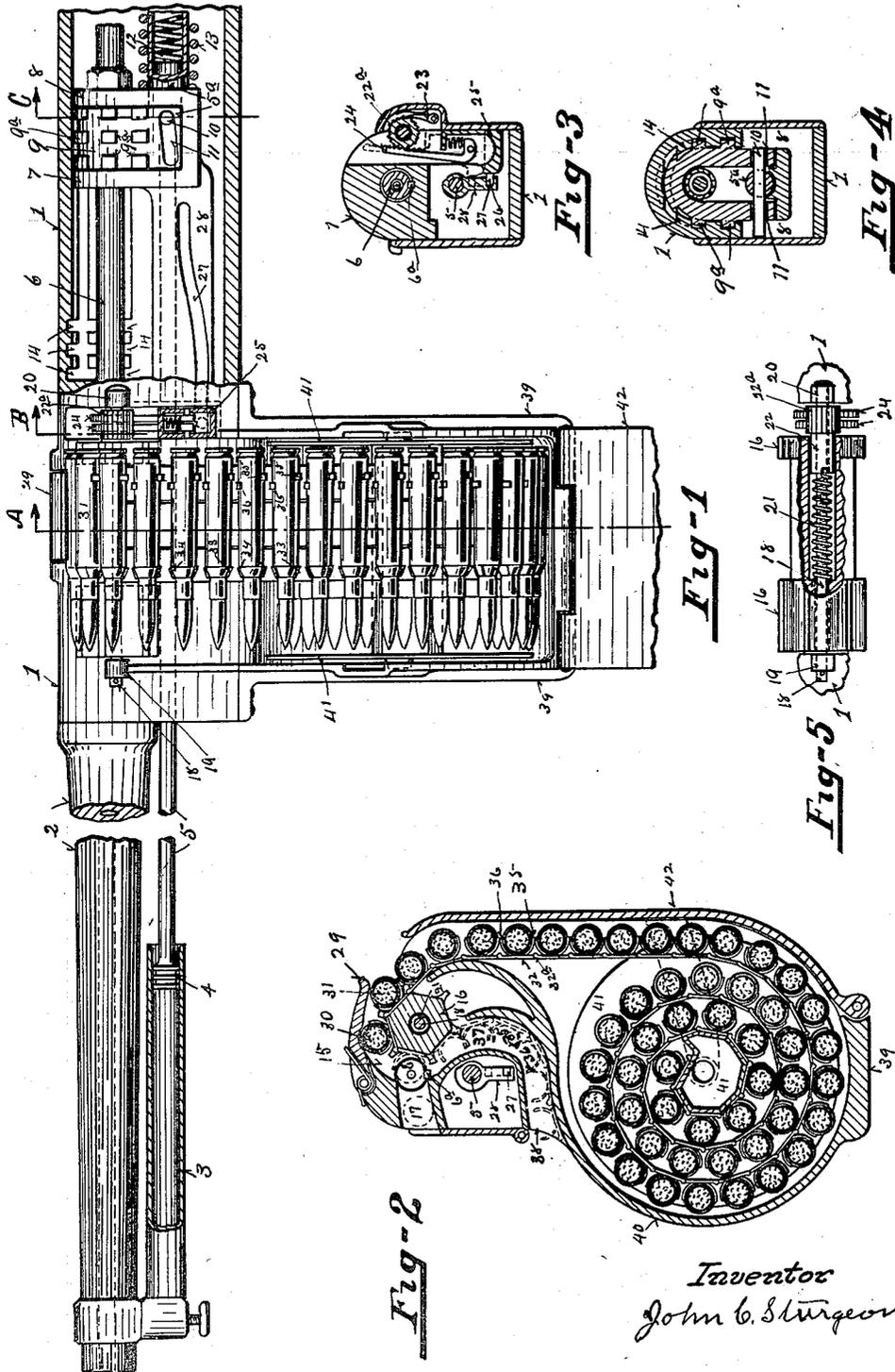


J. C. STURGEON.
 AUTOMATIC GAS OPERATED FIREARM.
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1,290,852.

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UNITED STATES PATENT OFFICE.

