O. K. McCOMBS.

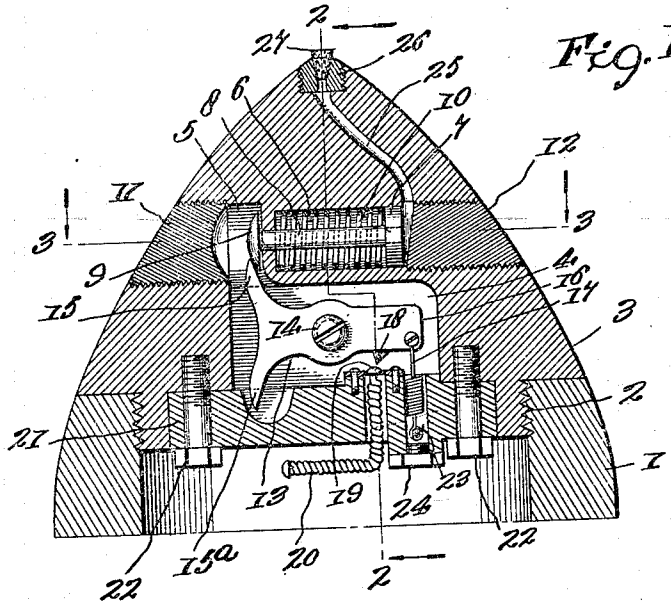
AUTOMATIC FIRING DEVICE FOR EXPLOSIVE SHELLS.

APPLICATION FILED JAN. 29, 1918.

1,290,763.

Patented Jan. 7, 1919.

Fig. 1.



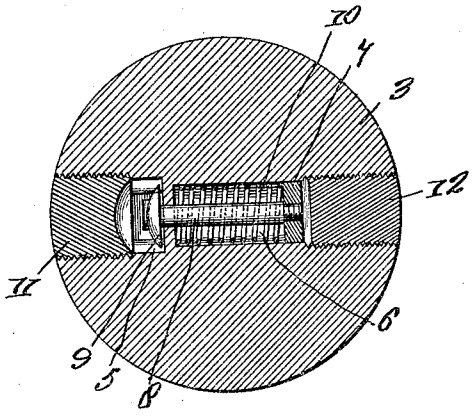


Fig. 3.

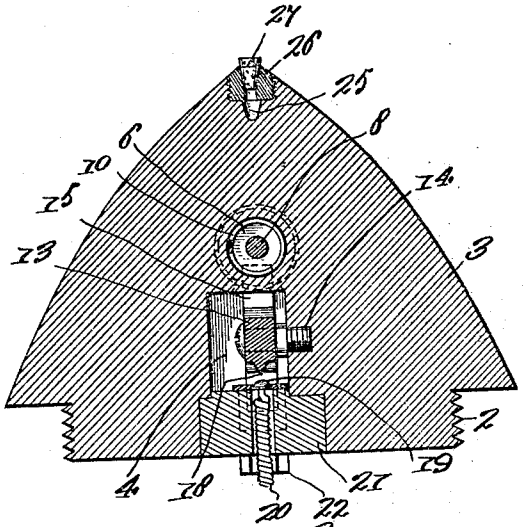


Fig. 2.

Inventor

Orville K. Mc Combs.

by Williamson & Giusta,

Attorneys.

Witness

Edwin J. Beller.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

ORVILLE K. McCOMBS, OF GALVESTON, TEXAS.

AUTOMATIC FIRING DEVICE FOR EXPLOSIVE SHELLS.

1,290,763. Specification of Letters Patent. Patented Jan. 7, 1919.

Application filed January 29, 1918. Serial No. 214,340.

To all whom it may concern:

Be it known that I, ORVILLE K. McCOMBS, a citizen of the United States, stationed at Fort Crockett, Galveston, in the county of Galveston and State of Texas, have invented certain new and useful Improvements in Automatic Firing Devices for Explosive Shells; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention is intended to provide an automatic firing device by means of which an explosive shell may be caused to travel any distance within the range of the shell through the air without exploding; but may be automatically exploded at a predetermined interval after striking the surface of the water, and thus the shell may be used as a depth charge or projectile mine.

