United States Patent [19]

Gaye

[11] **3,762,268**

[45] **Oct. 2, 1973**

[54] **AMMUNITION HANDLING SYSTEM**

[75] Inventor: **John H. Gaye**, Winooski, Vt.

[73] Assignee: **General Electric Company**, Burlington, Vt.

[22] Filed: **July 12, 1972**

[21] Appl. No.: **270,934**

[52] **U.S. Cl.** ..... **89/34**, 42/1 B

[51] **Int. Cl.** **F41d 9/06**

[58] **Field of Search** ..... 89/33 BB, 33 BL, 89/34; 193/25 AL; 206/3

[56] **References Cited**

UNITED STATES PATENTS

3,246,565 4/1966 Ramseyer 89/34

Primary Examiner—Stephen C. Bentley

Attorney—Irving M. Freedman et al.

[57] **ABSTRACT**

An ammunition storage and feeding system includes a plurality of ammunition storage and feeding containers which may be manually interlocked seriatim and whose contained belts of ammunition will, thereby, be respectively interlocked seriatim, all at the gunner's convenience, during firing.

9 Claims, 10 Drawing Figures

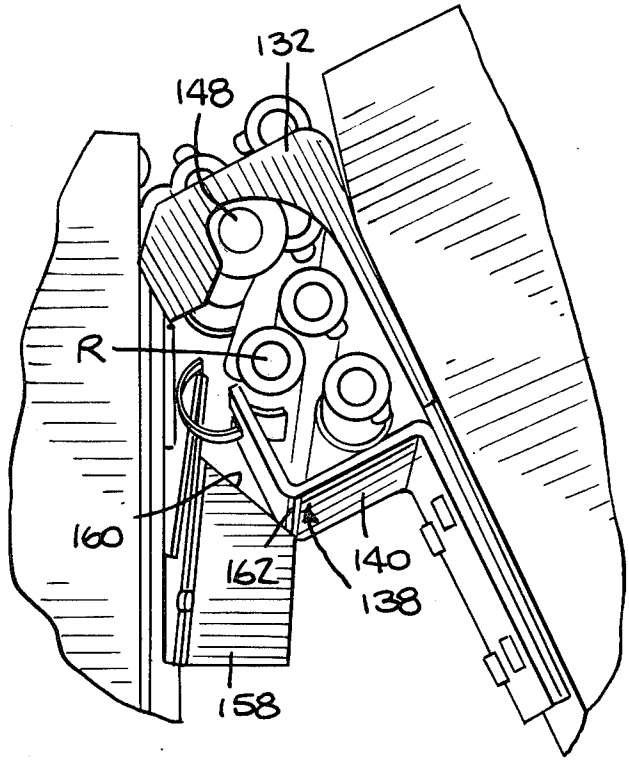
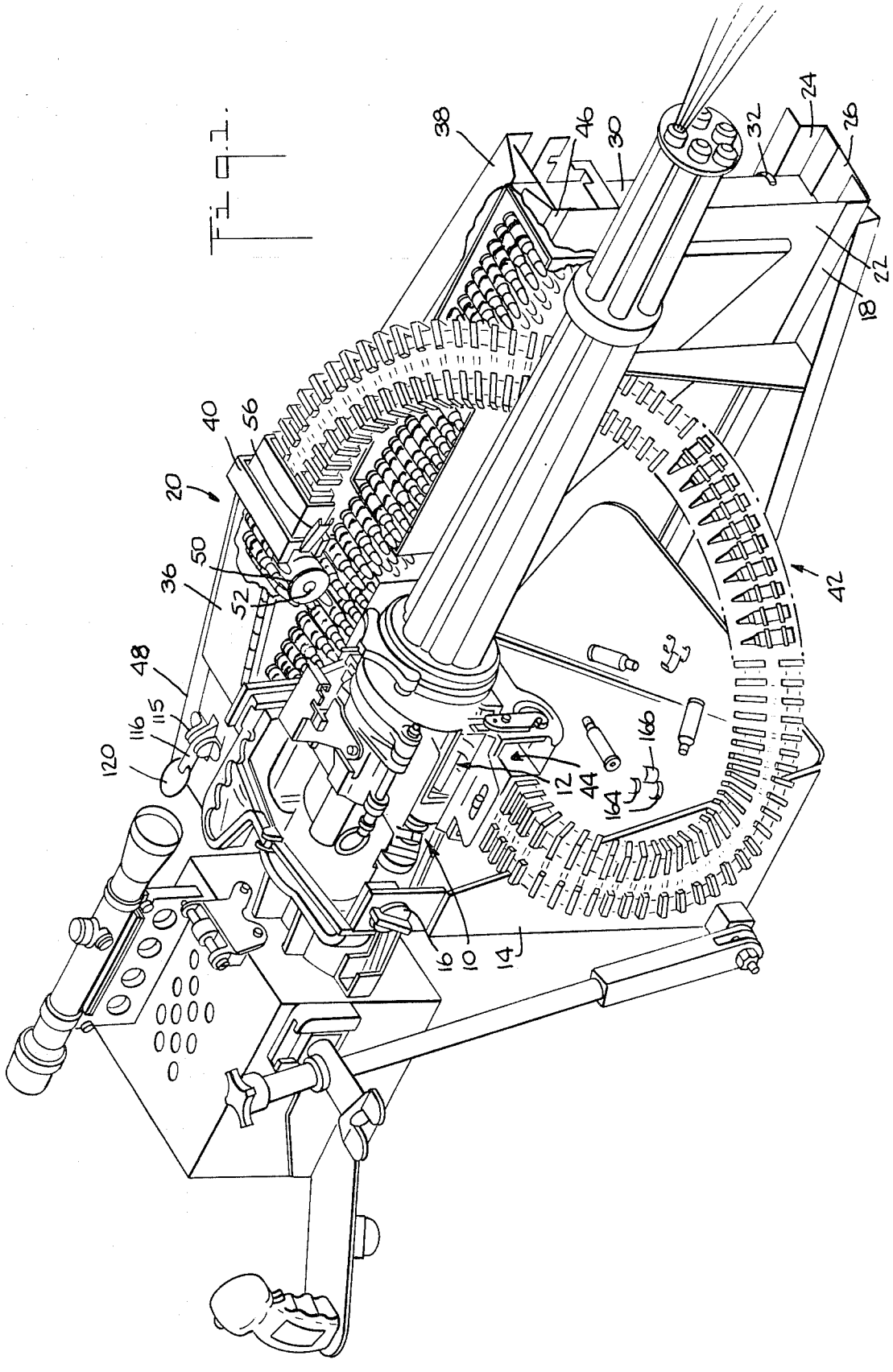


