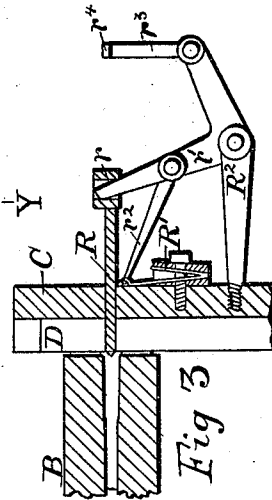
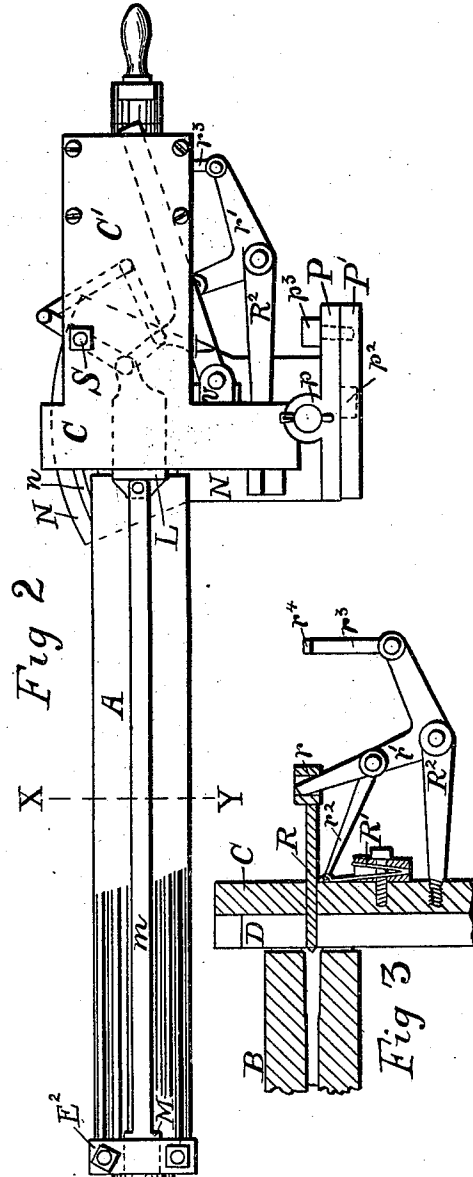
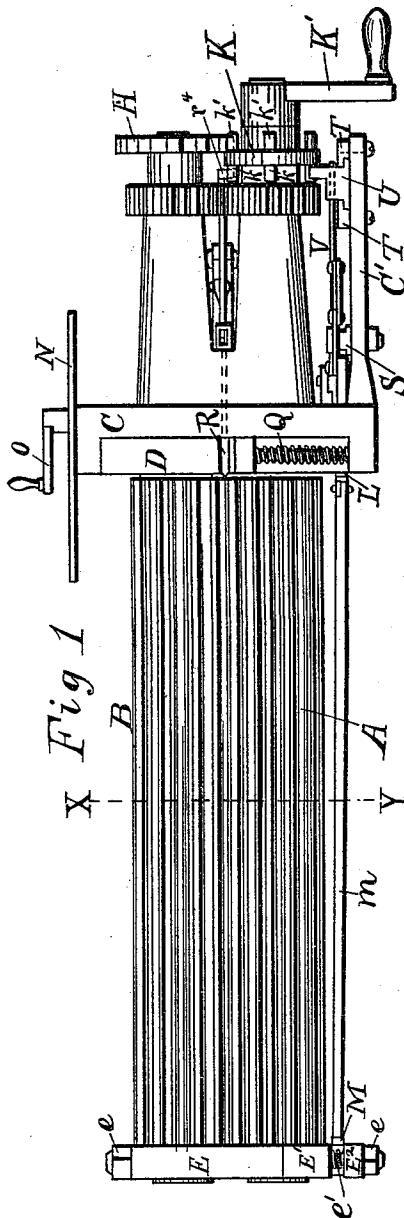


R. BOWERS.
RAPID FIRING GUN.

No. 476,242.

Patented June 7, 1892.



