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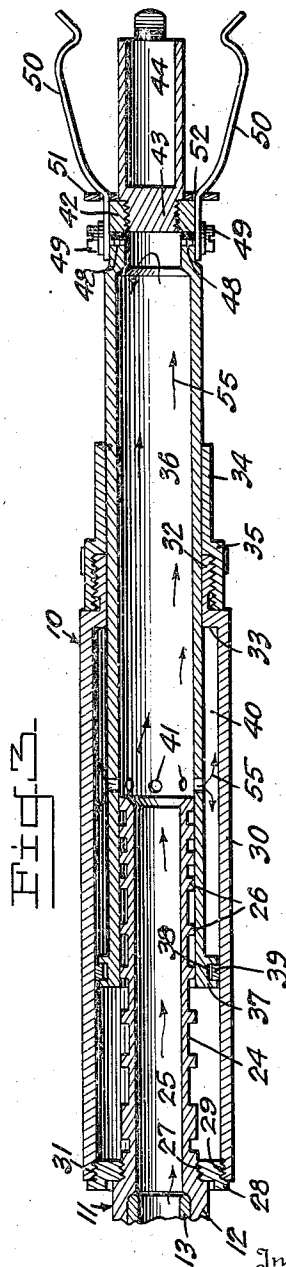
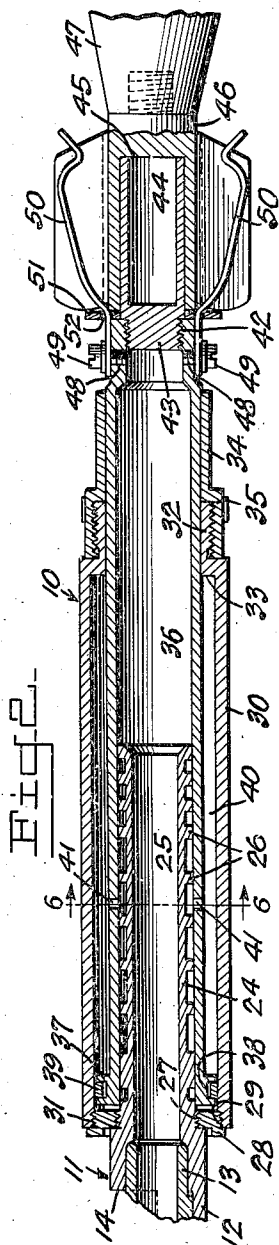
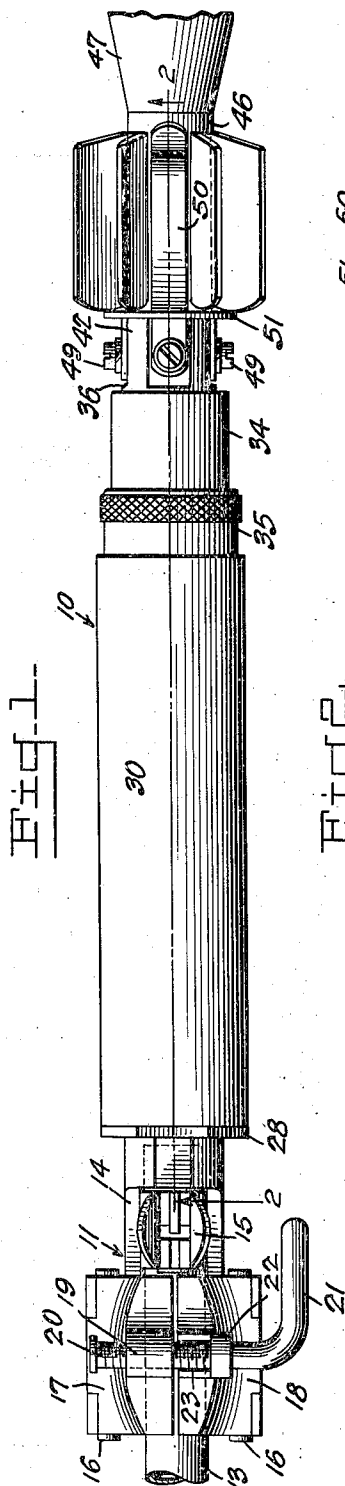
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PROJECTILE LAUNCHER

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PROJECTILE LAUNCHER

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The invention described herein may be manufactured and used by or for the Government for governmental purposes without the payment to me of any royalty thereon.

