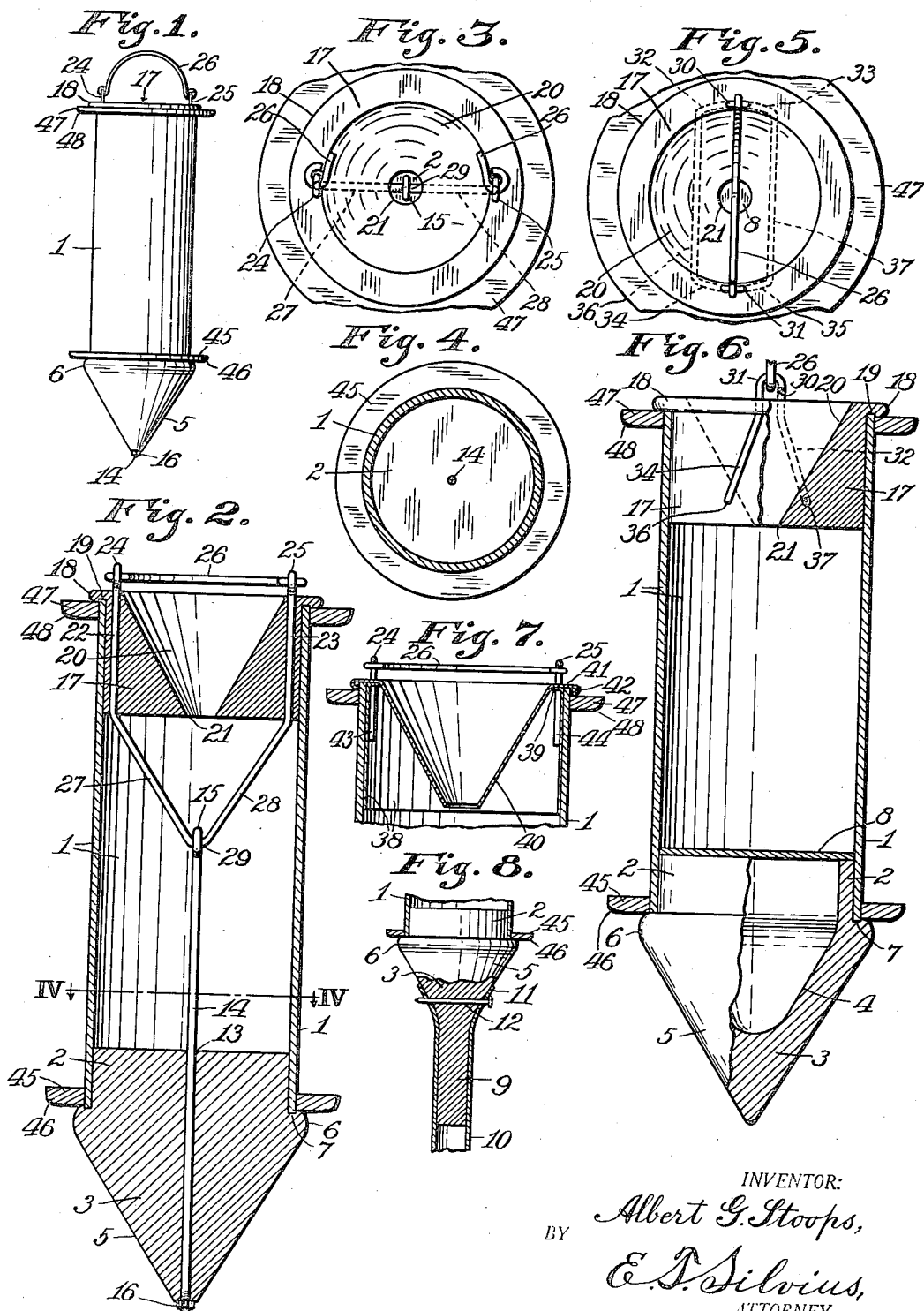


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A. G. STOOPS.
WELL SHOOTING TORPEDO APPARATUS.
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UNITED STATES PATENT OFFICE.

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WELL-SHOOTING-TORPEDO APPARATUS.