Witnesses:—

R. A. Bullard
Edward Tarrow

Inventor:—

Ruby Bowers
for R. A. Bullard
att'y

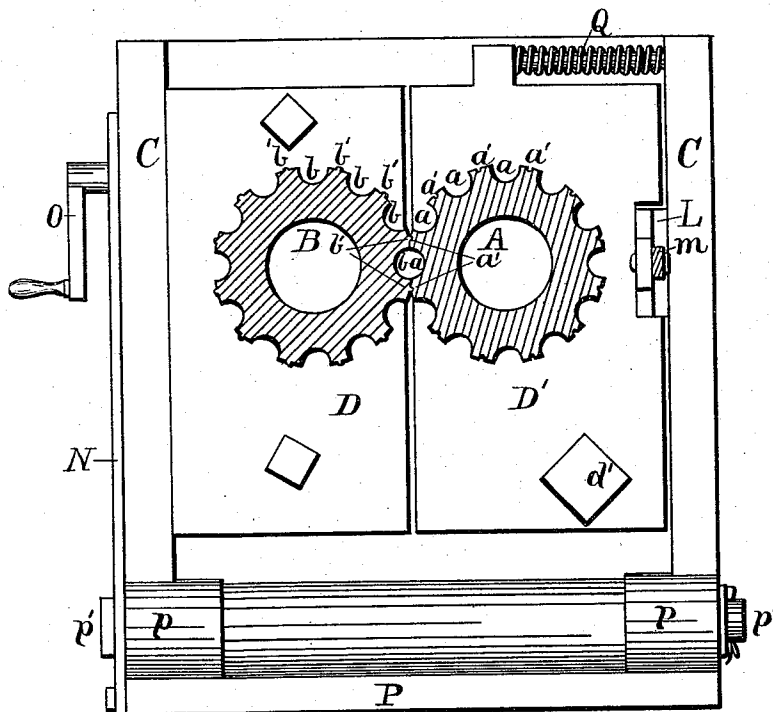
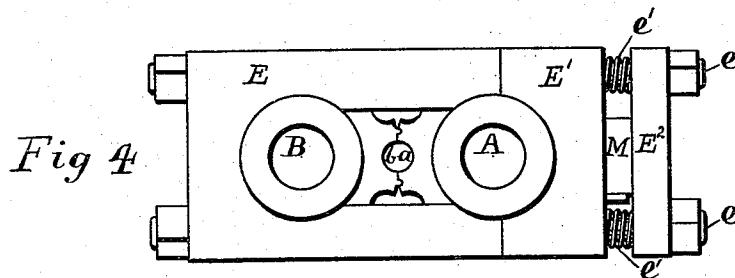
(No Model.)

2 Sheets—Sheet 2.

R. BOWERS.
RAPID FIRING GUN.

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Witnesses:-
R. A. Bullard
Edward Furrow

Inventor:-
Riley Bowers
per Ed Bullard
atty

UNITED STATES PATENT OFFICE.

RILEY BOWERS, OF SPRINGFIELD, ILLINOIS.

RAPID-FIRING GUN.

SPECIFICATION forming part of Letters Patent No. 476,242, dated June 7, 1892.

Application filed July 8, 1891. Serial No. 398,866. (No model.)

To all whom it may concern:

Be it known that I, RILEY BOWERS, a citizen of the United States, residing at Springfield, in the county of Sangamon and State of Illinois, have invented a new and useful Improvement in Rapid-Firing Machine-Guns; and I declare the following to be a full, clear, and exact description of my invention.

My invention consists of a gun with a barrel composed of two or more revolving pieces, together with the apparatus necessary to operate it properly.

In the accompanying drawings, Figure 1 is a top view of the gun. Fig. 2 is a side view of the same. Fig. 3 is a longitudinal section in the center of the gun near the breech to show the operation of firing. Fig. 4 is a view of the front end of the gun looking toward the muzzle; and Fig. 5 is a cross-section at *x y*, Fig. 2.

Similar letters refer to similar parts throughout the several drawings.

The two revolving steel cylinders A and B compose the barrel of the gun. In the periphery of each are a number of semicircular grooves *a a* and *b b*, making, when standing opposite each other, a perfect bore *b a*. Midway between the grooves *a a* in cylinder A are smaller semicircular grooves *a' a'*, and midway between the grooves *b b* in cylinder B are small semi-cylindrical projections *b' b'*. These fit into one another and hold the two cylinders A and B so neither part of the barrel may from any cause maintain an improper position while the gun is being operated.

