E. K. STANDISH.

DEVICE FOR LOADING PROJECTILES INTO CANNON.

APPLICATION FILED MAY 22, 1920.

1,438,670.

Patented Dec. 12, 1922.

4 SHEETS—SHEET 1.

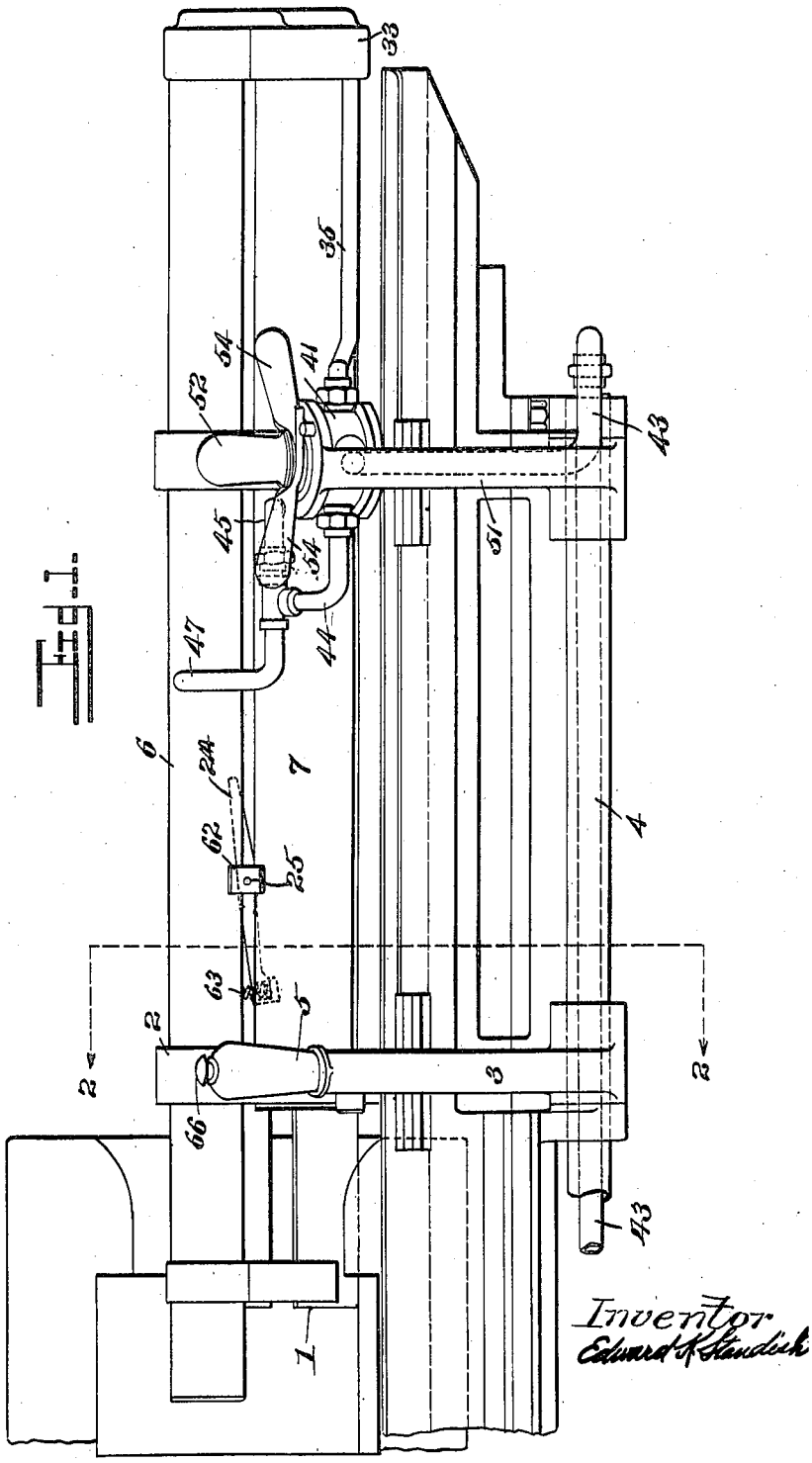


Fig. 1.

