Jan. 15, 1957 E. W. HOPKINS 2,777,235

FIREARM MAGAZINE WITH NEGATOR COIL SPRINGS

Filed March 10, 1953

Fig. 2.

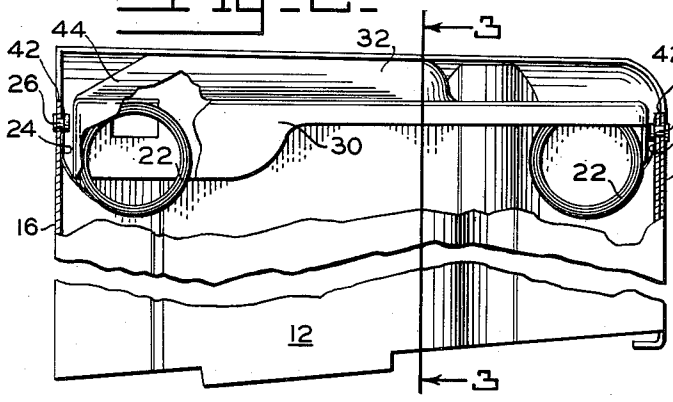


Fig. 3.

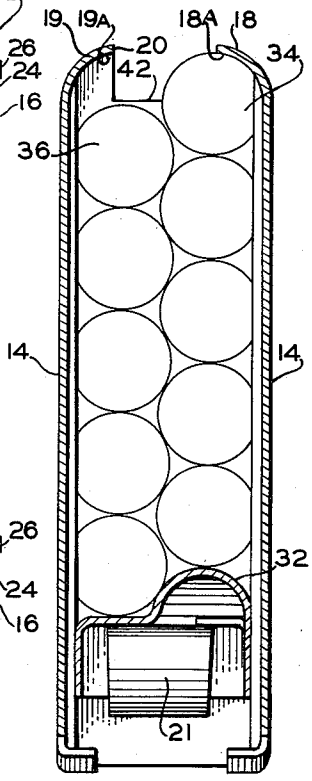


Fig. 4.

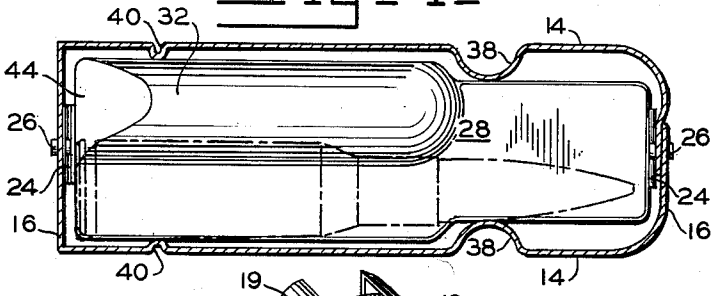
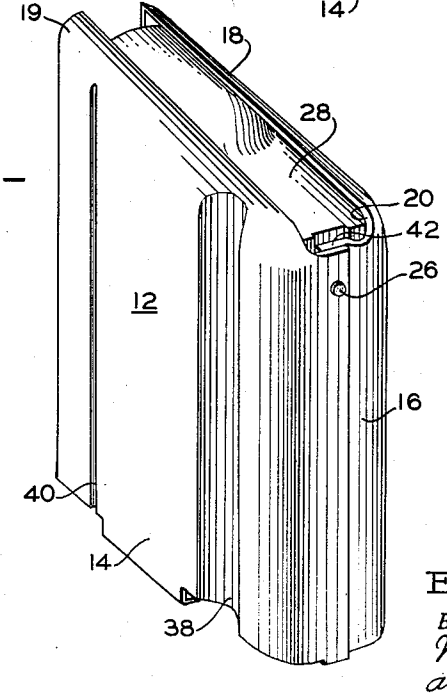


Fig. 1.



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FIREARM MAGAZINE WITH NEGATOR COIL SPRINGS

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2 Claims. (Cl. 42—50)

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

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

My invention relates to an ammunition magazine for an automatic firearm and more particularly to such a magazine having a constant pressure follower device therein including special springs such as the negator springs described in ASME Paper No. 51–F–11.

The cartridge magazine in present use includes a case for containing a supply of firearm cartridges, constructed for removable attachment to a firearm with the cartridges in substantially horizontal disposition as the firearm is discharged. When the magazine is loaded, the cartridges are laterally adjacent therein and they are biased by a follower actuated by a compression spring towards particular removal positions in the magazine. The magazine is pre-loaded by pushing successive cartridges into the removal positions until the magazine is full, at which time the spring is fully compressed. During discharge of the gun, the cartridges are serially pressed towards the removal positions by reaction of the spring responsive to consecutive withdrawal of the removal position cartridges by the feeder mechanism of the gun.

The feeder mechanism of an automatic gun is operated by gases resulting from discharge of the ammunition, with the discharge gas from each cartridge operating the mechanism to feed the succeeding cartridge from the removal position of the magazine to the firing position in the gun. The explosive charges of the cartridges are maintained within close limits for accurate range control of the gun and therefore the discharge gas force available for operating the feeder mechanism varies between relatively narrow limits.

In a magazine of the type described, the cartridges are supported and are biased towards the removal position by reactive force of the spring. Both the reactive force and the weight of the cartridges are maximum when the magazine is full with the spring compressed. The spring elongates and the reactive force decreases as the cartridges are withdrawn from the magazine. This decrease is partly compensated by the decrease in the weight of cartridges to be sustained, but the resultant force available to bias the cartridges to the removal position varies widely between a full and an empty magazine.

It has been found that if a spring in present use is constructed for a maximum holding force equal to the withdrawal force of the feeder mechanism, the force available for holding the last few cartridges in the removal position is insufficient for smooth operation of the firearm.