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AUTOMATIC GAS-OPERATED FIREARM.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JOHN C. STURGEON, a citizen of the United States, residing at Erie, in the county of Erie and State of Pennsylvania, have invented certain new and useful Improvements in Automatic Gas-Operated Firearms; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, forming part of this specification.

This invention relates to automatic gas-operated fire-arms, and has for its objects improvements in the construction and operation of the mechanism thereof.

In accomplishing these objects I provide a frame, to the front end of which I secure a barrel, under the front end of which there is a cylinder communicating with the bore thereof to receive gas from the discharge of the gun.

In the frame there is a reciprocating breech-bolt having a locking-lug frame secured thereto, in which there is mounted a vertically moving locking-lug having projections on the periphery thereof adapted to engage and be disengaged from slots on the inner surface of the frame and be moved backward in longitudinal slots therein.

In the cylinder under the barrel there is a piston from which a rod extends backward to the locking-lug and engages an inclined slot therein so that its backward movement, actuated by the force of the gas on the piston, operates to disengage the locking-lug from the frame, and the further backward traverse of the piston and rod operates after such disengagement to move the locking-lug frame backward; and for moving the locking-lug frame forward there is a spiral retracting spring operating against the rear end of the locking-lug frame, and for moving the locking-lug into engagement there is provided a spiral spring operating on the rear end of the rod extending from the piston in the cylinder under the barrel.

For automatically supplying cartridges to the arm, I preferably secure a cylindrical magazine to the under side of the gun-frame so that the forward end thereof is substantially in line with the rear end of the barrel; this cylindrical magazine being adapted to receive a spool of cartridges se-

cured to a flexible band by means of suitable clips, so that when brought in front of the breech-bolt the cartridges can be pushed out of the clips by the forward movement thereof directly into the rear end of the barrel. This cylindrical magazine is preferably permanently secured to the gun-frame, and provided with a door on one side thereof through which cartridge spools can be inserted into and removed therefrom. If desired, however, the cartridge magazine may be removably attached to the under side of the gun-frame. For removing cartridges from the magazine and presenting them in front of the breech-bolt, I preferably mount a sprocket-wheel in the frame having the teeth on its central part cut away so as to receive the flexible band conveying the cartridges; the teeth of the sprocket wheel engaging the cartridge at each side of the belt so that the rotation of the sprocket-wheel moves the belt and cartridges thereon forward at each movement of the sprocket-wheel.

For preventing displacement of the belt and cartridges on the sprocket-wheel I preferably provide a spring actuated arm pivoted to the gun-frame so as to extend over and contact with cartridges on the sprocket-wheel; and for operating the sprocket-wheel I preferably provide a longitudinal cam secured to the front of the locking-lug frame and extending forward under the breech-bolt, which engages and operates dog mechanism which preferably engages ratchet-teeth at one end of the sprocket-wheel so as to maintain the necessary tension of an internal spring in the sprocket-wheel, which spring operates to move the sprocket-wheel forward at the end of each rearward traverse of the breech-bolt. The spring in the sprocket-wheel may, however, be omitted if desired, and the cam-actuated dog mechanism can engage ratchet teeth on the end of the sprocket-wheel so that the dog mechanism will act directly on the sprocket-wheel to move it forward.

These and other features of the construction and operation of the mechanism of the arm are hereinafter fully described and illustrated in the accompanying drawings in which:—

Figure 1, is a side view of a portion of the frame, parts thereof being shown in elevation and parts in section.

Fig. 2, is a transverse section of the same

on the line A in Fig. 1, looking in the direction of the arrow.

Fig. 3, is a transverse section of the same on the line B in Fig. 1, looking in the direction of the arrow.

Fig. 4, is a transverse section of the same on the line C in Fig. 1, looking in the direction of the arrow.

Fig. 5, is a view of the sprocket wheel mechanism partially in elevation and partially in section.

