March 10, 1959 G. A. LYON 2,876,678

ROCKET GUN

Filed April 5, 1952 2 Sheets-Sheet 1

Fig. 1

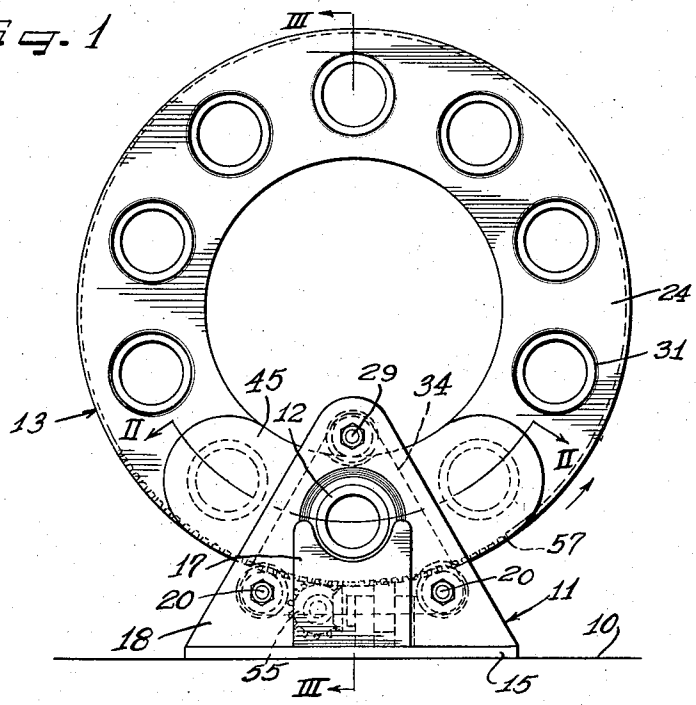


Fig. 2

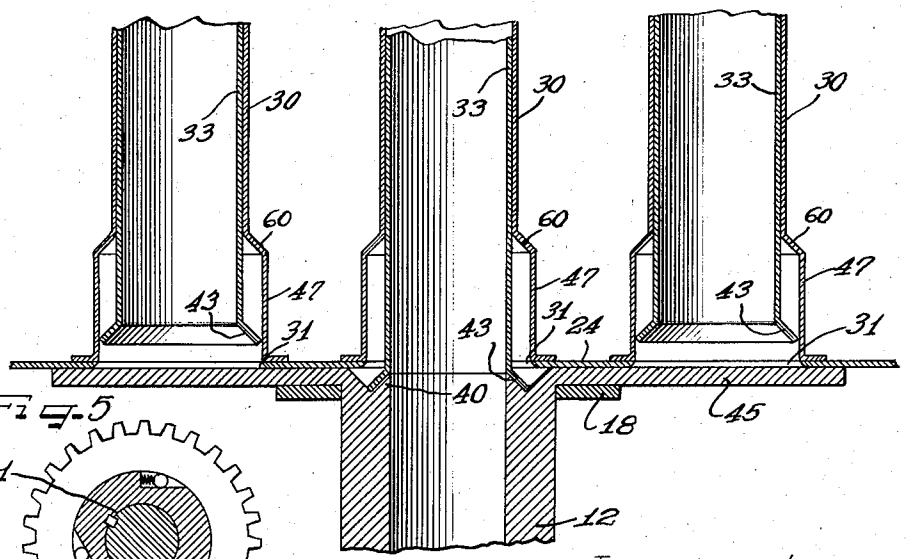
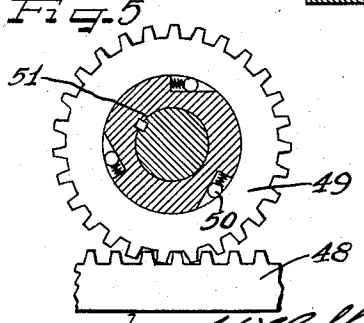


