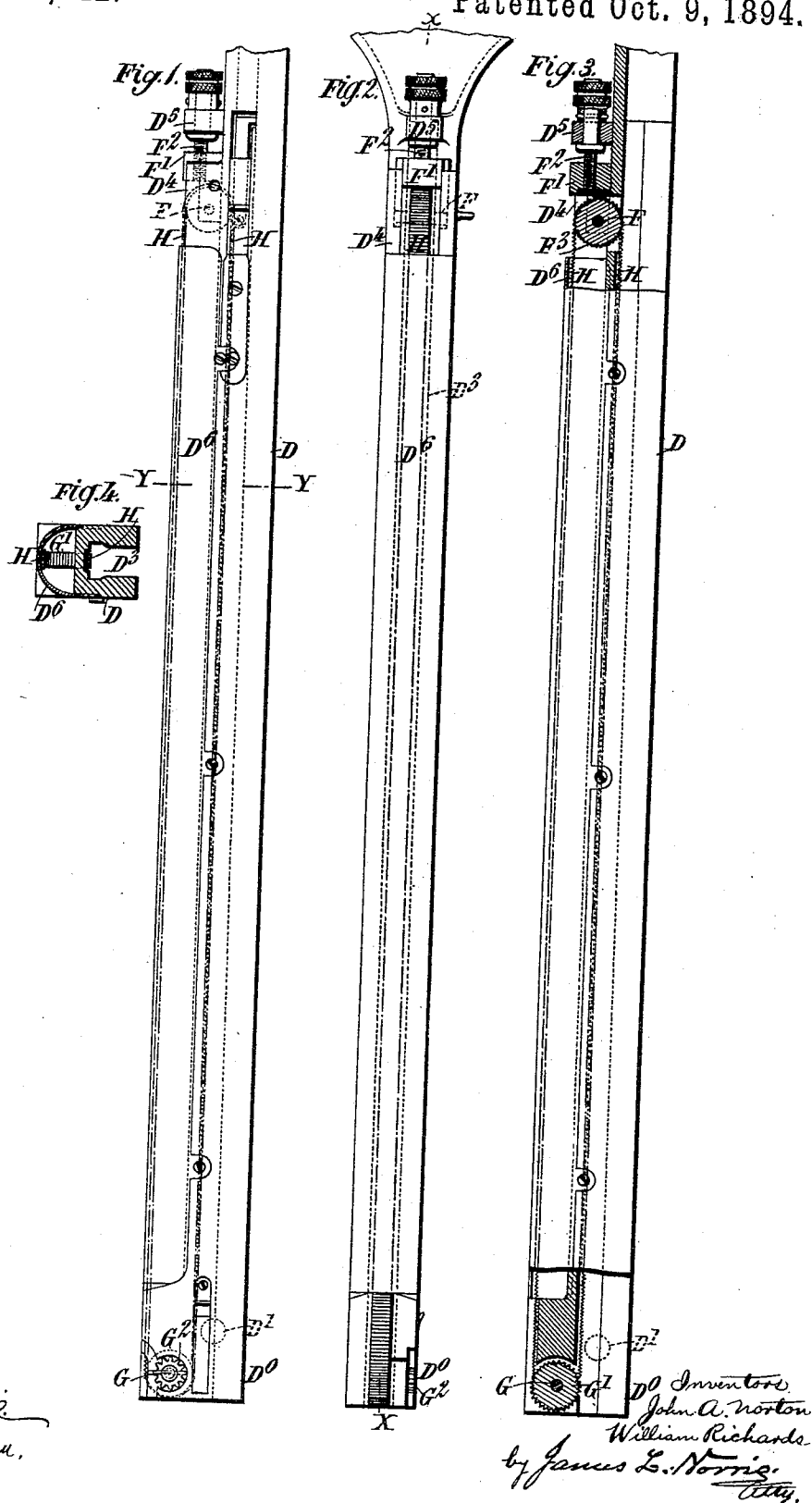


(No Model.)

6 Sheets—Sheet 1.

J. A. NORTON & W. RICHARDS.
APPARATUS FOR SUPPLYING CARTRIDGES TO MACHINE GUNS.
No. 527,342.

Patented Oct. 9, 1894.



