May 17, 1955 B. DARSIE 2,708,390

DISINTEGRATING CARTRIDGE BELT LINK

Filed Dec. 23, 1953 2 Sheets-Sheet 1

Fig. 1

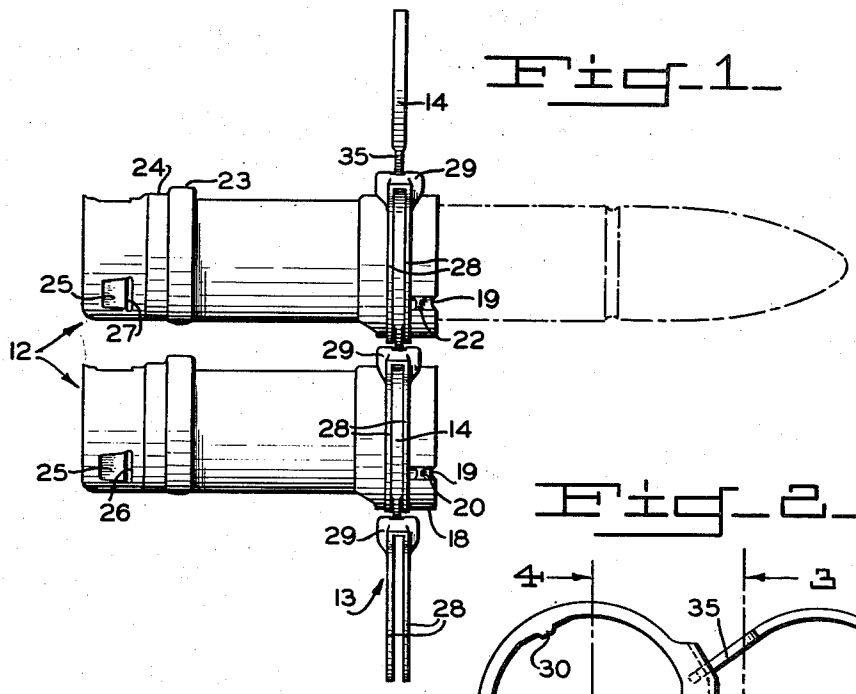


Fig. 2

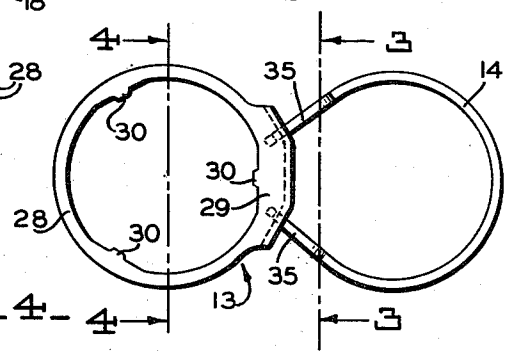


Fig. 3

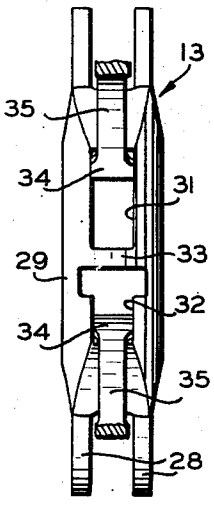


Fig. 4

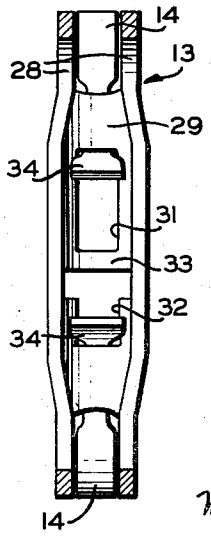
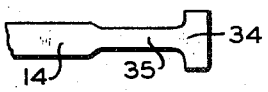


Fig. 5



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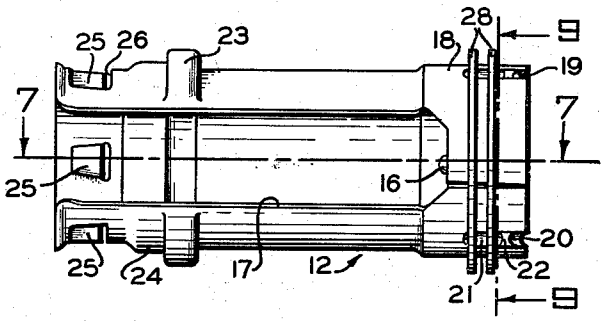


