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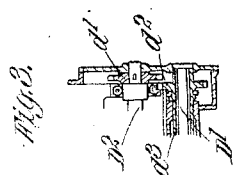
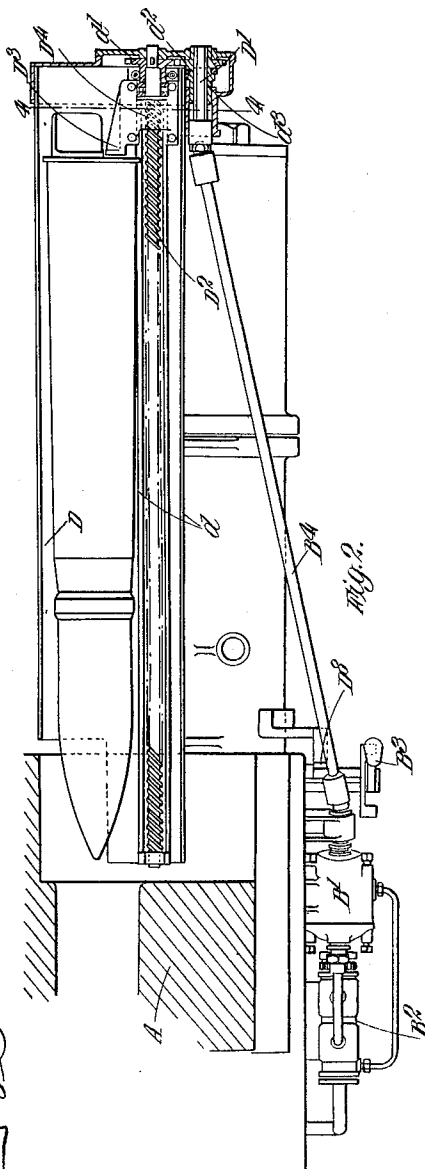
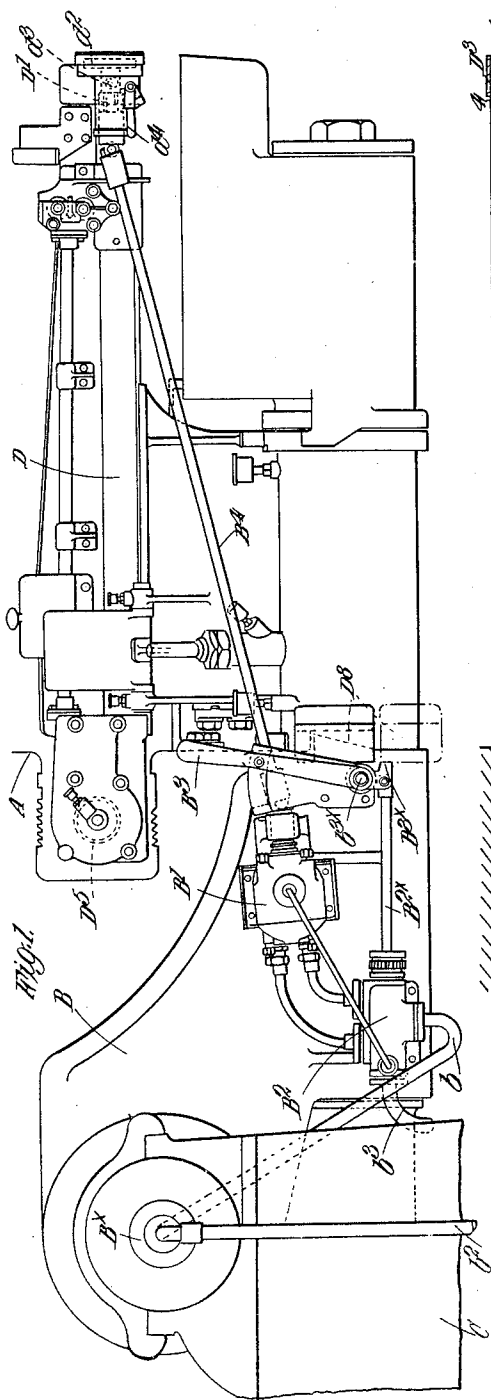
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AMMUNITION LOADING APPARATUS FOR ORDNANCE