Witnesses.
J. A. Saul
G. V. Ren.

Inventors,
John A. Norton
William Richards
by *James L. Norris*
Atty.

(No Model.)

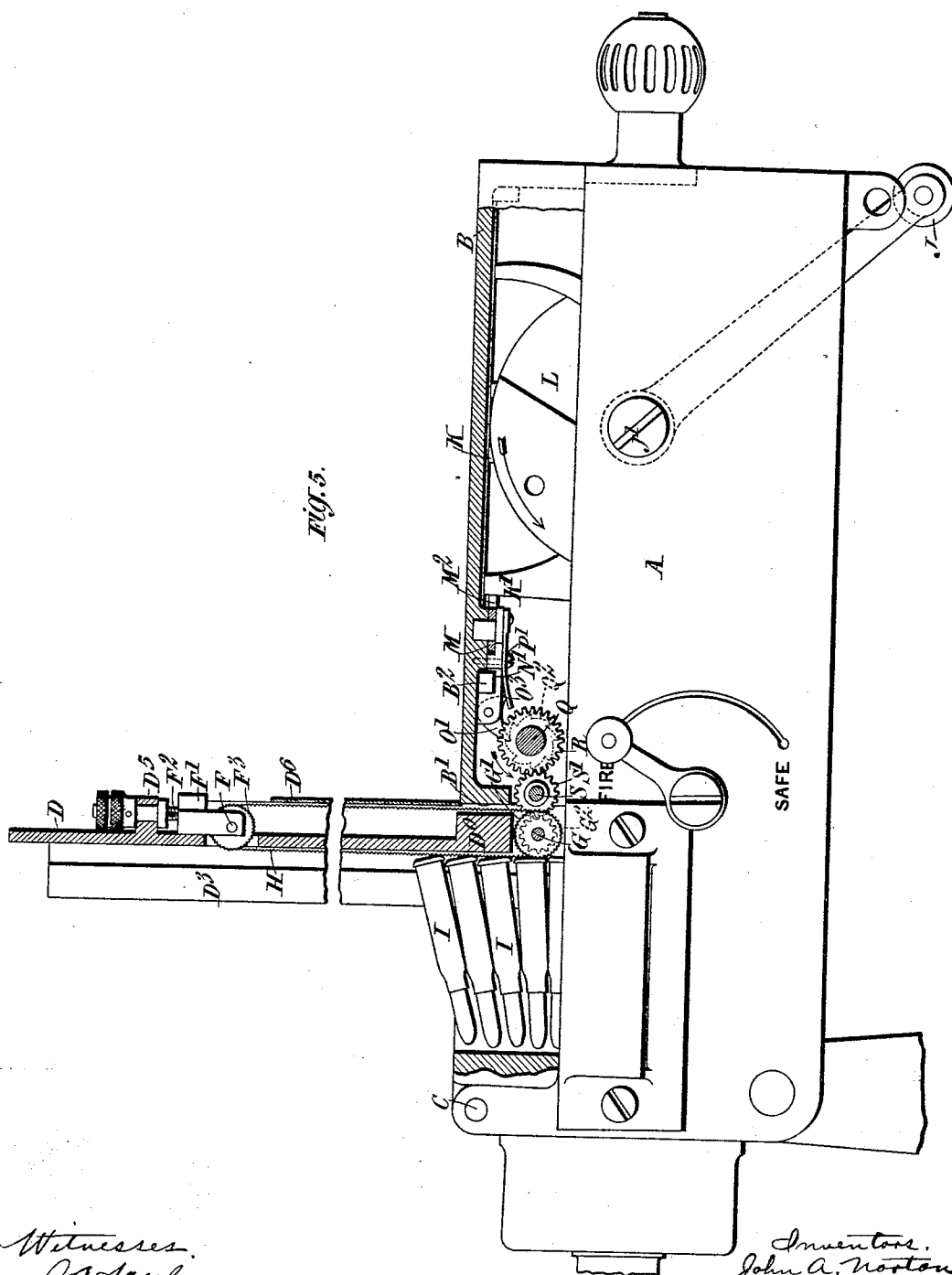
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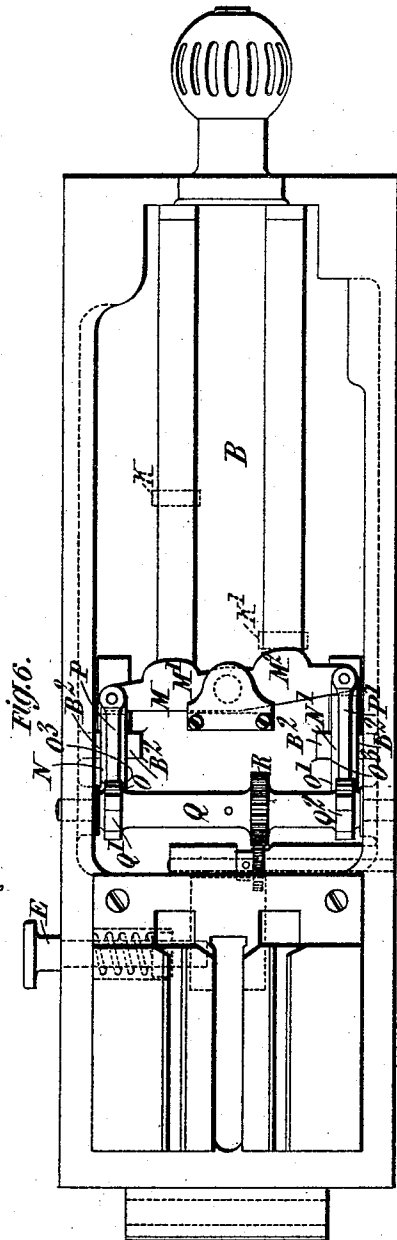
