June 13, 1933. L. E. HODGES 1,913,548

CASING PLUGGING APPARATUS

Filed July 16, 1932 2 Sheets-Sheet 1

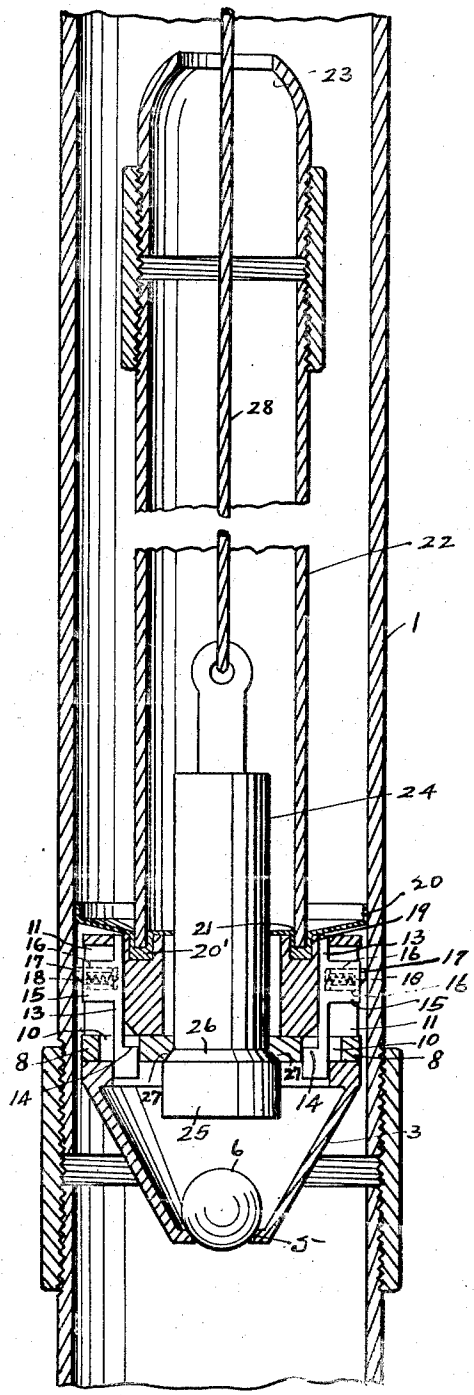


Fig. 1.

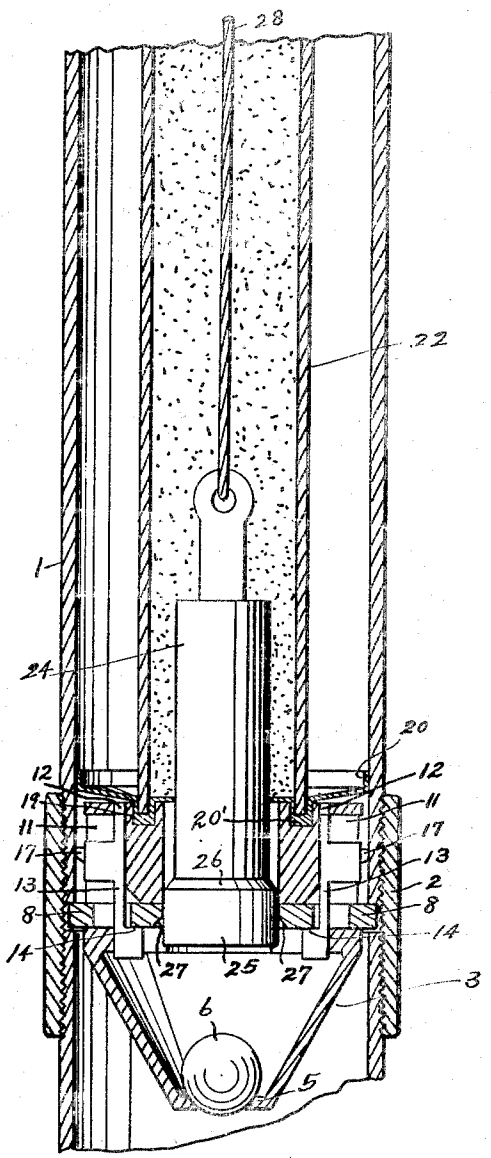


Fig. 2.

