

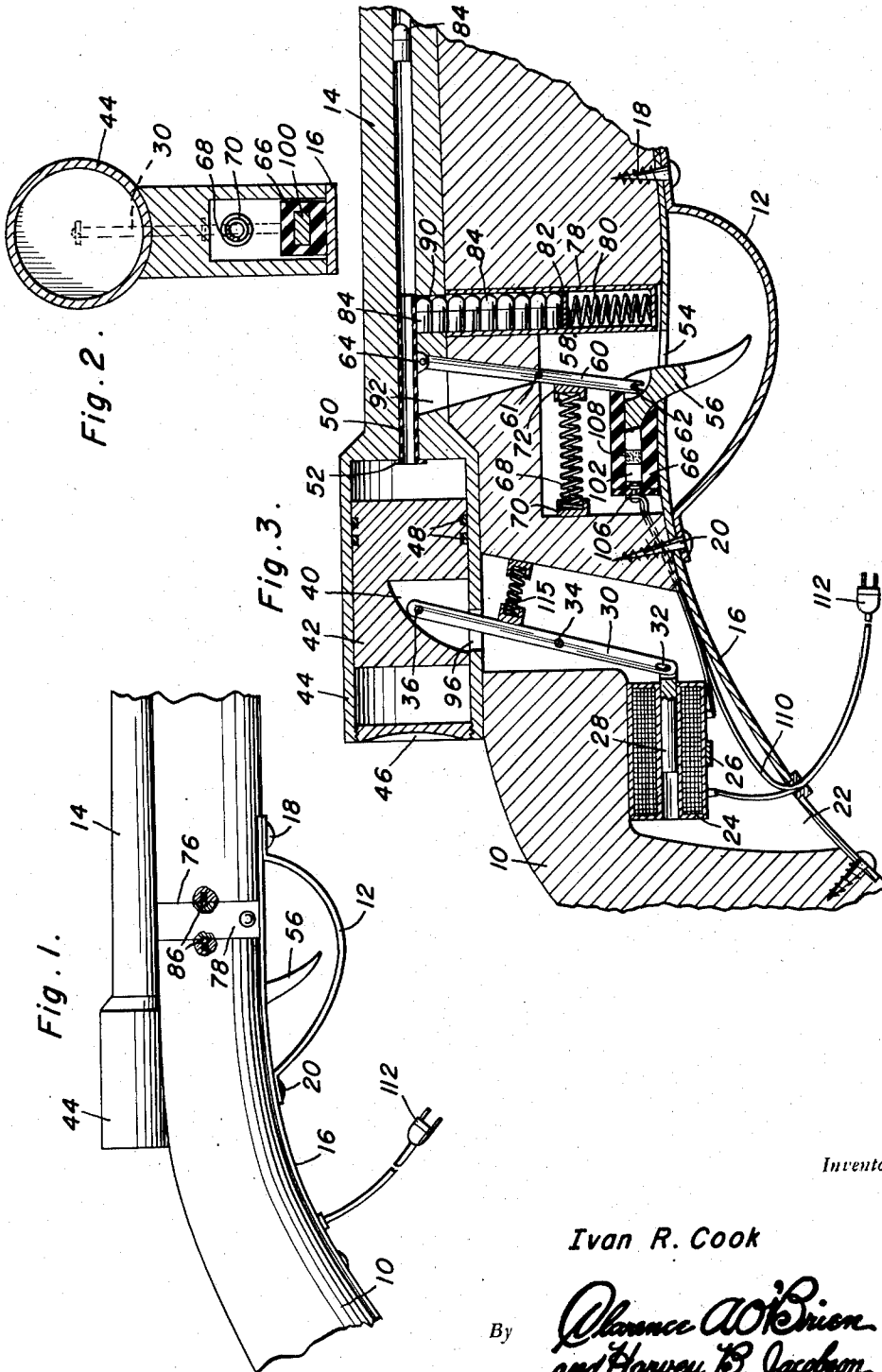
Sept. 18, 1951

I. R. COOK  
ELECTRIC AIR GUN

2,568,432

Filed Aug. 25, 1949

3 Sheets-Sheet 1



Inventor

Ivan R. Cook

By

Clarence A. O'Brien  