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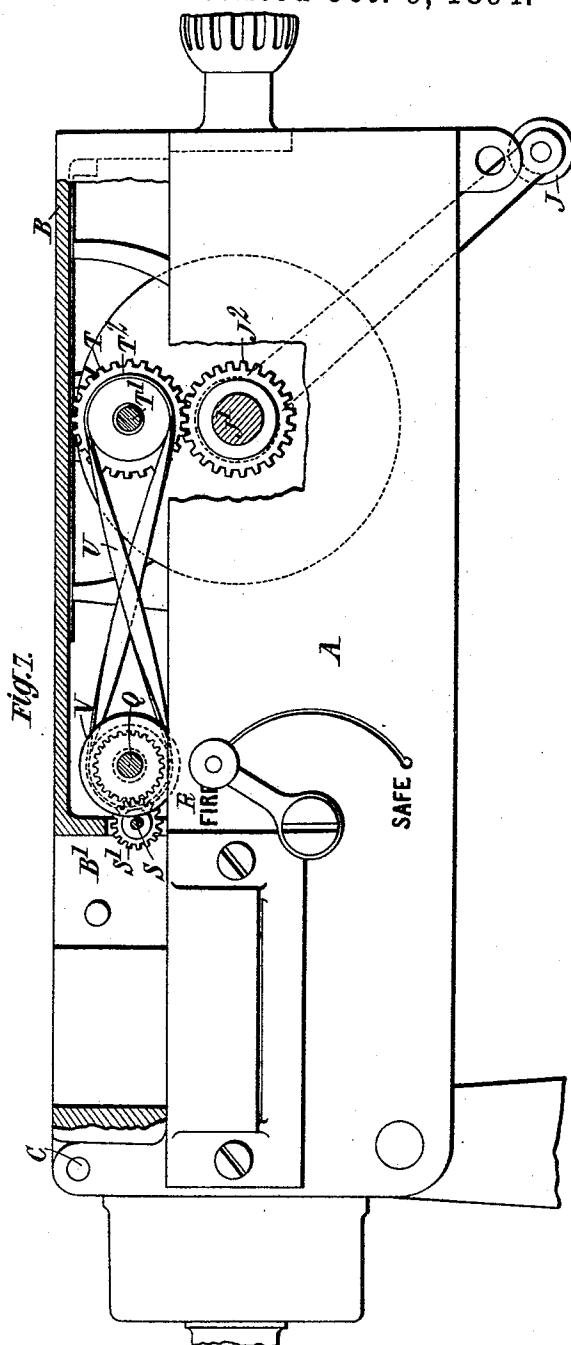
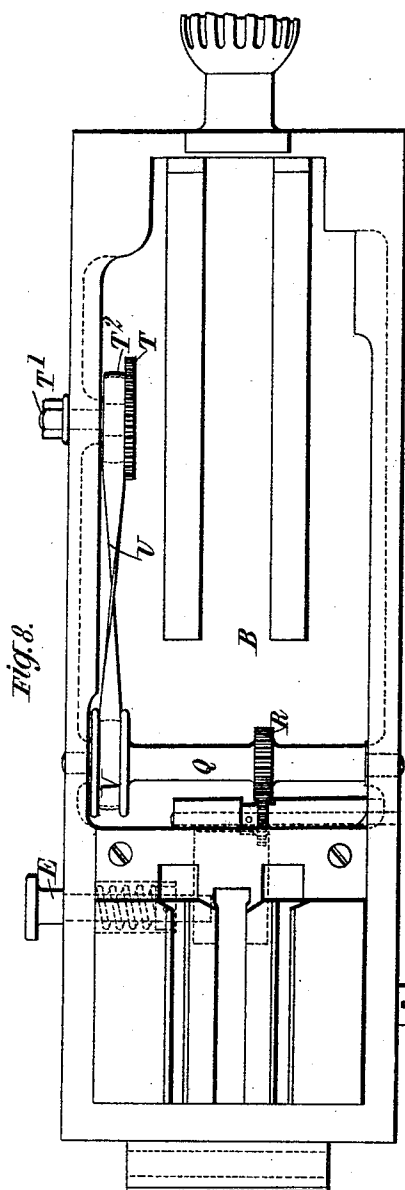
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Fig. 9.