This invention relates to an improved launcher for use in launching projectiles such as mortar shells and hand grenades from a rifle.

The present forms of launchers employed with rifles for launching hand grenades include adapters which form an expendable part of the launchers and which are launched therefrom with the grenades and remain in engagement therewith until the grenades are detonated.

It is therefore a primary object of the present invention to eliminate the necessity of providing an expendable adapter member by providing an improved launcher wherein the adapter is movably mounted relatively to fixed parts of the launcher but which remains at all times in engagement therewith and from which a projectile is launched.

Still another object of the invention is to provide a launcher capable of not only being used for launching hand grenades but which is also capable of launching mortar shells, as for example, a 60 mm. mortar shell, by applying a special adapter element to the launcher which is capable of being quickly applied or removed.

A further aim of the invention is to provide a launcher wherein a reciprocally mounted element, which carries the projectile, is projected by operation of the expanding gases from a propelling cartridge, fired in the barrel of a rifle to which the launcher is applied, to accelerate the projectile, and the movement of which is thereafter rapidly decelerated for launching the projectile therefrom by inertia.

Still a further object of the invention is to provide a launcher which is so constructed that a portion of the propelling gases will be trapped, during acceleration of a telescoping part of the launcher within a chamber thereof, and thereafter utilized by being compressed to decelerate said telescoping part.

Other objects and advantages of the invention will hereinafter become more fully apparent from the following description of the drawings, which illustrate preferred embodiments thereof, and wherein;

Figure 1 is a top plan view of a preferred embodiment of the invention and with a mortar shell shown applied thereto;

Figure 2 is a longitudinal sectional view thereof taken along the line 2—2 of Figure 1;

Figure 3 is a view similar to Figure 2 but show-

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ing the launcher parts in an intermediate or partially projected position;

Figure 4 is an enlarged view partially in section and partially in side elevation showing the launcher in a fully extended or projected position;

Figure 5 is a fragmentary, longitudinal sectional view similar to Figure 4 and showing a slightly modified form of the launcher;

Figure 6 is a cross sectional view of the launcher taken substantially along a plane as indicated by the line 6—6 of Figure 2;

Figure 7 is a fragmentary longitudinal sectional view of a modification of the launcher for use with a hand grenade; and

Figure 8 is a longitudinal sectional view, partially in elevation, of another modification of the launcher for use with a hand grenade.

Referring more particularly to the drawings, wherein like reference characters designate like or corresponding parts throughout the several views, and referring particularly to Figures 1 to 4 and 6, 10 designates generally a preferred embodiment of the improved launcher in its entirety and which includes a connector member, designated generally 11, which is provided with a first cylinder or tubular portion 12 which is adapted to fit over the muzzle end of a rifle barrel 13 and which is recessed in the upper portion thereof, as seen at 14, to accommodate the front sight 15 of the rifle. At its rear, the tubular portion 12, on opposite sides thereof, carries hinge pins 16 on which are pivotally mounted hinge leaves 17 and 18 which are swingable into position for engaging over the portion of the barrel 13. The hinge leaf 17 rearwardly of sight 15 is provided with threaded aperture 19, which is disposed transversely thereof. A clamping screw 20 is carried by the leaf 17 by threaded engagement with the aperture and provided with a bent end 21. The end of the threaded portion of the screw 20, which is adjacent to the end 21, is provided with a fixed collar 22. The hinge leaf 18 is provided with a groove 23 for receiving a part of the threaded portion of the screw 20 and which terminates in a recessed seat for the collar 22 so that by tightening the screw 20 the two hinged leaves will be clamped about the barrel in an obvious manner to thereby rigidly secure the launcher to the rifle barrel.

