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Aug. 28, 1928. 1,682,323

T. A. CONLON

MECHANICAL LOADER FOR CANNON

Filed June 26, 1924 4 Sheets-Sheet 1

Fig. 1.

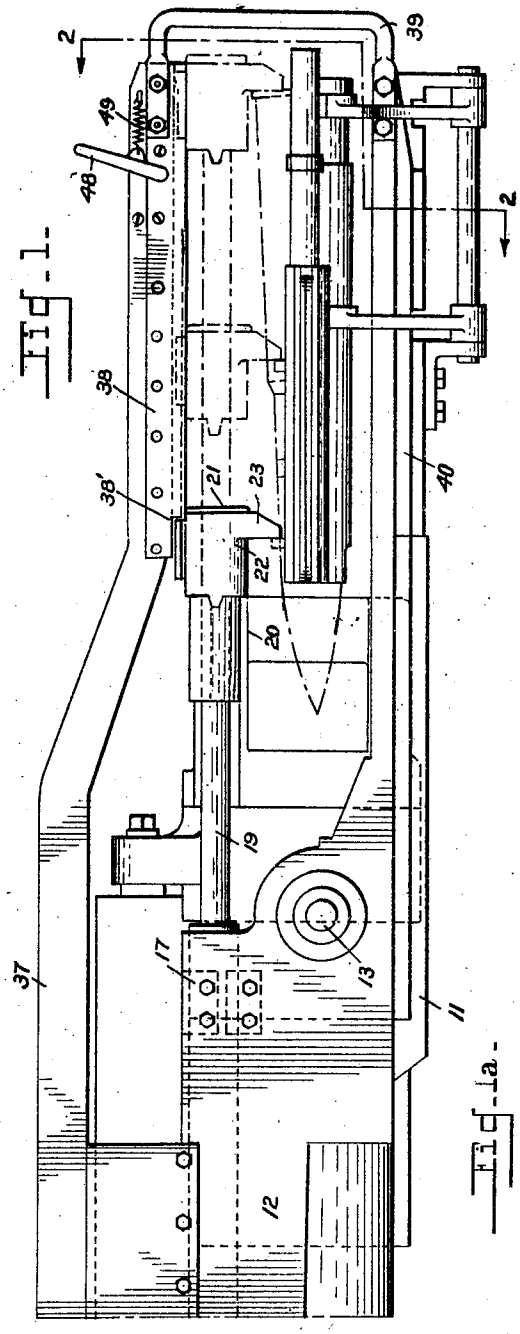
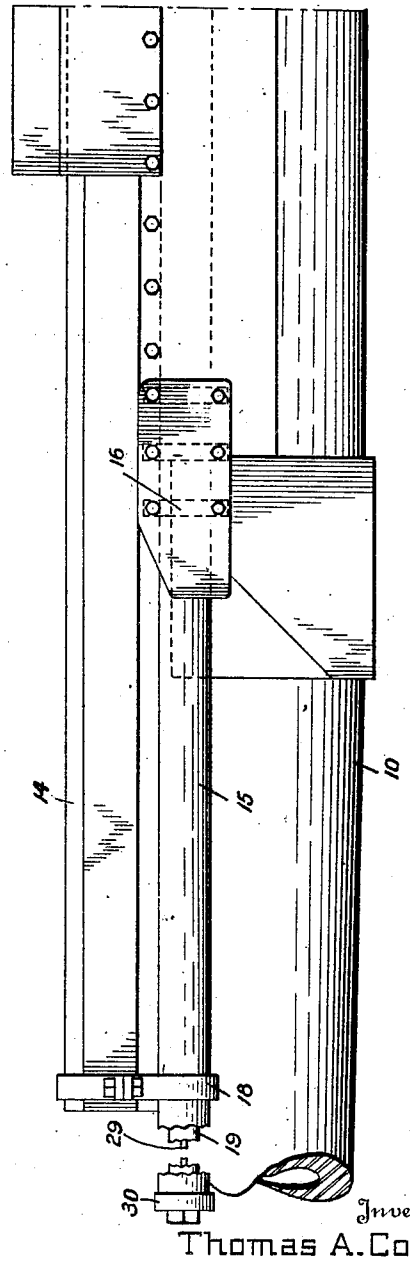


Fig. 1a.