and Harvey B. Jacobson  
Attorneys

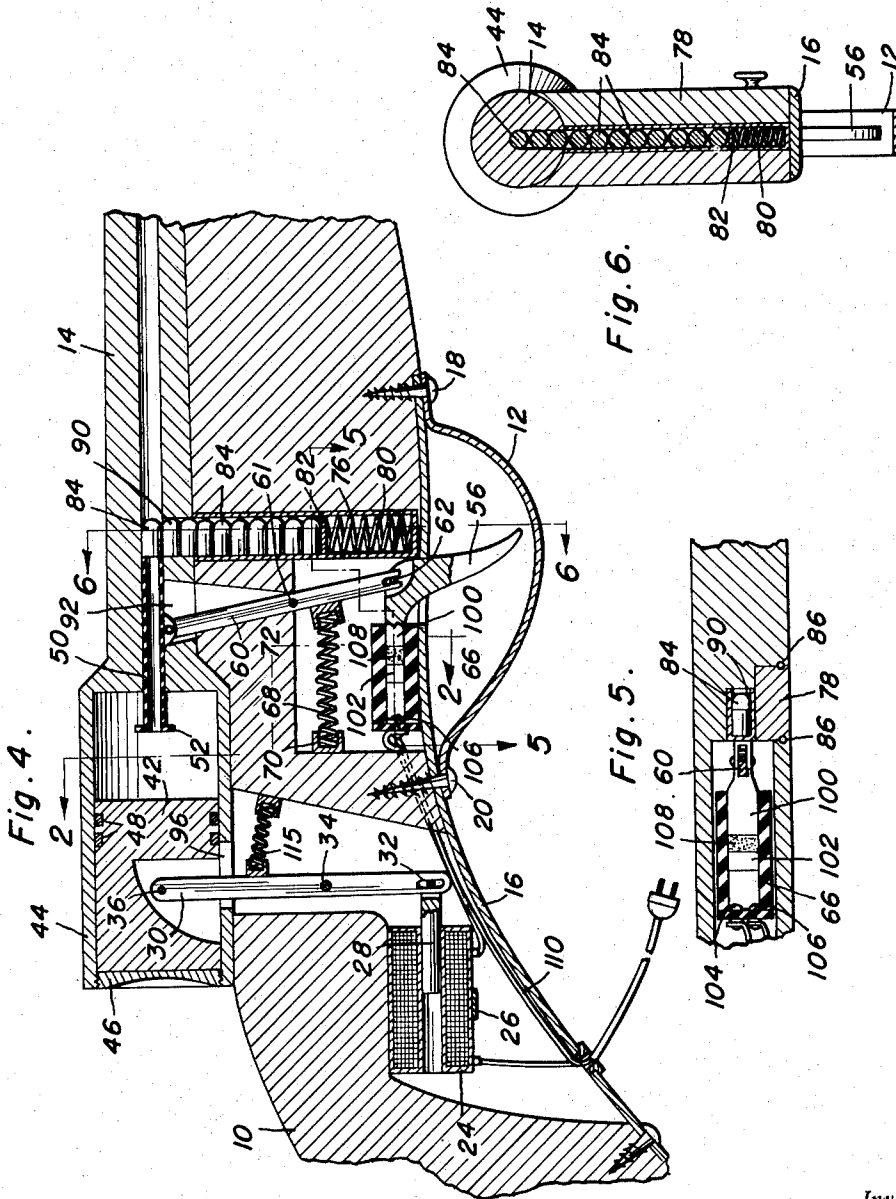
Sept. 18, 1951

I. R. COOK  
ELECTRIC AIR GUN

2,568,432

Filed Aug. 25, 1949

3 Sheets-Sheet 2



