March 9, 1926. 1,576,074

W. T. THOMAS

APPARATUS FOR SEALING OIL WELLS

Original Filed April 9, 1925

Fig. 1.

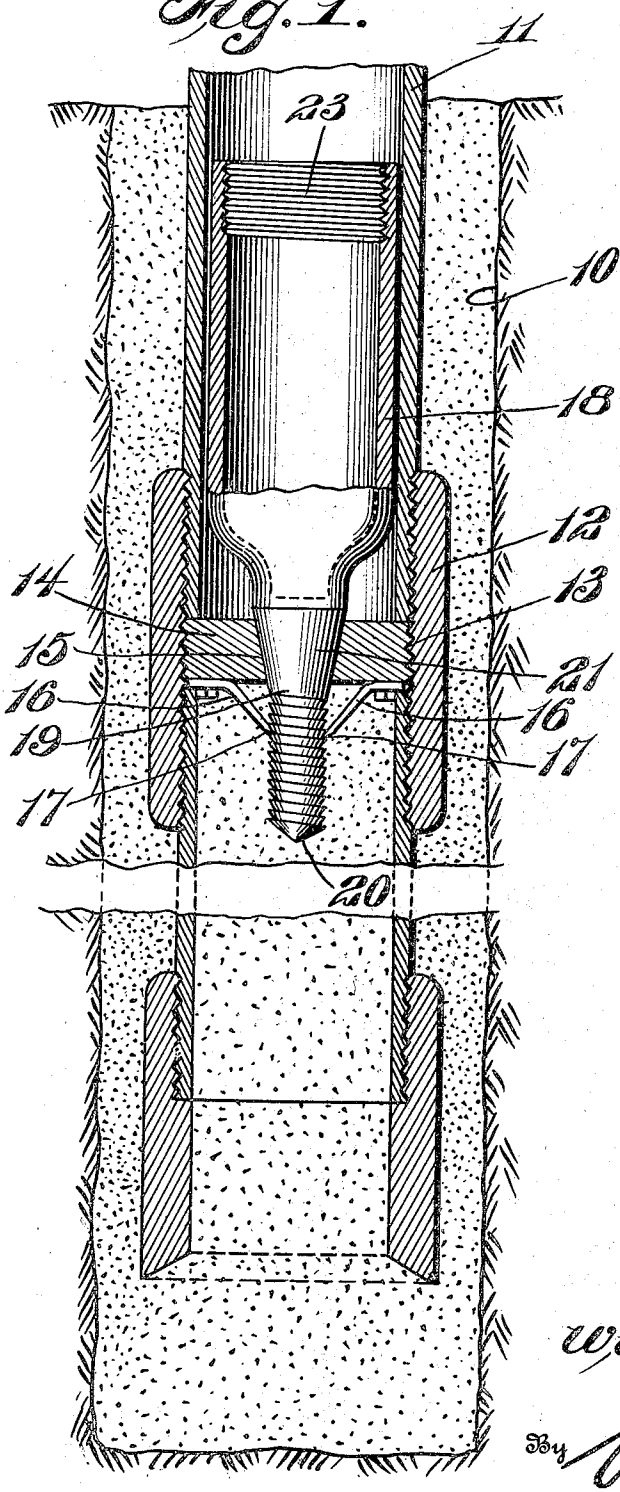


Fig. 2.

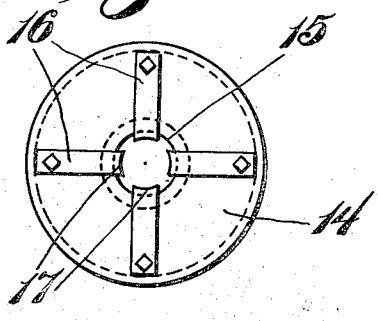
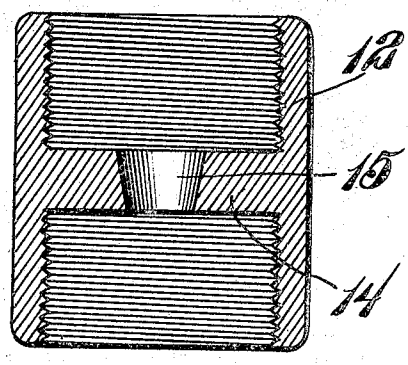


Fig. 3.



