July 10, 1951 R. KAUCH 2,560,292

GAS PISTON OPERATED REVOLVER

Filed Aug. 13, 1948

FIG. 1

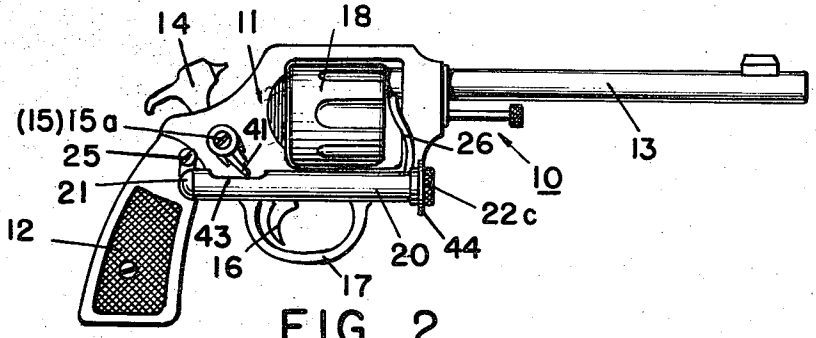

FIG. 2

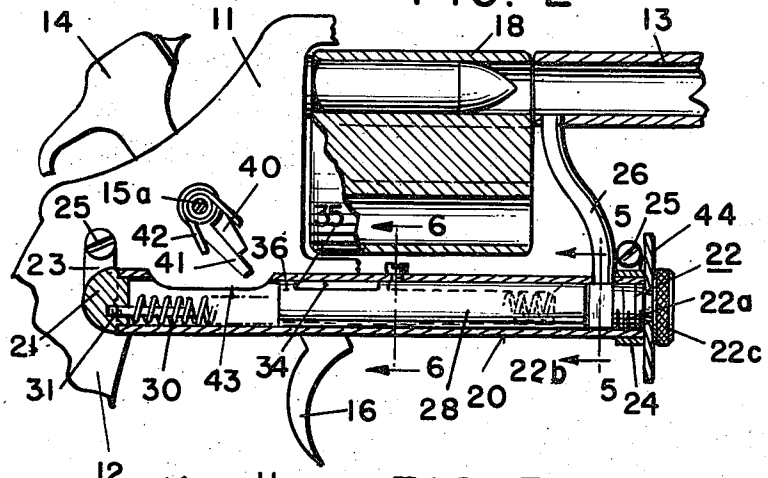

FIG. 4

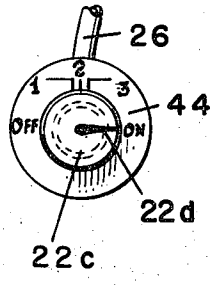

FIG. 3

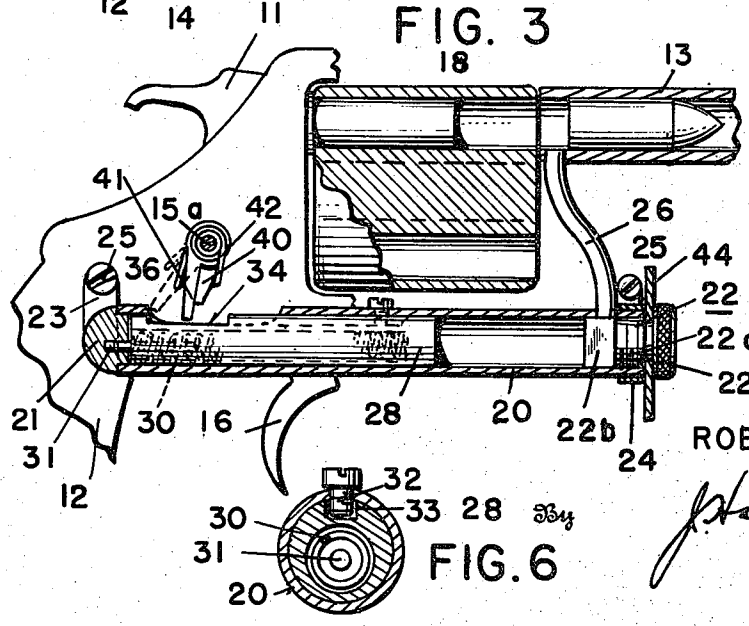

FIG. 5

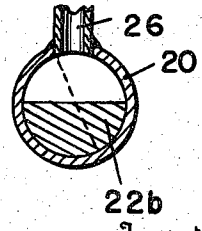

FIG. 6

Inventor

ROBERT KAUCH,

By J. Harold Kilcoyne

ATTORNEY

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GAS PISTON OPERATED REVOLVER

Robert Kauch, Alexandria, Va.

