XR 1,347,755

O. V. PAYNE.

CARTRIDGE MAGAZINE.

APPLICATION FILED MAY 15, 1919.

1,347,755. Patented July 27, 1920.

2 SHEETS—SHEET 1.

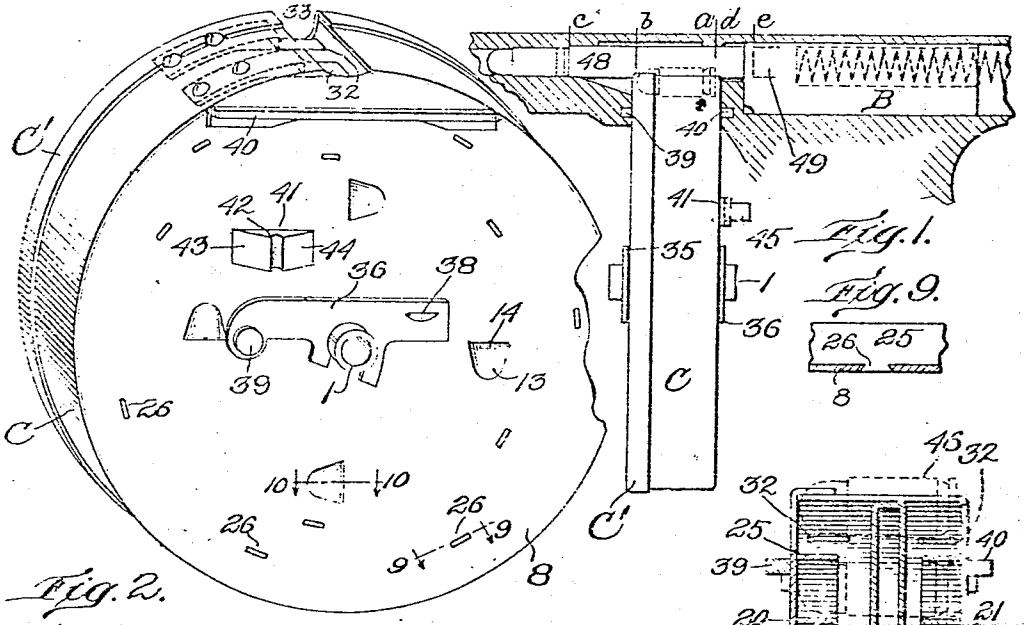

Fig. 1.

Fig. 9.

Fig. 2.

Fig. 10.

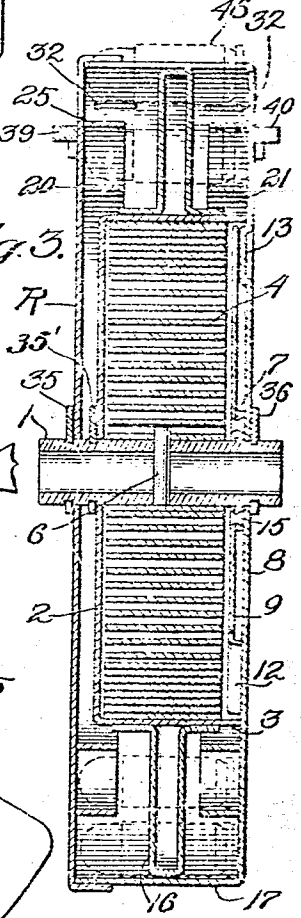

Fig. 3.