The tube 12 extends beyond the muzzle of the barrel 13 and the extension 24 of tube 12 is aligned internally and externally with barrel 13, the bore 25 of said extension being of slightly greater diameter than the bore of the barrel 13

and in axial alignment therewith. The extension 24 is externally grooved circumferentially to form a plurality of longitudinally spaced collars 26 of different widths and which are spaced varied distances apart. The inner end of the extension 24 is externally threaded at 27 to receive a nut 28 which is provided with an externally threaded portion 29. A second cylinder 30 is provided with an internally threaded end 31 which engages the externally threaded portion 29 for mounting the cylinder 30 around and in spaced relationship to the tubular extension 24. Cylinder 30 extends beyond the forward end of the tube 24 and terminates in a restricted externally threaded neck 32 which forms an annular rearwardly facing shoulder 33 within the cylinder 30. A bushing 34 is provided with an enlarged internally threaded socket end 35 which engages the threaded neck 32 and forms an extension thereof. The bore of the bushing 34 is of substantially the same diameter as the bore of the neck 32 and forms an aligned continuation thereof.

A sleeve 36 is slidably mounted in the bushing 34 and neck 32 and has an outer end which extends therebeyond. The inner end of the sleeve 36 is disposed about and slidably engages the rings or collars 26 of the tube 24 and is disposed within and radially spaced from the wall of the cylinder 30. The inner end of the sleeve 36 is enlarged to form a collar 37 having an annular outwardly opening groove 38 which contains an expansion ring 39 which bears against the wall of the cylinder 30 and which combines with the collar 37 to form an annular piston for the annular cylinder chamber 40, formed by the cylinder 30 and the sleeve 36. Sleeve 36 is provided with a plurality of circumferentially spaced ports 41 which form communicating passages between the interior of the sleeve 36 and the chamber 40 and which are normally closed by engagement with the tube 24, as when the sleeve 36 is in a retracted position as seen in Figure 2.

The outer end of the sleeve 36, beyond the bushing 34, terminates in a restricted internally threaded neck 42 for receiving the restricted threaded shank 43 of a readily removable adapter head 44. The head 44 extends a substantial distance beyond the neck 42 and is circular in cross section and as indicated may be internally recessed and open at its outer end. The adapter head 44 is sized to slidably engage the unoccupied propelling cartridge recess 45 in the tail fin assembly 46 of a mortar shell, such as a 60 mm. mortar shell, a portion of which is shown at 47 in Figures 1 and 2. The neck 42 is provided with a plurality of circumferentially spaced outwardly opening bores 48 which are internally threaded to receive headed screws 49 on each of which is mounted a spring claw or finger 50. A washer 51 engages around the adapter head 44 and against the outer end of the neck 42 and is provided with circumferentially spaced slots 52 through which corresponding portions of the fingers 50 extend for holding said fingers in properly spaced relationship relatively to one another. The spring fingers or claws 50 combine to form a spring clip for engaging a fragmentation hand grenade 53, as shown in dotted lines in Figure 7, when the adapter head 44 is removed and replaced by a plug 54. However, the spring fingers 50 may be left in place while utilizing the launcher 10 for launching mortar shells 47 as said fingers will not interfere with the launching or support of the mortar shells and will assume po-

sitions between the fins of the tail fin assembly 46 and out of engagement therewith. Consequently, by the simple expedient of substituting the plug 54 for the adapter head 44 the launcher 10 can be used for launching either mortar shells or hand grenades.

In the embodiment of the invention previously described, the means for attaching the launcher 10 to the barrel 13 is especially constructed for use in conjunction with a U. S. Army rifle M1903. By the simple expedient of substituting the attaching means of a grenade launcher M7 for the attaching means, illustrated in Figure 1, the launcher 10 could be adapted for use with a U. S. rifle M1. Similarly, the launcher 10 could be used with the U. S. Carbine M1 and M1A1 by substituting the attaching means of the carbine rifle grenade launcher for the attaching means, illustrated in Figure 1.