Inventor

Ivan R. Cook

By

Clarence A. O'Brien  
and Harvey B. Jacobson  
Attorneys

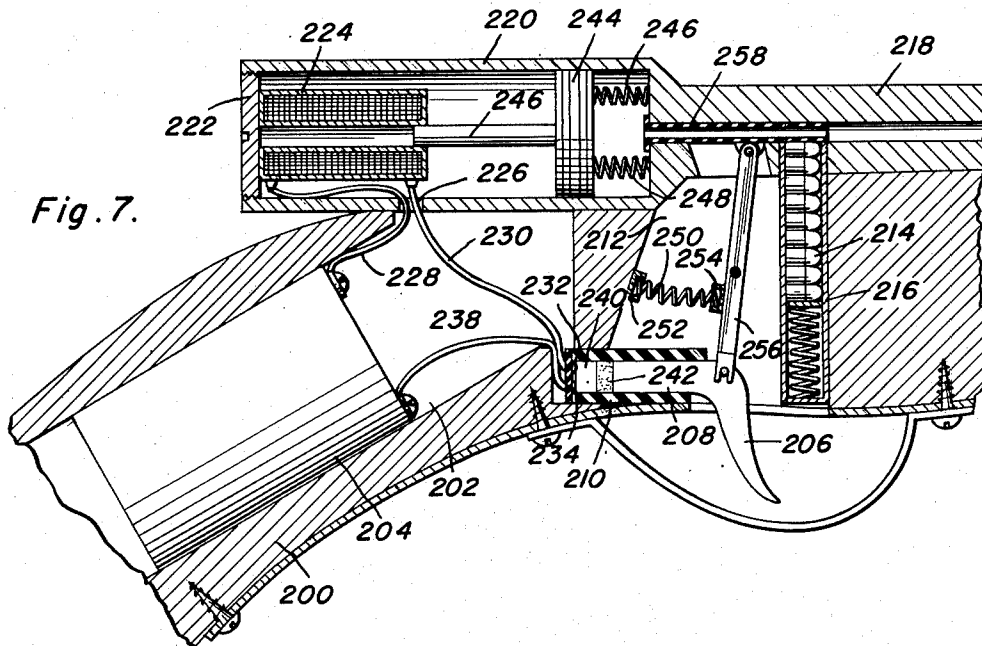
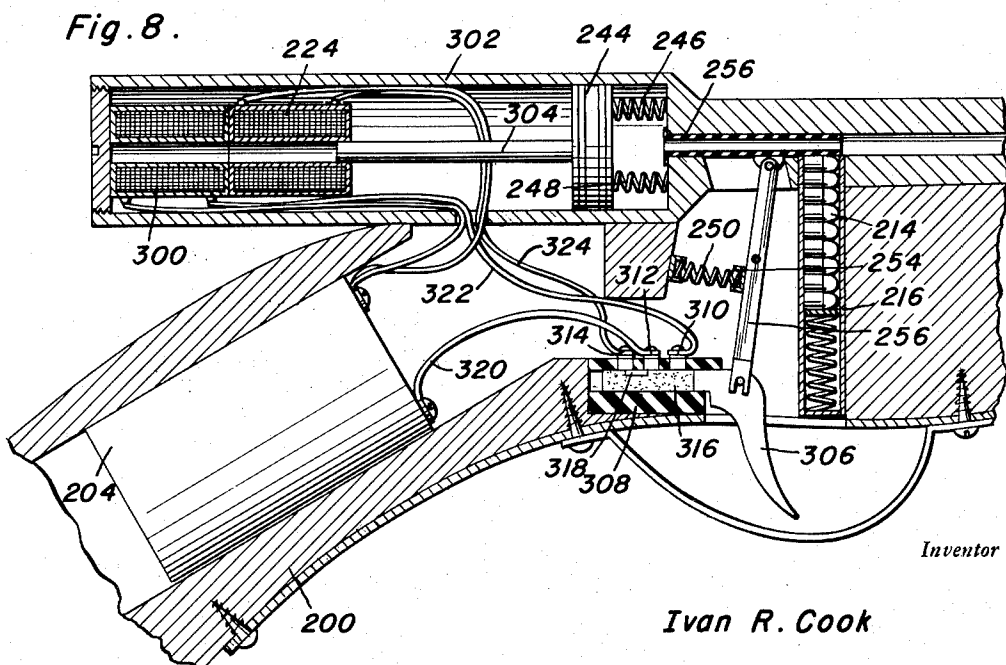
Sept. 18, 1951

