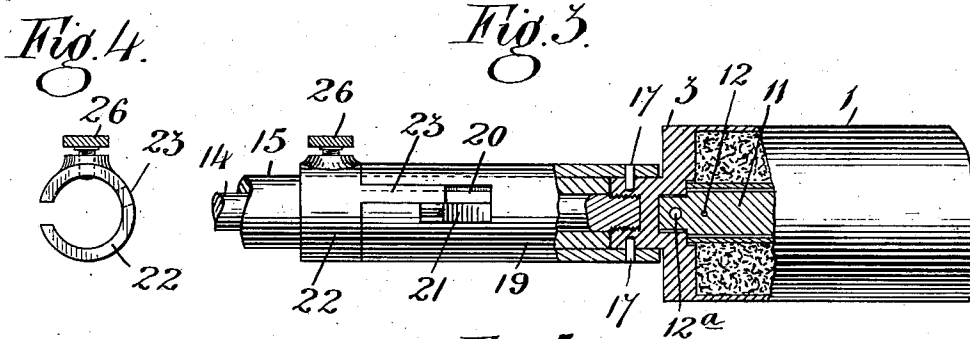
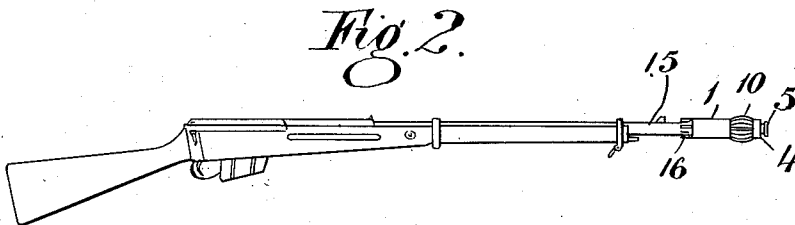
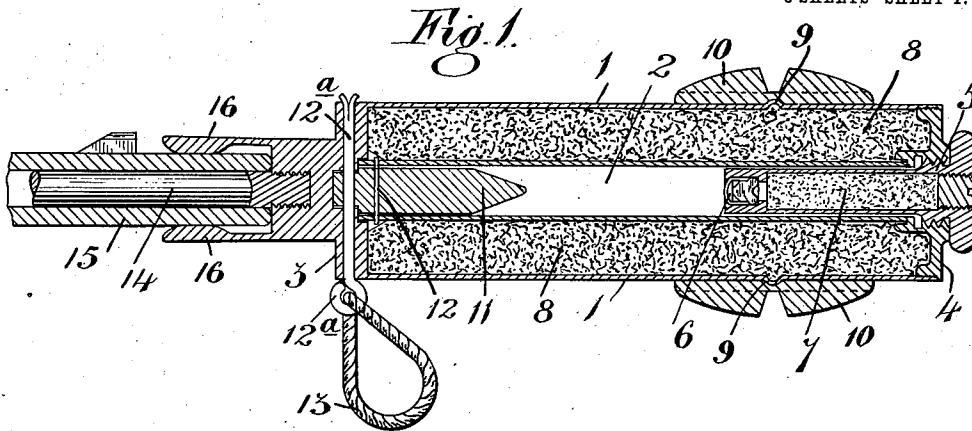


F. M. HALE.
EXPLOSIVE GRENADE.
APPLICATION FILED OCT. 26, 1908.

940,527.

Patented Nov. 16, 1909.

3 SHEETS—SHEET 1.



Witnesses:

