F. W. HULSE.

MAGAZINE.

APPLICATION FILED APR. 10, 1918.

1,330,873.

Patented Feb. 17, 1920.

2 SHEETS—SHEET 1.

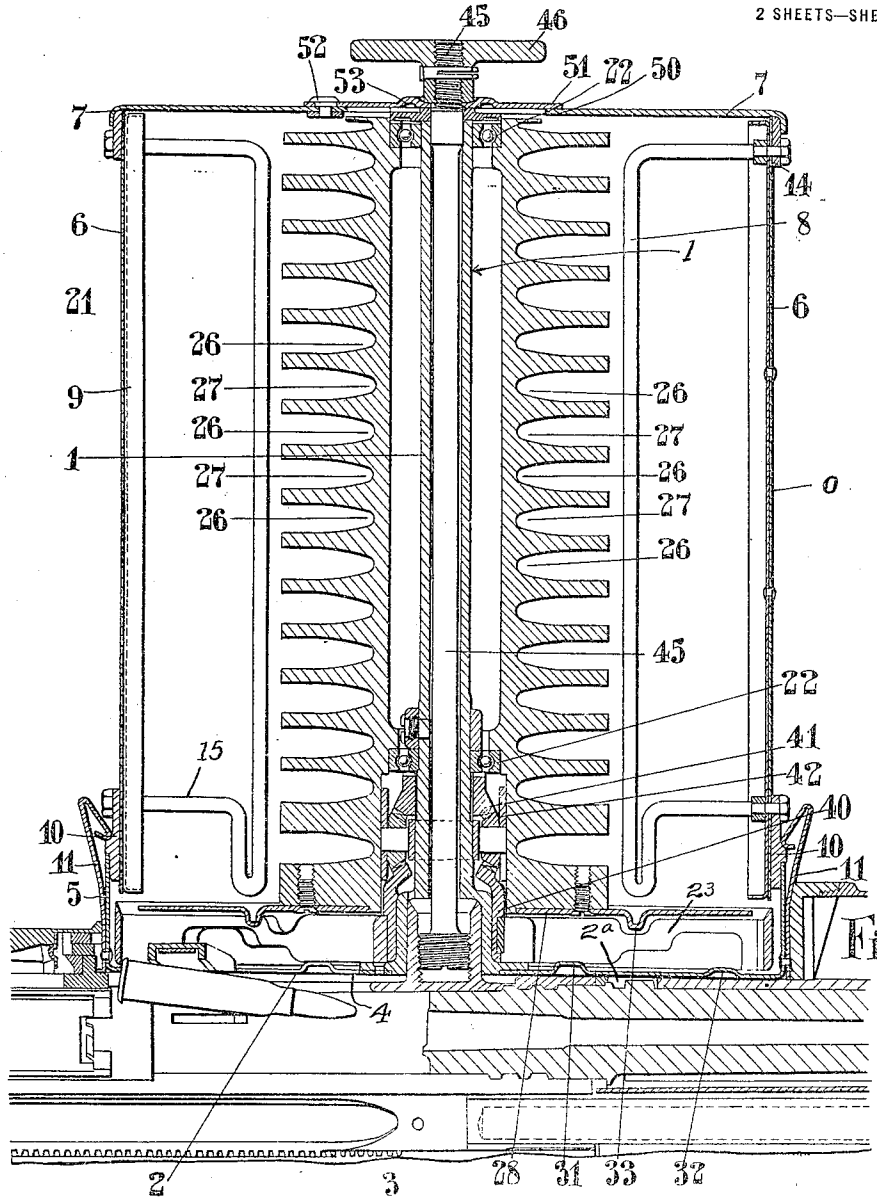


Fig.1.

