(No Model.) 2 Sheets—Sheet 1.

L. F. BRUCE.

CARTRIDGE FEEDER FOR MACHINE GUNS.

No. 343,532. Patented June 8, 1886.

Fig 1

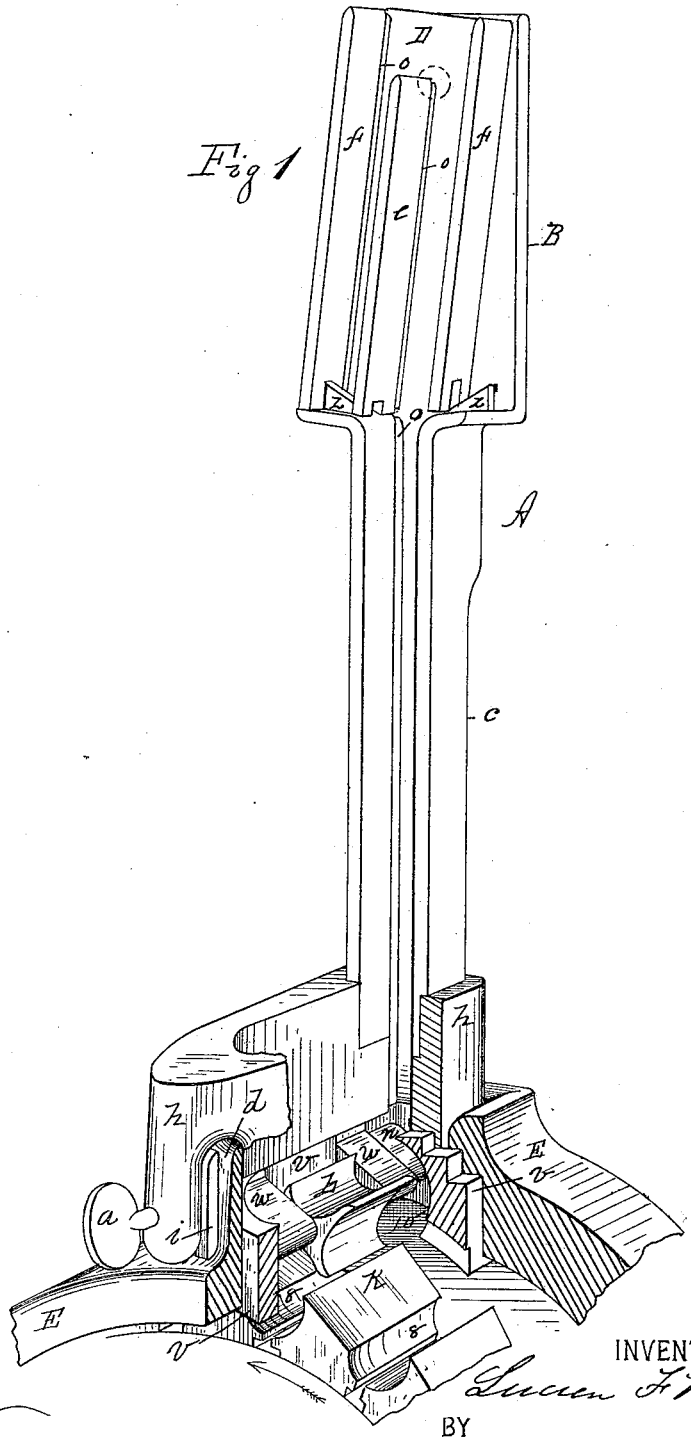

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Fig 2

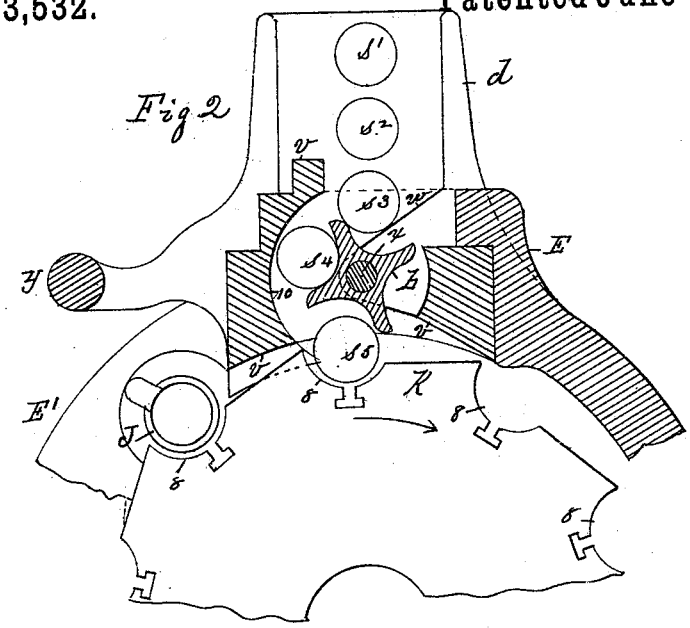
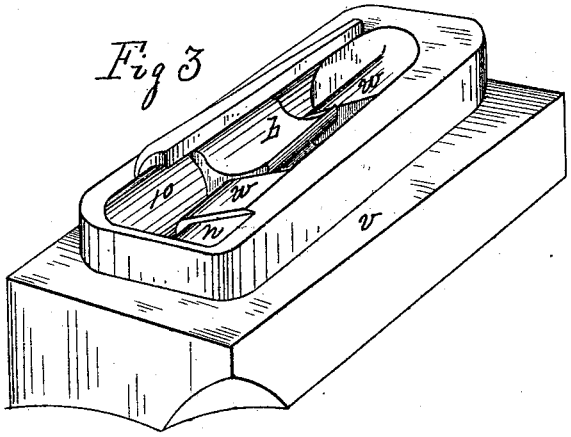


Fig 3



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UNITED STATES PATENT OFFICE.

LUCIEN F. BRUCE, OF SPRINGFIELD, MASSACHUSETTS, ASSIGNOR TO THE GATLING GUN COMPANY, OF HARTFORD, CONNECTICUT.

CARTRIDGE-FEEDER FOR MACHINE-GUNS.

SPECIFICATION forming part of Letters Patent No. 343,532, dated June 8, 1886.

Application filed September 7, 1885. Serial No. 176,309. (No model.)

To all whom it may concern:

Be it known that I, LUCIEN F. BRUCE, a citizen of the United States, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Cartridge-Feeding Devices for Machine-Guns, of which the following is a specification.

This invention relates to improvements in cartridge-feeding devices for machine-guns, the object being to provide improved means for so directing the movement of each cartridge after it leaves the feeder above the hopper that it shall in passing through the latter be so held and governed that it invariably reaches the cartridge-carrier, from which it is driven into the barrel, in a line with the bore of the latter, and whereby the misplacement of a cartridge, owing to the overweight of its ball end, is made impossible.

In the drawings forming part of this specification, Figure 1 is a perspective view of a portion of the rotating cartridge-carrier of a machine-gun and of the hopper of the latter, partly broken away to show the parts thereunder, said hopper having applied thereto, in close proximity to the carrier, cartridge feeding and controlling devices embodying my