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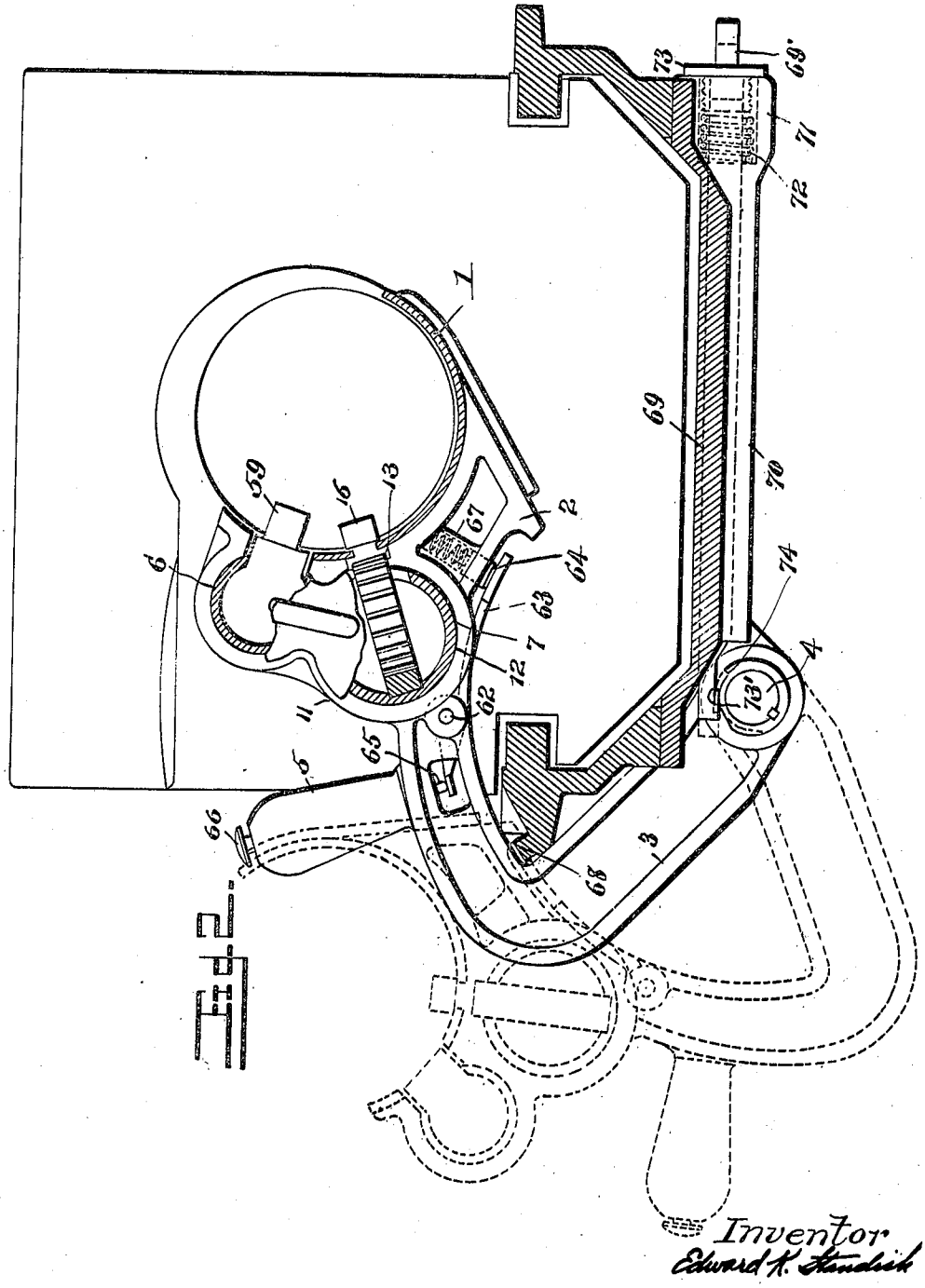


FIG. 2.

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4 SHEETS—SHEET 3.

Fig. 3.

