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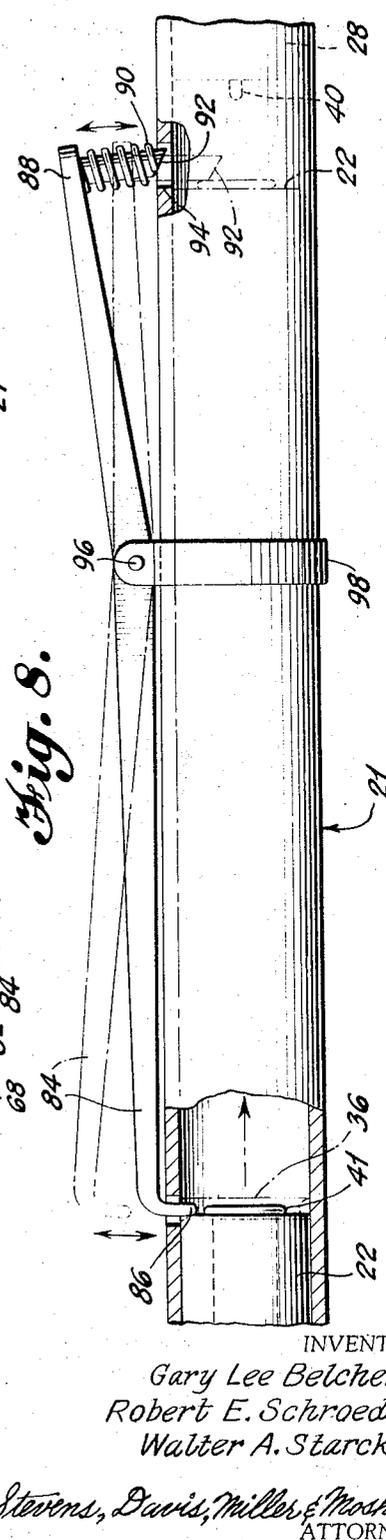
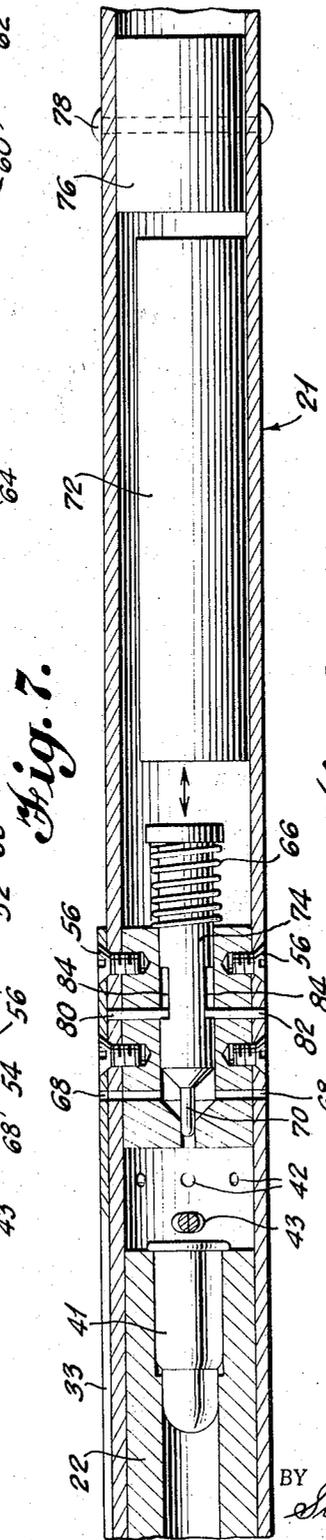
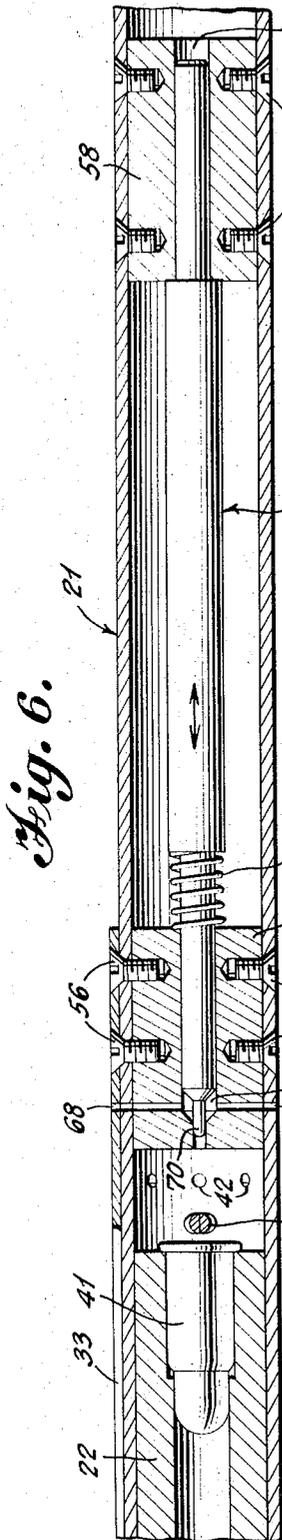
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UNDERWATER GUN

