Oct. 13, 1936. E. A. SWENSON 2,057,169

AUTOMATIC FIREARM

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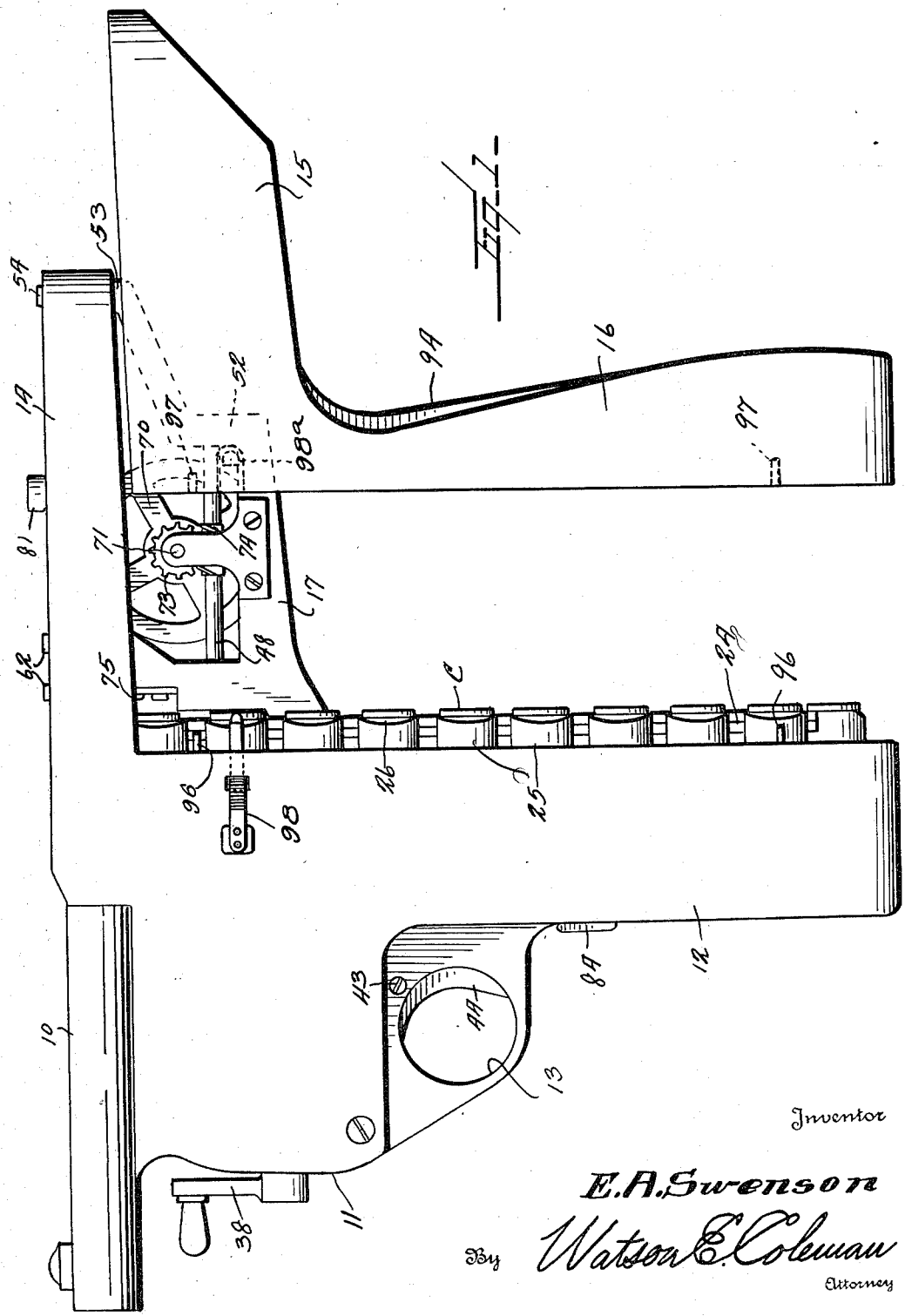