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Fig. 2.

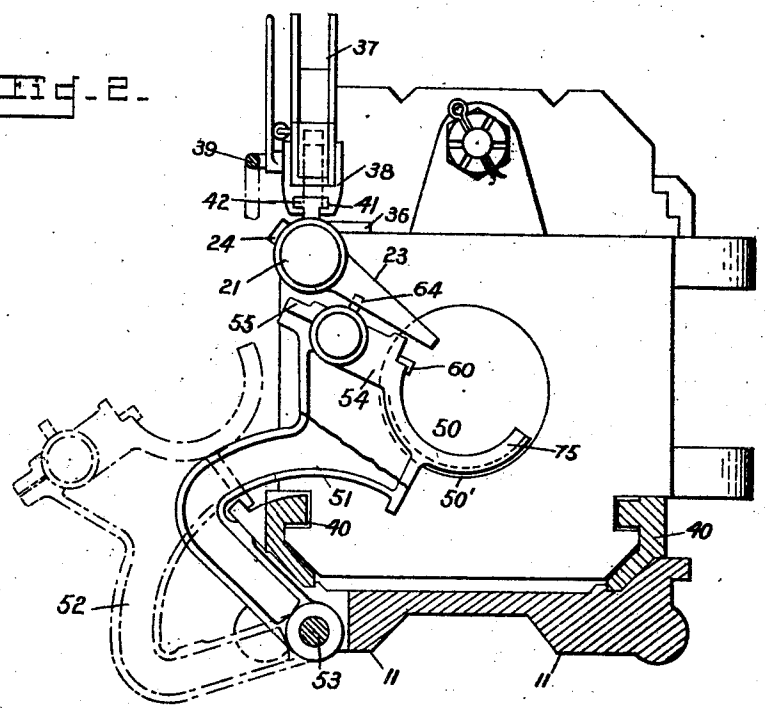


Fig. 4.

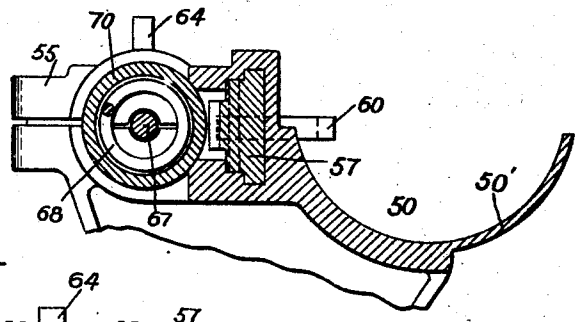
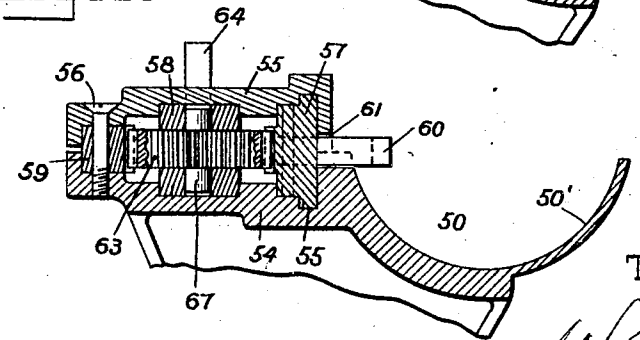


Fig. 5.