Fig. 5



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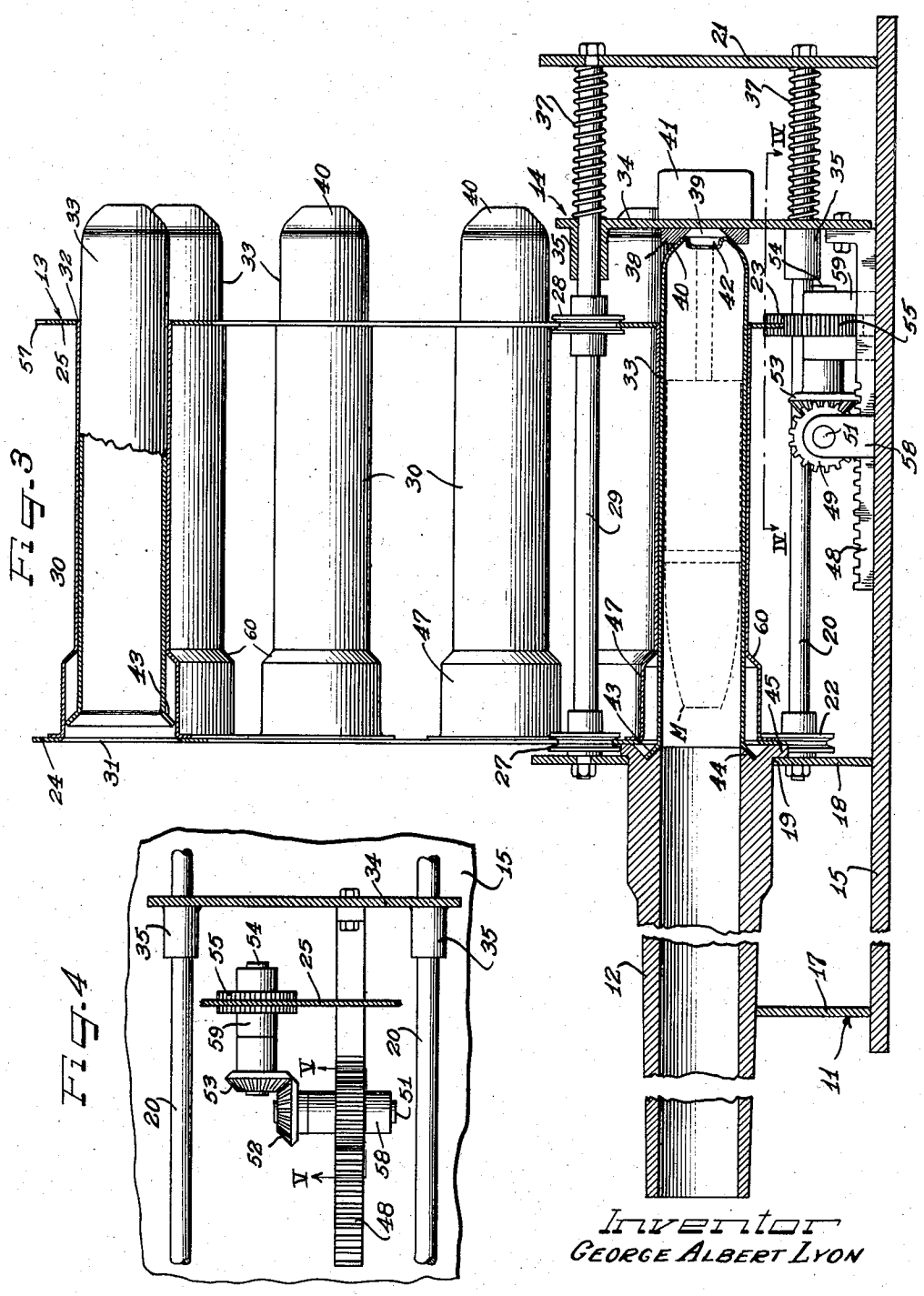


Fig. 3

Fig. 4

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United States Patent Office

2,876,678

Patented Mar. 10, 1959

2,876,678

ROCKET GUN

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Application April 5, 1952, Serial No. 280,777

5 Claims. (Cl. 89—1.7)

The present invention relates to improvements in guns or missile launchers, and more particularly concerns a gun construction which is especially suitable for firing and directing rocket-type missiles.