Fig. 1.


38
46
30
32
24
26
22
18
40
56
20
50
36
52
48
116
115
120
42
12
44
164
166
10
14

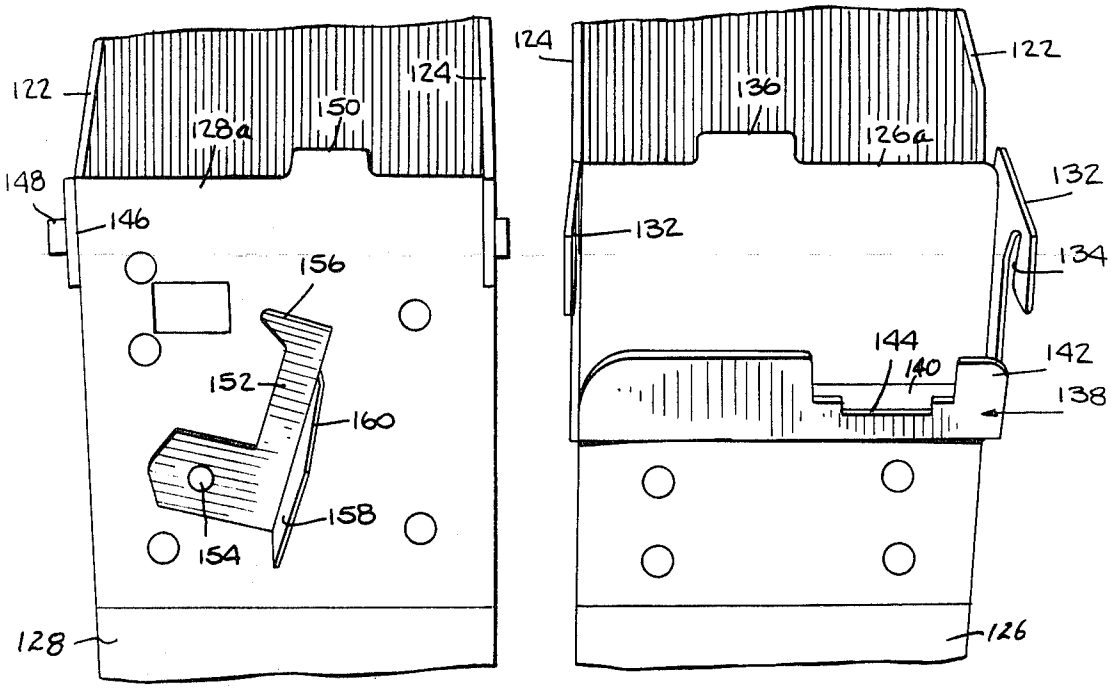

122
124
150
128a
148
146
156
152
160
158
154
128
124
122
136
126a
132
132
134
144
140
142
138
126

Fig. 2.

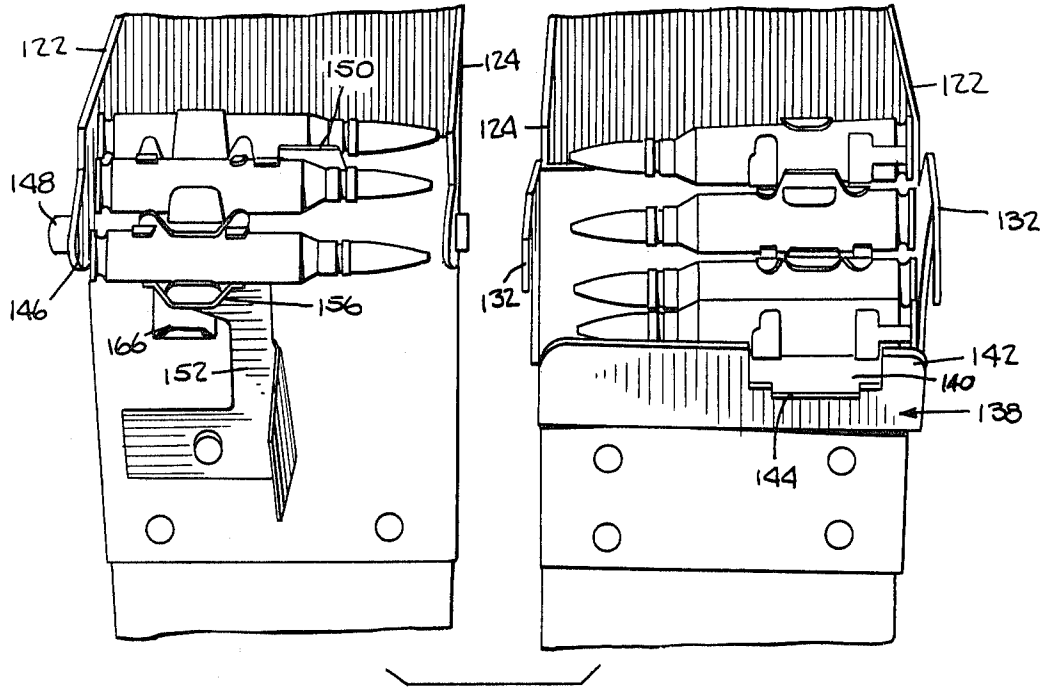

122
150
124
148
146
156
166
152
124
122
132
132
142
140
138
144

Fig. 3.