It is therefore an object of my invention to provide a cartridge magazine of the type described, constructed to apply a substantially constant force to cartridges in the removal position therein.

A further object of my invention is to provide a cartridge magazine of the type described including a pair of biasing springs formed to produce equal total pressures on cartridges in the removal positions of the magazine.

An additional object of my invention is to provide a cartridge magazine having a follower mechanism designed to occupy minimum space therein when the magazine is full.

Other objects will become evident from the following description of my invention.

In carrying out my invention, a magazine for storing cartridges is provided with a follower actuated by a pair of springs to bias the cartridges successively to predetermined removal positions therein. The springs are terminally secured to the opposite ends of the magazine and extend in coils beneath the follower to be fully coiled when the magazine is empty and to be attenuated to occupy minimum space within the magazine when the magazine is full of cartridges.

The springs employed are of a special class of springs called negator springs. Such springs generally may be constructed to exert reactive forces according to selected linear or non-linear patterns by preforming the incremental lengths of the springs into arcs of suitable radii. The springs employed in my invention are individually preformed to non-linear patterns to produce a constant pressure on the cartridges in the removal position of the magazine.

For a more complete understanding of my invention, reference is made to the following description and the accompanying drawing, in which:

Fig. 1 is a perspective view of one embodiment of my invention;

Fig. 2 is a side elevational view of the magazine shown in Fig. 1 with the side of the case partially cut away;

Fig. 3 is a view along the line 3—3 of Fig. 2 with the exception of the magazine loaded; and

Fig. 4 is a top view of the magazine with the lips of the case broken away.

According to the drawing, a cartridge magazine includes a case **12** of substantially rectangular cross-section, provided with sides **14** and ends **16**. Sides **14** are extended into arcuate lips **18** and **19** to form a pair of respectively adjacent removal positions **18***a* and **19***a* within case **12**. The lips are spaced to form a port **20** for passage of cartridges therethrough. Means are provided for removable attachment of case **12** to the firearm with the removal positions in parallel relation to the axis of the firearm.

The case includes ribbon springs **21** having coils **22** and provided with extremities **24** secured to ends **16** by rivets **26**. The magazine is provided with a follower **28** disposed substantially perpendicularly to sides **14** and having a skirt **30** formed therearound. The ends of follower **28** engage coils **22** thereby to be biased towards port **20**. Follower **28** is provided with an off-center cylindrical raised rib **32** having a radius equal to that of a cartridge and case **12** is constructed to accommodate staggered rows of cartridges, as shown in Fig. 3. Springs **21** are in normal fully-coiled position with case **12** empty of cartridges and with rib **32** biased into engagement with lip **18**. This normal position is shown in Fig. 2.

The magazine is filled and springs **21** are thereby stressed into loaded position before the magazine is attached to the gun, by pressing successive cartridges into case **12** through port **20** with the projectile ends thereof extending away from rib **32**. The full magazine is shown in Fig. 3 with a cartridge **34** in engagement with lip **18** in the removal position **18***a* of one of the rows of cartridges. As cartridge **34** is removed, a cartridge **36** leading the remaining row is advanced to engage lip **19** in the removal position **19***a* of the remaining cartridge row and it is clear that when a cartridge is withdrawn from the removal position of either row, the adjacent cartridge of the remaining row is advanced to the removal position corresponding thereto.

Sides **14** are provided with concavities **38** conforming

to the reduced diameters of the cartridge projectiles to align the rows. Creases 40 are provided in sides 14 to insure minimum friction as the cartridges move towards port 20.

Ends 16 are cut away to edges 42 to allow the feeder mechanism of the firearm to project into port 20 to push from the magazine the cartridge occupying either removal position. Rib 32 is provided with a bevel portion 44 to prevent interference of the feeder mechanism with follower 28.

Whether the magazine is full or partly full the loads on the individual springs are unequal due to the configuration and unequal distribution of weight along the length of a single cartridge. The springs are provided with corresponding incremental arcs formed to produce equal total pressures for restraining the cartridges in the removal positions. Cartridges can therefore be retained in the removal positions with equal facility whether the magazine is full or only partly full for smooth withdrawal therefrom by the feeder mechanism of the firearm.

It is evident from the above description that coils 22 are fully wound and occupy the greatest space when the magazine is empty of cartridges and rib 32 engages lip 18. When the magazine is full springs 21 are fully stretched and coils 22 occupy a minimum space beneath follower 28. This construction reduces the size of case required for equal capacity since the entire compression spring in present use must be accommodated beneath the follower at all times.

While the foregoing is a description of the preferred embodiment, I intend in the following claims to include those modifications and variations that are within the spirit and scope of my invention.

I claim:

1. A magazine for a firearm comprising a case for storing cartridges having a pair of lips with an exit port therebetween, a follower for engaging the cartridges and a pair of negator coil springs each having an end portion secured to said case and a remaining coiled portion disposed for serial engagement with said follower at points respectively corresponding to the cartridges to apply a constant pressure to each cartridge against said lips as said springs decompress, the increments of said spring between said points being arcuately formed to produce a substantially constant value of the pressure, for equal resistance to removal of the cartridges from said magazine.

2. A magazine for a firearm comprising a case for storing cartridges having a pair of lips with an exit port therebetween, a follower for engaging the cartridges and a pair of negator coil springs each having an end portion secured to said case and a remaining coiled portion disposed for serial engagement with said follower at points respectively corresponding to the cartridges to apply a constant pressure to each cartridge in removal position against said lips as said springs wind into coils, said end portion being formed to produce a desired value of the pressure between the first of the cartridges and said lips and the increments of said spring between said corresponding points being formed to produce the desired value of pressure between each of the remaining cartridges and said lips for substantially equal resistance to the removal of the cartridges from said magazine.

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