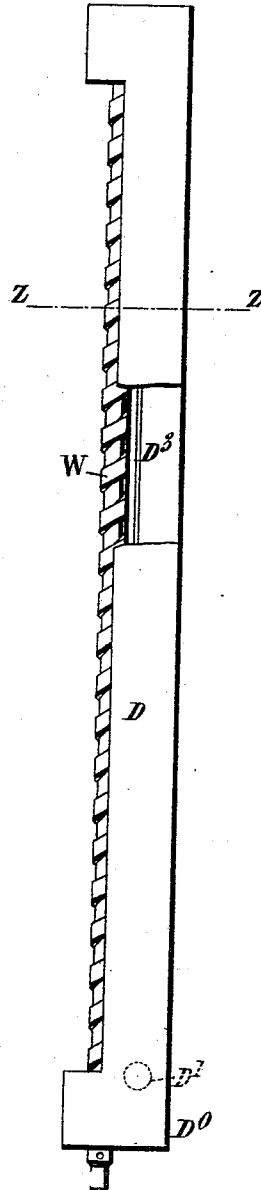


Fig. 10.

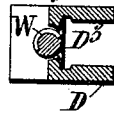
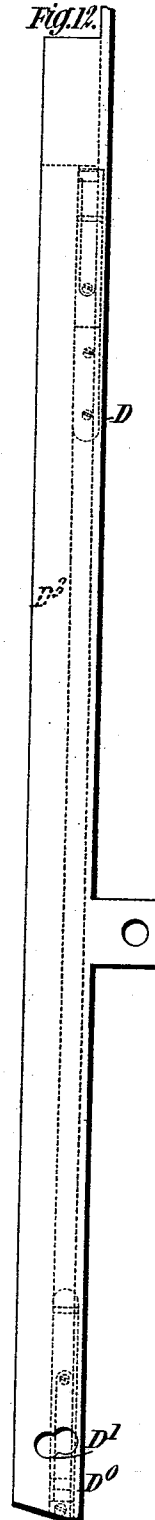


Fig. 11.