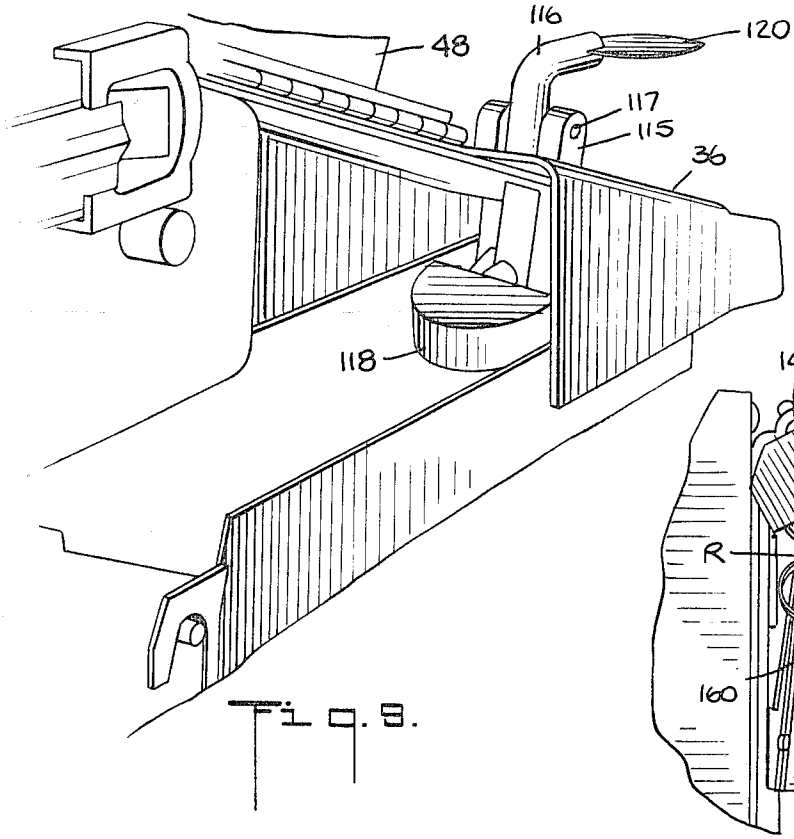


Fig. 3.

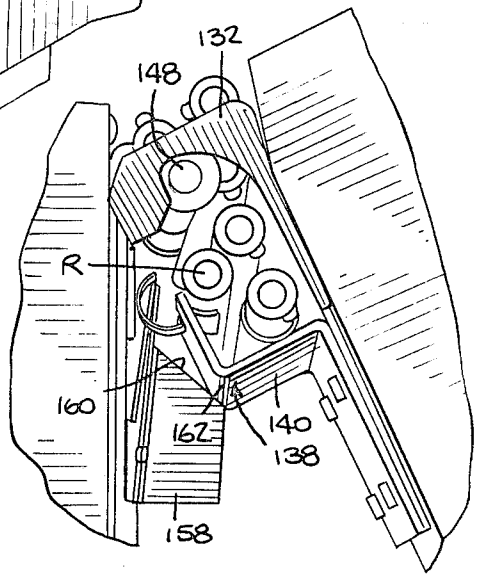


Fig. 4.

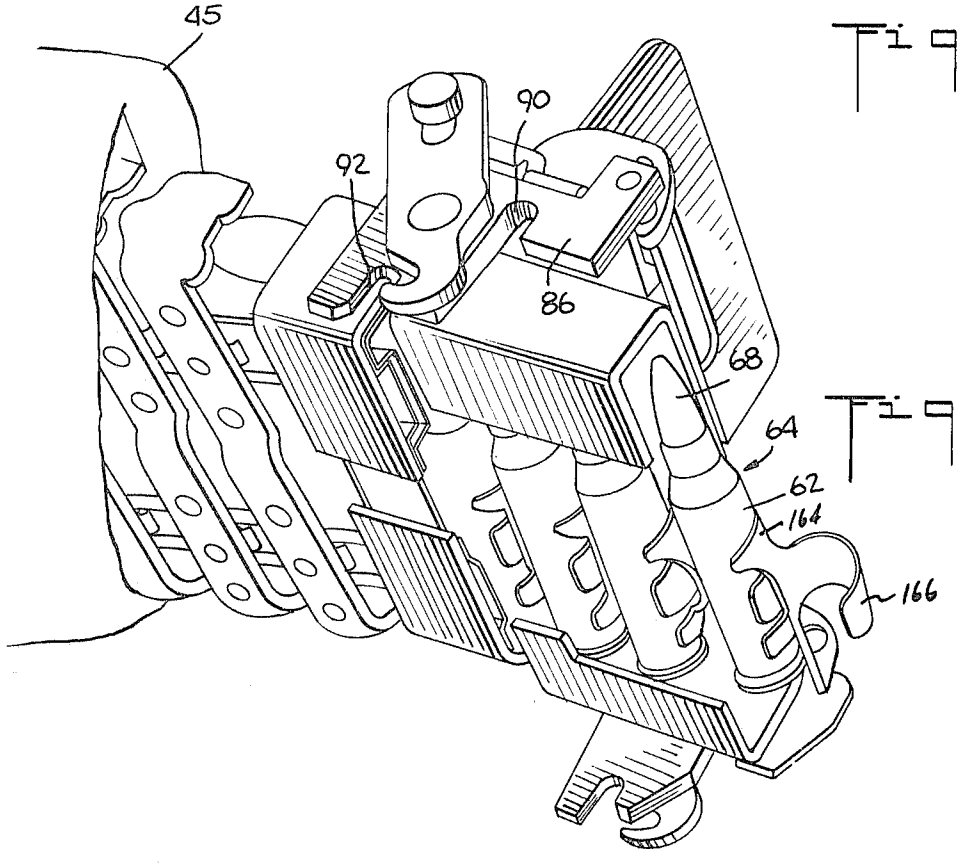


Fig. 5.