An important object of the present invention is to provide an improved gun or missile launcher of reasonably light weight and compact arrangement and adapted for rapid fire operation.

Another object of the invention is to provide an improved rapid fire, rotary magazine-type of gun for ordnance purposes.

A further object of the invention is to provide in a rapid fire gun or missile launcher an improved magazine construction.

Still another object of the invention is to provide in a gun or missile launcher a novel quick loading, rapid fire magazine and indexing arrangement.

Yet another object of the invention is to provide a novel rocket gun with novel rocket-motivated magazine and indexing structure.

According to the general features of the present invention, there is provided in a gun construction including a supporting structure and a gun barrel, novel magazine and indexing structure including means for supporting a series of elongated missile-carrying cartridges or casings in reciprocal relation and having indexing mechanism operable by interengagement with the missile-carrying casings successively to index the casings with the gun barrel and for indexing a succeeding missile-carrying casing upon firing of each preceding missile.

Another feature of the invention is to provide in a gun or missile launcher, wherein a gun barrel is stationarily mounted, a novel rotary magazine and missile-motivated indexing mechanism for step-by-step turning of the magazine to index successive missile-carrying portions of the magazine with the breech of the gun barrel.

A further feature of the invention is to provide in a gun construction, a rotary magazine comprising a pair of concentric supporting rings having a series of missile-supporting tubes, and means for rotatably supporting the magazine for successive indexing of the missile-carrying tubes with the breech of a gun barrel.

Other objects, features and advantages of the present invention will be readily apparent from the following detailed description of a preferred embodiment taken in conjunction with the accompanying drawings, in which:

Figure 1 is a more or less schematic front elevational view of a gun construction embodying the features of the present invention;

Figure 2 is an enlarged fragmentary detail sectional view taken substantially on the line II—II of Fig. 1;

Figure 3 is an enlarged vertical sectional detail view taken substantially on the line III—III of Fig. 1;

Figure 4 is a fragmentary sectional plan view taken substantially on the line IV—IV of Fig. 3; and

Figure 5 is an enlarged fragmentary vertical sectional detail view taken substantially on the line V—V of Figure 4.

As shown on the drawings:

A gun construction as more or less schematically shown in Figs. 1 and 3 is adapted to be mounted on any preferred base such as a gun carriage for land operations, a vehicle for mobile, land or amphibious operations, an airplane, or a naval vessel. While various features of the gun may be adapted for firing of projectiles or missiles of various kinds, the invention will be especially described in the adaptation thereof best suited for firing or launching rocket-type missiles, and wherein a rapid succession of rockets are to be fired. To this end, the construction comprises a supporting bracket or framework 11 carrying a gun barrel 12, a magazine structure 13 and indexing mechanism 14.

For minimizing weight consistant with adequate strength in the assembly, the framework 11 may be made from metal plates or other structurally acceptable metallic elements represented in the exemplary illustration by a base plate 15 supporting a forward vertical gun barrel cradle plate 17 and a rear vertical gun barrel-supporting plate 18 in spaced parallel relation to the cradle plate 17. By means of the plates 17 and 18 the gun barrel 12 is supported in fixed position relative to the supporting frame 11.

According to the present invention, the magazine 13 is of the rotary type and is supported by the frame 11 in operative rotary position behind the gun barrel breech. To this end, the frame plate 18 which supports the breech end portion of the gun barrel 12 is preferably of width and height greater than the requirements for supporting the gun barrel and as shown may be of generally triangular shape with a gun barrel receiving and supporting aperture 19 therein, while adjacent to its opposite sides respective horizontally aligned and parallel coextensive rearwardly extending shafts 20 are supported. The rear end portions of the shafts are supported by a frame structure 21 which may be a triangular plate similar to the plate 18 and supported in vertical spaced parallel relation thereto upon the base plate 15. The shafts 20 carry adjacent to their forward ends respective groove rollers 22, and spaced rearwardly from the rollers 22 respective roller means 23 providing a roller cradle for the magazine 13. In a light weight but sturdy construction, the magazine 13 comprises a pair of substantially similar spaced parallel front and rear body plates 24 and 25, the outer peripheries of which are arranged to ride in cradled rotary relation upon the front rollers 22 and the rear rollers 23, respectively.

