June 19, 1962 D. D. MUSGRAVE 3,039,221

CARTRIDGE MAGAZINE WITH ELLIPTICAL SPRINGS

Filed March 6, 1961

FIG. 1.

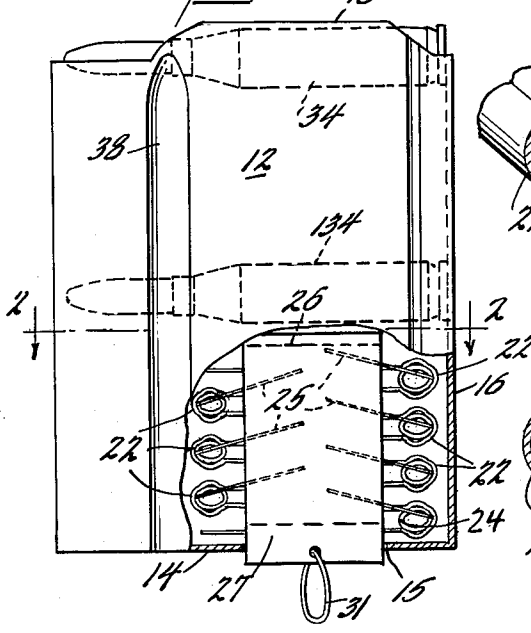


FIG. 5.

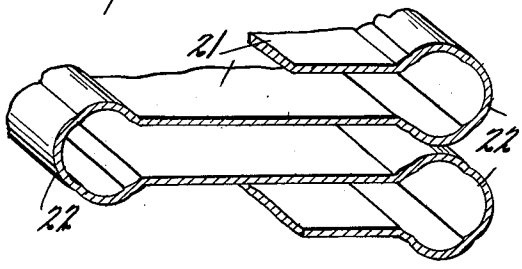


FIG. 6.

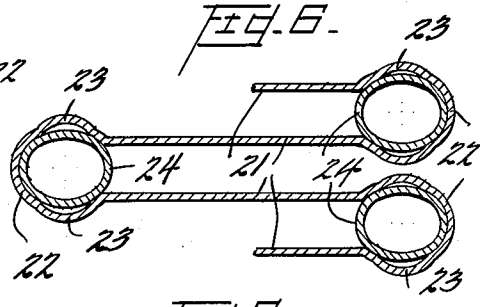


FIG. 7.

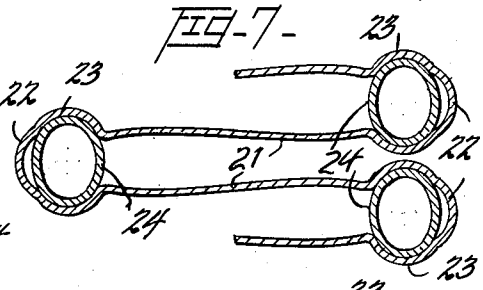


FIG. 2.

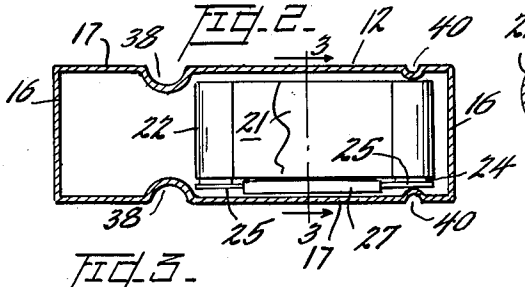


FIG. 8.

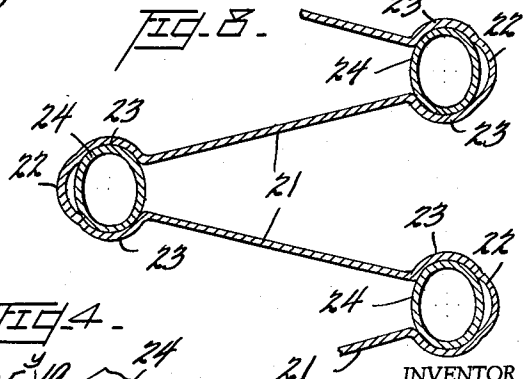


FIG. 3.

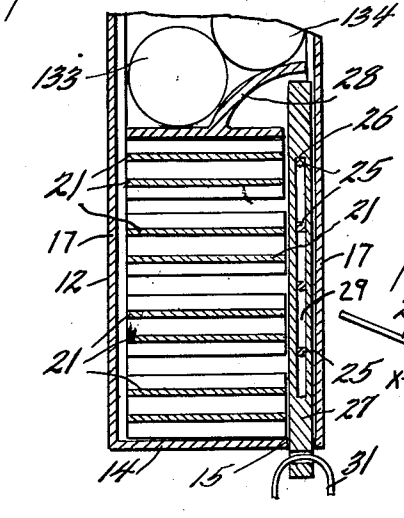
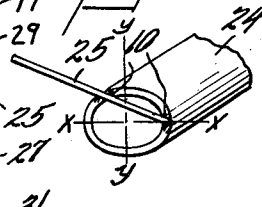


FIG. 4.