Fig. 5.

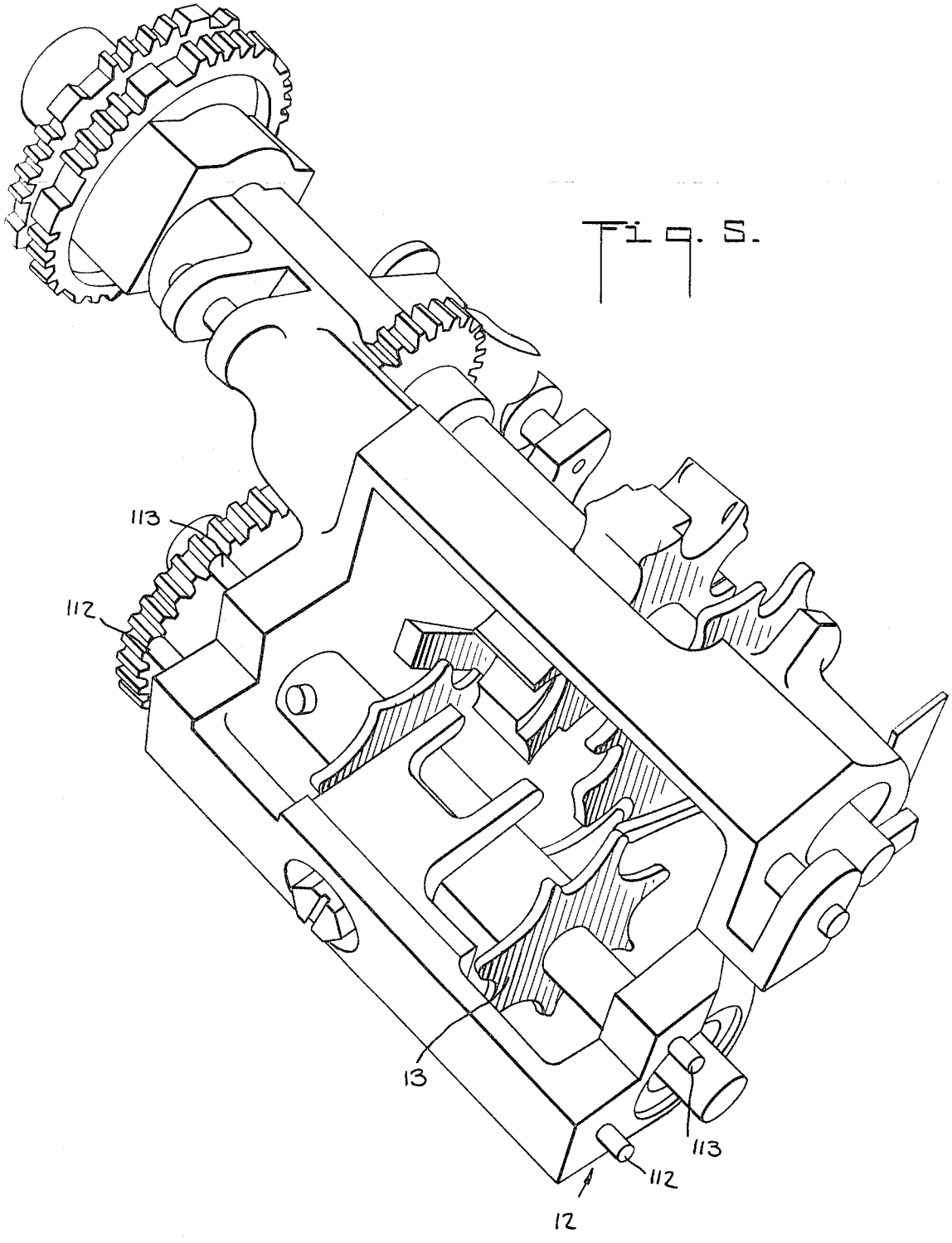


Fig. 6.

