June 11, 1946. D. R. LUSTER ET AL 2,402,060

GRENADE LAUNCHER

Original Filed June 25, 1943

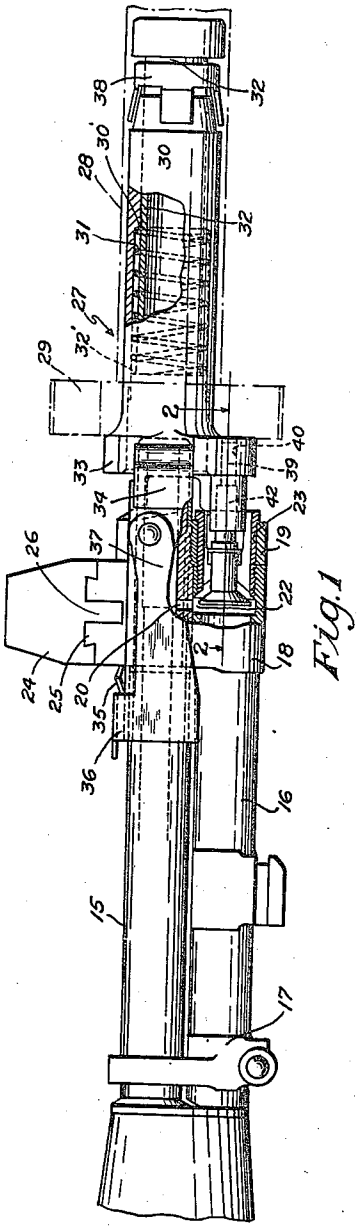


Fig. 1

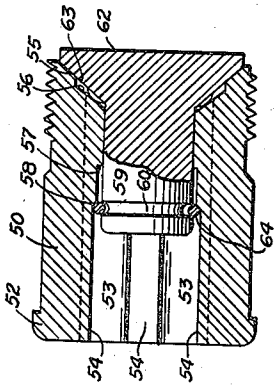


Fig. 4

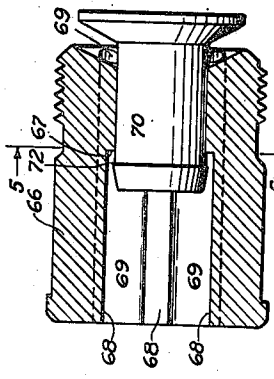


Fig. 6

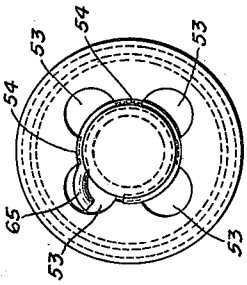


Fig. 3

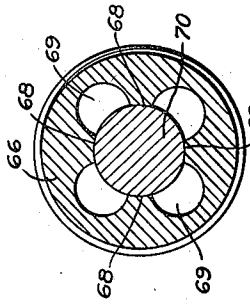


Fig. 5

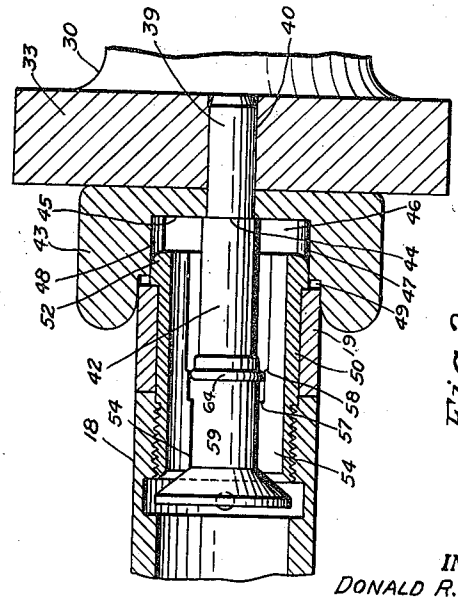


Fig. 2

INVENTORS
DONALD R. LUSTER
PETER B. RUTHERFORD

BY Harold L. Gassmann

AGENT

Patented June 11, 1946

2,402,060

UNITED STATES PATENT OFFICE

2,402,060

GRENADE LAUNCHER

Donald R. Luster, Oak Ridge, Tenn., and Peter B. Rutherford, Herkimer, N. Y., assignors to Remington Arms Company, Inc., Bridgeport, Conn., a corporation of Delaware

Original application June 25, 1943, Serial No. 492,254. Divided and this application December 8, 1944, Serial No. 567,241

4 Claims. (Cl. 42—1)

1

This invention relates, in general, to firearms, and, in particular, to a grenade launcher adapted to be used on an automatic gas operated rifle of the type illustrated in the Garand patent, No. 2,287,032, and is a division of the parent application, Serial No. 492,254, filed June 25, 1943, and issued as Patent No. 2,390,738, December 11, 1945.

