

O'Brien et al.

[15] **3,662,646**

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[54] FEEDER

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[73] Assignee: **General Electric Company**

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[52] U.S. Cl. .... 89/33 SF, 89/33 CA

[51] **Int. Cl.**.....F41d 9/02

[58] **Field of Search** ..... 89/33, 33 SF

## FOREIGN PATENTS OR APPLICATIONS

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[57] **ABSTRACT**

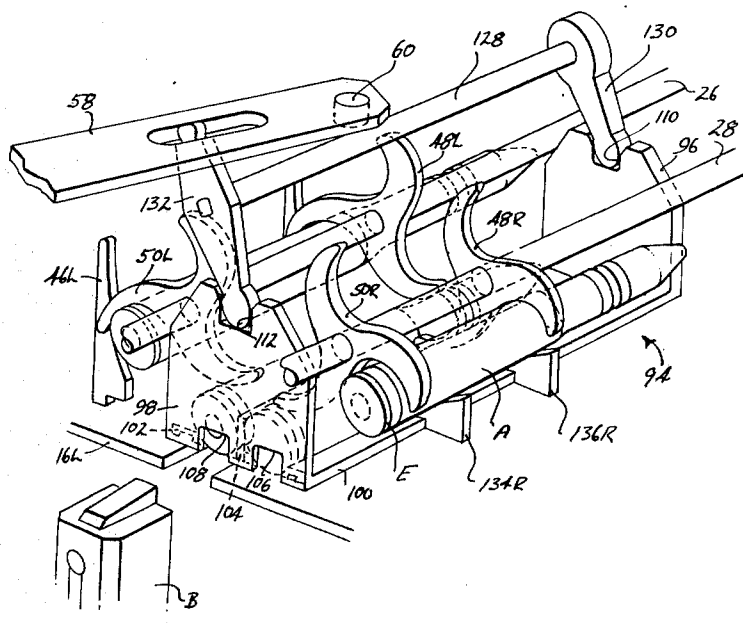
An ammunition feeder for a machinegun has two sets of in-feed sprockets which alternatively feed rounds to a shiftable tray having two alternative stripping stations, either of which may be alternatively disposed to cooperate with the bolt.