Fig. 6

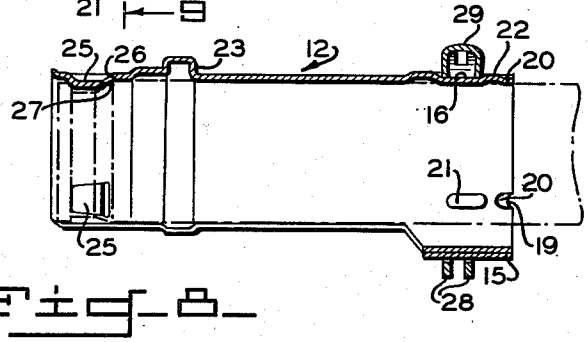


Fig. 7

Fig. 8

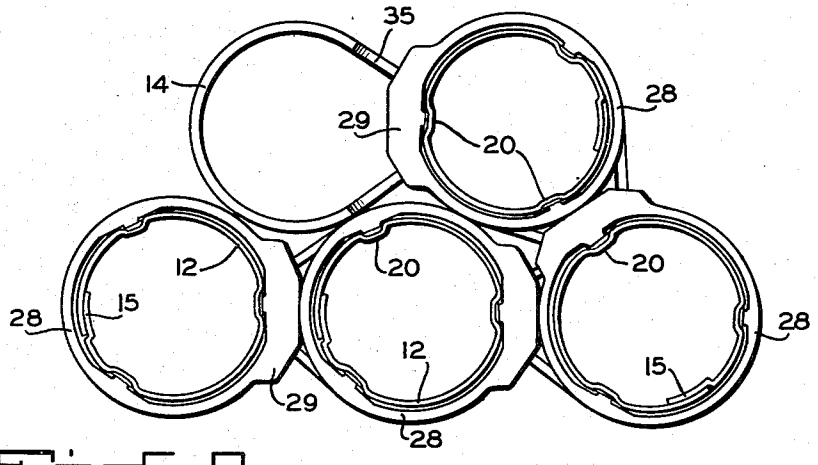
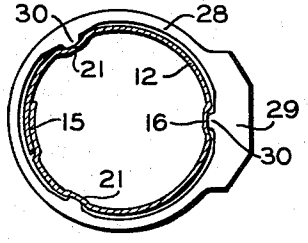


Fig. 9



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DISINTEGRATING CARTRIDGE BELT LINK

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Application December 23, 1953, Serial No. 400,147

5 Claims. (Cl. 89—35)

This invention relates to a disintegrating type of articulated ammunition belt for feeding cartridges into high speed automatic weapons and is more particularly directed to an improved link mechanism adapted to transport the fired cartridge cases out of the weapon without interfering with the successive disintegration of adjacent links.

In order to provide for the automatic disintegration of ammunition belts employed in the feeding of cartridges into present day types of machine guns and automatic cannon, each cartridge link in the belt is customarily provided with a plurality of loops constructed and arranged so that a single loop on one of the links interfits coaxially with a pair of spaced-apart loops on an adjacent link to receive a cartridge therethrough which acts as a pintle for articulately connecting the links. Disintegration of the resulting ammunition belt occurs as each cartridge is successively removed from engagement with the interfitted cartridge gripping portions of adjacent links and inserted into the firing chamber of the gun. The separated links are eventually forced out of the gun by the progressive advance of the unfired portion of the belt while the fired cartridge cases are simultaneously ejected through a separate passage in the feeding mechanism of the weapon.

In the high rate types of machine guns designed for aircraft use, ejection of the fired cartridge cases is preferably effected by continuing the rearward movement imparted thereto by the action of the extractor mechanism. However, in certain aircraft installations space limitations do not permit ejection of the fired cartridge cases out of the rear end of the gun. Instead, provision has been made for halting the rearward travel of the fired cases so that ejection can be effected from the side of the gun at substantially right angles to the longitudinal axis thereof. One method by which this can be done consists of ejecting the fired cartridge case directly into the same ammunition belt link from which it had originally been transferred into the firing chamber of the gun barrel. Such act of relinking the fired cartridge cases prior to ejection from the gun is a highly desired improvement in aircraft installations since it results in a significant decrease in the amount of storage space required to hold the expended ammunition. However, when a fired cartridge case is relinked in those types of belts which utilize the cartridge itself as the means for connecting adjacent links, the case merely substitutes for the original cartridge and thereby prevents the desired disintegration between adjacent links.