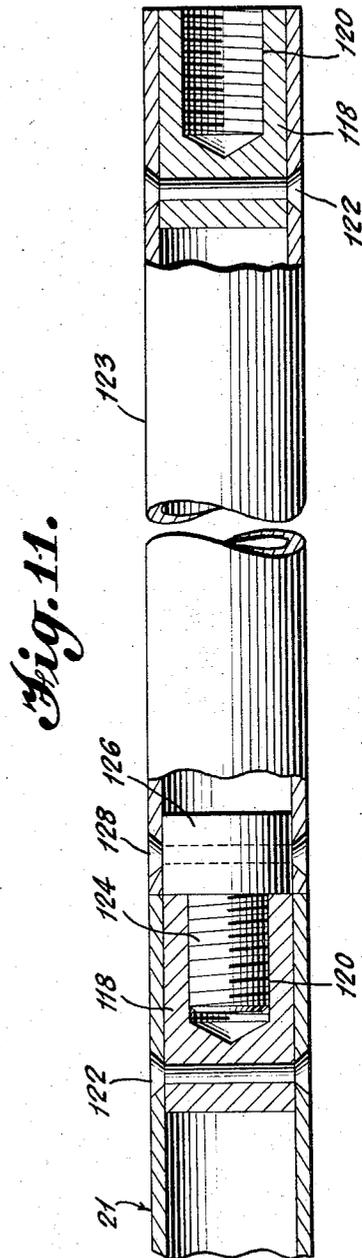
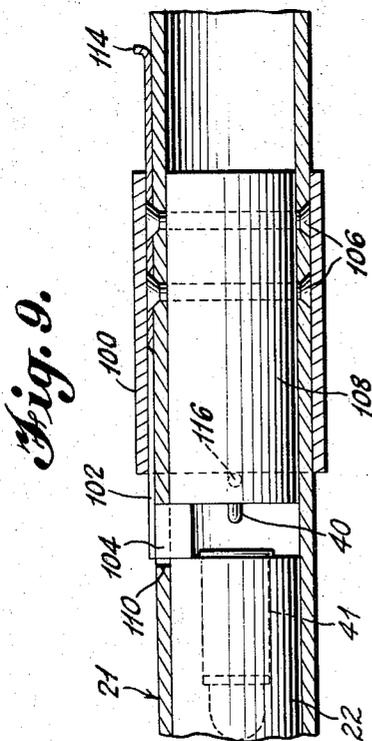
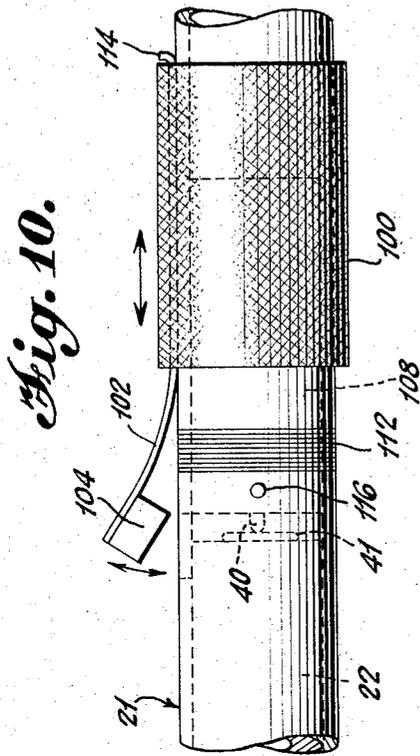
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3 Sheets-Sheet 2



