April 30, 1957 S. G. GERDIN 2,790,356

FEEDING MECHANISM FOR A GUN INCLUDING A RAMMING CHAMBER

Filed Nov. 18, 1952 6 Sheets-Sheet 1

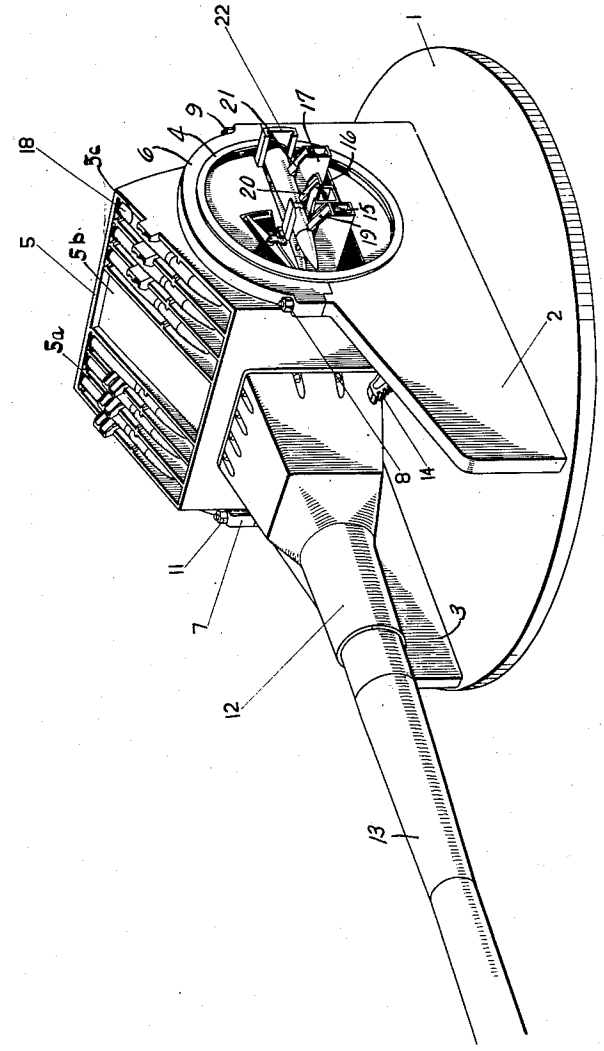


Fig. 1

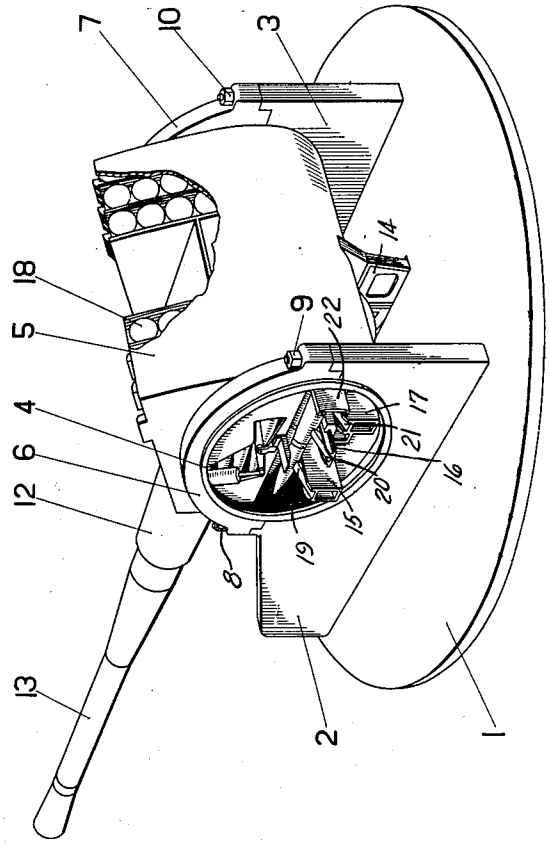
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Fig 2

