April 5, 1938. V. F. LUCHT ET AL 2,112,853

LOADER FOR GUNS

Filed May 4, 1936 4 Sheets-Sheet 1

Fig. 1.

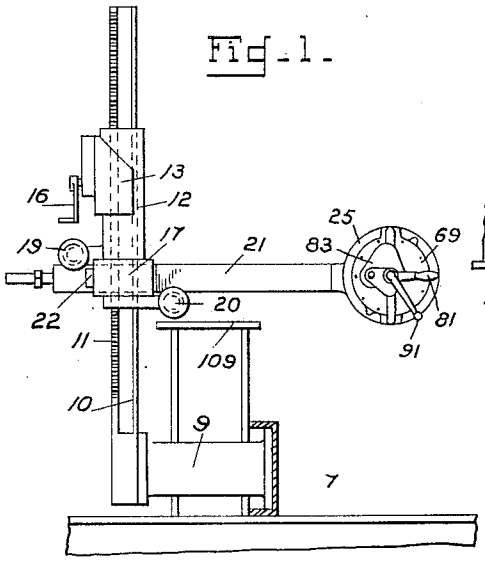


Fig. 2.

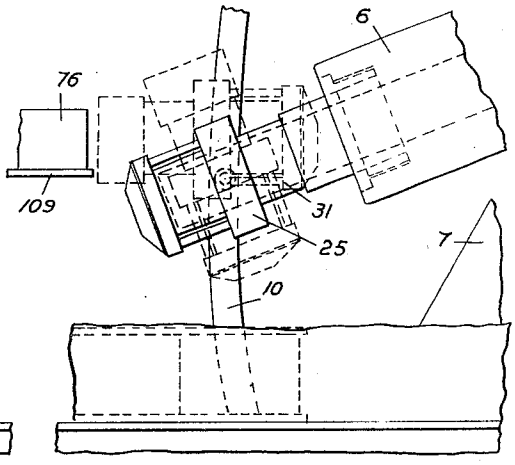


Fig. 3.

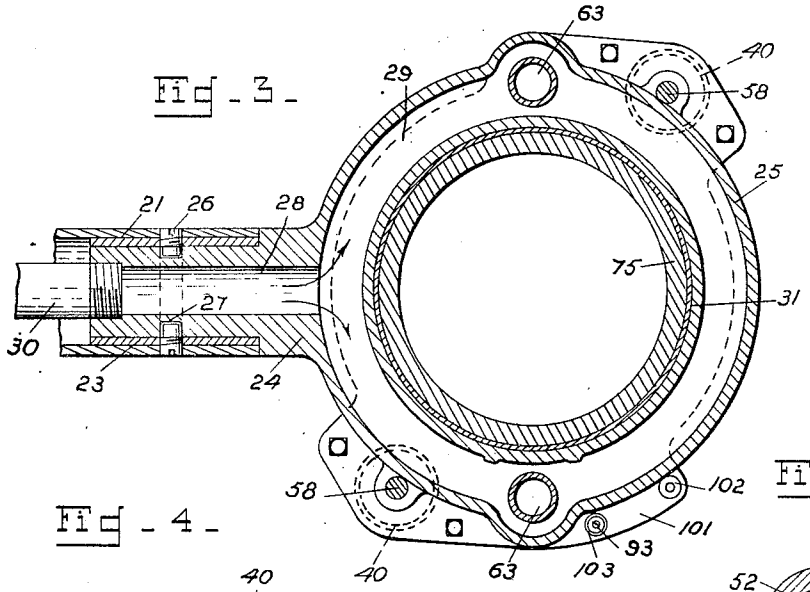


Fig. 4.

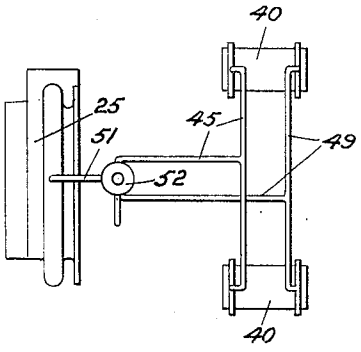
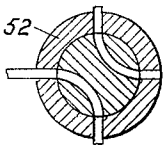


Fig. 5.



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Fig. 6.

