J. E. ROBINSON.

INTERNAL ANCHOR DEVICE FOR OIL, GAS, WATER, AND OTHER WELLS.

APPLICATION FILED JUNE 12, 1913.

1,092,508. Patented Apr. 7, 1914.

2 SHEETS—SHEET 1.

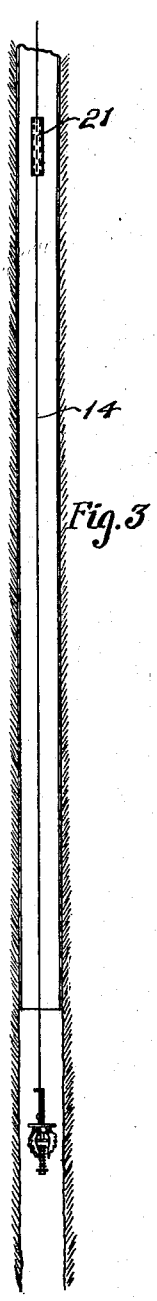

Fig. 3

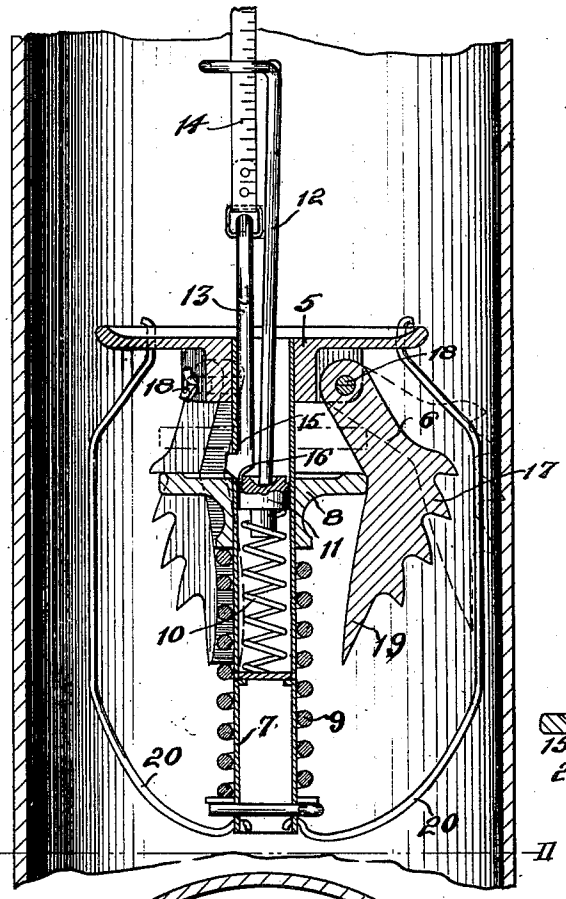

Fig. 1

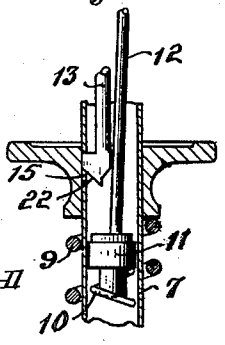

Fig. 4

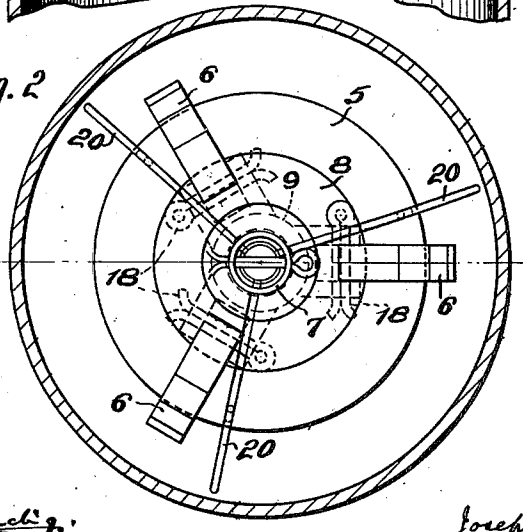

Fig. 2

WITNESSES

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Fig. 5

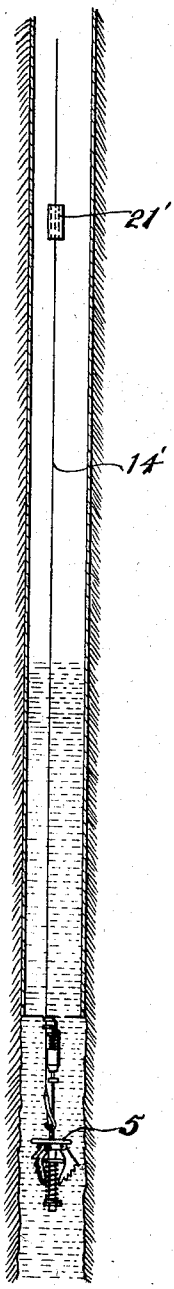

Fig. 6

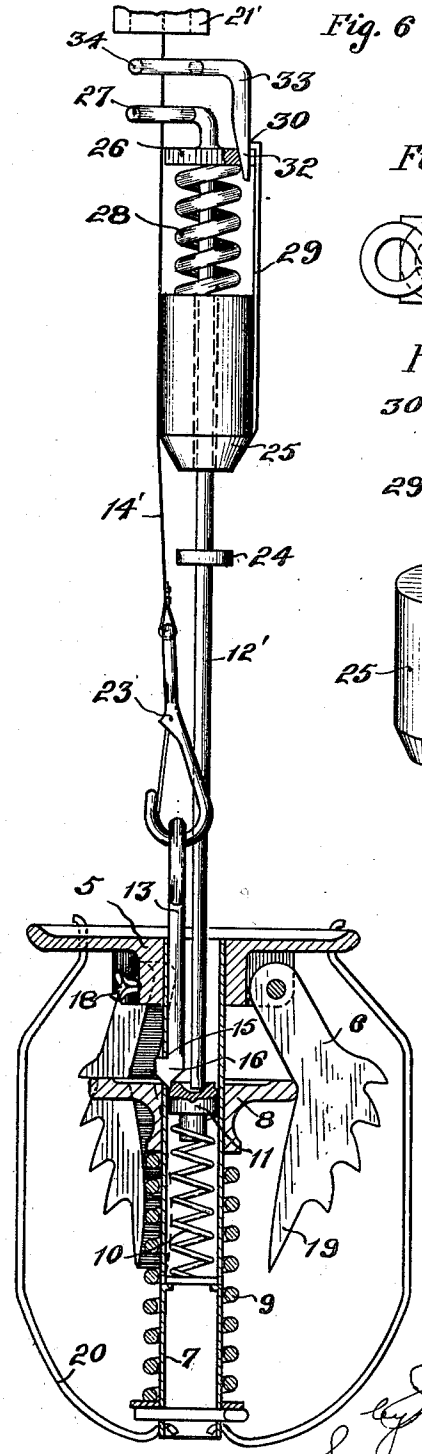

Fig. 7

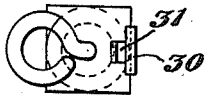

Fig. 8

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INTERNAL ANCHOR DEVICE FOR OIL, GAS, WATER, AND OTHER WELLS.

1,092,508. Specification of Letters Patent. Patented Apr. 7, 1914.

Application filed June 12, 1913. Serial No. 773,254.

To all whom it may concern:

Be it known that I, JOSEPH E. ROBINSON, a citizen of the United States, residing at Oil City, in the county of Venango and State of Pennsylvania, have invented certain new and useful improvements in internal anchor devices for oil, gas, water, and other wells, such as are used to support torpedoes or other explosive devices in operative position within the well, or for temporarily plugging the well below the well-casing, or for shutting off the water from the sand in the well where the well is being cased deeper, or, in general, for placing an explosive device or stop means within a well where such means may be required for any purpose.

A further object of the invention is the provision of an internal anchor device of the character specified which, if used as a support for a torpedo, will, upon explosion of the shot, be broken to pieces and fall to the bottom of the well, not interfering in any way with the passage therethrough.

A further object of this invention is the provision of a device of the character indicated which will be of light weight such as will make it possible to support it, if desired, upon either a light wire or steel measuring tape or line, eliminating the need of a second or heavier wire to carry the weight of the device. Another object is the construction of an anchor mechanism which will be cheap and easy to make and which will be reliable and prompt in its action when released and will therefore lock itself in position within the well without any material shift or change in place.

A further object of the invention is to construct a device of this character which will operate very sensitively and which will still hold firmly to the supporting wire or steel measuring line while being lowered but readily release the supporting means when the device is fixed in place.

The above, as well as such other objects as may hereinafter appear, I attain by means of a construction, two forms of which I have illustrated in the accompanying drawings, wherein:

Figure 1 is a sectional view showing one form of the device as it is being lowered through a well casing; Fig. 2 is a transverse section on the line II—II of Fig. 1; Fig. 3 shows the device supported in position below the end of a well casing; Fig. 4 is a detailed view showing the position of the parts when the trip mechanism is released; Fig. 5 illustrates my second form of device supported in position in the well; Fig. 6 is a side elevation of the second form of device; Fig. 7 is a plan view of the trigger device; and Fig. 8 is a perspective view of the operating hammer.