An object of the invention is to provide means for launching a grenade from a rifle barrel using the pressure of powder gases transmitted entirely through the barrel. A further object is to adapt an automatic gas operated firearm for launching grenades by providing the gas cylinder with a gas valve which is automatically held open by the grenade launcher when the latter is secured on the end of the rifle barrel.

Other objects, features and advantages of the invention will be more fully described in the following specification which is descriptive of an exemplary embodiment of the invention. It will be understood, however, that the invention may be modified within the scope of the appended claims for use with firearms of other types than that shown in the drawing.

In the drawing:

Fig. 1 is a side elevation partly in section of the grenade launcher of this invention secured on the end of a rifle barrel.

Fig. 2 is a sectional plan view of the gas valve and adapter on line 2—2 of Fig. 1.

Fig. 3 is an end view of a gas cylinder valve screw for use in the gas cylinder of a firearm mounting the launcher.

Fig. 4 is a side elevation in section of the valve screw shown in Fig. 3.

Fig. 5 is a section view of a modification of the gas valve shown in Fig. 3.

Fig. 6 is a side elevation in section of the modified gas valve screw.

Referring to Fig. 1, the grenade launcher of this invention is shown mounted on the barrel 15 of a firearm which, for the purposes of illustration, is of the type described in the above identified Garand patent and comprises a gas cylinder 16 provided with an integral rear band 17 and a front band 18, whereby the cylinder is supported on the underside of the barrel. A suitable retaining member 19 is shown threadedly secured on the front or muzzle end of the barrel and is adapted to abut the front edge of the band 18 of the gas cylinder so as to hold the band in place on the barrel. The band 18 is located adjacent a gas port 20 of the barrel and is provided with a gas inlet 22 which is in alignment with the gas port 20. Normally, a standard gas cylinder lock screw (not shown) is mounted through an aperture 23 of the retaining member 19 and is threaded in the front end of the gas cylinder to form both a removable closure therefor and a coupling for connecting the end of the cylinder to the retaining member 19.

2

In the present invention, however, the lock screw is not used and a suitable gas cylinder valve screw is substituted therefor which serves both as a coupling for the gas cylinder and retaining member and as means for enabling the escape of gas from the barrel in the manner and for the purposes hereinafter described.

The front band 18 constitutes a mounting for a front sight, indicated generally at 24, the latter being secured to the band 18 by a dove-tail connection comprising a transversely disposed dovetail tongue 25 and slot 26 adapted to receive complementary parts of the front sight.

The improved grenade launcher, indicated generally at 27, is adapted to be readily mounted without the use of tools on the muzzle end of the barrel 15 for supporting a grenade. The grenade is typical of a new type developed by the Ordnance Department and comprises a hollow cylindrical tail 28, a fragmentary portion of which is indicated by dotted lines in Fig. 1, attached at one end to a container of the explosive charge (not shown) and having suitable guide vanes 29 at its opposite end.

It will be understood that, when a bullet is shot from the barrel, the gas pressure behind the bullet does not escape into the gas port to act on the auto slide mechanism until the gas port has been uncovered by the bullet and then the pressure is only of momentary duration. Similarly with the old types of grenades, the stem of the grenade covered the gas port until the grenade was substantially clear of the muzzle end of the barrel. However, the newest type of grenade embodies simply a hollow cylindrical tail portion 28 having a wall adjacent its forward end. When launching this type of grenade from the rifle, the wall of the grenade covers the barrel muzzle, and, consequently, the powder gases which are developed in the barrel prior to discharge of the grenade escape through the gas port and act for a relatively long period of time on the slide actuating mechanism. It has been found that subjecting the slide action mechanism to these hot gases for the longer periods effects greater wear and strain on the mechanism and is hazardous. The grenade launcher 27 of this invention provides means for overcoming these malfunctions.

The improved launcher is the subject matter

of the aforementioned parent application and is described and illustrated fully therein. Briefly, the grenade launcher comprises two telescoping tubular members, the outer member **30** being slidably mounted on the inner member **32** and restrained from sliding rearwardly thereon by a coil compression spring **31** mounted in an annular recess between the two tubes, the opposite ends of the spring being arranged to engage annular shoulders **30'** and **32'** respectively of the outer and inner tubular members. The rear end of the inner tube is counterbored to receive the muzzle end of the rifle barrel and is held tightly in engagement therewith by resilient mounting means of which the outer tube and coil spring form essential parts. The outer tube is provided at its rear end with a yoke member **33**, on opposite sides of which are pivotally mounted laterally swinging straps **34** having portions **35** designed to engage behind the front sight mounting of the barrel. The portions **35** of the straps constitute cam surfaces which, as the straps are swung together behind the front sight mounting, cammingly engage the rear edge thereof and draw the yoke **33** and its tube **30** rearwardly relative to the inner tube **32** and against the compression force of the coil spring **31** whereby the inner tube **32** is forced tightly against the muzzle end of the barrel. The straps are adapted to be readily locked in position by means of a U-shaped clasp **36** which is carried on the end of an arm **37** pivoted to one of the straps **34**, the clasp being adapted to engage and hold the two straps together rearwardly of the front sight. A friction ring **38** is provided on the front end of the launcher for releasably retaining a grenade thereon.

