Sept. 1, 1925. 1,552,273

W. H. CASE

CHARGE LOWERING AND RELEASING MEANS

Filed Dec. 16, 1924

Fig. 1.

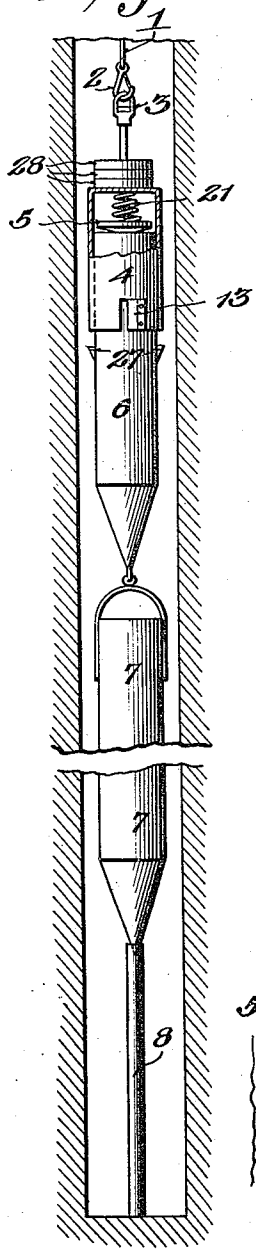


Fig. 2.

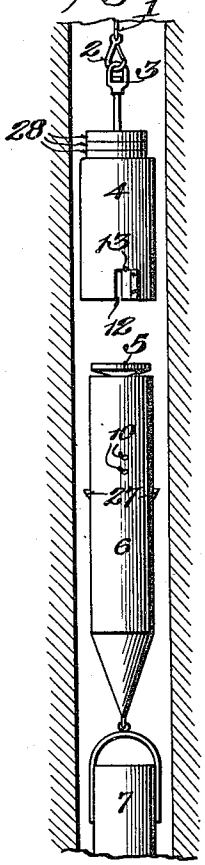


Fig. 3.

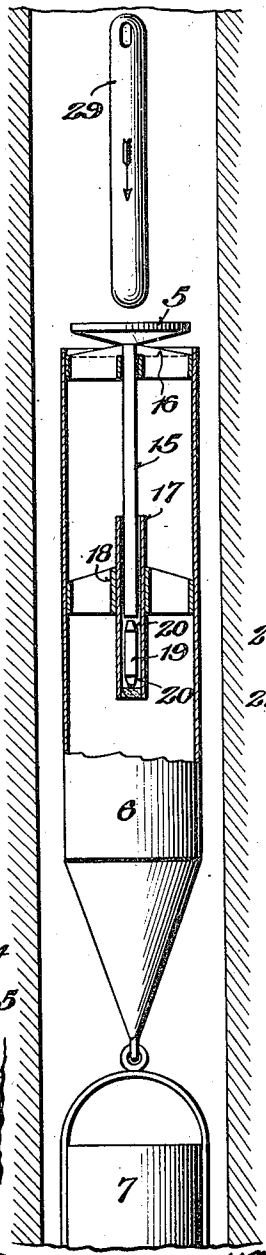


Fig. 6.

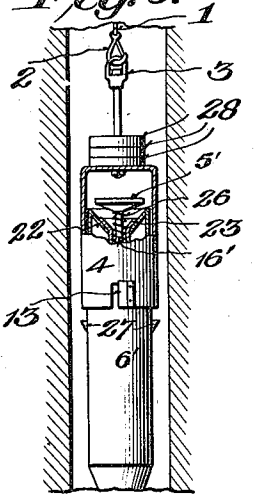


Fig. 7.

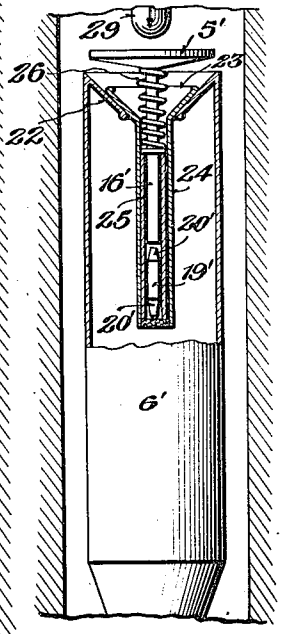


Fig. 4.