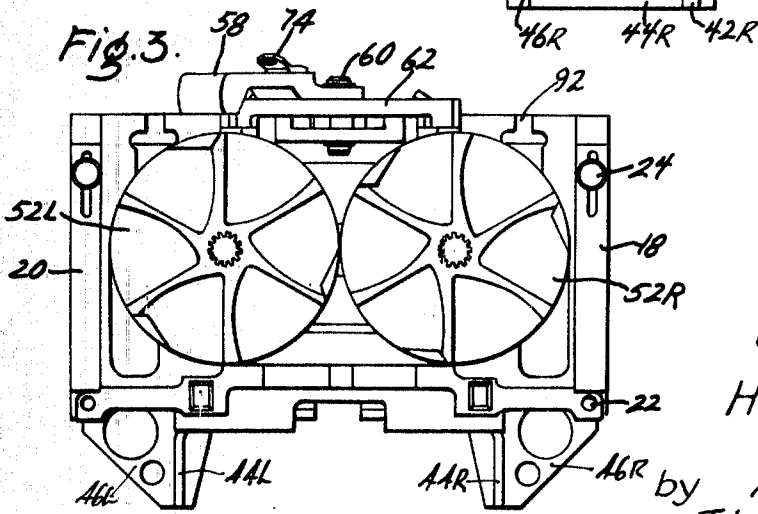
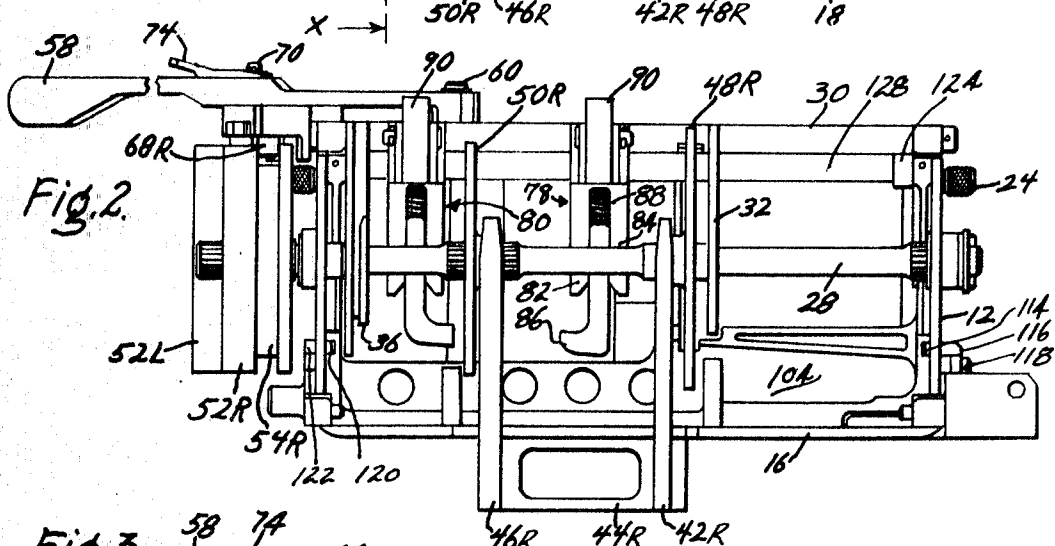
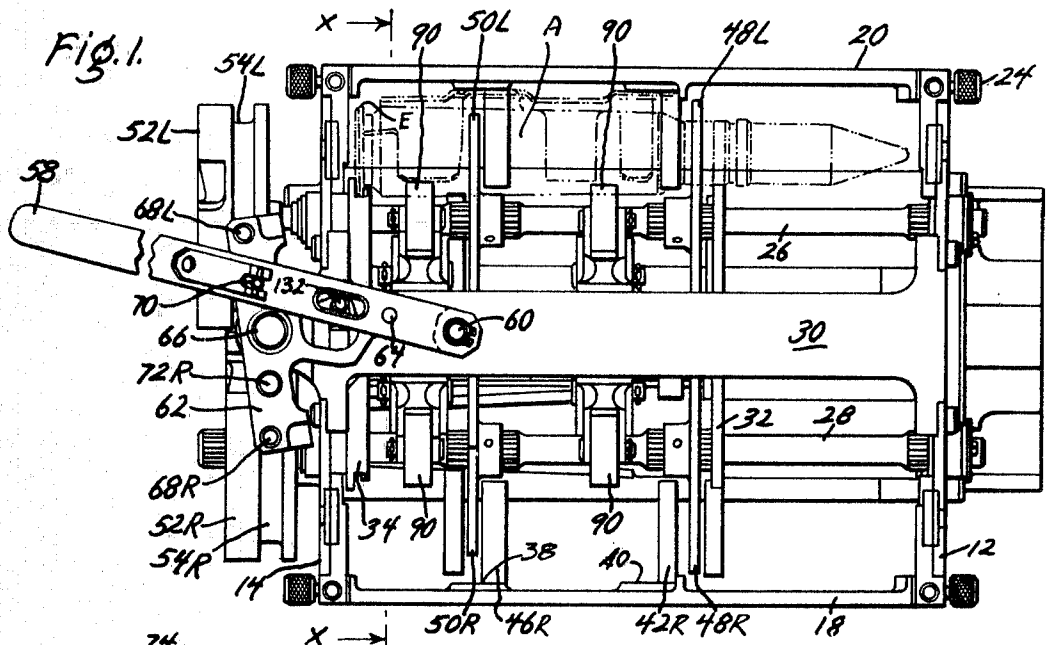
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### 10 Claims, 9 Drawing Figures