FIG. 1

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AUTOMATIC FIREARM

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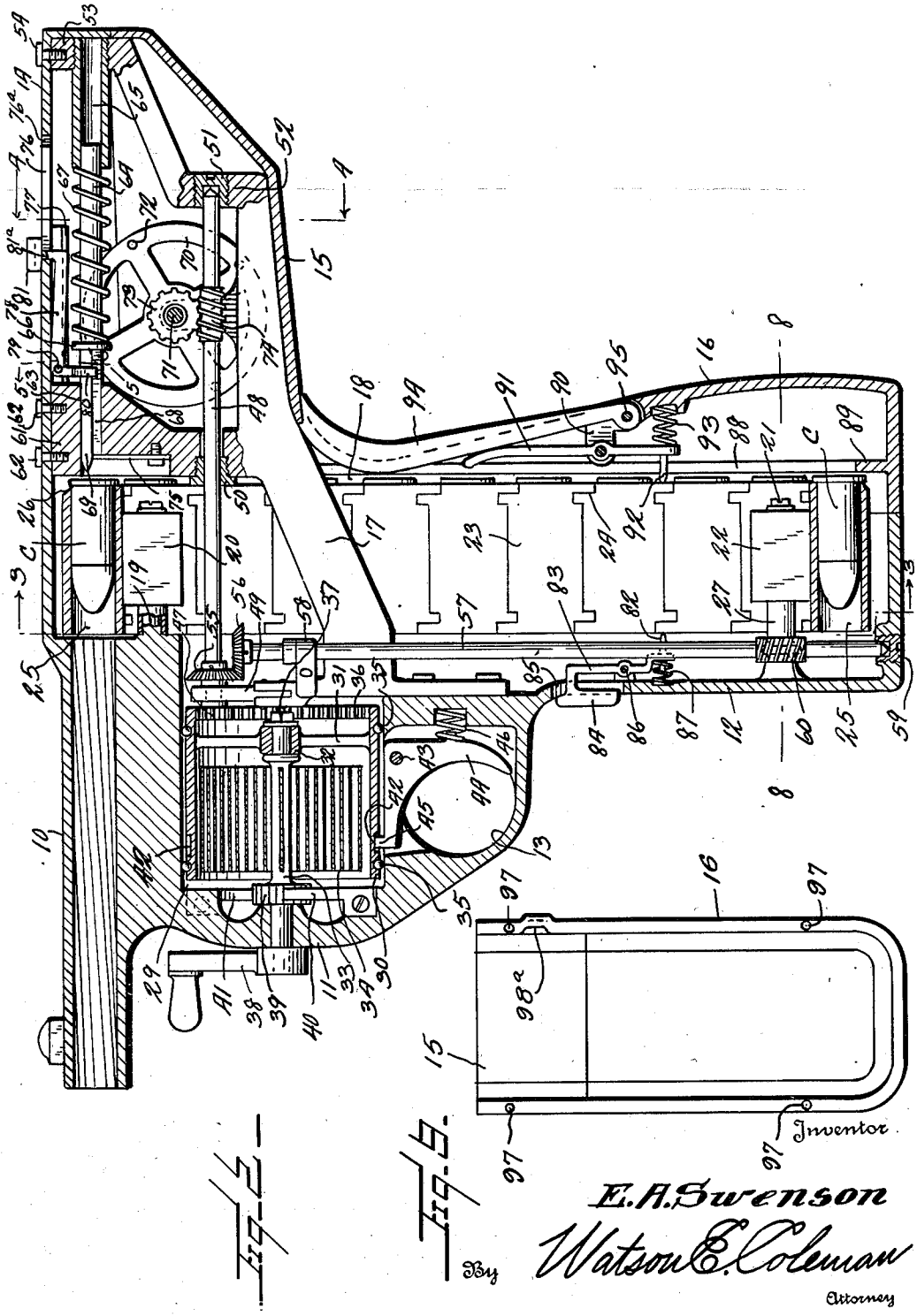


Fig. 2.



Fig. 5.

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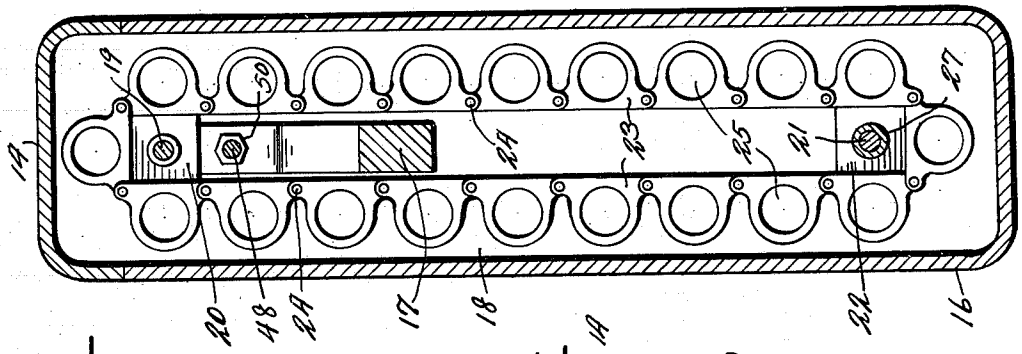
By Watson E. Coleman