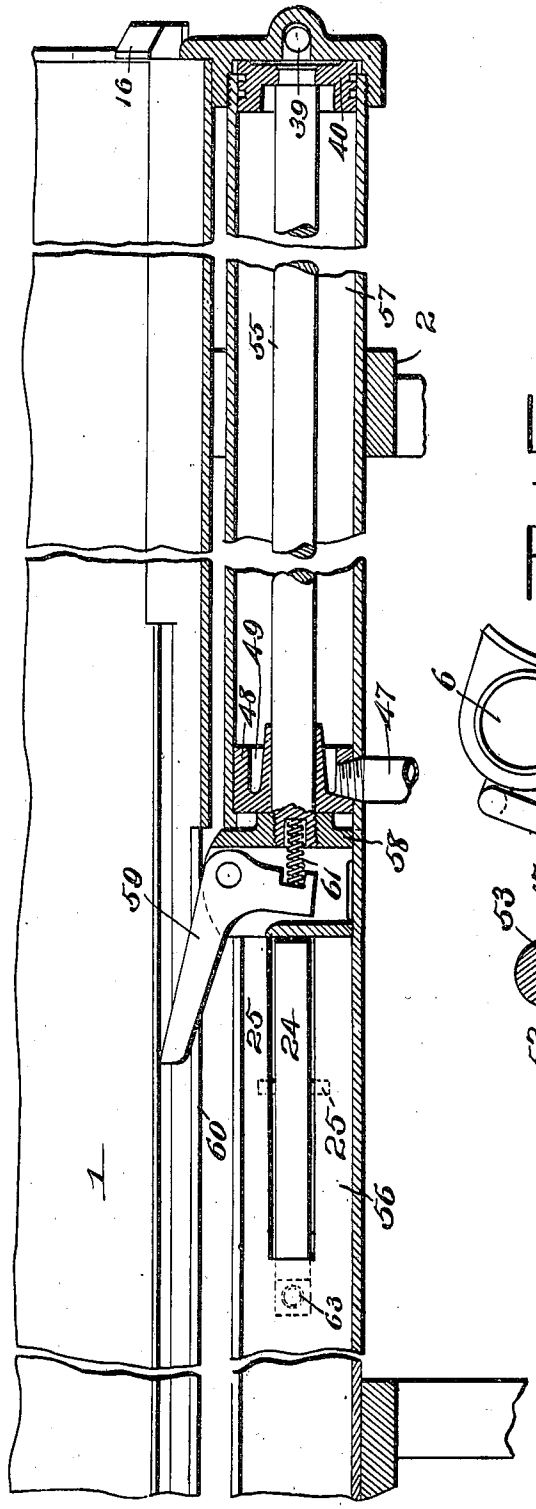
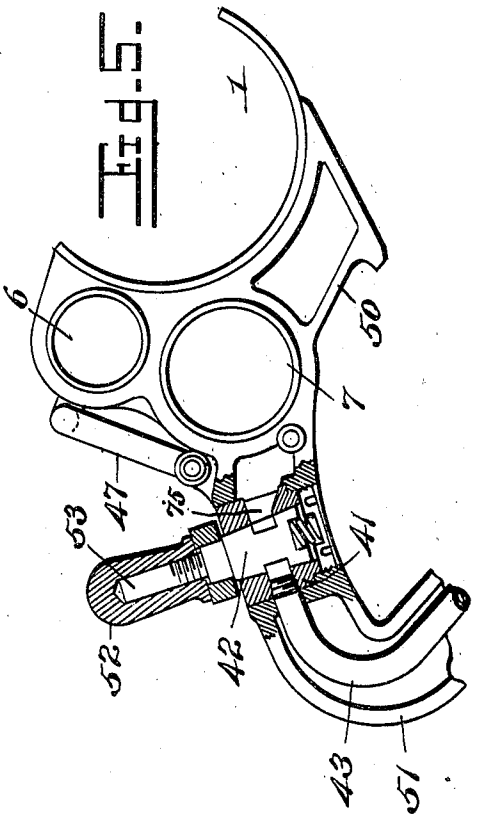


Fig. 5.



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4 SHEETS—SHEET 4.