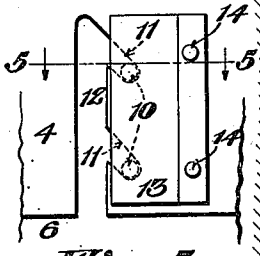
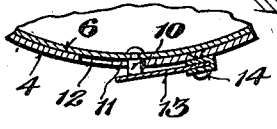


Fig. 5.



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UNITED STATES PATENT OFFICE.

WILLIAM H. CASE, OF TULSA, OKLAHOMA, ASSIGNOR TO GYPSY OIL COMPANY, OF TULSA, OKLAHOMA, A CORPORATION OF OKLAHOMA.

CHARGE LOWERING AND RELEASING MEANS.

Application filed December 16, 1924. Serial No. 756,314.

To all whom it may concern:

Be it known that I, WILLIAM H. CASE, a citizen of the United States of America, and a resident of Tulsa, Oklahoma, have invented new and useful Improvements in Charge Lowering and Releasing Means, which invention is fully set forth in the following specification.

This invention relates to charge-lowering and releasing means and while capable of general use, is more particularly adapted for lowering and releasing explosive charges into oil wells prior to "shooting" the same.

It has heretofore been proposed to lower a shell into the well and explode the same by dropping a weight down the well onto the shell-firing mechanism. It has also been proposed to fire the lowered shell by dropping a weighted explosive detonator or "jack squid" onto the same. It has also been proposed to fire the lowered shell by slacking the lowering wire, thereby releasing a weight which drops onto the firing mechanism. It has further been proposed to lower a shell having a wire attached to the firing mechanism, the shell being fired by an electric battery after the well casing has been withdrawn over the wire. These methods are defective and hazardous in that an object accidentally dropping in the well might strike the exposed firing mechanism, causing a premature explosion of the charge with consequent damage to the well and casing. Moreover, where the casing has been withdrawn from a well and a cave occurs in the hole, an explosive detonator dropped in the well might be deflected into the cave, there exploding and ruining the hole.

Objects of this invention are to provide a charge-lowering and releasing means which overcomes the defects and disadvantages above referred to; which covers and protects the firing mechanism of the charge or well torpedo until the latter has been properly positioned in the well; which automatically uncovers the firing mechanism when the charge reaches the proper position in the well; and which provides for withdrawal of the lowering device before the charge is fired.

The invention will be better understood by reference to the accompanying drawings, illustrating one expression of the inventive idea and wherein—

Figure 1 is a sectional view of a well, showing a well torpedo in firing position, and my charge-lowering and releasing means applied thereto;

Fig. 2 is a view similar to Fig. 1 showing the means after the same has been detached from the lowered torpedo;

Fig. 3 is a longitudinal sectional view showing interior details of a torpedo and manner of firing the same;

Fig. 4 is an enlarged fragmentary detail showing cover-attaching and releasing means of the present invention;

Fig. 5 is a horizontal section on the line 5—5 of Fig. 4;

Fig. 6 is a view similar to Fig. 3 showing another form of firing mechanism; and

Fig. 7 is a sectional view showing the firing mechanism of Fig. 6 on a larger scale.

Referring to the drawings, 1 indicates the usual lowering line or cable provided with a snap-hook 2 which may be attached to a bail 3 bolted or otherwise suitably secured to the top of a protective cover 4 for the firing-head 5 of an explosive container or torpedo 6. Said cover is adapted to be fitted on the torpedo over the firing-head and locked on the torpedo whereby the same may be lowered onto an explosive shell 7 previously placed in the well and supported in position adjacent the "sand" or oil-bearing strata by an anchor 8 of suitable length disposed in the "leg" of the well.