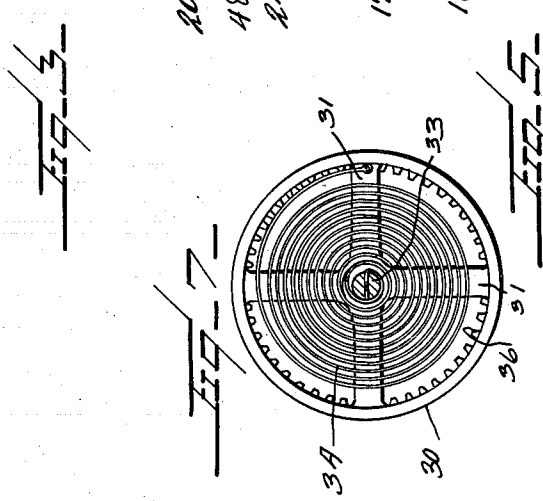
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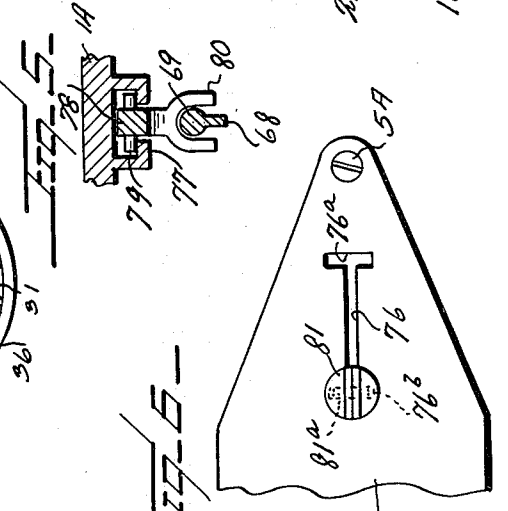
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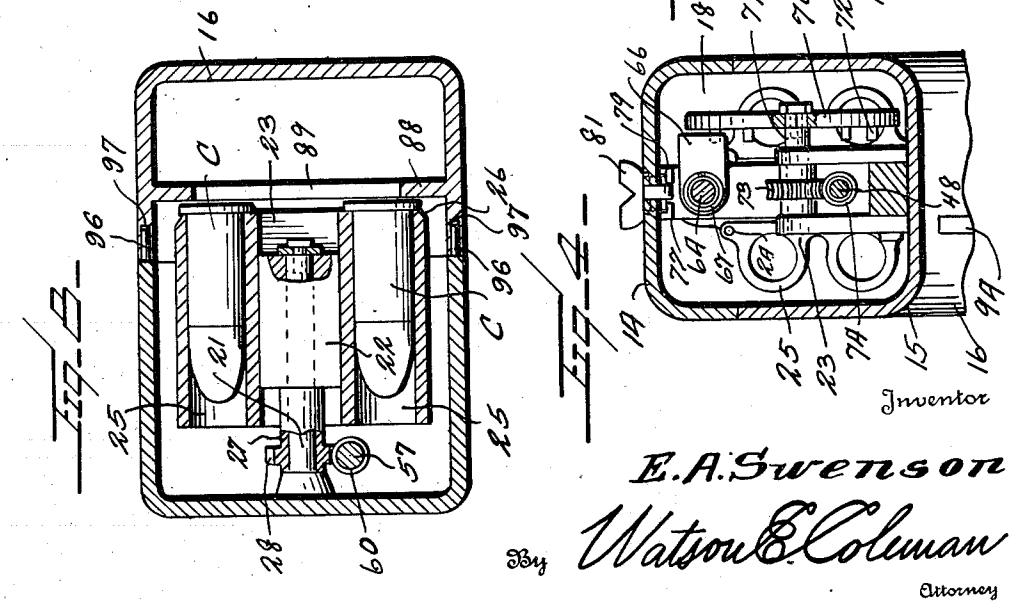
AUTOMATIC FIREARM

Filed May 9, 1935 3 Sheets-Sheet 3









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Patented Oct. 13, 1936

2,057,169

# UNITED STATES PATENT OFFICE

2,057,169

## AUTOMATIC FIREARM

Eric A. Swenson, Beaukiss, Tex.

Application May 9, 1935, Serial No. 20,672

9 Claims. (Cl. 42—5)

This invention relates to magazine firearms and particularly to a magazine pistol.

The general object of the invention is to provide an automatic gun of this character in which the cartridges are carried upon an endless carrier and in which a motor is used to operate the endless carrier to bring the cartridges one by one into register with the barrel and to retract the hammer or firing pin and release the hammer for projection when each cartridge has arrived in position directly opposite the barrel.

Another object is to provide a structure of this character in which the motor includes in it a coil spring having means whereby it may be wound up whenever necessary and in which the motor is released for rotation under the action of the spring by a pull upon the trigger.

A further object is to provide in a gun of this character a hollow handle or grip extending downward from the stock and in which the endless carrier for the cartridges is carried and provide means whereby the movement of the endless carrier is locked even though the trigger be pulled accidentally unless the fingers are gripped around the butt or handle.