In these drawings 1 indicates a section of the frame of the arm; 2 a section of barrel, 3 the gas cylinder under the front of the barrel, 4 the piston operating therein, and 5 the rod connecting said piston with the bolt-locking mechanism of the arm: all of these parts being common to gas-actuated automatic guns of the type involved in this invention. The breech-bolt 6 is of the ordinary reciprocating type provided with the usual spring actuated firing-pin (not shown). To this breech-bolt 6 there is secured a locking-frame comprised of sides 7 and 8. Between these sides 7 and 8 there is a bifurcated locking-lug 9 which embraces the breech-bolt 6 and the part 5^a of the piston rod 5, passing through and reciprocating in openings in the sides 7 and 8 of the locking-frame.

The part 5^a is provided with a transverse stud 10 which engages and operates in inclined slots 11 in the lower ends of the locking-lug 9, whereby the reciprocal movement of the rod 5 operates to move the locking-lug 9 up and down in the frame 7-8; the rod 5 being moved rearwardly by the action of the gas in the cylinder 3, operating on the piston 4; this rearward movement operating to move the locking-lug 9 downward and at the same time compressing the spring 12 mounted on the rear part 8 of the locking-frame. The further rearward movement of the piston 4 operates to move the locking-lug frame, the locking-lug mounted therein, and the breech-bolt to which the locking-lug frame is secured, to its rearmost position compressing the spiral spring 13, which, when the pressure on the piston 4 is removed, operates to move the locking-lug frame to its forwardmost position, when the spring 12 acts to move the rod 5 and the part 5^a thereof, a sufficient distance to raise the locking-lug 9 to its normal position; this locking is accomplished by bringing the lugs 9^a on the locking-lug 9 into engagement with the slots 14 in the frame of the arm, locking the breech-bolt ready for firing.

On the frame 1 opposite the cartridge inlet 15 of the arm, I mount a sprocket wheel 16 adapted to be intermittently rotated so as to consecutively bring the spaces between the sprockets thereon in line with the travel of the breech-bolt 6, so that at the end of the rearward traverse of the bolt a cartridge

occupying said space will be brought in front of the bolt in line with and ready to be moved forward by the bolt into the barrel, as illustrated in Fig. 2; this movement of the cartridge in front of the breech-bolt causes it to contact with and eject the spent cartridge, which has been drawn back by the hook 6^a on the end of the breech-bolt during the rearward traverse of the breech-bolt through the opening 17 in the side of the frame, as illustrated in Fig. 2.

The sprocket-wheel 16 is preferably mounted on a pintle 18 passing through ears 19 and 20 on the frame. The central part 16^a of this sprocket-wheel is preferably made hexagonal in peripheral contour to receive and support a belt made of sections hinged together, as more fully hereinafter described.

The central part of the sprocket-wheel 16 is chambered out to receive a spiral spring 21, one end of which engages the sprocket-wheel and the other the hub 22 of a ratchet pinion 22^a, so that the spring 21 forms a flexible operative connection between the sprocket-wheel 16 and the ratchet pinion 22^a as illustrated in Fig. 5; and on the frame there is pivoted a dog 23 which engages the teeth of the ratchet pinion 22^a and prevents rearward movement thereof.

For moving the ratchet pinion forward there are vertically moving dogs 24 pivoted in a vertically sliding part 25; this part 25 is provided with a stud 26 which engages a cam-slot 27 in a part 28 secured to the side 7 of the locking frame, as illustrated in Figs. 1 and 3, under the breech-bolt 6 and travels forward and backward in unison therewith. This cam-slot 27 operates on the stud 26 during the forward traverse of the breech-bolt to raise the part 25 and the dogs 24 pivoted therein, which dogs engage the teeth of the ratchet pinion 22^a, and the backward traverse of the bolt and cam moves the part 25 and the dogs 24 downward, thereby winding up the spring 21; the sprocket being meanwhile prevented from turning by the pressure of the bolt between the sprockets of the sprocket-wheel; but when the bolt has completed its backward traverse and is withdrawn from the sprocket wheel, the power stored in the spring operates on the sprocket-wheel 16 to rotate it forward one notch; this distance of rotation of the sprocket-wheel being governed by the spring dog 29 mounted on the frame, which contacts with the incoming cartridges 30-31 on said sprocket-wheel as illustrated in Fig. 2. This operation is consecutively repeated at each forward and rearward movement of the breech-bolt until the supply of cartridges is exhausted.

