United States Patent [19]

Savioli et al.

[11] **3,712,173**

[45] **Jan. 23, 1973**

[54] **SPRING LATCH FOR AMMUNITION CHUTE**

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[73] Assignee: **The United States of America as represented by the Secretary of the Army**

[22] Filed: **Aug. 14, 1970**

[21] Appl. No.: **64,535**

[52] **U.S. Cl.** .....**89/33 BB**, 24/230 AS, 24/265 B

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

[58] **Field of Search**.....16/147, 173, 176; 24/230 AS, 24/230 SC, 265 B; 89/33 R, 33 BB, 34; 292/40

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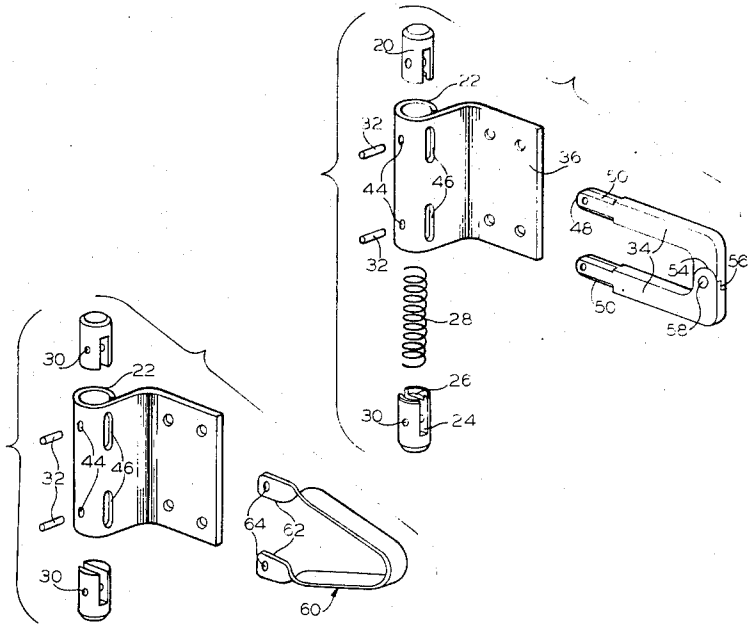
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[57] **ABSTRACT**

The releasable retention of an ammunition chute to the feedway of a gun is accomplished by a pair of oppositely biased plungers slidably retained on each side of the chute for engagement with corresponding sockets in outwardly extending brackets on each side of the gun feedway. Axial displacement of the plungers is effected by a lever pivoted thereto at one end and joined at the opposite end thereof to permit compensatory movement at substantially right angles to the direction in which the levers are actuated whereby the forces transmitted to the plungers are limited to the axis of displacement thereof to prevent concurrent sticking and binding.