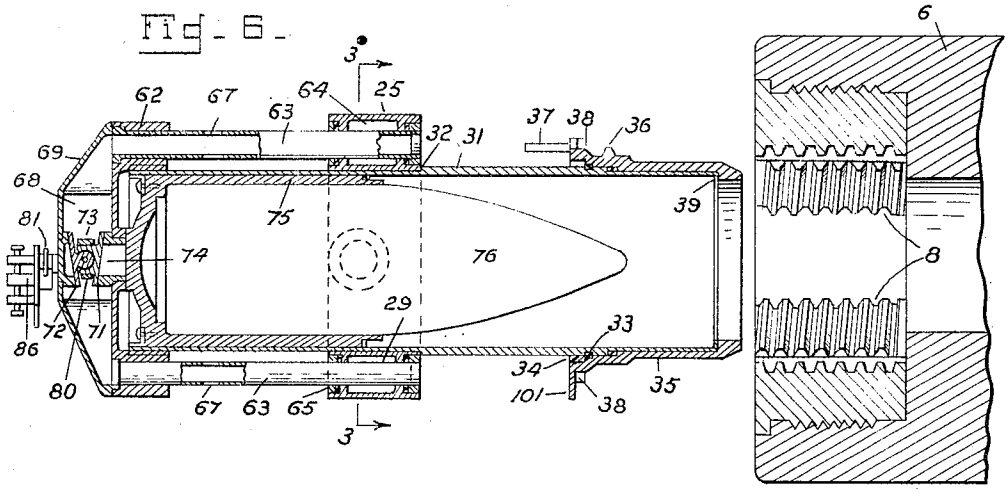


Fig. 7.

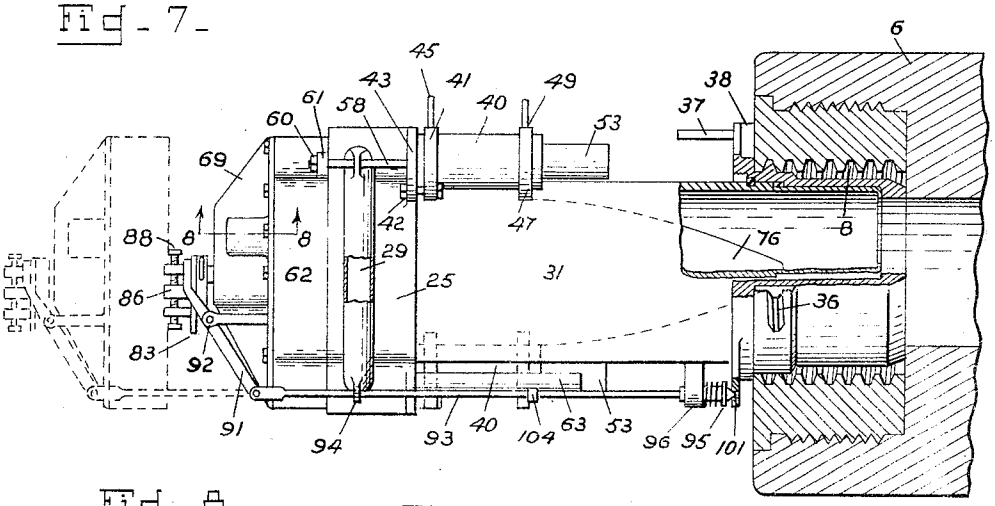


Fig. 8.

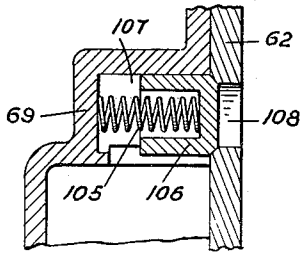


Fig. 9.

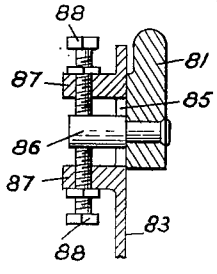
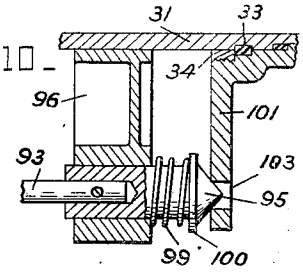


Fig. 10.



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Fig. 11.