Assuming launcher 10 to be applied to rifle barrel 13, as seen in Figures 1 and 2, and with the parts thereof in retracted position ready for operation and with the mortar shell 47 mounted on the adapter head 44, when a conventional propelling cartridge is discharged in the chamber, not shown, of the rifle barrel 13, the propelling gases will initially fill the chamber formed by the bore 25 and the portion of the sleeve 36, disposed therebeyond. The rapidly expanding gases will impinge against the inner end of the shank 43 to cause the sleeve 36 to telescope outwardly on the tube 24 and within the cylinder 30. This sliding movement of sleeve 36 will be guided by engagement of the sleeve with the tube or extension 24, the cylinder 30, through the collar 37, and the neck 32 and bushing 34. As the sleeve 36 is accelerated in its outward movement, the ports 41 will pass out of engagement with the tube 24 as the sleeve 36 in moving from its position of Figure 2 reaches its position of Figure 3. This will uncover the ports 41 so that a part of the gases, as indicated by the arrows 55, will pass therethrough and into the annular chamber 40, which has been reduced in volume by the outward movement of the piston 37. The outward movement of the sleeve 36 will continue without substantial deceleration until the ports 41 move into engagement with the neck 32 which will promptly close said ports and trap the expanding gases in the now diminished chamber 40. Further movement of the sleeve 36 outwardly will be rapidly decelerated by the compression of the gases within the chamber 40 so that the projectile 47 will be launched by inertia from the adapted head 44, and the outward telescoping movement of the sleeve 36 will cease at substantially its position of Figure 4 due to the pressure in the now greatly reduced chamber 40. Thus, the collar or piston 37 will not strike the annular rearwardly facing shoulder 33 which, if it were not for the trapped gases in the chamber 40, would occur with damaging results to parts of the launcher 10. Thus, the collar 37 functions in the chamber 40 as a piston and with the annular rearwardly facing shoulder 33 as a fixed cylinder head for the cylinder chamber 40. When the bolt, not shown, of the rifle of which the barrel 13 forms a part, is opened, the gases contained in the barrel 13 and in the extended launcher 10 will be vented through the barrel chamber so that the sleeve 36 can be telescoped inwardly and back to its initial position of Figures 1 and 2, ready for use in launching another projectile 47.

In Figure 5, a slightly modified form of a launcher 10 is illustrated in which bushing 34 is

omitted. With this embodiment, the ports 41 move first into engagement with the bore of the neck 32 for trapping the gases in the chamber 40 and thereafter move beyond the neck 32 to vent the gases from the sleeve 36 to the atmosphere. This sudden release of the pressure within the sleeve 36 greatly increases the rate of deceleration of the sleeve and thus greatly augments the inertia launching of either the mortar shell or fragmentation grenade from the launcher.

By the simple expedient of substituting the plug 54 for the adapter head 44 the launcher 10 is ready for use for launching a fragmentation hand grenade, Mk. 11A1. The operation of the launcher 10 in launching the hand grenade is identical with its operation in the launching of a mortar shell and the description of the operation will not be repeated. One of the spring fingers 50, not shown, is of the type employed with the "adapter," grenade projection M1, provided with an arming clip for engaging and holding the safety lever, not shown, of the grenade 53 after the safety pin thereof, not shown, has been removed. This arming clip is removed by setback upon acceleration of the grenade through acceleration of the sleeve 36. As its function herein is identical as in the adapter M1 and as this feature forms no part of the claimed invention of the present application, a further disclosure thereof is deemed unnecessary.