INVENTORS
Gary Lee Belcher,
Robert E. Schroeder,
Walter A. Starck, II

BY *Stevens, Davis, Miller & Mosher*
ATTORNEYS



INVENTORS

Gary Lee Belcher,
Robert E. Schroeder,
Walter A. Starck, II

BY
Stevens, Davis, Miller & Mosher
ATTORNEYS

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UNDERWATER GUN

Gary Lee Belcher, Coral Gables, and Robert E. Schroeder and Walter A. Starck II, Islamorada, Fla., assignors to Bangstick Corporation, Miami, Fla., a corporation of Florida

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The present invention relates to a gun for use in underwater fishing and more particularly to a gun for discharging a high velocity projectile at an underwater target such as a fish.

In the sport of underwater fishing, underwater guns and spear guns have been utilized, but the prior art devices have been deficient in that the density and pressure of the water which such projectiles must traverse substantially decreases their velocity, and therefore the efficacy of these fishing devices is accordingly substantially decreased.

It is, therefore, an object of this invention to provide an underwater gun for discharging a projectile having a higher striking velocity than was heretofore possible.

Another object of this invention is to provide an underwater gun of simple and economical, yet effective, construction.

A further object of this invention is to provide an underwater gun which permits a projectile to attain a high velocity in air before entering an underwater target.

A concomitant object of this invention is to provide an underwater gun which is actuable by contact with a target.

Yet, another object of this invention is to provide an underwater gun having a hermetically sealed barrel, the bore of which is not subjected to the pressure of the aqueous ambient until a bullet within the barrel has attained a desired high velocity.

The aforementioned desiderata are obtained by the provision of an underwater gun comprising a pair of telescoping members, one of which contains a firing pin and other of which contains a bullet or similar projectile. The latter member is hermetically sealed and the seal is not released until the explosive pressure caused by detonation of the cartridge has increased to an amount sufficient to expel the bullet with an effective high velocity. Other objects and many of the attendant advantages will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings in which like reference numerals designate like parts throughout the figures thereof and wherein:

FIGURE 1 is a perspective view of a preferred embodiment of the invention;

FIGURE 2 is a fragmentary side elevation of the apparatus of FIGURE 1;

FIGURE 3 is a cross-sectional view taken along line 3-3 of FIGURE 1;

FIGURE 4 is a cross-sectional view taken along line 4-4 of FIGURE 1;

FIGURE 5 is a cross-sectional view taken along line 5-5 of FIGURE 1;

FIGURE 6 is a fragmentary sectional side elevation showing an alternate firing pin mechanism;

FIGURE 7 is a fragmentary sectional side elevation showing another alternate firing pin mechanism;

FIGURE 8 is a fragmentary side view, partially in section showing an alternate safety mechanism;

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FIGURE 9 is a fragmentary sectional side view showing another safety mechanism in the "safe" position;

FIGURE 10 is a fragmentary side view of the safety mechanism of FIGURE 9 in the "release" position; and

FIGURE 11 is a fragmentary side view partially in section of an extension section coupled to the device of this invention.

Referring now to the drawings, there is shown in FIGURE 1, which illustrates a preferred embodiment of the invention, an underwater gun which is generally designated 20. The gun 20 comprises a relatively long, tubular, hollow breech or receiver tube 21 and a relatively short, tubular, hollow tube or barrel 22. The outside diameter of the barrel 22 is slightly less than the inside diameter of the receiver tube 21 so as to be telescopically slidable therein. The barrel 22 is preferably constructed of cold drawn seamless steel tubing and the receiver tube 21 may be constructed of aluminum.

The hollow breech 21 has an aperture 23 formed in the proximal end thereof and a rubber sling 24 is threaded through the aperture 23 and serves to facilitate manipulation of the gun and to prevent its loss.