It is, therefore, an object of this invention to provide an improved disintegrating ammunition belt wherein the individual links are not only adapted for the relinking of fired cartridge cases but are constructed to disintegrate from one another in direct response to such relinking movement.

Still another object of this invention lies in the provision of a disintegrating link for connecting individual cartridge holders in an articulated belt wherein each link

comprises a double ring member frictionally engageable with the exterior periphery of the holder and a single open loop member rotatably mounted on the holder between the loops of the double ring member for connection with another double ring member on an adjacent holder.

Another object of this invention is the provision of an ammunition belt of the aforesaid type wherein the interfitted single loop and double ring members are of resilient construction and are confined to the front end portion of the cartridge holder.

It is well-known that for ballistic reasons some types of ammunition utilize cartridge cases which are substantially tapered from the rim to the front end. Inasmuch as such cartridges are customarily engaged at their center of gravity by the linkage in which the cases serve as a pintle, considerable difficulty has been experienced in ramming the cartridges forwardly through the links engaged therewith.

It is, therefore, another object of this invention to provide an improved cartridge belt linkage for frictionally gripping individual cartridges of the forwardly tapered type in such manner as to maintain a constant friction even during the forward ramming of the cartridges through the linkage.

The space limitations imposed on certain machine gun installations in aircraft and tanks affect not only the storage of expended ammunition but that of unfired ammunition as well. It is apparent that the optimum stacking arrangement for storing the maximum number of cartridges in the minimum amount of space requires that each cartridge holder in one layer of the ammunition belt simultaneously contact two adjacent holders in an adjacent layer. It is therefore essential that the link means for connecting adjacent cartridge holders permit the belt to readily fold in a reverse bend at either end of each successive layer formed in a conventional storage box or container. However, such optimum stacking has heretofore been unattainable in those types of belts wherein the pivotal connection between adjacent links eliminated the use of the cartridge as a pintle. In such types of link constructions, the connecting portions which project outwardly from either side of the cartridge gripping member create interferences therebetween upon reversal of direction in stacking which causes the cartridge at the ends of each layer of the belt to lie in a higher plane than those cartridges in the central portions thereof. Moreover, while many of the link constructions which utilize the cartridge as a pintle do permit the desired folding back of a layer upon reaching the side of the ammunition box, the customary offset construction of the single loop relative to the double loop does not permit symmetrical rotation of the cartridge in the single loop and consequently prevents the same extent of reverse bending at the opposite side of the storage box. The consequent greater height of the cartridges at one end of each layer of the belt than at the opposite end thereof obviously decreases the maximum number which can be stored in the ammunition box.

It is therefore an important object of this invention to provide an improved relinking and disintegrating type of ammunition belt which permits the storage of a greater number of layers of a cartridge belt in a given space than heretofore possible with conventional link constructions.

Still another object is the provision in a relinking type of disintegrating ammunition belt of a link construction permitting symmetrical distribution of the individual cartridges throughout a plurality of successive superimposed layers.

The specific nature of the invention as well as other objects and advantages thereof will clearly appear from

a description of a preferred embodiment as shown in the accompanying drawings in which:

Fig. 1 is a plan view of a pair of adjacent cartridge belt links of the present invention;

Fig. 2 is a side view of a single loop member assembled to the double ring member;

Fig. 3 is an enlarged cross-sectional view taken along the line 3—3 of Fig. 2;

Fig. 4 is an enlarged cross-sectional view taken along the line 4—4 of Fig. 2;

Fig. 5 is an enlarged fragmentary view of an end portion of the single loop member;

Fig. 6 is a plan view of the trailing side of a cartridge holder;

Fig. 7 is a cross-sectional view taken along the line 7—7 of Fig. 6;

Fig. 8 is an end view showing the links in stacking relation at the end of a layer; and

Fig. 9 is a cross-sectional view taken along line 9—9 of Fig. 6.

As illustrated in the drawings, the ammunition belt of the present invention essentially comprises a plurality of cartridge holders **12** connected in articulate adjacent relation by a double ring member **13** keyed onto the exterior periphery of holder **12** and a single open loop member **14** rotatably surrounding holder **12** at a point between the rings of member **13** for connection with the member **13** on the adjacent holder **12**. Inasmuch as cartridge holders **12** are preferably fabricated by stamping operations, the cylindrical configuration thereof is obtained from a substantially rectangular blank whose side edges are joined in an overlapping joint **15** as best shown in Fig. 9. Although separation of joint **15** under tension is adequately prevented through the encirclement thereof by double ring member **13**, it has been found necessary to unite the overlapping ends by spot-welding or the like in order to prevent misalignment of the front edges thereof. A rectangular slot **17** extending longitudinally along the side of cartridge holder **12** limits the closed construction to the front end thereof which is of slightly increased diameter as best shown at **18** in Fig. 6.