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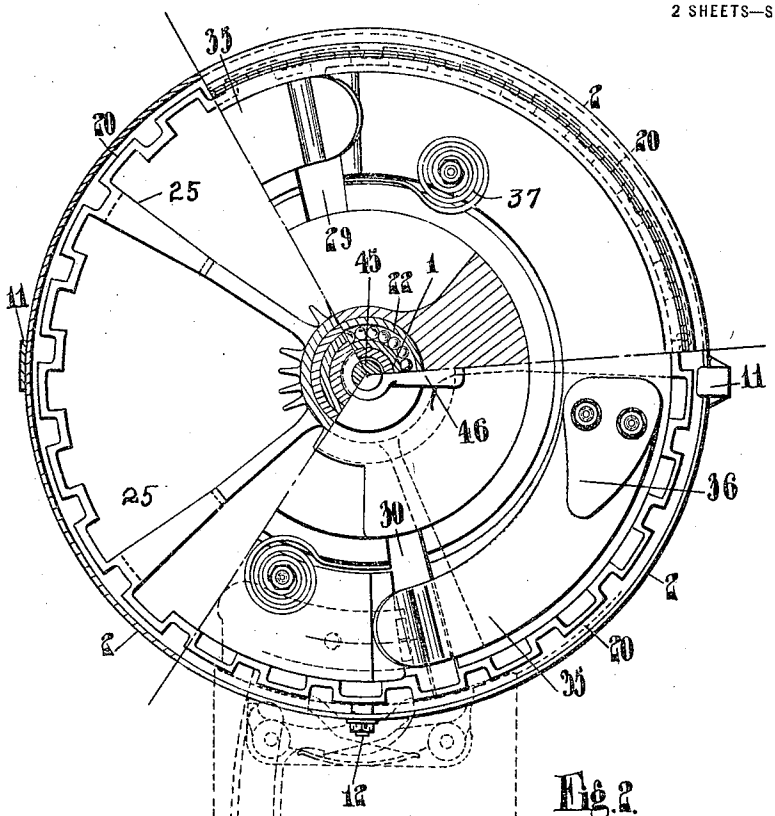


Fig. 2.

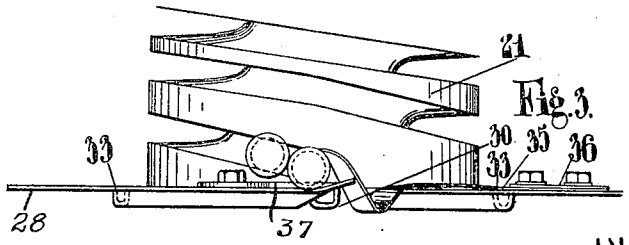


Fig. 3.

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UNITED STATES PATENT OFFICE.

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To all whom it may concern:

Be it known that I, FREDERICK WILLIAM HULSE, a subject of the King of Great Britain and Ireland, and resident of "Norwood," Bristol Road, Northfield, near Birmingham, in the county of Warwick, England, have invented certain new and useful Improvements in and Relating to Magazines, of which the following is a specification.

This invention relates primarily to magazines of machine guns of that type in which, as in the well known Lewis gun, the cartridges are arranged in a spiral with their axes all radial. The said type of magazine may also be used for supplying articles approximately of long cylindrical or cartridge shape, to machine tools or the like which operate on the said articles.

The objects of the invention are to provide a magazine of the said type of larger capacity than has been practicable hitherto, and further to reduce the inertia forces on the feed mechanism by means of which the cartridges or articles are in succession fed into the breech, or other receptacle, thereby reducing the wear and tear on the gun under service conditions.

The invention consists in arranging the magazine in fixed relationship to the body of the gun or other machine, and arranging the cartridges or articles spirally and radially therein in such manner as to be capable of moving axially but not circumferentially relative thereto, for the purpose of feeding to the breech chamber or other receptacle.

The invention also consists in a transferring device adapted to receive the articles from the magazine and deliver them to the breech chamber or other receptacle.

A convenient form is a rotatable feed disk or wheel with radial compartments at the base of the magazine in close proximity to the body of the gun or machine and driven by the usual feed mechanism, into which the cartridges or articles are fed from the body of the magazine, and from which they are discharged into the breech chamber or other receptacle.

The invention also consists in a rotatable spiral guide sleeve for the cartridges or articles co-axial with the magazine, and driven by suitable means at such speed relative to the feed disk or wheel that normally as one cartridge or article is fed into the feed wheel another is delivered from the feed wheel to the breech chamber or other receptacle.

The invention further consists in the apparatus hereinafter described.

We append drawings illustrating our invention as carried out in one form, as applied to a magazine of 400 cartridge capacity, for a Lewis gun.

Figure 1 is a section through the axis of the magazine.

Fig. 2 is a plan view comprising part sections by various planes transverse to the axis of the magazine.

Fig. 3 is an elevation illustrating the passage of cartridges from the body of the magazine into the feed disk.