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Fig. 4

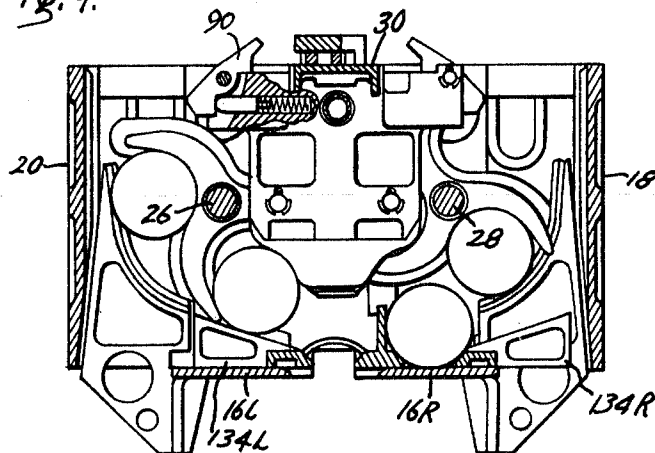


Fig. 7

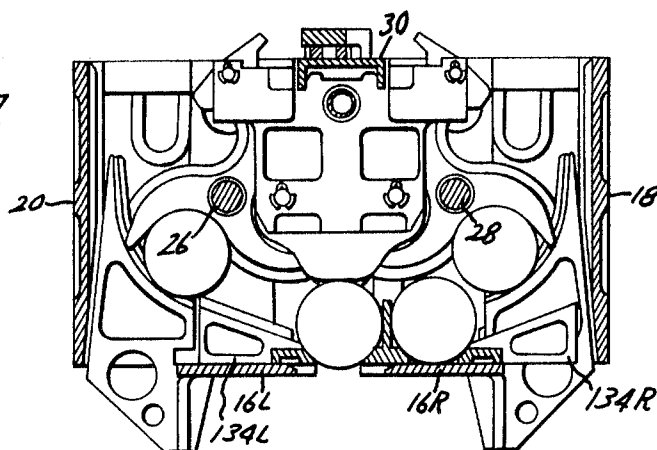
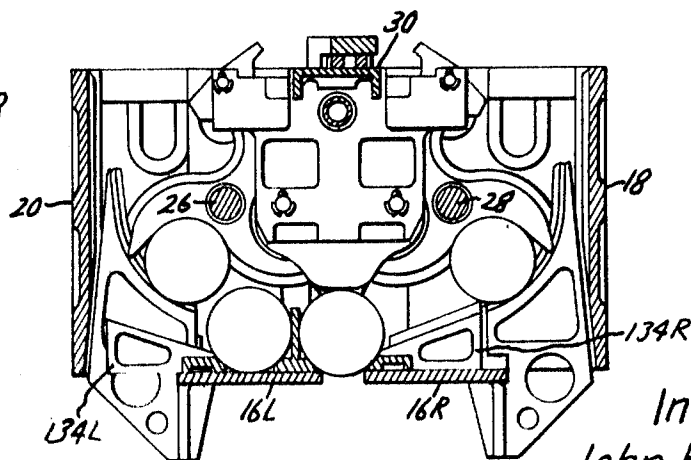