My invention will be more fully understood after reference to the accompanying drawings, in which similar reference symbols indicate similar parts throughout the several views:—

Figure 1 shows a central longitudinal section through the forward end of a shell, parts being shown in elevation.

Fig. 2 shows a section along the broken line 2—2 of Fig. 1, and looking in the direction of the arrows; and

Fig. 3 shows a section along the line 3—3 of Fig. 1, and looking in the direction of the arrows.

1 represents a shell body which is internally screw-threaded, as at 2, to engage corresponding screw threads on the cap 3. This cap is provided with a chamber 4, which chamber has the lateral projection 5, and separated from this chamber is a second chamber 6 in which the piston 7 fits snugly; the piston 7 being connected by the piston rod 8 to the head 9, the piston being normally pressed forward by the coil spring 10.

The chamber 5 is closed by the screw plug 11, and the chamber 6 is closed by the screw plug 12 after the parts are assembled therein.

The hammer 13 is pivoted on the pin 14, whose center lies in the longitudinal axis of the shell, and this hammer is provided with an arm 15 adapted to engage the head 9 of the piston rod 8; and for the proper balancing of the parts when the shell is spinning, it is also provided with a symmetrically-disposed arm 15^a opposite the arm 15.

The other end 16 of the hammer 13 is under tension by the spring 17, and the hammer is provided with a firing pin or point 18, adapted to engage the primer 19 which may be connected either to an ordinary delayed action fuse, or to a time train 20. The primer and spring and fuse or time train are carried by the plate 21 bolted to the cap 3 by the bolts 22. These bolts should be symmetrically disposed relative to the axis of the shell, and in fact all of the moving parts are so arranged that their weights will be symmetrically disposed relative to the longitudinal axis of the shell after the shell has been spun up by the rifling of the gun and while it continues in flight.

The spring 17 projects down into a chamber 23 in the plate 21, and this chamber is closed by a screw cap 24. This for convenience in assembling the parts.

At the forward end of the cap 3 I provide a tapered channel 25, whose inner end opens into the chamber 6 and whose outer end is closed by a bushing 26. This bushing is provided with an opening therethrough connected to the passage 25. The opening in this bushing is normally kept closed until the shell is loaded into the gun by any suitable stopper, such as the cork plug 27. By keeping this passage closed, except when the projectile is fired, the parts inclosed in the cap may be protected against moisture or corrosion.

After the shell has been fired from the gun and continues its flight, with the point forward in the usual way, air will be forced into the passage 25 and will tend to press back the piston 7 against the action of the spring 10; but this spring should be strong enough to safely resist the pressure of the air until the projectile strikes the water, when the water, flowing by reason of its impact with the shell into the passage 6, will force back the piston, causing the head 9 of the plunger to clear the arm 15 of the hammer thus releasing the hammer and allowing the firing point 18 to strike the pri-

mer under the action of the spring 17, which will ignite the fuse or time train and will explode the shell in the usual way.

In order to prevent air pressure from prematurely pressing back the piston 7, the spring 10 should be amply strong to resist it.

Since this pressure will vary with the velocity of the projectile, it is desirable to have a good margin of safety, thus the same shell may be used with different bushings according to the time it is desired to delay the action of the mechanism. Moreover, by varying the aperture through the bushing 26, the depth in the water, to which the projectile passes before the pressure is sufficient to move back the piston and release the hammer, may be predetermined; thus the projectile may be caused to explode at approximately the desired depth in the water without use of fuse train.

It will be seen that the device is especially adapted for use with low power guns fired at high elevation and high trajectory, where the projectile will strike the water at a large angle of inclination.

Such guns are especially efficient against U-boats, for if the projectile strikes the U-boat without exploding it will puncture the shell thereof and passing through the shell will explode beneath the same; while if it misses the U-boat and explodes at sufficient depth and not too far from the U-boat, the crushing of the shell of the U-boat would be effected. Such shells are intended to carry large charges of high explosive, and the walls of the same may be comparatively thin, but the chambers for the explosive are comparatively large.

The outstanding feature of this invention is using a water pressure generated by reason of its impact with a swiftly moving shell, to operate the firing mechanism.