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7 Claims. (Cl. 89—192)

1

This invention relates to improvements in revolvers, and more particularly to a revolver equipped with gas-energized means for effecting automatic cocking of the firing hammer thereof, thus to render the operation of the revolver fully automatic as respects cocking of the hammer and rotation of the cartridge cylinder, so that only the limited pull or squeeze on the trigger necessary to effect release of the cocked hammer is required in firing.

As is well known, the firing hammer of a standard revolver is cocked either manually, as by pulling back the hammer with the thumb, or by pull on the trigger which is so interconnected with the hammer that its rearward movement effects cocking of the hammer and thereby rotation of the cylinder, and finally release of the hammer. Generally speaking, the hammer is cocked manually when accuracy of fire is desired, it being recognized that while trigger-cocking provides for more rapid firing, the force or "squeeze" required to be exerted on the trigger and the substantial trigger movement required to effect hammer cocking seriously interferes with the ability to aim and fire same with accuracy.

Stated broadly, the present invention contemplates and aims to provide a novel and highly effective gas-energized means for cocking the firing hammer of a revolver following each firing of a cartridge therefrom, thus to render the revolver fully automatic in its operation as respects cocking and cylinder rotation. Hence, a revolver equipped with the automatic cocking means herein contemplated may be fired at a more rapid rate, with less effort, and with a greater degree of accuracy than hitherto possible.

It is a further aim of the invention to provide a revolver equipped with gas-energized hammer-cocking means providing a mode of cocking the hammer in addition to the conventional means therein provided, namely, manual cocking and cocking under control of the trigger. To effectuate such additional means or mode of cocking the hammer without interference to the conventional means, the gas-energized cocking means as herein provided is adapted to be cut into and out of operation at will, and is so organized and operative that when cut out of operation, the revolver may be operated in normal manner.

The above and other objects and features of advantage of the invention will be apparent from the following detailed description thereof, taken with the accompanying drawings, in which:

Fig. 1 is a side elevation of a revolver equipped

2

with the improved gas-energized hammer cocking means of the present invention, the firing hammer being shown in its cocked position;

Fig. 2 is a broken-away part-sectional view illustrating in detail the gas cylinder, its gas connection to the revolver barrel, and the piston means energized by the gas supplied to the gas cylinder for effecting movement of the hammer to its cocked position;

Fig. 3 is a similar view illustrating the hammer in its firing position and the actuating piston about to begin its hammer-cocking stroke;

Fig. 4 is an end view looking into the right or control end of the gas cylinder, as seen in Fig. 2;

Fig. 5 is a section taken along line 5—5 of Fig. 2; and

Fig. 6 is a section taken along line 6—6 of Fig. 2.

In the drawings, reference character 10 designates a standard-make revolver equipped with the gas-energized hammer cocking means of the present invention. Such a revolver includes side frames, of which the right side frame 11 is shown, a handle grip 12, and a fixed barrel 13. The firing mechanism includes the firing hammer 14 mounted on a shaft 15 extending transversely between and having bearing in the side frames, the hammer being cocked by thumb pressure, or by pull on a trigger 16 enclosed in a trigger guard as shown. As is usual, the cocked hammer is released by limited squeeze on the trigger 16 and, when so released, is driven forward to its firing position by a main spring (not shown). A chambered cylinder 18 is mounted on a swing arm disposed to the other side frame for loading in the usual manner. The mechanisms interconnecting the trigger with hammer shaft and for translating rotation of the latter into cocking of the hammer and rotary movement of the chambered cylinder 18, thereby to bring a fresh cartridge in register with the barrel and then to hold the cylinder in firing position, are both well known and accordingly will not be here described.

The present invention provides a gas-energized means for cocking the hammer and thereby effecting the necessary rotary movement of the cylinder required to bring a cartridge in line with the barrel which provides an optional mode of operating the revolver; that is to say, when cut into operation it supersedes and makes unnecessary manual or trigger cocking and, when cut out of operation, it permits conventional cocking either manually or through the trigger.

As best seen in Figs. 2 and 3, the improved gas-

energized cocking means of the invention includes a gas cylinder **20** illustratively shown to be closed at its ends by end plugs **21**, **22**, and to be secured against the outer face of the revolver side frame **11** as by an attaching bracket **23** integral with one cylinder end plug **21**, and by a strap **24** encircling the other end, the bracket and strap being secured to the side frame by screws **25**. Communication between the right or piston end of the cylinder **20** and the rearward end of the revolver barrel **11** is provided by a tube **26** extending substantially parallel with the outer face of the revolver side frame. By reference to Fig. 1, it will be observed that the cylinder **20** is positioned intermediate the chambered cylinder **18** and the trigger guard **17** and is thus disposed in a relatively out-of-the-way and non-interfering position with respect to said parts. It is also within the purview of the invention to form the cylinder **20** integral with the side frame **11**, in which case it would form a built-in or component part of the revolver rather than an attachment element therefor as shown.