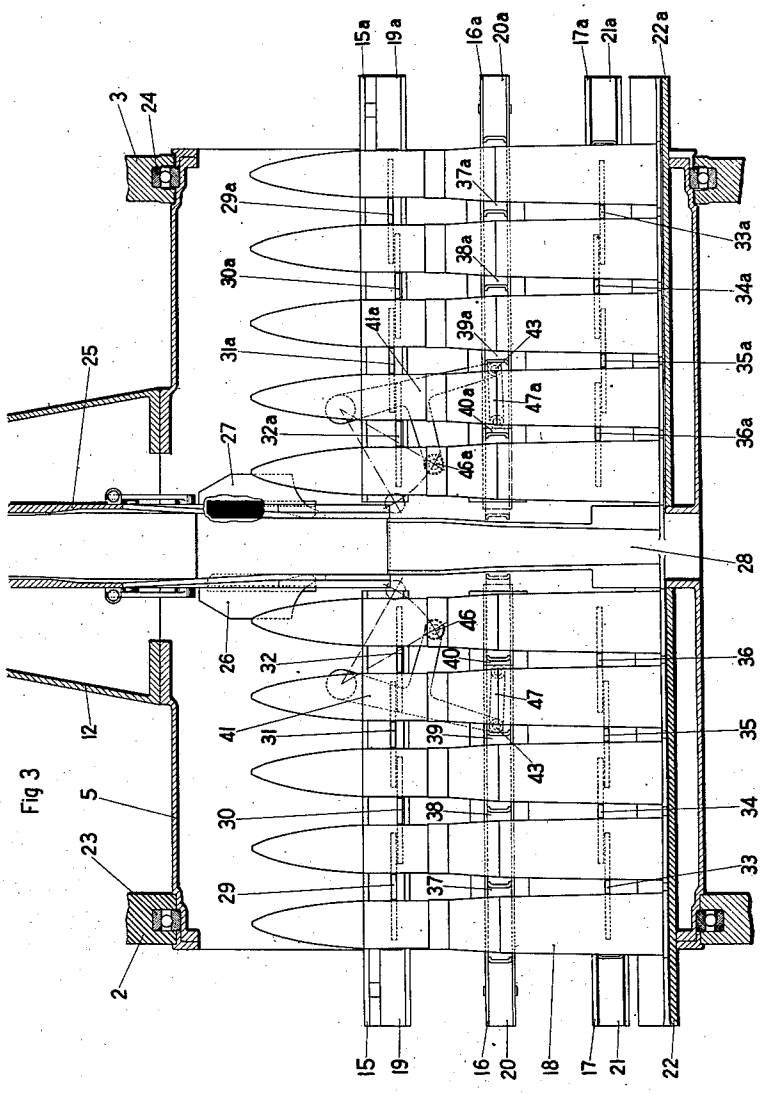


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FEEDING MECHANISM FOR A GUN INCLUDING A RAMMING CHAMBER

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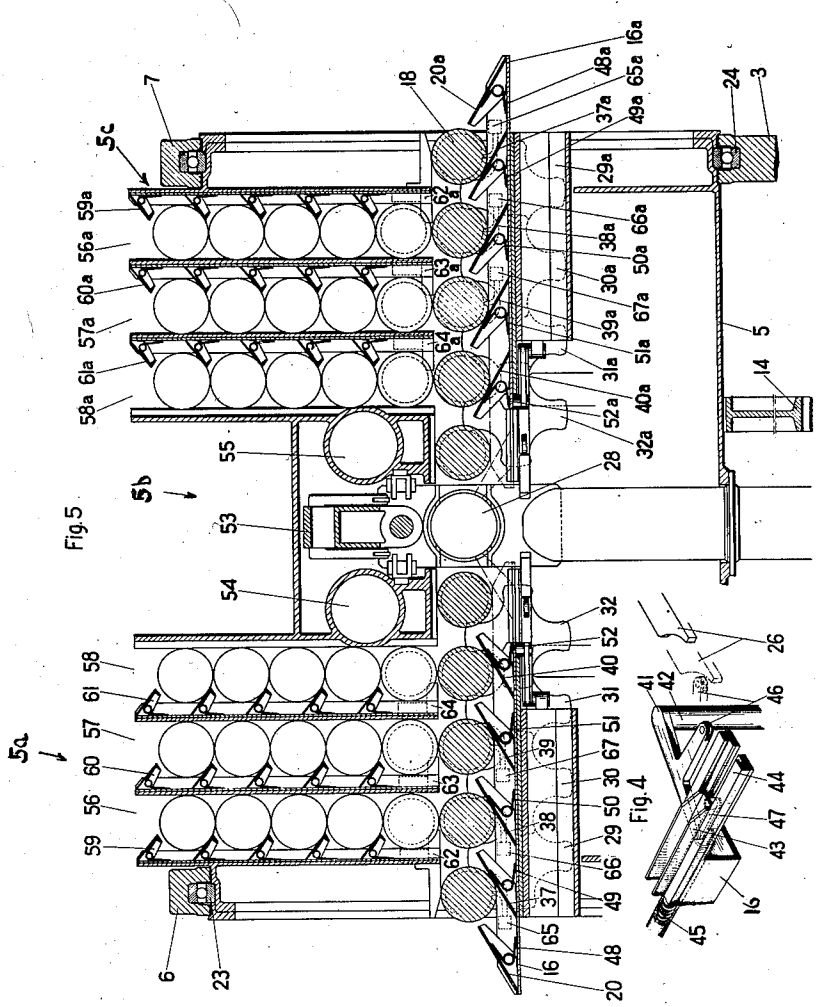