Inventor
William T. Thomas

By Watson & Coleman
Attorney

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UNITED STATES PATENT OFFICE.

WILLIAM T. THOMAS, OF TONKAWA, OKLAHOMA, ASSIGNOR OF ONE-HALF TO AMERICAN IRON & MACHINE WORKS, INC., OF TONKAWA, OKLAHOMA, A CORPORATION OF OKLAHOMA.

APPARATUS FOR SEALING OIL WELLS.

Application filed April 9, 1925, Serial No. 22,000. Renewed January 14, 1926.

To all whom it may concern:

Be it known that I, WILLIAM T. THOMAS, a citizen of the United States, residing at Tonkawa, in the county of Kay and State of Oklahoma, have invented certain new and useful Improvements in Apparatus for Sealing Oil Wells, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to apparatus for sealing oil wells and more particularly to apparatus for use in cementing the casings of wells to the walls of the well.

An important object of the invention is to provide an element acting as a piston for driving the cement out of the casing at the bottom so that it will rise about the walls of the casing and means for locking this piston at a predetermined point in the casing so that a predetermined level of the cement may be had both interiorly and exteriorly of the casing.

A still further object of the invention is to provide a device of this character in which the piston is automatically locked and in this locking acts a cylinder valve perfectly cutting off return of the cement to the casing.

A still further object of the invention is the provision of a device of this character which may be readily removed from the well after the sealing apparatus has been operated.

These and other objects I attain by the construction shown in the accompanying drawings, wherein for the purpose of illustration is shown a preferred embodiment of my invention and wherein:—

Figure 1 is a fragmentary section of the lower portion of a well showing apparatus constructed in accordance with my invention in the position assumed after the combined piston and valve is seated;

Figure 2 is a bottom plan view of the valve disk; and

Figure 3 shows a modified construction in which the disk is integrally constructed with the coupling for the casing sections.

Referring now more particularly to the drawings, the numeral 10 generally indicates a well bore and 11 a casing within the bore. In accordance with my invention, this casing adjacent its lower end is provided with a coupling 12 which is interiorly threaded throughout its length and within which the adjacent sections of the casing in an engagement leave exposed a portion of the threads, as indicated at 13. Threaded into this coupling at this exposed section 13 is a disk 14 having a central opening 15 tapered to provide an upwardly facing valve seat. To the under surface of the valve seat, springs 16 of a desired number are secured and extend inwardly and downwardly as shown and have their lower ends 17 pointed and arranged upon a circumference less than the size of the opening of the valve seat.

A follower or piston is provided comprising a cup-shaped member 18 having at its lower end a teat 19, the lower extremity of which is pointed, as at 20, so that it may readily enter the opening 15 of the disk 14. The upper end of the teat at the point where it joins the cup-shaped member is shaped to form a valve 21 for coaction with the seat and the teat intermediate its ends is provided with ratchet threads, as indicated at 22, the shoulders of these threads facing upwardly. This cup-shaped piston is of a size as closely approximate as is possible the internal diameter of the casing and is provided interiorly with screw threads 23.

In the use of the device, after the casing has been placed with the seat or disk 14 therein, the desired amount of the cement is poured into the well and the piston placed upon the cement. Pump pressure is then applied to force the piston and cement downwardly into the casing so that it will rise at the sides of the casing to effect the desired seal. When the piston arrives at the disk, the teat 19 thereof passes through the opening 15 until the valve 21 solidly engages against the valve seat 15. At this time, the springs have engaged the shoulders of the threads 22 and prevent return of the piston so that the seal between the valve and seat is maintained and the cement held against return to the casing. The pressure can then be removed and the piston left in its place until the concrete

is set. After the concrete has set, the piston may be removed by inserting a fishing tool which will engage with the threads 23 thereof and if the threads 22 are oppositely pitched to the threads 23 by rotating the fishing tool, the disengagement of the pistons from the springs can be obtained. Otherwise, it is simply necessary that a strong enough pull be exerted to break the grip of the springs upon the threads 22. The disk 14 is preferably formed of some material which is readily broken by a drill so that it may be very readily drilled out of the coupling 12 by the same pull employed for drilling the cement from the bottom of the casing.