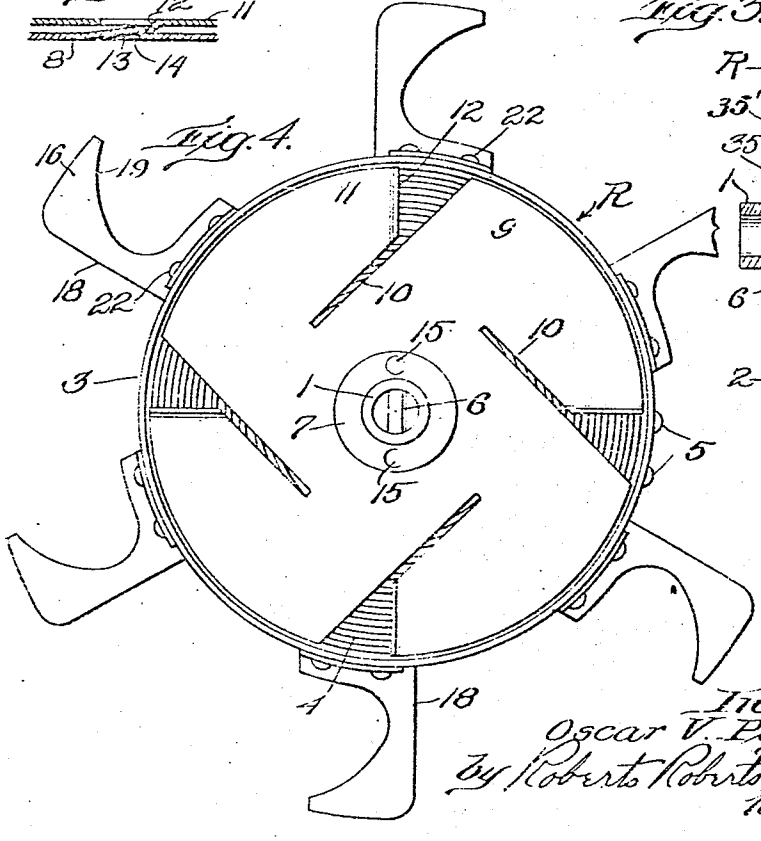

Fig. 4.

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2 SHEETS—SHEET 2.

Fig. 5.

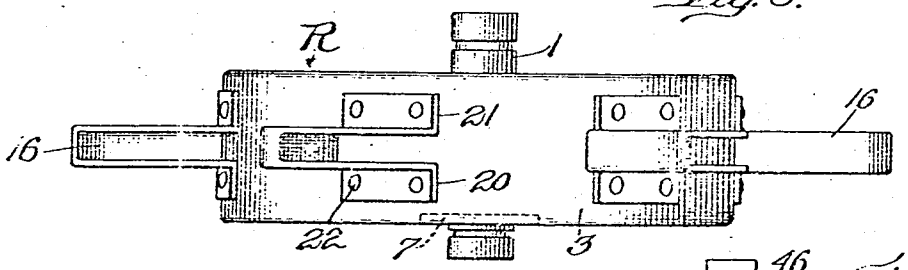


Fig. 8.

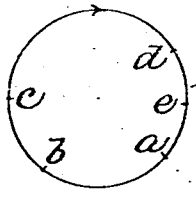


Fig. 7.

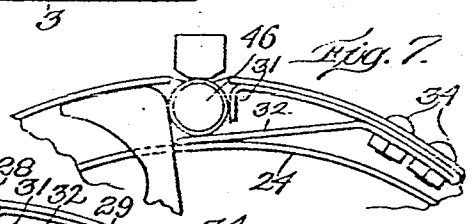
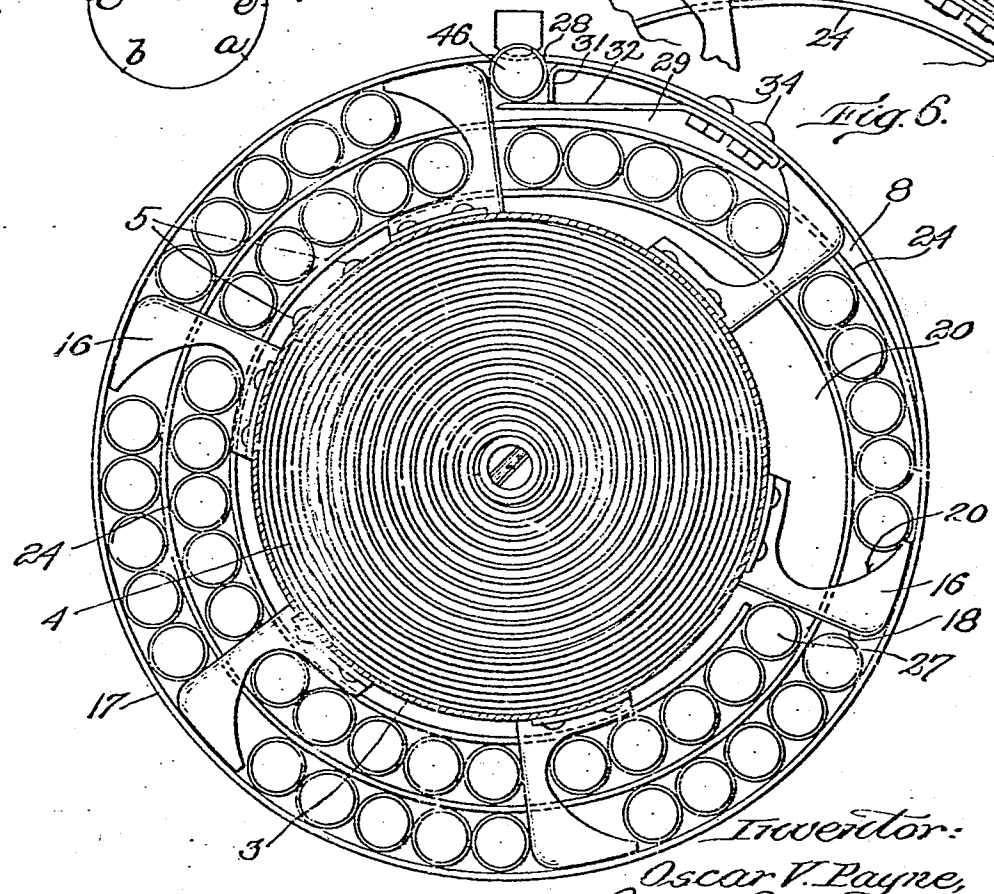