Inventor

Lester E. Hodges

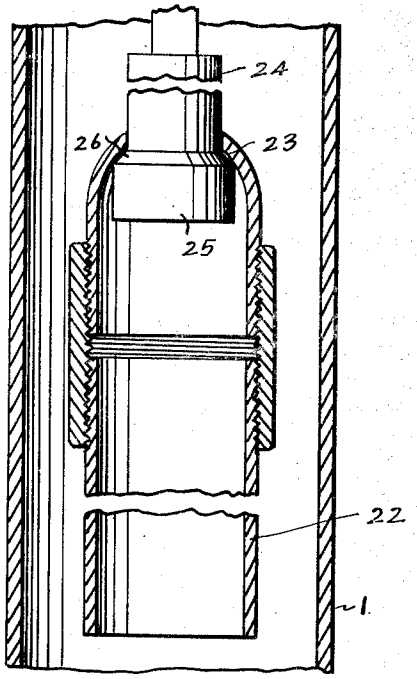
By Hardway & Lather

Attorneys

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CASING PLUGGING APPARATUS

Filed July 16, 1932 2 Sheets-Sheet 2



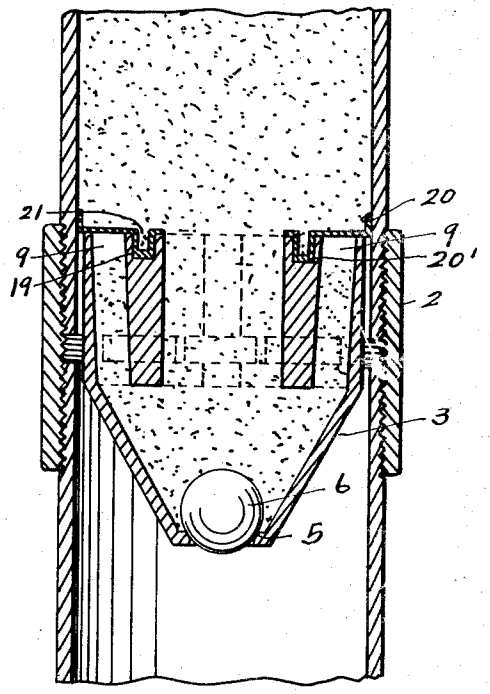


Fig. 3.

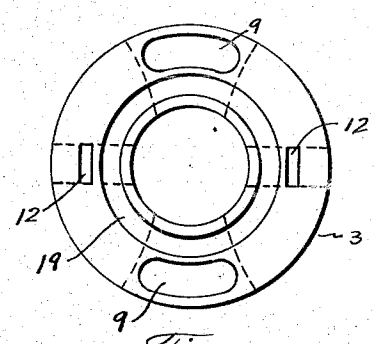


Fig. 4.

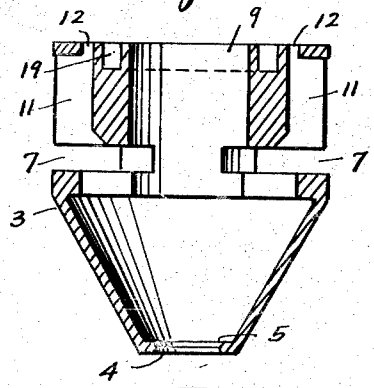


Fig. 5.

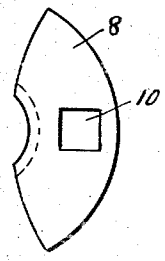


Fig. 6.

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Patented June 13, 1933

1,913,548

UNITED STATES PATENT OFFICE

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CASING PLUGGING APPARATUS

Application filed July 16, 1932. Serial No. 622,904.

This invention relates to casing plugging apparatus.

An object of the invention is to provide an apparatus of the character described whereby a cement plug may be formed at any selected location in a pipe in a well bore.

Another object of the invention is to provide an apparatus of the character described comprising a barrier so constructed that it may be anchored at a selected point in a well bore and means associated with the barrier whereby a load of cement may be dumped in the pipe and supported by said barrier while the cement sets and plugs up the pipe.

Another object of the invention is to provide apparatus of the character described comprising a supporting barrier, means whereby the barrier may be located and anchored in a well bore at a selected location and means associated with the barrier for lowering a load of plastic cement as the barrier is lowered and for dumping said load in the pipe above said barrier.

