METHOD OF AND MEANS FOR LOADING AMMUNITION CONTAINERS

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This invention relates to improvements in apparatuses for feeding machine guns or cannon of military aircraft and refers more especially to an improved ammunition container and to a new method and new means for loading this container.

This method aims at overcoming the structural and aerodynamic difficulties arising from the ever increasing number of machine guns or cannon mounted in airplanes and the commensurate quantity of ammunition therefor, required to be carried inside the stressed skin structures of aircraft.

Although the problem is often acute in fuselages and nacelles, it presents the greatest difficulties when applied to wing construction.

One object of the invention is to provide an ammunition container capable of feeding several wing guns or cannon and which can be built within the wing of an aircraft without substantially weakening the structural strength of this wing, though the basic principle of the invention can be applied equally well to ammunition containers located in any other stressed skin component of the airplane.

Another feature of the invention is to utilize a stressed skin structure of the aircraft, such as the top covering of a wing, to form the fixed cover of an ammunition container.

A further feature is to provide removable loading means which can be readily associated with the ammunition container only at the time of loading, can be conveniently operated, on the ground, so as to give a quick and accurate loading and can be quickly removed or stowed within the gun bay of the wing after loading so as not to interfere with the flight of the airplane and the operation of the gun or cannon-feeding mechanism.

A further feature consists in subdividing the container chordwise, by means of the spars of the wing, into as many longitudinal boxes as there are guns or cannon in each wing, each of these individual boxes being entirely closed, except for a relatively narrow entrance slot provided near the top of a wing rib, which forms a partition between the container box and being in turn subdivided spanwise into substantially square compartments by the other ribs of said wing, slots being likewise provided in these ribs so as to form a horizontal loading passageway for the cartridge belt, extending along the entire length of each box immediately below the fixed cover formed by the wing upper double skin.

Another feature resides in providing sliding means insertable between these slots and spanning the gaps therebetween to support the belt along this feedway during the loading operation.

Still another feature consists in providing baffles or deflectors under the anti-friction rollers which are usually provided along this feedway in order to minimize the drag on the belt during feeding, these baffles preventing jamming of the belt under these rollers.

Other useful features of the invention will become apparent from the reading of the following description made in reference to the accompanying drawing, in which Figure 1 is a fragmentary longitudinal sectional view of the left wing of a military aircraft, showing an embodiment of the present invention in conjunction with the several compartments of a single container. Figure 2 is a similar view showing the loading device removed and one box of the ammunition container operatively connected to a gun. Figure 3 is a fragmentary side elevation taken on the line 3-3 of Figure 1.

In this drawing, a conventional wing construction is shown consisting of a double, top covering or skin a, any number of spars b and either solid or truss ribs c at any convenient spacing. Into this structure is built an ammunition container extending spanwise along the wing and subdivided into a series of longitudinal juxtaposed boxes by the spars b themselves, each of these boxes feeding one of the guns or cannon of this wing. Each of these individual boxes is entirely closed by the structural parts a, b, c and the bottom skin d of the wing, except for a relatively small horizontal slot provided near the top of the rib c—f, which rib constitutes a partition between the ammunition container and the gun bay e. The length of this slot is only slightly greater than that of the cartridge to be used and the height is about one-half inch more than the diameter of this cartridge. Each of these boxes is in turn subdivided spanwise into substantially square compartments 10 by the other ribs of the wing, slots being likewise provided in these ribs under the cover a so as to form a horizontal loading feedway for the cartridge belt f. This feedway extends along the entire length of each individual box immediately below the fixed cover formed by the lower skin a—f. The double top covering c of the wing.

A strong outstanding flange 12, protecting about one inch into the gun bay e, is made integral with the U channel 11, bracing the two skins of the cover a above the rib c—f. The lower surface of the bottom skin a—f forms a smooth, stiff and continuous inside top surface, flush with
the top of the aligned slots in the ribs c and c—1. This flush horizontal surface forms the top of the feedway previously mentioned, while the two spars b constituting the side walls of the box, form also the sides of the feedway. This feedway is normally bottomless, but at the time of the loading, a loading track 13, made of hinged sections, is inserted into the aligned slots so as to bridge the gaps between the ribs c, c—1, and form the bottom of the feedway.

This insertion is facilitated by anti-friction rollers 14, carried on shafts 15, journaled in brackets 16, and forming part of the reinforcing structure of the ribs c, c—1, around the slots.

Besides this loading track 13, the removable loading equipment of the new ammunition container according to the present invention includes also a loading tool consisting of a pair of star sprocket wheels 17, fitted to the calibre of the ammunition to be used and a crank and drive 18 positioned so as to be clear of surrounding interferences and to drive the star wheels. The star wheels 17 are mounted on a frame 18 made integral with a lateral clamp 20 for attaching the loading tool to the flange 12 above the entrance slot of the box to be loaded. A counter 21, provided with reset wheel 22 calibrated to indicate the number of cartridges passing under the star wheels 17 can be incorporated in this tool assembly. After loading one box, this tool can either be left along the flange 12 to the next empty compartment or can be stowed in the gun bay.