Fig. 6.



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UNITED STATES PATENT OFFICE.

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CARTRIDGE-MAGAZINE.

1,347,755. Specification of Letters Patent. Patented July 27, 1920.

Application filed May 15, 1919. Serial No. 297,285.

To all whom it may concern:

Be it known that I, OSCAR V. PAYNE, a citizen of the United States, and resident of Cleveland, in the county of Cuyahoga and State of Ohio, have invented new and useful Improvements in Cartridge-Magazines, of which the following is a specification.

This invention relates to cartridge magazines and more particularly to drum-shaped magazines in which the cartridges are fed along a spiral passageway.

Magazines of this general character have been proposed heretofore but for various reasons have not proved satisfactory. One difficulty presented is that of intermittently advancing the cartridges along the spiral passageway sufficiently quickly as successive cartridges are delivered from the magazine. In small magazines adapted to hold only a small number of cartridges this difficulty is not so pronounced but in larger magazines adapted to hold a larger number of the cartridges the inertia of the cartridges is so great and the friction of the cartridges rubbing against the walls of the passageway is so high that the cartridges do not feed freely and uniformly from the magazine. The high friction is developed principally because of the curvature of the passageway and owing to the fact that the propelling force is usually applied to the rearmost cartridge and thence successively to the preceding cartridges, so that the cartridges are forced outwardly against the outer wall of the passageway and tend to bind. The cartridges are usually impelled along the passageway by a spring engaging the rearmost cartridge and in larger magazines the spring must be made heavy and strong to advance the large number of cartridges when the magazine is relatively full. When the magazine becomes almost empty the force required to impel the remaining cartridges is relatively small. Consequently if the spring be made sufficiently heavy to impel the larger number of cartridges it is too strong to impel the small number of cartridges at the proper rate and with the proper force and as the cartridges are fed out the force with which they are presented to the magazine opening gradually increases, becoming excessive as the magazine approaches emptiness.

Another objection to spiral magazines of the character heretofore proposed is that they are unduly bulky, are ill-shaped for convenient manufacture and use, and have a disproportionate amount of waste space therein. For many reasons I have found it desirable to make the magazine casing circular and to confine the spiral passageway to an annular space bounded on the outside by the circular wall of the casing and bounded on the inside by a concentric circular wall or partition of smaller diameter. If an ordinary spiral passageway be formed in this annular space it will leave waste spaces adjacent the two walls, the spaces varying in width throughout the length of the annular space and together being equal in area to one complete turn of the spiral passageway.

The principal objects of the present invention are to overcome the aforesaid difficulties and disadvantages incident to spiral magazines of the prior art and to provide a spiral magazine in which the cartridges may be advanced without undue friction and binding, in which the cartridges are presented to the delivery opening of the magazine substantially uniformly throughout the delivery of all the cartridges in the magazine, and in which the spring or other means for impelling the cartridges toward the delivery opening of the magazine may be made sufficiently strong to properly advance the entire mass of cartridges when the magazine is relatively full without interfering with the proper presentation of the cartridges to the delivery opening when the magazine approaches emptiness.

Other objects of the invention are to provide a magazine in which the motive spring may be wound either before or after the magazine is filled and generally to improve the construction of such magazines whereby they may be readily constructed at low cost and whereby they are convenient and reliable in use.