The cylinders A and B are held firmly in place by two steel yokes—one at the muzzle end E E' E² and the other at the breech C C D D'. Bearings are turned on the cylinders and corresponding boxings in the yokes, so that the cylinders may move easily and perfectly while the gun is in operation. It will be noticed that when the cylinders are in position to form the bore *b a*, as in Figs. 4 and 5, the cylinders cannot be revolved without the center of one moving away from the other, because the distance between the centers of A and B must be greater when groove *a'* and projection *b'* are on a straight line through the centers of A and B than when grooves *a* and *b* are on said line. Provision has been made for this movement. The boxings hold-

ing cylinder B are stationary, D being bolted firmly to C at the breech, and the bearing in yoke E at the muzzle is immovable.

The boxings holding cylinder A are permitted to move sufficiently to allow A and B to revolve. Boxing D', holding the breech-bearing of A, is fastened to C by the bolt *d'*, which is screwed firmly into C without binding D', but allows D' to move on it as an axis. Thus the upper end of D' can move outward when necessary by compressing the coil-spring Q, which immediately forces D' back to its former position when A and B have revolved to the position of forming the bore *b a* again. Cylinder A is held in a similar manner at the muzzle-bearing. The muzzle-yoke is made of several separate pieces E, E', and E², which are securely held together by the bolts *e e* passing through them. When the cylinders revolve, E' is forced away from E by the cylinder A, and in doing so compresses the coil-springs *e' e'*, which force E' back to its former position when A and B reach the right position for forming the bore *b a*.

In the firing of the gun the concussion would force A away from B if not more securely held in place than by the springs Q and *e' e'*. At such times A is held securely against B by two steel wedges L in the breech-yoke C and M in the muzzle-yoke E E' E². The wedges L and M are moved in and out during the operation of the gun. They are in position at time of firing so that A cannot give at all because of the concussion, but slip back and allow A its lateral movement immediately after firing.

The muzzle of the gun may be raised and lowered by moving on the bolt *p'* as an axis. P is the upper base of the carriage, and has two lugs *p p*, with eyes through which the bolt *p'* passes. The lower part of yoke C rests between these lugs and has a hole corresponding with the eyes in *p p*, and the bolt *p'* binds them all together, giving the muzzle of the gun a vertical movement about this joint. To hold the muzzle at the proper height, a quadrant N, having a circular slot *n*, with the bolt *p'* as a center, is securely fastened to the upper base P, and a clamp-screw crank O, passing through this slot *n* and set in yoke C, holds the muzzle at the height desired.

The muzzle of the gun has a horizontal

movement by the upper base P of the carriage turning on the lower base P' about the pin p^2 as an axis. The muzzle is held horizontally in any position by a screw p^3 , threaded into P' and working in a circular slot in P.

5 Loading is done from a magazine (not shown) immediately above the cylinder A and in front of the yoke C and boxing D' by dropping the cartridges mechanically into the grooves $a a$ as they pass under the magazine. The cartridges are carried into the position of firing by the revolving movements of A and B, thus leaving the barrel close up about them. After the discharge the shells are dropped from the gun by the further movements of A and B. This action may be readily understood from Fig. 5.

The wedges L and M in the breech and muzzle yokes, which secure the cylinder A from lateral movement away from B at the time of discharge, are operated from the pin-wheel K at the rear end of the gun. Pin-wheel K is attached to the pinion of the crank K' and has four pins $k k'$ running through it and projecting on both sides. (Indicated as pins $k k$ and pins $k' k'$.) These pins are equidistant apart and from the center of the axis. The pin-wheel K revolves in the direction of the hands of a watch, and the pins $k k$ on the side toward the muzzle of the gun as they rise strike against and lift the cross-head U. The cross-head U moves vertically and is held in place by the jibs T T, which are fastened to C', an arm of the breech-yoke C. In a slot in U works one end of the arm V, which rises and falls with U. The other end of arm V is fulcrumed at v to the yoke C. V in its movements moves the toggle-joint composed of four pieces and fulcrumed at S. This toggle-joint is attached to the wedge L, so that in its movement the wedge L is also moved. The wedge M is attached to L by the bar m , so that both wedges move simultaneously. When the pins $k k$ lift the cross-head U, the connections just described throw the wedges L and M into the positions they occupy at the time of firing the gun, and when pins $k k$ pass up beyond U then U drops by its own weight and suddenly slips the wedges L and M backward from their former positions, and thus allows cylinders A and B to revolve to the next position of firing.

