May 1, 1951 W. L. MacKENZIE 2,550,837

AMMUNITION FEEDING MEANS

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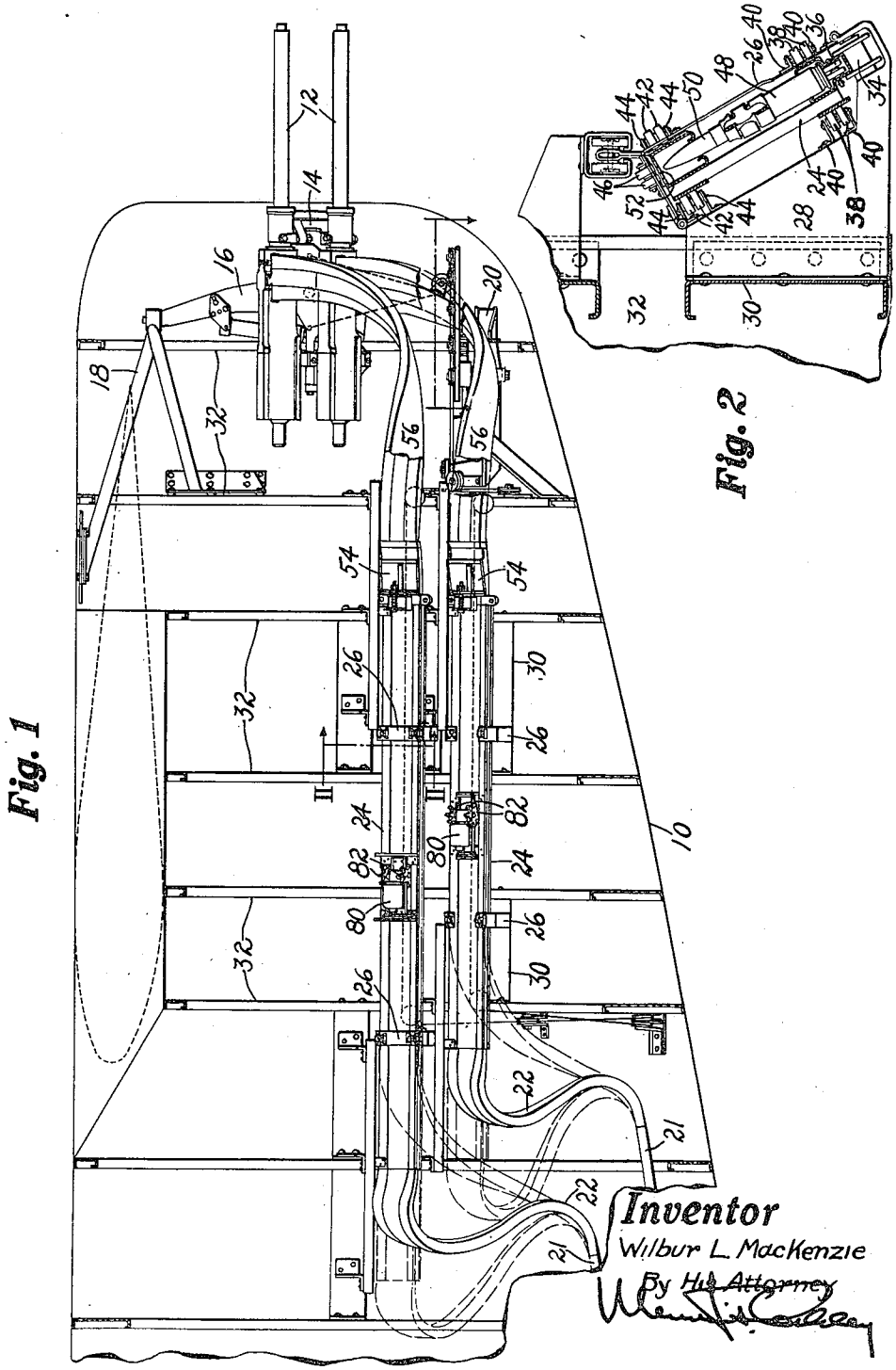


