E. W. NEWELL.

PNEUMATICALLY OPERATED IMPACT FUSE.

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1,309,773. Patented July 15, 1919.

Fig. 1.

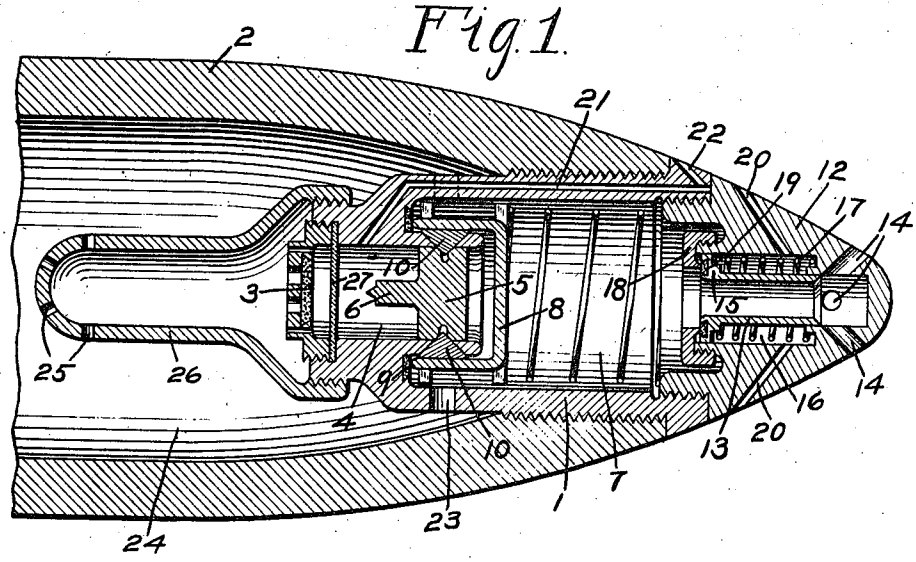
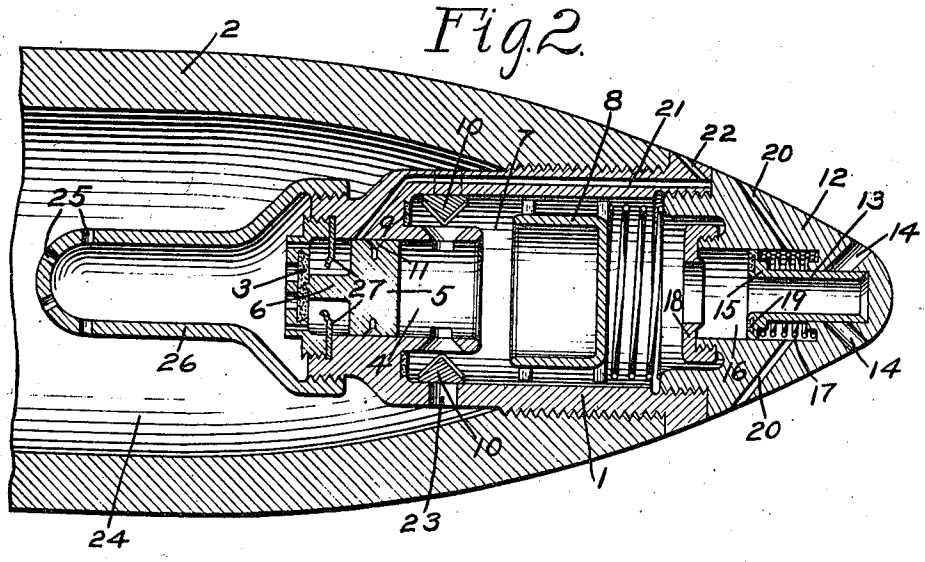


Fig. 2.



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PNEUMATICALLY-OPERATED IMPACT-FUSE.

1,309,773. Specification of Letters Patent. Patented July 15, 1919.

Application filed March 3, 1917, Serial No. 152,224. Renewed January 21, 1919. Serial No. 272,354.

To all whom it may concern:

Be it known that I, EDWARD W. NEWELL, a citizen of the United States, residing at Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented new and useful Improvements in Pneumatically-Operated Impact-Fuses, of which the following is a specification.

This invention relates to explosive projectiles, and more particularly to a fuse mechanism therefor.

One object of my invention is to provide a fuse mechanism adapted to be controlled by fluid under pressure.

Another object of my invention is to utilize fluid supplied to the fuse mechanism for enhancing the explosive qualities of the explosive.

Other objects and advantages will appear in the following more detailed description of the invention.

In the accompanying drawing; Figure 1 is a central sectional view, in part, of a projectile containing a fuse mechanism embodying my invention, and showing the parts in normal position; and Fig. 2 a similar view, showing the parts in the position assumed immediately after impact of the projectile.

According to my invention, a casing 1 is provided which is adapted to be screwed into the forward end of the projectile body 2 and has mounted at the rear end a primer 3.

The casing 1 is provided with a cylindrical bore 4 within which is a piston 5 forming part of a firing plunger 6, the bore 4 being positioned, so that the movement of the piston 5 therein will cause the firing plunger to strike the primer 3.

Normally inclosing the outer end of the bore 4 and contained in chamber 7 of casing 1, is a cup shaped member 8 adapted to engage a seat 9 carried by the casing 1, so as to seal the mouth of said bore from the chamber 7.

When the member 8 is seated in normal position, it serves to hold wedge shaped sear blocks 10 in position for engaging a corresponding wedge shaped groove 11 formed in piston 5, so as to lock said piston and prevent movement of the firing plunger.

