April 25, 1939. C. G. SWEBILIUS 2,155,512

PUMP-ACTION FIREARM

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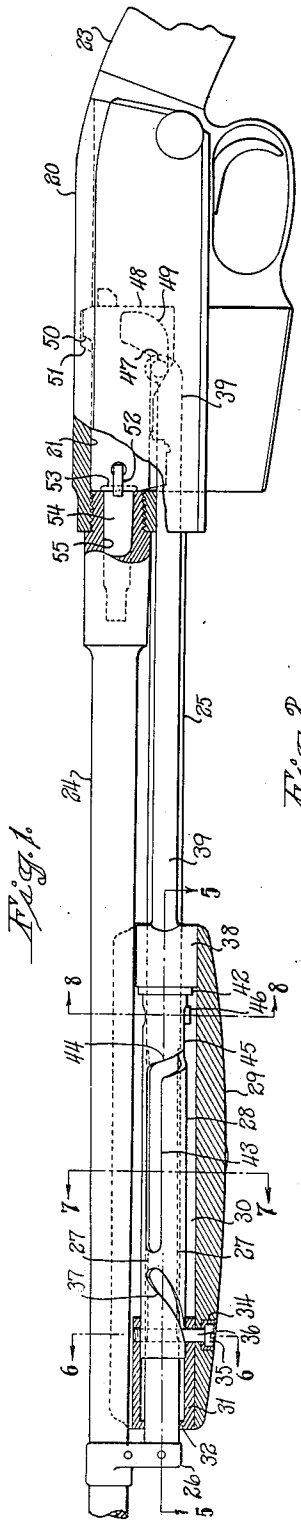


Fig. 1.

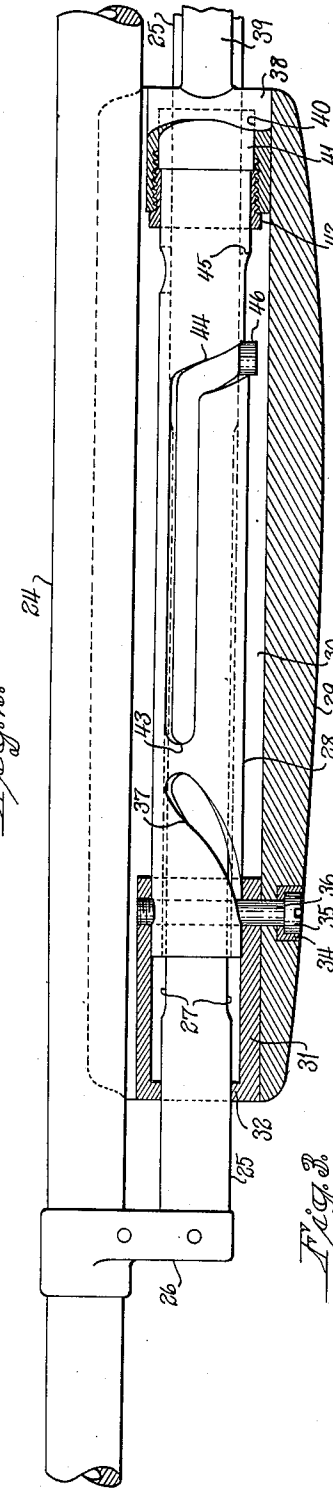


Fig. 2.