The magazine is in the form of a cylindrical drum made in two parts, called hereinafter the "inner" and "outer" parts. The inner part I comprises a tubular center post 1 and bottom casing or disk 2 integrally fastened together, and is in fixed but easily detachable relationship to the body of the gun. The bottom of the center post fits on the usual magazine post 3 on the body top. The bottom casing is provided with a locating stud or studs 2^a which fit in corresponding holes on the body top. It is also provided with suitable openings 4 for the passage of the cartridges into the breech chamber and for the operation of the mechanism which actuates the feed disk aforesaid. The bottom casing is flanged at its periphery to form a short cylindrical rim 5, with which the outer part of the magazine fits in fixed but detachable relationship. The outer part O of the magazine comprises a cylindrical drum 6, a top disk or drum cover 7 integrally or detachably fastened thereto, and guiding means for preserving the radial arrangement of the cartridges while permitting them to move axially, as aforesaid. In the example illustrated the top cover is detachably fastened by means and for a purpose described hereinafter. The said guiding means consist of grooves on the drum for the bases of the cartridges, and guide wires or spacing rods 8, or the like at approximately the middle of the length of the cartridge. The grooves and spacing rods are arranged parallel to the axis of the drum, and serve to locate the cartridges in vertical rows inside the magazine. The grooves may be formed by pressing or otherwise shaping

the drum, or by separate spacing strips 9 integrally fastened to the drum.

The two parts of the magazine are detachably fastened together by suitable means independently of the means used for fastening it to the body of the gun. The said means comprise a bottom ring 10, of suitable cross-section integral with the drum 6, and a pair of retaining springs 11 fastened to the rim 5 of the bottom casing. The shapes of the said bottom ring and retaining springs, as shown in Fig. 1, are such that the outer and inner parts of the drum can be quickly fastened together or detached. A stud or the like 12 is fixed to the bottom ring 10, and engages with a notch in the upturned edge of the rim 5, thus determining the position of engagement of the inner and outer parts of the drum. A top ring 14 is also integrally fastened at the top of the drum 6. The spacing rods 8 aforesaid are bent to shape and their ends are fastened to the top and bottom rings by nuts and washers, as shown in Fig. 1. The shape of the spacing rods provides for axially guiding a cartridge from the top to the bottom of the magazine, and for the feed plate springs described hereinafter clearing the radial portions 15 of the spacing rods near the bottom of the magazine.

It may be remarked that the relative terms "bottom," "top" and "vertical" as applied to the magazine refer to the normal position of the gun. But it is to be clearly understood that the cartridge feed and guide mechanism provided by this invention is positive in character, and does not depend on gravity. The gun can therefore be used in any position, even upside down, as compared with the normal position.

The rotatable feed disk 20 and spiral guide sleeve 21 are inside the magazine, the former close to the bottom casing 2; the latter mounted on ball bearings 22 on the center post 1 and extending the whole available length of the magazine. The feed disk or wheel is of depth equal to or slightly greater than the diameter of the base of the cartridges; it is divided into radial compartments 23 into which the cartridges are fed from the top, and delivered from the bottom into the breech chamber 24. The number of compartments is the same as the number of vertical rows in the magazine. The feed disk in plan therefore resembles a wheel with radial spokes 25 from the hub to the rim. In the example illustrated, the feed wheel has five spokes and twenty-five compartments for cartridges, each compartment being formed by a groove for the base of the cartridge inside the rim of the feed wheel and a groove for the bullet point of the cartridge on the hub of the wheel. The grooves on the rim are spaced at equal angular intervals, each spoke being located between two adjacent grooves. The grooves in the hub between two adjacent spokes are spaced at equal intervals, but the angle between the two adjacent grooves on opposite sides of a spoke is greater, thus permitting a substantial thickness for the inner portions of the spokes.

The usual well known means are used for driving the feed wheel and for delivering the cartridges into the breech block chamber, and do not form any part of the present invention. The bottom casing is suitably pierced to allow of the connection between the feed wheel and its driving means. The feed wheel may be made of one solid piece with the compartments suitably formed threin as in the example illustrated, or it may be built up of sheet metal parts integrally fastened together.