I. R. COOK  
ELECTRIC AIR GUN

2,568,432

Filed Aug. 25, 1949

3 Sheets-Sheet 3



Inventor

Ivan R. Cook

By *Clarence A. O'Brien*  
*and Harvey B. Jacobson*  
Attorneys

## UNITED STATES PATENT OFFICE

2,568,432

## ELECTRIC AIR GUN

Ivan R. Cook, Oregon City, Oreg.

Application August 25, 1949, Serial No. 112,388

6 Claims. (Cl. 124—13)

1

This invention relates to novel and useful improvements in guns.

An object of this invention is to forcibly emit a projectile from a gun barrel by an improved structure which includes the principle of operating a piston in a cylinder for urging the pellet from the barrel, the piston being operative in response to an electrical impulse caused by a solenoid in operation or other suitable equivalent electrically operative element.

Another object of this invention is to teach various structural adaptations of the air operated ejection of projectiles whereby motive force in the form of compressed air in movement is derived through an electrical impulse caused to be set in motion from a suitable source of current, such as a battery or other, through the use of an improved trigger mechanism.

Ancillary objects and features of novelty will become apparent to those skilled in the art, in following the description of the preferred forms of the invention, illustrated in the accompanying drawings, wherein:

Figure 1 is an elevational fragmentary view of a part of a gun, showing particularly the clip-type arrangement for charging the gun with projectiles;

Figure 2 is a sectional view taken on the line 2—2 of Figure 4 and in the direction of the arrows;

Figure 3 is a longitudinal sectional view illustrative of one form of the invention showing the various parts in one position;

Figure 4 is a sectional view of the form of the invention shown in Figure 3, showing the various parts in another operative position;

Figure 5 is a sectional view taken on the line 5—5 of Figure 4 and in the direction of the arrows;

Figure 6 is a transverse sectional view taken on the line 6—6 of Figure 4 and in the direction of the arrows;

Figure 7 is a longitudinal sectional view showing a second form of the invention differing from the first primarily in the choice of current supply and location of solenoids; and

Figure 8 is a longitudinal sectional view of another modification, showing a bank of solenoids together with a slightly modified trigger structure, as a differentiating feature over the illustration of Figure 7.

Many air rifles and air pistols are commonly known and used. My invention deals with an improved gun of this type, adapted particularly for target use, although the gun may be used wherever found practicable or desirable.

There are three illustrated forms of the device disclosed herein. The first form includes various details of Figures 1—6, inclusive. Many of the conventional elements of guns are used, such as

2

the stock 10, trigger guard 12, and barrel 14. A plate 16 is disposed beneath the trigger guard and partially held in place by the screws 18 and 20 which hold the trigger guard fixed in place to the body of the gun. A recess 22 is formed in the stock 10 for accommodation of various operative elements.

Disposed in this recess is a conventional solenoid 24 which is held in place by any suitable means as the bracket 26. The solenoid core 28 is reciprocable in the solenoid's field coil and has a lever 30 pivoted thereto by a lost motion connection 32. A pin 34 is passed through the lever 30 and attaches it within the recess 22 for pivotal movement at a point substantially intermediate its ends. The end of the lever 30 opposite that having the lost motion connection 32 has a pivot pin 36 fixed thereto which is disposed in an opening 40 formed in a piston 42. The lever or rod 30 is adapted to be operated by the solenoid so that the piston 42 is reciprocated in the cylinder 44.