It will be obvious that the disk, if so desired, can be made integral with the casing coupling and such a structure as illustrated in Figure 3. Since the structure is otherwise capable of modification without in any manner departing from the spirit of my invention, I do not limit myself to such specific structure except as hereinafter claimed.

I claim:—

1. In apparatus for cementing wells, a disk carried by the casing adjacent the lower end thereof and having a central opening providing an upwardly facing valve seat, a follower piston adapted to be placed upon the cement and having at its lower end a valve for coaction with the valve seat and means carried by the disk and engaging the the follower piston for locking the follower piston in position with its valve engaged with the seat of the disk.

2. In apparatus for cementing wells, a disk carried by the casing adjacent the lower end thereof and having a central opening providing an upwardly facing valve seat, a follower piston adapted to be placed upon the cement within the casing and having at its lower end a valve for coaction with the valve seat, the piston having an axial extension adapted for passage through the valve opening of the disk, said extension being provided with ratchet teeth, the valve disk having upon its lower face a plurality of spring catches for engagement in the ratchet teeth of said extension to maintain the valve in engagement with the seat.

3. In apparatus for cementing wells, a disk carried by the casing adjacent the lower end thereof and having a central opening providing an upwardly facing valve seat, a follower piston adapted to be placed upon the cement within the casing and having at its lower end a valve for coaction with the valve seat, the piston having an axial extension adapted for passage through the valve opening of the disk, said extension being provided with ratchet teeth, the valve disk having upon its lower face a plurality of spring catches for engagement in the ratchet teeth of said extension to maintain the valve in engagement with the seat, the upper end of the piston having threads for engagement with a fishing tool.

4. In apparatus for cementing wells, a disk carried by the casing adjacent the lower end thereof and having a central opening providing an upwardly facing valve seat, a follower piston adapted to be placed upon the cement within the casing and having at its lower end a valve for coaction with the valve seat, the piston having an axial extension adapted for passage through the valve opening of the disk, said extension being provided with ratchet teeth, the valve disk having upon its lower face a plurality of spring catches for engagement with the seat, the upper end of the piston having threads for engagement with a fishing tool, the ratchet teeth of the extension being formed by ratchet threads, said threads being oppositely pitched to the threads of the piston.

5. In apparatus for cementing wells and in combination a disk adapted to be inserted in the casing of a well adjacent the lower end thereof, said disk having a central opening formed at its upper end to provide an upwardly and outwardly tapering valve seat, a cup-shaped piston of substantially the same diameter as the casing of the well in which the device is to be employed having at its lower end a teat, the junction of the teat with the piston being formed of a valve for coaction with the seat, the teat having ratchet teeth and the bottom of the disk having spring fingers for engagement with said teeth.

6. In apparatus for cementing wells and in combination a disk adapted to be inserted in the casing of a well adjacent the lower end thereof, said disk having a central opening formed at its lower end to provide an upwardly and outwardly tapering valve seat, a cup-shaped piston of substantially the same diameter as the casing of the well in which the device is to be employed having at its lower end a teat, the junction of the teat with the piston being formed of a valve for coaction with the seat, the teat having ratchet teeth and the bottom of the disk having spring fingers for engagement with said teeth, the upper end of the piston being provided with interior threads for engagement with a fishing tool.

7. In apparatus for cementing wells and in combination a disk adapted to be inserted in the casing of a well adjacent the lower end thereof, said disk having a central opening formed at its upper end to provide an upwardly and outwardly tapering valve seat, a cup-shaped piston of substantially the same diameter as the casing of the well

in which the device is to be employed having at its lower end a teat, the junction of the teat with the piston being formed of a valve for coaction with the seat, the teat having ratchet teeth and the bottom of the disk having spring fingers for engagement with said teeth, the upper end of the piston being provided with interior threads for engagement with a fishing tool, the ratchet teeth of the teat being provided in the form of ratchet threads oppositely pitched to the threads of the piston.

In testimony whereof I hereunto affix my signature.

WILLIAM T. THOMAS.