A further object is to provide a structure of this character in which one shot may be fired upon each retraction of the trigger.

A further object is to provide a safety device for the firing pin whereby the firing pin may be retracted and held retracted until the "safety" is released.

Other objects have to do with the details of construction and arrangement of parts, as will appear more fully hereinafter.

My invention is illustrated in the accompanying drawings wherein:

Figure 1 is a side elevation of a magazine or automatic pistol constructed in accordance with my invention, the rear section of the frame being shifted rearwardly to show the means whereby the endless carrier is loaded and the shells ejected;

Figure 2 is a vertical section through the structure shown in Figure 1 but with the two sections of the frame closed;

Figure 3 is a section on the line 3—3 of Figure 2;

Figure 4 is a section on the line 4—4 of Figure 1;

Figure 5 is a fragmentary section on the line 5—5 of Figure 1;

Figure 6 is a fragmentary top plan view of the plate which carries the safety latch, this figure showing the latch in its forward position;

Figure 7 is a front end elevation of the cylinder and motor spring, the shaft thereof being in section;

Figure 8 is a section on the line 8—8 of Figure 2;

Figure 9 is an end elevation of the rear section of the gun.

Referring to the drawings and particularly to Figures 1 and 2, 10 designates the barrel of the gun and 11 the forward section of the frame or fore-stock, 12 being the downward extension of the frame constituting the forward end of the butt or grip. The fore-stock is provided with the trigger opening 13. The forward section of the frame is extended rearward in general alinement with the barrel, as at 14. The rear section of the frame is constituted by the section designated 15 in Figure 1, which is angular in side elevation and is designed to fit beneath the portion 14 and extend down the fore-stock 12. This portion 15 of the frame has a hollow downward extension 16 constituting part of the grip and the housing for the endless carrier, which supports the cartridges. As illustrated in Figure 2, there is attached to the frame 11 on the inner face thereof the brace or support 17 which extends rearward and upward and then almost straight rearward.

As shown in Figures 1 and 3, there is provided just rearward of the rear end of the barrel 10 a vertical chamber 18 within the upper end of which is disposed a stub shaft 19 rotatably carrying a square or flat faced roller or wheel 20. Mounted upon a shaft 21 and disposed at the lower end of this chamber 18 is a square or flat faced roller 22. Operating on these squared rollers 20 and 22 is an endless cartridge carrier composed of links 23 pivotally connected to each other, as at 24, each of these links being formed to provide a longitudinally extending cartridge chamber 25. The outer wall of each cartridge chamber is cut away or beveled, as at 26, in Figure 8, so that the empty shells may be readily withdrawn. The cartridges C fit in these chambers 25, as shown also in Figure 8. The shaft 21 carries upon it a sleeve 27 with which the square roller 22 is engaged for rotation, this sleeve carrying upon it the worm gear 28.

The forward portion of the frame forward of the carrier chamber 18 is chambered, as at 29, and disposed within the chamber is a cylinder 30 carried by spokes 31 from a central hub 32 through which passes a shaft 33. Engaged with this shaft 33 and disposed within the cylinder is a coiled motor spring 34, as shown in Figure

7, the outer end of this motor spring being connected to one of the spokes of the cylinder, as shown in this figure. It will be understood, of course, that the cylinder is mounted for free rotation upon the shaft. The exterior face of the cylinder is formed with raceways forming tracks for the anti-friction balls **35**. At one end, the interior of the cylinder is provided with internal gear teeth **36**. The shaft **33** is provided with a shoulder against which the hub **32** fits and with a nut **37** bearing against a washer and holding the hub in place, the hub, however, having free rotation around the shaft. The shaft constitutes a winding shaft and to that end is provided with a crank **38**, whereby it may be manually rotated to wind up the spring.

In order to hold the spring from unwinding, I mount upon this shaft the ratchet wheel **39**, there being a spring pawl **40** to engage the ratchet wheel and prevent reverse turning movement which will unwind the spring. A like pawl **41** is also provided which engages the diametrically opposite portion of the ratchet wheel **39**, as shown in Figure 2. It is to be noted that the cylinder **30** is provided at diametrically opposite points with the longitudinally extending notches **42**. Pivoted upon the frame by a pivot **43** is the trigger **44** which has a nose **45** engaging within one of the notches **42**. The trigger is urged in this position by a spring **46**, as shown in Figure 2. When the trigger is retracted, the spring **34** will cause the cylinder to rotate in a certain direction until the nose **45** again engages the opposite recess or notch **42**, so that if the trigger is retracted and then released immediately, a single shot is fired by the half rotation of the cylinder **30**.