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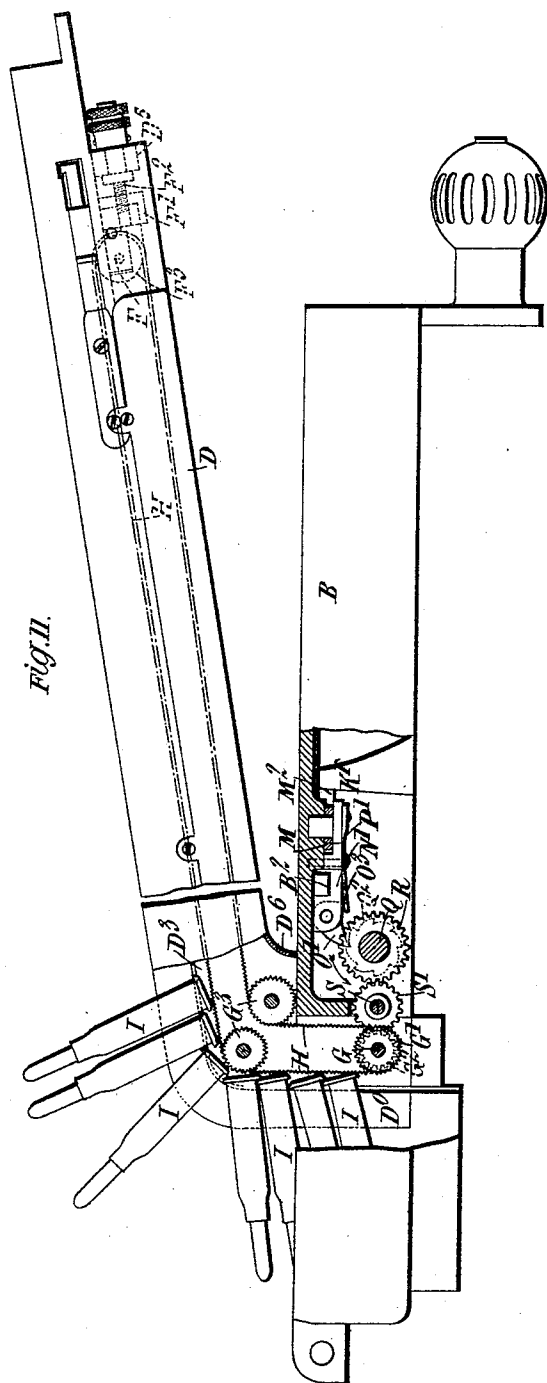
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UNITED STATES PATENT OFFICE.

JOHN ADAMS NORTON AND WILLIAM RICHARDS, OF LONDON, ENGLAND.

APPARATUS FOR SUPPLYING CARTRIDGES TO MACHINE-GUNS.

SPECIFICATION forming part of Letters Patent No. 527,342, dated October 9, 1894.

Application filed December 15, 1893. Serial No. 493,787. (No model.)

To all whom it may concern:

Be it known that we, JOHN ADAMS NORTON, director and general agent of the Gardner Gun Company, a citizen of the United States of America, and WILLIAM RICHARDS, mechanical engineer, a subject of the Queen of Great Britain, both residents of London, England, have jointly invented certain new and useful Improvements in Apparatus for Supplying Cartridges to Machine-Guns, of which the following is a specification, reference being had to the accompanying drawings.

Our invention relates to improvements in apparatus for supplying cartridges to guns of that type or class of which the well-known "Gardner" gun is a prominent example.

In a gun of this kind the cartridges are now supplied to the feed mechanism by means of a vertical grooved guide, bar, or plate, which is arranged at the breech in the proper position to deliver the cartridges as they descend therein to a horizontally-reciprocating slide which distributes the cartridges to the gun barrels. The groove in the said bar is T-headed, that is to say, it is rabbeted or undercut, the back being a closed flat surface and the front being open, so that the flanged base or rim of the cartridge enters the rabbet while the tube or body of the same projects through the forward side of the guide, bar, or plate, the cartridge being therefore free to slide down the groove while prevented by its flange from escaping therefrom. The said guide, bar, or plate is of such length as to contain a considerable number of cartridges placed one over the other, and forming a column, which, when the gun is working moves downward as the successive cartridges reach and pass away from the bottom of the groove. As the cartridges are held in the rabbet of the T-headed groove by the rim or flange while the cylindrical part containing the bullet projects through the open front side of the bar or plate and has no support outside of the same, it is obvious that the weight of the bullet tends to tilt the cartridges in such a manner that the lower edge of the rim bears against the back of the groove, and its upper edge bears against the edges of the groove or aperture through which