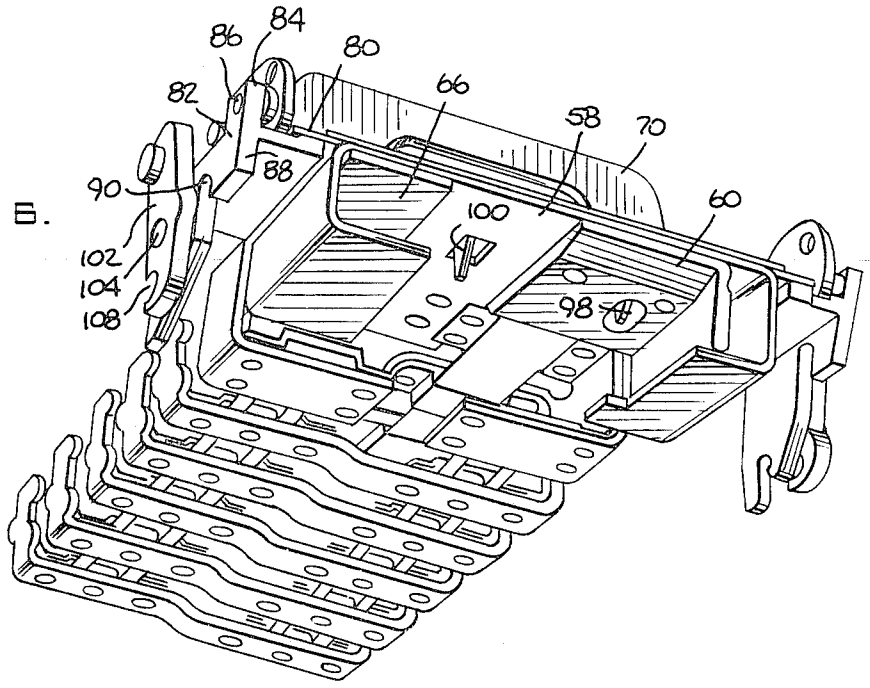

86
84
80
82
66
58
70
88
90
100
60
102
104
108
98

Fig. 7.

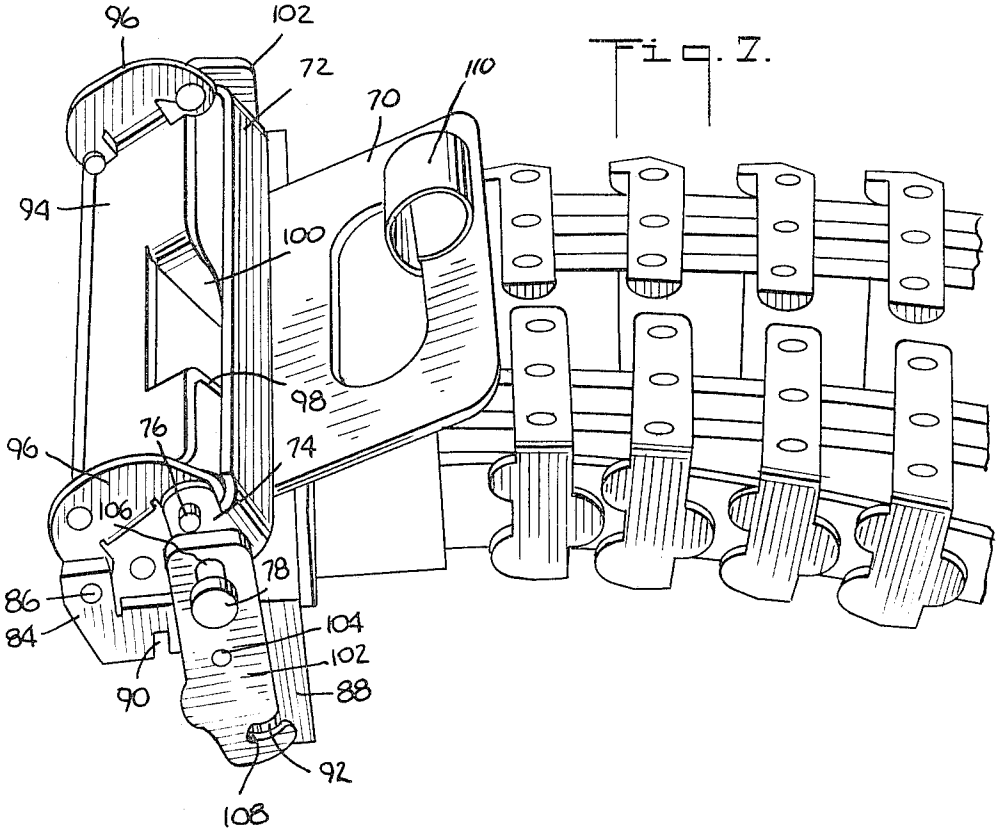
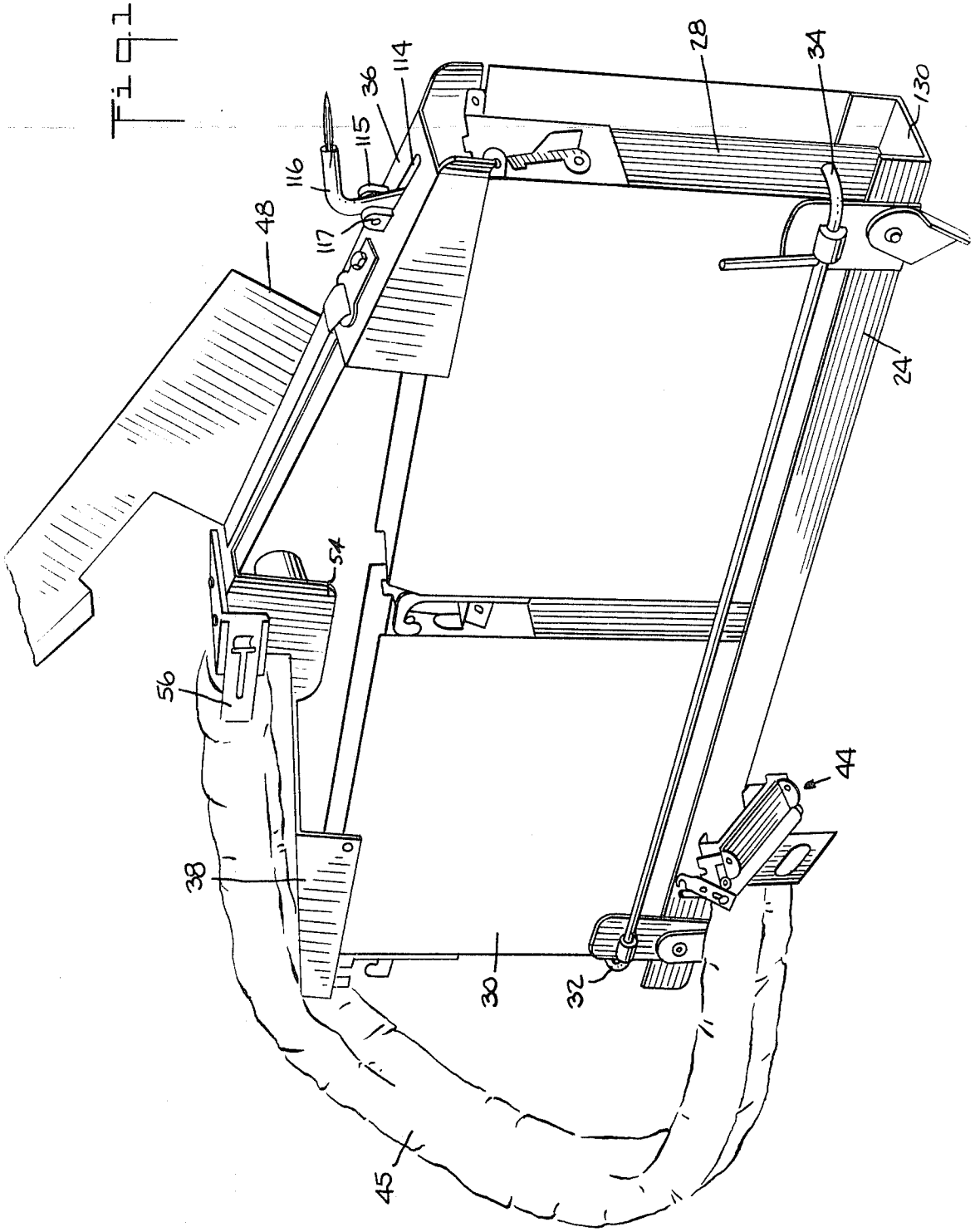