A close-ended cylindrical insert 25 is tightly seated in the breech tube 21 and is fixed in place by a rivet 26. The insert 25 may be plastic or other suitable material.

Mounted in breech tube 21 near the distal end 29 thereof is a breech plug 28, which may be a solid plastic cylindrical member held in position by rivets 30, 31 and 32. Rivets 30 and 31 also serve to secure leaf spring lock member 33 to the top breech tube 21. Lock member 33 has a curved, pointed free end 34 which extends through slot 35 in the breech and seats in groove 36 of barrel 22 as shown in FIGURE 3 to prevent the barrel from falling out of breech tube 21. Groove 36 has rounded walls which allow the end 34 of the lock member 33 to ride up out of the groove 36 when the barrel is pushed backwards for reasons which are fully described hereinafter. Firing pin 40 is rigidly fastened to the forward face so as to be able to strike the head of a cartridge 41 mounted in the proximal end of barrel 22.

A series of peripheral apertures 42 in breech 21 slightly forward of the firing pin 40 communicate the inside of the breach between the firing pin and the proximal end of barrel 22 with the surrounding ambient. A safety pin 43 is positioned across the breech in diametrically opposed apertures in breech 21 between the firing pin and the proximal end of barrel 22 to prevent barrel 22 from accidentally being pushed back and detonating cartridge 41.

The proximal end of barrel 22 is sealed by a neoprene O-ring 44 or the like which sealingly engages the inner wall of the barrel and the shell portion of cartridge 41. Cartridge 41 is seated in the proximal end of barrel 22 and the rim of the shell bears against the front end of the barrel. The distal end of barrel 22 is sealed by an expandable plastic cap 46 which comprises a cylindrical body portion 47 of slightly greater diameter than the end 49 of barrel 22 and a flange portion 48 which seats against the distal end of the barrel. The cap 46 may be made of any somewhat resilient material, but polyethylene is preferred. The fit between the cylindrical portion 47 of cap 46 and bore 49 of barrel 22 is sufficiently tight to prevent leakage of water into the barrel, and yet not too tight, so that the gases formed by the detonation of cartridge 41 will blow the cap off the end of the barrel. To facilitate easy removal of cap 46 and provide a better seal, a second O-ring 50, made of neoprene or similar

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resilient material, may be placed in a circular groove near the end of the barrel 22 so that it is interposed between the cap and the barrel.

Since the bullet is discharged into an object by contact therewith, rifling of the barrel in order to impart target accuracy to the bullet is not necessary.

In operation, the gun is loaded by insertion of the cartridge 41 in the proximal end of the barrel so that the rim of the shell seats against the end of the barrel 22. The polyethylene cap 46 is then inserted over the distal end of the barrel to seal that end. The proximal end of the barrel is sealed by O-ring 44 so that bore 49 of the barrel is substantially water-tight. The gun may be loaded either under or above water; however if loaded under water care must be taken that the barrel when finally loaded does not contain an impeding quantity of water. A number of similar barrels may be easily loaded above water so that they will be ready for immediate use.

The barrel is then slid into the distal end of breech 21 until the end 34 of locking member 33 is seated in groove 36 of the barrel so as to prevent the barrel from falling out of the breech.

The safety pin 43 is inserted in the breech as shown in FIGURE 4 and should not be removed until the gun 25 is about to be used, so as to prevent accidental detonation of cartridge 41.

When a target is sighted the safety pin 43 is removed and the gun is thrown or pushed against the target so as to strike the target. The force of striking the target pushes the barrel 32 back in the breech 21 toward firing pin 40. The end 34 of lock member 33 easily rides out of groove 36 so as to enable this telescoping movement of the barrel. At the rearmost position of the barrel the cartridge is forced against firing pin 40, thereby detonating the cartridge.