the cartridges project. In other words, the action of gravity on the front end of the cartridges causes a turning movement whereby points on the cartridge are forced into contact with opposite sides of the groove and it is obvious that at these points of contact friction exists and such friction of course tends to retard the downward movement of the column of cartridges. In ordinary cases no disadvantage arises from this circumstance but it is possible that under some conditions, if the gun should be used at a high angle of elevation, some inconveniences might arise therefrom, as in such position the component of the weight which presses the cartridge-rim against the sides of the groove will be increased. Therefore, to prevent the possibility of any difficulty from this cause, we have devised our present improvements.

The said improvements consist partly in combining with the aforesaid vertical feed-bar means which render the descent of the cartridges in the groove independent of the action of gravity. This object we accomplish by a device which acts to relieve the rim or flange of the cartridges of the friction which retards their descent in the groove. As above stated the cartridges in the groove are tilted by the weight of the bullet and hang downward so that the lower edge of the rim is pressed against the back of the said groove. Now it is obvious that if the surface against which the cartridge rim is thus pressed is caused to move in the same direction as the cartridge it will not retard or prevent the movement of the latter. We therefore place at the back of the groove a movable surface, which, in the working of the gun, has imparted to it, by the breech-mechanism, a downward movement whereby it causes the descent of the cartridges in the groove. This moving surface does not in any case require to be provided with projections of any kind to push the cartridges along the groove.

In order that our invention may be clearly understood, we will now proceed to describe the same with reference to the accompanying drawings, wherein—

Figure 1 is a side elevation of a feed-bar

provided according to our invention with a movable surface and means whereby motion is imparted thereto. Fig. 2 is a rear elevation of the same. Fig. 3 is a side elevation of the said feed-bar, partly in vertical section, on the line X X of Fig. 2. Fig. 4 is a transverse section through the bar, on the line Y Y of Fig. 1. Fig. 5 is a side elevation of the breech of a two-barreled "Gardner" gun with the said improved feed-bar in place therein. The upper part of this figure is in vertical central section. Fig. 6 is an under side view of the cover of the breech-frame of the said gun. Fig. 7 is a side elevation of the breech frame of a "Gardner" gun fitted with a modified form of driving-apparatus for the aforesaid movable surface. Fig. 8 is an under side view of the cover of the breech-frame of the gun shown in Fig. 7. Fig. 9 is a side elevation, partly in vertical central section, of a feed-bar fitted with an alternative form of movable surface. Fig. 10 is a transverse section on the line Z Z of Fig. 9. Fig. 11 is an elevation similar to Fig. 5, showing a further alternative construction of feed-bar according to our invention. Fig. 12 is a side elevation of a feed-bar which is hereinafter particularly described.

Like letters indicate corresponding parts throughout the drawings.

We will describe our invention with reference first to Figs. 1 to 6.

A is the breech-frame of a "Gardner" gun. B is the cover of the breech-frame hinged thereto at C.

B' is an opening in the cover B to receive the feed-bar D and to permit the cartridges to pass to the horizontally-reciprocating slide of the gun. The lower end D⁰ of the bar D is shaped to fit the opening B' and provided with a hole D' to receive the end of a spring bolt E which is adapted to slide in the cover B to engage with the bar when the latter is in place. The upper end of the feed-bar is widened as shown, to facilitate the entry of cartridges into a groove D³ formed in the front face of the bar.

F is a spindle journaled in a block F' adapted to slide in guides D⁴ provided upon the bar D near the upper end thereof.

D⁵ is a lug upon the bar, just above the guides D⁴.

F² is an adjusting spindle rotatable in the lug D⁵ and provided with a screwed end which is adapted to engage with a threaded hole in the block F' as shown in Fig. 3.

G is a spindle journaled in the lower end of the bar D.

F³ is a small pulley with a corrugated or roughened periphery, secured upon the spindle F and arranged to project into the groove D³ through an opening formed in the bar D.