The annular rim of increased diameter portion **18** of holder **12** is arcuately recessed as shown at **19** at equally spaced radial locations which, for purposes of illustration, is limited to three in number. Extending rearwardly from each recess **19** is an indentation **20** formed into the exterior periphery of increased diameter portion **18**. A second indentation **21** equivalent in depth and width to indentation **20** is provided rearwardly thereof in longitudinal alignment therewith and is of elongated substantially rectangular construction. The particular elongated indentation **21**, located diametrically opposite slot **17** and identified by the numeral **16** is of greater length than the remaining indentations for a purpose to be later explained. The front ends of indentations **16** and **21** terminate short of the rear end of indentations **20** thereby forming a raised bridge **22** therebetween. The rear end portion of cartridge holder **12** is provided with a raised circumferential rib **23** which projects outwardly to a greater height than increased diameter portion **18** for a purpose to be later explained. Adjacent to and rearwardly of rib **23** is a circumferential portion **24** substantially equivalent in diameter to that of front end portion **18**. Rearwardly of portion **24** are provided radially disposed cartridge gripping detents **25** in respective axial alignment with indentations **20** and adapted to frictionally engage in the extractor groove of a cartridge when properly seated in holder **12** as shown in Fig. 7. Holder **12** is slitted along the forward edge of each of cartridge gripping detents **25** as shown at **26** and thereby forms a plurality of radially disposed inwardly projecting planar edges **27** which cooperate to form a circle of slightly smaller diameter than the base of a cartridge case.

Double ring member **13** is provided with a pair of thin identical rings **28** disposed in spaced coaxial relation by an integral connection portion **29**. The interior periphery of each ring **28** is provided with three inwardly projecting detents **30** disposed in the same relative radial locations as indentations **20** of holder **12**. One of detents **30** is located substantially centrally of integral connecting portion **29**. The diameter of a circle drawn through the terminal ends of detents **30** is substantially equivalent to the diameter of the circle similarly defined by the exterior surfaces of indentations **20** or **21**. Thus, double ring member **13** must be forced over raised bridge portions **22** in order to engage detents **30** in elongated identations **16** and **21**. The necessary expansion of rings **28** is provided through the relatively thin resilient construction thereof. Connection portion **29** of member **13** is provided with a substantially rectangular slot **31** and a T-slot **32** separated from each other by a relatively narrow strip **33**.

Single loop member **14** is of substantially horseshoe-shaped construction and is of slightly smaller width than the space between rings **28** of member **13**. The terminal ends of member **14** are of T-shaped construction as shown at **34** and the foot portions **35** thereof are of slightly lesser width than the remainder of the loop body in order to pass freely through slots **31** and **32**. In this respect, it will be noted that the necessary width of slots **31** and **32** is obtained by making connecting portion **29** of greater width than the space between ring portions **28** of member **13**.

In order to assemble the link, member **14** is first placed between rings **28** of member **13** and in coaxial alignment therewith. Then double ring member **13** is placed against the front end of increased diameter portion **18** of holder **12** with detents **30** in longitudinal alignment with arcuate recesses **19** so that the ones centrally of integral connecting portion **29** are located in alignment with elongated indentation **16**. Members **13** and **14** are then forced onto the periphery of cartridge holder **12** in such manner that detents **30** ride over bridge portions **22** and enter into elongated indentations **16** and **21**. Single loop member **14** is consequently freely rotatable about the periphery of cartridge holder **12** but is retained thereon in the track formed by rings **28** of member **13** with the T-shaped ends **34** projecting outwardly therefrom on the side opposite connecting portion **29**. These T-shaped ends **34** of member **14** can be engaged in slots **31** and **32** of the double ring member **13** on the adjacent cartridge holder **12** by first rotating member **14** so that the bar portion of one of ends **34** is substantially parallel to the longitudinal axis of rectangular slot **31** in connecting portion **29**. Then, by passing end **34** through slot **31** and rotating member **14** back to a position of parallelism with rings **28**, ends **34** can be squeezed together to align the free one with T-slot **32** for passage therethrough. Upon release of ends **34**, the inherent resilience of member **14** will force foot portions **35** into contact with the outer ends of slots **31** and **32** as shown in Fig. 4 and thereby prevent disengagement therefrom due to the fact that the bar portions of ends **34** are longer than the widths of slots **31** and **32**. However, the difference in width between foot portions **35** of T-shaped ends **34** and the width of slots **31** and **32** permits the necessary amount of twisting and pivoting movement between members **13** and **14**. Additional movement therebetween is provided through the resilience of rings **28** as member **14** forces them apart.