Fig. 8



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Fig. 5

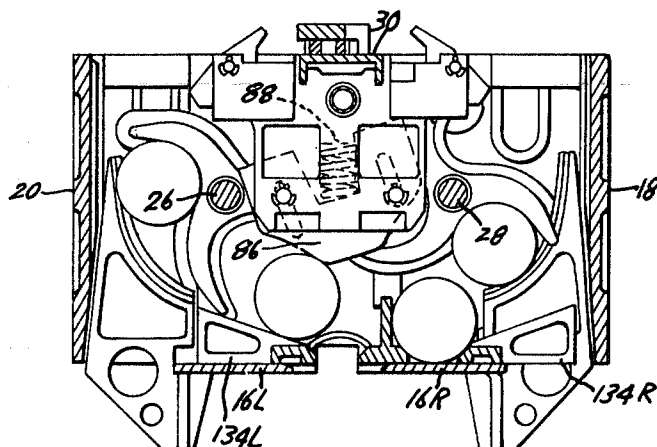
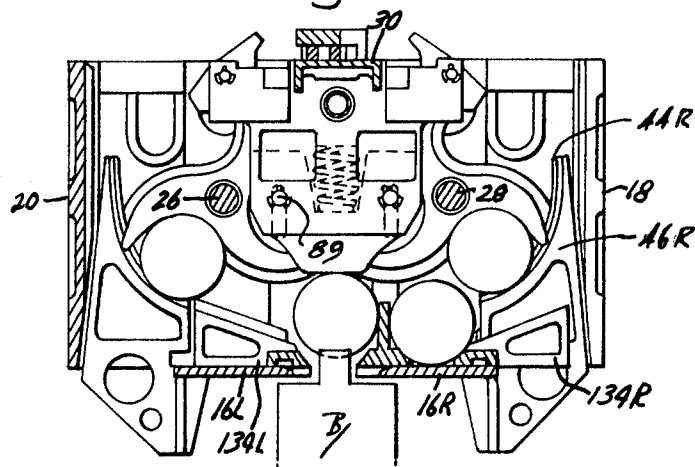
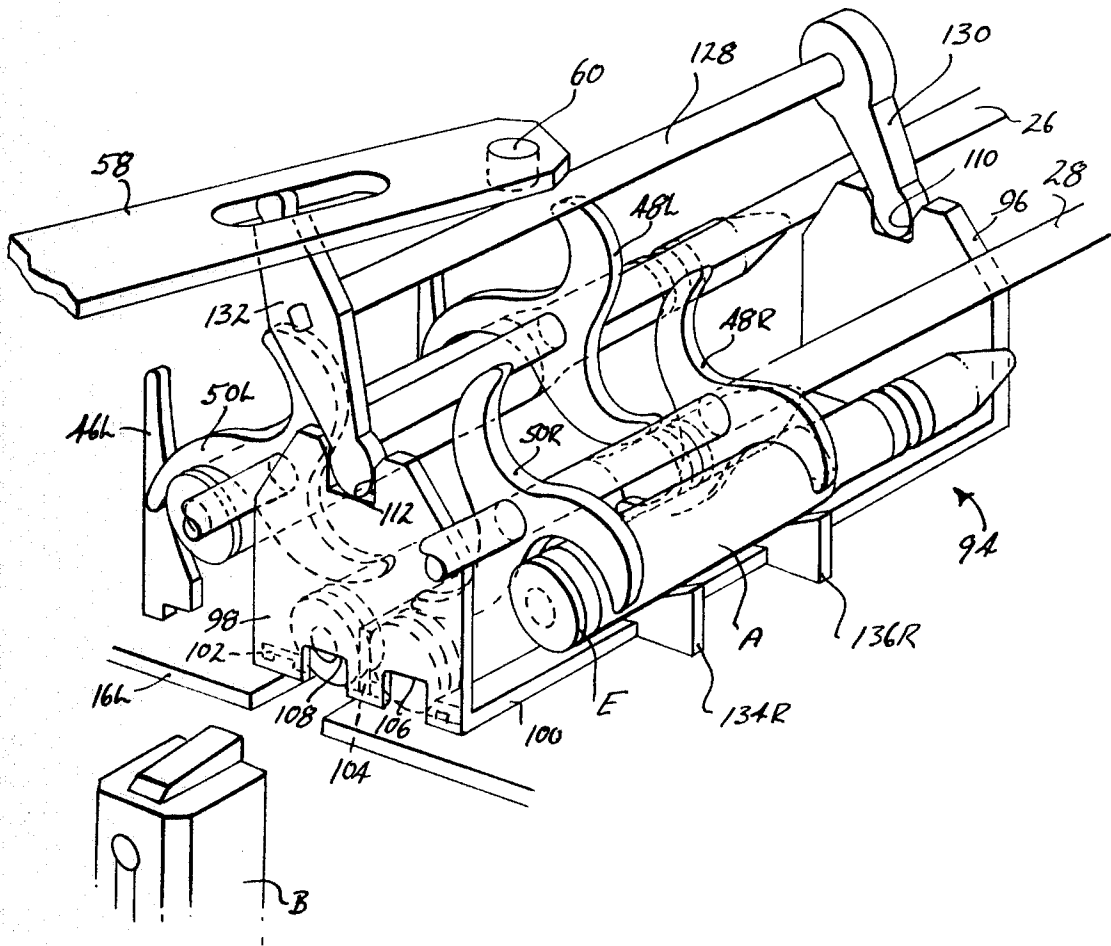


Fig. 6



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Fig. 9



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## FEEDER

## BACKGROUND OF THE INVENTION

## 1. Field of the Invention

This invention relates to automatic and semiautomatic guns having a reciprocating breech which drives a cartridge feed mechanism.