J. B. Keeler

C. D. Kester

Inventor

Frederick M. Hale

By *James L. Norris*

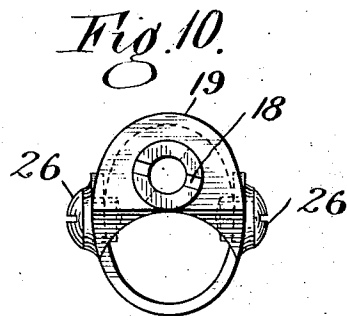
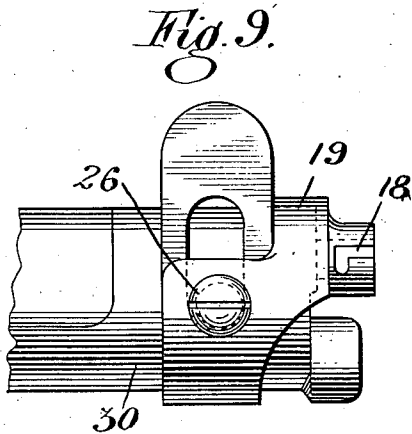
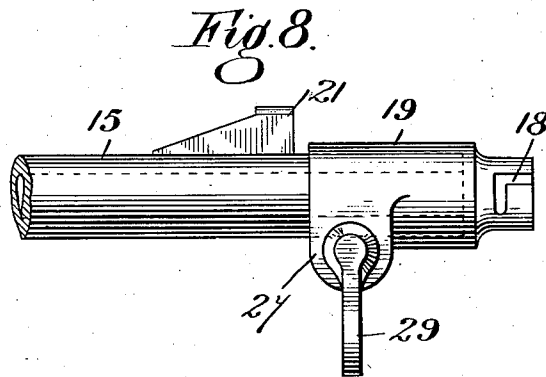
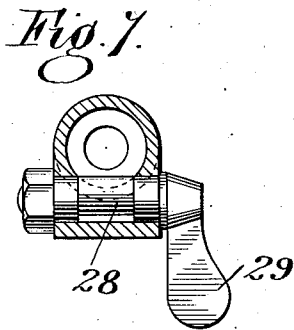
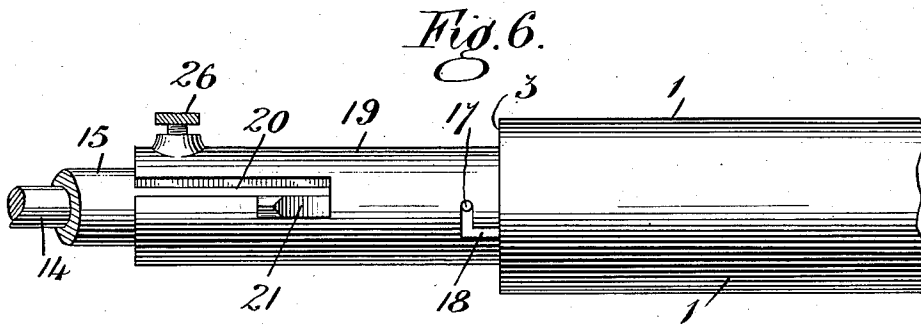
Att'y.

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3 SHEETS—SHEET 2.



Witnesses:

W. H. Hester
C. D. Hester

Inventor

Frederick M. Hale

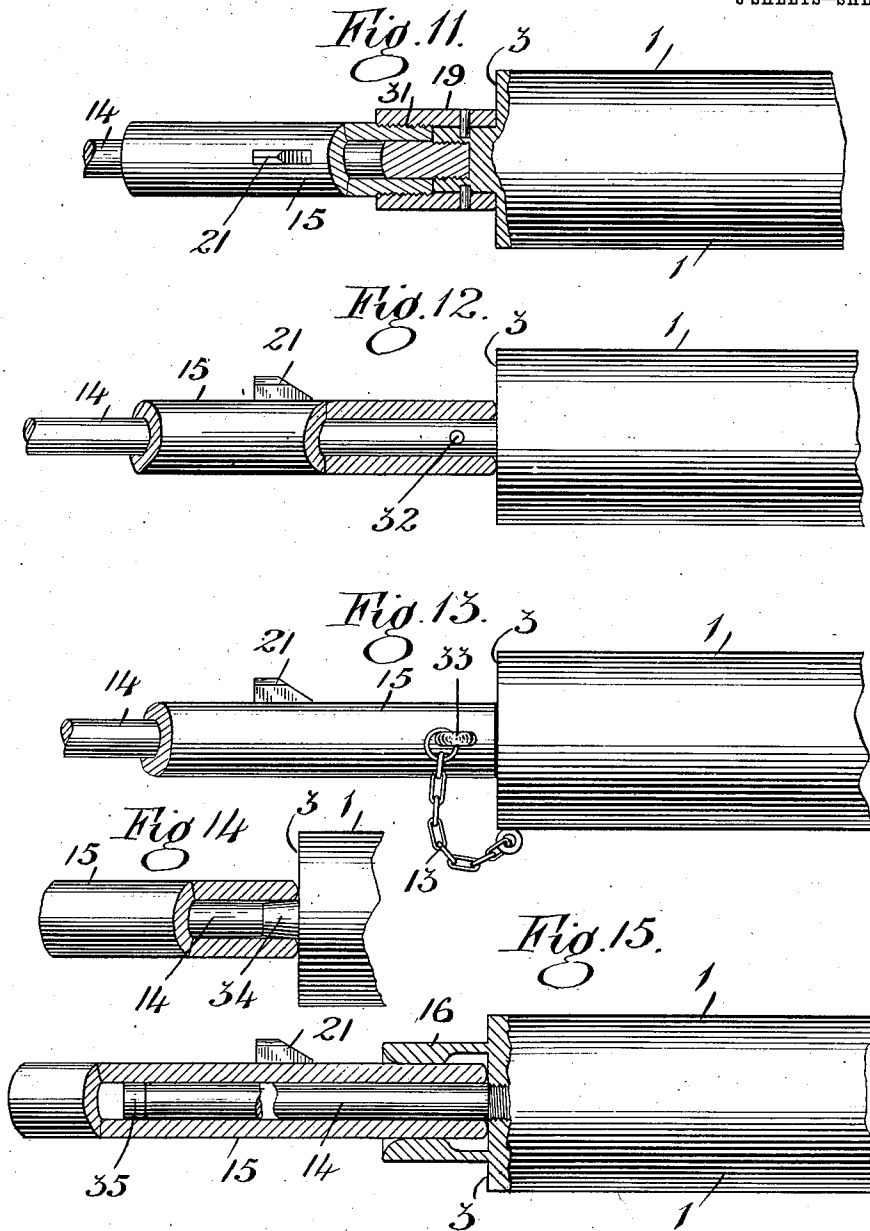
By *James L. Norris*

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3 SHEETS—SHEET 3.



Witnesses:
[Signature]
[Signature]

Inventor
Frederick M. Hale
By *[Signature]*
[Signature]

UNITED STATES PATENT OFFICE.

FREDERICK MARTIN HALE, OF LONDON, ENGLAND.

EXPLOSIVE GRENADE.

940,527.

Specification of Letters Patent.

Patented Nov. 16, 1909.

Application filed October 26, 1908. Serial No. 459,556.

To all whom it may concern:

Be it known that I, FREDERICK MARTIN HALE, a subject of the King of Great Britain, residing at London, England, have invented certain new and useful Improvements in Explosive Grenades, of which the following is a specification.

The object of this invention is to construct an explosive grenade of that class which is provided with a rod which fits the barrel of a service rifle, carbine or other type of small arm, and is propelled therefrom in any desired direction by the firing of a cartridge within the barrel, the grenade being provided with means whereby its projection is delayed or retarded, to allow for the proper and efficient expansion of the gases from the exploded cartridge, and for the full compression of the air in the barrel, so that when the retardation is overcome, the grenade will be projected to a greater distance by the propelling power created in the barrel than would be the case where the grenade is simply connected by its rod to the barrel without any means of proper and firm attachment or grip. I also provide means in the grenade for firing the detonator when the grenade strikes the ground or an object, such means being positively held from movement in the grenade until ready for firing, and then until the grenade strikes the object, thus rendering the grenade perfectly safe to handle and fire under all conditions, and as a further safeguard, I may carry the detonator and the exploder charge separately, the detonator for firing the grenade being inserted into its position only when the grenade is affixed to the rifle at the moment of firing.

The grenade carries a stem or rod which may be provided with means such as a gas check to insure full effect of the gases on the end of the rod, or the rod may be rifled on the whole or part of its length to insure the confinement of the gases of the propelling charge and to impart centrifugal motion during the flight of the grenade.