The cylinder 44 is disposed at the rear end of the barrel 14 and is in communication therewith. The rear end of the cylinder has a removable plug 46 therein for assembly purposes. Conventional piston rings 48 are used in the expected manner.

A hollow pusher as the sleeve 50 is disposed in the end of the barrel 14 and has a lip 52 at the inner end thereof which is disposed in the cylinder 44. This hollow pusher or sleeve is of resilient material, preferably rubber of sufficient rigidity, to serve one of its functions, which is to push the projectiles forward slightly in the barrel.

An opening 54 is formed in the plate 16 and has a trigger 56 passed therethrough. A part of the trigger is disposed in the recess 58 which is formed in the stock at the front of and spaced from the recess 22. An operator arm 60 is pivoted on a pin 61 intermediate its ends within the recess 58 and has one end pivoted to the trigger 56 by a lost motion connection 62, and the other end pivoted to the sleeve 50 by means of a pivot pin 64. Accordingly, upon operation of the trigger which is slidably disposed in a bearing block 66 mounted on the plate 16 within the recess 58, the arm 60 is operated, thereby slidingly operating the sleeve 50.

Means resiliently opposing the operation of the arm 60 is disposed in the recess 58. The preferable means consists of a spring of the flat or coil 68 variety having one end disposed in a boss 70 which is carried by the stock and the other end disposed in an identical boss 72 which is secured to the arm 60.

A lateral opening 76 is provided slightly in front of the trigger 56 for accommodation of the clip 78 having a spring 80 therein pressing

against the elevator 82, which in turn supports the projectiles 84. Spring-loaded balls 86 are carried by the gun body for operation in small recesses supplied in the edges of the clip (Figure 1) in order to fix it in place firmly and retain it in the proper position.

There are three openings provided in the barrel and cylinder structure. The front opening 90 communicates with the constantly spring biased projectiles 84 so that the uppermost projectile may be urged into the bore of the barrel 14. The second opening 92 is for passage of the arm 60 whereby it may be reciprocated by the trigger 56 and spring 68 mechanism for proper operation. The final opening 96 is a passage opening for the rod or lever 30.

In Figure 4, the device is shown preparatory for shooting. When the trigger 56 is pulled in the proper manner, the horizontal part 100 which is slidable in the bearing block 66 is urged rearwardly so that the contact 102 which is carried thereby bridges the two contacts (Figure 5) 104 and 106, respectively. The contact 102, although carried by the trigger 56, is insulated from the remainder thereof by the electrically insulating material 108 which is interposed therein.

By bridging the two contacts 104 and 106, one side 110 of the electrical circuit is completed so that current obtained from the plug 112 enters the solenoid 24, thereby reciprocating the arm 30 and urging the piston 42 forward forcibly. In so urging the arm 30, the spring 115 is compressed, thereby opposing the operation thereof and acting as a return for the piston.

However, while the trigger was being operated in the expected manner, the resilient sleeve 50, which has a bore, is urged forward an amount so as to push the top projectile forwardly of the opening 90 so that compression would not be lost.

When the trigger 56 is released after having fired single projectile, the springs 68 and 115, respectively, reacting on the arm 60 and the rod 30 opposing the operations of each, cause the position of elements, as disclosed in Figure 4, to occur. Hence, another pellet or projectile is disposed in the gun barrel preparatory for operation which will be caused by simply operating the trigger again.

Referring now to Figure 7, a second form of the invention is shown. Here, the stock 200 is provided with a recess 202 for accommodation of a battery 204.

A trigger 206 which is identical to the trigger 56 has a part 208 thereof reciprocable in a bearing block 210, disposed in the recess 212 of the gun body proper.