In carrying on well drilling and oil producing operations it, at times, becomes desirable to remove a portion of a pipe set in a well bore from the bore and in many cases it is desirable to plug up the pipe left in the bore to prevent the water from a water bearing stratum from reaching the oil bearing stratum and for similar purposes and the invention herein described has been designed for the purpose of plugging the string of pipe to be left in the well. The invention also comprehends a novel method of plugging a well.

With the above and other objects in view, the invention has particular relation to certain novel features of construction, operation and arrangement of parts an example of which are given in this specification and illustrated in the accompanying drawings, wherein:—

Figure 1 shows a vertical sectional view of the apparatus as being let down into the pipe in the well.

Figure 2 shows a vertical sectional view thereof showing the apparatus in the well ready to release the load of cement.

Figure 3 shows a vertical sectional view of the apparatus taken at right angles to the view shown in Figure 2, showing the load of cement dumped and ready to set.

Figure 4 shows a top plan view of the barrier cage, showing the ball valve removed.

Figure 5 shows a vertical sectional view thereof, and

Figure 6 shows a plan view of an anchor plate employed.

Referring now more particularly to the drawings wherein like numerals of reference designate similar parts in each of the figures, the numeral 1 designates a pipe as set in a well bore, the sections of which are connected by couplings, as 2 with the adjacent ends of the pipe section spaced apart.

The numerial 3 designates the barrier cage as a whole. The upper portion of this cage is of tubular formation and its lower end is downwardly tapered and of hollow formation and is provided with the lower end opening 4, surrounded by a valve seat 5. An upwardly opening ball valve 6 is confined with the cage and rests on said seat 5 to normally close the opening 4. Beneath the upper end of the cage there is provided the oppositely disposed transverse slots 7, 7 through which the radially movable arcuate anchor plates 8, 8 work. Between said slots the cage has the oppositely arranged vertical channels 9, 9 which lead upwardly from the hollow lower end of the cage.

Each plate 8 has a keyway 10 and above these keyways the cage 3 has the side slots 11, 11, whose upper ends terminate in the keyways 12, 12 through the upper end of the cage. There are the keys 13, 13 whose upper ends work in the keyways 12 and whose lower ends are inwardly thickened forming the inside shoulders 14, 14 and said inwardly thickened lower ends normally work in the keyways 10, when the apparatus is assembled for lowering, and hold the anchor plates 8 inwardly. The keys 13 have the outward extensions 15, 15, which work in the slots 11, and have the sockets

16 to receive the dogs 17 which are seated against, and held in outer position by, the coil springs 18.

Inside of the channels 9 and keyways 12 the upper end of the cage has an annular groove 19 and on the cage there is an upwardly opening cup ring 20 forming a close fit inside the pipe 1 and this cup ring has an annular rib 201 around its underside which is seated in the groove 19 and which has an annular groove 21 in its upper side in which the lower end of the tubular cement container 22 is adapted to seat. The upper end of this container is open and is contracted to form a stop 23.

There is a release plug 24 preferably cylindrical in shape and whose lower end has the enlarged head 25 having the annular upwardly beveled face 26 around the upper end of said head which normally engages the upwardly converging faces 27, 27 on the inner margins of the anchor plates 8, 8. The plug 24 is suspended by a suitable cable 28.

The apparatus is assembled as shown in Figure 1 with the ball valve 6 in place and with the face 26 in engagement with the faces 27, 27 whereby the plug 24 will be locked in its lower position as shown in Figure 1 and whereby the outer margins of the plates 8 will be held in contact with the innerwall of the pipe 1 as the apparatus is lowered. As thus assembled the apparatus will be let down into the pipe with the lower end of the container seated in the groove 21 and with said container filled with cementitious material. As the apparatus is lowered the dogs 17 will ride against the inside walls of the pipe.

As the device is lowered the fluid, if any, in the pipe beneath the apparatus will lift the valve 6 and will pass on up through the channels 9 past the cup ring 20.

