Oct. 27, 1953 C. H. STEVENS ET AL 2,656,635

CARTRIDGE RETRACTING DEVICE

Filed May 22, 1951

Fig-1-

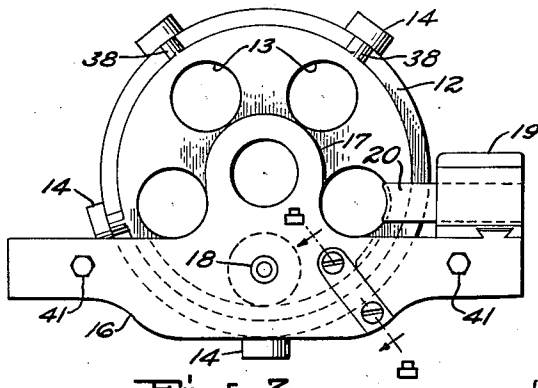


Fig-2-

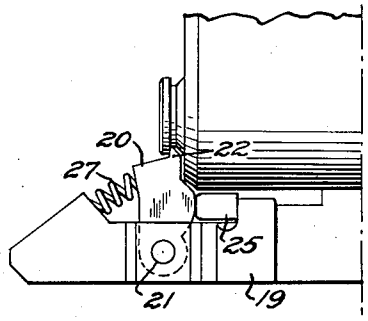


Fig-3-

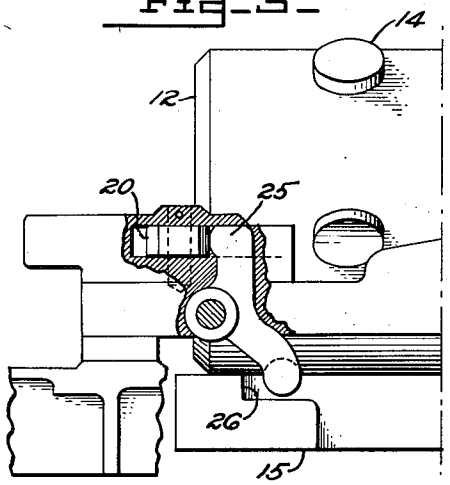


Fig-4-

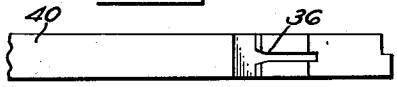


Fig-5-

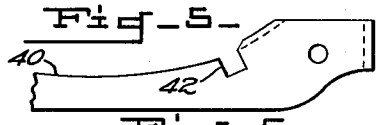


Fig-6-

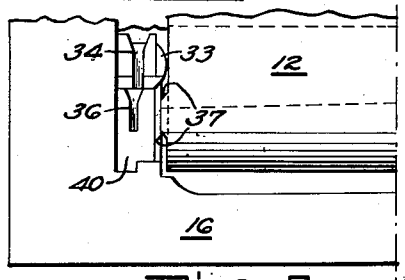


Fig-7-

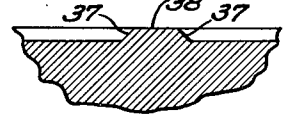


Fig-8-

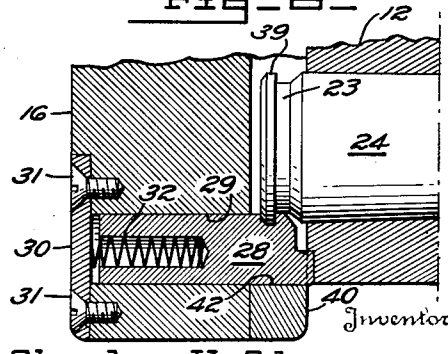
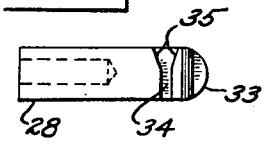


Fig-9-



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UNITED STATES PATENT OFFICE

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CARTRIDGE RETRACTING DEVICE

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3 Claims. (Cl. 42—68)

(Granted under Title 35, U. S. Code (1952), sec. 266)

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The invention described in the specification and claims may be manufactured and used by or for the Government for governmental purposes without the payment of any royalty thereon.