A clip having pellets 214 therein, which is indicated at 216 and which is identical to the clip disclosed in Figure 3 is provided for feeding the breech of the barrel 218. The said barrel 218 is disposed on the stock and has a cylinder 220 at the rear part thereof communicating therewith. A removable plug 222 is provided in the end of the cylinder 220 so that the solenoid 224 may be disposed therein. An opening 226 is provided in the cylinder 220 so that the wires 228 and 230, respectively, may be passed therethrough. The wire 228 connects directly with the battery 204, while the wire 230 terminates in a contact 232 which is at the end of the bearing block 210. A second contact 234 is also provided in the end of the bearing block 210 which has a wire 238 leading therefrom and terminating in the battery 204. Accordingly, when the contact 240 which is carried by the part 208

of the trigger 206 comes into bridging relationship with the contacts 232 and 234, the circuit of the solenoid 224 is completed. Since the contact 240 is carried by but insulated from the trigger 206, no current will be lost through the trigger. The medium for such an insulation is simply an electrically insulating section 242 carried by the trigger.

A piston 244 is disposed in the cylinder 240 and may be provided with conventional piston rings. A rod 246 extends from the piston and is disposed within the solenoid 224, serving as the core therefor. Springs 246 are disposed in the inner end of the cylinder, reacting on the barrel and also reacting on the piston to serve as a limiting means for the said piston.

In operation, projectiles 214 are fed as described in connection with the first form of the invention. That is, when the spring 250 which reacts within the bosses 254 and 252, carried by the arm 256 and the stock, respectively, the resilient sleeve or hollow hammer 258 is pivotally operated rearwardly so that the spring in the clip urges the top projectile into the bore of the barrel. When the trigger 206 is pulled for firing, the two contacts 232 and 234, respectively, are bridged thereby, energizing the solenoids 222. Hence, the piston 244 is urged outwardly against the spring opposition in order to forcibly emit a charge of air through the bore of the barrel 218, thereby carrying the projectiles which are disposed therein with it. In the return operation of the arm 256 by the spring 250, the hollow sleeve 258 moves rearwardly to allow a pellet 214 to move upwardly, but when the arm is moved for operation a slight amount, the pellet 214 is moved forwardly slightly in the barrel prior to the bridging of the contacts 234 and 232.

Referring to Figure 8, another embodiment of the invention is disclosed. This embodiment differentiates primarily from the embodiment of Figure 7 in the duplication of the solenoid 224. There is a second solenoid 300 disposed in tandem with the solenoid 224. This will, of course, indicate the lengthening of the cylinder 302 with respect to the cylinder 220. However, the remainder of the barrel and cylinder construction is identical with that disclosed in Figure 7, aside from the necessary lengthening or shortening of parts as the rod 304.

The trigger 306 is slidable in the insulating bearing block 308 and there is a slightly different arrangement of contacts to be bridged. A first contact 310 is provided and then there is a second contact 312, together with a third 314. An insulating member 316 forms a part of the trigger and carries a contact 318. When the contact 318 bridges the two contacts 310 and 312, through appropriate wiring 320 and 322, the solenoid 300 is energized. Then, when the trigger is operated slightly further, the contacts 312 and 314 are bridged, thereby operating the solenoid 224 through appropriate wiring 320 and 324. Accordingly, the stroke of the piston in this embodiment is materially lengthened in order to insure greater compression.

Having described the invention, what is claimed as new is:

1. A gun comprising a stock with a barrel fixed thereto, said barrel having an aperture therein, a cylinder at one end of said barrel, a projectile clip disposed in said stock and having an opening for passage of projectiles through said aperture and into said barrel, a spring-loaded trigger slidably connected to said stock, a hollow

5

projectile pusher slidably disposed in said barrel and having an end disposed in said cylinder, means pivotally attaching said pusher to said trigger, a guide carried by said stock, a contact insulated from the carrier by said trigger disposed in said guide, a piston slidably disposed in said cylinder for forcibly urging air through said hollow pusher to urge a projectile from said barrel, means for actuating said piston operatively connected therewith including an elongated member secured to said piston, a solenoid connected to said elongated member for operating said elongated member, and a pair of electrical conductors fixed to said guide and connected to said solenoid and adapted to be bridged by said contact.