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FEEDING MECHANISM FOR A GUN INCLUDING A RAMMING CHAMBER

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FEEDING MECHANISM FOR A GUN INCLUDING A RAMMING CHAMBER

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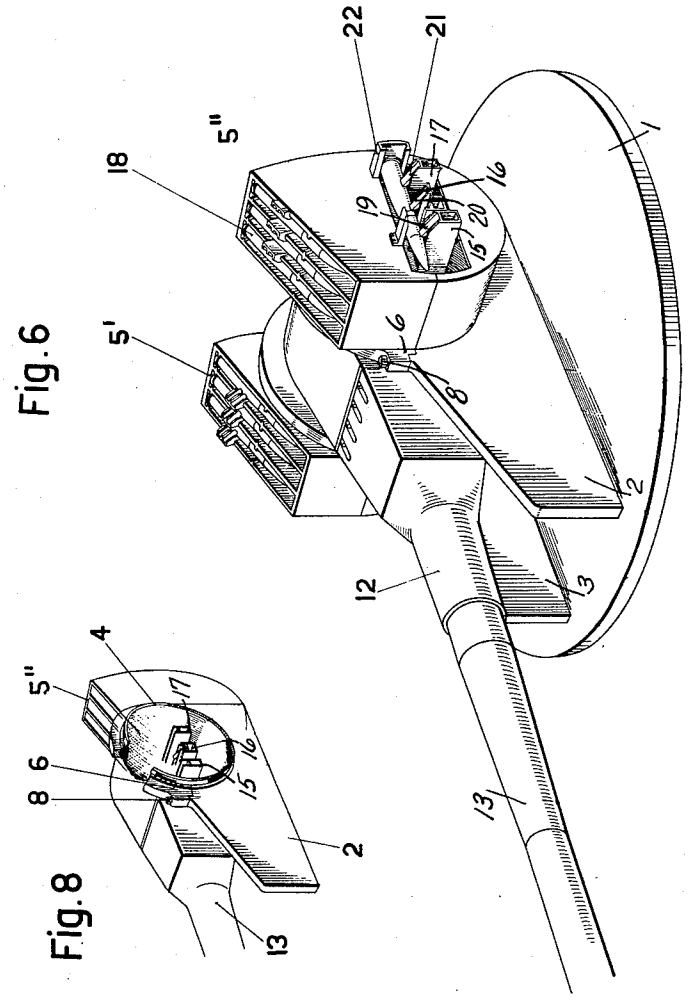