In one aspect the invention consists in providing separate means for advancing the cartridges toward the delivery opening of the magazine and for presenting the cartridges to the opening after they have been brought into the region thereof. The latter means preferably comprises a spring or other motive means (as opposed to a stationary guide) which is adapted to present the cartridges individually to the opening. Thus the cartridges may be advanced col-

lectively, either *in toto* or in groups, by the main motive means and then be presented individually to the delivery opening by the other motive means. The delivery opening, spiral passageway and the two motive means are preferably so arranged that the main motive means advances the cartridges along a path transverse of the opening and the other motive means moves the cartridges transversely of said path. Thus each motive means impart a separate and distinct motion to the cartridges. Moreover the latter motive means preferably acts as a stop to restrain the action of the main motive means after each foremost cartridge has been advanced thereto and until the cartridge has been delivered from the magazine.

In another aspect the invention consists in providing, as a part of the main motive means, a rotor having arms extending outwardly into the spiral passageway at spaced intervals to engage the cartridges in groups so that the impelling force is applied to the cartridges in groups instead of merely to the rearmost cartridge as heretofore. This is of peculiar importance where the cartridges are fed along a long spiral passageway inasmuch as it avoids the tendency to bind and the undue friction, especially against the outer wall of the long passageway, which has heretofore rendered it practically impossible to employ spiral magazines except in small sizes. The rotor arms are made to extend across the inner turns of the spiral passageway into the outer turn so that each arm impels a plurality of groups of cartridges in the respective turns of the passageway. Moreover the arms are preferably so shaped that the space between adjacent arms in each turn of the passageway is substantially equal to the added diameter of a group of cartridges and by flaring the arms outwardly the space in each turn may be made equal so that that the space in each turn will hold the same number of cartridges in a fairly close group.

In another aspect the invention comprises a spring for actuating the aforesaid rotor together with means for winding the spring and holding it wound. The winding means preferably comprises a shaft journaled in the magazine concentrically with the rotor, the actuating spring being connected at its opposite end to the shaft and rotor respectively, together with one or more members extending outwardly from the shaft along the wall of the magazine case, said members and case having coöperating catches adapted to hold said shaft against backward rotation by the spring. Said member preferably comprises a disk of sheet metal secured to the shaft and provided with struck-up spring fingers adapted to engage the catches provided on the magazine case. Said shaft may also serve as a bearing for the rotor.

In still another aspect the invention consists in forming the spiral passageway not in the form of a true spiral but in the form of a modified spiral, the modified spiral preferably being circular throughout a portion or portions of its length. For example, throughout a sector of 210° the turns of the passageway are made circular and concentric and throughout the remaining sector the passageway is so curved as to connect one end of the next circular portion to the other end of the next circular turn, thereby forming a continuous passageway which is an approximate spiral. In this way a longer passageway can be formed in a given annular space as will more clearly appear hereinafter.

Other aspects of the invention will be apparent from the following description and the accompanying drawings in which—

Figure 1 is a side elevation of the magazine applied to a firearm, the firearm being shown more or less diagramatically in section;

Fig. 2 is a perspective view of the magazine;

Fig. 3 is a vertical longitudinal section of the magazine;

Fig. 4 is an end elevation of the magazine rotor looking from the rear;

Fig. 5 is a plan view of the rotor;

Fig. 6 is a front elevation of the magazine with the cover removed and the rotor in section;

Fig. 7 is a detailed view corresponding to Fig. 6, showing the parts in a different position;

Fig. 8 is a diagram illustrating the mode of operation;

Fig. 9 is a section on line 9—9 of Fig. 1; and

Fig. 10 is a section on line 10—10 of Fig. 1.

The particular embodiment of the invention chosen for the purpose of illustration comprises a drum-shaped case C having a cover C′ covering its forward open side. In axial openings in the case C and cover C′ is journaled a tubular shaft 1 which projects from the opposite sides of the case. Shoulders are provided on the shaft 1 on each side of the case by providing annular grooves in the shaft; and retaining means are provided to fit in behind the shoulders to serve the two-fold purpose of retaining the shaft against axial movement in the case and of holding the cover on the case. As shown in Figs. 1, 2 and 3 the retaining means are in the form of detents 35 and 36 pivotally mounted on the end walls of the case by means of pins 37 and provided with forked portions adapted to fit into the grooves in the shaft. In order to hold the

detents in position the free ends thereof are provided with struck-up catches 38 adapted to coöperate with similar catches on the end walls of the case (Fig. 10).