Since the distal end of barrel 22 is sealed by cap 46, water does not enter the barrel until the expanding gases of the detonated cartridge obtain sufficient pressure to overcome the sealing pressure of the cap against the bore of the barrel and the water pressure against the head of the cap. At such time the cap is forced off the barrel; however, between detonation and the time of blowing off the cap, the bullet of cartridge 41 has attained a substantially higher velocity in bore 39 than it would if the barrel were not sealed and the bore was filled with water. Thereby a greater shock power is obtained when the bullet hits the target; moreover, the expanding powder gases resulting from detonation follow the path of the bullet and produce an explosive effect within the target.

The gun may be made to use any conventional caliber cartridges, such as .32, .38 or .357 pistol cartridges.

FIGURE 6 illustrates an alternate type of firing pin mechanism in which the firing pin, instead of being mounted in a fixed position, is free to move within a limited area. In this embodiment the barrel 22 is slideably mounted with the breech tube 21 as previously described. Immediately to the rear of barrel 22 is the safety pin 43 and the apertures 42 as previously described. A front breech block 52 having an opening 54 through its center is then mounted in breech tube 21 by means of screws 56 which also serve to hold leaf spring lock 33 in place. A second breech block 58, mounted within the breech tube ends slightly to the rear of breech block 52, is secured in place by screws 60 and has an opening 62 through its center. Supported by and slideably mounted between these two breech blocks is an axially-moveable one-piece firing pin 64 which is biased away from the breech block 52 and the cartridge 41 by spring 66. The breech blocks are preferably made of brass and the firing pin is preferably made of Monel metal, although other materials may be used. In operation the safety pin 43 is first removed as previously described and the capped end of the barrel 22 is thrust against the hunted object, causing the barrel 22

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to slide rearwardly within the breech tube 21 until the rear of the cartridge casing 41 comes to rest against the front of the breech block 52. The momentum of this forward thrust will then cause the firing pin 64 to be carried forward by its own inertia against the bias of the spring 66 compressing it and causing the forward end 70 of the firing pin to strike the rear of the cartridge detonating it. Water escape ports 68 are provided between the center opening 54 of the breech block and the ambient water so that any water which as accumulated in the opening 54 will be readily discharged when the firing pin moves forward.

FIGURE 7 illustrates a firing pin mechanism similar to that described in connection with FIGURE 6 except that the firing pin is divided into two parts. The cylindrical weight portion 72 is enclosed within the breech tube 21 between the spring-biased portion of the firing pin 74 and the breech block 76 which is held in a fixed position by rivet 78. The operation of this embodiment of firing pin assembly is similar to that described in connection with the FIGURE 6 embodiment except that the cylindrical weight 72 is free to move back and forth within the breech tube independent of the movement of the spring biased portion of the firing pin. The rearward travel of the firing pin 74 is limited by retaining pins 80 and 82 which ride against turned down shoulder 84 of the firing pin.

FIGURE 8 illustrates a rocker arm, an additional safety device, which performs the same function as, and replaces, the leaf spring lock member previously described. The purpose of this rocker arm 84 is to prevent accidental discharge of the cartridge while inserting a loaded barrel into the breech tube. The figure in solid lines shows the position of the rocker arm when the loaded barrel has first been inserted and it has contacted the downwardly curved end 86 of the rocker arm 84. It is then necessary to press on the opposite end 88 of the rocker arm in order to depress the spring 90 and allow the pin 92 to enter the breech tube through the opening 94. When the rocker arm is so depressed the arm assumes the position shown in dotted lines with the pin 92 protruding into the breech tube. The rocker arm 84 is pivoted about pin 96 which is held in place by a metal band 98 around the breech tube. After the end 88 of the rocker arm has been depressed, the curved end 86 pulls out of the breech tube and it is then possible to slide the loaded barrel 22 farther into the tube until the end of the barrel comes to rest against the pin 92 as shown in dotted lines. This action properly positions the loaded barrel inside the breech tube and when the end 88 of the rocker arm is released the downwardly curved end 86 will then engage the proper groove in the barrel as previously described in connection with groove 36 of FIGURE 2. Thus with the aid of this rocker arm it is possible to properly position the loaded barrel inside the breech tube with ease.