This invention relates to cartridge case extracting means for firearms and is more particularly directed to means for automatically loosening fired cartridge cases in their chambers immediately prior to the actual extraction therefrom.

In high speed automatic firearms of the type wherein a plurality of annularly disposed firing chambers are provided in a revolving drum, a cartridge is first rammed into the leading one of the firing chambers and then positioned therein by a fixed guide operative on the base of the cartridge case so that the annular extractor groove therein will be properly aligned for engagement by the claw of the extractor. However, due to manufacturing tolerances, the overall length of each cartridge case may vary from one to the other. Thus, some cartridge cases will project from their respective firing chambers to a greater extent than others and will therefore be forced further therein by the fixed guide means. Although such dimensional variations in the length of the cases are exceedingly small, the resulting excessive "crush," as it is referred to in the art, will seriously affect ease of extraction by causing the longer cartridge cases to stick in their chambers. Similar sticking may also be encountered when the metal of the fired cartridge case expands in its firing chamber to such extent as to prevent the normal return to its original dimensions. In some instances of sticking, the extractor claw may even shear off the engaged portion of the fired cartridge case. The resulting failure to extract will create a dangerous jamming condition since the continued revolution of the drum will bring a live round into position for ramming into the occupied chamber.

One method of extraction now provided in the art for firearms of the type referred to above comprises a fulcrumed lever arranged to actuate a spring-biased pivotal extractor in such manner that the fired cartridge case engaged thereby will first be loosened in its firing chamber and then flipped rearwardly therefrom. These two steps of extraction are accomplished by two adjoining inclined cam surfaces provided in the reciprocable slide member employed to actuate the fulcrumed lever during counter-recoil. While such design functions satisfactorily, the work performed by the slide tends to decrease the speed of counter-recoil thereof and thereby detracts from the optimum rate of fire of the firearm.

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It is therefore an object of the present invention to increase the rate of fire in automatic firearms of the revolver type wherein a counter-recoiling slide actuates a cartridge extractor by providing improved means for loosening a fired cartridge case in its chamber independently of the slide and extractor movements.

It is a further object of this invention to provide in automatic firearms of the revolver type improved means for automatically effecting the same amount of primary extraction on a fired cartridge regardless of the degree to which such case may tend to stick in its firing chamber.

A specific object of the present invention resides in the provision of a simple automatically operated device for loosening a fired cartridge case in its chamber immediately prior to the actual extraction therefrom.

The specific nature of the invention as well as other objects and advantages thereof will clearly appear from the following description of a preferred embodiment as shown in the accompanying drawing in which:

Fig. 1 is a rear end view of the revolving drum and the support therefor showing the location of the cartridge loosening means relative to the extractor;

Fig. 2 is a fragmentary top view of Fig. 1 showing the extractor in contact with its actuating lever;

Fig. 3 is a fragmentary right side view of Fig. 1 in partial cross-section showing the slide in position to actuate the extractor lever and thereby the extractor;

Fig. 4 is a fragmentary top view of the insert adapted to be secured to the rear drum support and shows the groove therein for guiding a loosened cartridge case into engagement with the extractor;

Fig. 5 is a front view of the portion of the insert shown in Fig. 4;

Fig. 6 is a fragmentary top view of the insert fixedly mounted in the drum support and shows the relation between the cartridge-guiding groove therein and the cartridge-engaging groove in the retracting plunger;

Fig. 7 is an enlarged cross-sectional view of one of the cam portions on the rear face of the drum;

Fig. 8 is an enlarged cross-sectional view taken along the line 8—8 in Fig. 1; and

Fig. 9 is a top view of the retracting plunger.