Fig. 1

Fig. 2

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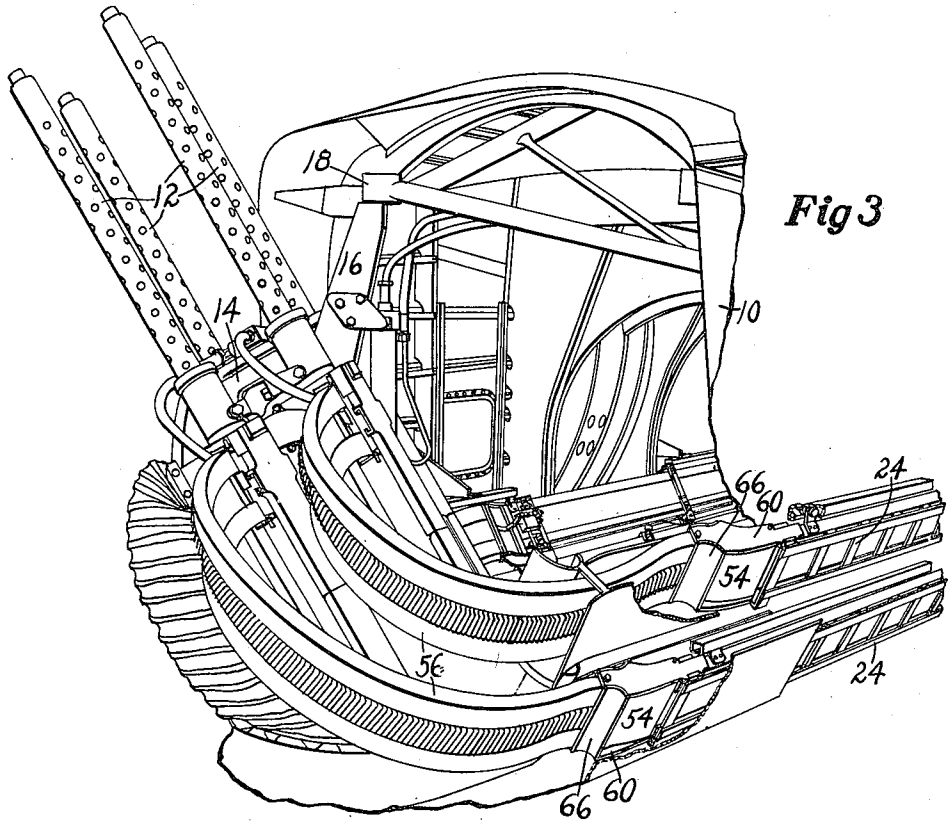


Fig 3

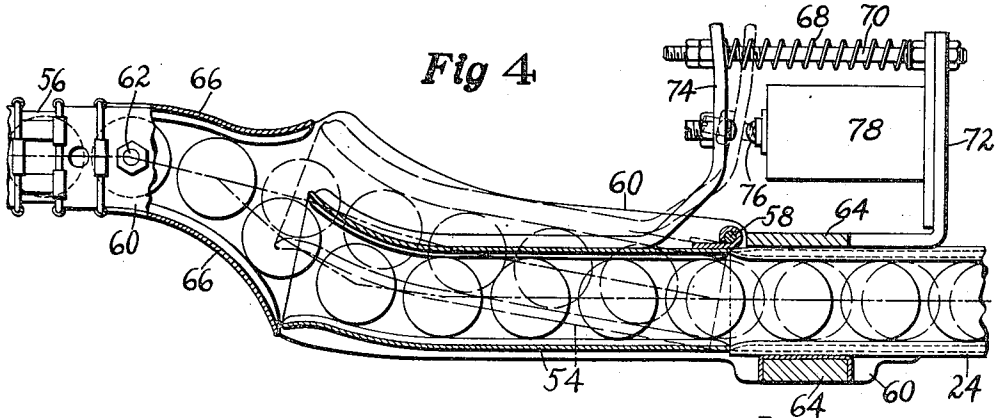


Fig 4

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AMMUNITION FEEDING MEANS

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Original application July 3, 1944, Serial No. 543,344, now Patent No. 2,479,633, dated August 23, 1949. Divided and this application November 30, 1945, Serial No. 631,867