Figure 8 shows a slightly modified form of launcher, designated generally 56, having a modified form of connecting means, designated generally 57, including an elongated member 58 which is substantially semicircular in cross section for engaging under a rifle barrel, and which is provided at its rear end with a hinge 59, disposed at one side thereof, for mounting a hinge leaf 60, which is likewise arcuately shaped in cross section for engagement over the rifle barrel and which is clamped in an operative position by a wing nut and pivoted screw connection 61. The forward end of the member 58 terminates in an enlarged internally threaded socket 62 which receives the enlarged externally threaded collar 63 of a tube 64 which has a bore 65 which is adapted to align with the bore of a rifle barrel, on which the launcher 56 is mounted and which is of a larger diameter than the rifle bore. The tube 64 is also provided with longitudinally spaced annular grooves forming longitudinally spaced annular collars or rings 66 which are of different widths and varying distances apart in correspondence with collars or rings 26, shown upon Figs. 2 and 3. A collar 67, formed of sections, is removably mounted in the rearmost groove of tube 64 and is retained in an applied position by a nut 68 which engages an externally threaded portion of the collar 67. The nut 68 is also externally threaded to engage the internally threaded end 69 of a cylinder 70, which is disposed around and spaced from the tube 64 and which extends therebeyond. The cylinder 70 is provided with a restricted neck 71 at its forward end forming an annular shoulder 72 which faces rearwardly. A pin 73 extends radially through and is reciprocally mounted in the neck 71 and is urged inwardly thereof by a leaf spring 74, carried by the neck 71. A sleeve 75 is slidably mounted on the tube rings 66 and in the neck 71 and is provided at its rear end with an outturned annular flange or collar 76 the periphery of which slidably engages the inner wall of the cylinder 70. It will be understood that sleeve 75 has one or more ports through its wall, which correspond

in location and function to ports 41 in the species of Figs. 1-4. These ports do not appear in Fig. 8 because they are located in that portion of sleeve 75 which is broken away. A shortened sleeve section 77 is brazed or otherwise secured in the forward end of the sleeve 75 and extends beyond the outer end thereof and forms a support for a plurality of spring claws or fingers 50 which are mounted by screws 49 in the same manner as the claws 50 are mounted on the launcher 10. A curved bracket 78 projects from a portion of the periphery of the exposed end of the sleeve 77 and carries a pivot pin 79 by means of which a trap door or closure 80 is pivotally supported in a position for closing the outer end of the sleeve member 77, to thus close the outer end of the sleeve 75. The pin 73 is provided with a rounded end which engages a rounded indentation 81 in the sleeve 75, when said sleeve is in a fully retracted position, as seen in Figure 8 for holding the sleeve thus positioned against casual displacement. The flange 76 functions as a piston within the annular chamber 82 in the same manner as the collar 37 of the launcher 10.

When a fragmentation grenade 53 is applied to the launcher 56 and held by the claws 50 the base of the grenade will bear against and retain the closure 80 in a closed position in relationship to the sleeve member 77. The fuze lever is held by one of the claws in the same manner as previously described in the description of the embodiment of Figure 7. Assuming a propelling cartridge to be fired in the chamber of rifle, not shown, to which the launcher 56 is connected, the initial acceleration of the sleeve 75 produced by the expanding gases will cam the pin 73 out of the indentation 81 to allow the sleeve 75 to be telescoped outwardly. The outward movement of the sleeve 75 will be resisted by the air in the chamber 82 being compressed by the flange 76 moving toward the shoulder 72 to restrict chamber 82. The deceleration of sleeve 75 thus produced will only become material as the flange 76 approaches shoulder 72 and will then increase rapidly to stop outward movement of sleeve 75 before flange 76 engages shoulder 72. The inertia projection of the grenade 53 from the claws 50 will be augmented by force of the expanding gases bearing against the inner side of the closure 80 which will force said closure to swing outwardly as the grenade is released by the claws 50 thereby augmenting the launching of the grenade.

By removing the adapters from the threaded neck 42, ball ammunition can be fired through the barrel 13 and through the launcher 10 without requiring removal of the launcher. In fact, the launcher 10 under such conditions will function effectively as a flashhider. Ball ammunition can also be fired through the launcher 56 if the closure 80 is removed maintained in an open position, and the launcher 56 likewise will function as a flashhider.

The launcher 10 will also function as a silencer, since there is no release of the propelling gases therefrom until the bolt is opened so that the report resulting from the launching of a projectile, which ordinarily occurs, will be substantially eliminated.

Various other modifications and changes are contemplated and may obviously be resorted to without departing from the spirit and scope of the invention as hereinafter defined by the appended claims, as only preferred embodiments thereof have been illustrated and described.