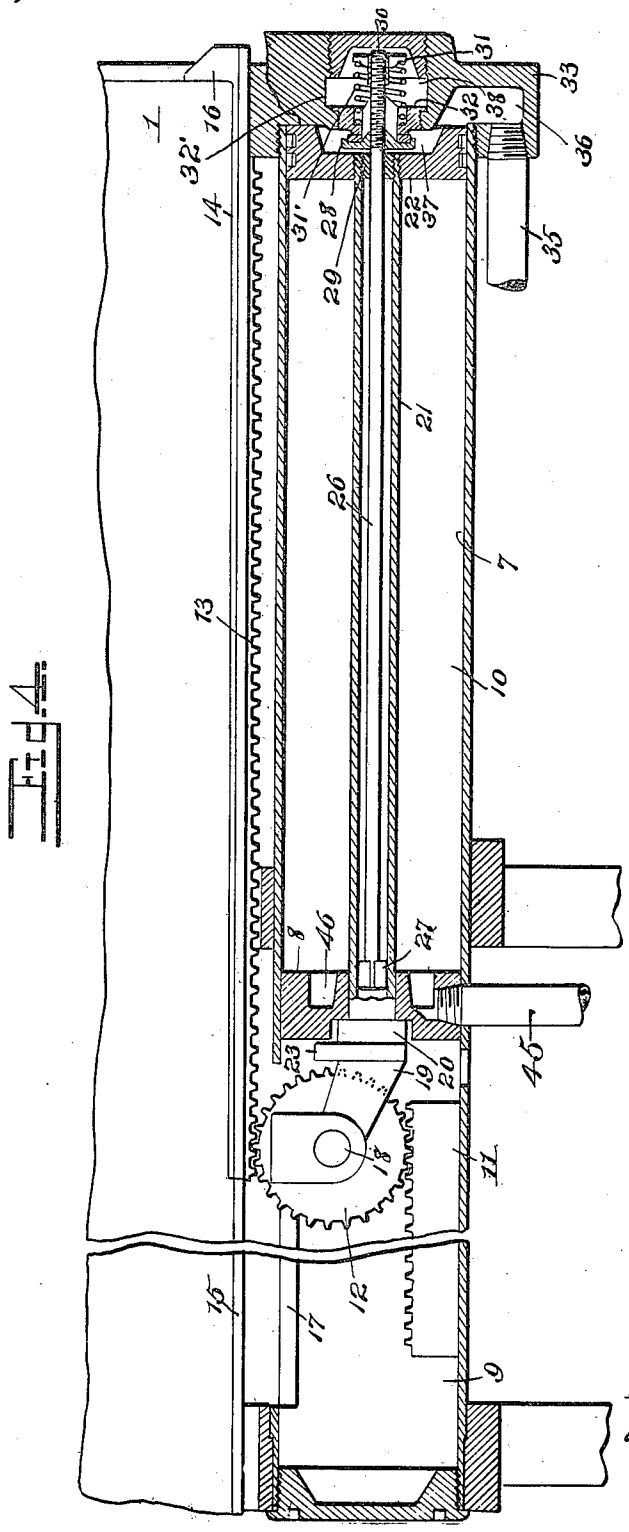


FIG. 4.

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UNITED STATES PATENT OFFICE.

EDWARD K. STANDISH, OF STOUGHTON, MASSACHUSETTS.

DEVICE FOR LOADING PROJECTILES INTO CANNON.

Application filed May 22, 1920. Serial No. 383,587.

(FILED UNDER THE ACT OF MARCH 3, 1883, 22 STAT. L., 625.)

To all whom it may concern:

Be it known that I, EDWARD K. STANDISH, a citizen of the United States, and a resident of Stoughton, county of Norfolk, State of Massachusetts, have invented an Improvement in Devices for Loading Projectiles Into Cannon, of which the following is a specification.

The invention described herein may be used by the Government, or any of its officers or employees in prosecution of work for the Government, or by any other person in the United States, without payment to me of any royalty thereon, in accordance with the act of March 3, 1883.

This invention relates to devices for loading projectiles into cannon, and the object, in general, is to provide a novel device of this nature which will be semi-automatic in operation, and which will load around at all angles of elevation and which will allow of varying the pressures of loading made necessary by these varying angles.

A further object is to provide such a device which will be simple in construction, and positive and reliable in operation.

A further object is to provide a light compact device whose total length is less than that of the round to be loaded and which will provide a loading movement greater than its own length.

A further object is to provide a loading device embodying safety means for preventing operation of the firing mechanism during the loading operation.

With these objects in view, the invention resides, broadly stated, in a loading device embodying a projectile cradle pivotally hung from the cannon, or its support, at one side of the breech, and fluid-actuated means for moving the projectile along said cradle and into the cannon when the cradle has been swung upward to operative or loading position.

More specifically, the invention resides in a device embodying said cradle and including projectile-propelling members independently and successively movable in said cradle.

Still more specifically, the invention resides in the combination of such projectile-propelling members, successively-operable pistons controlling movement of such members, and novel connections between said pistons and said members.

The invention resides, furthermore, in safety means controlled by said cradle and automatically engageable with the firing mechanism when the cradle is swung into loading position, to lock said mechanism against movement, said mechanism comprising preferably, a locking-bar normally spring-pressed into locking engagement with the firing mechanism, and automatically releasable when the cradle is swung downward, out of loading position.

The invention resides, finally, in certain felicitous refinements of construction and advantageous combinations of parts, as will be fully hereinafter explained, and which go to make up the ultimate perfection of the device as an entirety.

The accompanying drawings graphically portray an illustrative embodiment of the underlying principles of the invention. Like reference characters, of course, designate corresponding parts throughout the several views. Briefly described:

Figure 1 is a view in side elevation of my mechanism for loading projectiles into cannon;

Figure 2 is a vertical sectional view, on the line 2—2, Fig. 1, looking in the direction of the arrows;

Figure 3 is a fragmentary longitudinal sectional view of the upper cylinder;

Figure 4 is a fragmentary longitudinal sectional view of the lower cylinder; and

Figure 5 is a fragmentary view taken looking at the forward end of the cylinders and the cradle, the fluid valve being shown in section.