Preferably the magazine plates 24 and 25 are ring-shaped so as to provide inner peripheries which are adapted to be engaged rotatably by respective front and rear grooved rollers 27 and 28, respectively, on a supporting shaft 29 carried by and between the upper portions of the frame members 18 and 21. Thereby the magazine 13 is held against displacement from the roller carriage.

The magazine plates 24 and 25 are maintained in spaced relation rigidly by a series of preferably uniformly annularly spaced magazine tubes 30 the front end portions of which are appropriately secured to the magazine plate 24 in concentric alignment with a series of circular ports 31 in the front magazine plate. The rear ends of the magazine tubes 30 are secured in concentric relation to respective circular apertures 32 in the rear magazine plate 25. Through this arrangement, the magazine tubes are adapted to receive operatively respective casings or cartridges 33 slidably therein for successive registration with the breech of the gun barrel 12 for firing of a missile mounted in the registered cartridge into the gun barrel. In Fig. 3 a rocket-type missile M is shown schematically within the registered cartridge 33.

Indexing of the magazine 13 to register the successive cartridges 33 carried thereby with the gun barrel is effected

by the indexing mechanism 14. To this end the indexing mechanism 14 is so constructed and arranged that it will operate by recoil force imparted thereto through rearward thrust of the cartridge 33 from which firing takes place to rotate the magazine by one magazine chamber increment automatically to bring the next succeeding magazine chamber into aligned registration with the gun barrel. Herein this is accomplished by providing the indexing mechanism with a thrust plate 34 disposed vertically behind the lower portion of the magazine 13 and in forwardly spaced relation to the fear frame member 21 and provided with tubular bearing bosses 35 by which the thrust plate is slidably reciprocably mounted upon the shafts 20 and 29. In a convenient form the thrust plate 34 may be of generally triangular shape as indicated in Fig. 1. Means such as respective compression springs 37 disposed about the respective shafts normally bias the thrust plate 34 forwardly by bearing at their rear ends against the frame member 21 and at their forward ends against the rear face of the thrust plate about the bearing apertures through the thrust plate.

Carried by the thrust plate 34 is a centering and thrust block 38 having a forwardly opening taper walled centering pocket 39 centered with respect to the axis of the bore of the gun barrel 12 and arranged to engage a complementary tapered butt or base end formation 40 on the shell or cartridge 33 in firing position. The centering and thrust block 38 may be generaly ring-shaped to afford access therethrough for appropriate firing pin or igniter means (not shown) associated with a firing device 41 that may be carried by or in association with the thrust plate 34.

The central opening in the thrust and centering block 38 may register with a primer or fuse boss 42 at the center of the butt end of the cartridge.

One of the functions of the thrust plate 34 is to thrust or drive the engaged cartridge 33 forwardly so that a flared lip flange 43 at the mouth of the cartridge will engage about a complementary beveled tail flange 44 defining the breech opening to the gun barrel bore. Thereby a centered relation of the mouth end of the cartridge with the gun barrel breech is effected.

In order to avoid side flash and escape of smoke from around the gun barrel breech it is preferably provided with a guard plate 45 which may be formed integrally with the gun barrel or formed as a separate attached piece, as preferred. This guard plate as best seen in Figs. 1, 2 and 3 may be generally symmetrically kidney-shaped to extend equally to opposite sides of the gun barrel breech in such a manner as to extend into overlapping and closing relation to both of the immediately adjacent magazine chambers. Further, the guard plate 45 is disposed in face-to-face sliding engagement with the opposed outer face of the front magazine body plate 24, not only at the opposite sides but also above and below the gun barrel 12. It will be observed that the gun barrel tail flange 44 is disposed in a transverse plane forwardly from and clear of the magazine front plate 24.