Mounted for reciprocation in the cylinder **20** is an elongated actuating piston **28**, which is bored for a substantial portion of its length so as to provide a cylindrical recess and seat for one end of a stiff coil spring **30**. The other end of the spring reacts against the cylinder end-plug **21** and is centered on a pin **31** affixed to said end-plug and having length sufficient to prevent any lateral distortion of the spring under compression. Thus, it will be seen that the coil spring **30** is effectively interposed between the piston and left end of the cylinder, so that leftwise movement of the piston in response to pressures developed in the barrel effects compression of the spring.

To preclude rotary movement of the piston within its cylinder, a key **32** (Fig. 6), which may be the shank of a screw threaded through the cylinder wall, operates in an axially extending keyway **33** machined or otherwise formed in the piston along its top line. The key-way **33** opens into a recess **34** which may be formed in the piston top surface by machining a flat therein, the recess terminating in an abrupt vertical shoulder **35** which is spaced an appreciable distance from the left end face of the piston, so as to provide in effect an upstanding ratchet tooth **36** thereon, which, it will be observed, is contained within the periphery of the piston.

To provide the necessary material in the upper half portion of the piston as to permit of the aforesaid key-way **33** and recess **34** being provided therein, the spring-receiving bore of the piston is preferably formed eccentric to the piston center line, such eccentricity being in downward direction, as seen in Fig. 6.

The prior referred-to hammer shaft **15** is formed with an extending end **15***a* which projects beyond the right side frame **11** of the revolver. As best seen in Figs. 2 and 3, the extended shaft end **15***a* carries a short-length shaft actuating arm **40** which is rigid with the shaft, and a longer length driving arm or pawl **41** which is normally biased into face engagement with the actuating arm by means of a spring **42**. However, mounting of driving arm **41** on shaft end **15***a* is such as to permit it to partake of limited angular movement in direction away from said actuating arm. By further reference to Figs. 2 and 3, it will be observed that the length of the actuating arm **40** is such that its free lower end terminates above the cylinder **20**, whereas the length of the longer driving arm **41** is such that its free lower end projects through an opening or window **43** provided in the spring end of the cylinder **20** and into the path of movement of the piston **28** contained therein, and more particularly, into the path of movement of the aforesaid ratchet tooth **36** formed at the left thereof. The arrangement is such that when engaged by the left end of the piston as the latter moves to the left, the driving arm **41** is turned on shaft end **15***a* to its dotted line position illustrated in Fig. 3. As the result thereof, the driving arm ratchets over the tooth **36** in the continued movement of piston **28** and thereupon drops into the recess **34**. The depth of this recess is such that having cleared the tooth, the driving arm is free to swing against the actuating arm **40** under the urge of its spring **42**. Upon the piston reversing its direction of travel, the shoulder **35**, which in part defines the tooth, may now engage against the end of the driving arm which then functions as a one-way clutch or driving means for translating return piston movement into angular movement of the actuating arm **40** and hence rotary movement of the hammer shaft in direction as to effect cocking of the hammer **14**.

Reverting to the cylinder end plug **22**, such preferably comprises an externally threaded plug body **22***a* which is adapted to be screwed into the internally threaded right end of the cylinder **20** and an inner half-round section **22***b* disposed in line with the gas inlet to the cylinder, i. e., the lower end of the tube **26**. The outer end of the plug is formed as a knurled knob **22***c* whose radial face is marked or otherwise impressed with a pointer **22***d*. The plug **22** preferably secures a circular dial plate **44** in fixed position against the cylinder end, the dial plate carrying the spaced markings "off" and "on," and the intermediate numerals 1, 2, 3, as seen in Fig. 4. The contemplated arrangement is such that when the knob **22***c* is turned so that pointer **22***d* points to the "off" position the half-round section **22***b* of the plug covers the gas inlet to the cylinder **20**, with the result that the gas-energized cocking means is completely cut out of operation. When the pointer is turned to the "on" position, the plug half-round section is turned so that it uncovers said inlet and supplies the full pressure of gas obtaining in the barrel to the operating cylinder. And when the pointer is turned to the intermediate positions designated 1, 2 and 3, which indicate throttling positions of the half-round section of the plug, gas pressure in the barrel is transmitted to cylinder **20** at gradually increasing rates. Thus, the plug **22**, in addition to functioning as an end plug, also functions as an open-and-shut valve and as a throttling valve, respectively, for cutting in and out of operation the gas-energized hammer cocking means of the invention, and for graduating the rate of pressure transmission from barrel to cylinder in accordance with whether fast or slow cocking movement of the hammer is desired.