The internal teeth **36** engage a pinion **47** mounted upon a shaft **48**. This shaft is carried at its forward end in a bearing **49** in turn carried by the rear end of the brace **17**. The shaft **48** extends through a stuffing box bearing **50** and into a bearing recess in a screw threaded plug **51** extending into a flange **52** extending upward from the rear end of the brace **17**. It will be noted from Figure 2 that above this flange **52**, the brace **17** extends upward and rearward to the rear end of the stock and then extends straight upward, as at **53**, and is connected to the upper plate of the stock by means of a screw **54**. This shaft **48** operates the firing pin retracting means, as will be later described. The shaft **48** carries upon it the beveled gear wheel **55** which in turn engages a horizontally disposed beveled gear wheel **56** mounted upon a vertical shaft **57**. This shaft at its upper end is supported in a bearing **58** carried by the brace **17** and at its lower end is mounted in a step bearing **59** in the form of a plug having screw threaded engagement with the lower end of the portion **12** of the grip. Mounted upon this shaft **57** is a worm **60** (see Fig. 8) which engages the pinion **28** on the sleeve **27** which operates the endless cartridge carrier. Thus, it will be seen that when the motor is released by the retraction of the trigger **44**, the rotation of shaft **48** will not only operate the firing pin mechanism but operate the endless carrier.

Forming the rear wall of the chamber **18** is an upward extension **61** of the brace **17**. It is in this upward extension of the brace that the gland **50** is mounted. This extension at its upper end supports the upper plate of the rear stock **14** which is held thereto by the screws **62**. This upward extension is longitudinally bored or pierced in alinement with the axis of the barrel **10**, as at **63**, and disposed to operate through this bore **63** is the forward end of a firing pin, the shank of which is designated **64**. The shank **64** is cylindrical in cross section and operates within a rear tubular guide **65** having screw threaded engagement with the upwardly extending portion **53** of the rear end of the brace **17**. The forward end of this shank has on it a laterally projecting lug **66** and surrounding the shank is a coiled compression spring **67** which urges the firing pin forward. The firing pin itself, as shown in Figure 5, has a downwardly projecting longitudinally extending rib **68** extending forward from the lug **66**. The extremity of the upper portion **69** of the firing pin is pointed for impact against the detonating cap of the cartridge. For the purpose of retracting the firing pin everytime that a cartridge arrives in a position of register with the barrel **10**, I provide a wheel **70** mounted upon a shaft **71**, this wheel having outwardly projecting studs **72** arranged at equally spaced intervals, these studs in the revolution of the wheel being adapted to engage against the lug **66** and cause the retraction of the firing pin until the stud has escaped the lug, whereupon the spring **67** will project the firing pin into engagement with the cartridge. This shaft **71** carries upon it a worm wheel **73** engaged by a worm **74** on the shaft **48**, so that as this shaft rotates, the wheel is turned in a clockwise direction to retract the firing pin and then release it. When the firing pin springs forward under the impulse of the spring **67**, it deflects a flat spring **75** mounted against the front face of the upward extension **61** of the brace, the upper end of this flat spring bearing against the extremity of the key or rib **68**. Thus when the firing pin is projected under the action of the spring **67**, it is immediately retracted, when the force of the spring **67** is spent, by the spring **75** which brings the parts back to the position shown in Figure 2. The plate **14** is slotted at **76** and slightly below and forward of this slot are the two guide flanges **77**, shown in Figure 5, between which is disposed a slide bar **78** having trunnions **79** engaging these tracks **77** for sliding movement. The forward end of this slide bar **78** is provided with a downwardly extending fork **80**, shown in Figure 5, which embraces the firing pin and which, when retracted, engages against the lug **66**. The rear end of the bar **78** extends upward through the slot **76** and is provided with a safety button **81**. This button **81**, as shown in Figure 4, is notched to provide a sight. The slot **76** extends longitudinally of the plate **14** and at its opposite ends is formed with the transverse intersecting slots **76a** and **76b** so that the slot **76** is substantially H-shaped. Beneath the button there is formed a transverse lug **81a** shown in Figure 2, so that when the button is pulled up, it may be retracted along the slot **76** and then the lug depressed into the slot **76a**, thus holding the "safety" retracted to prevent any accidental projection of the firing pin, or in other words, this locks the firing pin in a safety position.