It will be obvious that various modifications might be made in the herein described apparatus, and in the construction, combination and arrangement of parts which could be used without departing from the spirit of my invention, and I do not intend to limit my invention to such details except as particularly pointed out in the claims.

Having thus described my invention, what I claim and desire to secure by Letters Patent of the United States is:—

1. A projectile of the character described comprising a body portion and a cap, said cap being provided with a hammer chamber and a piston chamber, and a passage having an inlet opening in the forward part of the cap and an outlet opening in the front end of said piston chamber, a piston, piston rod and spring mounted in said piston chamber, the head of said piston rod projecting into said hammer chamber, a spring impressed hammer mounted in said chamber and having an arm engaging said head but adapted to be released as said head is pressed backward, and a primer adapted to be struck by said hammer when released, substantially as described.

2. A projectile of the character described comprising a body portion and a cap, said cap being provided with a hammer chamber and a piston chamber, and a passage having an inlet opening in the forward part of the cap and an outlet opening in the front end of said piston chamber, a perforated bushing detachably connected to said cap over the inlet end of said passage, for regulating the size of said inlet opening, a piston, piston rod and spring mounted in said piston chamber, the head of said piston rod projecting into said hammer chamber, a spring impressed hammer mounted in said chamber and having an arm engaging said head but adapted to be released as said head is pressed backward, and a primer adapted to be struck by said hammer when released, substantially as described.

3. A projectile of the character described, comprising a body portion and a cap, said cap being provided with a hammer chamber and a piston chamber, and a passage having an inlet opening in the forward part of the cap and an outlet opening in the front end of said piston chamber, a piston, piston rod and spring mounted in said piston chamber, the head of said piston rod projecting into said hammer chamber, a spring impressed hammer mounted in said chamber and having an arm engaging said head but adapted to be released as said head is pressed backward, the said piston rod and the parts carried thereby, as also the said hammer being mounted transversely of said cap and having their weights balanced about the longitudinal axis of the projectile, and a primer adapted to be struck by said hammer when released, substantially as described.

4. A projectile of the character described, comprising a body portion and a cap, said cap being provided with a hammer chamber and a piston chamber, and a passage having an inlet opening in the forward part of the cap and an outlet opening in the front end of said piston chamber, a perforated bushing detachably connected to said cap over the inlet end of said passage, for regulating the size of said inlet opening, a piston, piston rod and spring mounted in said piston chamber, the head of said piston rod projecting into said hammer chamber, a spring impressed hammer mounted in said chamber and having an arm engaging said head but adapted to be released as said head is pressed backward, the said piston rod and the parts carried thereby, as also the said hammer being mounted transversely of said cap and having their

weights balanced about the longitudinal axis of the projectile, and a primer adapted to be struck by said hammer when released, substantially as described.

5. A projectile of the character described, comprising a body portion and a cap, said cap being provided with a hammer chamber and a piston chamber, and a passage having and inlet opening in the forward part of the cap and an outlet opening in the front end of said piston chamber, a piston, piston rod and spring mounted in said piston chamber, the head of said piston rod projecting into said hammer chamber, a spring impressed hammer mounted in said chamber and having an arm engaging said head but adapted to be released as said head is pressed bacwward, and a primer adapted to be struck by said hammer when released, with a delayed action firing device adapted to be ignited by said primer, substantially as described.

6. A projectile of the character described, comprising a body portion and a cap, said cap being provided with a hammer chamber and a piston chamber, and a passage having an inlet opening in the forward part of the cap and an outlet opening in the front end of said piston chamber, a perforated bushing detachably connected to said cap over the inlet end of said passage, for regulating the size of said inlet opening, a piston, piston rod and spring mounted in said piston chamber, the head of said piston rod projecting into said hammer chamber, a spring impressed hammer mounted in said chamber and having an arm engaging said head but adapted to be released as said head is pressed backward, and a primer adapted to be struck by said hammer when released, with a delayed action firing device adapted to be ignited by said primer, substantially as described.