Briefly summarizing the operation of the gas-energized hammer cocking means as described, it will be assumed that plug knob **22***c* has been turned to "on" position, and that the hammer **14** has been initially moved to its cocked position by thumb pull thereon, following reloading of the cylinder. The trigger is now in its position corresponding to the cocked hammer position, so that only slight rearward squeeze thereon will release the hammer.

Piston 28 is in its right-wise position wherein it is normally maintained by spring 30. Upon the trigger being squeezed, the hammer drives forward to its firing position (Fig. 3) and explodes the firing charge of the cartridge in the chambered cylinder, driving the bullet from the shell, into and thence through the barrel 13. As is well known, the burnt propelling gas expands and develops very high pressures within the barrel as the bullet travels from the inner to muzzle end thereof. This high pressure gas bleeds through tube 26 into the gas cylinder 20 and drives piston 28 in leftwise direction, thereby to highly compress the spring 30 and store energy therein.

Consequent to the hammer moving to firing position, the actuating and driving arms 40, 41 are positioned substantially as seen in Fig. 3, the longer arm being disposed in the path of movement of the left end of the piston. However, due to said arm being permitted limited angular movement when engaged by the piston moving in leftwise direction, the driving arm rides over the piston tooth 36 and then drops into the recess 34.

As the bullet emerges from the muzzle of the barrel, the force of the propelling gas is spent, whereupon spring 30 releases its stored energy in imparting return movement to the piston 28. During such return movement, the shoulder 35 defining one side of the piston tooth 36 engages against the lower end of the driving arm 41 which now provides an operative driving connection between piston and actuating arm 40 for translating return movement of the piston into rotation of the hammer shaft 15 in direction as to return the hammer from its firing position (Fig. 3) to its cocked position (Figs. 1 and 2) against the action of the hammer main spring. Since movement of the hammer to cocked position also effects partial rotation of the chambered cylinder 18, as required to present the next unfired cartridge in line with the barrel 13, as well as return of the trigger to its initial position corresponding to cocked hammer position, the cycle is completed and the revolver is ready for immediate refiring, as aforesaid. Thus, assuming the cylinder 18 to mount six cartridges and the first cocking of the hammer to have been effected by the thumb, the six cartridges may be fired at an extremely rapid rate, with less effeort, and with greater accuracy than hitherto possible with the conventional revolver.

In the event that automatic cocking of the hammer is effected in the "on" position of the knob 22c at a faster rate than is desired, cocking movement can readily be slowed to the desired rate, for example, by turning the pointer from the "on" to the 3, 2, 1 positions, whichever is found in practice to give the desired slower rate. And, when it is desired to operate the revolver in the normal fashion, the knob 22c may be turned to its "off" position, such resulting in cutting the gas-energized cocking means out of operation.

While the gas-energized cocking means of the invention has been illustrated as an attachment for existing revolvers, it will be understood that such is only for convenience and clarity in illustration, as the hammer cocking means herein proposed may also be built into new revolvers without substantial re-design or modification thereof.

As many changes could be made in carrying out the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. In combination, a revolver having a fixed barrel, a chambered cylinder and firing mechanism including a firing hammer mounted on a shaft operative when rotated in one direction to effect cocking of the hammer and rotation of the cylinder, and means for rotating said shaft in said one direction upon firing of a cartridge in the chambered cylinder including a gas cylinder, a piston mounted for reciprocation therein, a gas connection between the barrel and one end of the gas cylinder whereby the piston is actuated toward the other end of the cylinder in response to pressure of gas in the barrel, a coil spring contained in the gas cylinder and being interposed between the other end thereof and the piston so as to be compressed by the piston as the latter is moved against the spring by the gas pressure aforesaid and to actuate the piston in its return movement when the pressure in the barrel is spent, and one-way clutch means operative between said hammer shaft and said piston for translating return movement of the piston into rotation of the hammer shaft in said one direction.