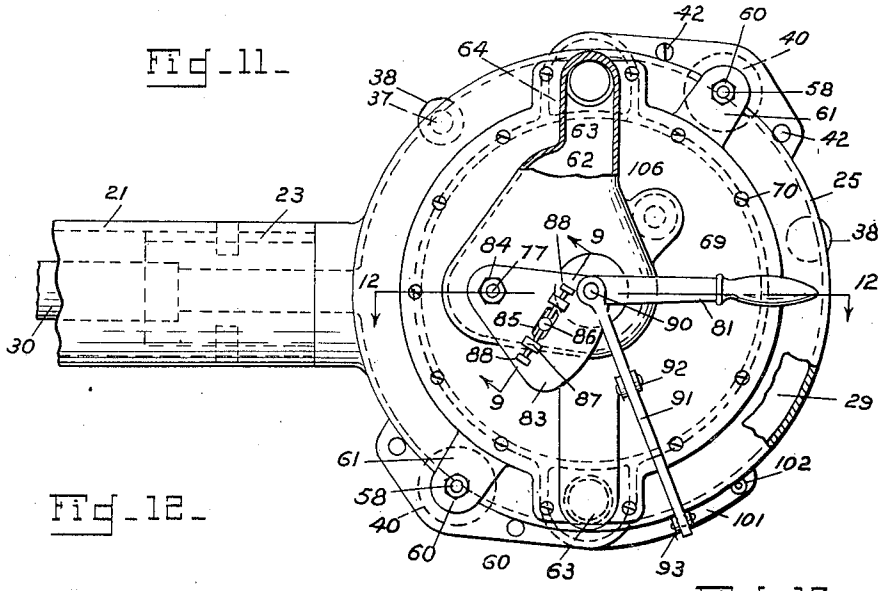


Fig. 12.

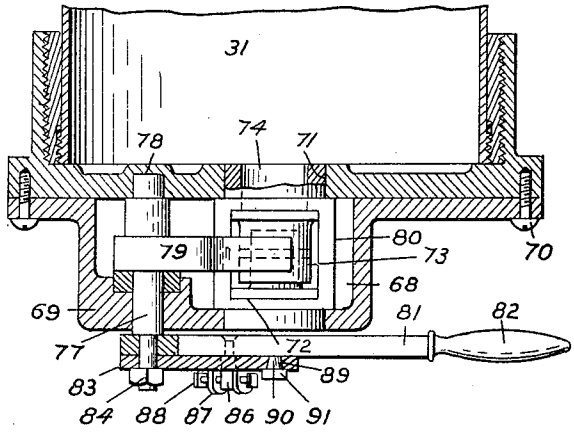


Fig. 13.

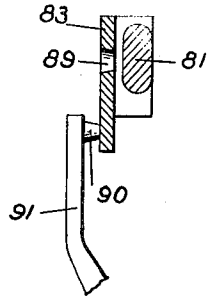


Fig. 14.

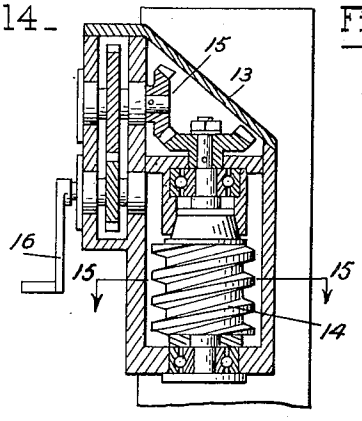
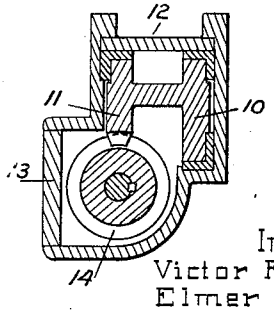


Fig. 15.



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Fig. 16.

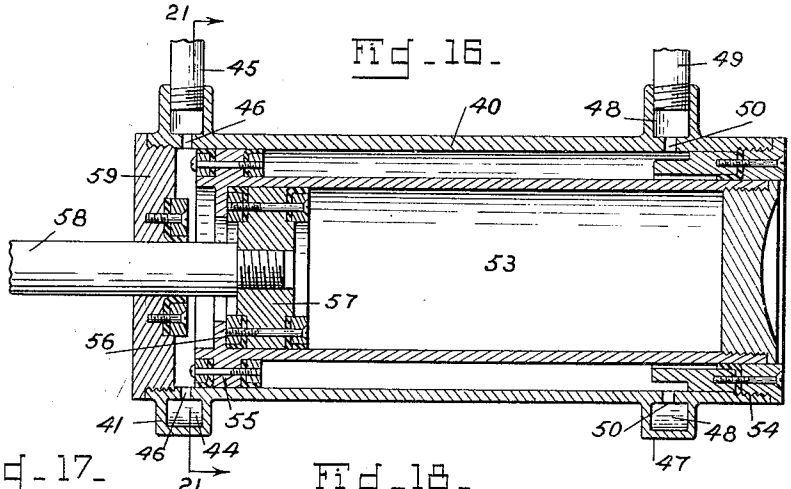


Fig. 17.