Referring, now, in detail to the drawings:

1 designates a cradle mounted for oscillatory movement, so that, in the upper position thereof (as shown in full lines in Fig. 1), it is in alinement with the cannon-barrel, whereby, in the loading operation, a projectile disposed in said cradle may be propelled therealong into the barrel.

In this instance, the cradle is preferably carried by a casting or oscillatory bracket 2, having a bent or bell-crank arm 3 keyed to a rock-shaft 4 suitably journaled for axial turning movement. This rocking shaft 4 is of hollow construction and carries the oper-

ating fluid to the valve 42 and the pistons 22 and 40. A pressure controlling valve is also placed between the source of supply of said fluid and shaft 4, the operating pressure being changed as the gun is elevated to compensate for the greater power required to load at high elevations.

Conveniently, the arm 3 and thus the cradle 1 is manually oscillated by a handle 5 carried by the arm.

Carried by the casting 2 are upper and lower cylinders 6, 7, respectively, which are disposed in parallel relationship, as shown.

The lower cylinder 7, Fig. 4, is divided by a partition 8 into two sections 9, 10.

In section 9 is disposed a stationary rack 11. A toothed wheel 12 meshes, at diametrically opposite points on its circumference, with said rack and with a movable rack 13 disposed exteriorly of the cradle 1 and carried on the under surface of a projectile-carriage 14 slidable in a longitudinal slot 15 in the cradle. The carriage 14 is provided with a lateral toe 16, against which a projectile rests when the carriage 14 is in movement to load the projectile into the cannon. The wheel 12 projects, as shown, through a longitudinally-extending slot 17 in the wall of section 9 of the cylinder 7.

The wheel 12 is mounted on an axle 18 supported by arms 19 on a head 20 at the end of a hollow piston-rod 21 slidably mounted in the partition 8 and carried by a piston 22. The head 20 carries a projection or tripper 23.

Arranged in the path of movement of said tripper, near the end of the movement of the piston 22 toward the partition 8, is one end of a rocker-dog 24 provided, intermediate its length, with pivot-trunnions 25, 25 suitably journaled in bearings 62 disposed between the two cylinders 6 and 7. The other end of said rocker-dog projects into the cylinder 6, as shown in Fig. 3, and constitutes a latch to prevent movement of the piston 40 in said cylinder, as will presently appear. A coiled spring 63 normally tends to maintain the latch in tilted position, as shown.

Within the hollow piston rod 21, Fig. 4, is a valve-rod 26 carrying, at the end thereof interiorly of the piston-rod, a head or collar 27 and, toward its other end, a valve 28. The head 27 is so arranged relative to the piston 22 that, when the piston has about completed its movement toward the partition 8, said head will be struck by a plug 29 screwed into the piston end of the piston-rod 22, as shown in Fig. 4, and thus move the valve 28 away from its valve-seat. The piston rod slides through the plug 29, and the latter thus constitutes a support or bearing therefor.

The end of the valve-rod 26 exteriorly of the piston-rod 21 is screw-threaded, as shown at 30, and the valve 28, having a central, threaded aperture is threaded onto the screw-threaded portion of the valve-stem so as to occupy a position thereon removed from the end thereof. Threaded on the exterior end of said threaded portion of the valve-stem is a disk 31, and a spring 31′ encircles said threaded portion of the valve-stem and bears, at one end, against said cap 31 and, at its other end, against an apertured plug 32 screwed into a diaphragm 32′ in an end casting 33 at the end of the cylinders 6 and 7, and to which casting said cylinders are secured, as by being threaded thereinto. Said spring functions to keep the valve 28 normally against its valve-seat formed on the plug 32.

The casting 33 is tapped for connection with a pipe 35, and is formed to provide a chamber 36; and the piston 22 is preferably hollowed or dished out on the outer face thereof, as shown, to provide a space or pocket 37 communicating with the chamber 36.

The valve 28, it will be noted, controls communication, by way of the opening through the plug 32, between said chamber 36 on one side of the diaphragm 32′ and a chamber 38 on the other side thereof. From said chamber 38, a port 39 leads to the upper cylinder 6, in front of a piston 40 therein, Fig. 3.