96
102
72
110
70
94
100
98
76
74
96
106
78
86
84
104
102
88
90
92
108

FIG. 10.



AMMUNITION HANDLING SYSTEM

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to a system for storing plurality of articles in linked trains of predetermined length, for semi-automatically coupling such trains together, and for automatically feeding them as a continuous train of indefinite length. The invention is shown embodied as an ammunition storage and feeding system for a machine gun having a very high rate of fire.

2. Description of the Prior Art

The feeding of ammunition to a machine gun by means of a cloth belt is shown at least as early as Feb. 22, 1876 in U.S. Pat. No. 173751 issued to Fortune L. Bailey. The significant improvement since then has been the development of the metal link to provide a disintegrating belt. While theoretically the belt can be made as long as desired; in practice, the length of the belt has been limited to that which can be accommodated by the container in which it is to be stored, carried into action and fed to the gun. After that belt as been fired out, as a separate manual operation, the leader of a fresh belt is hooked into the gun. This results in a hiatus in the gunner's ability to fire his gun. An exemplary description of a smaller container for ammunition which is directly carried by the gun is shown in U.S. Pat. No. 3,293,986. Exemplary descriptions of larger containers, including interior compartments or hangers to support loops in the belt, are shown in U.S. Pat. Nos. 2,811,084; 2,874,615; 2,889,751; and 3,461,774. With each of these containers, after the contained belt has been fired out, the leader of a fresh belt, from a fresh container, must be hooked into the gun. In U.S. Pat. No. 2,951,422 issued Sept. 6, 1960, V.S. Bobkowski shows an elaborate system having a helical conveyor which transports loose rounds of ammunition from special hoppers to a gun (somewhat in the manner of a meat grinder). The hoppers may be fed to the conveyor in series, and after the contents of one hopper are extracted, the conveyor will extract from the next hopper without a hiatus therebetween.

BRIEF SUMMARY OF THE INVENTION

Accordingly, it is an object of this invention to provide a system for continuously feeding to a gun, seriatim, belts of ammunition contained in an unlimited number of containers.

It is another object to provide such a system wherein fresh containers can be added on, at the gunner's convenience, during the course of firing, permitting a burst whose length limited only by the survival of the gun barrel.

A feature of this invention is the provision of an ammunition storage and feeding system including a plurality of ammunition storage and feeding containers which may be manually interlocked seriatim and whose contained belts of ammunition will, thereby, be respectively interlocked seriatim, all at the gunner's convenience during firing.

BRIEF DESCRIPTION OF THE DRAWING

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

FIG. **1** is a perspective view of the armament system including the machine gun and the ammunition storage and feeding system;

FIG. **2** is an end view of the respective interlocking ends of the ammunition boxes.

FIG. **3** is an end view similar to FIG. **2**, showing the respective ends of the ammunition belts fixed to the ends of the boxes;

FIG. **4** is a side view of the boxes of FIG. **3**, showing the boxes and their respective belts in an intermediate stage of being interlocked;

FIG. **5** is a perspective view of the feeder of the gun of FIG. **1**;

FIG. **6** is a perspective view from below of the distal end of the ammunition storage system flexible guide which locks onto the feeder;

FIG. **7** is a perspective view from above of the distal end of the guide of FIG. **6**;

FIG. **8** is a view similar to FIG. **6** showing the leading end of the ammunition belt locked in and to the guide of FIG. **6**;

FIG. **9** is a partial perspective view of the ammunition storage system cover, showing the depleted ammunition indicator; and

FIG. **10** is a perspective view of the ammunition storage system showing the cover in its open position.