As an incident to firing of the missile M from the cartridge 33 disposed in firing position, the cartridge 33 recoils and drives the thrust plate 34 rearwardly against the compression springs 37 which thus become loaded to rebound instantaneously upon dissipation of the recoil force. To accommodate such recoil of the cartridge 33, each of the magazine chamber tubes 30 is provided at its forward end portion with an enlarged diameter portion 47 into which the lip flange 43 moves during recoil.

As the thrust plate 34 moves rearwardly during recoil, it draws with it a rack bar 48 attached to its lower end portion and operative to rotate a one way friction clutch pinion 49 in non-clutching direction, that is, counterclockwise as viewed in Figs. 3 and 5. Then, as the rack bar 48 thrusts forwardly with the thrust plate 34 during rebound, the clutch pinion 49 is rotated in clockwise direction as viewed in Figs. 3 and 5 thereby engaging ball clutch mechanism 50 and turning a drive shaft 51 to which is operatively keyed a bevel gear 52. In turn a bevel gear 53 meshing with the bevel gear 52 turns a driven shaft 54 to which is keyed a drive gear 55 meshing with gear teeth 57 provided on the outer periphery of the rear magazine plate 25, thereby turning the magazine by one chamber increment as indicated by the directional arrow in Figure 1 to bring the next succeeding magazine chamber into registration with the gun barrel bore. It will be understood, of course, that appropriate supporting brackets carried by the base structure 15 are provided for supporting the respective shafts 51 and 54 of the gear assembly rotatably. As shown, for example, a bracket 58 is provided for the shaft 51 and a bracket 59 is provided for the shaft 54. In order to accommodate the peripheral gear teeth 57, the rear roller carriage rollers 23 are preferably toothed to provide idler gears supporting the rear panel 25 of the magazine.

It will thus be apparent that in the operation of the gun, as each missile is fired, the recoil automatically disengages the cartridge casing 33 thereof from the breech of the gun barrel, and automatically as an incident to the recoil thrust of the cartridge 33 actuates the indexing mechanism 14 to actuate the magazine 13 in the rotary direction indicated by directional arrow in Fig. 1, to index the next succeeding magazine chamber 30 with the gun barrel breech. The thrust force developed by the rebound of the springs 37 drives the centering and thrust block 38 against the butt end of the newly indexed cartridge 33 and drives the same into forward end engagement with the breech of the gun barrel 12. Thereupon, automatically or under selective control, the newly indexed and registered missile is fired and the indexing cycle is repeated. This may be accomplished in rapid fire sequence or by selective firing as desired.

Automatic reloading mechanism (not shown) may be employed to eject the empty cartridges 33 from the magazine chambers and reload the magazine chambers, or the magazine may be manually reloaded as particular service requirements may dictate. Since the cartridges 33 are longer than the depth of the body of the magazine 13, the butt end portions of the cartridges provide ready means for pushing the empty cartridges out of the front end of the magazine chamber tubes 30. Then a loaded cartridge can be quickly inserted in the cleared magazine tube 30. By having butt ends 40 of the cartridges 33 tapered, and the front or mouth end portions of the magazine tubes 30 of larger diameter than the cartridges and by having the inner end portions of the enlarged mouth portions 47 of the cartridges tapered inwardly as indicated at 60 ease of insertion of the elongated cartridges 33 into the magazine chamber tubes is facilitated. Overthrowing of the loaded cartridges 33 into the magazine tubes 30 is avoided by the stop presented by the beveled shoulder 60 engageable by the lip flange 43 of the cartridge being loaded. Of course, rear end stop means could readily be supplied at the loading station to assure limitation upon rearward projection of the cartridges as loaded to a maximum predetermined extent.

Further ease of loading of cartridges into the magazine chambers is assured by having the edges defining the respective ports 31 in the front panel 24 of the magazine beveled or round tapered as shown in Figs. 2 and 3 so as to ease the butt end of one of the cartridges 33 being inserted thereinto into concentric relation.

It will be understood that modifications and variations may be effected without departing from the scope of the novel concepts of the present invention.