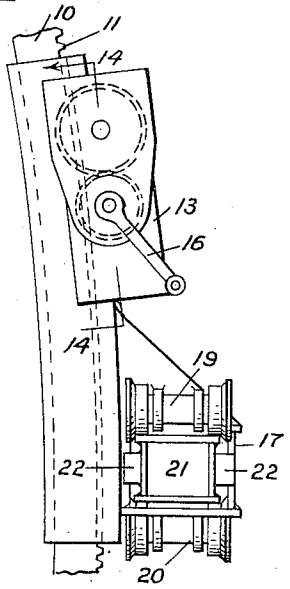


Fig. 18.

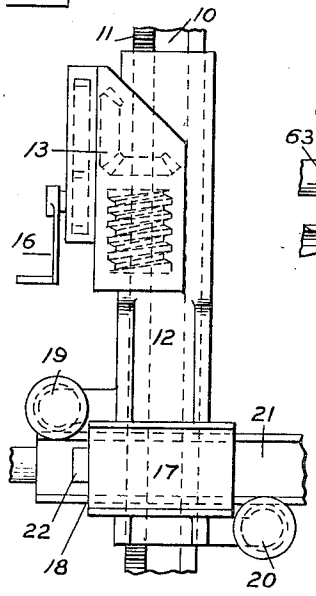
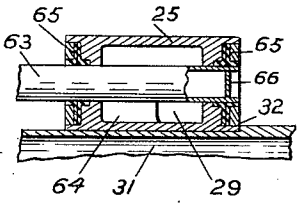


Fig. 19.



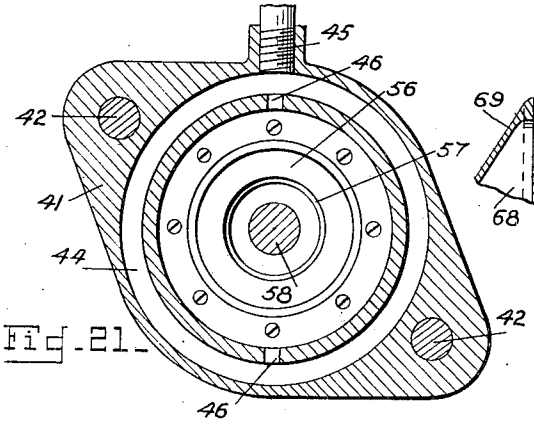
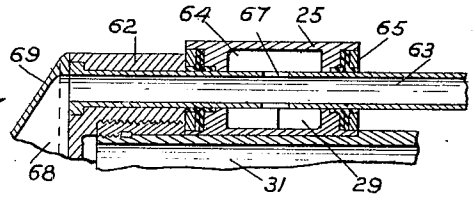


Fig. 21.

Fig. 20.



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UNITED STATES PATENT OFFICE

2,112,853

LOADER FOR GUNS

Victor F. Lucht, Aberdeen, Md., and Elmer C. Goebert, Philadelphia, Pa.

Application May 4, 1936, Serial No. 77,766

13 Claims. (Cl. 89—47)

(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 us of any royalty thereon.

This invention relates to a loader for guns.

In medium and large caliber guns the projectile is of considerable weight and it is customary to move the gun into an approximately horizontal position to facilitate loading of the projectile into the gun. The projectile may first be placed on an auxiliary loading tray or it may be rammed into the gun directly from a cart or wagon.

The purpose of this invention is to provide a pneumatically operated loader which is capable of loading the gun at an angle of 20 degrees, of reducing the time of loading and of producing a uniform seating of the projectile on the forcing cone in the bore of the barrel.

Further objects are to arrange a loading cylinder which is conveniently movable to and from a position in rear of the gun barrel, which is tiltable to receive a projectile and present it to the bore of the barrel and which is movable into and out of locked engagement with the barrel.

With the foregoing and other objects in view, the invention resides in the novel arrangement and combination of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed may be made within the scope of what is claimed without departing from the spirit of the invention.

A practical embodiment of the invention is illustrated in the accompanying drawings, wherein:

Fig. 1 is a view in rear elevation of the improved loader.

Fig. 2 is a somewhat diagrammatic view in side elevation showing the various positions of the loading cylinder during the loading operation.

Fig. 3 is a sectional view on the line 3—3 of Fig. 6.

Fig. 4 is a diagrammatic view of the air connections between the cradle and the cylinders.

Fig. 5 is a sectional view of the two-way valve of Fig. 4.