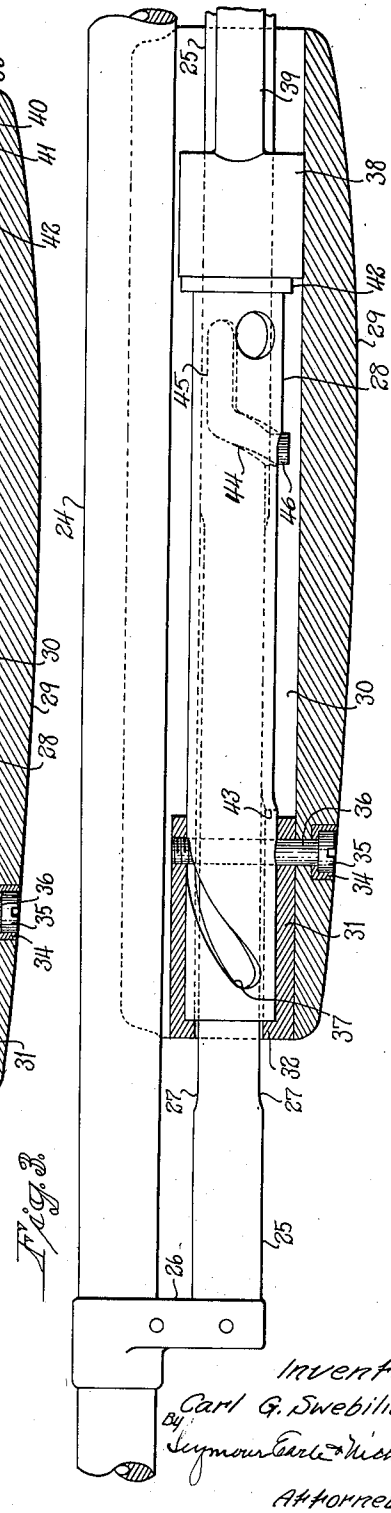


Fig. 3.

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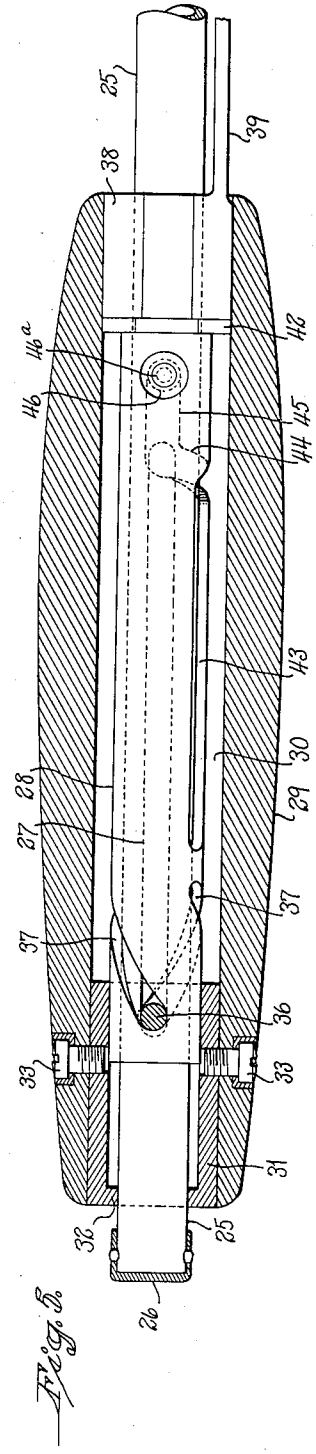


Fig. 9.

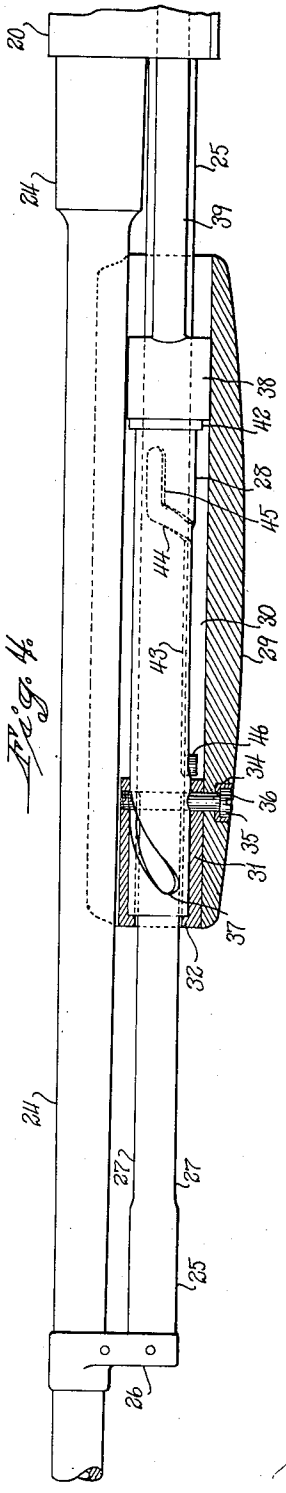


Fig. 4.

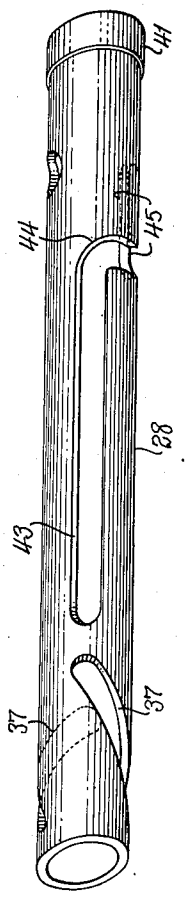


Fig. 10.