invention, said figure showing also a vertical grooved cartridge-feeder attached to the hopper in the ordinary manner. Fig. 2 is a view of a portion of the rear end of the cartridge-carrier and a vertical section of the hopper, and a transverse section of the said cartridge-controlling devices, there being shown also in said figure a portion of the ring to which the rear ends of the barrels are attached, and the end of one of the latter. Fig. 3 is a perspective view of said cartridge-controlling devices removed from the hopper.

This invention is in the nature of an improvement on my patent of September 20, 1881, and the construction and arrangement of the feed devices in the hopper of the gun, as herein shown, are adapted to obviate the imperfections pertaining to the devices of said patent in respect to their ability to properly govern the movement of the cartridges in the hopper immediately adjoining the surface of the carrier K. The roller *n* of said patent is located in the side of the foot *c* of the cartridge-conductor *b*, at such a distance above the said carrier that the cartridges, after passing the roller *n*, often turn and drop "bullet down," and occasion great inconvenience; and, furthermore, in said patent the "fluted roller" is not hung with its axis under the down-coming line of cartridges, and hence the roller or wheel in that construction cannot so efficiently co-operate with the line of cartridges to govern the movement of each one as does the wheel herein shown, which in operation occupies the position relative to the cartridges indicated in Fig. 2 by *s* and the side of the carrier K there shown.

By means of the within-described improvements each cartridge is made to drop into its proper place and in proper position on the carrier K, as hereinafter fully set forth.