I claim as my invention:

1. In a gun construction including a barrel, a magazine structure having a plurality of successive chambers each of which includes a cylindrical tubular portion adapted to be concentrically aligned with the breech of the gun barrel and having adjacent to the front end thereof

a forward end portion providing a counterbore like enlarged diameter mouth, a reciprocable cartridge for supporting a missile slidably disposed in said cylindrical tubular portion and having an enlarged front end portion reciprocably received retractably and protractably in said enlarged mouth of the cylindrical tubular portion, and means for moving the cartridge toward said breech to protract and engage said enlarged front end portion of the cartridge in operative firing relation to the breech.

2. In a gun construction including a barrel, a magazine structure having a plurality of successive chambers each of which includes a cylindrical tubular portion adapted to be concentrically aligned with the breech of the gun barrel and having adjacent to the front end thereof a forward end portion providing a couterbore like enlarged diameter mouth, a reciprocable cartridge for supporting a missile slidably disposed in said cylindrical tubular portion and having an enlarged front end portion reciprocably received retractably and protractably in said enlarged mouth of the cylindrical tubular portion, and means for moving the cartridge toward said breech to protract and engage said enlarged front end portion of the cartridge in operative firing relation to the breech, said mouth having at the inner end thereof a stop shoulder opposing the enlarged front end portion of the cartridge to determine the extreme retracted position of the cartridge.

3. In a missile launcher comprising a supporting structure and a barrel fixedly supported by said structure, a magazine having a tubular cartridge support open front and rear and with the front end thereof registrable with the breech of the barrel, a cartridge shell for supporting a missile therein, said cartridge shell being substantially longer than said tubular support and being reciprocably slidably disposed in said tubular support and with the rear end of the shell providing a butt portion normally extending substantially beyond the rear end of the tubular support but the shell being movable forwardly to project beyond the front end of the tubular support, said shell butt end portion having a central attachment structure for a primer of a missile housed within the shell, and means including a thrust block structure having a complementary recess engageable with the butt end portion of the shell to afford a thrust backing and centering means for the firing aspect of the missile launcher and operating to thrust the shell toward the breech of the barrel and with the front end of the shell projected beyond the front end of the tubular support into engagement with said breech, said block structure having firing means cooperatively related through said recess with said central primer attachment structure of the shell.

4. In a gun construction including a barrel, a magazine structure having a plurality of successive chambers each of which includes a cylindrical tubular portion adapted to be concentrically aligned with the breech of the gun barrel and having adjacent to the front end thereof a forward end portion providing a counterbore-like enlarged diameter mouth, a reciprocable cartridge for supporting a missile slidably disposed in said cylindrical tubular portion and having a taper flared mouth flange

reciprocably received retractably and protractably in said enlarged mouth of the cylindrical tubular portion, the breech of the gun barrel having an annular groove therein opening rearwardly and defined by a taper flange structure engageable centeringly by said mouth flange of the cartridge in the firing aspect of the gun, and means for moving the cartridge in said cylindrical tubular portion toward said breech to protract said taper flared mouth flange into engagement within said annular groove and into engagement with said taper flange structure of the gun barrel breech.

5. In a gun construction including a barrel, a magazine structure having a plurality of successive chambers each of which includes a cylindrical tubular portion adapted to be concentrically aligned with the breech of the gun barrel and having adjacent to the front end thereof a forward end portion providing a counterbore-like enlarged diameter mouth, a reciprocable cartridge for supporting a missile slidably disposed in said cylindrical tubular portion and having an enlarged front end portion reciprocably received retractably and protractably in said enlarged mouth of the cylindrical tubular portion, means for moving the cartridge toward said breech to protract and engage said enlarged front end portion of the cartridge in operative firing relation to the breech, the magazine structure having a forwardly facing surface through which the chambers open, and a guard plate fixedly disposed in generally planar alignment with the rear end portion of said gun barrel breech and extending in all directions about the breech and having a portion extending into overlapping and closing relation to the next adjacent magazine chamber, said plate being in face-to-face sliding engagement with the opposed forwardly facing surface of the magazine structure, said plate coacting with the magazine structure forwardly facing surface to avoid side flash and escape of smoke from around the gun barrel breech.

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