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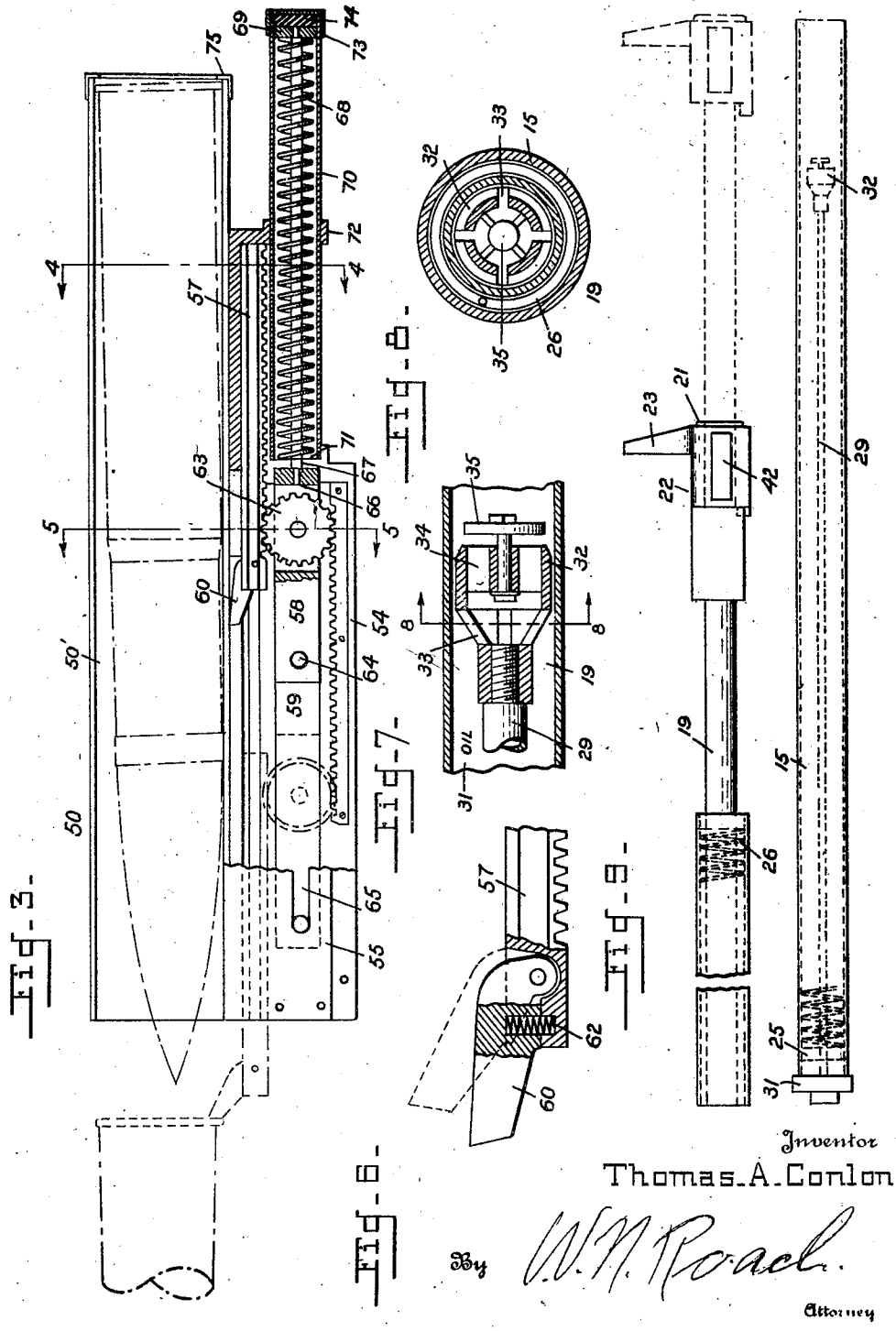


Fig-3-

Fig-6-

Fig-7-

Fig-8-

Fig-5-

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Fig. 10.

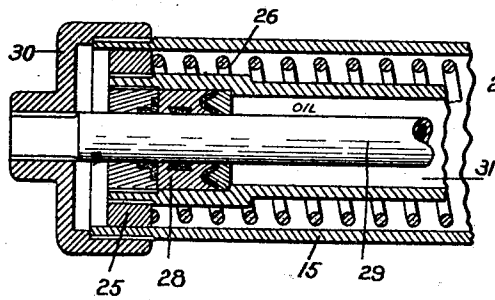


Fig. 11.

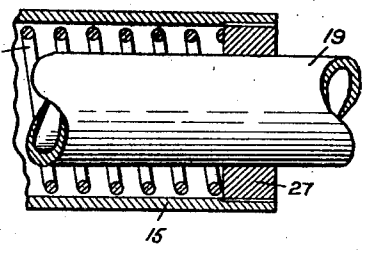


Fig. 12.