For supplying cartridges to the sprocket-wheel 16 I preferably use a belt made of sections 32 on each of which sections there are

clips 33—34 and 35—36 adapted to embrace and hold a cartridge thereon, and these sections 32 are hinged together by hinges 32^a so that they form a continuous belt or chain, each section of which carries a cartridge, as clearly illustrated in Figs. 1 and 2. This belt can be fed to the sprocket-wheel 16 in the usual manner of feeding cartridges from a continuous belt, by placing the two cartridges 30—31 at the end of the belt upon the sprocket wheels under the spring dog 29 after which they are moved forward by the action of the sprocket-wheel; and after the consecutive removal of the cartridges by the action of the breech-bolt pushing them out through the clips 33—34 and 35—36 the empty belt passes downward through a passage 37 and out through an opening 38 at the side of the frame 1.

This method of feeding cartridges from a belt is not desirable, and I have devised what I believe to be a more desirable one. This I do by providing on the frame 1 of the arm a U-shaped extension 39 extending downwardly therefrom, in which extension I secure a cylindrical magazine 40 adapted to receive and support spools 41 upon which the cartridge carrying belt 32—32^a can be wound, as illustrated in Figs. 2 and 3; access being had to this magazine 40 for the insertion and removal of the spools 41 by opening the hinged side 42 of the magazine 40, and when a full spool of cartridges has been inserted in the magazine, the end of the belt 32—32^a is placed upon the sprocket-wheel 16 and the door 42 closed, as illustrated in Fig. 2, the cartridges will be continuously fed to the arm until the spool 41, is exhausted, when a new spool can be inserted in the magazine as desired.

The operation of the several parts of the mechanism has been so clearly described in connection with the description of the parts of the mechanism that further description of their operation is deemed unnecessary.

I have thus shown and described my invention so as to enable others skilled in the art to which the invention appertains to construct and operate the same. I do not, however, confine myself to the exact construction, arrangement and combination of parts thereof, as many modifications can be made therein without departing from the spirit of my invention.

Therefore what I claim as new and desire to secure by Letters-Patent, is:—

1. In a gun, a gun-frame, a reciprocating breech-bolt, a locking-lug frame secured to said breech-bolt, means for reciprocating the breech-bolt mechanism, a cartridge magazine secured to the under side of the gun-frame adapted to hold a spool of cartridges removably secured upon a belt, means adapted to engage the belt for removing cartridges from the magazine in front of the

breech-bolt, and a cam under the breech-bolt engaging and operating said cartridge moving mechanism.

2. In a gun, a gun-frame having cartridge inlet and outlet openings at opposite sides thereof, a breech-bolt mounted in the frame and reciprocating between the cartridge inlet and outlet openings therein, a cartridge magazine, adapted to contain a spool of cartridges removably secured to a flexible band, secured to the under side of the gun-frame, a sprocket-wheel, having the central part of its periphery cut away to receive the cartridge carrying band, mounted between the cartridge inlet and outlet openings in the gun-frame, and a reciprocating cam secured under the breech-bolt and moving in unison therewith for operating said sprocket-wheel.

3. In a gun, a gun-frame, a breech-bolt, a locking-lug frame secured thereto, a vertically movable locking-lug therein, means for operating said locking-lug, locking-lug frame and breech-bolt, a cartridge magazine secured to the under side of the gun-frame adapted to contain a spool of cartridges removably secured to a flexible belt, a sprocket-wheel over which said belt operates, a motor spring in said sprocket-wheel, a longitudinal cam under the breech-bolt, and dog mechanism engaged by said cam for maintaining the tension of said motor spring.