3 Claims. (Cl. 89—33)

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The present invention relates to ammunition feeding means and is herein illustrated in its application to means for feeding and guiding cartridge belts to a plural gun assembly in the tail portion of an airplane. It will be apparent to those skilled in the art that embodiments of the illustrated ammunition feeding means in vehicles other than airplanes and also in fixed gun emplacements come within the scope of the present invention.

It is usual in machine guns of the type herein illustrated to provide means operated by the recoil of the gun for feeding a cartridge belt into the feedway of the gun. The tail gun assembly in an airplane usually receives ammunition from a trough located substantially amidships and the length and weight of a section of cartridge belt extending from the trough to the gun assembly is such that the cartridge feeding mechanism of the gun requires assistance in drawing the belt from the trough. The illustrated organization includes a known type of booster motor for assisting the feed of the cartridge belt and known means for controlling the operation of the booster motor comprising a movable chute herein illustrated as a channel member through which the cartridge belt is fed and means operated by movement of said channel member for starting and stopping said booster motor. The illustrated channel member is so constructed and arranged that it swings in accordance with variations in tension of the cartridge belt causing the booster motor to begin to operate when the load becomes great and to stop after the tension has been substantially released. The cartridge belt is fed through the channel member into a funnel the small end of which communicates with a flexible chute and the expanded end of which communicates with the free end of the channel member during the entire range of its swinging movement. The delivery end of the flexible chute communicates with the feedway of the gun.

In the illustrated organization the cartridge belt passes from the channel member through a very restricted space in the tail portion of the airplane to a feedway in one side of the chamber of a gun. Because of the arrangement of the feedway and the restricted space through which the cartridge belt is required to travel it has been found necessary to provide a flexible chute for guiding the cartridge belt during its movement through said restricted space into the feedway of the gun. The construction operation of the channel member and the ammunition chutes must be such that the cartridge belt will at all

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times pass freely into the channel member and from the channel member to the flexible chute. With this in view there is provided in accordance with the present invention a belt feeding and guiding means comprising a rigid chute through which the cartridge belt is fed, belt feeding mechanism such, for example, as a booster motor mounted on said rigid chute, a movable chute which, in the illustrated organization, is the channel member above referred to, said movable chute being hinged at the delivery end of said rigid chute and arranged to receive a cartridge belt from said rigid chute, another chute which, in the illustrated organization, is the flexible chute above referred to, located in constant communication with the delivery end of said movable chute and arranged to receive a cartridge belt therefrom, and means operated by swinging movement of said movable chute for causing the operation of the booster motor.

These and other features of the invention will now be described with reference to the accompanying drawings and pointed out in the appended claims.

In the drawings,

Fig. 1 is a side elevation of the tail portion of an airplane provided with a plural gun mount and ammunition feeding means embodying the features of the present invention, the fuselage being shown in central longitudinal section;

Fig. 2 is a section on the line II—II of Fig. 1;

Fig. 3 is a perspective view showing the gun mount and a portion of the ammunition feeding mechanism in an extreme position; and

Fig. 4 is an enlarged plan view, partly in section, illustrating a portion of one of the cartridge belt guiding assemblies.

Referring to Fig. 1, the numeral 10 indicates the tail portion of the fuselage of an airplane and the numeral 12 indicates two guns of a four-gun assembly projecting rearwardly from the tail end of the airplane, said guns, as herein illustrated, being .50 cal. machine guns of known construction. The four guns 12 are supported on one cradle 14 pivotally mounted on a bent column 16 for swinging movement heightwise of the airplane, hereinafter referred to as movements in elevation, said column being pivotally mounted in supporting brackets 18 and 20 for swinging movement about an axis extending heightwise of the plane to provide for widthwise swinging movements of the guns, hereinafter referred to as movements in azimuth.