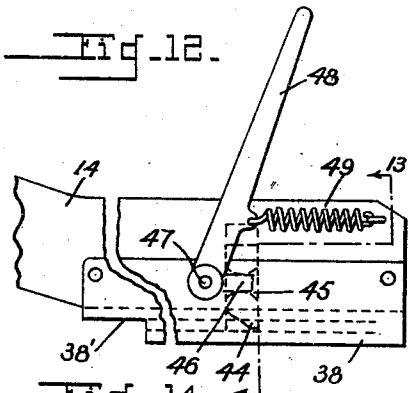


Fig. 13.

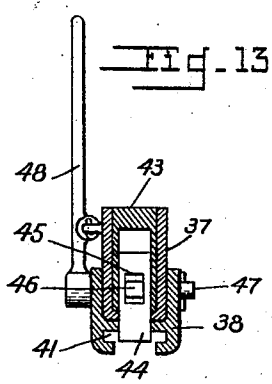


Fig. 14.

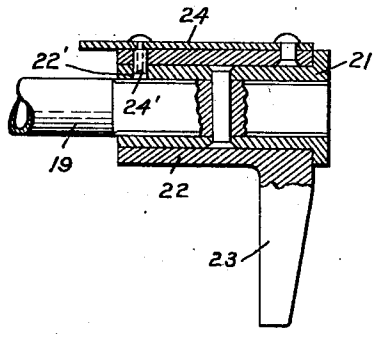
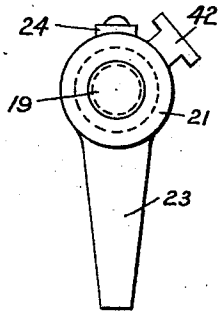


Fig. 15.



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UNITED STATES PATENT OFFICE.

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MECHANICAL LOADER FOR CANNON.

Application filed June 26, 1924. Serial No. 722,526.

(GRANTED UNDER THE ACT OF MARCH 3, 1883, AS AMENDED APRIL 30, 1928; 370 O. G. 757.)

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.

The subject of this invention is a mechanical loader for cannons.

In loading projectiles into heavy artillery at all angles of elevation, the weight of the projectile requires that mechanical assistance be resorted to, in performing the ramming operation.

My invention resides in utilizing the energy of recoil to store up energy to perform the loading operation and I accomplish this result by associating the rammer with the recoiling portions of a gun and adapting the rammer to return to battery independently to cooperate with a gear mechanism carried by the projectile tray to advance a projectile into the breech of the barrel.

The principal objects of my invention are to provide a semi-automatic rammer retractable with the gun and returnable independently thereof; to automatically catch and retain the rammer in retracted position a sufficient distance to permit ejection of the empty cartridge case; to arrange a buffer mechanism within the rammer cylinder to ease the return movement of the rammer; to permit the rammer to be rotated when in forward position to provide for insertion of the first shell; to associate with the rammer a projectile tray housing a compact gear mechanism having a loading movement greater than its own length and actuated by the rammer to complete the loading movement; to apportion the loading movement between the rammer and gear mechanism; to provide a loading movement in excess of the movement of each of the loading members whereby to reduce the overall length of such members; and, to provide means for returning the gear mechanism to retracted position which will act as a buffer during the forward movement of the rammer.

To these and other ends, my invention consists in the construction, arrangement, and combination of elements described hereinafter and pointed out in the claims forming a part of this specification.

A practical embodiment of my invention is illustrated in the accompanying drawings, in which,

Figs. 1 and 1[a] are a view in side elevation of my mechanism for loading projectile into cannon;

Fig. 2 is a vertical sectional view on the lines 2—2 of Fig. 1;

Fig. 3 is a plan view of the loading tray, partly broken and partly in section;

Fig. 4 is a sectional view taken on the line 4—4 of Fig. 3;

Fig. 5 is a sectional view taken on the line 5—5 of Fig. 3;

Fig. 6 is a detailed view of the pick-up finger partly in section;

Fig. 7 is a fragmentary longitudinal sectional view of the buffer valve with the rammer cylinder removed;

Fig. 8 is a sectional view of the rammer cylinder taken on the line 8—8 of Fig. 7;

Fig. 9 is a side elevation of the rammer and cylinder;

Figs. 10 and 11 are fragmentary longitudinal sectional views of the rammer cylinder;

Fig. 12 is a view in side elevation of the latch mechanism;

Fig. 13 is a sectional view taken on the line 13—13 of Fig. 12;

Fig. 14 is a detailed view of the rammer head partly in section; and

Fig. 15 is an end view of the same.