Within the nose 12 of the projectile there is mounted a sleeve valve 13 adapted to control forwardly inclined passages 14 which open to the atmosphere.

The rear end of the valve 13 is provided with a piston 15 working in a bore 16 formed in the nose 12 and between the piston and the outer end wall of the nose there is mounted a coil spring 17. The rear end of the nose 12 is provided with a rearwardly extending screw threaded projection upon which is screwed a seating ring 18 against which a seat 19 on the piston 15 is normally adapted to engage.

Passages 20 lead rearwardly from chamber 16 to the atmosphere and a passage 21 in casing 1 connects chamber 4 at the rear of piston 5 through a rearwardly inclined passage 22 to the atmosphere.

In order to prevent rattling, a light coil spring may be placed in the chamber 7 so as to act on the member 8.

The parts are normally positioned as shown in Fig. 1 of the drawing, and when the projectile is fired from the gun, air enters the passages 14 in the nose 5 of the projectile, due to the movement of the projectile and enters the chamber 7, building up a fluid pressure therein.

When the piston 15 is seated, a restricted area only of the piston is exposed to the fluid pressure in chamber 7, while the annular space formed by the valve 13 and containing spring 17 is subjected to atmospheric pressure by way of passages 20.

The seated area of piston 15 is such as to provide a differential area subject on one side to the pressure in chamber 7 and on the other side to the atmospheric pressure in the spring chamber.

It will therefore be seen that when the fluid pressure in chamber 7 and on said differential area has been built up to a pressure sufficient to overcome the resistance of spring 17, the piston 15 will lift from its seat, and thus expose the full area of the piston to the pressure in chamber 7. This sudden increase in pressure on piston 15 then causes the quick movement of the piston and valve 13 to close the passages 14 so as to retain the fluid pressure in chamber 7.

Upon impact of the projectile, the member 8 is moved forward by inertia, releasing the sear blocks 10 and permitting the fluid pressure in chamber 7 to act on the

forward face of piston 5. The opposite side of the piston being subject to ordinary atmospheric pressure by way of passages 21 and 22, the higher bottled up pressure in chamber 7 will cause the rearward movement of the piston 5, so that the firing plunger 6 will strike the primer 3 and detonate the projectile, the sear blocks 10 being thrown out of engagement with the piston by the movement of the piston.

It is well known that many substances when in the form of fine particles become explosive, especially when exposed to air in motion and it is also known that the usual explosives act more effectively when similarly exposed.

According to one feature of my invention, I propose to utilize this principle by providing means for supplying air admitted to the fuse mechanism to the chamber containing the explosive material.

Accordingly, ports 23 in the casing 1 are provided, so that when air is admitted to chamber 7 during the flight of the projectile, the same will pass through the ports 23 to the explosive chamber 24 of the projectile and also through ports 25 in the usual gaine 26.

In order to prevent the passage of air from the explosive chamber of the projectile into the piston chamber 4 at the rear of piston 5, a diaphragm 27 may be interposed across the piston chamber, between the primer 3 and the firing plunger 6. This diaphragm may be made of a fragile substance, such as glass, or an easily punctured material, such as a thin sheet of metal, so that the movement of the firing plunger to strike the primer will fracture or puncture the diaphragm.

Having now described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. A projectile provided with a chamber and having inlet ports through which air from the atmosphere is compressed into said chamber by the flight of the projectile, a firing plunger for detonating the projectile, and means operated upon impact of the projectile for supplying fluid from said chamber to operate the firing plunger.

2. A fuse mechanism for a projectile having a chamber adapted to be charged with air under pressure during the flight of the projectile, a firing plunger, and means normally cutting off communication from said chamber to the firing plunger and operated by inertia upon impact of the projectile for opening communication from the chamber to the firing plunger, to thereby operate the plunger by air pressure.

3. A fuse mechanism for a projectile having a chamber adapted to be charged with air under pressure during the flight of the projectile, a firing plunger, a locking device for said plunger, and means operated by inertia upon impact of the projectile for releasing said locking device and for supplying air from said chamber to actuate said firing plunger.

4. A projectile provided with a chamber and having inlet ports through which air is compressed into said chamber during the flight of the projectile and a valve operated at a predetermined pressure in said chamber for closing said ports.

5. A projectile provided with a chamber and having inlet ports through which air is compressed into said chamber during the flight of the projectile, a valve for controlling said ports, and having a piston normally subject over a restricted area to pressure in said chamber and operated at a predetermined pressure in the chamber to expose the full area thereto and thereby quickly move said valve to close the inlet ports.

6. An explosive projectile having a chamber adapted to be charged with air under pressure during the flight of the projectile and having ports for admitting air from said chamber to the main explosive chamber of the projectile.

7. An explosive projectile having a chamber adapted to be charged with air under pressure during the flight of the projectile and having ports for admitting air from said chamber to the explosive chamber of the projectile, a firing plunger, and a frangible diaphragm interposed between said plunger and the explosive chamber.

8. An explosive projectile having a chamber adapted to be charged with air under pressure during the flight of the projectile and having ports for admitting air from said chamber to the explosive chamber of the projectile, a primer, a firing plunger therefor, and a frangible diaphragm between said primer and the firing plunger.

9. An explosive projectile having a chamber adapted to be charged with air under pressure during the flight of the projectile and having ports for admitting air from said chamber to the explosive chamber of the projectile, a primer, a firing plunger adapted to be operated by fluid supplied from said air chamber to one side of said plunger, and a frangible diaphragm between said primer and the opposite side of the firing plunger.

In testimony whereof I have hereunto set my hand.

EDWARD W. NEWELL.