## 2. Description of the Prior Art

A single barreled machine gun having (1) a reliable high rate of fire, (2) a short aft end, that is, a length from the aft end of the cartridge being in-fed to the aft end of the gun which is shorter than the length of the cartridge; and (3) selectable dual feed of ammunition, that is, permit the gunner to continually select either of two feeds of ammunition, is shown in U. S. Pat. application Ser. No. 814,085, filed on 7 Apr. 1969, by R. H. Colby. That gun is admirably suited to its purpose. It has a feeder with two sets of in-feed sprockets which alternatively feed rounds to a stationary tray from which the round is subsequently stripped by the bolt into the chamber. However, after the feeding has been switched from one sprocket set to the other sprocket set, the last round placed on the tray by the preceeding set had to be stripped, chambered and fired before the first round from the subsequent set could be stripped, chambered and fired.

## BRIEF SUMMARY OF THE INVENTION

Accordingly, it is an object of this invention to provide a feeder with two sets of in-feed sprockets which alternatively feed rounds to a tray from which the round is subsequently stripped by the bolt into the chamber, wherein after the feeding has been switched from one sprocket set to the other sprocket set, the first round from the subsequent set is immediately available to be stripped, chambered and fired.

A feature of the invention is the provision of a feeder having two sets of in-feed sprockets which alternatively feed rounds to a shiftable tray having two respective alternative stripping stations, either of which may be alternatively disposed to cooperate with the bolt.

## BRIEF DESCRIPTION OF THE DRAWING

These and other objects, features and advantages will be apparent from the following specification thereof taken in conjunction with the accompanying drawing in which;

FIG. 1 is a top plan view of a feeder embodying this invention;

FIG. 2 is a right side view in elevation of the feeder of FIG. 1;

FIG. 3 is an aft view in elevation of the feeder of FIG. 1;

FIGS. 4, 5, 6, 7, and 8 are aft views in cross-section taken along plane X—X of FIG. 1 illustrating the dual, alternative feeding function, and

FIG. 9 is a perspective view of the rudimentary structure of the feeder of FIG. 1.

## THE PREFERRED EMBODIMENT

The feeder herein shown and described is adapted to be used with the machine gun shown and described in Ser. No. 814,085 in substitution for the feeder therein. Recourse should be made to that disclosure for a complete description of the machinegun. Briefly recapitulating, that machine gun includes a receiver, a barrel extension reciprocable in the receiver, a bolt B reciprocable in the receiver, an accelerator intercoupling the receiver, the barrel extension and the bolt, and a crank shaft which is reciprocated by the barrel extension via cams. The crank shaft has four spring loaded detents. One detent is adapted to drive one feeder sprocket and half a feed increment on the up stroke of the crank shaft, another detent is adapted to drive that sprocket one half a feed increment on the down stroke, the other two detents are similarly adapted to drive the other feeder sprocket. Only one sprocket may cooperate with the crank shaft at any given time.

The feeder of this invention includes a front wall 12 and a rear wall 14, both integral with a bottom plate which is formed of a left and a right spaced elongated portion 16L and 16R. A right side wall 18 and a left side wall 20 are respectively releasably mounted to and between the front and rear walls by a plurality of hinge pins 22 and spring loaded detents 24.

A left hand splined shaft 26 and a right hand splined shaft 28 are journaled through and between the front and rear walls. A top connecting beam 30 extends from and between the front and rear walls and includes a front, transverse ammunition guide plate 32 and a rear, transverse ammunition guide plate 34. The edge of the plate 34 includes a lip 36 adapted to engage the extractor plate E of the round of ammunition A. The interior surfaces of the side plates 18, 20 include appropriate bosses 38, 40 to guide the ammunition links L. A respective left and right front, blunt, hook shaped ammunition guide and link stripper 42L 42R extends upwardly-outwardly from a respective left and right flange 44L and 44R on the edge of each respective bottom elongated portion 16L and 16R, and a respective left and right rear, sharp, hook shaped ammunition guide and link stripper 46L and 46R extends upwardly-outwardly from the flange on the edge of each respective bottom elongated portion 16L and 16R.