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2 Sheets-Sheet 1



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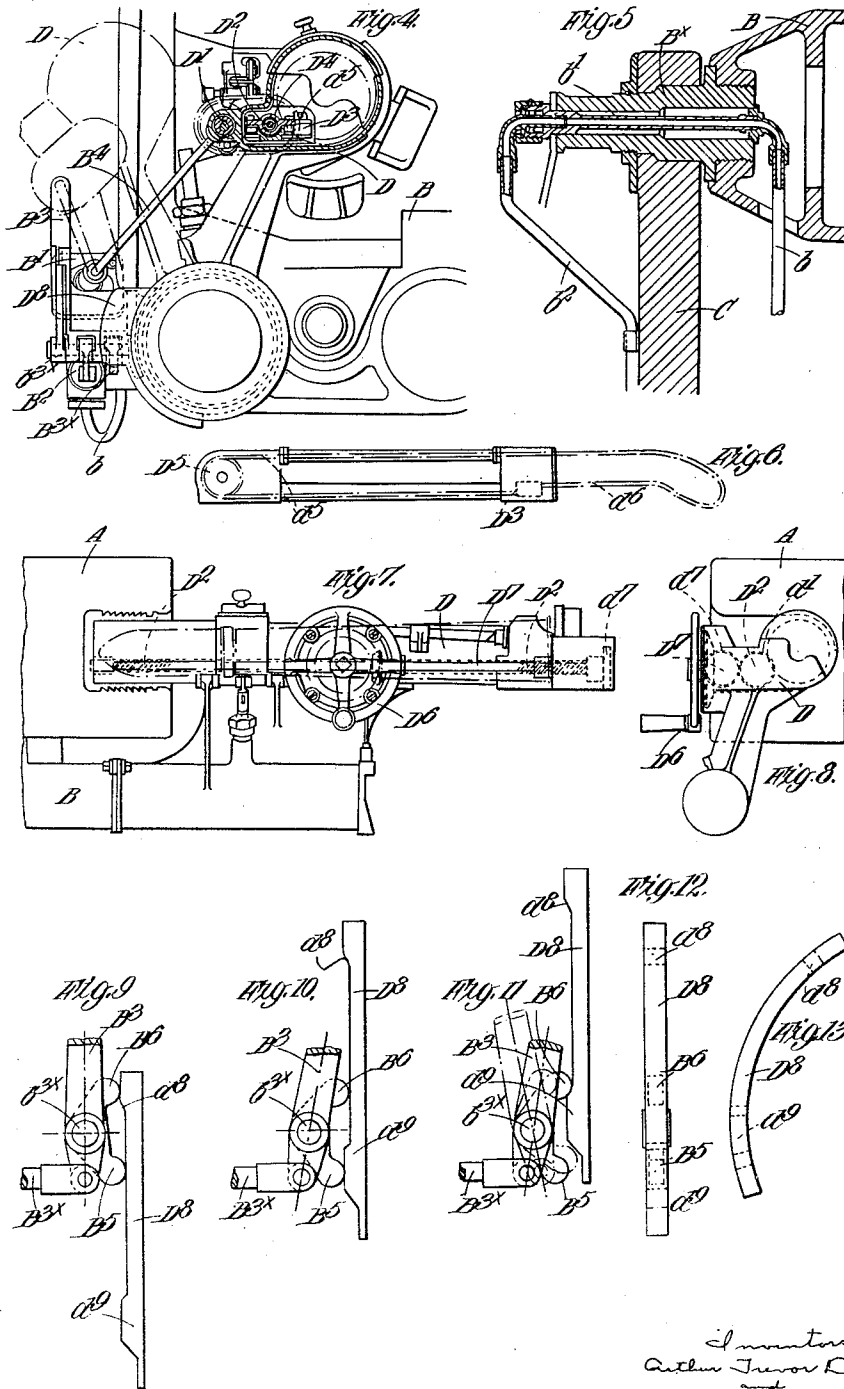
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AMMUNITION LOADING APPARATUS FOR ORDNANCE

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE.

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AMMUNITION-LOADING APPARATUS FOR ORDNANCE.

Application filed May 26, 1927, Serial No. 194,306, and in Great Britain March 1, 1926.

This invention relates to ammunition loading apparatus for ordnance in which a movable loading tray carrying a rammer is provided for bringing the ammunition from a receiving position at one side of the path of recoil of the gun, into a position behind the breech for being rammed into the gun by the rammer.

According to the invention the rammer carried by the loading tray comprises a quick pitch screw which engages with a nut forming part of or connected to the rammer head and which is rotated through suitable mechanism in order to reciprocate the rammer head, preferably by a motor which may, for instance, be a hydraulic motor of the swash-plate type. The motor may be mounted on the gun cradle and in this case the said mechanism may comprise a shaft provided at each end with a universal joint to permit the loading tray to be moved to and from its loading position behind the gun. The control member of the motor (i. e. a reversing control valve, of the piston type for example, in the case of a hydraulic motor) may be under the influence of a device serving to hold the said control member against movement to the "ram" position when the loading tray is in any but its loading position behind the gun. This device may also serve to move the control member to the "withdraw" and "neutral" positions when the loading tray is being moved towards its receiving position out of the path of recoil of the gun.