Relative pivotal movement between adjacent holders **12** is produced by the rotation of member **14** between rings **28** and about the centerline of holder **12** as an axis. Moreover, the fact that member **14** on one cartridge holder **12** is engaged with connecting portion **29** of member **13** on the adjacent holder serves to prevent any appreciable change in the pitch distance therebetween. Inasmuch as the rotation of each cartridge holder **12** within a surrounding single loop member **14** is limited only by contact between the double ring members **13** on both

holders adjacent thereto, the ammunition belt formed through the successive connection of adjacent cartridge holders **12** is adapted to fold back on itself to such extent that every holder in one belt layer lies in staggered relation with the corresponding holder of an adjacent layer. As a result, the distance between the centers of the cartridge holders in adjacent layers is reduced to a minimum thereby enabling a maximum belt length to be folded within a given storage space. Furthermore, the link construction described herein permits the same relative rotation between adjacent holders in either clockwise or counterclockwise direction and thereby establishes symmetrical layers of ammunition belt wherein the height thereof is constant throughout. Circumferential ribs **23** on the rear end portions of cartridge holders **12** also come into contact with one another when the ammunition belt is properly stacked and thereby serve to maintain the nose of each cartridge in the same horizontal plane. Such stacking arrangement, plus the fact that the interfitting double ring and single loop combination is located along the center of gravity of holder **12** together with the cartridge therein, is particularly conducive toward minimizing the accelerations and decelerations produced in the belt by the intermittent cartridge feeding movements required by the gun.

As the ammunition belt of the present invention is fed into the gun with slot **17** in the trailing side of holder **12**, each cartridge is pushed forwardly therefrom into the firing chamber in the barrel. Upon being fired, the empty case is ejected rearwardly into the same holder **12** from which it had been originally chambered. Suitable latch means (not shown) may be provided in the feeding mechanism of the gun to decelerate the rearward movement of the ejected case and also to hold such against rebounding movement in holder **12**. The increased diameter of front end portion **18** facilitates the entry of the fired case into cartridge holder **12**. As the ejected cartridge case continues to move rearwardly into holder **12**, the rear end thereof strikes planar edges **27** within the interior thereof and since double ring member **13** is being held stationary by suitable means (not shown), the impact imparted to holder **12** causes it to move rearwardly out of keyed engagement with detents **30**. Although members **13** and **14** continue to be engaged in pairs, the absence of holders **12** prevents engagement therebetween and thereby permits disintegration of the belt. The engaged pairs of members **13** and **14** as well as holders **12** with the fired cases therein are subsequently forced out of the gun by the continuing advance of the linked ammunition belt.

Although a particular embodiment of the invention has been described in detail herein, it is evident that many variations may be devised within the spirit and scope thereof and the following claims are intended to include such variations.

I claim:

1. A distintegrating cartridge link belt for feeding cartridges into automatic guns comprising a resilient cartridge gripping holder for each cartridge, a double ring member removably mounted on said holder, a single loop member rotatably mounted on said holder in coaxial interfitting relation with said double ring member, means connecting said single loop member with said double ring member on an adjacent holder, and stop means within said holder for receiving the impact of a rearwardly ejected cartridge case whereby said holder is disengaged from said double ring member when the latter is held stationary and thereby permits disintegration between each interfitting single loop and double ring members during movement thereof out of the gun.

2. A disintegrating cartridge link belt for feeding cartridges into automatic guns comprising a resilient cartridge gripping holder for each cartridge, a double ring member frictionally engageable with the exterior periphery of said holder at the same location as the center of gravity of said combined holder and cartridge, a single horseshoe-shaped loop member rotatably mounted on said holder in coaxial interfitting relation with said double ring member, means on the ends of said loop member engageable with said double ring member on an adjacent holder, and stop means within the interior surface of said holder for receiving the impact of an ejected fired cartridge case whereby the momentum imparted to said holder is sufficient to overcome the frictional engagement thereof with said double ring member when the latter is held stationary and thereby effect disintegration between each interfitting single loop and double ring members during movement thereof out of the gun.