Suitably secured to the yoke **33** is a means constructed and arranged to engage and open a valve, of the type hereinafter described, when the launcher is fastened onto the end of the barrel. The valve opening means comprises a cylindrical stem **39**, see Figs. 1 and 2, having a drive fit in a centrally located aperture **40** in the bottom of the yoke **33** and provided with an enlarged rearwardly extending head **42**.

Secured to the yoke **33** by the stem **39** is an adapter **43**. The latter provides means for preventing the shooter from attaching the launcher to a firearm from which the standard gas cylinder lock screw has not been removed and comprises a substantially rectangular block, the longitudinal axis of which is substantially transverse to the longitudinal axis of the barrel and parallel to the horizontal plane of the barrel. The front face of the adapter abuts the rear face of the yoke and is held in engagement therewith by a shoulder **44** of the stem **39**, which engages the bottom **45** of a recess **46** formed in the rear face of the adapter.

The recess **46** is substantially rectangular except that its right and left sides **47** and **48**, see Fig. 2, are concave arcs of a circle, the diameter of which is greater than the height of the block and substantially equal to the outside diameter of the gas cylinder valve screw hereinafter described. Moreover, the recess **46** is counterbored as at **49** to provide a means for guiding the adapter **43** over the end of the valve screw.

The gas cylinder valve screw, shown in Figs. 2, 3 and 4, is adapted to be provided as standard equipment or substituted for the standard lock screw used on the above identified rifle when equipping the gun with the grenade launcher. Further, it should be pointed out that, when the gun is equipped with the gas cylinder valve screw,

the launcher of this invention may be quickly mounted for firing a grenade or removed and the gun used in the ordinary manner for firing projectiles without making any other alterations in the gun. Moreover, the bayonet may be mounted on the gun even though the gas cylinder valve screw is in place. The valve screw comprises a bushing **50** suitably dimensioned to fit in the conventional lock screw aperture **23** of the retaining member **19** and is threaded at its rear end to engage in the internally threaded aperture of the front sight mounting **18**. The bushing is provided with a rim **52**, the diameter of which corresponds to the diameter of the recess **46** of the adapter **43** so as to make a nice fit therein when the launcher is secured to the barrel. By making the diameters of the recess **46** and rim **52** slightly less than the outside diameter of the standard type of lock screw, it will be clear that the launcher cannot be mounted on a rifle which is equipped with the standard lock screw.

The bushing **50** is provided with a longitudinal bore having a plurality of circumferentially spaced longitudinally extending grooves **53**, four being shown in the present embodiment, which form lands **54**. The grooves **53** constitute gas escape apertures and are in direct communication with a valve seat **55** which is formed on the rear end of the bushing and provided with an annular relief recess **56**, see Fig. 4. The bore is counterbored from the front or rim end of the bushing rearwardly a predetermined distance to form substantially square shoulders **57** on the four lands **54**. Further, the lands are provided with a second counterbore which terminates in a bevelled shoulder **58** on each land for the purpose hereinafter described.

Slidingly supported on the lands in the rear part of the bushing is a valve member comprising a cylindrical valve stem **59** having a circumferential groove **60** in its front end and a valve head **62** at its opposite end, the latter having a bevelled surface **63** adapted to make a gas tight fit on the valve seat **55** of the bushing. As shown, the valve seat **55** is relieved by the recess **56** so that, in the event carbon is deposited on the surfaces, it will not keep the valve member from seating correctly. Likewise, the counterbored portions of the bore provide relief surfaces for the valve stem **59**.

Suitable means for retaining the valve member in the bushing comprises a snap ring **64** which is sprung into the groove **60** of the valve stem and is adapted to frictionally engage the counterbored lands **54** and their respective shoulders **57** and **58**. One end **65** of the ring is adapted to project into one of the grooves **53** of the bushing, as shown in Fig. 3, to prevent rotation of the ring.