Mounted on the end walls of the case are horizontal guides 39 and 40 adapted to slide horizontally into grooves in a firearm, as illustrated in Fig. 1. On the rear wall of the case is mounted a stop 41 having a vertical groove 42 in the center and sloping surfaces 43 and 44 on either side of the groove. This stop is adapted to coöperate with a detent 45 on the firearm to lock the magazine against transverse movement after the guides 39 and 40 have been slipped into the corresponding grooves in the firearm until the delivery opening 33 of the magazine is positioned immediately below the bolt of the firearm. By sloping the faces 43 and 44 on each side of the groove 42 the magazine may be inserted from either side and the detent on the firearm will ride up one of the sloping surfaces and snap into the groove 42. This means for locking the magazine against transverse movement is described and claimed in my co-pending application, Serial No. 297,282 filed on even date herewith.

Rotatably mounted on the shaft 1 is a rotor R having a radial wall 2 and an outer circumferential wall 3. In the space between the shaft 1 and the outer wall 3 is disposed a coil spring 4 which is anchored to the rotor wall 3 at one end by means of rivets 5 (Fig. 6) and at the other end to the shaft 1 by means of a pin 6 (Figs. 3 and 6). An annular flange 7 is formed on the shaft 1 immediately within the end wall 8 of the case C and to this flange is secured a disk 9 by means of rivets 15. A spring catch or bifurcated washer 35′ is arranged to fit into a groove in the shaft 1, as shown in Fig. 3, to hold the rotor in position on the shaft. As shown in elevation in Fig. 4 the disk 9 is intersected with a plurality of oblique slots 10 thus providing fingers 11 which have their outer ends 12 bent outwardly in radial planes. The rear wall of the case C is provided with a plurality of indentations 13 which present radial shoulders 14 in the path of the ends 12 of the fingers 11 and facing in such direction as to engage the ends 12 and prevent the disk 9 and shaft 1 from rotating in a clockwise direction (Figs. 4 and 10). However the fingers 11 on the disk 9 are sufficiently flexible to permit the ends 12 to ride over the indentations 13 when the disk is rotated in a counter-clockwise direction (Fig. 4).

Mounted on the outer periphery of the wall 3 of the rotor are a plurality of arms or fingers 16 which extend outwardly into close proximity to the outer peripheral wall 17 of the case C. These fingers are provided on one side with radial faces 18 and on their other sides with curved edges 19, the edges 19 being curved for a purpose which will hereinafter be described. The fingers 16 are preferably formed of single pieces of sheet material stamped and pressed into the shape illustrated in the drawings with lateral flanges 20 and 21 adapted to be secured to the wall 3 of the rotor by means of rivets 22 or other suitable means.

On the inner faces of the end walls of the case C are secured guide members 24 and 25, the guide members being mounted substantially in spirals so as to form therebetween spiral channels of sufficient width to receive the ends of the cartridges, as shown for example in Figs. 3 and 6. The guide members 24 and 25 are preferably made in the form of flexible bands of sheet metal and are secured along their outer edges to the end walls of the casing C in any suitable manner but preferably by providing tabs at intervals along their outer edges adapted to fit through slots in the walls of the case and be riveted therein. Thus in the detailed view shown in Fig. 9 the band 24 is provided with a tab 26 which projects through a slot in the wall 3 of the casing and is riveted over on the outside, it being understood that these tabs 26 are provided at suitable intervals along the guides 24 and 25, as shown for example in Fig. 2.

This method of mounting the guides 25 on the walls of the casing affords a convenient method of accurately positioning the guides on the casing inasmuch as the series of slots adapted to receive the tabs 26 on the guide members may be stamped in the walls of the case in the proper positions by means of a die and in order to position the guides accurately in the case it is then only necessary to flex them and fit the tabs into the slots and rivet the tabs therein.

As shown in Fig. 6 the guides 24 and 25 are so positioned in the case that the spiral channel therebetween begins at the position occupied by cartridge 27 and progresses in a clockwise direction and terminates at the delivery opening 28. While the guides may be so positioned as to make the channel exactly spiral I have discovered that the channel may be made longer in a given annular space between the rotor and the peripheral wall of the case by making the channel in the form of a modified spiral. As illustrated in Fig. 6 this modified spiral comprises circular portions concentric with the axis of the case extending from the top of the magazine through 210° in a counter-clockwise direction around to the position occupied by cartridge 27. The remaining portions of the walls extending through the remaining 150° are substantially circular but the center of curvature of these portions is shifted so that the opposite ends of the 150° portions connect with the succeeding

ends of the 210° portions. In this way a continuous channel is formed which is approximately spiral.