In accordance with the present invention, means are provided for attachably and releasably locking the cover and torpedo together whereby the latter may be suspended from the cover and released by rotary and gravitational movement of the same when the torpedo has been lowered to its position of rest on shell 7. This lock-

ing means (Figs. 4 and 5) preferably comprises one or more projections or latch-pins 10, 10, on the torpedo 6, which are adapted to be engaged in hook or cam-shaped extensions 11, 11, of a bayonet-slot 12 formed in the cover at the open end thereof. A spring guard-plate 13 overlies the extensions 11, 11 of slot 12 and is secured to the cover by suitable means such as rivets 14, 14. When the cover is being fitted on the torpedo, plate 13 is sprung outwardly by a suitable tool and relative rotation of the cover and torpedo causes pins 10, 10, which have previously entered slot 12, to engage in the hook or cam-shaped extensions 11, 11. The projecting ends of the pins then hold plate 13 in the outwardly sprung position until the cover is released from the charge.

Any suitable mechanism may be employed for firing the charge. As shown in Figs. 1 to 3, the firing mechanism preferably comprises the firing-head 5 provided with a plunger 15 which projects through an apertured deformable firing-head support 16 suitably secured within the explosive container or torpedo 6 at the base thereof. Plunger 15 extends within a tubular guide 17 carried by a guide support 18 suitably secured on the inner wall of the explosive container or torpedo. A firing-pin 19, provided at its ends with caps 20, 20, is positioned in guide 17 in spaced relation with the free end of plunger 15 and a coil-spring 21 is interposed between firing-head 5 and the top of cover 4 to prevent movement of the firing-head while the torpedo is being lowered into the well.

A somewhat different form of firing mechanism is shown in Figs. 6 and 7 wherein the explosive container or torpedo 6′ is provided with an apertured conical base 22 in which is sealed the conical end 23 of a holder 24 which projects through the aperture of said base into the torpedo. A tubular guide 25 is supported within the holder to receive the firing-pin 19′ with its attached caps 20′, 20′. The plunger 16′ of a firing-head 5′ is inserted within the guide and the free end of said plunger is normally held away from the firing-pin by a spring 26 encircling the plunger, and interposed between the upper end of guide 25 and the firing-head 6′.

In assembling the various instrumentalities, the torpedo-body 6 is suspended in the top of the well or casing by a line-sling or other suitable means (not shown). The torpedo is then loaded and the capped firing-pin, firing-head, and spring are placed at the base of the torpedo. The firing-head cover 4 is then attached to the torpedo by the bayonet-slot and pin connection above described. In order to prevent the cover from accidentally striking the firing-head while the cover is being attached to the torpedo or after the latter has been lowered onto shell 7, the torpedo is provided with stops 27, 27 which limit movement of the cover downwardly on the torpedo.

After the parts have been assembled as above described, the line 1 is secured to bail 3 by hook 2 and the torpedo slightly lifted to facilitate removal of the temporary supporting means. The torpedo is thus suspended from the cover and line and is lowered by the latter down the well onto the shell 7. When the torpedo reaches its position of rest on the shell a slack occurs in line 1 and the weight of the cover, together with the cam-shaped formation of slots 11, 11, cause a slight rotary and gravitational movement of the cover on latch-pins 10, 10. As the cover continues to descend, said pins enter slot 12 and plate 13 springs inwardly against the cover, thereby preventing the pins from again entering slots 11, 11 during movements of the line and cover preliminary to removal of the same from the well. While the weight of the cover is ordinarily sufficient to cause gravitational movement of the cover as above described, the same may be provided with one or more weights 28, 28 secured on the cover by its bail-fastening means. After the line and cover have been withdrawn from the well, a "go-devil" or weight 29 is dropped in the hole and the charge is fired by the impact of said weight striking the firing-head of the torpedo and thereby actuates the firing mechanism to explode the torpedo or charge.

What is claimed is:

1. In combination, an explosive charge or torpedo adapted to be lowered to position in a well preparatory to explosion thereof, a removable cover for said charge adapted to protect the same while being lowered or positioned in the well, and means for removing said cover when the charge has been positioned in the well.

2. In combination, an explosive charge or torpedo adapted to be lowered to position in a well preparatory to explosion thereof and then exploded by impact of a body dropped upon it, a removable cover for said charge adapted to protect the same against impact and premature explosion by a body or bodies falling in the well while the charge is being positioned therein, and means for removing said cover when the charge has been positioned in the well.