Ammunition for the four-gun assembly is stored amidships and is fed to the guns through four

separate systems of ammunition guides or chutes. To facilitate feeding, the ammunition is provided in belts, preferably of the disintegrating metallic link construction. The cartridge belts are fed, or drawn, through the chutes by the cartridge feeding mechanism of the respective guns, assisted by automatically actuated feeding means located at an intermediate position lengthwise of each system of chutes. In tracking a target, the gun assembly has a wide range of movement and the ammunition chutes connected to the guns must be so constructed and arranged as to be movable with the gun assembly in its target tracking movements. To this end that section of each system of chutes connected to the gun is of a flexible link construction.

The construction and operation of two complete systems of ammunition guiding chutes at one side of the airplane are illustrated in Fig. 1. In each system the ammunition belt is fed from a trough (not shown), located approximately amidships, through a fixed rigid chute 21 extending rearwardly from said trough, then through a flexible chute 22. The delivery end of the flexible chute is attached to a rigid chute 24 arranged to extend along the inside wall at one side of the fuselage. The rigid chute is supported for longitudinal movement in a plurality of brackets 26, one of which is illustrated in Fig. 2. Each bracket is arranged in an inclined position and secured to a plate 28 mounted on a panel 30 attached to the ribs 32 of the fuselage. For supporting the rigid chute 24 within the brackets 26 each bracket has pivotally mounted in the lower portion thereof a roll 34 having flanges at each end between which flanges a hollow tongue 36 extending downwardly from the rigid chute 24 is mounted. The lower portion of the rigid chute is positioned widthwise of the bracket by two rolls 38 pivotally mounted between angle brackets 40 and arranged to extend inwardly through openings in the bracket 26. Similarly, the upper portion of the rigid chute is positioned widthwise of the bracket 26 by rolls 42 pivotally mounted between angle brackets 44. For holding the rigid chute heightwise movement rolls 46 are arranged to extend through an opening in the top of the bracket 26 for engagement with the upper surface of the rigid chute. The rigid chute is so constructed and arranged that the cartridge belt slides through it in upright position with the shell 48 of the cartridge supported on the base of the rigid chute and the projectile 50 positioned between the beaded marginal portions of a channel plate 52 secured in the upper portion of the rigid chute. The ammunition belt passes from the delivery end of the rigid chute 24 through a short chute or channel member 54 and from said short chute through a flexible chute 56 the delivery end of which is mounted in the feedway of one of the guns 12 as best shown in Fig. 3. Referring to Fig. 4, the channel member 54 is hinged on a pin 58 mounted in plates 60 secured to the flexible chute 56 by screws 62 and rigidly secured to the rigid chute 24 between the end portions of bars 64. The channel member 54 has a short range of swinging movement from its full line position in Fig. 4 to its position indicated by broken lines. During such movement of the channel member its delivery end moves laterally within the limits of the expanded end portion of a guideway or funnel formed by bent plates 66 secured to the end portions of the plates 60. Thus, in all positions of the swinging channel member 54 its delivery end registers with the guideway provided by the plates 66 and the movement of the cartridge belt proceeds without interruption in any position of said channel member. The channel member is normally retained in its full line position as illustrated in Fig. 4 by a spring 68 mounted on a pin 70 secured to an angle bracket 72 mounted on the rigid chute 24, said spring being arranged to bear against an end portion of a bent arm 74 secured to the channel member 54 and bifurcated to embrace the pin 70. When the channel member is in its normal position illustrated in Fig. 4 the cartridge belt travels in a curved path as it passes from the delivery end of the channel member through the funnel provided by the bent plates 66. During the firing of the gun the cartridge belt is drawn through the series of guideways above described, by mechanism (not shown) operated by the recoil of the gun. The tension imparted to the cartridge belt by the feed mechanism in the gun straightens that portion of the belt passing through the channel member 54 and the adjacent funnel thereby swinging the channel member into its broken line position illustrated in Fig. 4. The bent arm 74, moving with the channel member 54 acts against a plunger 76 to close a switch mounted in a box 78 secured to the angle bracket 72. The closing of said switch causes the operation of a motor 80 (Fig. 1) secured to the rigid chute 24. Said motor operating through suitable gearing (not shown) actuates a pair of sprockets 82 the teeth of which project through an opening in the rigid chute 24 for engagement with the cartridges mounted therein. The operation of the sprockets 82 assists in the feeding movement of the cartridge belt thus relieving the recoil mechanism of the gun which, as commonly constructed, is not designed to draw a cartridge belt through a series of guideways as long as that herein illustrated. After a very brief period of operation of the sprockets 82 the tension on the portion of the cartridge belt passing through the channel member 54 and the adjacent guideway is relieved sufficiently to permit the spring 68 to return the channel member to its full line position illustrated in Fig. 4, whereupon a spring (not shown) in the switch box 78 opens the switch and causes the operation of the sprockets 82 to be arrested. It will be understood that the sprockets 82 will be operated intermittently at frequent intervals during the firing of the gun and will relieve the ammunition feeding mechanism of the gun of the greater part of the burden of feeding the ammunition belt. The above-described mechanism for assisting in the feeding of the ammunition belt, together with the swinging channel member for operating the switch is provided in each of the four ammunition feeding systems provided for the four-gun assembly illustrated in the drawings.