In the particular example illustrated in Fig. 6 the annular space between the rotor and the peripheral wall of the case C is substantially equal in radial width to the width of two cartridge channels. In a space of this width a truly spiral channel could only be extended through 360° and there would be waste spaces inside and outside this channel which would be equal in area to a 360° channel. However by shaping the channels in the manner described the channel can be extended through at least 570°, as illustrated in Fig. 6, leaving waste spaces 29 and 30 which are together only equal to the area of a portion of the channel extending through 150° instead of 360°. Obviously the circular portions of the channels which are concentric with the case may be extended throughout angles of more or less than 210° with a proportionate saving of space.

Mounted on the inside of the peripheral wall 17 of the case C, immediately in advance of the delivery opening 28, is a pair of stops 31 and a pair of springs 32, the stops being disposed transversely of the channel in position to engage the foremost cartridge and the springs 32 being arranged to engage the foremost cartridge on the inside and force it outwardly into the position shown in Fig. 6, where it may be projected through the opening 33 in the cover C' by means of the bolt of the firearm. As shown in Fig. 6 the stops 31 and springs 32 are formed of single bands of spring material folded and bent into the shape shown and secured to the peripheral wall of the case by means of bolts 34. As shown in Fig. 3 the guide walls 24 and 25 and the stops 31 and springs 32 are spaced apart a sufficient distance to permit the rotor fingers 16 to pass therebetween.

The operation of the mechanism is as follows: The spring 4 may be wound either before or after the cartridges are placed in the magazine. It may be wound before the cartridges are placed in the magazine by removing the cover and rotating the rotor in a counter-clockwise direction until the spring is properly tensioned. The rotor may then be held in this position by inserting a cartridge into the position occupied by cartridge 46 in Fig. 6. As the spring is wound it imparts a rotative force to the shaft 1 in a clockwise direction (Fig. 6) but the shaft is prevented from rotating due to the fact that the spring fingers on the disk 9 engage the stops 13 on the rear wall of the case. The spring 4 may be wound after the magazine has been filled with cartridges by means of a crank adapted to extend into the hollow shaft 1, and having a forked end adapted to straddle the pin 6. To wind the spring in this fashion the shaft is rotated in a clockwise direction (Fig. 6).

The cartridges are arranged in the magazine in groups as shown in Fig. 6, the foremost cartridge 46 holding the rotor against rotation by engagement with the stops 31. Owing to the peculiar shaping of the rotor fingers 16 the space between the rotor fingers in each portion of the spiral channel is equal in length notwithstanding the fact that the portions are disposed at different radial distances from the rotor. Moreover the forward faces of the rotor fingers are radial so that the forces applied to the various groups of cartridges are longitudinal of the channels. As the foremost cartridge is fed out of the magazine through the delivery opening 33 the next cartridge is moved forwardly until it engages the stops 31, the spring fingers 32 being pressed downwardly into the position shown in Fig. 7. So long as the bolt of the firearm is above the magazine the next cartridge is held in this position thereby. However when the bolt is retracted from above the magazine the springs 32 quickly flip the cartridge up into the position shown in Fig. 6.

Thus the advance of each cartridge into the position to be picked up by the bolt is divided into two stages. The first stage comprises the movement of the cartridge along the spiral channel into engagement with the stop 31 and the second stage involves the movement of the cartridge transversely of the spiral channel into the position shown in Fig. 6. The first movement is produced by means of the main spring 4 and in this movement all of the cartridges are advanced one step. The second movement of the foremost cartridge is produced by the springs 32 and this movement is individual to the foremost cartridge, the remaining cartridges remaining stationary during this movement.

The arrangement whereby the cartridges are advanced collectively into positions adjacent the delivery opening and are then moved individually into position in the delivery opening by separate means is a distinct improvement over the prior art wherein only a single motive means is provided to advance the cartridges. This will be apparent by reference to Fig. 1 wherein is shown a bolt B having a forward portion 48 adapted to reciprocate to and fro above the magazine between the full line position and the dotted line position 49. In this figure the line *e* indicates the transverse plane of the forward face of the bolt when in retracted position; *a* represents the plane of the forward edge of the bolt when it engages the foremost cartridge in the magazine in its forward movement; *b* represents the transverse plane of the forward edge of the bolt when the foremost cartridge leaves the

magazine; *c* represents the transverse plane of the bolt when in firing position; *d* represents the point where the foremost cartridge is uncovered by the bolt on its rearward stroke and lies in the plane *a*.