Referring to the drawings by numerals of reference:

The barrel 10 of the cannon is reciprocally carried by the usual mount comprising a cradle 11, cradle side plates 12, trunnions 13, and recuperator mechanism 14. Stationary between the barrel and the left side cradle plate is a cylinder 15 supported and rigidly held by U-shaped brackets 16 fixed to the front end of the side plate 12 and also supported by a bracket 17 secured to the inner face of the rear end of the side plate. The forward portion of the cylinder 15 is supported by a metal strap 18 embracing the recuperator mechanism 14.

Mounted for reciprocal movement in the cylinder 15 is a hollow rammer rod 19 normally extending beyond the breech end 20 of the barrel and provided at its rearmost end with a sleeve 21 on which is mounted with a close movable fit a ram head 22 having a dependent finger 23 which is disposed at an angle and projects in line with the

bore of the barrel. Riveted to the ram head 20 is a leaf spring 24 provided with a pin 24′ for insertion in a recess 22′ formed in the sleeve to hold the ram head against movement with respect to the sleeve.

To insert the first round of ammunition into the bore, the leaf spring is manually raised so that the shell on striking the finger 23 will rotate the ram head out of line with the bore.

Referring to Figures 10—11 the forward end of the rammer rod 19 is provided with a collar 25 for spacing the rammer rod from the cylinder and for confining a coil spring 26, the opposite end of which abuts against a plug 27 closing the rear end of the cylinder and apertured for the reception of the rammer rod.

The front end of the hollow rammer rod is closed by packing rings 28 apertured for the reception of a buffer rod 29 which is rigidly secured in any suitable manner to a cylinder cap 30, and which is stationary with respect to the rammer rod and spaced therefrom to form a chamber 31. The free end of the buffer rod is reduced and threaded (see Fig. 7) to receive a valve head 32 formed with communicating ports 33 and 34 and carrying a check valve 35.

The chamber 31 between the buffer rod and the rammer rod is filled with a liquid which is expelled by the packing rings through the ports during retraction of the rammer rod, while during the forward movement of the rammer rod the liquid acting on the check valve seats the same and slowly reenters the chamber through a bypass established by slightly spacing the valve head from the rammer rod thereby retarding the forward movement of the rammer rod and constituting a buffer mechanism.

The breech of the gun to which my device may be attached is formed with a stepped upper left edge and in the depression thus formed is secured a guide collar 36 which embraces the rammer rod in front of the rammer head 22 and serves as a support for the rod and as a means for retracting the rod during the recoiling movement of the barrel to compress the spring 26.

Attached to the cradle side plate 12 is a rearwardly extending, overhead channel support 37, its rear portion carrying a guide plate 38 on its underface, which is bolted or riveted thereto in any suitable manner. The rear end of the support 37 is secured to a bracket arm 39, which is bolted to the cradle side plate extension 40, as clearly shown in Figure 1. The under side of the guide plate 38 is formed with a T-groove 41 (see Fig. 2) to receive a complementary tongue 42 formed on the ram head 22. The guide plate 38 is undercut at its forward end as at 38′, to permit lateral movement of the tongue 42 when the ram head is rotated by contact with the shell when the first round is loaded into the cartridge chamber, as hereinbefore set forth.

The rear portion of the support 37 carries a block 43 (see Fig. 13) in which is vertically slidable, a latch 44 which extends into the T-groove 41 through apertures in the support and guide plate. The latch is formed with a centrally disposed flared opening 45 adapted to receive a latch pin 46 secured to a rock shaft 47 mounted transversely through the guide plate and the support. The shaft is oscillated by a lever 48 to which is attached a spring 49 for normally maintaining the latch depressed.

The latch is adapted to be tripped by the tongue 42 during retraction of the rammer and is moved to locking position by the latch spring to retain the rammer in cocked position during counterrecoil of the barrel. When in this position the ram head will be located sufficiently to the rear to permit the projectile tray to dispose a projectile in line with the bore and it will also be in position to engage the base of the shell and move it forward when the latch is manually operated to release the tongue of the rammer which is urged forwardly by its spring 26.

A tray 50, designed to carry a projectile, is mounted for oscillatory movement so that when in upper position (as shown in full lines in Fig. 2) the projectile is in alignment with the bore of the cannon to permit it to be moved into the barrel during the loading operation.