Referring more particularly to Fig. 1 which shows the simpler form of construction and which will therefore be described first, it will be seen that in carrying out my invention, I provide a head or plate 5 to which there are pivotally secured the supporting dogs or pawls 6, preferably three in number, depending in a position such as will tend to hold them inward out of operative position. Secured to the plate 5 and extending downward therefrom is a tube or casing 7 surrounding which and longitudinally movable relatively thereto is a pawl-actuating collar 8 which contacts with the inner edges of the dogs or pawls 6. Surrounding the tube 7 there is a locking spring 9 and within the tube there is a trigger spring 10 upon which rests the trigger device 11 which is preferably recessed upon its upper face for better engagement with the lower end of the trigger-release pin 12. As a convenient means for obtaining a supporting engagement with the rod 13 that is carried by the supporting rod or tape 14, I provide the tube 7 with a slotted opening at 15 through which the laterally hooked lower end of the supporting rod 13 is arranged to project while the device is being lowered. The extreme lower end of the rod 13 is provided with a downwardly extending point 16 that makes engagement in the position shown in Figure 1 with the trigger device 11.

The dogs or pawls are provided with a series of teeth 17 arranged at different distances from the pivot pin 18 so that they will provide a means of engagement with the interior of either a well opening or a casing through quite a range of differing diameters and the lower end 19 of each pawl is sharpened into a kind of chisel point so as to provide a firm means of engagement in case the device expands into a very large opening.

As a means for guiding the device as it is lowered through the casing, I provide three rods or wires 20 mounted as shown in Figure 1, such rods being preferably located

closely adjacent to the pawls and bent so as to project a little ways beyond the teeth of the pawls when the latter are in retracted position.

The operation of my device is as follows. The parts being placed in the position shown in Figure 1, with the pin 13 supported from a tape or suspension wire, the anchor is lowered in the well to the desired point, at which the explosion is to take place or the plugging is to be done, this point being generally somewhere below the lower end of the well casing, as indicated in Fig. 3. A weight 21, generally composed of a short piece of pipe, is then dropped, descending along the supporting tape or wire until it comes in contact with the upper bent end of the release rod 12, when it drives the trigger device 11 downward against the force of the spring 10, allowing the end of the supporting rod 13 to be driven radially inward by reason of the inclined surface 22 shown in Fig. 4, through contact therewith of the collar 8 as it is forced upwardly by the spring 9. The upward movement of the collar 8 bearing against the inner edges of the pawls drives the latter outwardly, as diagrammatically indicated in dotted lines in Figure 1, so that the teeth 17 come into engagement with the inner surface of the casing or of the wall of the well, depending upon the position of the anchor; and there being but three pawls employed, a good secure engagement of each of them is obtained, such teeth 17 coming in contact with the inner wall of the well as will be determined by the extent to which the pawls are forced outwardly; that is, as required by the diameter of the well. The inward radial movement of the lower end of the pin 13 of course releases the engagement of the pin with the anchor and the supporting cord or tape is then withdrawn from the well and the spring 9 having immediately driven the pawls outwardly into locked position and acting to hold them there of course prevents the anchor from falling out of position.

As the trigger mechanism above described is sensitive as well as reliable and the device as a whole is light in weight, the anchor stays almost exactly in the same position to which it had been lowered, which is a matter of importance because if used for explosive purposes, the firing of a shot in the wrong place in the well may cause a cave-in instead of producing the desired effect.

A somewhat different form of apparatus is illustrated in Figs. 5, 6, 7, and 8, such form of apparatus being the preferred form in certain respects. The main body portion of the device below the head or plate 5 (Fig. 6) is precisely the same as in the construction of Fig. 1, the parts 5, 6, 7, 8, 9, 10, 11, 15, 16, 18, 19 and 20 being the same as described in connection with the apparatus of Fig. 1, so that further description of this portion of the apparatus is unnecessary. The apparatus is also supported by wire or tape 14′ extending to the top of the well and carrying a gravity operating weight 21′, such weight, however, being much lighter than in the construction of Figs. 1 to 4. The end of the tape 14′ carries a snap hook 23 which engages the upper end of the rod 13. The rod 12′, which corresponds in function to the rod 12 of the construction of Fig. 1, is provided with a collar 24 which is fixed against movement along the rod. Mounted above this collar 24 and slidable on the rod 12′ is the hammer 25. The extreme upper end of the rod 12′ is provided with a collar 26 and an eye 27 which surrounds the tape 14′. Between the hammer 25 and the collar 26 is a compression spring 28 normally held under considerable degree of compression when the parts are in the position illustrated in Fig. 6. The hammer 25 is held against downward movement by the spring member 29 which has a hook portion 30 at its upper end engaging the edge of the collar 26. As indicated in Fig. 7, the edge of the collar 26 which is engaged by the hook portion 30 is provided with a slot 31 in which fits the beveled end 32 of the trigger 33, such trigger having an eye 34 fitting around the tape 14′.