The diagram in Fig. 8 represents a complete cycle of the bolt beginning on the left at point *c* where the bolt is in firing position and progressing in the direction of the arrow to the point *d* where the foremost cartridge is uncovered by the bolt and permitted to be moved upwardly into position in the path of the bolt, thence to point *e* where the bolt is in extreme retracted position, thence to point *a* where the bolt engages the rear end of the cartridge, thence to point *b* where the cartridge has been moved out of the magazine and thence to point *c* which completes the cycle. The first movement of the foremost cartridge, which is accompanied by a corresponding movement of all of the cartridges, takes place between points *b* and *d* of the cycle, *i. e.* while the bolt is traveling forward from plane *b* to firing position and then returning to plane *d* (Fig. 1). The second movement of the foremost cartridge, which is an individual movement according to the present invention, takes place between the points *d* and *a* of the cycle, *i. e.* while the bolt is traveling rearwardly from point *a*—*d* to retracted position and then returning to plane *a* (Fig. 1). The interval of time between points *d* and *a*, *i. e.*, between the time when the foremost cartridge is uncovered by the bolt in its rearward movement and the instant when the bolt engages the cartridge in its forward movement, is very short and in order to advance the cartridge into position to be picked up by the bolt it must be moved very quickly during this short interval.

Heretofore it has been customary to produce both of the aforesaid movements of the foremost cartridge by means of a single main spring corresponding to spring 4 in the present disclosure. As hereinbefore explained this is unsatisfactory where a large number of cartridges must be advanced inasmuch as the inertia of the mass is so great that the second movement cannot be effected sufficiently quickly to insure the bolt picking up a cartridge during each forward stroke. However by providing separate motive means (springs 32 in the present disclosure) individually to produce the second movement of the cartridge the second movement can be effected almost instantaneously and this insures reliable and uniform operation.

Another important advantage of this magazine is that the cartridges are advanced in groups by means of the rotor instead of being advanced in a single train by means engaging only the rearmost cartridge. Owing to the fact that the cartridges must be advanced along the long curved channels there is a great tendency for the cartridges to wedge and bind if propelled by a force applied solely to the rearmost cartridge. However by dividing the cartridges into groups and applying an impelling force to each group this tendency to wedge and bind is overcome and the action is free and uniform. This difficulty is peculiar to magazines having long spiral channels, and heretofore has never been satisfactorily overcome.

What I claim is:

1. A cartridge magazine comprising a substantially circular casing having a delivery opening at the periphery thereof, means for advancing cartridges circumferentially toward said opening, and other means for propelling the cartridges radially to said opening.

2. A cartridge magazine comprising a substantially circular casing having a delivery opening at the periphery thereof, means including a circumferentially acting spring for advancing cartridges toward said opening, and other means including a radially acting spring for presenting the cartridges to said opening.

3. A cartridge magazine comprising a container having an opening through which cartridges may be delivered therefrom, means for advancing cartridges toward said opening, and a leaf spring adapted to be flexed by the advancing cartridges and thereby positively to present the cartridges to said opening.

4. A cartridge magazine comprising a circular casing having a delivery opening at the periphery thereof, means for advancing cartridges circumferentially toward said opening, and a leaf spring mounted in said casing with its free end extending across said opening in position to be flexed away from the opening by the advancing cartridges, thereby positively to present the foremost cartridge to the opening by its resiliency.

5. A cartridge magazine comprising a container having an opening through which cartridges may be delivered therefrom, means for advancing the cartridges toward said opening along a path transverse of said opening, and other means for successively moving the cartridges substantially perpendicularly of said path to said opening, said last means being arranged to impart its propelling force to each cartridge substantially in the direction of the path of movement of the cartridge to said opening.

6. A cartridge magazine comprising a container having an opening through which cartridges may be delivered therefrom, means for collectively advancing the cartridges toward said opening along a path

transverse of said opening, and other means for individually propelling the cartridges transversely of said path to said opening, said last means being movable transversely of said path.

7. A cartridge magazine comprising a container having an opening through which cartridges may be delivered therefrom, means including a spring for urging the cartridges toward said opening, and other means for individually moving the cartridges to said opening, the last said means being arranged to positively stop said first means from advancing the cartridges after a cartridge has been presented thereto and until the cartridge has been delivered therefrom.

8. A cartridge magazine comprising a container having an opening through which cartridges may be delivered therefrom and having an arcuate passageway along which cartridges may be fed to said opening, motive means for collectively advancing the cartridges along said passageway, and other motive means for individually presenting the cartridges to said opening, said last means acting substantially perpendicularly to said first means.