The firing is effected by the movement of the firing-pin R, which lies snugly in a hole in the breech-yoke C, its center being in line with the center of the barrel when in position for firing. At the rear end of R is an enlarged head, in which is a slot r . In r works one end of an elbow-lever r' , which is fulcrumed at the end of arm R², which is screwed firmly into the breech-yoke C. To the lever r' , between its fulcrum and the firing-pin R, is attached a bar r^2 , connecting r' with the spring R'. The spring R' is securely fastened to the yoke C. The end of the elbow-lever r' beyond the fulcrum is connected with a bar r^3 , which has on its upper end a spur r^4 on one side.

As the pin-wheel K moves it carries the pins $k k$ down against the top of the spur r^4 on bar r^3 , and by this action through r' draws back the firing-pin R, also through the connecting-piece r^2 , putting the spring R' under strain. When the pins $k k$ pass down far enough to let the spur r^4 slip off them, the spring R' throws the firing-pin R forward, firing the cartridge and discharging the gun. The pins $k' k'$ on the rear side of the pin-wheel K in their movement work in the gear-wheel H, which is pinioned on the cylinder B and which has the same number of teeth as there are grooves $b b$ in B. Each of the pins $k' k'$ carry the gear-wheel H forward one tooth, or from one position of firing to the next position of firing. The gear-wheel G is pinioned on the cylinder B the same as is H, and plays in the gear-wheel F, which is pinioned on the cylinder A. The wheels G and F have the same number of teeth, so that cylinders A and B work together exactly.

The gun is operated in the following-described manner: Power is applied to the crank K', moving the pin-wheel K, the upper part of which moves toward the gear-wheel H. Starting with the gun in position just after firing, the pin k strikes the top of the spur r^4 on the bar r^3 , thus throwing the firing-pin R back from the shell. At the time the pin k strikes r^4 the pin k diametrically opposite to it passes from under the cross-head U, letting it drop. U by its movement withdraws the wedges L and M, holding the cylinder A in place, and allows the boxings at the breech and muzzle to act on the springs Q and $e' e'$. The pin k' next strikes the tooth of the gear-wheel H and carries it, and with it cylinders B and A, around to the next position of firing, and then slips off the tooth of H, leaving B and A in that position. At the time that pin k' acts on the tooth of H the pin k acts on the top of the spur r^4 , forcing it down and throwing the firing-pin R back ready for another stroke. At the time the pin k' slipped off the tooth of H, leaving the bore $b a$ in position for firing, the pin k diametrically opposite to that striking r^4 strikes under the cross-head U, lifting it up and forcing the wedges L and M into place. Just as the wedges L and M fully reach their positions the pin k passes beyond its contact with r^4 and, slipping off, allows the spring R' to thrust forward the firing-pin R and fire the cartridge. The operation is repeated for each shot.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination of revolving cylinders A and B, provided with longitudinal grooves in their peripheries, forming the bore of a gun-barrel, with yokes provided with boxings located at the ends of said cylinders and supporting the same, all operatively connected, substantially as set forth.

2. The combination of the cylinders A and B, having longitudinal grooves in their periph-

eries, forming the bore of a gun-barrel, the cylinder A having intermediate grooves $a' a'$ and the cylinder B having projections $b' b'$, fitting into said grooves $a' a'$, with means for
 5 revolving said cylinders, as set forth.

3. The combination of the muzzle-yoke E E' E² and the breech-yoke C and boxings D D', located therein, with the revolving cylinders having longitudinal grooves in their peripheries and located in said boxings, as and
 10 for the purposes described.

4. The combination of the wheel K, having pins $k' k'$, the arm C', carrying cross-head U, provided with a slot, the pivoted arm V, working in said slot, the toggle-joint fulcrumed at
 15 S and connected to arm V, and wedges L and M, connected to and operated by said toggle-joint, substantially as shown.

5. The combination of the wheel K, having
 20 pins $k' k'$, the arm r^3 , the elbow-lever con-

nected with arm r^3 and fulcrumed at the end of R², the spring R', connected to r' by the piece r^2 , and the firing-pin R, all operating together to effect the firing of the gun, substantially as shown.

6. In a rapid-firing gun, the combination of
 25 the crank-wheel K, the pins $k' k'$, the gear-wheel H, operated by $k' k'$, the gear-wheels G and F, which work in each other and operate the grooved cylinders A and B, composing the
 30 barrel, the breech and muzzle yokes holding said cylinders, the springs Q and $e' e'$ operating in said yokes, and the wedges L and M, with their operating attachments, substantially as and for the purposes set forth.

RILEY BOWERS.

Witnesses:

FRANK D. HUDSON,
 LAURA D. HUDSON.