A respective left and right front, three hook sprocket 48L and 48R, and a respective left and right rear, three hooked sprocket 50L and 50R are respectively fixedly splined onto the shaft 26, 28. A respective drive ratchet wheel 52L and 52R each having six teeth, a respective annular cam track 54L and 54R, and three radial cutouts (not visible) in the front faces, are slidably splined onto each shaft. A switch handle 58 is pivotally mounted to the upper side of the top connecting beam 30 by a pin 60. A T-bar switch plate 62 is pivotally mounted to the underside of the handle by a pin 64, and is pivotally mounted to the upperside of an aft extension of the top connecting beam 30 by a pin 66. A respective camming pin 68L and 68R extend downwardly from each end of the arm of the T-bar switch plate and extends in the respective annular cam track 54L and 54R. Thus, swinging of the handle to the right will provide swinging of the switch plate to the right and respective forward shifting of the right hand drive sprocket 52R out of engagement with the respective drive detents (not shown) of the drive crank shaft and respective forward shifting of the left hand drive sprocket 52L into engagement with the respective drive detents of the drive crank shaft. A locking pin 70 passes through the handle 58 and is adapted to engage either of a left hand or right hand locking hole 72L or 72R in the switch plate, to lock the plate, arm and drive ratchets in either the full left or full right position. The upper end of the pin 70 is pinned to a crank arm 74 and biased downwardly by a spring, not seen, captured between the distal end of the arm 74 and the handle 58. A left and right locking pin (not visible) project rearwardly from the rear wall 14, and are adapted to engage one of the radial cutouts 56L, 56R in a respective drive ratchet, when that drive ratchet is in its forward disposition, free of the drive detents.

A front depressor spring assembly 78 and a rear depressor spring assembly 80 extend downwardly from the top connecting beam 30. Each assembly includes two laterally extending, longitudinally spaced apart plates 82, 84, fixed to the bar 30. A plunger foot 86 is slidably mounted between these plates, and is biased downwardly by a compression spring 88. As shown in FIG. 4, the plunger foot 86 is substantially V-shaped in elevation. The lower end of the spring 88 nests in the cleft of the V while the upper end nests in mutually opposed recesses formed in the mutually opposed faces of the plates 82, 84. Vertical travel of the foot is limited by two laterally spaced apart pins 80 fixed through and between the plates and respectively passing through two spaced apart, vertically elongated slots in the foot. The widths of the slots are slightly greater than the diameters of the pins to permit limited rocking movement of the foot, that is, to permit the foot to both pivot about one pin and to translate on both pins. Four spring loaded dogs 90 are respectively pivotally mounted in

the upper corner of each of the depressor assemblies, to hold ammo belts, not shown. Four bayonet sockets 92 in the front and rear walls, receive and snap locks on the two laterally spaced apart ammunition chutes, not shown, to the top of the feeder.

A laterally shiftable tray assembly 94 is disposed within the feeder. The tray assembly includes a front lateral plate 96, a rear lateral plate 98, a right side beam 100 extending longitudinally from and between said plates, a left side beam 102 extending longitudinally from and between said plates, and an upstanding medial web 104 extending longitudinally from and between said plates. The lacuna between the web and the right beam serves as a right tray aperture 106, and the lacuna between the web and the left beam serves as a left tray aperture 108. An elongated socket 110 is cut out into the top center edge of the front plate 96 and a similar socket 112 is cut out into the top center edge of the rear plate 98. A rabbet 114 is cut into the front face of the front plate 96 and receives a track element 116 which is mounted on the front wall 12 by screws 118 and through a hole in the wall. A similar rabbet 120 is cut into the rear face of the rear plate 98 and receives a track element 112 which is mounted on the rear wall 14 by pins and through a hole in the wall.

A front hanger 124 and a rear hanger 126 are integral with and extend downwardly from the top connecting beam 30, and a shaft 128 is journaled to and beyond these hangers. An arm 130 has its upper end fixed to the forward end of the shaft 128 between the hanger 124 and the wall 12, its lower end formed into a ball and disposed in the socket 110. An arm 132 has a medial portion fixed to the aft end of the shaft 128 between the hanger 126 and the wall 14, its lower end formed into a ball and disposed in the socket 112, and its upper portion extending upwardly, through a clearance hole in the top connecting beam 30, through a clearance hole in the switch plate 62, and through an elongated, camming hole in the switch handle 58. Thus, swinging the handle 58 to the right swings the upper end of the rear arm 132 to the right, rotates the shaft 128 clockwise, and swings the lower ends of the arms 130, 132 to the left, shifting the tray assembly to the left, so that the right aperture 106 is disposed the center line of the feeder and is aligned with the bolt B. Concomitantly, the handle 58 has caused the switch plate to cam the right drive ratchet 52R into engagement with the crank shaft detents. Similarly, swinging the handle to the left aligns the left aperture with the bolt and engages the left drive ratchet 52L.

