing engaging or biting elements are herein shown in the form of T-shaped chisels 11 the heads 12 of which are loosely mounted in the grooves 8 of the mandrel and the shanks or stems 13 thereof project through the openings 4 in the head 3, said chisels being held by said openings against vertical movement, but are adapted to slide horizontally therein for projection or withdrawal according to the direction in which the mandrel is moved. The mandrel is tapered from its upper toward its lower end for the purpose of actuating these chisels, the downward movement of the mandrel tending to force the chisels outward into biting engagement with the casing A and the upward movement thereof tending to withdraw said chisels into the head 3 out of engagement with the casing, and thus permit the plug to be removed.

The mandrel 5 is provided at its upper end with a shank 13 for connection with a piston rod or other means for lowering and withdrawing the plug from the casing, said shank being preferably provided with indentations or teeth 14, for holding the mandrel reliably in engagement with its operating element. A closing plate 15 for the upper end of the head 3 is carried by

the shank 13 of the mandrel and when the mandrel is inserted to its full extent within the sleeve 1 this plate 15 rests on the outer face of the head 3 and securely closes the sleeve thus preventing the entrance of sand and dirt at this point.

The casing engaging chisels 11 are of any suitable or desired construction, but are here shown provided with biting points 16 which are adapted to readily engage the walls of the well casing when said chisels are forced outward by the downward movement of the mandrel as is shown clearly in Fig. 1.

When it is desired to remove the plug, a pull is exerted upon the mandrel actuating element (not shown) connected with the shank 13 which draws the mandrel 5 upward until the plate 6 engages the shoulder 7 of the head 3 and this upward movement causes the chisels 11 to be withdrawn into the head 3 thereby disengaging them from the well casing. A continued pull on the shank 13 will then cause the sleeve and head to be withdrawn with the mandrel and the plug may be either entirely removed from the casing or disposed at another point therein as may be desired.

While I have described my invention with more or less minuteness as regards details and as being embodied in certain precise forms, I do not desire to be limited thereto unduly any more than is pointed out in the claims. On the contrary, I contemplate all proper changes in form, construction and arrangement, the omission of immaterial elements and substitution of equivalents as circumstances may suggest or render expedient.

I claim as my invention;—

1. A heaving plug comprising a casing provided with a plurality of openings in its side walls, gripping elements slidable in said openings, a tapered mandrel slidably mounted in said casing and provided with grooves, said gripping elements having heads slidably engaged with said grooves.

2. A heaving plug comprising a cylindrical body with openings extending transversely through the side walls thereof, gripping elements mounted to slide in said openings and means for projecting and withdrawing said gripping elements.

3. A heaving plug comprising a cylindrical body with openings extending transversely through the side walls thereof, gripping elements mounted to slide in said openings, and a tapered member slidably mounted in said cylindrical body and provided with under cut grooves extending longitudinally thereof, said gripping elements having heads slidably engaged with said grooves.

4. A heaving plug comprising a cylindrical body with openings extending transversely through the side walls thereof, gripping elements mounted to slide in said openings, a mandrel slidably mounted in said body and tapered from its outer toward its inner end, said mandrel having under cut grooves extending longitudinally thereof, heads on said gripping elements slidably engaged with said grooves and coöperating guides formed on said mandrel and said body.

5. A heaving plug comprising a cylindrical body having a head at its upper end, said head having radially extending openings therein and a shoulder on its inner face, a closure for one end of said body, a tapered mandrel slidably mounted in said body and provided with under cut grooves, gripping elements slidable in the openings of said head and provided on their inner ends with heads for slidable engagement with the grooves in said mandrel and a stop plate secured to the inner end of said mandrel.

6. A heaving plug comprising a cylindrical body having a head at its upper end, said head having radially extending openings therein and a shoulder on its inner face, a closure for one end of said body, a tapered mandrel slidably mounted in said body and provided with under cut grooves, gripping elements slidable in the openings of said head and provided on their inner ends with heads for slidable engagement with the grooves in said mandrel, a stop plate secured to the inner end of said mandrel, and a closure for the open end of said body carried by said mandrel.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

LEROY FRANCIS BILLS.

Witnesses:
J. A. STEELE,
H. R. CROZIER.