G' is a similar pulley secured upon the spindle G and received in a recess formed centrally in the lower end D⁰ of the bar D. The spindle G has also a toothed pinion G²

secured thereon which is received in a cavity formed in the exterior of the bar at the lower end thereof.

H is an endless band of corrugated metal, leather, tape or other suitable material or a flat link chain which is placed upon the pulleys F³ and G' as shown so that part of the band is in the groove D³ the bottom of which is very slightly channeled to receive it, and part of it lies over the rear face of the bar, within a protective casing D⁶ which is attached to the said bar. By operating the adjusting-spindle F² to move the block F' the band H may be tightened or slackened as desired.

I I are cartridges in the groove D³.

J is the handle by which the gun is operated. J' is the main shaft of the gun, operated by the said handle.

K K' are the plungers, forming part of the well-known mechanism of the "Gardner" gun. L is a cam, operated by the handle J to actuate the said mechanism.

M is a rocking-lever, pivoted within the cover B and provided with cam-faces M' M² thereon which lie in the line of travel of the plungers K K'.

N N' are arms pivoted to the ends of the rocking-lever M and having pawls O O' hinged thereto. The pawls O O' have tails O² O³ formed thereon. P P' are springs secured upon the arms N N' to bear against the said tails.

B² B³ are projections formed upon the interior of the cover B to guide the arms N N' in their reciprocation.

Q is a spindle adapted to turn in bearings in the cover B. Q' Q² are ratchet wheels fixed upon the said spindle Q to be operated by the pawls O O'.

R is a spur pinion fixed upon the spindle Q.

S is an intermediate shaft adapted to turn in bearings in the interior of the cover B, and provided with a spur pinion S' geared with the pinions G² and R.

In the operation of this apparatus the plungers K K' strike the cam faces M' M² alternately as each plunger moves forward, so that the lever M oscillates and effects the reciprocation of the arms N N'. As the said arms approach respectively the ratchet wheels Q' Q², the pawls O O' come into gear with the said ratchet wheels and rotate them intermittently and thereby turn the spindle Q and the pinion R intermittently in the direction indicated by the arrow shown in proximity thereto. As one pawl retires from engagement with one of the ratchets the other pawl advances into engagement with the other ratchet. The pinion R communicates this movement through the pinion S' to the pinion G² on the spindle G which latter by means of the pulley G' operates the band H so that the portion thereof within the groove D³ descends intermittently and facilitates, by its action upon the flanges of the cartridges resting against it, their de-

seent toward the opening B', at the times at which the cartridges are to be received by the horizontally-reciprocating slide aforesaid.

In the modification of the aforesaid apparatus illustrated by Figs. 7 and 8, we place upon the crank-shaft J' a toothed wheel J² to operate another toothed wheel T placed upon a stud T' secured inside the cover B. The said wheel T is connected with a pulley T² from which a belt U extends to another pulley V on a transverse shaft Q which is journaled in the cover and actuates by means of suitable gearing, the moving surface in the groove of the feed-bar. In this modification we dispense with ratchet apparatus and therefore the endless band of the vertical groove has a continuous action tending to move the cartridges downward in the groove, instead of the intermittent action which is obtained by the use of the ratchet apparatus.

Guns of the class hereinbefore referred to are usually furnished, when they have more than two barrels, with a vertical feed-plate having in it a separate groove for each barrel. We provide each of these grooves with a moving surface or band arranged to be operated by mechanism such as that above described or other suitable mechanism, operated directly or indirectly by the crank-shaft.

In the alternative construction illustrated in Figs. 9 and 10 a screw-threaded spindle W is mounted in the feed-bar so as to project into the groove D³ at the rear side thereof. The said spindle is operated by suitable gearing connected with its lower end and with the breech-mechanism of the gun. When the spindle W is rotated the descent of the cartridges is facilitated by the action of the screw threads upon the bases of the cartridges.