The tray is cast with brackets 51 which having a bent arm 52 mounted on a rock shaft 53 suitably journaled for axial turning movement in the cradle 11 of the cannon.

The tray is formed with a lateral extension 54 adapted to be closed by a cover plate 55 which may be secured thereto by means of machine screws 56, the whole forming a casing provided with grooves for the reception of a reciprocal rack 57, a reciprocal bolt 58 and a stationary rack 59.

The reciprocal rack carries a resiliently actuated pick-up finger 60 preferably pivotally secured to its forward end and adapted to be extended through a slot 61 formed between the extension and the cover plate by resilient means, such as the spring 62 so as to bring the finger into position to engage the base of a projectile at the proper instant during the loading operation.

For the purpose of operating the movable rack and imparting to it a more rapid rectilinear movement than that of the part furnishing the moving force, the bolt 58 has rotatably mounted therein a pinion 63 which is in mesh with both the movable rack and the stationary rack. The bolt is provided with a lug 64 which extends through a slot 65 formed in the cover plate 55 and in

position to be contracted by the rammer finger 23 (as seen most clearly in Fig. 2) during the forward movement of the rammer and at a time when the cartridge base has just cleared the pick-up finger 60. As will be readily understood from the foregoing the rack will carry the round from its picked-up position completely into the cartridge chamber, while the rammer is travelling from its position at pick-up to its position of rest, that is, the distance travelled by the lug 64 as seen most clearly in Figure 3.

Any suitable means may be employed for restoring the bolt and reciprocable rack to normal position, a preferred form, as herein shown, consisting in providing an aperture 66 in the rear wall of the extension 54 through which a rod 67 is adapted to reciprocate, the forward end of the rod being suitably secured to the rear end of the bolt 58. The rod is resiliently retracted preferably by a coiled spring 68 which surrounds the rod and is confined between the rear end of the extension and a head 69 secured to the rear end of the rod. To provide a support and guide for the rod and also to protect the rod and spring, a tubular casing 70 may be provided, secured at its forward end to the rear of the extension 54 as at 71 and further supported in a bracket arm 72 extending laterally from the tray. The tubular casing is conveniently closed by a cap 73 which holds in position a buffer disc 74 of rubber or other suitable material.

In operation, assuming the breech of the cannon to be open, the leaf spring 24 is raised and the tray tilted to position a shell in line with the bore, the shell during this movement rotating the ram head out of line with the bore. The ram head is then turned back until the leaf spring pin 24′ reengages the sleeve 21 and the shell is rammed in by hand. An alternate method is to manually retract the rammer until cocked by the latch 44 on the support 37 when the tray may be tilted into position and the rammer released from the latch to advance the shell along the tray.

Upon recoil of the barrel the guide collar 36 secured to the breech end thereof forces the ram head 22 to ride to the rear in the guide plate 38 until cocked by the latch 44 where it remains during counterrecoil of the barrel. In this position, it is sufficiently to the rear to permit ejection of the empty cartridge case. The retraction of the rammer compresses the spring 26 and forces the fluid confined in the rammer through the valve on the buffer rod 29.

The tray is then tilted to position a shell in line with the barrel and the ram rod being released advances the shell forward by its finger 23. The pick-up finger 60 is maintained in depressed position until cleared by the shell when it rises to engage behind the base thereof. At the same time, the rammer picks up the two-to-one gear mechanism, which through the finger 60 carries the round into the breech. The spring 68 compressed during forward movement of the gear mechanism assists the buffer mechanism in retarding the rammer and when the tray is moved away from the breech it returns the gear mechanism to initial position.

While in the foregoing, there has been illustrated and described, such combination and arrangement of elements as constitute the preferred embodiment of my invention, it is nevertheless desired to emphasize the fact that interpretation of the invention should only be conclusive when made in the light of the subjoined claims.

I claim:

1. In combination with a cannon and its mount, a loading mechanism embodying a tray movable into and out of alignment with the cannon at the breech end thereof, a projectile advancing member slidably mounted in said tray, a bolt, a pinion mounted in the bolt and meshing with said member, a projectile advancing member supported by the mount and recoilable under tension with the cannon, said member adapted to reciprocate the bolt, and means associated with the bolt for returning the same to initial position.