My invention can be carried out in a variety of ways, a few of which are hereinafter described, and are shown in the accompanying drawings, wherein—

Figure 1 is a longitudinal sectional view of my improved explosive grenade in its simplest form, said figure showing the attachment of the grenade to the muzzle end of the rifle barrel by means of spring clips.

Fig. 2 is an elevation of an ordinary service rifle with my grenade in position thereon. Fig. 3 is a side elevation partly in section, of a portion of a grenade and barrel of a rifle, the attachment being effected by a socket fitted to the barrel and, by pins on the grenade engaging the socket, which latter is held to the barrel by a ring. Fig. 4 is an end view of the ring above referred to. Fig. 5 is a plan view of Fig. 3. Fig. 6 is an elevation of portion of a grenade and barrel of a rifle similar to Fig. 3, but with the socket secured to the barrel by a screw instead of by a ring. Fig. 7 is a transverse section, and Fig. 8 is a side elevation of a socket affixable to the barrel of a rifle by a cam which engages a recess in the barrel. Fig. 9 is a side elevation and Fig. 10 a front view of a socket affixed to the muzzle end of a short service rifle. Fig. 11 is a fragmental side elevation, partly in section, of a grenade and barrel of a rifle, with the socket screwed to the rifle barrel. Fig. 12 is an elevation partly in section, and Fig. 13 an elevation of a portion of a grenade and barrel in which the latter and the stem of the grenade are formed with registering openings arranged to receive the retaining and retarding pin. Fig. 14 is an elevation of a portion of a grenade and barrel, with the barrel in section, the means for attachment of the grenade to the barrel and retardation consisting of a ring or collar. Fig. 15 is a view similar to Fig. 1, but with the stem or rod of the grenade provided with a gas check.

I will first describe my preferred construction of explosive grenade, but it must be understood that this forms no part of my present invention, except in so far as the appliances or means for effecting the connection thereof to the rifle barrel are concerned.

The grenade is constructed with a shell 1 preferably cylindrical in shape, and a concentric tube 2 arranged therein and affixed to the ends 3 and 4 of the shell, the latter end being hollow and provided with a screw thread for receiving the detonator shell 5 which carries the detonator 6 and the exploder charge 7, the outer end of said shell serving as a nose. The space between the shell 1 and the tube 2 contains the bursting charge 8. Surrounding the shell 1 and connected thereto by a rim 9 is a weight ring 10 which serves to steady the grenade during its flight through the air and causes it to strike the ground upon its nose. The said

ring is also serrated so that on explosion of the grenade it breaks up into fragments with shrapnel effect.

Inside the tube 2, I position a striking pin or hammer 11 which is held in position by a shearing wire 12 passed therethrough and through the walls of the tube. Through the end 3 and also through the striker 11, I drill another hole into which I pass a safety pin 12^a carrying a cord 13, which pin 12^a serves as a means for positively retaining the striker 11 at a fixed position within the tube 2 under all conditions.

To the end 3, I screw or otherwise secure a rod 14 of suitable length, which forms the stem of the grenade, such stem or rod being designed for insertion into the barrel 15 of a rifle. According to Fig. 1, I also provide the end 3 of the grenade with spring arms or like appliances 16, these being of such a size, strength, and character as to grip the outside of the barrel 15 sufficiently tight to hold the grenade firmly on the barrel, and also to resist the pressure of gases and air in the barrel, due to the firing of a cartridge, until a determined pressure is reached, at which point the pressure overcomes the grip of the arms or clips 16 and projects the grenade from the barrel. Ordinarily, the detonator shell 5 is detached from the grenade and carried separately, while the safety pin 12^a remains inserted in the grenade and is only withdrawn at the moment of firing.

When it is desired to fire the grenade, the detonator 5 is screwed into the end 4, and the rod 14 is inserted into the barrel 15, the latter being engaged by the spring clips or fingers 16. The safety pin 12^a is then withdrawn by the cord 13 and the propelling cartridge inserted in the rifle. When the cartridge is fired, the gases will expand and compress the air in the barrel. With the expansion and pressure so formed the grenade is projected from the rifle.