FIGURES 9 and 10 illustrate an alternate type of safety mechanism which may be used in lieu of or in conjunction with the safety pin previously described. A flat leaf spring 102 supporting a small metal block 104 is secured in place on the outside of the breech tube 21 by means of rivets 106 which also serve to secure the breech block 108 inside the breech tube. The leaf spring 102 is biased upwardly and tends to pull the metal block 104 up out of the opening 110 in the breech tube. In order to force the metal block 104 down into the opening so that it will serve to prevent the rearward movement of the barrel 22 inside the breech tube 21, a knurled metal sleeve 100 of slightly larger diameter than the tube is placed over the top of the leaf spring and tube. When the knurled sleeve 100 is in the forward position as shown in FIGURE 9, it depresses the leaf spring forcing the metal block 104 into the opening 110. When the knurled sleeve 100 is moved rearwardly as shown in FIGURE 10

it allows the metal block to spring up out of the opening 110, thus clearing the way for free movement of the barrel and also exposing a red painted area 112 on the barrel indicating that the gun is in the "fire" position. The axial travel of the barrel sleeve 100 is limited by the upwardly turned portion 114 of the leaf spring at the rear and a short protruding pin 116 at the front.

FIGURE 11 illustrates an optional coupling assembly which may be secured to the distal end of the breech tube. A special breech plug 118 with an internal threaded portion 120 is secured inside of the breech tube 21 by a rivet 122. A breech tube extension, preferably made of the same material and of the same diameter, as the breech tube itself, has a plug 126 with a male threaded portion 124 secured to its end by a rivet 128. The opposite end of this breech tube extension 122 has a plug with an internal threaded portion identical to that described in connection with the distal end of the breech tube. The breech tube extension may be made in lengths of three or four feet for convenient storage and as many lengths as needed may be screwed together so that the underwater gun of this invention may be used while the operator is in a boat or while a skin diver is at a greater distance from his subject.

It is also within the purview of this invention to use the gun of this invention as a substitute for a spear to be shot out of a conventional spear gun (not shown). If the gun is used as a spear gun insert, the operation and construction would be substantially the same as that described above, except that the breech 21 would be considerably shorter than illustrated, so that the gun assembly described could be readily and easily attached to the distal end of a spear in lieu of the barbed point.

It will be appreciated that the construction heretofore described contemplates preferably a light-weight, though rugged, construction. It might be surmised that in use of the gun under water, lightness of construction would lead to difficulty in developing substantial momentum and direction control of the gun when it is hand propelled toward an object some distance away from the user. This disadvantage, however, does not occur in the present construction because the elongated breech member 21, immediately upon being taken under water, fills with water through ports provided therein, as indicated at numerals 130. The water thus contained acts as a ballast and provides the desired stability. Of course, it will be understood that breech member 21 need not be hollow but may be formed of a solid rod suitably machined for the needs of the invention.

As will be perceived the devices which are produced according to this invention may have substantial length and therefore it is desirable that means be provided for handling them with ease and without interference with the movement of the user. As has been indicated above a sling 24 is provided at the end of breech 21 enabling the user to attach the unit to his body in any suitable manner so that it may trail behind him and offer no obstruction. In order to assure that the gun does thus not accidentally fire by dragging along the underwater floor, which may be rocky and therefore likely to effect discharge, it is desirable to provide as an accessory a suitable float which will effect buoyancy of the unit sufficient to give substantial assurance against this possibility. A suitable float may be attached to the end of the unit opposite the sling 24 in any suitable manner. A cylindrical float of about three pounds positive buoyancy slipped over the receiver tube will serve the purpose satisfactorily. Such a float will cause the unit to trail above and behind the diver where it is readily accessible but out of the way. Plastic floats of urethane foam or Styrofoam are sufficient in depths up to about fifty feet. In greater depths, the cellular structure of such foams sometimes collapse with consequent loss of buoyancy. For this reason, a hollow, rigid, pressure-resistant plastic float is preferred in greater depths.

As has been indicated above, the devices of this invention are adaptable for use with ordinary types of cartridges, it being necessary only that the barrel accommodate the particular cartridge gauge. However, it has been found in use of this invention that situations sometimes arise where it is desirable that very high and surely death dealing potential be at hand and, in this connection, a further discovery, as a facet of this invention, is desired to be discussed and its application to the underwater guns herein described be explained.