2. In combination with a cannon and its mount, a loading mechanism embodying a tray movable into and out of alignment with the cannon at the breech end thereof, said tray formed with a slot, a rack slidably mounted in said tray, a pick-up finger pivotally carried in the forward end of said rack, and normally projected in line with the bore, a bolt formed with a lug projecting through the slot in the tray, a pinion mounted in the bolt and meshing with the rack, and a rammer supported by the mount and adapted to advance a projectile until it picks up the lug on the bolt to actuate the rack.

3. In combination with a cannon and its mount, a loading mechanism, embodying a tray, movable into and out of alignment with the cannon at the breech end thereof, a rack slidably mounted in said tray, a pick-up finger pivotally carried in the forward end of said rack and normally disposed in line with the bore, a rammer supported by the mount for advancing a projectile to clear the finger, and a connection between the rack and the rammer adapted to be engaged by the rammer at a point opposite the finger whereby to actuate the rack.

4. In combination with a cannon and its mount, a loading mechanism embodying a tray movable into and out of alignment with the cannon at the breech end thereof, a projectile advancing member slidably mounted in said tray, a projectile advancing member supported by the mount, and a con-

nection normally engaging the forward end of the first mentioned member whereby said member is actuated by the last mentioned member.

5. In combination with a cannon and its mount, a loading mechanism embodying a tray, movable into and out of alignment with the cannon at the breech end thereof, a projectile advancing member slidably mounted in said tray, a projectile advancing member supported by the mount, and a connection between the members whereby the second mentioned member actuates the first member.

6. In combination with a cannon and its mount, a cylinder carried by the mount, a hollow rammer reciprocably mounted in the cylinder, and recoilable with the cannon, a spring within the cylinder compressible during recoil of the rammer, a fluid in the rammer, a rod disposed within the rammer and stationary with respect thereto, said rod being spaced from the rammer, and a valve carried by the rod and adapted to retard the flow of the fluid during counterrecoil of the rammer.

7. In combination with a cannon and its mount, a loading mechanism embodying a tray, movable into and out of alignment with the cannon at the breech end thereof, said tray adapted to hold a projectile, and a ram head normally positioned in line with the bore of the barrel and rotatable by the projectile when the tray is moved into alignment with the barrel.

8. In combination with a cannon and its mount, a loading mechanism embodying a tray movable into and out of alignment with the cannon at the breech end thereof, projectile advancing members carried by the mount and the tray, means carried by the members for retarding their forward movement, the means carried by the tray member being adapted to return said member to initial position when the tray is moved out of alignment with the cannon barrel.

9. In combination with a cannon and its mount, a loading mechanism embodying a tray, movable into and out of alignment with the cannon at the breech end thereof, projectile advancing members carried by the mount and the tray, and means carried by both of the members for retarding their forward movement.

10. In combination with a cannon and its mount, a loading mechanism embodying a tray movable into and out of alignment with the cannon at the breech end thereof, projectile advancing members carried by the mount and the tray, and means carried by one of said members for retarding the forward movement of both members.

11. In combination with a cannon and its mount, a loading mechanism embodying a tray movable into and out of alignment with the cannon, at the breech end thereof, means carried by the tray for advancing a projectile into the breech and a rammer supported by the mount for successively advancing the projectile and the aforesaid means.

12. In combination with a cannon and its mount, a loading mechanism embodying a tray movable into and out of alignment with the cannon at the breech end thereof, means carried by the tray for advancing a projectile into the breech, and an automatic rammer supported by the mount for advancing the projectile into position to be engaged by the aforesaid means.

13. In combination with a cannon and its mount, a loading mechanism embodying a tray movable into and out of alignment with the cannon at the breech end thereof, and projectile advancing members carried by the mount and the tray for successively advancing a projectile into the breech.

14. A loading mechanism for cannon including projectile engaging members, one of said members actuated by the other member.

15. A loading mechanism for cannon including coacting projectile engaging members one of which provides a loading movement in excess of the stroke of the coacting actuating members.

16. A loading mechanism for cannon including a pair of projectile engaging members one of which is mounted on a longitudinally movable part of the cannon and the other of which is mounted on a longitudinally stationary part of the cannon.

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