3. In combination, an explosive charge or torpedo adapted to be lowered to position in a well preparatory to explosion thereof, a removable cover for said charge adapted to protect the same while being lowered or positioned in the well, a connection between said cover and charge for supporting said charge from said cover until the charge is positioned in the well, and means for releas-

ing said connection and withdrawing the cover from the well after the charge has been positioned in the well.

4. In combination, an explosive charge or torpedo adapted to be lowered in a well preparatory to explosion thereof and having impact firing means in position to be exposed to a body dropped in the well after the charge has been positioned therein, a removable cover for said charge adapted to protect said firing means against impact and premature explosion by a body or bodies falling in the well while said charge is being positioned therein, and means for removing said cover when the charge has been positioned in the well.

5. In combination, an explosive charge or torpedo adapted to be lowered in a well preparatory to explosion thereof and having impact firing means in position to be exposed to a body dropped in the well after the charge has been positioned therein, a removable cover for said charge adapted to protect said firing means against impact and premature explosion by a body or bodies falling in the well while said charge is being positioned therein, a connection between said cover and charge for supporting said charge from said cover until the charge is positioned in the well, and means for releasing said connection and withdrawing the cover from the well after the charge has been positioned in the well.

6. In combination, an explosive charge or torpedo adapted to be lowered to position in a well preparatory to explosion thereof, a removable cover for said charge adapted to protect the same while being lowered or positioned in the well, a connection between said cover and charge adapted to support the charge from the cover while the same are being lowered in the well and to be automatically released to disconnect the cover from the charge when the charge reaches its position in the well, and means for withdrawing the cover from the well after it has been disconnected from the charge.

7. In combination, an explosive charge or torpedo adapted to be lowered to position in a well preparatory to explosion thereof, a removable cover for said charge adapted to protect the same while being lowered or positioned in the well, a connection between said cover and charge adapted to support the charge from the cover while the same are being lowered in the well and to be automatically released to disconnect the cover from the charge when the charge reaches its position in the well, means preventing reengagement of the connection between the cover and charge, and means for withdrawing the cover from the well after it has been disconnected from the charge.

8. In combination, an explosive charge or torpedo adapted to be lowered to position in a well preparatory to explosion thereof, a removable cover for said charge adapted to protect the same while being lowered or positioned in the well, a connection between said cover and charge for supporting said charge from said cover while the charge is being positioned in the well, cable means connected to said cover for lowering the charge to position in the well, and means automatically releasing said connection between the cover and charge when the charge comes to rest in the well and thereby permitting withdrawal of the cover from the well by said cable means.

9. In combination, an explosive charge or torpedo adapted to be lowered to position in a well preparatory to explosion thereof, a removable cover for said charge adapted to protect the same while being lowered or positioned in the well, cable means connected to said cover for lowering the charge to position in the well, and a connection between said cover and charge adapted to support said charge from said cover while the charge is being lowered or positioned in the well by the cable means and to be then automatically released and disconnect said cover and charge when the latter reaches its position in the well.

10. In combination, an explosive charge or torpedo adapted to be lowered to position in a well preparatory to explosion thereof, a removable cover for said charge adapted to protect the same while being lowered or positioned in the well, cable means connected to said cover for lowering the charge to position in the well, a connection between said cover and charge adapted to support the charge from the cover while the charge is being lowered or positioned in the well by said cable means and to be automatically released by continued lowering movement of the cover relative to the charge after the latter comes to rest in the well thereby disconnecting the cover from the charge for withdrawal from the well by the cable means.

11. In combination, an explosive charge or torpedo adapted to be lowered to position in a well preparatory to explosion thereof and having thereon a firing head; a removable cover for said charge adapted to cover and protect said firing head against impact and premature explosion by a body or bodies falling in the well while said charge is being positioned therein, cable means connected to said cover for lowering the charge to position in the well, and a connection between said cover and charge adapted to support the charge from the cover while the charge is being lowered or positioned in the well by said cable means and to be automatically released by continued lowering movement of the cover relative to the charge after the latter comes to

rest in the well thereby disconnecting the cover from the charge for withdrawal from the well by the cable means.