The rotatable spiral guide sleeve has one or more spiral channels in which the bullet ends of the cartridges are located, the base ends of the cartridges projecting radially therefrom approximately at right angles to the axis of the magazine, the radial depth of the spiral channels being made sufficient for this purpose. The guide sleeve shown in the drawings has two spiral guide channels 26 and 27. A circular disk or feed plate 28 of large diameter is integrally fastened to the bottom of the guide sleeve, and is cut and suitably shaped at the end of each spiral channel to provide openings 29 and 30 for the passage of the cartridges. When assembled in their proper relative position, the feed wheel is located in a chamber formed between the bottom casing of the magazine and the said feed plate. As the feed wheel is driven, the cartridges contained in the compartments roll on the bottom casing or the circular feed plate. Suitable circular ridges 31, 32 and 33 may be formed on the two said parts to provide definite surfaces for the cartridges to roll on.

The feed wheel is driven through an angle equal to that between the radial center lines of two adjacent compartments for each bullet fired by the gun. The guide sleeve is simultaneously driven through a different angle, (in the example illustrated half the said angle), thereby causing all the bullets in the magazine to descend a slight distance, and simultaneously delivering a cartridge from the bottom of one of the spiral channels into the feed wheel. To effect such delivery into the feed wheel, the edge of the guide plate following the opening at the bottom of each spiral channel may be bent upward to form a guide finger which slices off the lower cartridge as the opening passes below the various vertical rows.

In the example illustrated, for this purpose a spring is fixed to the feed plate in convenient relationship to each of the said openings, each spring comprising two leaves

or plates 35 and 36. Fig. 3 is an elevation showing the said relationship. An auxiliary cartridge guide spring 37 is fitted at each opening for the purpose of supporting the bullet end of the cartridge and to act in conjunction with the plate spring in forcing the cartridge through the opening into the feed wheel as soon as the leading edge of the opening has moved into such position as will permit the passage of the cartridge.

The ratio of the rotative speeds of the feed wheel and spiral sleeve and the number of spiral channels in the guide sleeve are inter-related, in such manner as to feed a cartridge into the feed wheel for each cartridge discharged therefrom into the breech chamber. Many combinations are possible. For example, the feed wheel and the guide sleeve may be driven in the same direction, or in opposite directions. If the feed wheel and guide sleeve rotate in the same direction, one must move faster than the other. In order to reduce inertia forces and increase the capacity of the magazine the preferable arrangement is to make the guide sleeve rotate slower than the feed wheel. In the example illustrated, the guide sleeve rotates at half the speed of the feed wheel, and has two spiral channels, in which case the feed wheel must have an odd number of compartments.

Driving means are provided from the feed wheel to the guide sleeve to give the required angular displacement of the latter for each bullet delivered to the breech block chamber. A suitable arrangement is a train of toothed wheel gearing. For the two-channel guide sleeve illustrated, a bevel differential gear having two equal bevel wheels is a convenient form; one of the bevel wheels 40 is fastened to the feed wheel, the other bevel wheel 41 to the tubular center post of the magazine, and the planet pinion bearing 42 are fastened to the spiral guide sleeve; the guide sleeve being thus driven at half the speed of the feed wheel.

For the purpose of securing the magazine with its contained mechanism and cartridges to the body of the gun and quickly detaching it, a long stud or locking rod 45 is screwed to the magazine post on the body top 3 and this projects through the tubular center post beyond the drum cover 7. A wing nut, locking handle 46 or the like completes the fastening.

When the magazine has been emptied of its cartridges, the wing nut may be unscrewed, the empty magazine removed bodily, another magazine fully loaded with cartridges placed in position, and the wing nut screwed up tight.

In the example illustrated, however, provision is made for re-filling the magazine without removing it from the gun, the drum cover 7 only being removed. For this purpose, the drum cover is flanged at its periphery to embrace the drum top ring 14, and has a central aperture 50 through which the locking handle 46 can pass. The locking handle is in this case fixed to the locking rod. A latch plate 51 pierced, and slotted at one side for the locking rod to pass through, is jointed at 52 to the drum cover, and in its operative position covers the aperture 50 and affords an abutment for the locking handle. The parts being assembled as shown, the drum cover can be removed by turning the locking handle, thereby unscrewing the locking rod a turn or so from the magazine post 3 until the boss of the locking handle clears the circular ridge 53 of the latch. The latch is then swung to the side, and the drum cover can be removed.