3 Claims, 6 Drawing Figures

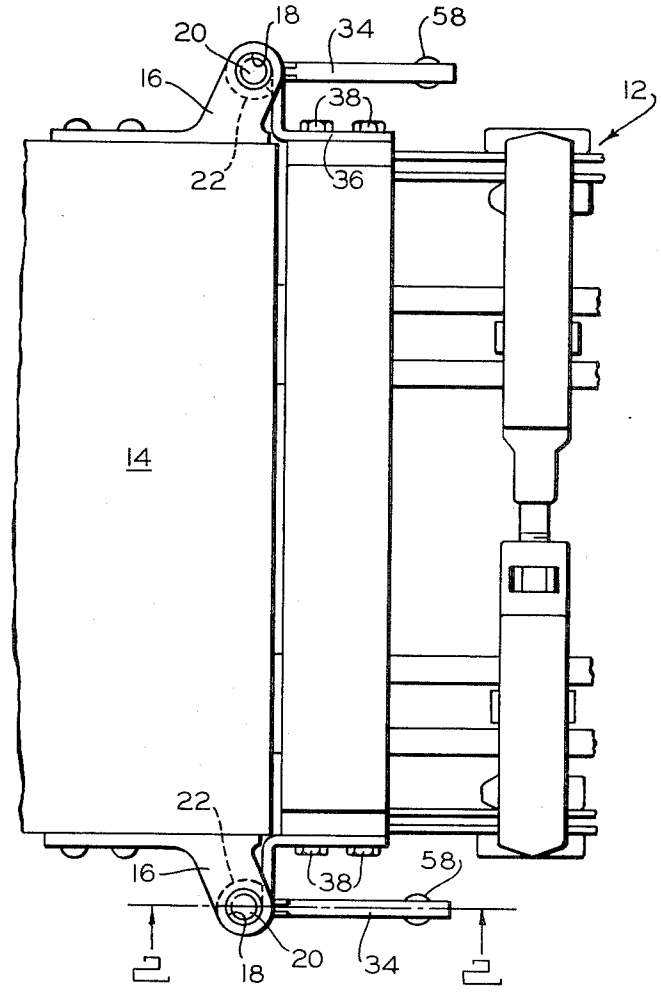


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Fig. 1



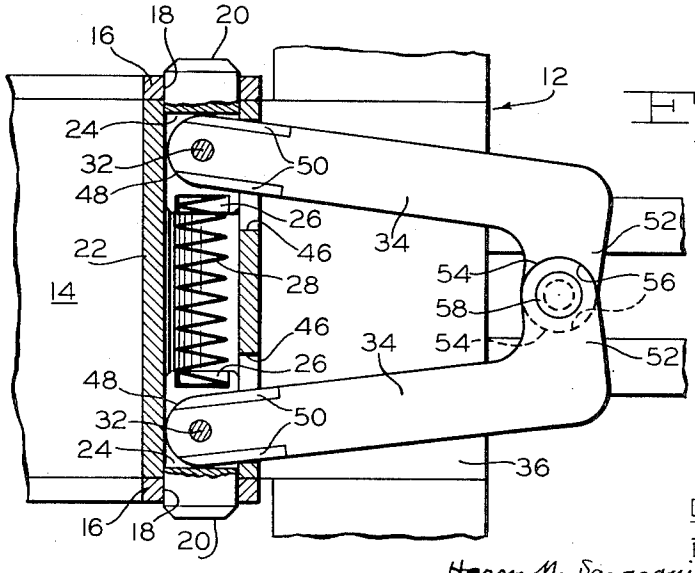


Fig. 2

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Fig. 3

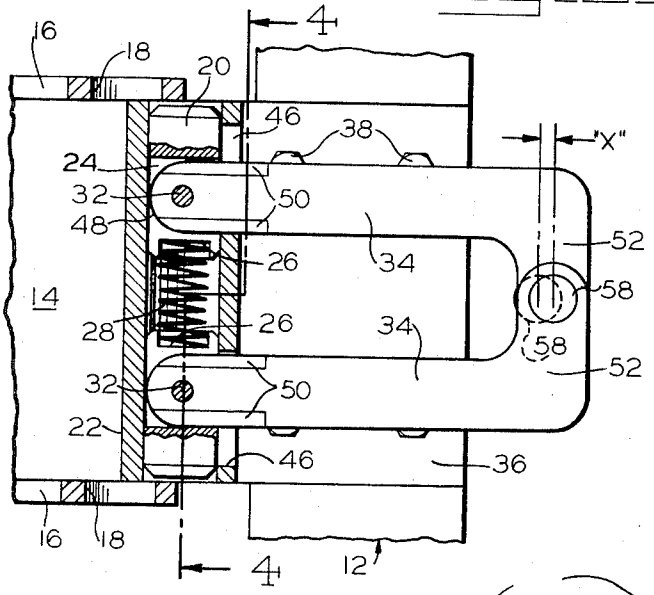


Fig. 4

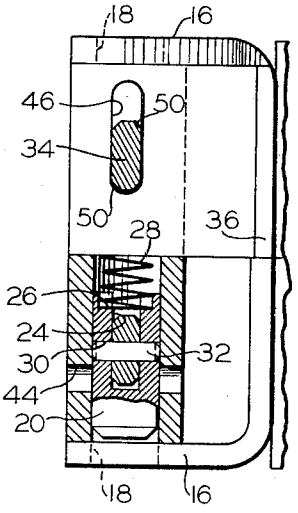


Fig. 5

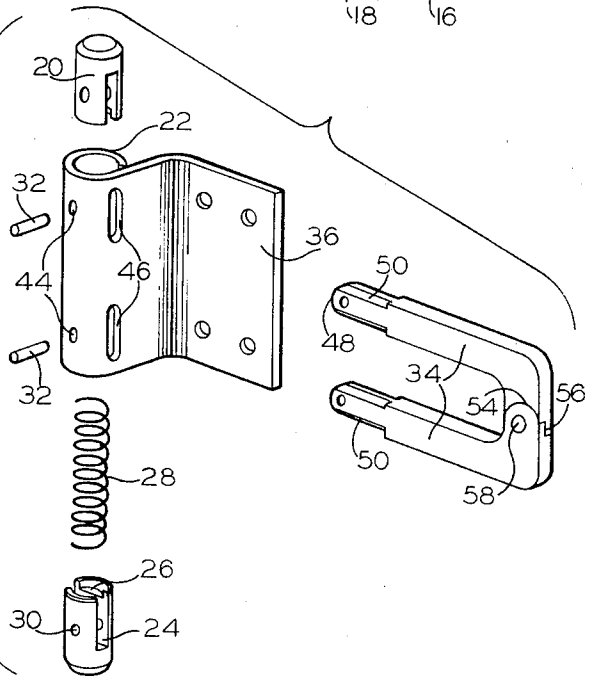
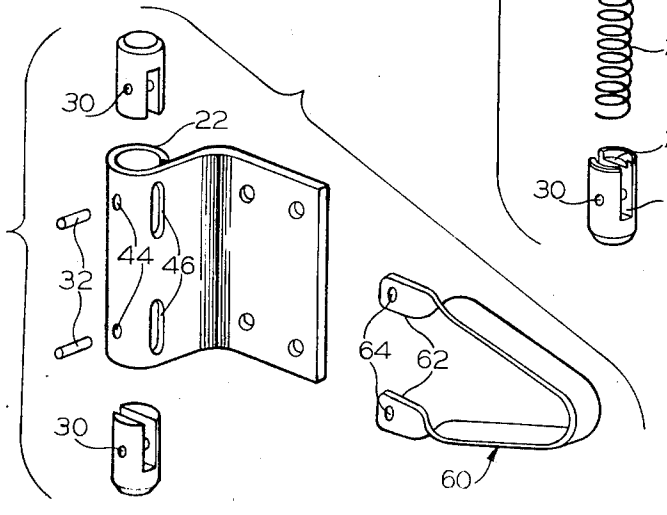


Fig. 6



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SPRING LATCH FOR AMMUNITION CHUTE

The invention described herein may be manufactured, used and licensed by or for the government for governmental purposes without the payment to us of any royalty thereon.

BACKGROUND OF THE INVENTION

This invention relates to means for releasably connecting flexible chuting between a supply of ammunition and a gun and is more particularly directed to a latching device therefor which can be readily functioned manually even though the portion thereof which provides the latching engagement is disposed in a relatively inaccessible location.

In many fixed gun installations to which the ammunition therefor must be fed in the form of a continuous belt of linked cartridges, the limited space surrounding the gun frequently requires that the container from which the belt is drawn be located in an area relatively remote from the gun. The consequent gap between the container and the gun is ordinarily spanned by a flexible chute with releasable latch means at each end thereof. It has been found that the rapid manual release required thereof is best provided by a pair of oppositely biased plungers slidably housed in the end of the chute for releasable engagement with correspondingly disposed sockets in the item to which the chute is being fastened.