A left and right rear, wedge shaped ammunition guide 134L and 134R and a left and right front, wedge shaped ammunition guide 136L, and 136R are integral with and extend laterally from each of the left side beam 102, and the right side beam 100. These wedges form a smooth curve with the adjacent fixed ammunition guides 42L, 42R, 46L and 46R.

Thus, a cycle of operation may be described as follows: As shown in FIG. 4, the switch handle 58 is swung to the left, the tray assembly 96 is swung to the right so that the left tray aperture 108 is aligned with the bolt, a round has been stripped and chambered, and the bolt and the barrel are in battery. After the round is fired, the barrel extension and the bolt recoil, the bolt ejects the fired cartridge case, the barrel extension cams the feeder drive crank shaft to drive the left drive ratchet one-half of a feed increment to advance the next round along and between the left hand front and rear wedge guides and the sides of the depressor feet, onto the left tray aperture 108 and under the depressor springs, as shown in FIG. 7. In this process, the round initially rocks and raises the depressor feet, as shown in FIG. 5, and subsequently raises the feet as it is raised by the recoiling bolt with its rammer passing thereunder, as shown in FIG. 6. The respective springs both aligns the feet and biases the feet downwardly to seat the round on the tray aperture as shown in FIG. 7.

It will be seen in FIG. 7 that a round had previously been disposed on the right hand tray aperture 106. At this point, the option is available to fire either the left hand or the right hand round. If the decision is to fire the left hand round, then the

bolt is unseared, and permitted to ride forward to strip the left hand round from the left hand tray aperture. If the decision is made to change ammunition feeds and to fire the right hand round, then the switch handle 58 is swung to the right, shifting the tray assembly to the left and aligning the right tray aperture with the bolt, as shown in FIG. 8. When the bolt is unseared it will strip the right hand round from the right hand tray aperture.

It will be seen that adjacent rounds in the same feed path are spaced apart by more than the diameter of an intermediate round, and, therefore, a space is provided which will receive the round on a tray aperture which has been shifted out of alignment with the bolt. As each round is traversed down the guides by the sprockets, it is under positive control until it is snubbed under the side concavities of the plunger feet, as shown in FIG. 5. On the last half increment of rotation of the sprockets, it is snapped by the tips of the sprockets along the sides of the plunger feet under the feet onto the tray aperture.

What is claimed is:

1. An ammunition side stripper and feeder assembly for an at least partly self acting gun having a reciprocable bolt and firing linked rounds of ammunition, comprising:

a housing;

an ammunition tray disposed in said housing and having first and second laterally spaced apart, longitudinally elongated apertures;

first transfer means in said housing for initially receiving a first train of linked rounds, for subsequently side stripping a round from its link in said train, and for finally disposing such round on said first tray aperture;

second transfer means in said housing for initially receiving a second train of linked rounds, for subsequently side stripping a round from its link in said train, and for finally disposing such round on said second tray aperture; and means for shifting said tray laterally to and between a first and a second disposition for aligning either said first or said second tray aperture respectively with said bolt.

2. An assembly according to claim 1 wherein:

said first transfer means includes

first rounds delinking means,

a first shaft journaled to said housing and having a first plurality of sprockets fixed thereon for positively displacing a round past said first delinking means, and a first drive means longitudinally movable to and between a drive disposition and a non drive disposition and angularly fixed to said first shaft for rotating said shaft;

said second transfer means includes

second rounds delinking means,

a second shaft journaled to said housing and having a second plurality of sprockets fixed thereon for positively displacing a round past said second delinking means, and a second drive means longitudinally movable to and between a drive disposition and a non drive disposition and angularly fixed to said second shaft for rotating said shaft; and

said shifting means being coupled to said tray and said first and second transfer means for concurrently shifting said tray to said first disposition, said first drive means to said drive disposition on said first shaft, and said second drive means to said non drive disposition on said second shaft, and for concurrently shifting said tray to said second disposition, said first drive means to said non drive disposition on said first shaft, and said second drive means to said drive disposition on said second shaft.