THE PREFERRED EMBODIMENT

An ammunition storage and feeding system embodying this invention is shown in FIG. **1** incorporated in an armament system having a machine gun **10** of the type disclosed in U.S. Pat. application Ser. No. 152,889, filed June 14, 1971 by R. Pettinga et al. The machine gun has a side stripping feeder **12** incorporated therein whose feeder sprocket **13** is controlled be a cam operated positive clutch and brake (not visible) of the type shown in U.S. Pat. No. 3,578,118 issued May 11, 1971 to L.K. Wetzel.

The gun is mounted in a yoke **14** by a pair of pivot pins **16.** A frame **18** is fixed to the side of the yoke, and has a cover **20** fixed thereto. The frame has two spaced apart side walls **22** and **24,** a bottom **26** integral therewith, and is adapted to hold two ammunition cans **28** and **30** therein. The cans may be slid in from the aft end and slid out the forward end of the frame; and may be secured in place by a forward latch arm **32,** and an aft latch arm **34,** both extending from a rod which is pivotally mounted to the wall **24.** The cover **20** has an aft upper integral wall **36** at a relatively large included angle, and a forward upper integral wall **38** at a relative small included angle to provide a middle mutual vertical gap to receive the aft attachment fitting **40** of a flexible guide **42,** which also has a forward fitting **44** for attachment to the feeder **12** of the gun. The guide may be covered by a cloth sleeve **45.** The cover has a gun-proximal side wall **46** which is integral with the frame and the upper walls **36** and **38,** and has a gun-remote side wall **48** which is hinged at its top to the aft upper-wall **36,** and held down by a quick-release fastener, not shown, so that access to the interior of the cover may be obtained. A roller **50** is journalled on a shaft **52** ex-

tending to and between the gun proximal wall and an intermediate wall 54 bounding the gap. The aft attachment fitting 40 is releasably secured to the sidewalls of the cover by a pair of quick-release catches 56.

The forward attachment fitting 44 includes a rectangular C-shaped channel 58 having an interior L-shaped bracket 60 to guide the case 62 of each round of ammunition 64, and a flat spacer 66 to guide the nose 68 of each round. A handle 70 has a longitudinal 90° extension 72 from which depend a pair of transversely spaced apart ears 74. Each ear has a transversely extending forward pin 76 and a transversely extending aft pin 78. Fixed to the channel 58 is a transverse bracket 80 which has a pair of transversely spaced apart side plates 82. Each side plate 82 has an upstanding ear-portion 84 with a transversely extending pin 86, and a depending portion 88 with a forward, upper notch 90 and an aft, lower notch 92. A transverse plate 94 has a pair of transversely spaced apart, longitudinally and upwardly extending ears 96. The aft end of each ear 96 is pivoted to the forward end of the respective ear 74 on pin 76, and the forward end of each ear 96 is pivoted to the respective ear-portion 84 on pin 86 to form a toggle between the plate 94 and the handle extension 72. The plate 94 also has two transversely spaced apart teeth 98 and 100 which extend through respective apertures in the channel and the aft guide bracket into the enclosed volume of the C-shaped channel 58. When the handle 70 is swung up, the toggle is locked, and the teeth extend into the enclosed volume and are adapted to pass between the adjacent rounds of ammunition disposed within the fitting 44. When the handle is swung down, breaking the toggle, the teeth are withdrawn and the rounds are freed. A pair of transversely spaced apart levers 102 are respectively pivotally mounted at 104 to each depending portion 88, and each has a respective slot 106 in which the respective pin 78 slides, and a respective notch 108. When the handle 70 is swung fully down, so that it is captured by a spring clip 110 mounted to the flexible guide, the levers 102 are swung so that the respective notches 108 and 92 overlap.

The feeder 12 has a first pair of longitudinally spaced apart, longitudinally extending pins 112, and a second pair, transversely spaced therefrom, of longitudinally spaced apart, longitudinally extending pins 113. When the forward attachment fitting 44 is locked onto the feeder 12, the pair of pins 112 are received into the pair of notches 90 respectively and the pair of pins 113 are received by the pair of notches 92 and captured by the pair of notches 108 respectively.

An aperture 114 is provided in the aft upper wall 36, straddled by a pair of ears 115. A crank-shaped rod 116 is disposed through the aperture 112 and is pivoted to and between the ears 115 by a pin 117. The lower end of the rod 116 has a feeler-foot 118 and the upper end has a signal-flag 120.

Each of the ammunition cans 30 and 28 is open topped and has two side walls 122, 124, a forward end wall 126, an aft end wall 128, and a bottom wall 130. The forward end wall 126 has a pair of transversely spaced apart, longitudinally extending lugs 132, each with a respective upwardly directed notch 134. The wall 126 also has an upwardly extending tooth 136, and an L-shaped bracket 138 whose leg 140 extends longitudinally forward and whose foot 142 extends upwardly. The foot 142 has a downwardly directed, stepped notch 144. The aft end wall 128 has a pair of transversely spaced apart, longitudinally extending lugs 146, each with a respective transversely outwardly directed pin 148, adapted to mate with the respective notch 134 on an adjacent lug. The wall 128 also has an upwardly extending tooth 150, and an arm 152 having a pivot 154, a transversely extending tooth 156, and a longitudinally extending handle 158 having an upper cam surface 160.

The belts of ammunition are formed by conventional metal links 162 each having two spaced apart loops 164 encircling the case of the preceding round of ammunition and a central loop 166 encircling the case of the suceeding round of ammunition. Each can of ammunition is loaded with a continuous belt of ammunition, in folded layers, with the end of the lowest layer being brought up adjacent the inside surface of the aft end wall 128 and over, with the tooth 150 passing between the second and third rounds from the end of the belt. The open single loop of the last link is held against the outside surface of the aft end wall 128 by the tooth 156 of the pivoted arm 152. The leading end of the belt is brought over the top of the forward end wall 126 with the tooth 136 passing between fifth and six rounds of the belt. The second through fifth rounds hang downwardly adjacent the outer surface of the end wall 126 with the first round R swung upwardly and adjacent the toe of the foot 142 and all within the bracket 138. To interlock the cans and their belts, the aft can is tilted and its notched lugs 132 are hooked onto the pinned lugs 146 of the forward can.