4. In a gun, a gun-frame having cartridge inlet and outlet openings in opposite sides thereof, a breech-bolt mounted between said openings, bolt locking mechanism therefor, gas operated mechanism for unlocking said bolt-locking mechanism and moving the bolt rearwardly, spring mechanism for moving the bolt forward and locking it; a cartridge moving sprocket-wheel, a flexible cartridge-band having cartridges removably secured thereto, cam mechanism under the breech-bolt and reciprocating in unison therewith operating on said sprocket-wheel to move the belt and cartridges thereon forward.

5. In a gun, a gun-frame, a breech-bolt mounted therein, a breech-bolt locking mechanism secured thereto, gas operated mechanism for unlocking the breech-bolt and moving it backward, spring mechanism for moving the breech-bolt forward and locking it, a cartridge moving sprocket-wheel, a cam under the breech-bolt and moving in unison therewith for operating said sprocket-wheel, and a spring operated arm engaging cartridges on said sprocket-wheel.

6. In a gun, a gun-frame having cartridge inlet and outlet openings in opposite sides thereof, a breech-bolt mounted in said gun-frame and reciprocating between said openings, means on said breech-bolt for locking it to the gun-frame, means for moving the breech-bolt and its locking mecha-

- nism, a sprocket-wheel mounted opposite to the cartridge inlet in the gun-frame, a cartridge carrying band operating in a depression in the central portion of the sprocket-wheel, reciprocating cam mechanism operating to intermittently rotate said sprocket-wheel, and means for preventing the backward movement of the sprocket-wheel.
- 5 7. In a gun, a gun-frame, a barrel secured to the front end of said frame, a cylinder under the front portion of the barrel communicating with the bore thereof, a breech-bolt, locking mechanism secured thereto for locking the breech-bolt to the gun-frame, a piston in said cylinder communicating with the bolt-locking mechanism and adapted to unlock it and move it and the breech-bolt rearwardly, spring mechanism engaging the breech-bolt locking mechanism adapted to move it forward and lock it to the gun-frame, a cartridge feeding sprocket-wheel opposite the cartridge inlet opening, a spring actuated arm for engaging cartridges on the sprocket-wheel, a cam under the breech-bolt for operating said sprocket-wheel, and means for limiting the movement of the sprocket-wheel.
- 10 8. In a gun, a gun-frame, a barrel secured to said frame, a reciprocating breech-bolt, a locking-lug frame on said breech-bolt, a vertically movable locking-lug in said locking-lug frame, notches in the inside of the gun-frame, projections on said locking-lug adapted to engage said notches, a cylinder under the barrel communicating with the bore thereof, a piston therein, a rod extending from said piston to said locking-lug for disengaging the locking-lug from the gun-
- frame and moving the locking mechanism and breech-bolt backward, spring mechanism engaging the rear of the locking-lug and the rear of the locking-lug frame for moving the locking-lug frame and breech-bolt forward and operating the locking-lug to lock it, a sprocket-wheel mounted within the gun frame for moving cartridges in front of the breech-bolt, a cam extending from the locking-lug frame forward under the breech-bolt for intermittently operating the sprocket-wheel, and stop mechanism for limiting the movement of the sprocket-wheel.
- 15 9. In an automatic gun, a frame, a reciprocating breech-bolt and bolt locking mechanism, a barrel on the front end of the frame, a cylinder under the barrel communicating with the bore thereof, a piston in said cylinder communicating with the bolt-locking mechanism and engaging an inclined slot in the locking-lug member thereof and operating to unlock it, and move it backward, a spring on the bolt-locking mechanism compressed by the first part of the backward movement of said piston, a spring behind the bolt-locking mechanism adapted to be compressed by the backward movement thereof, and move the bolt-locking member forward when the pressure on the piston is released, a sprocket-wheel, a flexible cartridge carrying belt operated thereby, a cam under the breech-bolt reciprocating in unison therewith, and dog mechanism between said cam and said sprocket-wheel whereby the movement of the cam operates to intermittently operate said sprocket-wheel.
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In testimony whereof I affix my signature.
 JOHN C. STURGEON.