The loading track 13 is an elongated platform made preferably of stainless steel and with turned-down edges, on which the ammunition belt can be fed through the slots into the otherwise closed compartments 10. After loading, this track is withdrawn, folded and likewise stowed in the gun bay.

On each shaft 15 is mounted a second roller 23 of slightly larger diameter than the rollers 14 and the function of which will become apparent later.

If desired, above each compartment 10 in the double top covering a of the wing, there may be provided an emergency service opening, normally closable by a double stopper or plug 24 screwed or bolted to a reinforced rim 25 of the covering a so as to be flush with both the outer skin of the wing and the top c—1 of the feedway. However, the presence of this structure is not mandatory and is suggested merely to meet possible exigencies.

Care is exercised in the design and construction of the structural parts a, b, c, d of the wings, of these plugs 24 and of the track 13, so that projections and irregularities inside the box and along the feedway will be avoided.

It will be noted that the ammunition container of the present invention forms thus a rigid cellular structure and that the absence of the usual hinged cover avoids surface irregularities in the path of the high-speed airflow.

In loading the box, the cover door (not shown) over the gun is first removed. This cover does not need to be larger than is required when an ordinary ammunition container is used. Then the usual feed chute 1 bridging the gap between a box feedway and the corresponding gun a is removed, and the loading track 13 is inserted through the successive slots in the ribs c—1, c until the end inside the box is half-way through the last compartment 10. A stop (not shown) is provided to stop the track at this point. The loading tool 19 is then clamped to the ledge 12 above the slot in the rib c—1 in such a position that the star wheels 17 of this tool will drive the ammunition belt smoothly down the loading track 13. The box is now ready for loading.

The ammunition belt 7, made up to the required length, is then brought to the wing and placed on top of the wings on the opposite side of the gun 8 from the ammunition box. (For carrying the belt to the airplane and holding it while the box is loaded, a convenient carrier is provided.) At the end of the belt 7 is laid on the end of the loading track 13 which projects from the box feedway. The belt is then fed by hand into the star wheels of the loading tool. The belt is then cranked into the box by means of this tool until resistance on the handle 18 indicates that the belt, having traveled the full length of the loading track 13, fills the last compartment of the box.

The loading track is then slowly withdrawn by hand, keeping pressure with the other hand on the loading crank in order to prevent backward motion of the belt. As soon as a sufficient gap has thus been created by this withdrawal between the end of the track and the last slot, to allow for free fall of the unsupported part of the belt into the next to last compartment, the belt will resume its fall into this latter, until this compartment is in turn filled.

This process is continued, withdrawing the track only as needed to keep the belt moving into the box along the track and filling the compartments one after the other. Markings (not shown) on the track to indicate when its inner end reaches a slot and when it is half-way down a compartment are provided as an aid in efficient loading; and, if these marks are labeled with the corresponding number of rounds, then reference to these numbers in conjunction with the counter 21 will constitute a convenient guide to determine the proper speed at which to withdraw the loading track. Sections of the loading track may be removed as the track is withdrawn if this is found desirable for clearance.

When the track 13 has been fully withdrawn and the box fully loaded, the loading tool 19 is removed and the feed chute 1 is replaced, the end of the ammunition belt extending from the box being slipped into the chute before bringing the latter into position. The belt is then fed into the gun in the conventional manner, except that the brackets 16 act, during this feeding operation, as baffles or deflectors to prevent a jamming of the belt under the rollers 14, 23.

Though the compartments 10 are normally entirely closed, except for the narrow slots in the ribs c, c—1 forming the feedway, in case of emergency, each plug 24 may readily be unscrewed and removed to give access to the interior of any compartment when a link of the belt breaks within the compartment during the feeding operation.

26 indicates projections at the entrance of the feedway to index the loading track.

The structure herein shown and described is illustrative of only one practical application of the invention and it is to be understood that various modifications may be resorted to within the scope of the appended claims.

Having thus disclosed my invention and one mode of constructing and using same, what I claim as new and desire to secure by United States Letters Patent is:

1. In an aircraft: stress-taking structural members thereof defining a container closed on all sides and having a series of compartments
provided with aligned apertures in their side walls, removable means passing through said apertures to bridge said compartment at one end of the series and constructed to guide a chain of articles into said compartments, and means positioned adjacent the compartment at the other end of said series for feeding said chain of articles along said guiding means.

In an aircraft: structural members constituting integral members of the aircraft-structure and defining a container closed on all sides and wherein some of said structural members constitute spaced partitions subdividing said container into a series of compartments, said container having aligned apertures in one end wall and in each internal partition, a removable chute extending through said apertures to form a temporary feedway for a chain of articles over all compartments except the one most remote from the said slotted end wall of the container, means whereby the chute may be shifted successively from one compartment to the next adjacent compartment, and means for feeding said chain along said chute regardless of its position with respect to the several compartments.

