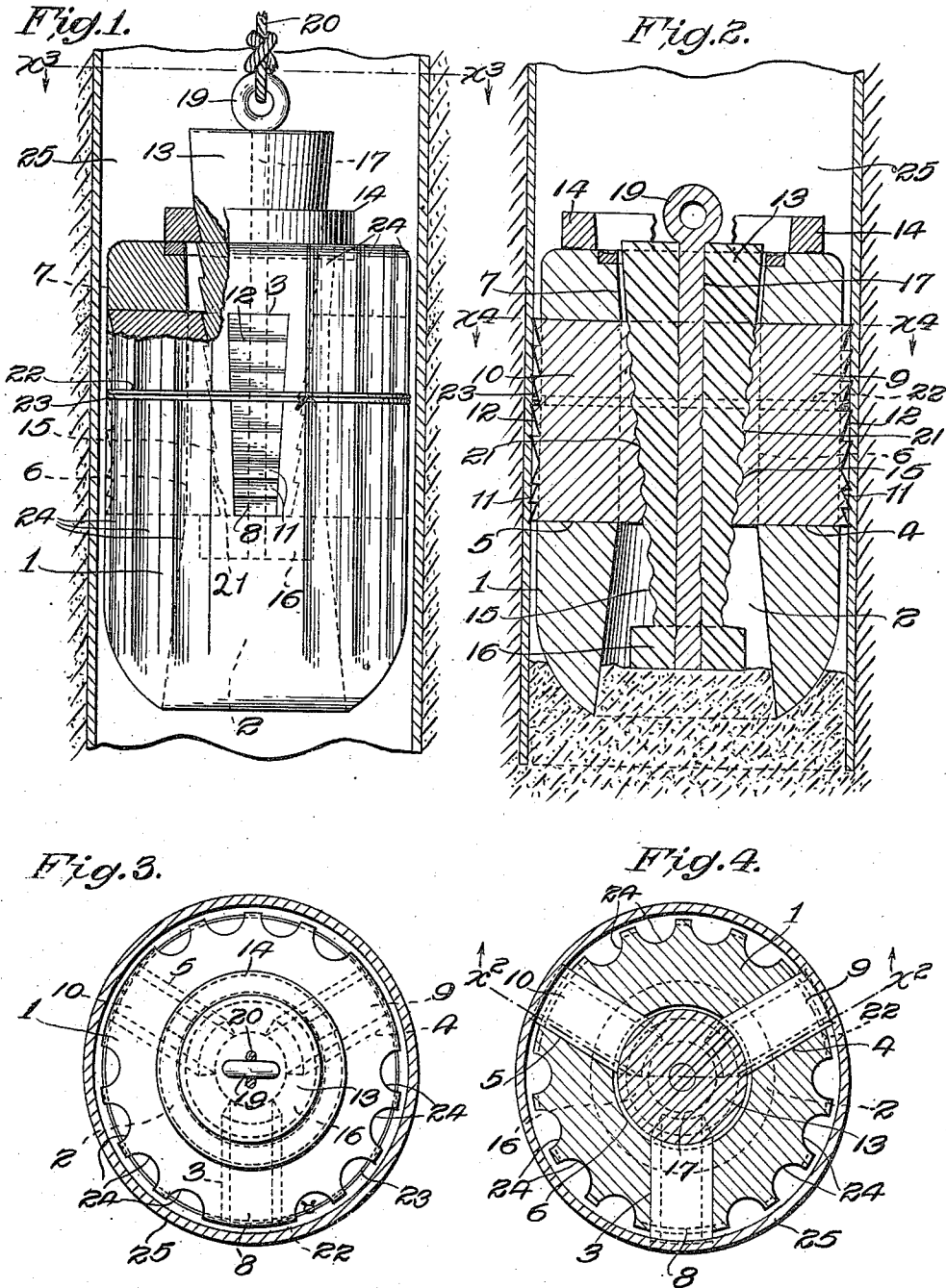


E. N. MOOR.
HEAVING PLUG FOR OIL WELLS.
APPLICATION FILED MAY 17, 1909.

987,812.

Patented Mar. 28, 1911.



Witnesses:

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UNITED STATES PATENT OFFICE.

EDWARD N. MOOR, OF OAKLAND, CALIFORNIA.

HEAVING-PLUG FOR OIL-WELLS.

987,812.

Specification of Letters Patent.

Patented Mar. 28, 1911.

Application filed May 17, 1909. Serial No. 496,645.

To all whom it may concern:

Be it known that I, EDWARD NORTON MOOR, a citizen of the United States, residing at Oakland, in the county of Alameda and State of California, have invented a new and useful Heaving-Plug for Oil-Wells, of which the following is a specification.

The invention relates to a plug for closing the lower end of an oil-well casing to prevent the casing from being filled by heaving up material such as sand, gravel, etc., and at the same time allowing oil to drain into the casing; the object of the invention being to produce a superior article, and the invention consists in the novel features herein shown, described and claimed.

The accompanying drawings illustrate the invention.

Figure 1 is a side elevation of the heaving-plug descending into the well-casing, the casing being shown in section. Portions of the mandrel are broken to expose the angular teeth. Fig. 2 is a sectional elevation of the plug fixed in the lower end of the casing in use and taken on line x^2 , Fig. 4. Fig. 3 is a horizontal section on line x^3 , Fig. 1, drawn for the purpose of showing a top plan view of the heaving-plug. Fig. 4 is a horizontal section on line x^4 , Fig. 2.