The present invention is particularly adapted for use in those automatic high speed firearms of the revolver type. Accordingly, a portion of one such firearm is illustrated in Figs. 1 and 3 and includes a revolving drum 12 having a plurality of firing chambers 13 annularly disposed equidistantly about the center thereof. A plurality of camming rollers 14 project from the outer periphery of drum 12 and are arranged to sequentially engage in a cam track (not shown) formed in a reciprocal slide 15 mounted immediately below drum 12. The contour of this cam track is such that the recoil and counter-recoil movement of slide 15 imparts a continuous rotation to drum 12.

A substantially U-shaped bracket 16 is fixedly secured in the firearm with the open portion thereof facing forwardly. Drum 12 is rotatably mounted between two fixed centers comprising a bearing portion 17 projecting upwardly from the rear end of bracket 16 and a front bearing (not shown). The rear end of bracket 16 also houses a firing mechanism 18 located immediately below bearing portion 17 as best shown in Fig. 1. Firing mechanism 18 is arranged to operate electrically whenever drum 12 rotates a round into contact therewith.

Fixedly secured to bracket 16 is a housing 19 having an extractor 20 pivotally mounted therein as by a pin 21. The outer end of extractor 20 is provided with a claw 22 arranged to engage in the annular extractor groove 23 of the present day type of cartridge cases 24 and bear against the rim 39 thereof. A lever 25 is vertically mounted to bracket 16 for pivotal movement. The upper end of lever 25 is arranged to contact extractor 20 while the lower end projects into the path of movement of a stepped shoulder 26 formed in slide 15. During the counter-recoil of slide 15, shoulder 26 thereon pivots lever 25 to actuate extractor 20 for flipping the fired cartridge case 24 out of firing chamber 13. A spring 27 biases extractor 20 forwardly to return claw 22 thereon to the position wherein the next cartridge case 24 will engage therewith.

In order to ease the work of extractor 20, the present invention provides a plunger 28 for loosening each fired cartridge case in its firing chamber immediately prior to engagement with extractor 20. Plunger 28 is slidingly seated in a recess 29 cut across the rear end of bracket 16 and located between firing mechanism 18 and extractor housing 19. The rear end of recess 29 is blocked by a plate 30 fastened to bracket 16 as by screws 31. A spring 32 is seated within plunger 28 and acts against plate 30 to continually bias plunger 28 forwardly. The front end of plunger 28 is arcuate in shape as best shown at 33 in Fig. 9 for a purpose to be disclosed.

An insert 40 is secured to the front face of bracket 16 as by screws 41 and such insert is provided with a transverse recess 42 aligned with recess 29 in bracket 16 for permitting passage of plunger 28 into contact with the rear face of drum 12. Rearwardly of arcuate end 33, plunger 28 is provided with a transverse groove 34 having diverging side walls at one end thereof as best indicated at 35. Insert 40 is provided with a similar groove 36 extending substantially at right angles from recess 42 therein. Groove 36 is located so as to axially align with groove 34 when plunger 28 is forced rearwardly to abut plate 30.

In order to force plunger 28 rearwardly, a plurality of raised cam portions 37 are circumferentially disposed on the rear face of drum 12 adjacent the peripheral edge thereof. Each cam portion 37 is provided with a substantially flat top surface 38 as best shown in Fig. 7. As drum 12 rotates, surfaces 38 sequentially contact the arcuate end 33 of plunger 28. Cam portion 37 is so located relative to each firing chamber 13 that a line drawn through the center thereof from the center of drum 12 will bisect flat surface 38.

In the operation of the firearm, cartridge cases 24 are sequentially rammed into each of firing chambers 13 as drum 12 revolves. Then, as each cartridge case 24 approaches the firing position, chambering is completed by contact thereof with the front face of firing mechanism 18. Firing then takes place and continued rotation of drum 12 brings the cartridge case rim 39 into groove 34 of plunger 28 as best shown in Fig. 8. The diverging side walls 35 of groove 34 serve to properly guide cartridge rim 39 therein. By this time, drum 12 has revolved sufficiently to bring one of cam portions 37 thereon into contact with the arcuate end 33 of plunger 28. Thus, plunger 28 is depressed sufficiently to abut plate 30 during the period of contact between the flat top surface 38 of cam portion 37 and plunger end 33. Since cartridge case rim 39 is engaged in groove 34, the entire case 24 will be pulled sufficiently rearward to become loosened in firing chamber 13.