9. A cartridge magazine comprising a container having an opening through which cartridges may be delivered and having a spiral passageway along which cartridges may be fed to said opening, said passageway extending through more than 360° so as to have overlapping portions, and a rotor mounted to rotate substantially about the central axis of said passageway, said rotor having arms extending outwardly at spaced intervals across the inner portions of said overlapping portions into the outer portions, said arms being shaped so that the distance therebetween is substantially equal in each of said portions and so that the forward faces of the arms are substantially radial, whereby cartridges placed in said portions of the passageway between said arms may be advanced in equal groups upon rotation of the rotor.

10. A cartridge magazine comprising a container having an opening through which cartridges may be delivered and having an approximately spiral passageway along which cartridges may be fed to said opening, said passageway comprising more than one turn so as to have overlapping portions, the portions of the turns defined by one sector being substantially circular and the portions of the turns defined by the remaining sector also being substantially circular, the center of curvature of the second said portions being shifted relatively to the center of curvature of the first said portions so that the ends of the second portions connect with the ends of succeeding turns of the first portions, and each of said sectors being of sufficient angular extent to make the junctions of the turns of the two sectors substantially tangential.

11. A cartridge magazine comprising a container having an opening through which cartridges may be delivered and having an approximately spiral passageway along which cartridges may be fed to said opening, said passageway comprising more than one turn so as to have overlapping portions, the portions of the turns defined by one sector being substantially circular and the portions of the turns defined by the remaining sector also being substantially circular, the center of curvature of the second said portions being shifted relatively to the center of curvature of the first said portions, so that the ends of the second portions connect with the ends of succeeding turns of the first portions, and the smaller of said sectors being at least of the order of one-third of a turn so as to make the junctions of the turns of the two sectors substantially tangential.

12. A cartridge magazine comprising a drum-shaped container having an opening at one side through which cartridges may be delivered, and a spiral wall disposed in said container substantially concentrically therewith to form a spiral passageway leading to said opening, said wall having ears extending through openings in one end of said container to secure the wall thereto.

13. The method of forming a spiral passageway in a cartridge container of the character described which comprises stamping a series of spaced slots in a wall of the container along a spiral path, forming a flexible band of material with ears in one side adapted to fit the slots and similarly spaced, and then flexing the band and securing the ears into the slots.

14. A cartridge magazine comprising a container having an opening through which cartridges may be delivered and having an arcuate passageway along which cartridges may be fed to said opening, a rotor for advancing cartridges along said passageway to said opening, a shaft rotatably mounted in said container concentrically with said rotor, a coil spring connected to said rotor at one end and to said shaft at the other end for actuating said rotor, and a disk mounted on said shaft to extend outwardly along the wall of said container, said disk and container having coöperating catches arranged to permit said shaft to be rotated in one direction to wind said spring but to prevent the shaft from rotating in the opposite direction.

15. A cartridge magazine comprising a container having an opening through which cartridges may be delivered and having an arcuate passageway along which cartridges may be fed to said opening, a rotor for advancing cartridges along said passageway

to said opening, a shaft rotatably mounted in said container concentrically with said rotor, a coil spring connected to said rotor at one end and to said shaft at the other end for actuating said rotor, and a disk mounted on said shaft to extend outwardly along the wall of said container, said disk and container having coöperating catches arranged to permit said shaft to be rotated in one direction to wind said spring but to prevent the shaft from rotating in the opposite direction, said disk being formed of sheet metal and the catches thereon comprising flexible fingers stuck up therefrom.

16. A cartridge magazine comprising a drum-shaped case, a shaft axially journaled in said container, the shaft having shoulders disposed on each side of the case, and detents movable into position behind said shoulders to restrain axial movement of said shaft.

17. A cartridge magazine comprising a drum-shaped case open at one end, a cover for said end, a shaft axially journaled in said case and cover, and means associated with said shaft for holding the cover on the case.

18. A cartridge magazine comprising a drum-shaped case open at one end, a cover for said end, a shaft axially journaled in said case and cover, and means associated with the shaft both to restrain axial movement of the shaft and to hold the cover on the case.

19. A cartridge magazine comprising a drum-shaped case open at one end, a cover for said end, a shaft axially journaled in said case and cover, the shaft having shoulders on each side of the case, and detents movable into position behind said shoulders to restrain axial movement of said shaft and to hold said cover on the case.

Signed by me at New York, N. Y., this 28th day of March, 1919.

OSCAR V. PAYNE.