In the illustrated organization the rigid chutes 24 are constructed and arranged for movement lengthwise of the airplane and the chutes 22 and 56 are of a flexible construction which facilitates such movement of the rigid chutes. The movement of the rigid chutes is effected automatically by means actuated by movement of the gun assembly in azimuth and in elevation. The extent and the timing of the movements of the rigid chutes are such that the flexible chutes 56 have a substantially constant amount of slack in any and all positions of the gun mount. The mechanism whereby the movements of the gun assembly are transmitted to the rigid chutes is

illustrated and described in my copending application for United States Letters Patent Serial No. 543,344, filed July 3, 1944, Patent No. 2,479,633, dated August 23, 1949, of which the present application is a division.

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

1. Means for guiding a cartridge belt comprising a rigid chute, a movable chute mounted to swing on an axis having a fixed relation to said rigid chute, the hinged end portion of said movable chute being arranged to communicate with said rigid chute, a flexible chute, and a funnel the small end of which communicates with said flexible chute and the expanded end of which communicates with the free end of said movable chute during the entire range of swinging movement of said chute, a booster for feeding said cartridge belt, and means operated by the swinging movement of said movable chute for causing the operation of said booster.

2. The combination with a gun, of means for guiding a cartridge belt to said gun comprising a series of chutes including a rigid chute and a flexible chute, means securing said rigid chute and said flexible chute together in spaced relation to each other comprising two side plates secured to opposite side portions of the rigid chute and secured also to opposite side portions of the flexible chute, a movable chute positioned between the side plates and pivotally mounted on said plates adjacent to the delivery end of said rigid chutes, and two bent plates secured to the flexible chutes and providing, together with said side plates, a funnel-shaped passage the expanded end portion of which registers with the delivery end of said movable chute.

3. The combination with a gun, of means for guiding a cartridge belt to said gun comprising a

series of chutes including a rigid chute and a flexible chute, means securing said rigid chute and said flexible chute together in spaced relation comprising two side plates secured to opposite side portions of the rigid chute and secured also to opposite side portions of the flexible chute, a movable chute positioned between the side plates and pivotally mounted on said plates adjacent to the delivery end of said rigid chutes, two bent plates secured to the flexible chutes and providing, together with said side plates, a funnel-shaped passage the expanded end portion of which registers with the delivery end of said movable chute, an arm secured to the movable chute, and means for so limiting movement of said arm in each direction of its travel that the range of movement of the delivery end of the movable chute corresponds to the width of the receiving end portion of said funnel-shaped passage.

WILBUR L. MacKENZIE.

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