It will be seen that with the present invention, the mass of the feed wheel directly set in motion by the feed mechanism of the gun is greatly reduced, and that the velocities of many moving parts are greatly reduced as compared with magazines hitherto used, with a corresponding reduction of the inertia forces on the mechanism. The wear and tear of the parts due to the rapid intermittent feed of automatic working under service conditions is thus reduced. Guns fitted with our improved magazine and feed mechanism may be expected to work for longer periods before a periodical overhaul is required. In the well known Lewis gun as made hitherto, the fully loaded magazine usually contains 47 cartridges and sometimes 97 cartridges, the complete magazine and cartridges have to be accelerated and retarded once for each bullet fired. The moment of inertia of the feed wheel of my present invention and the cartridges contained therein and that of the other oscillating parts is so small that the effective operation of the gun mechanism is not interfered with. The inertia stress on the rotatable guide sleeve is small compared with that on the feed wheel, even although its axial length is much greater. The cartridges in the magazine do not partake of any rotary motion, and as their axial speed during the intermittent feed motion is small, their mass does not appreciably add to the inertia forces on the mechanism. The axial length of the magazine can therefore be made much greater than practicable heretofore. I find that with a magazine capacity of 400 cartridges, there is less inertia stress on the mechanism than in the gun as made hitherto.

What I claim is:—

1. A magazine in fixed relationship to the gun or machine to be fed, in which the articles are arranged therein in such manner as to be capable of moving axially but not circumferentially relative thereto, a rotatable feed wheel located at the base of the magazine, and a rotatable spiral guide sleeve

for the articles co-axial with the magazine and driven by suitable means at such speed relative to the feed wheel that normally as one article is fed into the feed wheel an article is delivered therefrom.

2. In a device as claimed in claim 1, the combination therewith of driving means between the feed wheel and spiral guide sleeve.

3. In a device as claimed in claim 1, the combination therewith of means for driving the spiral guide sleeve at a slower speed than the feed wheel.

4. A magazine as claimed in claim 1, comprising an inner and an outer part, and detachable fastening means for the said parts, the said inner part comprising a tubular center post and bottom disk fastened together, the said outer part comprising a cylindrical drum with guiding means for preserving the radial arrangement of the cartridges while permitting them to move axially and a drum cover fastened to the said drum.

5. In a magazine as claimed in claim 1 wherein the inner surface is provided with axial grooves to locate the bases of the articles, and suitably bent spacing rods fastened to the drum and arranged in axial planes, so as to locate the articles approximately radially in axial planes, thus guiding the articles during their axial feed movement.

6. A magazine in fixed relationship to the gun or machine to be fed, in which the articles are arranged therein in such manner as to be capable of moving axially but not circumferentially relative thereto, a rotatable feed wheel located at the base of the magazine, and a rotatable guide sleeve with a spiral channel of such depth as to support the articles approximately radially, and a feed plate of large diameter fastened to the bottom of the guide sleeve and provided with an opening at the end of such spiral channel, and with means for detaching the lower article of an axial row in the magazine and forcing it through the said opening into the feed wheel.

7. In combination with a magazine as claimed in claim 6, means for quickly attaching and detaching the magazine to and from the gun or machine on which it is used.

8. In combination with a magazine as claimed in claim 6, means for refilling the magazine without detaching it from the gun or machine on which it is used.

9. A magazine in fixed relationship to the gun or machine to be fed in which the articles are arranged therein in such a manner as to be capable of moving axially but not circumferentially relative thereto, said magazine comprising an inner part and an outer part and means for detachably fastening said parts together, the said inner part consisting of a tubular center post and a bottom disk fastened to the post, the said outer part consisting of a cylindrical drum and a cover fastened to the drum, spacing strips fastened to the inner surface of the drum to provide axial grooves to locate the bases of the articles, spacing rods fastened to the drum and arranged in axial planes so as to locate the articles approximately radially in axial planes thus guiding the articles during the axial feed movement, and a rotatable spiral guide sleeve for the articles co-axial with the magazine.

10. A magazine of the character described including in combination, a fixed magazine including an inner part and an outer part, and means for detachably fastening the parts together, the inner part consisting of a tubular center post and a bottom disk fastened thereto, the outer part consisting of a cylindrical drum with guiding means for preserving the radial arrangement of the articles while permitting them to work axially, and a cover fastened to the drum, a rotatable feed wheel located at the base of the magazine, a rotatable spiral guide sleeve for the articles co-axial with the magazine, and driving means between the feed wheel and the spiral guide sleeve for rotating the guide sleeve at such speed relative to the feed wheel that normally as an article is fed into the feed wheel an article is delivered therefrom.

In testimony whereof I have signed my name to this specification.

FREDERICK WILLIAM HULSE