When the load of cement has been lowered to the desired place in the well, the apparatus may then be moved upwardly by the cable 28 through any suitable means at the ground surface provided for the purpose and when the dogs 17 engage with a projection in the pipe, usually against the lower end of the section of pipe above, at the joint, the keys 13 will be relatively moved downwardly and their inwardly thickened ends will clear the plates 8, and a further upward pull will operate through the faces 26, 27 to force the anchor plates 8 outwardly, the shoulders 14 engaging underneath said anchor plates and the enlarged head 25 may then pass between said anchor plates, as shown in Figure 2, and the anchor plates will be in readiness to engage in a joint between adjacent connecting section of the pipe as shown in Figure 2 and the apparatus may then be moved on upwardly or downwardly until said anchor plates 8 reach a joint whereupon they will engage in between adjacent ends of the pipe sections at said joint and the apparatus will be securely anchored in place. The plug 24 may then be carried upwardly until the head 25 engages the stop 23 and the container 22 moved upwardly as shown in Figure 3 dumping the load of cement into the pipe on the barrier thus formed where the cement will set and plug up the pipe, thus accomplishing the desired result, the container 22 having meanwhile been removed from the well.

The drawings and description disclose form of the invention by way of illustration only while the broad principle of the invention will be defined by the appended claims.

What I claim is:

1. Apparatus of the character described comprising a container, means for closing the lower end of the container, means for lowering said apparatus into a pipe in a well bore, means for anchoring said closing means in the pipe to form a barrier, said container being detachable from the barrier to permit the discharge of the contents thereof above the barrier.

2. Apparatus of the character described comprising a container for cementitious material, means detachable from the container for retaining said contents in the container, means associated with said retaining means for anchoring the retaining means in a pipe in a well, means for lowering said container and retaining means into said pipe and for detaching and removing said container from the pipe.

3. Apparatus adapted to be lowered into a pipe in a well bore and comprising a container for cement, means closing the bottom of the container and detachable therefrom, means for anchoring the closing means in the pipe to form a barrier therein, means for detaching the container from the anchored barrier to permit the dumping of the contents of the container into the well above said barrier.

4. Apparatus for plugging a pipe in a well bore comprising means for containing and lowering a load of cementitious material into a pipe in a well bore and having a detachable barrier, means for anchoring said barrier in the pipe and means for detaching the container from the barrier to effect the dumping of the contents of the container into the pipe above the barrier.

5. Apparatus for plugging a pipe in a well bore comprising a barrier adapted to be lowered into, and to close, said pipe, means for lowering the barrier, means for anchoring the barrier in the pipe, means detachably connected to the barrier for dumping a load of cementitious material into the pipe above the barrier.

6. Apparatus for plugging a pipe in a well bore comprising a supporting barrier adapted to be lowered into the pipe, means whereby the barrier may be located and anchored in the pipe at a selected location, means associated with the barrier for lowering a load of cementitious material as the barrier is lowered and for dumping said load into the pipe above the barrier.

7. Apparatus for plugging a pipe in a well bore comprising a barrier adapted to be lowered into, and to close, said pipe, means for lowering the barrier, means for anchoring the barrier in the pipe, means on and arranged to be lowered with the barrier for dumping a load of cementitious material into the pipe above the barrier, said apparatus having a valve controlled channel for permitting the passage of fluid upwardly therethrough.

8. Apparatus for plugging a pipe in a well bore comprising a barrier adapted to be lowered into, and to close, said pipe, means carried by the barrier adapted to move into active position, to engage the pipe to anchor the barrier therein, means for locking said anchoring means in inactive position out of engagement with the pipe, means engageable with the pipe, upon upward movement of the apparatus, relative to the pipe, and effective to release said locking means to permit said anchoring means to move into said active position, means for moving said anchoring means outwardly into said active position upon said release thereof, a container for cementitious material upon, and whose lower end is closed by, said barrier, said moving means being also effective to elevate said container from the barrier to dump the contents thereof into the pipe above the barrier.

9. Apparatus for plugging a pipe in a well bore comprising a barrier adapted to be lowered into said pipe and having a valve controlled passageway to permit the passage of fluid upwardly therethrough, anchors in the barrier movable radially into active position to engage with said pipe and into inactive position to release said pipe, means for locking said anchors in inactive position, means engageable with the pipe and effective to release said locking means upon upward movement of the apparatus, means for actuating said released anchors into said active position into pipe engaging position, a container for cementitious material supported in and whose lower end is closed by, the barrier, said actuating means being effective, upon upward movement thereof, to elevate the container from the barrier to effect the discharge of the contents thereof into the pipe above said barrier.

In testimony whereof I have signed my name to this specification.

LESTER E. HODGES.