The sport of underwater hunting, or fishing as it is sometimes called, involves many extremely exciting and fascinating experiences. Where the guns are used in relatively safe waters, that is where the fish are of what may be termed a "game" type measuring only up to a few feet, and being not at all dangerous, the underwater diver may enjoy the sport without concern that divers experience who are in waters in which dangerous fish are encountered, such, for example, as the shark. As is well known, sharks grow to very large sizes, and they are not at all easy to kill, it being necessary that a vital organ be pierced before their death dealing capabilities are arrested. Obviously, one who would attempt to defend himself against a shark with a small caliber weapon should be extremely capable of directing the weapon to the right spot. It is a rare diver who would care to engage consistently in such encounters unless the odds favored him greatly.

In the course of experiences in this connection, it has been discovered that the guns produced according to this invention may be charged and utilized in such a manner that they may be relied upon with substantial assurance that even the most dangerous and large fish can be quickly and surely disposed of. More specifically, it has been found that where a powder charge is employed which delivers a large quantity of gas, and where such powder charge is released by contact of the gun barrel with the body of the fish, the resulting gases follow the relatively small opening, made in the fish body by the penetrating bullet, into the interior of the body and there expand along the path following the bullet, with great and damaging effects, far out of proportion to the effects which the bullet itself might have. The effect of the expanding gases is believed to be compression upon the tissue which it encounters and the force which may be developed depending upon the charge is found to be so great that a cavity many inches in length and diameter is easily brought about. The action of the expanding gases may, it appears, be described as developing a very rapidly travelling shock wave, extremely powerful, and capable of rupturing vital organs with fatal effects at quite a distance from the point of origin. Explosive forces are known to develop fantastically high, but short lived, pressures and it may be that the expanding gases constitute a large measure of the dissipation of the initial explosion.

As has been indicated above, in using light powder charges, such as are found in cartridges loaded for target shooting, this result is not significantly accomplished, the damaging effect of the expanding gases being negligible. Standard .357 magnum cartridges produce a considerable volume of gas and the gas expanding effect is noticeable. In the course of pursuing the objective which the discovery of the gas expanding effects rendered perceivable, various experimental powder loads were tested. It has been found that fine grain black powder, for example, Du Pont ffff produces the desired result. In employing this powder, muzzle loading of the gun is used since the quantity of powder preferred exceeds the capacity of a standard .357 magnum cartridge case. In proceeding, an empty primed case is inserted into the breech and 90 to 100 grains of the above-mentioned black powder is loaded into the barrel from the muzzle. The lead bullet is then seated on a small cloth patch placed over the muzzle. The bullet and

patch is then shoved down the barrel until coming to rest against the column of powder. The patch is used to create friction between the bullet and barrel wall so that the bullet will remain in its position, atop the powder column, regardless of the position of the barrel. The muzzle is sealed with a small plastic cap as usual. Obviously, specially prepared shells according to this teaching may be made for the particular use, thereby avoiding the task of muzzle loading and assuring consistent satisfactory results. To continue, however, in using the above black powder charge in tests on various large fish, a tiger shark measuring thirteen feet was instantly immobilized by one discharge of the gun. This shark was struck just behind the head, the bullet penetrating dorso-ventrally. An ordinary bullet or spear following the same path without the effect of the powder would probably not have killed, since no vital organ was actually hit by the bullet.

From the foregoing, it will be perceived that the guns produced according to this invention when employed in combination with a high gas producing powder charge, provide a new type of weapon affording an extremely high degree of effectiveness and protection.