As the aft can is swung downwardly about the pins 148; the single loop 166 of the link passes through the notch 144 of the L-bracket 138 and straddles less than the diameter of the case of the round; the corner 162 of the L-bracket 138 engages the surface 160 of the handle 158 and cams the arm 152 about its pivot 154, disengaging the tooth 156 from the single loop 166; and finally the single loop snaps over the diameter of the case of the round, hereby inter connecting the two belts of ammunition.

The arrangement of the cans is determined by the need to have the leading element of the belt of ammunition be a round of ammunition. rather than a link. Should a link be required as the leading element, then the arrangement of the cans would be reversed.

The feeler-foot 118 of the signal rod 116 rests on the topmost layer of the ammunition belt of the aft can. As ammunition is drawn out of the aft can, the foot 118 is lowered, thereby raising the signal 120, thus indicating to the gunner the forward can is empty and that a fresh can should be hooked on behind the present aft can. When this has been done, the latches 32 and 34 are released, and the cans are pushed forward until the empty forward can is out of the frame. The latches are reengaged and the empty can is unhooked.

During the initial loading of the ammunition storage system, the leading end of the belt of the forward can is brought aft, up-around the roller 50, and through the aft attachment fitting 40 of the flexible guide The belt is led through the guide and out the forward attachment fitting 44. The handle 70 is swung up to project the teeth 98 and 100 between the third and second rounds, thereby locking the belt to the fitting. The storage system may be carried in the field in this disposition, ready for attachment to the feeder of the gun. For attachment, the forward upper notches 90 are fitted

onto the pins **112** and the handle **70** is swung down so that the notches **92** and **108** are locked onto the pins **112** The first round of the belt will automatically be received by the sprocket of the feeder which is automatically oriented by the clutch/brake.

What is claimed is:

1. An ammunition storage and feeding system for linked rounds of ammunition comprising:

a first ammunition container, having a forward end and an aft end for receiving and storing a first belt of linked rounds of ammunition having a forward end and an aft end;

a second ammunition container, having a forward end and an aft end, for receiving and storing a second belt of linked rounds of ammunition having a forward end and an aft end;

container intercoupling means consisting of a separate first portion fixed to said aft end of said first container and a separable second portion fixed to said forward end of said second container, for serially interconnecting said first and second containers; and

belt intercoupling means consisting of a separable first portion fixed to said aft end of said first container and a separable second portion fixed to said forward end of said second container, said first portion for receiving the aft end of the first belt and said second portion for receiving the forward end of the second belt, and for automatically serially intercoupling the aft end of the first belt to the forward end of the second belt while said container intercoupling means serially intercouples said first and second containers.

2. A system according to claim **1**, wherein:

said first portion of said belt intercoupling means comprises;

first means for retaining the last link in the aft end of the first belt adjacent the outer face of said aft end of said first container; and

said second portion of said belt intercoupling means comprises;

second means for retaining the first round in the forward end of the second belt adjacent the outer face of said forward end of said second container;

whereby the intercoupling of said first and second containers causes the interengagement of the first round of the second belt with the last link of the first belt.

3. A system according to claim **1**, wherein:

said second portion of said belt intercoupling means comprises;

a second support means, projecting from the outer face of said aft end of said second container, having a recess opening upwardly for receiving the forward end of the second belt and opening forward for passing a first portion of the last link in the aft end of said first belt; and

said first portion of said belt intercoupling means comprises:

a first support means, projecting from the outer face of said aft end of said first container, for releasably retaining the first portion of the last link adjacent said outer face of said aft end of said first container in such a disposition that while said containers are being serially intercoupled the first portion of the last link passes into said recess to snap around the case of the first round of the second belt disposed therein; and

said belt intercoupling means further includes;

third means for releasing said first support means from the first portion of the last link of the first belt before this first portion has snapped over the diameter of the case of the first round.

4. A system according to claim **3**, wherein;

said first support means is a pivoted arm having a cam receiving surface, and

said third means is cam coupled to said second container for engaging said cam receiving surface of said arm for causing said arm to release the first portion of the last link after the first portion of the last link has entered said forward opening of said recess in said second support means.

5. A system according to claim **1** further including:

housing means for receiving and releasably storing a plurality of serially interconnected containers.

6. A system according to claim **5** further including:

elongated ammunition guide means having an aft end coupled to said housing and a forward end for coupling to the feeder of a machine gun.

said guide means being adapted to guide the passage of a belt of ammunition from said housing means to the feeder of the machine gun.

7. A system according to claim **6** further including:

indicator means coupled to said housing and having;

a first portion disposed within said housing for engaging and being affected by the belt of ammunition, and

a second portion disposed without said housing and affected by said first portion.

8. A system according to claim **6** further including:

a belt of linked rounds of ammunition having an aft portion thereof disposed in said second ammunition container, an intermediate portion thereof disposed in said first ammunition container, and a forward portion thereof disposed in and through the length of said guide means.

9. A system according to claim **8** further including:

indicator means, for indicating ammunition belt consumption, coupled to said housing and having

a first portion disposed within said housing adjacent said second ammunition container and supported by said aft portion of said belt, and

a second portion disposed without said housing and having a disposition responsive to and indicative of the extent of the support of said first portion of said belt.

* * * * *