In order that the said invention may be clearly understood and readily carried into effect, the same will now be more fully described with reference to the accompanying drawings, in which:—

Figure 1 is a side elevation shewing a form of power operated loading apparatus constructed in accordance with this invention.

Figure 2 is a plan of Figure 1 with parts in section,

Figure 3 is a view of the gear wheels at the rear portion of Figure 2 but shewing these gear wheels in a different position.

Figure 4 is a sectional rear elevation on the line 4, 4 of Figure 2,

Figure 5 is a vertical section through the axis of one of the gun trunnions.

Figure 6 is a diagrammatic side elevation shewing one way in which the ramming apparatus can be operated in the event of failure of the operating motor.

Figure 7 is a side elevation shewing a handwheel and mechanism for operating the rammer by hand.

Figure 8 is a rear elevation of Figure 7,

Figures 9, 10 and 11 are side elevations shewing in different positions a form of the device for automatically moving the control member of the rammer motor during the movements of the loading tray, the cam forming part of this device being shewn developed.

Figure 12 is a rear developed elevation of the cam of Figures 9 to 11, and

Figure 13 is a rear elevation shewing the actual shape of the said cam.

A is part of the gun, B is part of the gun cradle, C is part of the gun carriage and D is the loading tray.

B¹ (Figures 1, 2 and 4) represents the rammer motor which is shewn as being a hydraulic motor (preferably of the swash-plate or similar type) and which is mounted on the gun cradle. B² is the casing of the reversing control valve (preferably of the piston type) for the motor B¹ and the stem B^{2*} of this valve is operated by a hand lever B³ pivoted at b^{3*} on the cradle. Fluid under pressure is supplied to the valve casing B² by a pipe b connected to a tube b¹ arranged within one the cradle trunnions B^{*} (see Figure 5), this tube being rotatably connected at its outer end to a pipe b² which is connected in a fluid-tight manner to the pressure main; the exhaust fluid is led from the valve casing by a pipe b³ which is connected to a tube arranged within the other cradle trunnion, this tube being rotatably connected in a fluid-tight manner to another pipe leading to the exhaust main. In this manner we are able to dispense with "walking" pipes which would otherwise be necessary in order to allow for the movement of the motor (which as aforesaid is mounted on the gun cradle) during the elevating of the gun.

The motor B¹ drives a shaft B⁴ through a universal joint and the rear end of this shaft is connected by another universal joint to a short shaft D¹ carried at the rear end of the loading tray D which is shewn as being of the type that swings about an axis parallel to the axis of the gun (preferable similar to that described in the specification of our earlier United States Patent No. 1,464,171 and carries a quick pitch screw D² at or near its lower part. The rammer head

D³ carried by a nut D⁴ that engages with this screw, has rollers bearing against longitudinal guides *d*, *d* on the tray and the rear end of the screw carries a pinion *d*¹ meshing
 5 with a pinion *d*² on a sleeve *d*³ splined to the shaft D¹. The said sleeve can be moved by a handle *d*⁴ (Figure 1) to bring the pinion *d*² out of engagement with the former pinion *d*¹ as shewn in Figure 3 so that in the
 10 event of the motor B² breaking down the rammer head D³ can be operated by hand; for this purpose a chain or rope passing round a pulley D⁵ (Figures 1 and 6) at the front end of the loading tray is provided
 15 and is detachably connected to the rammer head, the angle of the screw (about 45° for example) being such that when a pull is exerted on the free end of the chain or rope the screw will rotate freely and not offer
 20 any serious resistance to the longitudinal movement of the rammer head. Another chain or rope detachably connected to the rammer head serves to move the latter to the rear. This arrangement is shewn di-
 25 agrammatically in Figure 6 in which *d*⁵ is the chain or rope passing over the pulley D⁵ for performing the ramming operation by hand and *d*⁶ is the chain or rope for moving the rammer head to the rear, these two
 30 chains or ropes being, for convenience, joined together as shewn.

Figures 7 and 8 shew an arrangement for operating the quick pitch screw D² by hand for moving the rammer head to and fro and
 35 in this figure D⁶ is a handwheel mounted on the loading tray D and arranged to rotate a shaft D⁷ through bevel gearing. This shaft extends to the rear and carries a pinion *d*⁷ in permanent engagement with the
 40 aforesaid pinion *d*¹ on the rear end of the quick pitch screw D². Although, in the construction shewn, the rammer is intended to be operated by hand only, the hand-operated gear could be associated with a motor drive
 45 as in Figures 1 to 4 and used in the event of the motor breaking down, in which case the hand-operated gear would normally be de-clutched from the quick-pitch screw but would be clutched to this screw (and the
 50 latter de-clutched from the motor) if the motor should break down.