The release of this type of latch is readily achieved simply by actuating the plungers against the bias of the spring therebetween to disengage from the mating sockets in the container or the gun. However, in many gun installations, it is extremely difficult, and in some instances virtually impossible, to physically reach the plungers. Although efforts have been made to overcome this difficulty by providing the plungers with suitable extensions which can be readily grasped by the operator of the gun, such approach has not been successful primarily because of the tendency for the plungers to bind and stick during the required axial displacement thereof. Inasmuch as space limitations generally do not permit such extensions to be actuated along a path parallel to the displacement axis of the plungers, the forces imparted thereto are generally of angular nature and consequently interfere with the required linear travel of the plungers.

Accordingly, it is an object of this invention to provide an improved latch for connecting the end of a flexible chute to an ammunition container or gun at a point which is relatively inaccessible to the reach of the operator thereof.

It is a further object of this invention to provide a manually operable latch, as aforesaid, wherein oppositely disposed slidable plungers are each provided with a readily accessible extension which can be manually actuated to provide the latching and unlatching movements required of the plungers.

Another object of the present invention lies in the provision of a latch, as aforesaid, wherein the extensions are pivotally connected to the latching plungers and to one another in a manner which will permit the extensions to be pivoted about the connection therebetween without imparting any eccentric forces to the plunger whereby the required axial displacement thereof can be accomplished without sticking or binding.