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To all whom it may concern:

Be it known that I, ALBERT G. STOOPS, a citizen of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented a new and useful Well-Shooting-Torpedo Apparatus, of which the following is a specification, reference being had to the accompanying drawings and to the letters and figures of reference marked thereon.

This invention relates to apparatus for use in causing an explosion in a well which may have been drilled to obtain oil, the invention having reference more particularly to a torpedo shell, that is designed to be charged with an explosive and lowered into a well and there exploded, the invention being generally of the character of that disclosed in Letters Patent, No. 1,382,395, granted June 21, 1921, and in some respects an improvement on that apparatus.

An object of the invention is to provide an improved torpedo shell which shall be so constructed as to not be liable to cause an explosion when being charged with an explosive such as nitro-glycerine, or to accidentally cause an explosion when being lowered into a well.

Another object is to provide a torpedo shell which may be constructed at moderate cost and yet be strong and reliable and advantageously composed principally of non-metallic material, so as to minimize the liability to cause accidental explosion while permitting the shell to be quickly charged with an explosive.

A further object is to provide a torpedo shell which shall be so constructed that when two or more small torpedoes are lowered into a well of large diameter the torpedoes shall be prevented from passing or becoming located side by side in the well, but shall be compelled to remain one above another in the well as intended.

A still further object is to provide an improved torpedo of the above-mentioned character which shall be so constructed as to permit the connection of an anchor either to the lower end or to the upper end thereof and which shall be strong, durable and economical in use.

With the above-mentioned and other objects in view, the invention consists in a well-shooting-torpedo having novel structural features and improved parts, and in the combinations and arrangements of parts

as hereinafter particularly described and further set forth in the appended claims.

Referring to the drawings,—Figure 1 is an elevation of the improved torpedo shell; Fig. 2 is a longitudinal central section of the improved shell as preferably constructed, more especially when required to be of large capacity and size; Fig. 3 is a top plan of the preferred form of shell, partially broken away; Fig. 4 is a section on the line IV—IV in Fig. 2; Fig. 5 is a top plan of a slightly modified form of structure comprised in the invention; Fig. 6 is a longitudinal central sectional elevation of the modified structure; Fig. 7 is a fragmentary longitudinal central section showing a slightly modified upper portion of the shell; and, Fig. 8 is a fragmentary longitudinal sectional elevation showing slight modification of the lower portion of the shell structure.

In the various figures of the drawings similar reference characters indicate like elements or features of construction herein referred to in detail.

As preferably constructed the apparatus comprises a hollow cylindrical body or shell part 1 which preferably is non-metallic and may be composed of fibrous material and suitably water-proofed, a bottom within the lower portion of the shell, and a funnel-shaped top in the upper portion of the shell part. Preferably the bottom comprises a plug 2 which may be composed of wood or suitably treated fibrous substance, and is tightly secured in the shell part by any suitable means, and the plug has a guide projection 3 integral therewith, in some cases the plug part having a cavity 4 therein so as to be hollow and economical in the use of material while being of light weight, the guide projection having a tapering or conical guide surface 5. The guide portion of the plug part has a base portion which is diametrically larger than the exterior of the body part 1 so as to form a projecting safety guard 6 to slide in contact with the side wall of the well boring, which may be jagged, to prevent the body or shell part coming in contact with the side wall. The back of the guard portion 6 preferably has an annular groove 7 therein to receive the end of the body part 1. When the bottom part 2 is hollow the top or inner end thereof has a bottom plate 8 thereon which covers the cavity. In some cases the guide portion

3 has a neck 9 integral thereon to be inserted in a hollow anchor 10 to reinforce and strengthen the anchor which may be suitably secured thereto, the anchor preferably having a flared portion 11 receiving the guide portion 3 and secured thereto by means of a nail 12. In some cases, especially in the construction of the larger sizes of torpedoes, the bottom part is provided with a longitudinal hole 13 in which a tie rod 14 is secured so as to extend partially through the shell part, the end of the rod being provided with an eye 15. Preferably the rod extends through the guide portion 3 and has a nut or head 16 thereon in engagement with the end of the guide.