2. In combination, a revolver having a fixed barrel, a chambered cylinder and firing mechanism including a firing hammer mounted on a shaft operative when rotated in one direction to effect cocking of the hammer and rotation of the cylinder, and means for rotating said shaft in said one direction upon firing of a cartridge in the chambered cylinder including a gas cylinder, a piston mounted for reciprocation therein, a gas connection between the barrel and one end of the gas cylinder whereby the piston is actuated toward the other end of the cylinder in response to pressure of gas in the barrel, a coil spring contained in the gas cylinder and being interposed between the other end thereof and the piston so as to be compressed by the piston as the latter is moved against the spring by the gas pressure aforesaid and to actuate the piston in its return movement when the pressure in the barrel is spent, and a driving connection operative between piston and shaft for rotating the shaft in the required direction to actuate the hammer from its firing to its clocked position, said driving connection being effective only during return movement of the piston.

3. In combination, a revolver having a fixed barrel, a chambered cylinder and firing mechanism including a firing hammer, the cocking of which effects rotation of the cylinder, said hammer being mounted on a shaft having bearing in the revolver side frames, one end of said shaft being extended outwardly beyond one side frame, a gas cylinder associated with said one side frame and disposed below the shaft, a piston mounted for reciprocation therein, a connection between the barrel and one end of the actuating cylinder whereby the piston is actuated towards the other end of said cylinder in response to gas pressure developed in the barrel upon firing of a cartridge in the chambered cylinder, a coil spring contained in the gas cylinder and being interposed between the other end thereof and the piston so as to be compressed by the piston as the latter moves against the spring by the gas pressure aforesaid and to actuate the piston in its return

movement when the pressure in the barrel is spent, and cooperating means on the extended end of the hammer shaft and on the piston for effecting movement of the hammer from its firing to its cocked position responsively to return movement of the piston.

4. In combination, a revolver having a fixed barrel, a chambered cylinder and firing mechanism including a firing hammer, the cocking of which effects rotation of the cylinder, said hammer being mounted on a shaft having bearing in the revolver side frames, one end of said shaft being extended outwardly beyond one side frame, a gas cylinder associated with said one side frame and disposed below the shaft, a piston mounted for reciprocation therein, a connection between the barrel and one end of the actuating cylinder whereby the piston is actuated towards the other end of said cylinder in response to gas pressure developed in the barrel upon firing of a cartridge in the chambered cylinder, a coil spring contained in the gas cylinder and being interposed between the other end thereof and the piston so as to be compressed by the piston as the latter moves against the spring by the gas pressure aforesaid and to actuate the piston in its return movement when the pressure in the barrel is spent, and means on the extended end of the hammer shaft and coacting with the piston during its return movement for effecting movement of the hammer from its firing to its cocked position.

5. The combination as set forth in claim 3, wherein said cooperating means includes shaft actuating and driving arms carried by the extended end of the hammer shaft, of which the driving arm is spring-biased into engagement with the actuating arm but is mounted for limited angular movement away from same, the spring end of the piston being formed with an upstanding tooth contained within the piston periphery and being defined in part by a shoulder forming the end of an adjacent recess, the length of the driving arm being such that it extends into the path of movement of the tooth but the mounting of the driving arm permitting it to ride over the tooth of the spring-compressing stroke of the piston and thereupon to fall into said recess, said driving arm being engaged by the tooth shoulder on the return stroke of the piston and being operative to translate return piston movement into angular movement of the actuating arm and hence of the hammer shaft.

6. In combination, a revolver having a fixed barrel, a chambered cylinder and firing mechanism including a firing hammer and a rotary hammer shaft, rotation of which in one direction effects cocking of the hammer and rotation of the cylinder, spring means operative to store energy when compressed and being free to release its energy following its compression, means responding to gas pressure developed in the barrel upon firing of a cartridge in the cylinder to compress said spring means, and a one-way driving connection operative between said shaft and said last means and being actuable by the energy released by said spring means for imparting rotary movement to the hammer shaft in said one direction.

7. In combination, a revolver having a fixed barrel, a chambered cylinder and firing mechanism including a firing hammer and a rotary hammer shaft, rotation of which in one direction effects cocking of the hammer and rotation of the cylinder, spring means operative to store energy when compressed and being free to release its energy following its compression, a piston actuable in one direction by the gas pressure developed in the barrel upon firing of a cartridge in the cylinder to compress said spring means, and being actuable in return direction by the energy released by said spring means, and pawl and rachet means on the shaft and piston, respectively, for translating return movement of the piston into rotary movement of the hammer shaft in direction as to cock said hammer.

ROBERT KAUCH.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
1,124,427	Hammond	Jan. 12, 1915
1,233,096	Martinez-Silva	July 10, 1917
1,835,286	Dickinson	Dec. 8, 1931

FOREIGN PATENTS

Number	Country	Date
14,130	Great Britain	1886