Fig.6

Fig.8

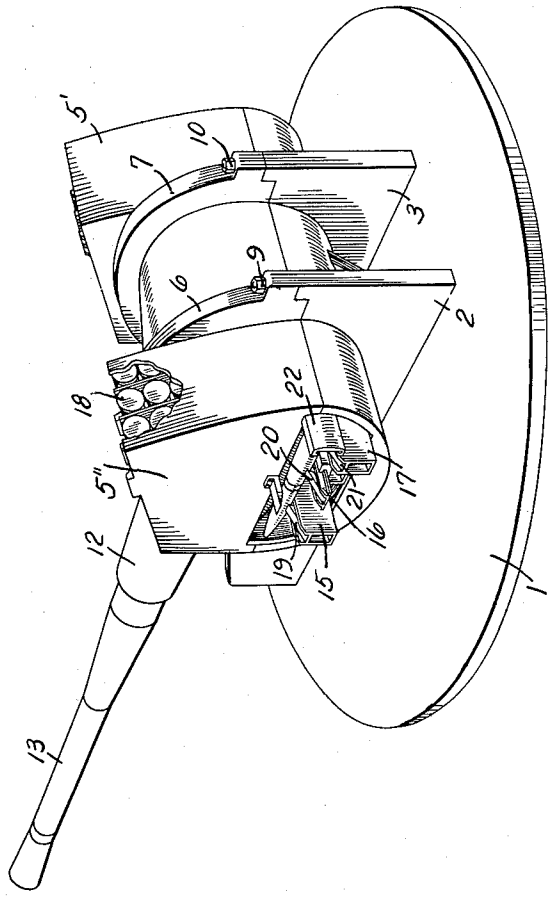
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Fig.7



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FEEDING MECHANISM FOR A GUN INCLUDING A RAMMING CHAMBER

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Application November 18, 1952, Serial No. 321,237

Claims priority, application Sweden November 30, 1951

12 Claims. (Cl. 89—33)

This invention relates to improvements in the feeding mechanism of a gun, particularly of a gun including a ramming chamber and supplied with projectiles from a magazine by means of one or more loading tables or trays.

Modern fire development frequently requires that a gun is capable of firing at a high rate of speed, particularly when used against fast moving targets.

With guns designed for a comparatively short range, the desired high rate of fire can be obtained by fitting the supply magazine substantially vertically upon the top of the jacket of the gun. Such a magazine can be conveniently and rapidly serviced by the gun crew at the same rate the projectiles are fed to the ramming chamber of the gun from the magazine as projectiles for short range guns generally have a comparatively small calibre and low weight. With guns designed for firing at long range targets particularly moving targets, the maintenance of a high rate of fire presents considerable difficulties. While it is also possible to fit a magazine upon the top of the jacket of a long range gun and to fill such magazine with projectiles before commencement of the firing, the calibre and weight of projectiles for long range guns make it impractical or at least very difficult to feed projectiles to the magazine at a rate sufficient to keep the magazine filled at a high rate of fire.

Accordingly, one of the objects of the present invention is to provide a feeding mechanism which permits the gun crew to supply comparatively heavy large calibre projectiles to the gun at a rate sufficient to maintain a high rate of fire.

Another object of the invention is to provide a feeding mechanism including a loading table permitting the gun crew continually to feed new projectiles to the gun and to ram the same one by one and a magazine from which the gun is automatically fed in case the gun crew for some reason for instance, due to casualties, is temporarily unable to supply the gun with projectiles at a rate sufficient to maintain the desired rate of fire. Such arrangement has the advantage that a full rate of firing is at least temporarily assured thereby giving the gun crew an opportunity to reorganize for renewed servicing of the gun with projectiles.

Still another object of the invention is to provide means by which the feeding mechanism of the gun is automatically changed from hand feeding to magazine feeding when no projectiles are supplied or the rate at which projectiles are supplied falls below the rate of consumption.

Another object of the invention is to arrange the aforementioned change-over means so that the feeding mechanism is automatically changed back to hand feeding when the guncrew resumes feeding of new projectiles at a sufficiently high rate thereby giving the gun crew an opportunity to replenish a partly or completely emptied magazine.

The aforementioned objects, features and advantages and other objects, features and advantages which will be

pointed out hereinafter are attained by providing a feeding mechanism basically comprising one or more loading tables from which projectiles placed thereon are rammed into the ramming chamber of the gun and which can be continually supplied with new projectiles by the gun crew, and at least one magazine disposed above the loading table and laterally adjacent to the ramming chamber of the gun. The said magazine remains closed for the discharge of the projectiles when and while the loading table is kept fully charged with projectiles and opens automatically for the discharge of projectiles upon the loading table when and while space for projectiles is left vacant on the loading table. The one or more magazines are preferably designed for a substantial number of projectiles thereby assuring that during a prolonged period of time firing will continue at full rate without placing a fresh supply of projectiles upon the loading table.