In the further alternative construction illustrated in Fig. 11, the lower end D⁰ of the feed-bar is curved so that the principal portion of the bar is at a considerable angle with the vertical, and lies fairly close to the cover B. In this feed-bar a band H is provided, which is operated and arranged as in the construction illustrated in Figs. 5 and 6 except that additional pulleys G³ are provided in the feed-bar for the purpose of guiding the band H as shown, at the curved part thereof. The angle that the principal part of the bar makes with the shorter vertical portion D⁰ received in the socket in the cover B, may of course be made different from the angle in the example shown. By the use of moving surfaces in a feed-bar according to our invention the cartridges travel downward therein with ease, even when the bar is as much inclined as in Fig. 11.

In guns such as those above referred to, the vertical grooved feed-bar or plate has been so constructed and attached to the gun that when in use it can only occupy one position, that is to say, it drops into a socket wherein it is held at a right angle to the axis of the gun barrels and cannot assume any other

position on the gun. Consequently, when the gun is adjusted to any degree of elevation, the guide groove is moved to the same degree out of its vertical position and therefore out of the position in which gravity acts most freely on the column of cartridges.

To prevent all possibility of the inconvenience that might arise from this circumstance we now construct the aforesaid bar as illustrated in Fig. 12, so that when placed on the gun it can be adjusted relatively to the axis of the gun barrels, so that whatever may be the angle of elevation of the gun the guide groove D³ can be kept in the most advantageous position, with respect to the action of gravity upon the column of cartridges in the groove. For this purpose we form in the cover B of the gun a socket greater in the direction of the length of the gun than the end of the bar D which is inserted therein. Two holes D' are provided in the end of the feed-bar, and the pin or bolt E which extends through the side of the cover as in Fig. 6, into the socket in which the feed-bar is received, will engage with either of the two holes D'. The socket being larger than the end of the feed-bar or plate allows the latter to be adjusted therein either at a right angle to the axis of the barrel or another angle according to the elevation of the gun. More than two holes D' may be provided. Moreover this part of our invention is applicable to the jointed frame described in the specification of British Letters Patent No. 2,572, A. D. 1891.

What we claim is—

1. In a machine gun, the combination with the slide or device for distributing the cartridges to the barrels, and the feed bar or plate having a longitudinal groove in its front face, of a movable surface or device mounted on said feed bar and projecting into the rear portion of said groove to afford a bearing for the rear ends of the cartridges, and means for actuating said movable surface from the breech mechanism of the gun, substantially as described.

2. In a machine gun, the combination with the feed-bar or feed-plate, of a movable band or belt against which the rear ends of the cartridges rest and which is geared with the breech mechanism of the gun, substantially as and for the purpose described.

3. In a machine gun, the combination with the feed-bar or feed-plate, of a movable band or belt against which the rear ends of the cartridges rest, and means for adjusting the tension of said band or belt, substantially as described.

4. In a machine gun, the combination with the breech frame, of a feed-bar or feed-plate that is adjustable to different angles with the axes of the barrels, substantially as and for the purpose described.

5. In a machine gun, the combination with the feed-bar or feed-plate, of a movable sur-

face carried by said bar or plate and against which the cartridges rest, and means for adjusting said bar or plate to different angles with the axes of the barrels, substantially as and for the purposes described.

5 6. In a machine gun, the combination with the breech frame and its socketed cover, of a feed-bar or feed-plate having a number of holes in the end that is engaged in the socket
10 of said cover, and a pin or bolt extended through the cover and engaged in either of said holes to secure the feed-bar at the required angle to the axes of the barrels, substantially as described.

15 7. In a machine gun, the combination with the grooved feed-bar or plate, of an endless belt or band mounted on said bar or plate, and means for actuating said belt or band from

the breech mechanism of the gun, substantially as and for the purpose described.

20 8. In a machine gun, the combination with the breech frame and its hinged cover, of the grooved feed-bar or plate supported on said cover, the endless belt or band mounted on said bar or plate in position for the cartridge
25 to rest against it, and means for imparting a movement to said belt or band in the required direction for feeding the cartridges, substantially as described.

In witness whereof we have hereunto set our
hands this 28th day of November, 1893.

JOHN ADAMS NORTON.
WILLIAM RICHARDS.

Witnesses:

S. WINLO HOAR,
THOMAS LAKE.