INVENTOR

Daniel D Musgrave

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3,039,221 CARTRIDGE MAGAZINE WITH ELLIPTICAL SPRINGS

Daniel D. Musgrave, 8201 Caraway St., Cabin John, Md.

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3 Claims. (Cl. 42—50)

This invention relates to cartridge magazines for firearms wherein the successive rounds of ammunition are moved to a feeding position by the action of a spring-loaded follower. Such magazines may be divided into two general types according to the relative arrangement of the cartridges, which may be side-by-side or end-to-end. The side-by-side arrangement is commonly referred to as the "box" type, and the end-to-end arrangement is usually known as the "tubular" magazine. For military use, the box magazine has become the dominant type and this invention will be disclosed as applied to a box magazine, but it could be applied to tubular magazines. (In this application the term "magazine," alone, should be construed to mean a box magazine.)

Current practice is to make the magazine a self-contained unit which may be easily attached to or detached from the weapon by the user. Each weapon is usually accompanied by a plurality of magazines, so that the firer may replace an expended magazine with a full one, and resume firing with a minimum elapsed time for reloading the piece. Magazines of this general type have been in use for many years and have been developed to a high standard of functional reliability. But an important limitation for which allowance must be made is the tendency of the magazine spring to lose its resilience if stored under load for long periods of time. For this reason magazines are stored empty and loaded only when use appears imminent. This procedure requires separate and additional handling and packaging of the ammunition and the magazine which occupy more space in transit and in storage. It also requires that loading be accomplished in the lower echelons of a supply system. This is contrary to present-day doctrine of relieving the ultimate user group of any supply activities which can better be performed in a higher echelon, such as a factory for fabricating magazines. It is apparent that loading of magazines can be accomplished more readily in a factory than in the field, where the ultimate user may operate under severe environmental conditions. It is also apparent that loading in the field requires opening the protective packaging and that factory-loaded magazines could remain in their protective package when issued to the ultimate user group but for the limitation on the life of the springs.

In consideration of the aforementioned situation, the principal object of this invention is to provide a cartridge magazine which may remain in the loaded condition for long periods without its springs being adversely affected.

A further objection of this invention is to provide such a magazine which will be compatible with firearms presently in use as well as with those to be constructed in the future.

Another object is to provide a magazine which may be prepared for use by the weapon operator in a minimum time after removal from storage.

Another object is to provide a magazine which is reusable and may easily be prepared for long term storage after reloading.

These and other objects of the present invention will become more apparent upon reference to the following specification, taken in connection with the accompanying drawings, wherein:

FIGURE 1 is a side elevation, partly-sectioned, of a box magazine having a cartridge lifting spring assembly which embodies the present invention.

FIGURE 2 is a longitudinal section taken in the plane 2—2 on FIGURE 1.

FIGURE 3 is a partial transverse section taken in the plane 3—3 on FIGURE 2.

FIGURE 4 is a partial, perspective view of an elliptical, tubular spring.

FIGURE 5 is a partial perspective view of the cartridge lifting leaf spring in its free state when removed from the magazine assembly.

FIGURE 6 is a section of the leaf spring shown in FIGURE 5 with elliptical, tubular springs inserted in the vertices.

FIGURE 7 is similar to FIGURE 6, with the exception that the elliptical, tubular springs are oriented differently.

FIGURE 8 is similar to FIGURE 7, with the exception that the leaf spring is extended.

Referring to the drawings, there is shown in FIGURES 1, 2, and 3, a cartridge magazine having a casing **12**, of substantially rectangular form, with ends **16**, sides **17**, and bottom **14**. Casing **12** may be fabricated of any suitable material such as plastic or sheetmetal. As may be noted in FIGURE 1, conventional magazine lips **19** are formed at the upper or feeding end of casing **12**.

Within casing **12** is disposed a typical cartridge follower **28** acting against the lowest cartridge **133**, and second lowest cartridge **134** of the staggered rows to be advanced to the feeding position, which is indicated by the location of cartridge **34** in FIGURE 1. Grooves **38** and **40** in sidewalls **17** of casing **12** are used as stiffeners for casing **12** and as interior ribs to assist in properly aligning the rows of cartridges in the well-known manner.

Means are provided for removable attachment of casing **12** to the firearm so that the feeding position at lips **19** is substantially parallel to the main axis of the firearm.

Disposed in casing **12**, between follower **28** and bottom **14**, is a cartridge lifting spring assembly consisting of a folded leaf spring **21** and one or more elliptical tubular springs **24**. The general arrangement of the spring assembly is shown in FIGURES 1, 2, and 3.