One end of the pipe 35 is tapped into a valve-casing 41, Fig. 1, of a two-way valve 42. Also tapped into the valve-casing 41 is a fluid-supply pipe 43 leading from a source of fluid-supply, preferably compressed air. Also tapped into the valve-casing 41 is a third pipe 44, having a branch 45 tapped into the cylinder 7 and into the partition 8, as shown in Fig. 4. The partition 8 is preferably provided with a ring-shaped groove or annular recess 46 in one face thereof, with which the pipe-branch 45 communicates, as shown. The pipe 44 is also provided with a second branch 47 (Figs. 1, 3 and 5) tapped into the cylinder 6 and into a partition 48 in said cylinder, and provided with a ring-shaped groove or annular recess 49 in one face thereof.

It will be noted that, in one position of the valve 42, pipe 43 is thrown into communication with pipe 35, and that, in the other position of the valve, communication is established between pipe 43 and pipe 44.

The valve-casing 41 is carried by a casting 50 assisting the casting 2 in supporting the cylinders 6 and 7 and the cradle 1, and is provided with a bell-crank arm 51 keyed to the rock-shaft 4.

A handle 52 may be threaded on the threaded portion of the valve-stem 53, and may be grasped by the operator in tilting the cradle 1.

The valve 42 is conveniently provided

with operating handles 54, 54 for turning the same.

The partition 48 divides the cylinder 6 into two sections 56, 57.

The piston 40 in the upper cylinder 6 is connected with a piston rod 55, which slides through a central aperture in the partition 48.

The end of the piston rod 55 projecting into the section 56 carries a hollow head 58. Pivoted to said head is a bell-crank lever 59, the shorter arm whereof depends into the head, as shown in Fig. 3, and the longer arm whereof projects through a slot 60 and into the cradle 1, in the path of movement of a projectile propelled therealong by the finger or lug 16.

A coiled spring 61 disposed near the end of the shorter arm of said lever 59 and between said arm and the end of the piston-rod 55 tends normally to hold the longer arm of the lever in raised position.

Normally, the latch 24 prevents movement of the piston 40, since the end of the latch projecting into the cylinder 6 is in the path of movement of the head 58, and the latter is prevented from advancing since said projecting end of the latch 24 is in juxtaposition thereto, as shown in Fig. 3.

In operation, assuming the breech of the cannon to be open and the cradle 1 tilted into the position shown in dotted lines in Fig. 2, the procedure of loading a projectile into the cannon is as follows:

A projectile is disposed in the cradle 1, against the lug 16, and the cradle is then moved into the full line position shown in Fig. 2 by the operator pushing upon the handles 5 and 52. This brings the cradle into alinement with the barrel. The valve 42 is then moved to admit air under pressure from the pipe 43 to the pipe 35, whence it enters the chamber 36 and impinges against the piston 22 to reciprocate the same toward the partition 8. The movable rack 13 is thus reciprocated in double quick time, owing to the meshing therewith and with the stationary rack of the wheel 12, which is operatively connected with the piston rod 21. The projectile on the traveling carriage 14 is thus propelled quickly along the cradle 1 until the piston 22 contacts with the partition 8 and the wheel 12 arrives at the end of the rack 11. In this position, the projectile has been advanced to a position directly in front of and in proximity to that end of the lever 59 which projects into the cradle; and the tripper 23 has moved into contact with the latch 24 to rock the same to bring the projecting end thereof out of the path of movement of the head 58 on the piston rod 55, thus permitting the piston 40 to move forward.

Immediately before the piston 22 moves into contact with the partition 8, the plug or tripper 29 contacts with the collar 27 and, in the continued further, but slight movement of the piston 22 before it strikes the partition 8, the valve-stem 26 is moved slightly to withdraw the valve 28 from its seat on the plug 32. The compressed air in the chamber 36 then passes through the central aperture in the plug 32, into the chamber 38, and thence through the port 39 to the piston 40, which is caused to reciprocate, the longer arm of the lever 59 pushing the projectile farther along the cradle 1 and into the barrel.

The pistons 22 and 40 are returned to normal position by rotating the valve 42 to bring the pipe 43 into communication with the pipe 44, whereupon the compressed air flows through the branches 45 and 47 into the ring-shaped cavities 46 and 49 in the partitions 8 and 48, respectively, thus driving the two pistons in the reverse direction, the air at the rear of pistons 22 and 40 being allowed to escape through pipe 35 and valve 42 to exhaust-port 75. The piston 22 has preferably an area equal to twice that of piston 40. Therefore, with uniform air pressure the velocity of travel of the projectile throughout its entire movement and the power required should be uniform.

It will be recognized that the structure described is simple, and requires no recondite knowledge to operate the same, and that the desired and important object of having the projectile propelled at uniform speeds along successive lengths of travel is accomplished in a certain, positive, and simple manner, and that the necessary over-travel of the round has been secured while maintaining the overall length of the loader at less than the length of the round.