2. In an aircraft: longitudinal and transverse structural members constituting integral members of the aircraft-structure and defining a closed container wherein some of said transverse structural members constitute spaced partitions subdividing said container into a series of compartments, said container having aligned apertures in one end wall and in each internal partition, a removable chute extending through said apertures to form a temporary feedway for a chain of articles over all compartments except the one most remote from the said slotted end wall of the container, means whereby the chute may be shifted successively from one compartment to the next adjacent compartment, and means for feeding said chain along said chute regardless of its position with respect to the several compartments.

3. In an aircraft: longitudinal and transverse structural members constituting integral members of the aircraft-structure and defining a closed container wherein some of said transverse structural members constitute spaced partitions subdividing said container into a series of compartments, said container having aligned apertures in one end wall and in each internal partition, a removable chute extending through said apertures to form a temporary feedway for a chain of articles over all compartments except the one most remote from the said slotted end wall of the container, means whereby the chute may be shifted successively from one compartment to the next adjacent compartment, and means for feeding said chain along said chute regardless of its position with respect to the several compartments.

4. In an aircraft: longitudinal and transverse structural members constituting integral members of the aircraft-structure and defining a closed container wherein some of said structural members constitute the end walls of the container, and spaced partitions subdividing said container into a series of compartments, said container having aligned apertures in one end wall and in each partition, a removable chute extending through said apertures to form a temporary feedway for a chain of articles over all compartments except the one most remote from the said slotted end wall of the container, means whereby the chute may be shifted successively from one compartment to the next adjacent compartment, and means for feeding said chain along said chute regardless of its position with respect to the several compartments.

5. In an aircraft wing the combination with a container for a chain of articles defined by the spars and ribs of the wing structure, said ribs defining the container into a series of compartments, of a feedway passing through said compartments and constructed and arranged to be removable therefrom step by step to temporarily bridge over said compartments and to successively guide said chain of articles into the respective compartments aforesaid.

6. The combination with a horizontal container for a chain of articles defined by the spars of an aircraft wing and divided into compartments by the ribs of said wing, said ribs having slots therein and the container and its compartments being inaccessible at top, bottom, sides and ends except for the slots in the ribs, of a feedway constructed and arranged to be removable step by step and passing through said slots to temporarily bridge said compartments and successively guide said chain of articles toward one of the compartments, and a rotary chain-feeder means located adjoining one end of said container and of said feedway for urging the said chain of articles along said feedway to successively fill the several compartments beginning with that most remote from said feeder means.

7. The combination with an aircraft wing having longitudinal spars and a gun bay, of a series of spaced transverse partitions within the wing combining with the skin and spars thereof to create a series of closed compartments extending spanwise of the wing from one side of the gun bay, all of said partitions with the exception of the one most remote from the gun bay provided with slots adjoining their upper edges, a guide removably inserted in said slots from a point adjacent the gun bay to terminate within the compartment most remote from the gun bay, means for impelling a succession of connected articles along said guide for delivery to the compartment most remote from the gun bay, and means for withdrawing the guide from under said connected articles in a series of steps to successively position its inner end in cooperation with the several compartments.

8. The combination with an aircraft wing having a gun bay and longitudinal spars, of spaced transverse ribs disposed between the top and bottom skins of the wing and combining with the spars to create a series of compartments situated spanwise of the wing at one side of the gun bay, each of said ribs, excepting that most remote from the gun bay, having a slot therein adjoining the top skin of the wing, said slots aligning longitudinally of the wing, a track inserted in said slots and extending through the several compartments and terminating within the compartment most remote from the gun bay and constructed and arranged for periodic withdrawal to successively terminate in each compartment, and means adjoining said gun bay and the next adjacent compartment for impelling a succession of articles along said track for delivery into each compartment in which said track terminates.

9. The combination with an aircraft wing having a gun bay and longitudinal spars, of spaced transverse ribs disposed between the top and bottom skins of the wing and combining with the spars to create a series of compartments disposed at one side of the gun bay, each of said ribs, excepting that most remote from the gun bay, having a slot therein adjoining the top skin of the wing, said slots aligning longitudinally of the wing, a track composed of a series of hinged sections inserted through said slots and the several compartments to terminate within the compartment most remote from the gun bay, said track being constructed and arranged to be removable to position its inner extremity successively within each of the several compartments, and means for impelling an interconnected series of articles along said track for delivery to the successive compartments within which said track terminates.

10. The combination with an aircraft wing...
having a gun bay and longitudinal spars, of spaced transverse ribs disposed between the top and bottom skins of the wing and combining with the spars to create a series of compartments extending spanwise of the wing at one side of the gun bay, each of said ribs, excepting that most remote from the gun bay, having a slot therein adjoining the top skin of the wing, said slots aligning longitudinally of the wing, a track composed of a series of hinged sections inserted through said slots and the several compartments to terminate within the compartment most remote from the gun bay and movable to position the inner extremity thereof successively within each of the several compartments, and a star feed wheel removably mounted on the wing for impelling an ammunition belt along said track for delivery to the successive compartments wherein the end of the track is situated.

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