For the purpose of locking the endless carrier formed by the links **23** from accidental upward movement when the firearm is not in use, I provide a safety pin **82** which engages against or projects into the path of movement of the endless carrier, this pin being carried upon a lever **83** having a head **84** disposed upon the front face of the frame element **12** and operating in a slot **85**. The lever is pivoted at **86** and the forward end of the lever carries the pin **82**. A spring **87** urges the pin **82** inward. The rear section

16 of the grip is provided with opposed flanges 88 joined at their lower ends by a cross flange 89, as shown in Figure 8, these flanges when the rear section 16 is in place, as shown in Figure 2, approximating the rear ends of the cartridges C and preventing any retraction of the cartridges from the carrier. Mounted upon this rear section 16 is an inwardly projecting bracket 90, as shown in Figure 2, and pivoted upon this bracket is a lever 91, the lower end of this lever carrying a safety pin 92 adapted, when projected, to prevent the movement of the cartridge carrier and urged to a projected position by means of the spring 93. The upper end of this lever is slightly curved and coacting therewith is a grip section 94 which is pivoted at 95 to the frame and operates within a slot in the upper portion of the section 16 and bears against the forward end of the section 15, as shown in Figure 2, so that it cannot be urged outward beyond the position shown in Figures 1 and 2, but this portion 94 can be forced in and when forced in will force the upper end of the lever 91 inward, thus retracting the pin 92. When the butt or handle of the gun is gripped by the hand, the trigger finger will, of course, be through the trigger opening 13 and bearing against the trigger. The next finger will engage the button 84 while the thumb or the upper portion of the hand will engage the grip section 94 to force this inward, thus retracting both of the safety pins 82 and 92.

The operation of this arm will be understood from what has gone before. The rear section formed of parts 15 and 16, as shown in Figure 1, may be withdrawn from the front section of the frame or, as shown in Figure 2, be disposed against this front section. Alining pins 96 are carried by the rear section and adapted to engage in bores 97 formed in the wall of the section 16. A latch of any ordinary construction and designated 98 on the forward section is adapted to hold the two sections in engagement with each other, that is, in the position shown in Figure 2. It will be seen that the upper face of the portion 15 is at a slight inclination downward and forward while the under face of the portion 14 is at a like inclination, thus bringing the parts in proper conjunction when the rear section of the frame or stock is brought forward against the front section.

In the operation of this structure, when the rear section 16 is removed from the front section, the empty cartridge shells may be withdrawn from the chambers 25 of the carrier 23 and fresh cartridges inserted and the gun loaded. Then the rear section formed of the parts 15 and 16 is abutted against the front section and latched. The gun is then ready for use. Assuming that the spring 34 has been wound up by the crank 38, then it follows that when the trigger 44 is retracted and released, assuming that the butt or grip of the gun has been gripped by the hand of the user so as to retract the safety pins 82 and 92, the motor makes half of a complete revolution. The size of the cylinder 30, as illustrated, is such that a full revolution will cause two cartridges to be delivered successively to the barrel and fired by successive projections of the firing pin. Obviously, however, if the trigger be kept retracted, a number of shots will be fired until the trigger is again released because the motor will continue to rotate under the influence of the spring 34 and bring the cartridges one by one into firing position where they are impacted by the firing pin which will be retracted as the fired cartridge is being carried away from the barrel 10 and the new cartridge brought into alinement with the barrel 10 and then projected at the instant that the new cartridge is in alinement with the barrel 10. If it be desired to prevent any discharge of the cartridges, the safety formed by the slide bar 78 may be retracted by means of the button 80 and latched in this retracted position.

I do not wish to be limited to the use of this principle of operation with a revolver as it might be applied to a gun, either a submachine gun or an "automatic." Neither do I wish to be limited to the proportions given for the cylinder 30 with relation to the gear wheels 47, 55 and 56, as these proportions might be changed so that a complete revolution of the cylinder would cause a single step of the endless carrier or, vice versa, only a portion of the movement of the cylinder might operate to bring a cartridge into position. As illustrated, however, two cartridges are brought into position and fired upon each complete revolution of the cylinder, that is, the cylinder makes a complete revolution every two shots and, therefore, the cylinder would rotate ten times in order to discharge the twenty cartridges.

It will be seen that all parts of this gun can be readily taken apart for cleaning and readily assembled, that there are no delicate parts to get out of order and that the gun will operate automatically so long as the trigger is retracted and the carrier is filled with cartridges.

While I have illustrated certain details of construction and certain arrangement of parts, I do not wish to be limited to this as obviously many changes might be made without departing from the spirit of the invention as defined in the appended claims.

What is claimed is:—

1. In a firearm of the character described, a frame formed to provide a barrel and a vertically extending magazine chamber, an endless carrier disposed within said chamber and formed to provide cartridge chambers, rollers supporting opposite ends of the carrier and acting when rotated to shift the carrier to bring one cartridge after another into alinement with the barrel, a straight firing pin disposed in alinement with the barrel and rearward of the magazine chamber, a motor, the stock immediately in advance of the grip being formed with a chamber to enclose the motor, means operatively connecting the motor to the firing pin to cause intermittent retraction of the firing pin, a spring urging the firing pin to a projected position, means operatively connecting one of said rollers to the motor whereby to cause the rotation of the roller and the movement of the carrier, and a trigger disposed in advance of and at the upper end of the hand grip immediately beneath the motor chamber, said trigger normally holding the motor from actuation, the trigger when retracted permitting the actuation of the roller.