FIGURE 4 shows ellipse spring **24** in detail. It may be fabricated of any suitable resilient material, such as spring steel. Its major axis is indicated by line X—X and its minor axis by line Y—Y. Suitably affixed to one end of spring **24**, as by weld **10**, is lever arm **25**, which is adapted to rotate spring **24** around its longitudinal axis, as will be described later. The assembly shown in FIGURE 4 can, of course, be fabricated opposite hand, to suit conditions.

FIGURE 5 shows a portion of a folded leaf spring **21** in its free or no-load state, before insertion of ellipse springs **24**. Leaf spring **21** has at each fold, vertices **22**, which, as may be noted in FIGURE 6, comprise a portion of an ellipse having its major axis oriented substantially parallel to the flat portions of leaf spring **21**. At the minor axis of the incomplete ellipse are formed detent grooves **23**, the purpose of which will be explained later.

In FIGURE 6, it will be noted that ellipse springs **24** have been inserted into vertices **22**. The dimensions of these parts are so chosen that ellipse springs **24** fit snugly into vertices **22** when their axes are similarly aligned, as shown in FIGURE 6. When the dimensions are so selected, the insertion of the ellipse springs into the vertices will cause no significant torsion of leaf spring **21**.

In FIGURE 7, ellipse springs **24** have been rotated 90°, thus aligning their major axes with detents **23** and torsioning leaf spring **21**. The torsion of the leaf springs exerts a pincer effect at detents **23** thus firmly gripping ellipse springs **24** and retaining them in the position shown.

Another effect of the torsion of leaf spring **21** as shown in FIGURE 7 is a tendency for the spring to expand between adjacent vertices in an effort to achieve the no-load

condition shown in FIGURE 8. It is not intended, however, to limit the invention to the torsion conditions shown. The principle of this invention may be applied to various combinations of torsion and distortion in the leaf spring and the ellipse spring. It is obvious that compression of ellipse spring 24 along its major axis can be utilized to store energy.

The installation of a spring assembly (as shown in FIGURE 6) into casing 12, will be understood by reference to FIGURES 1, 2, and 3. In the bottom 14 of casing 12, there is formed a slot 15 through which protrudes a slotted plate 27 having a pullcord 31 attached to the protruding portion. Formed in plate 27 is slot 29 into which lever arms 25 of ellipse springs 24 extend when the spring and plate are assembled. It will be noted that lever arms 25 are angled slightly upward and that the topmost of the levers is touching the top 26 of slot 29 in plate 27 and thus is retaining the plate in position.

In the upper part of casing 12 is located follower 28 and the staggered rows of cartridges. Dimensions of the several components may be chosen so that the spring assembly, when installed as shown in FIGURE 1, exerts a slight thrust between bottom 14 and follower 28, to hold the rows of cartridges intact.

Operation.—The magazine shown in FIGURE 1 is in the loaded and stored condition. The condition of its springs is shown on a larger scale in FIGURE 6. Plate 27 with pullcord 31 attached is protruding from the bottom of the magazine, and serves as an indicator that the springs are inactive.

When the user desires to activate the magazine he pulls plate 27 out through slot 15 by means of pullcord 31 and plate 27 is discarded. Movement of the plate causes top 26 of slot 29 to contact lever arms 25 and successively rotate ellipse springs 24 a quarter turn. The spring assembly now has assumed the state shown in FIGURE 7 with the assembly tending to expand substantially at right angles to the flat portions of leaf spring 21. The spring therefore exerts a driving force on follower 28.

As cartridges are removed from the magazine during firing the spring assembly will take the shape shown in FIGURE 8.

It is desired to point out that changes may be made without departing from the spirit of the invention. For

example, the vertices of the leaf spring may be staggered or pyramided to permit the assembly to be made smaller and other methods may be employed to attach the levers to the ellipse springs to assure maximum resiliency of the latter.

What I claim is:

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 said cartridges, a folded leaf spring for engaging said follower and consisting of flat portions and partial elliptical portions, tubular elliptical springs inserted in said partial elliptical portions with the major axes of said tubular elliptical springs coinciding with the major axes of said partial elliptical portions, means for rotating said tubular elliptical springs to align their said major axes with the minor axes of said partial elliptical portions, and detent means for retaining said major axes of said tubular elliptical springs in alignment with said minor axes of said partial elliptical portions.

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 said cartridges; a spring for engaging said follower and having a plurality of pairs of longitudinal resilient portions and partial elliptical resilient portions therebetween, the major axes of said partial elliptical resilient portions being in planes intermediate the respective planes of said longitudinal resilient portions; tubular elliptical members inserted in said partial elliptical resilient portions, with the major axes of said members coinciding with the major axes of said partial elliptical resilient portions; and means for axially rotating said members relative to said partial elliptical resilient portions, whereby the minor axes of said partial elliptical resilient portions are increased or decreased to vary the resilience of said spring.

3. The combination set forth in claim 2 and further characterized by the sections of said partial elliptical resilient portions at the minor axes thereof having indents in the inner surface thereof for resiliently engaging the portions of said members near the major axes thereof.

No references cited.