Fig. 6 is a longitudinal sectional view through the loading cylinder showing the relation of the parts before the cylinder is connected to the gun.

Fig. 7 is a view in side elevation with parts in section showing the cylinder coupled to the gun.

Fig. 8 is a sectional view on the line 8—8 of Fig. 7.

Fig. 9 is a sectional view on the line 9—9 of Fig. 11.

Fig. 10 is a sectional view through the latch for holding the coupling sleeve.

Fig. 11 is a view in rear elevation, with parts in section of the loading cylinder.

Fig. 12 is a sectional view on the line 12—12 of Fig. 11.

Fig. 13 is a detail view showing the relationship between the lever of the latch rod and the plate of the valve-actuating lever.

Fig. 14 is a sectional view on the line 14—14 of Fig. 17.

Fig. 15 is a sectional view on the line 15—15 of Fig. 14.

Fig. 16 is a longitudinal sectional view of one of the cylinder and piston units.

Figs. 17 and 18 are views respectively in rear and side elevation of the carriage for supporting the arm of the cradle.

Figs. 19 and 20 are longitudinal sectional views showing the relationship of one of the air tubes and cradle respectively in the rearward and forward positions of the loading cylinder.

Fig. 21 is a sectional view on the line 21—21 of Fig. 16.

Referring to Figs. 2 and 6 there is shown a gun barrel 6 of the recoiling type mounted for movement in elevation on a rotatable top carriage 7. The bore of the gun barrel is provided with the usual interrupted threads 8 for a screw breech block (not shown).

An arm 9 (Fig. 1) on the top carriage 7 extends laterally with respect to the gun and carries an arcuate upright support 10 which includes a rack 11. A carriage 12 mounted on the support has a housing 13 on its upper portion which carries a worm 14 (Figs. 14 and 15) meshing with the rack and actuated by a train of gears 15 including a handwheel 16.

A frame 17 (Figs. 17 and 18) on the lower portion of the carriage 12 has a horizontally disposed passage 18 arranged perpendicularly to the vertical plane containing the longitudinal axis of the gun barrel and is provided at its opposite ends with an upper set of rollers 19 and a lower set of rollers 20.

An arm 21 extending through the passage 18 and slidably supported by the sets of rollers 19 and 20 has lugs 22—22 adjacent its outer end for engaging one end of the frame 17 and thereby limiting movement of the arm towards the gun barrel. The other or inner end of the arm

is provided with a bearing 23 (Figs. 3 and 11) for receiving the trunnion 24 of an annular cradle 25. The trunnion is maintained against axial displacement by means of pins 26 threaded in the arm and bearing and extending into a peripheral groove 27 in the trunnion. The trunnion is formed with an air passage 28 leading to an annular air chamber 29 in the cradle 25. A pipe line 30 in the arm 21 leads from a source of air supply and is connected to the inner end of the trunnion.

A loading cylinder 31 (Fig. 6) is reciprocally mounted in the cradle 25 and is formed with an annular shoulder 32 at its approximate center for engaging the front face of the cradle and limiting its rearward movement with respect thereto. A ring 33 is mounted in a groove in the outer surface of the loading cylinder 31 and in spaced relation to its front or open end. A coupling ring 34 is rotatably mounted on the loading cylinder 31 in rear of the ring 33 and is threadedly engaged by the rear end of a coupling sleeve 35 which is rotatably mounted on the front end of the loading cylinder 31. The coupling sleeve 35 is provided with an interrupted thread 36 for engaging the interrupted thread 8 of the gun barrel. A handle 37 on the rear end of the coupling sleeve 35 provides means whereby the coupling sleeve is rotated. One or more rubber blocks 38 on the rear part of the coupling sleeve are adapted to engage the gun barrel to yieldingly limit forward movement of the loading cylinder. The front end of the coupling sleeve 35 is formed with an inturned flange 39 for limiting forward movement of a piston 75.

A pair of similar cylinders 40—40 (Fig. 7) are arranged in opposite relation (Fig. 11) on the forward side of the cradle 25, and each cylinder has a flange 41 (Figs. 16 and 21) at its rear end whereby it is attached by means of bolts 42 to a flange 43 (Fig. 7) on the cradle. The flange 41 is formed with an annular air chamber 44 (Fig. 16) and receives air from a line 45. The chamber 44 is in communication with the interior of the cylinder 40 through ports 46. At the front end of each cylinder 40, a flange 47 having an annular chamber 48 receiving air from a line 49, is in communication with the interior of the cylinder through ports 50. The air line 45 connects the rear chambers 44 of both cylinders and the air line 49 connects the front chambers 48 of both cylinders. The lines 45 and 49 are connected to the chamber 29 of the cradle by a supply line 51 including a two-way valve 52.