2. In a firearm of the character described, a frame having a barrel, the frame being formed to provide a magazine chamber extending at right angles to the barrel, many-sided rollers mounted within the magazine chamber adjacent the opposite ends thereof, an endless carrier formed of pivoted sections and operating over said many-sided rollers, each section of the carrier being formed to provide a cartridge chamber, a firing pin slidingly mounted in the frame in alinement with the barrel but rearward of the magazine chamber, a spring urging the firing pin in a direction to engage a cartridge supported

in alinement with the barrel, means causing a slight retraction of the firing pin after it has been projected by said spring, a spring motor mounted in said frame, means for winding up the spring of said motor, a trigger holding the motor from actuation under the action of said spring, a shaft extending parallel to the firing pin and driven by the motor, means operated by said shaft intermittently retracting and releasing said firing pin, and means operated by said shaft and engaging one of said rollers for causing a movement of the carrier to successively carry the cartridges into a position of alinement with the firing pin and barrel.

3. In a firearm of the character described, a frame having a barrel, the frame being formed to provide a magazine chamber extending at right angles to the barrel, many-sided rollers mounted within the magazine chamber adjacent the opposite ends thereof, an endless carrier formed of pivoted sections and operating over said many-sided rollers, each section of the carrier being formed to provide a cartridge chamber, a firing pin slidingly mounted in the frame in alinement with the barrel but rearward of the magazine chamber, a spring urging the firing pin in a direction to engage a cartridge supported in alinement with the barrel, means causing a slight retraction of the firing pin after it has been projected by said spring, a spring motor mounted in said frame, means for winding up the spring of said motor, a trigger holding the motor from actuation under the action of said spring, a shaft extending parallel to the firing pin and operated by the motor, a worm on the shaft, a transverse shaft disposed below the firing pin and having a worm wheel thereon engaged by the worm, said transverse shaft carrying thereon a wheel provided with a plurality of equally spaced projections, the firing pin having a lug disposed in the path of movement of said projections whereby as the wheel is rotated, the firing pin will be intermittently retracted and released, and a shaft extending parallel to the path of movement of the endless carrier having a worm thereon and operatively driven from the motor, one of said rollers having a shaft provided with a worm wheel engaged by said worm.

4. A firearm of the character described including a frame having a barrel and formed to provide a magazine chamber extending at right angles to the barrel, many-sided rollers disposed adjacent opposite ends of the magazine chamber, one of said rollers being disposed closely adjacent the barrel, an endless cartridge carrier carried by said rollers and formed of pivoted sections, each section having a cartridge chamber, a firing pin disposed rearward of the chamber and of the magazine chamber and in alinement with the barrel, a spring for projecting the firing pin into engagement with the cartridge, means acting to give a slight retraction to the firing pin after it has been projected into engagement with the cartridge, a spring motor mounted in the frame forward of the magazine chamber, the motor comprising a rotatable cylinder having internal gear teeth, a shaft upon which the cylinder is mounted for rotation, a coil spring within the cylinder connected at one end to the shaft and at the other end to the cylinder, the shaft having means whereby it may be rotated to wind up the spring, a pawl and ratchet associated with the shaft and holding the shaft rotated and against the action of the spring, the cylinder having longitudinally extending notches in its periphery, a spring projected trigger mounted in the frame and having a nose engaging said notches, a shaft extending rearward through said magazine chamber from the motor and having a pinion engaged by the internal gear teeth on the motor, the rear end of the shaft carrying a worm, a transverse shaft carrying a worm wheel engaged by said worm and carrying a firing pin actuating wheel having laterally projecting studs, the firing pin having a laterally projecting lug with which said studs are adapted to successively engage whereby as the wheel is rotated, the firing pin will be intermittently retracted and released, a beveled gear wheel mounted upon the first named shaft, a shaft extending at right angles to the first named shaft and parallel to the path of movement of the carrier and carrying the worm, a shaft supporting the many-sided roller remote from the barrel and having a worm wheel engaged by said worm, and fixed means for retracting the firing pin and holding it retracted.