In Figures 1, 2 and 4, D⁸ is a projecting member on the boss of the loading tray D, this member occupying the position shewn
 55 in which it is out of the path of a toe-piece B^{3*} on the aforesaid hand lever B³, when the loading tray is in the loading position, thereby permitting the control valve of the motor B³ to be moved to the rear so as to
 60 cause the motor to operate the rammer for ramming the projectile into the gun. When the loading tray is in the receiving position shewn by chain lines in Figure 4, the member D⁸ lies in the path of the toe-piece B^{3*}
 65 and the said movement of the valve is there-

by prevented. In the modification shewn by Figures 9 to 13 the member D⁸ on the boss of the loading tray is in the form of a cam member having two cam surfaces *d*⁸ and *d*⁹ arranged a suitable distance apart. The
 70 hand lever B³ has rigidly connected thereto a member having two arms B⁵, B⁶ of which the arm B⁵ is adapted to co-operate with the cam surface *d*⁸ and the arm B⁶ is adapted to co-operate with the cam surface *d*⁹.
 75 When the loading tray is in the receiving position, the cam surface *d*⁸ engages with the arm B⁵ and the flat portion of the member D⁸ engages with the other arm B⁶ as shewn in Figure 9. The control valve is thus locked in the neutral or central position. When the loading tray is moved to-
 80 wards the loading position and is approaching the latter position, the cam surface *d*⁸ co-operates with the arm B⁵ as shewn in Figure 10 so as to move the control valve to the "withdraw" position; further movement of the loading tray into the loading position then causes the cam surface *d*⁹ to move clear
 85 of the arm B⁶ as shewn in Figure 11 so that the hand lever B³ can then be moved to bring the control valve to the "ram" position, the parts B³, B⁵ and B⁶ then occupying the position shewn by chain lines in Figure 11. Conversely during the first part of the move-
 90 ment of the loading tray from the loading position to the receiving position the control valve is moved to the "withdraw" position (Figure 10) and as the loading tray reaches the receiving position the control valve is
 95 moved to the central or "neutral" position (Figure 9).

What we claim and desire to secure by Letters Patent of the United States is:—

1. In ammunition loading apparatus for
 103 ordnance, the combination with a loading tray, pivoted to the gun cradle, for bringing the ammunition from a receiving position at one side of the gun into the loading position behind the gun, of a rammer head
 110 carried by said tray, quick-pitch screw and nut gear, also carried by said tray, and a motor mounted on the gun cradle for operating said gear.

2. In ammunition loading apparatus for
 115 ordnance, the combination with a loading tray, pivoted to the gun cradle, for bringing the ammunition from a receiving position at one side of the gun into the loading position behind the gun, of a rammer head
 120 carried by said tray, quick-pitch screw and nut gear, also carried by said tray, a motor mounted on the gun cradle for operating said gear, a shaft between said motor and said gear and a universal joint at each end
 125 of said shaft.

3. In ammunition loading apparatus for ordnance, the combination with a movable loading tray for bringing the ammunition from a receiving position where it lies out
 130

of the path of recoil of the gun, into the loading position behind the gun, of a rammer head carried by said tray, screw and nut gear for operating said rammer head, 5 a motor for operating said gear, a control member for said motor and a device serving to hold said control member against movement to the "ram" position when the loading tray is in any but the loading position. 10

4. In ammunition loading apparatus for ordnance, the combination with a movable loading tray for bringing the ammunition from a receiving position where it lies out 15 of the path of recoil of the gun, into the loading position behind the gun, of a rammer head carried by said tray, screw and nut gear for operating said rammer head, a motor for operating said gear, a control 20 member for said motor and a device serving to hold said control member against movement to the "ram" position when the loading tray is in any but the loading position and also serving to move the control 25 member to the "withdraw" and "neutral" positions when the loading tray is being moved towards its receiving position.

5. In ammunition loading apparatus for ordnance, the combination with a movable loading tray for bringing the ammunition 30 from a receiving position where it lies out of the path of recoil of the gun, into the loading position behind the gun, of a rammer head carried by said tray, screw and nut gear for operating said rammer head, 35 a motor for operating said gear, means for at will disconnecting said motor from said gear and means for then operating said gear by hand.

6. In ammunition loading apparatus for ordnance, the combination with a movable loading tray for bringing the ammunition from a receiving position where it lies out 40 of the path of recoil of the gun, into the loading position behind the gun, of a rammer head carried by said tray, screw and nut gear for operating said rammer head, a 45 pressure fluid motor carried by the gun cradle for operating said gear and pressure and exhaust conduits for said motor, parts 50 of these conduits passing through the gun cradle trunnions.

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