3. An assembly according to claim 2 wherein:

said shifting means includes

guide means for supporting and guiding said tray to and between said first and second dispositions; and operating means for shifting said tray along said guide means, including a crank shaft journaled fore and aft to said housing,

a fore arm and an aft arm each respectively fixed at one end to said crank shaft and coupled at the other end to said tray, and means for rocking said shaft.

4. An assembly according to claim 3 wherein: said rocking means includes:

a switch handle pivotally mounted to said housing; and a crank arm fixed to said crank shaft and coupled to said switch handle.

5. An assembly according to claim 4 wherein: said first transfer means includes:

a first shaft journaled in said housing having a plurality of sprockets fixed thereon for positively displacing a round, and a first drive ratchet splined thereon for rotating said shaft incrementally;

said second transfer means includes:

a second shaft journaled in said housing having a plurality of sprockets fixed thereon for positively displacing a round, and a second drive ratchet splined thereon for rotating said shaft incrementally; and

a switch plate coupled to said switch handle and said first and second ratchet whereby when said switch handle is moved to a first disposition it rocks said crank shaft to a first disposition to shift said tray to said first disposition and to shift said first ratchet on said first shaft to an operative disposition and said second ratchet on said second shaft to an inoperative disposition, and when said switch handle is moved to a second disposition it rocks said crank shaft to a second disposition to shift said tray to said second disposition and to shift said second ratchet on said second shaft to an operative disposition and said first ratchet on said first shaft to an inoperative disposition.

6. An assembly according to claim 2 further including:

depressor means mounted to said housing in alignment with the bolt for resiliently passing a round from a respective plurality of sprockets to the respective tray aperture and for resiliently retaining the round on said respective tray aperture.

7. An assembly according to claim 6 wherein:

said depressor means includes a plurality of depressor feet which are resiliently mounted for rectilinear reciprocation and for concomitant pivotal movement.

8. An assembly according to claim 6 wherein:

said depressor means includes

a rail fixed to said housing over said tray;

a plurality of depressor plates, each having two parallel slots perpendicular to said rail, two projections fixed to said rail and extending respectively into and substantially clearing said slots, and spring means biasing said plate away from said rail, whereby said plate is free to reciprocate between said rail and said tray upon both

projections, and to pivot about one projection and swing on the other projection.

9. An at least partly self acting gun, comprising:

a receiver having a first longitudinal axis;

a barrel disposed for recoil and counter-recoil movement in said receiver along said first longitudinal axis;

a bolt disposed for recoil and counter-recoil movement in said receiver along said first longitudinal axis;

an ammunition side stripper and feeder assembly mounted to said receiver and coupled to and between said barrel extension and said ammunition feed assembly, for coupling movement of said barrel extension into movement of said stripper and feeder assembly, including a housing;

an ammunition tray disposed in said housing and having first and second laterally spaced apart, longitudinally elongated apertures;

first transfer means in said housing for initially receiving a first train of linked rounds, for subsequently side stripping a round from its link in said train, and for finally disposing such round on said first tray aperture;

second transfer means in said housing for initially receiving a second train of linked rounds, for subsequently side stripping a round from its link in said train, and for finally disposing such round on said second tray aperture; and

means for shifting said tray laterally to and between a first and a second disposition for aligning either said first or said second tray aperture respectively with said bolt.

10. An ammunition feed assembly comprising:

a housing;

an ammunition tray, disposed in said housing, having first and second, laterally spaced apart longitudinally elongated apertures,

ammunition depressor means, including:

a rail fixed to said housing over said tray;

a plurality of depressor plates;

a like plurality of means, each for mounting and capturing a respective depressor plate to said rail for reciprocatory movement and for rotary movement with respect to said rail,

each said means including:

two parallel slots in the respective depressor plate, two projections fixed to said rail and extending respectively into and substantially clearing said slots, and

spring means biasing said plate away from said rail, whereby said respective plate is free to reciprocate between said rail and said tray upon both projections, and to pivot about one projection and to swing on the other projection.

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