2. A gun comprising a stock with a barrel fixed thereto, said barrel having an aperture therein, a cylinder at one end of said barrel, a projectile clip disposed in said stock and having an opening for passage of projectiles through said aperture and into said barrel, a spring-loaded trigger slidably connected to said stock, a hollow projectile pusher slidably disposed in said barrel and having an end disposed in said cylinder, means pivotally attaching said pusher to said trigger, a guide carried by said stock, a contact insulated from and carried by said trigger disposed in said guide, a piston slidably disposed in said cylinder for forcibly urging air through said hollow pusher to urge a projectile from said barrel, means for actuating said piston operatively connected therewith including an elongated member secured to said piston, a solenoid connected to said elongated member for operating said elongated member, a pair of electrical conductors fixed to said guide and connected to said solenoid and adapted to be bridged by said contact, resilient means opposing the operation of said piston, and said pusher moving one of the projectiles along in said barrel when said trigger is actuated an amount less than the amount of trigger movement required to move the contact into bridging position.

3. A gun comprising a stock which has a barrel fixed thereto, said barrel having a bore, a solenoid, a cylinder communicating with said barrel and fixed thereto, a trigger disposed in said stock, an electrical contact carried by said trigger, and means electrically connecting said solenoid with said contact for operation of said solenoid, a piston disposed in said cylinder, means connecting said solenoid with said piston for operation of said piston to compress a charge of air through said barrel, means carried by said stock and opening into the bore of said barrel for feeding projectiles into said barrel, a pusher having a passage therein to conduct the charge of air, said pusher being located in said bore and having means connected therewith and with said trigger for pushing one of the projectiles along in said bore in response to movement of said trigger.

4. A gun comprising a stock which has a bar-

6

rel fixed thereto said barrel having an aperture therein, a solenoid, a cylinder communicating with said barrel and fixed thereto, a trigger slidably disposed in said stock, an electrical contact carried by said trigger, means electrically connecting said solenoid with said contact for operation of said solenoid, a piston disposed in said cylinder, means connecting said solenoid with said piston for operation of said piston to compress a charge of air through said barrel, a spring opposing the operation of said trigger to return it to the initial position, a clip adapted to hold a plurality of projectiles therein with a spring for urging the projectiles through said aperture and into the barrel, and means carried by said trigger and partially disposed in said barrel for urging one projectile forwardly slightly upon operation of said trigger prior to the actuation of said solenoid.

5. In a gun construction, a stock, a barrel fixed to said stock, and a cylinder communicating with said barrel, a bearing block carried by said stock and having a trigger slidably disposed therein, a solenoid, a piston disposed in said cylinder and mechanical means connecting for operation said solenoid and said piston, at least one spring opposing the operation of said piston, means responsive to movement of said trigger for operating said solenoid, an arm fixed to said trigger by a lost motion connection, a sleeve disposed in the inner end of said barrel and having a part thereof disposed in said cylinder, and means pivotally connecting said sleeve with said arm and so arranged as to urge a projectile upwardly slightly in the barrel prior to operation of said solenoid.

6. In a gun construction, a stock, a barrel fixed to said stock, and a cylinder communicating with said barrel, a bearing block carried by said stock and having a trigger slidably disposed therein, a solenoid, a piston disposed in said cylinder and mechanical means connecting for operation said solenoid and said piston, at least one spring opposing the operation of said piston, means responsive to movement of said trigger for operating said solenoid, an arm fixed to said trigger by a lost motion connection, a sleeve disposed in the inner end of said barrel and having a part thereof disposed in said cylinder, means pivotally connecting said sleeve with said arm and so arranged as to urge a projectile along slightly into the barrel prior to operation of said solenoid, and said sleeve providing an air passage for compressed air from the cylinder into the barrel.

IVAN R. COOK.

#### REFERENCES CITED

The following references are of record in the file of this patent:

#### UNITED STATES PATENTS

| Number    | Name    | Date          |
|-----------|---------|---------------|
| 1,167,178 | Hill    | Jan. 4, 1916  |
| 1,862,697 | Mihalyi | Jan. 14, 1932 |