The shell is provided with a top part 17 as preferably constructed that is designed to permit of its being cheaply produced of wood or suitable fibrous substance, and it has a flange 18 on its outer end that extends outwardly beyond the exterior of the shell to constitute a non-metallic guard. The back of the flange preferably has an annular groove 19 therein that receives the end of the body part 1. The top part is tightly secured by suitable means to the body part and has a funnel-shaped inner side 20 with a small outlet end 21 at the bottom of the top part. The top part is provided with means for suspending the torpedo which preferably comprises two rods 22 and 23 embedded in the top part and having ears 24 and 25 thereon respectively to which a bail 26 is connected. A yoke is provided which preferably comprises side rods 27 and 28 extending integrally from the rods 22 and 23 respectively and so as to be convergent each towards the other and having a loop 29 integral therewith which is connected with the eye 15, whereby the bottom part is supported substantially by the bail.

In some cases the tie rod may be omitted, especially in construction of the smaller sizes of torpedoes, and the bail ears may be secured to the top part alone, in which case two ear loops 30 and 31 are arranged upon the top part, the loop 30 being connected with anchor rods 32 and 33 that extend downwardly in the top part, the loop 31 being connected with anchor rods 34 and 35 that extend downward divergently in the top part in suitable grooves in the exterior thereof, the rods 32 and 34 being connected with a horizontal rod 36, and the rods 33 and 35 with a horizontal rod 37, so that the bail is strongly connected with the top part of the torpedo.

It may be desired in some cases to construct the top part of the torpedo so as to be of light weight, and in such event the upper portion of the body part 1 has a metallic thimble or liner 38 secured therein which is provided with an inwardly extending flange 39 that is arranged on a plane

corresponding to the end of the body part. A metallic funnel 40 is arranged within the thimble and has a flange 41 on its upper larger portion and extending over the flange 39 and against the end of the body part, and the flange has a bead 42 on its edge which extends about the exterior of the body part. Two anchor rods 43 and 44 are suitably secured to the inner side of the thimble and they extend through the flanges 39 and 41 and are provided with the ears 24 and 25 respectively, to which the bail is connected. In case the body part 1 is composed of metal, as may in some cases be preferred, the anchor rods 43 and 44 are directly secured to the inner side of the body part.

When it is designed to use torpedoes of small diameter in a well of considerably larger diameter in which two of the torpedoes might be received side by side, the torpedo is provided with means whereby to artificially augment the external diameter thereof to prevent the torpedoes from slipping out of proper place one above the other. To this end a plurality of rings, which may be cheaply composed of wood, are secured on the body part, one ring 45 being arranged behind the guard 6 and preferably having a rounded or beveled lower edge 46, and another ring 47 is arranged adjacent to the guard 18 and likewise has a rounded lower edge 48. The rings may be placed tightly on the body part before the latter is secured to the bottom and top parts and may be cemented or otherwise secured to the body part.

In practical use the torpedo properly charged with an explosive is lowered into a well by means of its bail and the lowering apparatus commonly used, the guards on the torpedo preventing contact of the body part or metallic parts of the torpedo with the metallic casing in the well or with rough or jagged wall portions in the well below the casing. The guard rings afford extra protection to the body portion of the torpedo when a torpedo is provided with them, and they so nearly fill the well transversely that one torpedo cannot pass another, but all are maintained nearly centrally, so that a plain anchor on the bottom of one torpedo may be readily guided so that its lower end shall fairly enter the funnel in the top of the lower torpedo. The torpedo is placed in the proper position in the well and anchored as customarily and is suitably exploded at the proper time, in some cases it being necessary to use several of the torpedoes to obtain the desired results.

Having thus described the invention, what is claimed as new is:

1. A well-shooting-torpedo apparatus including a hollow cylindrical shell, a guiding bottom having a relatively small plug

extending into and secured to one end of the shell, and a hollow top part secured in the opposite end of the shell and having anchor rods extending into and secured to the wall of the part, the rods having each an eye at the top of the wall.

2. A well-shooting-torpedo apparatus including a hollow cylindrical shell, a non-metallic bottom and guard combined integrally and having a relatively small plug extending into and secured to one end of the shell, the guard being larger diametrically than the shell externally, a separate guard ring embracing and secured to the shell adjacent to said guard and a bail on the opposite end of the shell.