Suitable means are provided for automatically locking the cradle in depressed position, as shown in dotted lines in Fig. 2. In this instance, such means comprises the following combination of structural elements:

Pivoted intermediate its length, as at 62, to the casting 2 is a rocker-arm 63, spring pressed, at one end, by a spring-pressed plunger 64, and bearing upwardly, at its other end, against the lower end of a pin 65 projecting longitudinally through the handle 5 and carrying, at its upper end, a button or finger-piece 66, by means of which the rocker-arm 63 may be rocked against the tension of the spring 67 disposed behind the plunger 64. In operation, as the arm 3, forming part of the casting 2 carrying the cradle 1, is rocked downward on its fulcrum 4, the rocker-arm 63 trails over a projection 68 on the brake 69 until the spring-pressed end thereof rides clear of said projection, whereupon the spring 67 forces said end downward so that it bears against the front wall of said projection 68 (as shown in dotted lines in Fig. 2) whereby the arm

3 is locked in its lowered position while the projectile is being placed in the cradle 1. When the operator desires to return the arm 3 and thus the cradle 1 to upper position, he presses down upon the thumb-piece 66, which rocks the rocker-arm 63 against the tension of the spring 67, thus moving the end of said rocker-arm out of contact with the front wall of the locking projection 68, whereupon the rocker-arm trails over the top of said projection, as the arm 3 returns to its raised position.

My invention comprehends suitable safety means for preventing operation of the firing mechanism during the loading operation, and, while such means may conceivably take a variety of forms, I have shown my preferred type, which is exceedingly simple in construction and positive and reliable in action, and which I will now proceed to describe:

A locking-bar 69′ is suitably supported for limited rectilinear movement in a bearing 70 carried by the brake 69 and having an enlarged portion, or head, 71 at one end thereof, in which is disposed a coiled spring 72 encircling said bar 69′ and bearing, at one end, against a collar 73 thereon and, at its other end, against the inner end wall of the diametrically enlarged recess in said head, the spring functioning, as is obvious, to move the bar 69′ in one direction, toward and into locking engagement with the firing-mechanism (not shown). The bar 69′ is provided, at the end thereof opposite the collar 73, with a locking-shoulder 73′ normally out of contact with a co-acting projection 74 fastened to the shaft 4 and having a movement of rotation when the loader is rocked downward or upward on its fulcrum. It will thus be seen that the shoulder 73′ on the bar 69′ is in the path of movement of said projection 74 when the arm 3 is moved downward, so that, during such movement, said projection engages said shoulder and moves the locking-bar 69′ in the direction to release the same from the firing mechanism. When the arm 3 is in raised position, with the cradle 1 in alinement with the cannon-barrel, and the projectile is being loaded into the cannon, the locking-bar 69′ is automatically engaged with the firing mechanism.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In a loading mechanism for cannon, and the like, a cradle movable into and out of alinement with the cannon-barrel, at the breech thereof, and projectile-propelling members at the side of said cradle and successively movable in said cradle.

2. In a loading mechanism for cannon, and the like, a cradle movable into and out of alinement with the cannon-barrel, at the breech thereof, projectile-propelling members at the side of said cradle and successively movable in said cradle, and fluid-actuated mechanism for effecting such movement of said members.

3. In a loading mechanism for cannon and the like, a cradle movable into and out of alinement with the cannon-barrel, at the breech thereof, projectile-propelling members at the side of said cradle, piston-cylinders, fluid-actuated pistons in said cylinders, and connections between said pistons and said members.

4. In a loading mechanism for cannon and the like, an oscillating cradle movable into and out of alinement with the cannon-barrel, at the breech thereof, and projectile-propelling members located at the side of said cradle and movable therewith.

5. In a loading mechanism for cannon and the like, a cradle movable into and out of alinement with the cannon-barrel, at the breech thereof, a projectile-propelling member in said cradle, a piston-cylinder, a fluid-actuated piston in said cylinder, carrying a piston-rod, and a rotatable member carried by said piston-rod and engaging said projectile-propelling member to actuate the same.

6. In a loading mechanism for cannon and the like, a cradle movable into and out of alinement with the cannon-barrel, at the breech thereof, a projectile-propelling member in said cradle, a piston-cylinder, a fluid-actuated piston in said cylinder, carrying a piston-rod, and a rotatable member carried by said piston-rod and geared to said projectile-propelling member to actuate the same.

7. In a loading mechanism for cannon and the like, a cradle movable into and out of alinement with the cannon-barrel, at the breech thereof, a projectile-propelling member in said cradle, a piston-cylinder, a fluid-actuated piston in said cylinder, carrying a piston-rod, and a rotatable, circumferentially-toothed wheel carried by said piston-rod and meshing with said projectile-propelling member to actuate the same.