7. A projectile of the character described, comprising a body portion and a cap, said cap being provided with a hammer chamber and a piston chamber, and a passage having an inlet opening in the forward part of the cap and an outlet opening in the front end of said piston chamber, a piston, piston rod and spring mounted in said piston chamber, the head of said piston rod projecting into said hammer chamber, a spring impressed hammer mounted in said chamber and having an arm engaging said head but adapted to be released as said head is pressed backward, the said piston rod and the parts carried thereby, as also the said hammer being mounted transversely of said cap and having their weights balanced about the longitudinal axis of the projectile, and a primer adapted to be struck by said hammer when released, with a delayed action firing device adapted to be ignited by said primer, substantially as described.

8. A projectile of the character described, comprising a body portion and a cap, said cap being provided with a hammer chamber and a piston chamber, and a passage having an inlet opening in the forward part of the cap and an outlet opening in the front end of said piston chamber, a perforated bushing detachably connected to said cap over the inlet end of said passage, for regulating the size of said inlet opening, a piston, piston rod and spring mounted in said piston chamber, the head of said piston rod projecting into said hammer chamber, a spring impressed hammer mounted in said chamber and having an arm engaging said head but adapted to be released as said head is pressed backward, the said piston rod and the parts carried thereby, as also the said hammer being mounted transversely of said cap and having their weights balanced about the longitudinal axis of the projectile, and a primer adapted to be struck by said hammer when released, with a delayed action firing device adapted to be ignited by said primer, substantiallv as described.

9. A projectile of the character described, comprising a body portion and a cap, a piston chamber provided in said cap and also a passage having an inlet opening in the forward part of the cap and an outlet opening in the front end of said piston chamber, a spring impressed piston mounted in said piston chamber, a spring impressed hammer mounted in said cap, with means operated by said piston for releasing said hammer, and a primer adapted to be struck by said hammer when released, substantially as described.

10. A projectile of the character described, comprising a body portion and a cap, a piston chamber provided in said cap and also a passage having an inlet opening in the forward part of the cap and an outlet opening in the front end of said piston chamber, a perforated bushing detachably connected to said cap over the inlet end of said passage, for regulating the size of said inlet opening, a spring impressed piston mounted in said piston chamber, a spring impressed hammer mounted in said cap, with means operated by said piston for releasing said hammer, and a primer adapted to be struck by said hammer when released, substantially as described.

11. A projectile of the character described, comprising a body portion and a cap, a piston chamber provided in said cap and also a passage having an inlet opening in the forward part of the cap and an outlet opening in the front end of said piston chamber, a spring impressed piston mounted in said piston chamber, a spring impressed hammer mounted in said cap, with means operated by said piston for releasing said hammer, and a primer adapted to be struck

by said hammer when released, with a delayed action firing device adapted to be ignited by said primer, substantially as described.

12. A projectile of the character described, comprising a body portion and a cap, a piston chamber provided in said cap and also a passage having an inlet opening in the forward part of the cap and an outlet opening in the front end of said piston chamber, a perforated bushing detachably connected to said cap over the inlet end of said passage, for regulating the size of said inlet opening, a spring impressed piston mounted in said piston chamber, a spring impressed hammer mounted in said cap, with means operated by said piston for releasing said hammer, and a primer adapted to be struck by said hammer when released, with a delayed action firing device adapted to be ignited by said primer, substantially as described.

13. A projectile of the character described, comprising a body portion and a cap, a piston chamber provided in said cap and also a passage having an inlet opening in the forward part of the cap and an outlet opening in the front end of said piston chamber, a spring impressed piston mounted in said piston chamber, a spring impressed hammer mounted in said cap, with means operated by said piston for releasing said hammer, the piston and hammer being mounted transversely of said cap, and having their weights balanced about the longitudinal axis of the projectile, and a primer adapted to be struck by said hammer when released, substantially as described.

14. A projectile of the character described, comprising a body portion and a cap, a piston chamber provided in said cap and also a passage having an inlet opening in the forward part of the cap and an outlet opening in the front end of said piston chamber, a perforated bushing detachably connected to said cap over the inlet end of said passage, for regulating the size of said inlet opening, a spring impressed piston mounted in said piston chamber, a spring impressed hammer mounted in said cap, with means operated by said piston for releasing said hammer, the piston and hammer being mounted transversely of said cap, and having their weights balanced about the longitudinal axis of the projectile, and a primer adapted to be struck by said hammer when released, substantially as described.

In testimony whereof I affix my signature.

ORVILLE K. McCOMBS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."