As further will be perceived by those skilled in the art, the broad teaching understandable from the foregoing discussion is applicable in so many different combinations of structure and cartridge as to defy particular limitations from the standpoint of breadth of the invention. In considering these applications, a main factor, obviously, is gun barrel strength, which is common to all applications. In other words the powder charge should be related to that which the gun structure will accommodate without bursting. This being a matter of skill, and easily determinable, further discussion is not necessary. It may be mentioned, however, that fast burning smokeless powders, such as used in most pistols, require special gun barrel characteristics of high bursting strength because the quantity of such powders, which are desirable to produce a highly damaging effect within the fish body, generates an extremely high internal gun barrel pressure. Powders of a slower burning smokeless type, such as are used in ordinary rifle cartridges, when used in this invention in the necessary quantity may produce total ignition problems of the powder. Thus, it will be appreciated that given a gun barrel of particular characteristics, the charge for the cartridge will be determined in relation to a particular powder and quantity thereof which will result in the desired gas quantity, which latter quantity must need be predetermined according to the resisting force to be acted against. It appears that where the necessary quantity of gas is produced, the resisting force, in this case living fish tissue, might well be disregarded, since the rate of gas expansion is believed to generate a substantially instantaneous impact-like effect of such magnitude as not to be containable to any significant extent by the relatively unresistant tissue. Thus, it might be regarded as an insignificant constant. Obviously, determination of the character of the charge therefore appears to be directly related to the gas producing capability of the charge involving considerations of both quantity and type of powder, and the quantity of tissue which may be necessary to damage in providing the most certain and quick kill. As indicated above small fish are easily destroyed by a small degree of internal expansion, whereas larger fish should be attacked only by a predetermined, large-quantity-gas-producing charge.

It is contemplated that various modifications of the teachings herein may be made without departing from the spirit of the invention which is disclosed. Accordingly, it will be understood that the invention is not restricted to the specific embodiments thereof as set forth in the foregoing paragraphs but that it extends to those embodiments in the invention coming within the

claims that are appended hereto and reasonable equivalents thereof.

What is claimed is:

1. An underwater weapon particularly adapted for underwater fishing comprising a breech member, a hollow barrel member having a distal end and a proximal end, said proximal end being slidably mounted in said breech member and adapted to support a cartridge in its said proximal end, closure means engaging the distal end of the said barrel member effecting sealing of the bore thereof against the unwanted entrance of water prior to firing of said weapon, while also being readily releasable therefrom following its firing so as not to impede movement of the contents of said cartridge from said barrel; firing means mounted in said breech member for effecting firing of said cartridge upon contact therewith.

2. A weapon as set forth in claim 1 including locking means mounted on said breech normally maintaining said barrel fixed with respect to said breech, said locking means being releasable upon the application of a substantial, longitudinally directed force on said barrel.

3. A weapon as claimed in claim 1 wherein said hollow breech member has openings therein to permit the entrance of water thereinto.

4. A weapon as claimed in claim 1 in combination with a cartridge of high quantity gas producing capabilities, the gas producing capabilities being preselected based upon a predetermination of a desired gas expansion force sufficient to produce lethal effects upon the living tissue of marine life.

5. A weapon as set forth in claim 1 wherein said closure means comprises a resilient cap having a body portion of slightly greater inside diameter than the outside diameter of said barrel.

6. A weapon as claimed in claim 5 in combination with a cartridge of high quantity gas producing capabilities, the gas producing capabilities being preselected based upon a predetermination of a desired gas expansion force sufficient to produce lethal effects upon the living tissue of marine life.

7. A weapon as set forth in claim 5 including releasable safety means mounted in said breech between said firing pin and the proximal end of said barrel.

8. A weapon as claimed in claim 7 in combination with a cartridge of high quantity gas producing capabilities, the gas producing capabilities being preselected based upon a predetermination of a desired gas expansion force sufficient to produce lethal effects upon the living tissue of marine life.

9. A weapon as set forth in claim 7 including locking means mounted on said breech normally maintaining said barrel fixed with respect to said breech, said locking means being releasable upon the application of a substantial, longitudinally directed force on said barrel.

10. A weapon as claimed in claim 9 in combination with a cartridge of high quantity gas producing capabilities, the gas producing capabilities being preselected based upon a predetermination of a desired gas expansion force sufficient to produce lethal effects upon the living tissue of marine life.

11. A weapon as claimed in claim 9 wherein said hollow breech member has openings therein to permit the entrance of water thereinto.

12. A weapon as claimed in claim 11 including means thereon effecting buoyance in underwater use.

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BENJAMIN A. BORCHELT, *Primary Examiner.*

R. V. LOTTMANN, R. F. STAHL, *Assistant Examiners.*