8. In a loading mechanism for cannon and the like, a cradle movable into and out of alinement with the cannon-barrel, at the breech thereof, a projectile-propelling member in said cradle, provided with a rack, a piston-cylinder, a fluid-actuated piston in said cylinder, carrying a piston-rod, and a rotatable, circumferentially-toothed wheel carried by said piston-rod and meshing with said projectile-propelling-member rack.

9. In a loading mechanism for cannon and the like, a cradle movable into and out of alinement with the cannon-barrel, at the breech thereof, a projectile-propelling member in said cradle, provided with a rack, a piston-cylinder, a fluid-actuated piston in

said cylinder, carrying a piston-rod, a rotatable, circumferentially-toothed wheel carried by said piston-rod and meshing with said projectile-propelling-member rack, and a stationary rack in said cylinder meshing with said toothed wheel.

10. In a loading mechanism for cannon and the like, a cradle movable into and out of alinement with the cannon-barrel, at the breech thereof, a piston-cylinder at the side of said cradle, a fluid-actuated piston in said cylinder, carrying a piston-rod, and a projectile-propelling member carried by said piston-rod and projecting into said cradle.

11. In a loading mechanism for cannon and the like, a cradle movable into and out of alinement with the gun barrel at the breech thereof, projectile propelling members carried by said cradle and successively movable thereon, and a radially movable member attached to the end of one of said propelling members and adapted to assist in propelling the said projectile into the gun.

12. In a loading mechanism for cannon and the like, a cradle movable into and out of alinement with the cannon-barrel, at the breech thereof, projectile-propelling members in said cradle, piston-cylinders, successively-actuated pistons in said cylinders, and connections between said pistons and said members.

13. In a loading mechanism for cannon and the like, a cradle movable into and out of alinement with the cannon-barrel, at the breech thereof, projectile-propelling members in said cradle, piston-cylinders, a valved-passageway connecting said cylinders, successively-actuated pistons in said cylinders, connections between said pistons and said members, and means, controlled by the movement of one of said pistons, for opening said valve.

14. In a loading mechanism for cannon and the like, a cradle movable into and out of alinement with the cannon-barrel, at the breech thereof, projectile-propelling members in said cradle, piston-cylinders, a valved-passageway connecting said cylinders, successively-actuated pistons in said cylinders, connections between said pistons and said members, a hollow piston-rod carried by one of said pistons, a stem carried by the valve in said passageway and projecting into said piston-rod and actuated during the movement of the piston carrying said hollow rod, to open said valve.

15. In a loading mechanism for cannon and the like, a cradle movable into and out of alinement with the cannon-barrel, at the breech thereof, projectile-propelling members in said cradle, piston-cylinders, successively-movable pistons in said cylinders, means for positively preventing movement of one of said pistons while the other one is moving in the loading direction, means for moving said first-mentioned means to inoperative position when said piston has completed its movement in the loading direction, and connections between said pistons and said projectile-propelling members.

16. In a loading mechanism for cannon and the like, a cradle movable into and out of alinement with the cannon-barrel, at the breech thereof, projectile-propelling members in said cradle, piston-cylinders, pistons in said cylinder successively movable in one direction and simultaneously movable in the reverse direction, and connections between said pistons and said projectile-propelling members.

17. In a loading mechanism for cannon and the like, a cradle movable into and out of alinement with the cannon-barrel, at the breech thereof, a projectile-propelling member movable in said cradle, and safety-means automatically engageable with the cannon firing-mechanism when the cradle is in alinement with the cannon-barrel.

18. In a loading mechanism for cannon and the like, a cradle movable into and out of alinement with the cannon-barrel, at the breech thereof, a projectile-propelling member movable in said cradle, and safety-means automatically engageable with the cannon firing-mechanism when the cradle is in alinement with the cannon-barrel, and automatically releasable from said cannon firing-mechanism when the cradle is moved away from the cannon-barrel.

19. A shell or round loader for cannon and the like, comprising a cradle pivotally connected to a gun, means for moving said cradle into and out of position at the rear of said gun, and a projectile propelling mechanism attached to said cradle at the side thereof, the rear end of said propelling mechanism being substantially in line with the rear end of the shell or round.

20. Means for loading a shell or round into a cannon or the like, comprising a cradle for holding said round pivotally connected to a gun, mechanism adapted to propel said round along said cradle, means for moving the cradle and propelling mechanism into and out of operative position at the rear of said gun, said propelling mechanism being attached to the side of said cradle and movable therewith.

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