In the drawings, K and E indicate, respectively, portions of the rotating cartridge-carrier and the hopper of the well-known Gatling gun, in which said parts occupy substantially the positions relatively shown in the drawings. The cartridge-carrier K is hung on a suitable axis, and is rotated in the rear of the barrels of the arm, and has the grooves S therein to receive the cartridges after the latter have passed through the hopper E, from whence they are made to enter the barrels (the end J of one thereof being shown in Fig. 2) by suitable mechanism. (Not shown in the drawings.) The hopper E is ordinarily hinged over the carrier K, and at *y* is shown a section of the projection or handle which is grasped to swing the hopper on its hinge. A suitable opening is made in the top of the hopper, constituting the mouth thereof to receive the foot *h* of the cartridge-feeder, as shown in Fig. 1, and at one end of said opening is an upwardly-projecting lip, *d*, over which one end of said foot passes, and through the latter is a thumb-screw, *a*, acting to force the shoe *i* against the side of said lip *d*, and thereby secure said foot and its attached feeder rigidly to the mouth of the hopper. The said cartridge-feeder consists of the single grooved guide or conductor *c*, communicating with the foot *h*, and having in each of its side walls a groove, *o*, in which two grooves the flanges of the cartridge-heads

engage, and the cartridges are thereby held in nearly a horizontal position while they slide downward to the hopper. The upper end of the conductor *c* is provided with an enlarged portion or plate, B, on which is pivoted the double-grooved conductor D, having the side walls, *f f*, and the central partition, *e*, thus forming two grooves on the conductor D, whose lower ends, one after the other, are capable of being swung over the upper end of the groove in said conductor *c*. The lower ends of the walls *f* of the conductor D are slotted, as shown, to engage with the switch-plates *z z*, located on opposite sides of the groove in conductor *c*. The edges of said plates *z* are inclined toward said groove.

The conductor D is adapted to receive at once a certain number of cartridges from a box, in which they are packed with their heads or flanges outward, by engaging the latter with the grooves *o* in the walls *f* and partition *e*, and then drawing the box away from the cartridges. Thus such of the latter as are in the groove of the conductor D, that communicates with the conductor *c* will at once drop into the latter, and from thence will move into the hopper E, and immediately that said groove in conductor D is emptied the weight of the cartridges in the second groove thereof (the cartridges resting on the inclined edge of the plate *z*) will cause said conductor to swing and bring the cartridges in said second groove over the end of conductor *c*, letting them drop into the latter, and so, as often as the two grooves of the conductor D are supplied with cartridges, each groove will be emptied into conductor *c*, one after the other, as above described.

The construction of each of the grooves of conductor D is substantially that of the groove in conductor *c* in respect to the grooves *o*, whereby the heads of the cartridges are engaged, as above described.

The above-mentioned cartridge-feeder is only one of several devices which may be employed to present the cartridges one by one at the mouth of the hopper E, controlled by the improved mechanism hereinafter described, to the carrier K, said mechanism being adapted to operate in connection with any feeder which is capable of presenting the cartridges to the hopper of the gun substantially in the manner above described.

The above-mentioned cartridge-governing devices, which operate within the hopper near the carrier K, consist of a wheel, *b*, having in its surface a series of recesses or longitudinal grooves for the reception of cartridges whose axis is substantially under the line of cartridges which enter the hopper from above, said wheel being located in a suitable curved or circular chamber in the hopper between its mouth and the cartridge-carrier K and between inclined tables located at either end of the wheel.

For convenience in constructing and applying said parts to the hopper, a wheel-case, *v*, is provided, which is secured in the hopper E under the mouth thereof, over which the cartridge-feeder is secured, and from one of the inner sides of said wheel-case there project two inclined tables, *w w*, the face of one of which is plain, and at the end of the other there is an offset, *u*, as clearly shown in Figs. 1 and 3, and the wheel *b* is hung to rotate freely between said inclined tables, the shaft *x* of the wheel having suitable bearings in the case *v*. The space between the base of the grooves on wheel *b* and the adjoining curved inner wall, 10, of the wheel-case is sufficient to permit a cartridge to pass freely therebetween, as shown in Fig. 2. The edges of the wings of wheel *b* rotate as close to the projecting parts of the carrier K at the side of the grooves 8 as possible and clear the same, in order that the wing of the wheel may follow the cartridge until the latter is lodged on the carrier.