3. A well-shooting-torpedo apparatus including a hollow cylindrical shell and a bottom in one end thereof, a hollow non-metallic top part secured within the shell adjacent to the opposite end thereof, the top part having an integral guard thereon projecting outward beyond the shell, two eyes having anchor rods extending into and secured to the wall of the top part, and a bail connected to the eyes.

4. A well-shooting-torpedo apparatus including a hollow cylindrical shell and a bottom in one end thereof, a hollow non-metallic top part arranged within and secured to the shell adjacent to the opposite end thereof and having a flange thereon seated against the end of the shell, the flange extending outward beyond the shell to constitute a guard, a separate guard ring embracing and secured to the shell adjacent to said flange, and a bail connected with the top part.

5. A well-shooting-torpedo apparatus including a hollow cylindrical shell having a bottom in one end thereof, and a hollow top part having a funnel-shaped inner wall face, the outer side of the wall of the top part being embraced by and secured to the shell adjacent to the opposite end thereof, the top part having a flange thereon extending outward past the adjacent end of the shell to constitute a projecting guard, the flange having a groove receiving the end of the shell.

6. A well-shooting-torpedo apparatus including a hollow cylindrical shell, a bottom plug secured in one end portion of the shell and having a conical guide projection integral therewith, the base of the conical projection extending outward beyond the exterior of the shell and having a groove therein receiving the end of the shell, a non-metallic guard ring directly embracing the shell adjacent to the base of the projection, and a bail on the opposite end of the shell.

7. A well-shooting-torpedo apparatus including a hollow cylindrical shell, a funnel in one end portion of the shell and having a flange seated on the end of the shell, a

guard ring extending about the shell and directly secured thereto adjacent to said flange, and a non-metallic bottom plug inserted in and secured to the opposite end portion of the shell and having a guard portion engaging the end of the shell, the plug having a conical guide projection integral therewith.

8. In a well-shooting-torpedo apparatus, the combination with a hollow cylindrical body part and a hollow top part secured in the body part adjacent to one end thereof, of a bottom part secured in the body part adjacent to the opposite end thereof and extending longitudinally and laterally beyond the end of the body part, the bottom part having a conical exterior beyond the body part and having also a central hole extending longitudinally therethrough, a tie rod extending through said hole and having an eye on its inner end and a head on its outer end, and a yoke secured to the top part and connected to said eye.

9. In a well-shooting-torpedo apparatus, the combination with a hollow cylindrical body part, and a bottom part secured in the body part adjacent to one end thereof and having a tie rod centrally connected thereto and extending into the body part, of a hollow top part secured in the body part adjacent to the opposite end thereof and having a funnel-shaped inner wall face, two anchor rods extending through the wall of the top part and having a yoke connected to the inner ends thereof and having each an eye on the outer end thereof, the yoke having connection with the tie rod, and a bail connected to the eyes.

10. In a well-shooting-torpedo apparatus, the combination of a hollow cylindrical shell, a bottom part having a plug on one end and a conical guide on the opposite end thereof, said plug being inserted into one end portion of the shell and secured thereto, the base of the conical guide having a guard portion extending outward appreciably beyond the exterior of the shell and having a groove therein receiving the end of the shell, a hollow top part having an annular wall inserted into the opposite end portion of the shell and secured thereto, the wall having a funnel-shaped inner face, the outer end portion of the wall of the top part having a guard portion extending outward appreciably beyond the exterior of the shell and having a groove therein receiving the adjacent end of the shell, and a bail connected to the wall of said top part.

11. In a well-shooting-torpedo apparatus, the combination of a hollow cylindrical shell, a bottom part having a plug on one end and a conical guide on the opposite end thereof, said plug being inserted into one end portion of the shell and secured thereto, the base of the conical guide having a guard

portion extending outward appreciably beyond the exterior of the shell, a hollow top part having an annular wall inserted into the opposite end portion of the shell and
5 secured thereto, the wall having a funnel-shaped inner face, the inner end portion of the wall of the top part being thicker than the outer end portion thereof, two eyes having anchor rods extending into and secured to the thicker portion of the wall of the top 10 part, and a bail connected to the eyes.
In testimony whereof, I affix my signature in presence of two witnesses.

ALBERT G. STOOPS.

Witnesses:

E. T. SILVIUS,
ROBERT LIEBRICH.