The cylindrical body 1 has a tapered bore 2 extending upwardly from its lower end to the bottoms of the slip-seats 3, 4, and 5, and a straight bore 6 extending from the bottoms of the slip-seats to the tops of the slip-seats, and a flaring bore 7 extending from the tops of the slip-seats to the top of the cylindrical body 1. The slip-seats 3, 4 and 5 are formed radially in the cylindrical body 1 extending from the central bore 6 to the periphery, and the slips 8, 9 and 10 are mounted to slide horizontally in these seats; each slip having downwardly-projecting teeth 11 upon the outer face and near its lower end, and upwardly-projecting teeth 12 upon the remainder of the outer face, the teeth 11 extending slightly beyond the teeth 12 so that the teeth 11 will engage the casing before the teeth 12.

The tapered mandrel 13 is mounted in the central opening of the cylindrical body 1, there being a frangible cast-iron ring 14 to engage the upper end of the cylindrical body and hold the mandrel in its elevated position. Teeth or corrugations 15 are formed upon the periphery of the mandrel. A button 16 is formed upon the lower end of the

mandrel, and a soft iron core 17 is cast into the mandrel in any well-known manner to prevent withdrawal, and is provided with an eye 19 upon the upper end for attachment to the line 20.

The inner faces of the slips 8, 9 and 10 are curved and inclined to fit the periphery of the mandrel 13, and corrugations or teeth 21 are formed upon the inner faces to engage the teeth of the mandrel. A groove 22 is formed in the periphery of the cylindrical body 1 to receive a wire 23 for tying the slips in place so as to hold the parts of the plug together for handling and insertion into the casing. The core 17 is to prevent the parts of the mandrel 13 from separating if the casting breaks.

Vertical corrugations or grooves 24 are formed in the periphery of the cylindrical body 1 to allow oil and water to pass upwardly around the plug into the casing as required to lower the plug into the casing and fix it in position, and as required to allow oil to drain into the casing. The cylindrical body is as large as will pass readily down into the casing 25.

In practical operation the heaving-plug may be dropped into the casing, or it may be lowered by the line 20 until the bottom of the hole is reached, and then the mandrel 13 may be driven down by manipulating the tools, not shown. The first blows upon the mandrel will break the wires and the frangible ring, thus allowing the mandrel to move downwardly and the slips to move outwardly, and as the mandrel is started downwardly, the teeth 11 will grip the casing and prevent the plug from being driven farther into the earth, and then continued hammering upon the mandrel will cause the slips to move outwardly still farther and cause the teeth 12 to firmly grip the casing so as to hold the plug from being raised in the casing. As the mandrel 13 is driven downwardly the teeth 15 upon the mandrel will interlock with the teeth 21 upon the slips, and when the plug has been properly fixed in the casing it will effectually plug the bottom of the well-casing and keep it closed to exclude coarse dirt, gravel, etc.

The corrugations or teeth 15 and 21 may be angular or curved. In Fig. 1 they are shown in dotted lines as angular, and in Fig. 2 they are shown as curved. The angular teeth of the mandrel in Fig. 1 project upwardly to so engage the downwardly-pro-

jecting teeth of the slips as to prevent any possible upward movement of the mandrel past the slips. The form of teeth shown in Fig. 2 allows the mandrel to be drawn upward by application of sufficient force.

It will be understood that the resiliency of the well-casing is effective to return the slips inwardly to hold them in the teeth-interlocking position.

I claim:

1. A heaving plug comprising a cylindrical body adapted to fit loosely in the casing and having peripheral vertical passages, and means for locking the cylindrical body in the casing.

2. A heaving plug comprising a cylindrical body having peripheral vertical grooves and adapted to fit loosely in the well-casing, slips mounted to slide horizontally in the cylindrical body, said slips being arranged radially from the center and a tapered mandrel mounted vertically to force the slips outwardly.

3. A heaving plug comprising a vertically cylindrical body having a vertical central bore and having slip-seats extending radially from the bore and having a peripheral groove and vertical liquid passages, slips slidingly mounted in the slip-seats and having teeth to engage the casing, a tapered mandrel mounted in the vertical bore for forcing the slips outwardly, a button upon the lower end of the mandrel, a frangible ring upon the upper end of the mandrel and engaging the upper end of the cylindrical body, and a tie in the groove for holding the slips in place, said button engaging the lower faces of the slips to hold the mandrel in place.

4. A heaving plug comprising a cylindrical body having a longitudinal bore and slip-seats extending radially from the bore and

longitudinal passages in its periphery, slips slidingly mounted in the slip-seats and having teeth upon their outer faces for engaging the well-casing, a tapered mandrel mounted in the longitudinal bore, there being teeth upon the periphery of the tapered mandrel and teeth upon the inner faces of the slips for locking the mandrel to the slips, a button upon the lower end of the mandrel for engaging the lower faces of the slips, means for tying the slips in the cylindrical body, and a frangible ring upon the upper end of the tapered mandrel engaging the upper end of the cylindrical body.

5. A heaving plug comprising a cylindrical body having a vertical bore and peripheral vertical grooves, slips radially mounted in the cylindrical body and extending into the vertical bore, a tapered mandrel mounted in the vertical bore to force the slips outwardly, said mandrel comprising a casting having a soft iron core to hold the parts from separating if the casting breaks.

6. A heaving plug for wells comprising a body to fit loosely in a well-casing and provided with a central bore and peripheral vertical grooves and with slip-seats radiating from such bore; slips in the slip-seats to engage the well-casing, a mandrel to spread the slips apart, and means to temporarily hold the mandrel inoperative; said mandrel and slips being adapted to engage each other to hold the mandrel down and the slips apart.

In testimony whereof, I have hereunto set my hand at Bakersfield Kern Co. California, this 10th day of May 1909.

EDWARD N. MOOR.

In presence of—

CHAS. S. BARNHART,
WALTER J. BARNHART.