I claim:

1. A projectile launcher for firearms comprising a launcher adapted to be mounted on the barrel of a firearm to extend forwardly of the muzzle thereof and in gas-tight connection with the bore of said barrel, said launcher including a reciprocally mounted member adapted to be projected by expanding gases from the bore of said barrel, means for releasably mounting a projectile on the outer end of said member, and means including said member and responsive to a predetermined forward movement of said member for receiving trapping and compressing a part of the propelling gases, said gases acting to stop the outward movement of the member and to thereby launch the projectile therefrom by inertia.

2. In a missile launcher, a tube, a cylinder of larger diameter than said tube, means rigidly connecting said tube and cylinder at their rear ends in coaxial relation, said tube terminating within and substantially midway between the end of said cylinder, said cylinder having a reduced extension at its forward end having an internal diameter a little greater than the external diameter of said tube, a sleeve of substantially the same length as said cylinder and slidably fitting said tube and reduced forward end of said cylinder, in gas-tight relation therewith, piston means rigid with the rear end of said tube and having a gas-tight sliding fit in said cylinder, there being an aperture in the wall of said sleeve in position to be closed by said tube when said sleeve is in rearwardmost position in said cylinder, means for closing the forward end of said sleeve, means for releasably mounting a missile on said forward end of said sleeve, and means for rigidly mounting said tube in gas-tight relation with the muzzle of a rifle barrel and in coaxial relation therewith, said aperture moving off the end of said tube and into said reduced forward end during a full forward stroke of said sleeve.

3. A launcher as recited in claim 2, the forward end of said sleeve having a forwardly extending projection adapted to slidably fit the propelling cartridge recess of a standard motar shell.

4. In a missile launcher, a tube, a cylinder, means rigidly connecting said tube and cylinder in coaxial relation at one end, said cylinder being of greater length than said tube and having an internal diameter greater than the external diameter of said tube, to form an annular chamber therebetween, said cylinder having an extension at its forward end reduced to an internal diameter a little greater than the external diameter of said tube, a sleeve slidably fitting over said tube and slidably fitting and extending through said forward reduced extension, said sleeve having piston means at its rear end in sliding gas-tight relation with the internal wall of said cylinder, to form a chamber between the walls of said cylinder and said sleeve which decreases in

volume as said sleeve slides outwardly along said tube and cylinder, said sleeve having an aperture through its wall in position to be closed by the walls of said tube when said sleeve is in rearwardmost position and which places said chamber in communication with the interior of said tube and sleeve as said sleeve moves forwardly to a position where said aperture clears the forward end of said tube, means for rigidly attaching said tube to the muzzle of a rifle barrel in gas-tight relation therewith, and in coaxial relation with the bore thereof, means closing the forward end of said sleeve, and means for detachably mounting a missile on the forward end of said sleeve.

5. A launcher as recited in claim 4, said aperture being so located longitudinally of said sleeve that said aperture passes into the reduced forward end of said cylinder as said sleeve approaches its forward limit of travel, to thereby trap a quantity of gas in said annular chamber.

6. In a projectile launcher, a tube, means adapted to rigidly mount said tube on and in gas-tight relation with the muzzle of the barrel of a firearm in coaxial relation with and forwardly extending from said muzzle, a sleeve having a closed forward end and reciprocally fitting said tube, means on the forward end of said tube to detachably mount a projectile, and cylinder means external and coaxial of said tube, said cylinder means coacting with said sleeve to receive and trap a quantity of propelling gas from said barrel, only after said sleeve has moved forwardly on said tube a predetermined distance, said cylinder means and sleeve thereafter compressing said trapped gas to thereby check further forward movement of said sleeve and thereby launch said projectile.

7. A projectile launcher as in claim 1, said reciprocally mounted member having a removable closure element in its forward end to allow passage of a bullet from said barrel through said launcher, when said closure is removed.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
215,392	Plumb	May 13, 1879
1,338,676	Constantinesco et al.	May 4, 1920
2,093,058	Savani	Sept. 14, 1937
2,335,299	Moore	Nov. 30, 1943
2,413,703	Fischer	Jan. 7, 1947

FOREIGN PATENTS

Number	Country	Date
16,280	Great Britain	1915
298,867	Germany	Nov. 2, 1920
819,876	France	July 19, 1937