A cylindrical piston 53 spaced from the cylinder 40 and having a closed front end slidable in a bushing 54 in the cylinder is formed at its rear end with an external flange 55 engaging the cylinder and an internal flange 56 engageable by a piston head 57 adapted to work in the cylindrical piston. A rod 58 on the head 57 extends rearwardly through the rear cap 59 of the cylinder 40 and is attached by means of a nut 60 (Figs. 7 and 11) to an ear 61 on the base 62 of the loading cylinder 31.

A pair of tubes 63—63 (Figs. 6, 19 and 20) fixed in the base 62 on opposite sides of the loading cylinder 31 each has a front portion slidably inserted in a chamber 64 in the cradle 25. Since the chamber 64 and the chamber 29 are in communication, the cradle is provided with packing 65 to prevent leakage. Each tube has a closed front end 66 and is provided with ports 67 which are so positioned that they will have communication with the chamber 29 when the loading cylinder 31 is in forward position as clearly shown in Fig. 20. The rear end of each tube is open and in communication with a valve chamber 68 established between the base 62 and a shaped plate 69 (Figs. 11 and 12) secured to the base by screw bolts 70.

The base 62 and plate 69 are respectively provided with valve seats 71 and 72 (Figs. 6 and 12) for a two-part wedge type valve 73. The valve seat 71 has a port 74 for admitting air to the interior of the loading cylinder 31 where it acts to drive a piston 75 which is in the form of a short cylinder adapted to receive the rear portion of a projectile 76. The piston is arrested by the inturned flange 39 of the coupling sleeve 35, and the projectile, due to inertia is thrown into the gun barrel and seated on the forcing cone.

A shaft 77 journaled in the plate 69 and supported in a socket 78 of the base 62 carries an inner lever arm 79 having a fork 80 for engaging the valve 73 and it also carries an outer lever arm 81 having a handle 82. A locking plate 83 loosely mounted on the shaft on the outer side of the lever arm 81 and retained by a nut 84 is provided with a slot 85 for receiving a pin 86 carried by the outer lever arm 81. A pair of ears 87—87 are fixed on the plate 83 at opposite ends of the slot 85 and each one carries a set screw 88 adapted to engage the pin 86. By virtue of this arrangement the plate is adjustably positioned with respect to the lever arm 81 and is movable therewith.

The plate 83 is provided with an aperture 89 (Fig. 13) for receiving a pin 90 on the upper end of a lever 91 which is mounted on a fulcrum 92 (Fig. 7) carried by the plate 69. A rod 93 pivotally connected to the lower end of the lever 91 passes through an ear 94 of the cradle and on its front end it carries a latch 95 (Figs. 7 and 10) slidably mounted in a bracket 96 on the loading cylinder 31. A spring 99 embracing the latch and confined between the ear and a collar 100 on the latch normally holds the latch against a latch plate 101 on the under side of the coupling sleeve 35. The latch plate is formed with a pair of spaced recesses 102, 103 (Fig. 11) of varying depth.

The latch is engaged in the deep recess 102 (Fig. 3) only when the coupling sleeve 35 is threadedly engaged in the gun barrel. In this position the rod 93 is displaced forwardly and the pin 90 (Fig. 13) on the lever 91 is withdrawn from the plate 83 so that the lever 81, 79, is free to be moved to open the valve 73. When the air valve is open the plate 83 opposes forward movement of the lever 91 and prevents the latch 95 from being moved out of locking engagement with the coupling sleeve 35. Whenever the coupling sleeve 35 is moved out of its coupling position the latch plate 101 because of the shallow depth of recess 103, holds the rod 93 in rearward position so that the pin 90 on the lever 91 will lock the lever arm 81 against movement. This interlocking arrangement therefore makes it impossible to open the air valve unless the sleeve 35 is coupled to the gun barrel and prevents uncoupling of the sleeve until the air valve is closed. The latch when engaged in the shallow recess 103 holds the coupling sleeve 35 in proper position with respect to the loading cylinder 31 during reciprocation of the latter. A lug 104 on the rod 93 engages the ear 94 of the cradle when the loading cylinder is in retracted position thereby preventing movement

of the rod 93 to unlock the lever 81 or sleeve 35.

The plate 69 (Fig. 8) is formed with a guideway 105 in which a relief valve 106 is held by a spring 107 to close an outlet 108 in the base 62.