SUMMARY OF THE INVENTION

It has been determined that these objects can best be attained by a latch structure with axially spaced plungers which are spring biased into mating sockets in the unit to which the flexible chute is to be joined. In order to permit axial displacement of the plungers even though actual manual contact therewith is prohibited by adjacent structure, a lever is pivoted at one end thereof to each of the plungers and extends outwardly therefrom at an acute angle thereto. The opposite ends of the levers are inwardly turned and are pivotally joined at a common point to form a unitary structure which can be manually actuated to transfer equal and opposite forces to each of the plungers. As the plungers are actuated by the levers to disengage from the ammunition container or the gun, the position of the point at which the levers are pivotally joined is progressively shifted at right angles to the direction of movement of the plungers to eliminate arcuate displacement of the points at which the levers are pivoted to the plungers. As a result, the forces imparted to each plunger is directed along the longitudinal axis thereof thereby avoiding the sticking or binding which otherwise would have taken place within the hollow interior of the latch.

BRIEF DESCRIPTION OF THE DRAWINGS

The exact nature of the invention as well as other objects and advantages thereof will be readily apparent from consideration of the following specification relating to the annexed drawings wherein:

FIG. **1** is a plan view showing one end of a typical flexible ammunition chute releasably secured at opposite sides thereof to the mouth of the feedway in a gun by means of the latches of the present invention;

FIG. **2** is a sectional view of enlarged size taken along line **2—2** in FIG. **1** to show a latch assembly in the engaged position thereof;

FIG. **3** is a view similar to that of FIG. **2** but showing the latch assembly in the released position required to permit the chute to be removed from the gun;

FIG. **4** is a sectional view taken along line **4—4** in FIG. **3** to show the manner in which the ends of the extension levers are pivoted to the plungers;

FIG. **5** is an exploded view showing the individual components of a complete latch assembly; and

FIG. **6** is a view similar to FIG. **5** but showing a simplified version of the latch assembly.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

As shown in FIG. **1** of the drawings wherein similar reference characters have been employed to designate corresponding parts throughout, the latches of the present invention are particularly useful but not necessarily limited to the releasable attachment of a typical flexible ammunition chute **12** to the feedway **14** of a gun. A pair of outwardly extending brackets **16** are secured to each side of feedway **14** to provide opposing sockets **18** for receiving the ends of mating plungers **20** slidably housed in a tubular member **22**.

As indicated at **24**, each plunger **20** is transversely slit therethrough from one end thereof to a point substantially two-thirds along the length thereof. Each plunger **20** is also provided with a well **26** in the end containing slit **24** for seating the end of a compression

spring 28. Plunger 20 also includes a centrally located transverse hole 30 therethrough intersecting slit 24 at right angles thereto for fixedly receiving a pin 32 to which one end of a lever 34 is pivotally secured for a purpose to be described hereinafter.

Plunger housing 22 is fastened to or integral with a mounting plate 36 which is, in turn, arranged to be bolted, as best indicated at 38 in FIG. 1, to the side of flexible chute 12 adjacent the end thereof. The opposite end portions of housing 22 are each pierced by a transverse hole 44 therethrough to provide access for the insertion of retaining pin 32 into plunger 20. Housing 22 is also axially slotted, as indicated at 46, at a point radially offset from hole 44 therein to provide access for the end of lever 34 for assembly thereof to plunger 20.

This end of lever 34 preferably terminates in an arcuate contour as indicated at 48, and is additionally transversely beveled, as at 50, on opposite sides thereof to permit contact with the arcuate ends of slots 46 in housing 22. The opposite end of each lever 34 is essentially of L-shaped configuration, as indicated at 52, terminating in a substantially semi-circular contour 54. Levers 34 are additionally stepped in the transverse direction, as indicated at 56, to provide a juxtaposed complementary fit. A headed pin 58 serves to join levers 34 for relative pivotal movement about a common axis extending centrally through the juxtaposed ends 52.

Upon completion of assembly, plungers 20 are biased outwardly of housing 22 by spring 28, as best shown in FIG. 2, to engage in sockets 18 in feedway brackets 16 to the extent permitted by the length of slots 46 in housing 22. The configuration and the relative positions of these components are designed to minimize the travel of plungers 20 during the latching and unlatching of the chute and yet provide adequate strength to resist the inertia and the other forces to which aircraft guns are typically subjected. When it is desired to remove chute 12 from the gun, levers 34 are grasped by the operator of the gun and actuated to pivot about pin 58 in the L-shaped end 52 thereof. During this movement of levers 34, plungers 20 are drawn thereby into the interior of housing 22 to disengage from sockets 18 in brackets 16 on the gun. If the joint pivot point of levers 34 were fixed, the opposite ends thereof would follow an arcuate path during the pivotal movement imparted to such levers. Since levers 34 are pivoted to plungers 20, the latter would be forced against the interior walls of housing 22 thereby causing undesirable binding therein which, at best, would substantially increase the physical effort required to separate chute 12 from the gun and, at worst, would completely prevent the desired separation.