When the valve is closed, as shown in Fig. 4, the snap ring **64** expands into frictional contact with the bevelled shoulders **58** and thus effectively holds the valve from jarring open, for it will be evident that any force tending to move the valve stem rearwardly so as to open the valve will be resisted by the force necessary to compress the snap ring as it rides up the bevelled shoulders **58** of the lands. In accordance with this construction, the valve will be held on its seat at all times unless positively opened which occurs when the end of the valve stem is engaged by the above described valve opening stem **42** of the launcher, as shown in Fig. 2. Further, complete removal of the valve from the bushing is even more strongly resisted by engagement of the snap ring with the

square shoulders **57** of the lands. In the normal use of the gun, no forces are developed on the valve stem sufficient to project the valve member from its bushing.

A modification of the valve screw is shown in Figs. 5 and 6 and comprises a bushing **66** substantially identical to the bushing **50**, but provided with a bore having a single counterbore which forms square shoulders **67** on lands **68** formed by longitudinal grooves **69**. The valve stem **70** of the valve member is shown provided at its forward end with a small annular lip or square shoulder **72** which is slightly larger in diameter than the diameter of the lands **68** rearwardly of the shoulders **67**. The valve is assembled by forcing the stem through the smaller end of the bushing until the shoulder **72** of the valve stem passes beyond the square shoulders **67** of the lands. Thereupon the shoulder **72** expands or recovers slightly sufficiently to engage the shoulders **67** to prevent the valve member from dropping out of the bushing.

It will be evident, from the above description, that when the launcher is mounted on the rifle barrel in the manner described above, the head **42** of the valve opening stem **39** engages the stem of the valve and moves it rearwardly in its bushing thereby holding the valve head off of its seat **55**. Any tolerance in the distance between the end of the barrel and the valve stem will, of course, be taken up by the resilient mounting means of the grenade launching device as hereinabove described.

What is claimed is:

1. The combination with an automatic firearm comprising a barrel, a gas cylinder mounted adjacent said barrel and communicating with the bore thereof, and a gas valve comprising a cylindrical bushing in the end of said cylinder, said bushing having a valve member for relieving the gas pressure in said cylinder; of a projectile launching device mounted on the muzzle of said barrel for supporting projectiles to be launched by gas pressure generated in the barrel, means on said device engageable with said valve member to open said valve when said device is mounted on said barrel, and an adapter on said device constructed and arranged to fit over said cylindrical bushing so as to permit said launching device to be used only on a firearm having said gas valve.

2. The combination with an automatic firearm comprising a barrel, a gas cylinder mounted adjacent said barrel and communicating with the bore thereof, and a gas valve comprising a cylindrical bushing in the end of said cylinder, said bushing having a valve member for relieving the gas pressure in said cylinder; of a projectile launching device mounted on the muzzle of said barrel for supporting projectiles to be launched by gas pressure generated in the barrel, a pin on said device engageable with said valve member to open said valve when said device is mounted on said barrel, and a member secured to said device by said pin and provided with a guide aperture arranged to fit over said cylindrical bushing so as to permit said launching device to be used only on a firearm having said gas valve.

3. In an automatic gas operated firearm, a barrel having a gas port; a gas cylinder supported on said barrel and having a gas passage opening into the gas port of said barrel and a gas valve screw adapted normally to close said gas cylinder and arranged to open said cylinder to release the gas therein, said screw comprising a bushing secured in the end of said gas cylinder having an external valve seat at one end, internal longitudinally extending lands and a counterbore at its opposite end, said counterbore being adapted to form shoulders on said lands intermediate the ends thereof; and a valve member comprising a valve stem slidably mounted on said lands and provided at one end with an enlarged valve head arranged normally to contact said external valve seat to prevent the escape of gas from said gas cylinder and to be disengaged from said seat by applying a force rearwardly against said valve stem so that gas entering said cylinder may escape therefrom, said valve stem having an integral flange at its opposite end arranged to engage the shoulders of said lands when said valve head is disengaged from said seat to hold said valve member in said bushing.

4. In an automatic gas operated firearm, a barrel having a gas port; a gas cylinder supported on said barrel and having a gas passage opening into the gas port of said barrel and a gas valve screw adapted normally to close said gas cylinder and arranged to open said cylinder to release the gas therein, said screw comprising a bushing secured in the end of said gas cylinder having a valve seat, internal longitudinally extending lands and shoulders on said lands; a valve member comprising a valve stem slidably mounted on said lands and provided with a valve head arranged normally to contact said valve seat to prevent the escape of gas from said gas cylinder and to be disengaged from said seat by applying a force rearwardly against said valve stem so that gas entering said cylinder may escape therefrom; and means for holding said valve member in said bushing when said valve head is disengaged from said seat comprising a spring ring secured to said valve stem arranged to make positive engagement with said shoulders and frictional engagement with the lands of said bushing.

DONALD R. LUSTER.
PETER B. RUTHERFORD.