A loading platform 109 in rear of the support 10 is arranged for carrying a projectile in a position that is convenient for insertion into the loading cylinder.

The operation of loading a projectile into the gun barrel consists in rotating the cradle (Fig. 2) to dispose the loading cylinder 31 in an approximately horizontal position with its open end directed rearwardly towards the platform 109. The projectile is then inserted, base foremost, into the loading cylinder.

The loading cylinder is next moved horizontally to the center line of the gun, the arm 21 riding between the rollers 19 and 20. It is then rotated towards a vertical position, the open end moving upwardly, and during this operation the projectile and the piston 75, in which it seats, are lowered due to gravity. The carriage 12 is then actuated until the arm 21 is lined up with the bore of the gun barrel. The loading cylinder is now rotated on trunnion 24 until it is coaxial with the gun barrel, its open end being close to the breech block opening of the barrel.

The loading cylinder is now moved forwardly to insert the coupling sleeve 35 on its front end into the breech block opening of the barrel. This movement may be accomplished either manually or pneumatically. The handle 37 is then grasped and the coupling sleeve rotated to engage its thread 36 with the threads 8 of the barrel. The latch plate 101 on the coupling sleeve 35 is also displaced and its deep recess 102 is moved into line with and entered by the latch 95 so that the lever 91 may withdraw its pin 90 from the plate 83 of the air valve lever arm 81.

When the loading cylinder is in forward position (Fig. 7), the tubes 63 which also serve as guides during movement of the cylinder, have their ports 67 in communication with the chamber 29 of the cradle so that air under pressure flows to the valve chamber 68. If the handle 82 is now moved upwardly, the valve 73 will be opened and the air will flow through the port 74 into the loading cylinder and drive the piston 75 forwardly.

When the piston is arrested by the flange 39 of the coupling sleeve 35, the projectile carried by the piston 75 is thrown into the chamber of the gun barrel and seated on the forcing cone. Since the thread 36 is loosely fitted between the threads 8 of the barrel the coupling sleeve 35 is capable of a slight forward displacement which is cushioned by the rubber block 38.

The air valve 73 is now closed, the coupling sleeve 35 counterrotated to disconnect it from the threads 8 of the gun barrel, and the loading cylinder withdrawn. Withdrawal may be accomplished manually or pneumatically through the compound piston.

The loading cylinder when withdrawn is moved laterally so that it will be clear of the path of the gun barrel as it moves in recoil.

We claim:

1. In a loader for guns, a movably mounted cradle having an annular air chamber, a cylinder reciprocally mounted in the cradle, said cylinder having an open front end and a base closing its rear end, a sleeve rotatable on the open end of the cylinder and adapted to be coupled to a gun barrel, a plate secured to the base of the cylinder and spaced therefrom to provide a valve chamber, tubes fixed to the base exteriorly of the cylinder and passing through the air chamber of the cradle, said tubes having communication with the valve chamber and having ports in communication with the air chamber of the cradle when the cylinder is in forward position, a ported valve seat in the base, a valve seat on the plate, a valve between the seats, a lever for actuating the valve, and means for interlocking the lever and coupling sleeve.

2. In a loader for guns, a movably mounted cradle having an annular air chamber, a cylinder reciprocally mounted in the cradle, said cylinder having an open front end and a base closing its rear end, a plate secured to the base of the cylinder and spaced therefrom to provide a valve chamber, tubes fixed to the base exteriorly of the cylinder and passing through the air chamber of the cradle, said tubes having communication with the valve chamber and having ports in communication with the air chamber of the cradle when the cylinder is in forward position, a ported valve seat in the base, a valve seat on the plate, a valve between the seats, and a lever for actuating the valve.

3. In a loader for guns, a movably mounted cradle having a central opening and having an air chamber with openings parallel to the central opening, a cylinder reciprocally mounted in the central opening of the cradle, said cylinder having an open front end and a base closing its rear end, a plate secured to the base of the cylinder and spaced therefrom to provide a valve chamber, tubes carried by the base of the cylinder and passing through the openings in the air chamber of the cradle for establishing communication between the valve chamber and the air chamber of the cradle when the cylinder is in forward position, a ported valve seat in the base, a valve seat on the plate, a valve between the seats, and a lever for actuating the valve.