The operation of the said hopper-inclosed devices in passing the cartridges from the cartridge-feeder to the carrier K is as follows: The circles s' to s^5, inclusive, Fig. 2, indicate substantially the positions of such of the cartridges which have come from the feeder above as are passing and about to pass through the hopper, the latter, s^5, indicating a cartridge already lodged on the carrier K. In practice, however, the cartridges s', s^2, and s^3 would lie one against the other. The interior of case *v* is slightly longer than the cartridge with which it operates, and the diameter of wheel *b* is proportioned somewhat to the distance between the grooves 8 on the carrier K, so that while the latter is being rotated to carry the cartridge s^5 from under wheel *b* the cartridge s^4 will by the action of said wheel, combined with the wall 10 of the case *v*, be dropped into the succeeding groove. Each cartridge as it enters the hopper drops onto the tables *w w*, the projecting flange of the head thereof resting on the lower incline, *n*, and from said inclines the cartridge slides or rolls against one of the wings of wheel *b*, rotating the latter, but being held in a line with the axis of the wheel after leaving the said tables, (see s^4,) which axis is in a line with the grooves 8 in the carrier K. Said cartridge then passes between the wall 10 and the wheel, and emerging from between the two is dropped into one of the grooves 8 so directly and quickly that it cannot become displaced between the hopper and carrier. If the rotation of the carrier be stopped for a moment, the weight of the cartridges above the wheel causes the latter to turn until one wing strikes the cartridge under it in the carrier, when it ceases to turn until the carrier again starts.

From the above description it is seen that the wing of the wheel with which the cartridge comes in contact as it leaves the inclined tables moves with the cartridge until the latter is dropped onto the carrier, and thereby, from

the time the cartridge encounters the wheel *b* until it is in the place on the carrier from whence it is driven into the barrel to be fired, it is held in a true horizontal position by the wheel, or one in a line with said groove in the carrier.

The wheel *b* may be made in one piece, as shown, or it may consist of two or more thin transverse sections of such a wheel secured on a suitable shaft.

It is obvious that the wheel-case *v*, as a separate piece, may be dispensed with, if desired, and the chamber therein to receive the wheel and having the inclined tables thereon be made in the hopper itself; but it is more convenient to make said case separate and insert it in the under side of the hopper.

What I claim as my invention is—

1. The hopper of a machine-gun having a mouth to receive cartridges from a feeder located above the latter, a passage leading from the mouth through the hopper, said passage having an incline on which the cartridges bear before reaching the cartridge-receiving wheel, combined with the cartridge-receiving wheel pivoted in said passage in the path of movement of the cartridges toward the carrier, and having a free rotary movement in said passage derived from the movement of the cartridges against said wheel, substantially as set forth.

2. Cartridge-controlling mechanism for machine-guns, consisting of the hopper E, located over the cartridge-carrier K of the gun, having a passage therein through which cartridges pass to the carrier, and having in said passage a wheel-chamber in proximity to said carrier, said chamber having on one side thereof the curved wall 10, and having opposite the latter and extending toward the same the inclined tables *w w*, on which the cartridges fall on entering the hopper, a cartridge-receiving wheel having grooves in its surface for the reception of cartridges, pivoted between the said inclined tables and having a free rotary motion therebetween derived solely from the gravity movement of the cartridges thereagainst, combined and operating substantially as set forth.

3. The hopper of a machine-gun having formed therein a wheel-chamber, substantially as described, between the mouth of the hopper and the cartridge-carrier of the gun, said chamber having on one side the curved wall 10, and having opposite the latter and extending toward the same the inclined tables *w w*, on which the cartridges fall on entering the hopper, a cartridge-receiving wheel having grooves in its surface for the reception of cartridges, pivoted between said inclined tables and having a free rotary motion therebetween derived solely from the gravity movement of the cartridges thereagainst, and a cartridge-feeder, substantially as described, secured over the mouth of the said hopper, to hold cartridges while they move downward therein into the latter by gravitation and onto said inclined tables and said wheel, combined and operating substantially as set forth.

4. The cartridge-carrier of a machine-gun having a rotary motion in the rear of the barrels thereof, and having grooves in its periphery to receive cartridges, the hopper above said carrier, a wheel-chamber, one wall of which forms a guide curving away from a perpendicular through the pivot of the wheel, and the cartridge-receiving wheel, whose axis is substantially parallel with the grooves, said wheel pivoted in said chamber nearly under the column of cartridges in the hopper and having a free rotary motion derived from the cartridges, all combined and operating substantially as stated.

LUCIEN F. BRUCE.

Witnesses:
H. A. CHAPIN,
WM. H. CHAPIN.