3. A disintegrating cartridge link belt for feeding cartridges into automatic guns comprising a tubular holder for frictionally retaining a cartridge therein, said cartridge retaining holder having a plurality of elongated indentations radially disposed about the exterior periphery thereof, a double ring member having a pair of spaced-apart coaxial resilient rings, a plurality of detents projecting from the interior periphery of each of said rings and adapted for respective engagement in said indentations, a raised bridge portion forwardly of each of said indentations for normally retaining said detents on said double ring member in engagement with said indentations in said holder, a single loop member rotatably mounted on said holder between said rings and in coaxial alignment therewith, said single loop member being of horseshoe-shaped construction and having lug means on the free ends thereof for engaging said double ring member on an adjacent holder, and a plurality of substantially rectangular indentations circumferentially disposed adjacent the rear end of said holder in respective axial alignment with said elongated indentations, each of said rectangular indentations having a slit along the front edge thereof to provide a stopping surface within the interior of said holder for receiving the impact of a rearwardly ejected fired cartridge case whereby said holder is moved rearwardly out of engagement with said double ring member thereon when said member is held stationary and thereby permits disintegration between each interfitting single loop and double ring members during movement thereof out of the gun.

4. A disintegrating cartridge link belt adapted for stacking in a container in adjacent contigous layers, each link in the belt comprising a tubular cartridge holder having a longitudinal slot extending forwardly from the rear end thereof for imparting cartridge gripping resiliency thereto, a double ring member removably mounted on the front end of said holder, a single loop member rotatably mounted on said holder in coaxial interfitting relation with said double ring member, means connecting said single loop member with said double ring member on an adjacent holder, said single loop member being equally rotatable in both the clockwise and counterclockwise direction about the centerline of said holder as an axis whereby the belt is adapted to fold in a reverse bend at each end of a layer to such extent that each holder in one layer is contiguous to two adjacent holders in an adjacent layer, a circumferential rib about the rear end of said holder having an exterior diameter equivalent to that of said double ring member and in coaxial alignment therewith whereby the centerline of each of said holders in the layers of the belt is disposed substantially parallel to the bottom of the storage container, and stop means within the interior surface of said holder for receiving the rearward momentum of a rearwardly ejected fired cartridge case and thereby moving said holder out of frictional engagement with said double ring member when the latter is held stationary to effect disintegration between each interfitting single loop and double ring members during movement thereof out of the gun.

5. A disintegrating cartridge belt for feeding cartridges into automatic guns comprising a tubular cartridge holding member having a longitudinal slotted portion extending forwardly from the rear end thereof, a plurality of in-

wardly directed cartridge gripping portions adjacent the rear end of said tubular cartridge holding member and adapted to engage in the extractor groove of the cartridge therein, a double ring member having a pair of spaced-apart coaxial ring portions connected by an integral portion, a single loop member rotatably mounted on said cartridge holding member in coaxial interfitting relation with said double ring member and in engagement with said integral portion of an adjacent double ring member, a plurality of radially disposed detents projecting inwardly from the interior periphery of each of said ring portions to define a circle of slightly smaller diameter than the outer diameter of the front end of said tubular cartridge holding member, a plurality of radially disposed indentations extending rearwardly from the front rim of said cartridge holding member and in respective axial alignment with said cartridge gripping portions therein, each of said indentations having an arcuate recess at the front end thereof to facilitate alignment therewith of said detents on said double ring member during assembly thereof onto said cartridge holding member, an elongated indentation disposed rearwardly of each of said first-mentioned indentations and coextensive therewith in depth and width for receiving said detents on said double ring member, a bridge portion separating each of said first-mentioned indentations from said elongated indentations and adapted to normally retain said double ring member on said cartridge holding member with said detents engaged in said elongated indentations, and stop means within the interior surface of said cartridge holding member for receiving the impact of an ejected fired cartridge case whereby the momentum imparted thereto forces said cartridge holding member rearwardly while said double ring member is held stationary and thereby forces said bridge portions past said detents on said fixedly held double ring member to effect disintegration between each of said interfitting single loop and double ring members during movement thereof out of the gun.

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