5. In a firearm of the character described, a frame formed to provide a fore-stock and a barrel and a rear stock, the fore-stock having a downward extension forming the forward portion of a hand grip, the rear stock having a downward extension forming the rear portion of a hand grip, said extensions being hollow, the frame being formed to provide a vertically extending magazine, the rear portion of the magazine being closed by the rear stock section, shafts supported by the fore-stock section, each of said shafts having a square roller thereon, an endless carrier formed of sections hinged to each other and operating over said rollers, each section having a cartridge chamber, the endless carrier being supported by said rollers in position to bring each of the cartridge chambers successively into alinement with the barrel, a firing pin carried by the fore-stock section rearward of said magazine and in alinement with the barrel, a spring urging said firing pin toward the cartridge in the chamber, a spring motor carried in the fore-stock section, means whereby the spring of said motor may be wound up, a spring projected trigger in the fore-stock section latching the motor against operation but when released permitting the operation of the motor, a shaft extending parallel to the firing pin and between the flights of the endless carrier, the shaft being operated by the motor, means operated by said shaft for intermittently retracting the firing pin and releasing it, means causing a slight retraction of the firing pin after it has been projected by the spring into contact with the cartridge, a vertical shaft extending downward into the magazine and operated from the first named shaft and having means for rotating the lowermost roller, a spring projected safety pin engageable with the carrier to stop its motion and mounted upon a lever having a button normally projecting beyond the forward face of the hand grip, a spring projected pin upon the rear portion of the hand grip and projecting into the path of movement of the carrier, an upwardly extending lever upon which the pin is mounted and a second lever pivoted upon the rear face of the hand grip and operating through a slot therein and bearing against the last named lever and projecting rearward of the hand grip whereby to lock the endless carrier from operation unless the said button and the last named lever are compressed by the hand.

6. A firearm of the character described, in-

cluding a frame having a barrel, the frame being formed to provide a fore-stock and hand grip section and a rear stock and hand grip section, the sections being detachable from each other, the fore-stock and hand grip section being formed to provide a vertically extending magazine, an endless carrier disposed in said magazine and formed of links, each link having a cartridge chamber therein, a motor carried within the fore-stock, a trigger resisting the rotation of the motor but permitting the rotation of the motor when the trigger is retracted, a spring projected firing pin mounted rearward of said magazine and in alinement with the barrel, means operated by the motor for intermittently retracting and releasing the firing pin, means operated by the motor for coincidently causing the travel of said carrier to bring the cartridges one by one into a position opposite said barrel, the rear section of the fore-stock and hand grip being provided with a guard flange approximating the rear ends of the cartridges and preventing the accidental withdrawal of said cartridges from their position in the cartridge chambers, said rear section of the fore-stock and hand grip being removable from the fore-stock and hand grip section to permit the insertion of cartridges within the carrier and the removal of discharged cartridges.

7. An automatic firearm including a frame having a stock, a barrel and a hand grip, an endless cartridge carrier extending downwardly in the hand grip and adapted as it is moved in one direction to carry cartridges one by one into alinement with the barrel, a spring operated motor carried by the stock in advance of the hand grip and at the upper end thereof, a firing pin, means operatively connecting the motor with the firing pin to cause an alternate retraction and projection of the firing pin when the motor operates, a trigger disposed immediately in advance of the hand grip and below the motor and holding the motor from operation but when retracted permitting the operation of the motor, means operated by the motor for moving said cartridge carrier, and spring projected manually retractible means on the hand grip normally locking the endless carrier from movement until the grip is grasped.

8. An automatic firearm including a frame having a stock, a barrel and a hand grip; an endless cartridge carrier extending downwardly in the hand grip and adapted as it is moved in one direction to carry cartridges one by one into alinement with the barrel, rollers disposed in said frame one in the lower end of the hand grip and the other adjacent the barrel and over which the endless cartridge carrier is trained, the rollers having their axes extending parallel to the barrel; a motor, the stock immediately in advance of the grip being formed to provide a chamber for the motor, a firing pin, means operatively connecting the motor with the firing pin to cause an alternate retraction and projection of the firing pin when the motor operates, means operated by said motor for moving said cartridge carrier, and a trigger disposed in advance of and at the upper end of the hand grip immediately beneath the motor chamber, said trigger holding the motor from operation but when retracted permitting the operation of the motor.

9. An automatic firearm including a frame having a stock, a barrel and a hand grip, the frame being extended rearward behind the stock and barrel and beyond the hand grip, an endless cartridge carrier extending downwardly in the hand grip and adapted as it is moved in one direction to carry cartridges one by one into alinement with the barrel, rollers one disposed within the lower end of the hand grip and the other in position adjacent the barrel and over which the endless carrier is trained, said rollers having axes extending parallel to the barrel, a spring operated motor carried by the stock in advance of the hand grip and having a shaft extending parallel to the barrel, a rectilinearly movable firing pin disposed in the upper part of the frame behind the barrel, means operatively connecting the motor shaft with the firing pin to cause an alternate retraction and projection of the firing pin when the motor operates, means operatively engaging the motor shaft with one of said rollers whereby to move said cartridge carrier, and a trigger disposed immediately in advance of the hand grip and below the motor and holding the motor from operation but when retracted permitting the operation of the motor.

ERIC A. SWENSON.