12. In combination, an explosive container, a protective cover for said container, and means for attaching said cover to the container whereby the latter may be suspended from the cover and released by gravitational movement of the latter.

13. In combination, an explosive container provided with firing mechanism, a protective cover for said firing mechanism, and means for attachably and releasably securing the cover to the container comprising a bayonet-joint connection between the two.

14. In combination, an explosive container provided with firing mechanism and a projection, and a protective cover for said firing mechanism provided with a bayonet-slot adapted to receive said projection whereby the container and cover may be attachably and releasably secured together.

15. In combination, an explosive container, a protective cover for said container, means for releasably locking said container to the cover comprising a bayonet-slot and pin connection between the two, and a spring guard normally adapted to prevent locking engagement of the pin in the bayonet-slot after the container has been released from said cover.

16. In combination, an explosive container, means for lowering the same, and a protective cover for said container fastened to said lowering means and attachably and releasably secured to the container.

17. In combination, an explosive container, a line for lowering said container, a protective cover for the container secured to said line, and means for attaching the cover to the container whereby the latter may be suspended from the cover and released by gravitational movement of the latter.

18. In combination, an explosive container, a line for lowering said container, a protective cover for the container secured to said line, means for attaching the cover to the container whereby the latter may be suspended from the cover and released by gravitational movement of the latter, and a guard normally preventing re-engagement of said attaching means after the container has been released from said cover.

19. The combination of an explosive container, a lowering line, a protective cover secured to said line, and means for attaching said cover to the container whereby the latter may be suspended from the cover and released by gravitational movement of the latter when the container has been positioned in the well.

20. The combination of an explosive container provided with firing mechanism, a protective cover adapted to be fitted on the container over said firing mechanism, means for attachably and releasably securing said cover to the container, and means secured to the cover for lowering the container into a well.

21. The combination of an explosive container provided at one end with firing mechanism, a line for lowering the container, a protective device secured to said line and adapted to be positioned on the container over said firing mechanism, and means for suspending the container from said protective device while the container is being lowered and providing for the gravitational movement of the protective device to release the container therefrom when the latter has been positioned in the well.

22. The combination of an explosive container provided with firing mechanism, a lowering line, a protective cover secured to said line and positioned on the container over said firing mechanism, and a bayonet-joint connection between the cover and container whereby the latter may be suspended from the cover and released by gravitational movement of the cover when the container has been positioned in the well.

23. The combination of a lowering line, an explosive container provided with firing mechanism, a protective cover for said firing mechanism attached to said lowering line, means for attaching the container to said cover adapted to automatically release the cover from the container when the container reaches its position in the well, and means for preventing re-engagement of said attaching means when the container has been released.

24. In combination, an explosive container provided with firing mechanism and a latch-pin, a lowering line, a protective cover secured to said line and adapted to be positioned on the container over said firing mechanism, said cover being provided with a bayonet-slot to receive the latch-pin of the container, and a spring guard-plate secured to the cover adjacent said slot and normally adapted to prevent locking engagement of the pin therein.

25. In combination, an explosive container provided with firing mechanism, a lowering line, a weighted protective cover secured to said line and adapted to be positioned on the container over said firing mechanism, and means for attachably and releasably securing the cover and container together whereby the latter may be suspended from the cover and released by its gravitational movement when the container has been positioned in the well.

26. The combination of a lowering line, a torpedo provided with firing mechanism, an explosive shell adapted to be lowered to the bottom of the well, a protective cover for said firing mechanism secured to the lower-

ing line, and means for suspending the torpedo from the cover adapted to automatically release the latter from the torpedo when the same contacts said shell.

27. The combination of a lowering line, a torpedo provided at one end with firing mechanism, a weighted protective cover fastened to the lowering line and positioned on the torpedo over said firing mechanism, a bayonet-slot and pin connection between the torpedo and cover whereby the latter may be suspended from the cover and released therefrom by gravitational and rotary movement of the cover when the torpedo has been positioned in the well, and a spring guard-plate for preventing re-engagement of the pin in said slot after the charge has been released from the cover.

In testimony whereof I have signed this specification.

WILLIAM H. CASE.