In operation, when the weight 21′ strikes the eye 34, the trigger 33 is forced downward and its beveled end 32 forces the hook portion 30 to the right, disengaging it from the collar 26. This permits the spring 28 to expand, giving the hammer 25 a sharp impulse downward, causing it to engage the collar 24 and move the rod 12′ and the member 11 to releasing position.

The apparatus just described involving the use of the hammer 25 and the spring for operating it is preferable to the construction of Fig. 1 in that the actuation of the rod 12′ is more positive and the weight 21′ which is employed can be made much smaller than the weight 21 employed in the construction of Fig. 1. This for the reason that spring 28 gives the additional impulse for operating the rod 12′, which is not present in the construction of Fig. 1 wherein the weight 21 is entirely relied upon to operate the rod 12. Considerable advantage is involved in the use of the lighter weight, since the weight attains a very high velocity in deep wells before striking the liquid above the anchor, and the wire or tape is liable to be broken if it bends or kinks, which action is particularly liable to occur at the point where the tape or wire enters the liquid above the anchor.

It will be understood that in most cases, there is a quantity of liquid above the anchor, as indicated in Fig. 5, in order to supply the necessary resistance for securing a reaction when the nitro-glycerin is ex-

ploded, and this liquid of course cuts down the momentum of the operating weight to a very large extent so that the operation of the rod 12 where no operating spring is employed as in the construction of Fig. 6 is not as positive as could be desired. This difficulty is overcome in the use of the spring in connection with the hammer as illustrated in Fig. 6, since the spring 28 will operate the hammer vigorously even though immersed in liquid, thus giving a much more positive operation of the rod 12′ than where the construction of Fig. 1 is employed.

What I claim is:

1. An anchor for use in a well, comprising in combination, a head, a plurality of gripping devices pivoted to the head and adapted to swing out and engage the sides of the well, means vertically movable with respect to the head for swinging the gripping devices outwardly, a spring for operating the said means, restraining means for the spring, and gravity operated means for releasing said restraining means.

2. An anchor for use in a well, comprising in combination, a head having a vertical shank, a plurality of gripping devices pivoted to the head and adapted to swing out and engage the sides of the well, a member slidable longitudinally on the said shank and adapted to swing the gripping devices outwardly, a spring for operating the said member, restraining means for the spring, and gravity operated means for securing the release of the said restraining means.

3. An anchor for use in a well, comprising in combination a head, a plurality of gripping devices pivoted to the head and each provided with a plurality of teeth, and means for securing the outward movement of the said devices to cause the engagement of the teeth with the wall of the well, the said teeth on each gripping device being arranged at different distances from the points of pivoted support thereof to adapt the anchor to use in wells of varying diameters.

4. An anchor for use in a well, comprising in combination a head, a plurality of gripping devices pivoted to the head and each provided with a plurality of teeth, and means for securing the outward movement of the said devices to cause the engagement of the teeth with the wall of the well, the said teeth on each gripping device being arranged at different distances from the points of pivoted support thereof and with the points thereof lying on a curve to adapt the anchor to use in wells of varying diameters.

5. An anchor device comprising a head, a plurality of supporting devices mounted thereon, a downward extension on said head having an opening within the same, a collar mounted around said downward extension and having engagement with said supporting devices, a spring for moving said collar, a supporting rod for lowering said head into operative position, and trigger means operative to release the engagement between the supporting rod and the head.

6. In combination with an anchor device having means for causing the anchor to grip the sides of the well, and restraining means for preventing such gripping action while the anchor is being lowered to position, of flexible means extending upward from the anchor, a gravity operating means mounted slidably on the flexible means, a hammer for causing the release of the said restraining means, a spring for operating the hammer, a catch for holding the hammer and spring against actuation, and trigger means for releasing the catch, the said trigger means being in the path of movement of the said gravity operating means.

7. In combination with an anchor device having means for causing the anchor to grip the sides of the well, and restraining means for preventing such gripping action while the anchor is being lowered to position, of flexible means extending upward from the anchor, a gravity operating means mounted slidably on the flexible means, and spring-operated means for causing the release of the said restraining means, the said spring-operated impact means having release means in the path of travel of said gravity operating means.

8. In combination with an anchor device having means for causing the anchor to grip the sides of the well, and restraining means for preventing such gripping action while the anchor is being lowered to position, of flexible means extending upward from the anchor, a gravity operating means mounted slidably on the flexible member, an upright rod arranged on downward movement to release the said restraining means and provided with a stop, a hammer slidably mounted on the rod above the stop, a compression spring carried on the rod and pressing downward on the hammer, a catch for holding the hammer in upper position, and a trigger in the path of movement of the gravity operating means for releasing the catch.

In testimony whereof I have hereunto signed my name in the presence of the two subscribed witnesses.

JOSEPH E. ROBINSON.

Witnesses:

HARRY A. CUPLER,

J. M. PENNIE.