According to Figs. 3, 4 and 5, the means of connection of the grenade to the barrel 15 consist of two shearing pins 17 projecting from the end 3 of the grenade and entering the bayonet slots 18 formed in the end of a socket 19, the latter being provided in turn with a bayonet slot 20 designed to receive the sight 21 on the barrel, as shown in Fig. 3. The socket is locked to the barrel by means of a ring 22 having a leg 23 which is designed to fit in the slot 20 at the side of the sight, the ring being attached to the barrel by a screw pin 26.

According to Fig. 6, the ring 22 is dispensed with and the socket 19 is held tightly to the barrel 15 by the screw 26, which is attached to the socket 19; otherwise the construction of socket is the same.

In Figs. 7 and 8, the socket 19 consists of a tube having wings 27 in which is arranged a cam shaped rod 28 which enters a groove

cut in the barrel 15 to retain the socket on the barrel. Rod 28 is provided with a handle 29 by which it can be turned, to engage or disengage the groove in the barrel, to replace or remove the socket.

In Figs. 9 and 10, the socket 19 is constructed of a shape for use with a short service rifle, in which the barrel projects only slightly, if at all, from the stock 30. In this case the socket is recessed or cut away at the rear upper portion and at the front lower portion so as to facilitate its positioning, the socket being held in place by screws 26.

In Fig. 11, the socket is formed with an interior screw thread 31 with which the exteriorly threaded end of the barrel is engaged.

In Figs. 12 and 13, a hole 32 is drilled through the stem 14 and also through the barrel 15, the two registering, the grenade being held in position upon the barrel by means of a shearing pin 33 inserted therein.

In the constructions shown in Figs. 3 to 13, the shearing pins serve to hold the grenade to the rifle and also to insure the requisite retardation.

In Fig. 14, the grenade is held to the barrel, and retarded by a ring 34 of soft metal, gutta percha or like material surrounding the rod 14, said ring being caused to expand and grip the inside of the barrel when the stem or rod 14 is passed into the latter.

It is preferred that in all cases the rod 14 fit fairly tight within the barrel 15 so as to prevent too much of the gases and compressed air creeping along the side of the rod and thus losing their power. To avoid the possibility of such an event occurring, when a loose fitting rod is employed, I may use a gas check 35 on the end of the rod, as seen in Fig. 15, this effectually reducing the amount of any gases or compressed air creeping up between the rod and the barrel. As another means of effecting the retardation and connecting the grenade to the rifle, I may rifle or form grooves wholly or partly on the rod corresponding to the rifling or grooving of the inside of the barrel, so that the grenade will be held to the barrel and on projection by the exploded cartridge will be given a centrifugal motion the same as a bullet, or instead of rifling or grooving the rod 14, the latter may be plain, and fitted with a gas check on the end to take the rifling.

What is claimed is:

1. An explosive grenade arranged for attachment to the barrel of a small arm; in combination with positive means for holding the grenade against projection until the gaseous pressure developed within the barrel becomes sufficiently great to overcome the action of said means.

2. An explosive grenade having one member thereof arranged for insertion in the bar-

rel of a small arm; in combination with positive means for effecting the attachment of the grenade to said barrel until the gaseous pressure developed within the latter becomes sufficiently great to overcome the action of said means.

3. A grenade having a stem arranged for insertion in the bore of a gun, and an explosive body portion located exteriorly thereof; in combination with positive means for effecting the attachment of the grenade to the gun until the gaseous pressure developed within the bore becomes sufficiently great to overcome the action of said means.

4. A grenade having a stem arranged for insertion in the bore of a gun, an explosive body portion located exteriorly thereof, and

retaining means connected with said body portion and arranged to engage the outer surface of the gun.

5. A grenade having a stem arranged for insertion in the barrel of a small arm, an explosive body portion located exteriorly thereof, and a cylindrical retaining member, connected with said body portion and arranged to fit over the end of the barrel.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

FREDERICK MARTIN HALE.

Witnesses:

F. C. SMITH,
T. W. PRICE.