As drum 12 continues to revolve, cartridge case rim 39 rides out of groove 34 and into groove 36. By this time cam portion 37 has moved out of contact with plunger end 33 thereby permitting spring 32 to return the plunger 28 to the unretracted position. Groove 36 guides cartridge case rim 39 into the correct position for extraction which is effected as previously explained.

Thus, there is here provided a simple yet positive device for loosening a cartridge case in the firing chamber of a revolver type firearm immediately prior to the normal extraction therefrom. The relatively large area of engagement between cartridge case rim 39 and groove 34 in loosening plunger 28 effectively prevents portions of rim 39 from being sheared off during the initial extracting movement of those cases which tend to stick in chamber 13.

Furthermore, by relegating the work of initial extraction to a member independent of the extractor, the inclined cam surfaces heretofore formed in reciprocable slide are no longer necessary and can be converted to the simple right-angled step 26 shown in Fig. 3. Accordingly, the previous frictional drag between the slide and the lower end of the extractor lever 25 is virtually eliminated. At a result, the slide will be enabled to counter-recoil with greater rapidity than heretofore thereby appreciably increasing the rate of fire of the firearm.

We claim:

1. In a firearm having a front and rear fixed support and a drum rotatably mounted therebetween, the drum having a plurality of annularly disposed firing chambers wherein cartridges are sequentially loaded for firing, the combination of a spring-biased retracting plunger slidably mounted in the rear drum support, said plunger having an arcuate front end and a transverse groove disposed rearwardly of said arcuate end for receiving therein the rim of a fired cartridge case as the drum revolves, a plurality of raised cam portions annularly disposed about the rear face of the drum, each of said portions being

aligned with one of the firing chambers and arranged to contact said arcuate front end of said plunger immediately subsequent to the engagement thereof with the rim of the fired cartridge case whereby said spring-biased plunger is cammed rearwardly to loosen the fired cartridge case in its firing chamber, and means for extracting the loosened cartridge case from the chamber.

2. In a firearm having a revolving drum provided with a plurality of annularly disposed firing chambers and means for sequentially loading cartridges therein, the combination of, a retracting plunger having a groove therein for receiving the rim of a fired cartridge case as the drum revolves, cam means for retracting said plunger relative to the rear face of the drum whereby the fired case is loosened in its respective firing chamber, an extractor, means for guiding said loosened cartridge case out of engagement with said plunger and into position for engagement by said extractor, and means for actuating said extractor to completely withdraw the loosened cartridge case for its firing chamber in the drum.

3. In a firearm having a revolving drum mounted between front and rear fixed supports and a plurality of annularly disposed firing chambers therein for receiving cartridges to be fired, the combination of a plunger slidably mounted in the rear drum support, said plunger having an arcuate front end and a transverse groove therein for receiving the rim of a fired cartridge case, a plurality of fixed cam portions projecting rearwardly from the rear face of the drum, each cam portion being disposed in axial alignment with

one of the firing chambers and having a flat top surface, spring means for biasing said plunger forwardly into contact with the rear face of the revolving drum whereby said plunger is cammed rearwardly to loosen the fired cartridge case in its chamber, an insert fixedly secured to the front face of the rear drum support, said insert having a substantially rectangular recess therethrough for permitting slidable passage of said plunger and a groove normal to the transverse axis of said recess, said plunger being positioned to align said groove therein with said groove in said insert during the period of contact between said arcuate end of said plunger and said flat top surface of said cam portion whereby the fired cartridge case engaged by said plunger is guided into engagement with said recess in said insert, a pivotal extractor mounted on the rear drum support in position to engage the rim of the loosened cartridge case emerging from said insert groove as the drum revolves, and means for actuating said extractor to completely withdraw the case from the firing chamber.

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KARL W. MAIER.

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