4. In a loader for guns, a movably mounted cradle having an air chamber, a cylinder reciprocally mounted in the cradle and having a port in its rear end, a valve for the port, guide tubes carried by the rear end of the cylinder and passing through the air chamber of the cradle parallel to the cylinder for establishing communication between the port and the air chamber in the cradle when the cylinder is in forward position, a projectile engaging piston in the cylinder, and means on the cylinder for limiting forward movement of the piston.

5. In a loader for guns, a movably mounted cradle having an air chamber, a cylinder reciprocally mounted in the cradle and having a port in its rear end, a valve for the port, guide tubes carried by the rear end of the cylinder and passing through the air chamber of the cradle parallel to the cylinder for establishing communication between the port and the air chamber in the cradle when the cylinder is in forward position.

6. In a loader for guns, a cradle, a cylinder reciprocally mounted in the cradle, a sleeve rotatable on the front end of the cylinder and adapted to be coupled to a gun barrel, a valve in the rear end of the cylinder for controlling an air supply to the cylinder, a lever for actuating the valve, a plate movable with the lever and adjustably positioned with respect thereto, said plate having a recess, a locking lever mounted on the cylinder, and having a pin on one end engageable in the recess of the plate, a rod connected to the other end of the locking lever and slidably mounted in

the cradle, a latch plate on the rotatable sleeve and having a recess for receiving the rod and a spring normally holding the rod against the latch plate and moving it into the recess thereof when the sleeve is in coupling position.

7. In a loader for guns, a cradle, a cylinder reciprocally mounted in the cradle, a sleeve rotatable on the front end of the cylinder and adapted to be coupled to a gun barrel, a valve in the rear end of the cylinder for controlling an air supply to the cylinder, a lever for actuating the valve, a locking lever mounted on the cylinder, said locking lever engageable with the valve lever to hold it in closed position and engageable by the valve lever when open, a rod connected to the lever and slidably mounted in the cradle, a latch plate on the rotatable sleeve acting on the rod when the sleeve is in uncoupled position to hold the locking lever in locking engagement with the valve lever, a spring for moving the rod into locking engagement with the latch plate and removing the locking lever from locking engagement with the valve lever.

8. In a loader for guns, a cradle, a cylinder reciprocally mounted in the cradle, a sleeve rotatable on the front end of the cylinder and adapted to be coupled to a gun barrel by being rotated on its axis, a valve for controlling an air supply to the cylinder and means for interlocking the sleeve and valve.

9. In a loader for guns, a platform, an upright support on the platform and including a rack, a carriage on the support and including gearing meshing with the rack, a frame on the carriage and having a horizontal passage, rollers on the frame, an arm extending through the passage of the frame and supported on the rollers, a cradle trunnioned in one end of the arm and having an annular air chamber, an air line in the arm and leading to the air chamber of the cradle, a loading cylinder reciprocally mounted in the cradle, means carried by the cradle and connected to the cylinder for reciprocating the same, means on one end of the cylinder for coupling it to a gun barrel, and means whereby air communication is established between the chamber of the cradle and the interior of the cylinder when the cylinder is coupled to a gun barrel.

10. In a loader for guns, a platform, an upright support on the platform and including a rack, a carriage on the support and including gearing meshing with the rack, a frame on the carriage and having a horizontal passage, rollers on the frame, an arm extending through the passage of the frame and supported on the rollers, a cradle trunnion in one end of the arm and having an annular air chamber, an air line in the arm and leading to the air chamber of the cradle, a loading cylinder reciprocally mounted in the cradle, means on one end of the cylinder for coupling it to a gun barrel, and means whereby air communication is established between the chamber of the cradle and the interior of the cylinder when the cylinder is coupled to a gun barrel.

11. In a loader for guns, a substantially vertically movable carriage, a horizontally movable arm mounted in the carriage, a cradle trunnioned in the arm for tilting movement in a vertical plane, a loading cylinder reciprocally mounted in the cradle and arranged to carry an article to be loaded in a gun, and a means on the loading cylinder for coupling it to a gun barrel and a rammer carried by the cylinder.

12. In a loader for guns, a substantially vertically movable carriage, a horizontally movable arm mounted in the carriage, a cradle trunnioned in the arm for tilting movement in a vertical plane, and a loading cylinder reciprocally mounted in the cradle and movable with the cradle through approximately 180 degrees in a vertical plane from load-receiving to load-delivering position.

13. In combination with a gun barrel having threads for a breech block which is to close the barrel for firing, a projectile containing loading cylinder mounted for movement towards and away from the gun barrel, a sleeve rotatable on one end of the loading cylinder, and a thread on said sleeve engageable with the threads of the gun barrel to connect said sleeve during loading.

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