In the accompanying drawing several now preferred embodiments of the invention are shown by way of illustration and not by way of limitation.

In the drawing:

Fig. 1 is a perspective view of a gun equipped with a feeding mechanism according to the invention.

Fig. 2 is a perspective view of the gun of Fig. 1 seen from a different angle.

Fig. 3 is a horizontal section of the feeding mechanism of the gun according to Figs. 1 and 2 on an enlarged scale.

Fig. 4 is a fragmentary perspective view of a detail of Fig. 3.

Fig. 5 is a vertical section of the feeding mechanism of the gun according to Figs. 1 and 2.

Fig. 6 is a perspective view of a gun equipped with a modification of the feeding mechanism according to the invention.

Fig. 7 is a perspective view of the gun of Fig. 6 seen from a different angle, and

Fig. 8 is a fragmentary detail view of the gun according to Figs. 6 and 7 on an enlarged scale.

Referring first to Figs. 1 to 5 in detail, these figures show a gun mounted on a circular base plate **1** rotatable for azimuth adjustment of the gun by a traversing mechanism not shown on the drawing as it is not essential for the understanding of the invention. Plate **1** supports the two standards **2** and **3** of the gun carriage. Each of the standard forms together with a respective bracket **6** and **7** a cylindrical bearing for a ring **4**. The rings are fixedly secured to the respective opposite side walls of a magazine **5** for rotation of the magazine and the parts associated therewith relative to the gun carriage. Bearing brackets **6** and **7** are secured to standards **2** and **3** by any suitable means such as nuts and bolts **8** to **11**.

The gun proper is shown as having a barrel **13** and a recoil jacket **12** which is fastened to the front wall of magazine **5**. The magazine, as will be more fully explained hereinafter, is so designed that it leaves space for the breech ring of the barrel so that the barrel can freely recoil into the magazine. A gear segment **14** is mounted on the bottom wall of the magazine. This segment coacts with the elevating mechanism of the gun which is also not shown. As can be clearly seen on the figures the magazine is divided into three sections *5a*, *5b*, and *5c*. Each of two outer sections is divided into three compartments each of which serves to receive a row of projectiles and forms a discharge chute. The middle section *5b* provides space for the breech ring of the barrel when the latter recoils and other components forming part of the conventional operating mechanism of a gun of the kind herein involved. Part of the space into which the breech ring of the barrel moves during the recoil forms a ramming chamber **28** of the gun.

The feeding mechanism further comprises one or as shown two loading tables or trays each of which is extended through the respective one of said rings 4. Each loading table is composed of three beams, the beams of one table being designated by 15, 16, and 17 and the beams of the other table by 15*a*, 16*a*, and 17*a*. To simplify the description only one of the two loading tables is described in detail but it should be understood that the second loading table is identical with the described one and corresponding parts are designated by adding the letter *a* to each reference numeral.

Beam 16 is mounted axially movable and can be reciprocated by a suitable conventional means not shown in the figures. Each of the three beams is provided near its outer end with a yieldable snap device 19, 20, and 21 respectively. Snap devices 19 and 21 on beams 15 and 17 serve to retain the outermost one of a plurality of projectiles 18 on a loading table and snap device 20 on beam 16 serves to feed the projectiles toward the ramming chamber 28. The beam 17 is further provided with a guide rail 22 which has a substantially U-shaped cross section as can be clearly seen on Figs. 1 and 2. This rail engages the back of each projectile placed upon the loading table and serves to guide the projectiles.

Referring now to Fig. 3 which shows a plan view of the loading tables and the projectiles placed thereon. The figure also shows the carriage standards 2 and 3 each of which is provided with a ball bearing 23 and 24 respectively to facilitate the elevational movements of the gun barrel and the loading table with the magazine relative to the base of the gun mounting. Fig. 3 further shows a guiding device 25 for guiding projectiles. This guiding device follows the recoil movements of the barrel and has at its rear end two similar cam surfaces 26 and 27 which extend into the ramming chamber 28.