However, inasmuch as the pivotal connection of the L-shaped ends 52 of levers 34 is not fixed at any one point, such connection is free to move at right angles to the direction of travel of plungers 20 through the distance x as shown in FIG. 3 of the drawings. As a result, plungers 20 are freely displaceable in housing 22 without any tendency to stick or bind therein. The pivotal movement imparted to lever 34 by the operator of the gun is halted upon contact thereof with the inner ends of slots 46. Release of both latches will, of course, permit the complete removal of chute 12 from feedway 14 in the gun. Restoration of chute 12 to the gun is readily accomplished by executing the same series of steps in a reverse manner. Since plungers 20 are rotatably insertable in sockets 18, the removal or replacement of chute 12 may be accomplished by first engaging one of the latches in gun bracket 16 on one side of feedway 14 and thereafter swinging the end of chute 12 to align plungers 20 in the opposite latch with bracket 16 on the other side of feedway 14.

In the event the environment in which chute 12 must be latched does not require maximum strength and ruggedness, a simpler and more economical latching arrangement may be employed. In this embodiment, the pair of levers 34 are replaced by a unitary actuator 60 formed from a rectangular strip of resilient metal centrally bent to provide a generally U-shaped section as best shown in FIG. 6. The ends of actuator 60 are twisted substantially at right angles to the lateral plane of the body thereof as indicated at 62, to permit insertion thereof into slots 46 in housing 42. Ends 62 are each provided with a central hole 64 to permit pivotal attachment thereof to plungers 20. If desired, spring wells 26 may be eliminated from plungers 20. The resiliency of actuator 60 operates plungers 20 in exactly the same manner as levers 34 without the need for return spring 28.

Thus, there is here provided a simple and efficient latching structure for releasably securing a flexible ammunition chute to a gun or to an ammunition container even though the plungers which provide the required latching engagement cannot be physically reached by the operator of the gun. Moreover, inasmuch as the structure utilized to actuate the plungers is free to move at right angles to the axis of plunger movement, the actuating forces imparted to the plungers are limited to the direction of axial displacement thereof and consequently do not cause the latter to stick or bind in their housing during the functioning of the latches.

Although the present invention is explained in accordance with the preferred embodiments shown and described herein, it will also become obvious to persons skilled in the art that other forms thereof as well as changes in the particular forms described, are possible within the spirit and scope of the present invention. Therefore, it is desired that the present invention shall not be limited except insofar as it is made necessary by the prior art and by the spirit of the appended claims.

We claim:

1. Latch means for releasably securing one end of an ammunition chute to the feedway of a gun, comprising,

at least one fixed housing extending outwardly from a side of the chute,

a pair of axially aligned plungers disposed in spaced apart relation and slidable in said housing,

at least one bracket projecting outwardly from the gun feedway and having axially spaced sockets therein for releasably receiving the remote ends of said plungers,

spring means engaging the adjacent ends of said plungers for axially biasing said remote ends into latching engagement with said sockets,

a lever assembly comprising a pair of levers each having one end thereof pivotally secured to one of said plungers and with the opposite end thereof extending outwardly from said housing, and

means for connecting the outwardly extending ends of said levers in a manner to permit lateral displacement of said outwardly extending ends in direct response to axial movement of said plungers whereby sticking or binding thereof in said fixed housing is avoided.

2. The combination defined in claim 1 wherein the outer ends of said levers terminate in an L-shaped configuration and said connection means therebetween comprises,

a transversely stepped portion at the end of each L-shaped configuration, and

a pivot pin extending transversely through the ends of said L-shaped configurations to join said transversely stepped portions in mating engagement.

3. The combination defined in claim 1 wherein said levers comprise oppositely facing strips of flexible metal terminating in vertical end portions disposed at substantially right angles to said strips for respective pivotal engagement with said plungers, and wherein said means for connecting said outwardly extending ends of said levers consists of a substantially U-shaped section integral therewith.

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