The loading table comprises four rotatable star wheels 29 to 32 mounted on beam 15. Two spokes of each wheel reach below two adjacent projectiles placed upon the loading table and an upwardly directed spoke extends between the two projectiles. Beam 17 is also associated with four rotatable similarly arranged star wheels 33 to 36. The eight star wheels serve to guide the projectiles as the same move over the loading table toward the ramming chamber. As will be apparent, two of the spokes of each wheel always support two adjacent projectiles from below and the upwardly directed spoke of each wheel always extends between two adjacent projectiles thereby holding the same at the proper intervals.

In addition to snap device 20 beam 16 is equipped with four additional snap devices 37 to 40 each of which is situated to the left or on the outside of a projectile on the loading table. Each snap device comprises an arm which is held in an upwardly slanted position by springs 48 to 52 respectively. As a result, each snap device permits a movement of a projectile toward the ramming chamber by being flattened by the weight of projectile moving toward the ramming chamber but resists a movement of a projectile in the opposite direction.

The means for moving the projectile closest to the ramming chamber 28 into the same are mounted below the loading table. As can best be seen on Fig. 4, these means comprise an arm 41 one end of which is secured to a rotatably mounted shaft 42. The other end of arm 41 is pivoted to a lever 47 which is connected to the movable beam 16 for moving the latter. The lever 47 is guided in a guide rail 44 which in contrast to beam 16 is stationarily mounted. Lever 47 is engaged by one end of a very strong spring 45 the other end of which is secured to the stationary guide rail 44 This spring is so biased that it always tries to turn arm 41 in a counter-clockwise direction or towards the right of the left hand loading table on Fig. 3. Arm 41 has a finger 46 which is engageable with the respective cam surface 26 as is indicated in phantom on Fig. 4.

A ramming device 53 is disposed above the ramming chamber 28 in the middle section 5*b* of the magazine and two drums 54 and 55 in which the recoil brakes are mounted are shown on opposite sides of the ramming device.

Fig. 5 shows very clearly the three chutes formed in magazine sections 5*a* and 5*c*. Each of these chutes which are designated by numerals 56, 57, and 58 may be considered as a magazine and is filled with five projectiles. These projectiles are held in position by snap devices 59, 60, and 61 respectively, conventionally used for the purpose. As will be noted, the projectiles in each chute are arranged in a row and the outermost chute is situated directly above the second projectile from the left. Similarly, the projectiles in chute 57 are placed above the third projectile from the left and the projectiles in chute 58 above the fourth projectile from the left.

The lowermost projectile in each of the chutes 56, 57, and 58 is retained in the respective chute by a locking device 62, 63, and 64 respectively. Each of these locking devices includes a lateral arm reaching under the lowermost projectile thereby retaining the same and with it all the other projectiles in the respective chute. The locking devices 62, 63 and 64 are controlled by control means 65, 66 and 67 disposed at the spaces on the loading table provided for the three outermost projectiles. The locking devices are so controlled by the control means that the locking device 62 is released when the control means 65 is not engaged by a projectile. Similarly, locking devices 63 and 64 are released when the respective spaces on the loading table are vacant.

The locking devices and the control means therefor can be designed in any manner suitable for the purpose. For instance, it may be visualized that each control means closes the energizing circuit of a solenoid which holds the respective locking device in its locking position as long as the control means is engaged by a projectile or the locking devices may be mechanically controlled for instance by a linkage system which holds the lateral arm of the locking devices in the locking position when the weight of a projectile presses against the respective control means. The arrangement of the locking devices and their control means may be conventional and is well understood in the art. It is therefore not described in detail.

The operation of the feeding mechanism, as hereinbefore described, is as follows:

Let it be assumed that the loading table and the magazine chutes are empty and that it is desired to fill both the tables and the magazines. Then first one table and then the other is filled by placing one projectile after the other upon the outer end of the beams and pushing the projectiles inwardly step by step by reciprocating movements of the movable beams 16 and 16*a*. Finally all the six magazine chutes are filled with projectiles.

Of the two arms 41 and 41*a* controlling the movement of the innermost projectile on each loading table into the ramming chamber, one is blocked, say arm 41, while the other arm 41*a* is free. Hence, spring 45*a* of the right hand table turns arm 41*a* as that lever 47*a* pivoted to this arm will force the innermost projectile on the right hand table into the ramming chamber. The vacant space then available on the right hand loading table can now be filled with an additional projectile. When now the rammer 53 of the gun is released the projectile in the ramming chamber 21 will be rammed. Stop means conventional for guns of the type here involved and coacting with the rammer will prevent the feeding of another projectile to the ramming chamber. When now the rammed projectile is fired, the recoil of the gun barrel will cause the cam surface 26 to activate the previously blocked arm 41 thereby forcing the innermost projectile on the left hand table into the ramming chamber. As the firing continues, projectiles will be fed to the ramming chamber alternately from the left hand and the right loading table. As long as both tables are supplied

with new projectiles, the projectiles in the discharge chutes will not be consumed but are retained in the chutes by the aforedescribed locking devices **62**, **63**, **64**, and **62***a*, **63***a*, and **64***a*. Let it now be assumed that the gun crew is not able to supply new projectiles to the left hand loading table and that the space for the outermost projectile becomes vacant. As a result, control means **65** releases locking device **62**. When now the second outermost projectile moves one step toward the ramming chamber so that the second outermost space becomes vacant, the projectiles in the magazine chute **56** drop successively upon the loading table until this chute is emptied and the space controlled by the control means **66** becomes vacant. The projectiles in chute **57** are then released so that the gun is fed from this chute and so forth until all the magazine chutes are emptied. The same sequence of operations takes place on the right hand loading table. It will also be apparent that if the gun crew resumes feeding of projectiles to the loading tables so that the vacant spaces thereon are filled, magazine feeding is automatically discontinued.

The feeding mechanism according to Figs. 6, 7, and 8 is similar in its structural design and operation to the feeding mechanism as previously described. Accordingly, corresponding parts are designated by corresponding numerals though primed. As will be noted, the Figs. 1 and 2 show a magazine containing six chutes disposed between the two standards of the gun carriage while according to Figs. 6, 7, and 8, two magazine sections **5'** and **5''** each containing three chutes are disposed on opposite sides of standards **2** and **3**. The operation of the feeding mechanism of Figs. 6 to 8 will be obvious from the previous description.

While the invention has been described in detail with respect to certain now preferred examples and embodiments of the invention it will be understood by those skilled in the art after understanding the invention, that various changes and modifications may be made without departing from the spirit and scope of the invention, and it is intended, therefore, to cover all such changes and modifications in the appended claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. A feeding mechanism for a gun having a ramming chamber comprising at least one loading table fixedly disposed in lateral alignment with the ramming chamber and having a freely accessible outer end for placing cartridges upon the said end and moving said cartridges over the loading table into the ramming chamber, the longitudinal axis of said loading table being perpendicular to the axis of the gun, at least one magazine for a supply of cartridges having at least one discharge chute situated above the loading table and issuing upon the same, and releasable locking means disposed in front of the discharge end of said chute, the said locking means being controlled by cartridges placed upon the loading table and blocking the discharge of cartridges from the chute upon the loading table when and while cartridges are moved over the table in front of said chute thereby preventing feeding of the ramming chamber from the discharge chute as long as cartridges are fed to the loading table at the rate of ramming.

2. A feeding mechanism for a gun having a ramming chamber, comprising at least one loading table fixedly disposed in lateral alignment with the ramming chamber and having a freely accessible outer end for placing cartridges upon the said end and moving said cartridges over the loading table into the ramming chamber, the longitudinal axis of said loading table being perpendicular to the axis of the gun, at least one magazine for a supply of cartridges having at least one discharge chute ending above the loading table spaced therefrom to provide space for moving the cartridges to the ramming chamber over the loading table and beneath the discharge end of the chute, and releasably locking means disposed in front of the discharge end of said chute, the said locking means being controlled by cartridges placed upon the loading table and blocking the discharge of cartridges from the chute upon the loading table when and while cartridges are moved over the table in front of said chute thereby preventing emptying of the magazine as long as cartridges are fed to the loading table at the rate of ramming.

3. A feeding mechanism for a gun having a ramming chamber, comprising at least one loading table fixedly disposed in lateral alignment with the ramming chamber and having a freely accessible outer end for placing cartridges upon said end and moving cartridges over the loading table into the ramming chamber, the longitudinal axis of said loading table being perpendicular to the axis of the gun, at least one magazine mounted above the loading table, the said magazine including a plurality of discharge chutes disposed side by side perpendicularly to the loading table, each discharge chute being designed for receiving therein one row of cartridges and having its discharge end adjacent to the loading table spaced therefrom for moving cartridges to the ramming chamber over the loading table and beneath to the discharge ends of said chute, and releasably locking means each disposed in front of the discharge end of one of said chutes between the respective end and the table, the said locking means being each controlled by cartridges placed upon the loading table for blocking the discharge of cartridges from the respective chute upon the loading table when and while cartridges are moved over the table in front of the discharge end of a respective chute thereby preventing emptying of the magazine as long as cartridges are fed to the loading table at the rate of ramming.

4. A feeding mechanism according to claim 12, wherein a plurality of yieldable stop means are provided on the loading table coacting with cartridges placed upon the table and spaced apart so as yieldably to retain each cartridge in vertical alignment with the discharge end of the discharge chute, the said yieldable stop means being arranged to yield for movement of cartridges over the loading table toward the gun.

5. A feeding mechanism according to claim 2, wherein the loading table is disposed on both sides of the ramming chamber laterally extending relative thereto and perpendicular to axis of the gun, and wherein a magazine is vertically disposed above each side of the loading table.

6. A feeding mechanism according to claim 2, wherein a housing is mounted laterally adjacent to the ramming chamber, the said housing including a compartment forming at least one magazine and having an opening therethrough, the said loading table extending to the ramming chamber through the said opening of the housing.

7. A feeding mechanism according to claim 12, wherein said loading table protrudes from both sides of the gun barrel perpendicular to the axis of the gun, and wherein a magazine is vertically disposed above each protruding side of the loading table, and wherein each side of the loading table and the magazine associated therewith are supported by a separate support member.

8. A feeding mechanism according to claim 7, wherein each of support members has a cylindrical outer configuration, and wherein the gun is mounted on a carriage including cylindrical bearings in which said cylindrical members are rotatably fitted so as to form said hollow trunnions for movement of the loading tables and the magazines associated therewith in unison with the elevational movements of the gun.

9. A feeding mechanism according to claim 2, wherein said loading table is disposed on both sides of the ramming chamber laterally extending relative thereto and perpendicular to axis of the gun, and wherein a magazine

is vertically disposed above each side of the loading table, the said loading table sides and the magazines associated therewith being disposed symmetrically relative to the ramming chamber at both sides thereof.

10. A feeding mechanism according to claim 2, wherein said loading table is disposed on both sides of the ramming chamber laterally extending relative thereto and perpendicular to axis of the gun, and wherein a magazine is vertically disposed above each side of the loading table, and wherein each side of the loading table and the magazine associated therewith are supported by a support member, each of the said two support members being disposed between the ramming chamber and one side of the loading table and the magazine associated therewith.

11. A feeding mechanism according to claim 2, wherein said loading table is disposed on each side of the ramming chamber laterally extending relative thereto and perpendicular to the axis of the gun, and wherein each side of the loading table is supported on a support member, the said support members being disposed on opposite sides of the ramming chamber and the said magazine being disposed between the two support members.

12. A feeding mechanism for a gun having a barrel pivotal about trunnions of an elevating device, comprising a loading table disposed transversely to the barrel axis and mounted pivotal in unison with the gun barrel about a fixed axis, the trunnions of said elevating device being hollow and said loading table extending through the trunnions, the outer end of the loading table being freely accessible for placing cartridges upon the table and loading the gun through the trunnions, magazine means having a discharge chute for a supply of cartridges mounted above said loading table spaced apart therefrom and issuing upon the table for feeding cartridges from the discharge chute upon the loading table, and releasable locking means disposed between the discharge end of the chute and the loading table and controlled by engagement with cartridges on the loading table, the said locking means blocking the discharge of cartridges from the chute when in engagement with a cartridge on the table and releasing the discharge of cartridges when out of engagement with a cartridge on the table thereby preventing feeding of the gun from the chute as long as cartridges are placed upon the table and in front of the chute.

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