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PUMP-ACTION FIREARM

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Fig. 6.

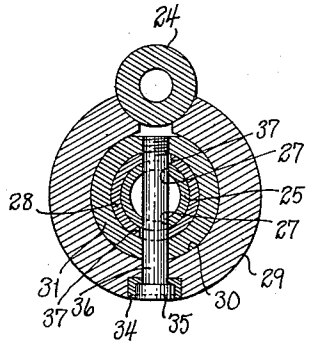


Fig. 7.

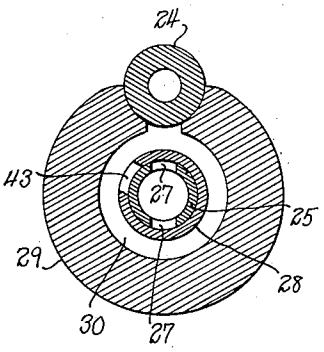


Fig. 8.

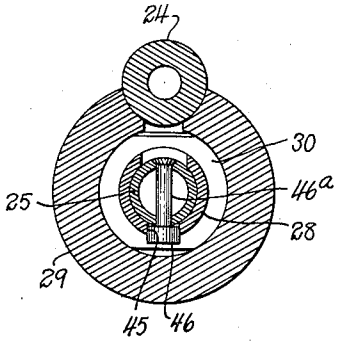


Fig. 9.



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Patented Apr. 25, 1939 2,155,512

UNITED STATES PATENT OFFICE

2,155,512

PUMP-ACTION FIREARM

Carl G. Swebilius, Hamden, Conn., assignor, by mesne assignments, to Western Cartridge Company, a corporation of Delaware

Application September 9, 1937, Serial No. 162,990

14 Claims. (Cl. 42—16)

This invention relates to an improvement in pump-action firearms and relates more particularly to operating mechanisms for the cartridge-extractors of such firearms.

Before proceeding with a detailed description of means employed for carrying out the present invention, it may here be explained that it often occurs that cartridge-cases become so expanded by the pressure developed when the powder charges originally in such cartridge-cases are ignited, as to cause the cartridge-cases to "seize" or adhere to the surfaces of the cartridge-chambers. Under such conditions the exertion of an excessive force upon the operating- or slide-handle of a pump-action firearm is required to break the bond between a cartridge-case and the cartridge-chamber, after which the extraction of the cartridge-case may be completed with the application of but a relatively-small force.

One of the objects of the present invention, therefore, is to provide a pump-action firearm having a superior operating mechanism for its cartridge-extractor which will require the application of but a relatively-light force in order to break the bond between a seized or adhered cartridge-case and the cartridge-chamber in which it is located.

A further object of the present invention is to provide a superior pump-action firearm having an extractor-operating mechanism which will automatically cause the slow initial movement of the cartridge-extractor and the subsequent more rapid movement thereof for a given rate of speed imparted to the operating-handle.

Another object of the present invention is to provide a pump-action firearm with superior cartridge-extractor operating-means whereby a given speed of movement of the applied force will first move the cartridge-extractor slowly but powerfully until a seized or adhered cartridge-case is freed and then move the said cartridge-extractor very rapidly but less powerfully to complete the extraction of such a cartidge-case.

With the above and other objects in view, as will appear to those skilled in the art from the present disclosure, this invention includes all features in the said disclosure which are novel over the prior art.

In the accompanying drawings, in which certain modes of carrying out the present invention are shown for illustrative purposes:

Fig. 1 is a broken view in side elevation of a pump- or slide-action firearm embodying the present invention and with portions of the structure shown in central longitudinal section, the parts being shown in the positions which they assume when the operating-handle is in its foremost position;

Fig. 2 is a similar but less comprehensive view showing the operating-handle as moved rearwardly a distance sufficient to start the initial slow but powerful actuation of the cartridge-extractor;

Fig. 3 is a view corresponding to Fig. 2, but showing the operating-handle as having been moved rearwardly sufficiently to complete the initial slow but powerful movement of the cartridge-extractor and just prior to the starting of the rapid rearward movement of the extractor to complete the extraction of the cartridge-case;

Fig. 4 is a similar view but showing the parts in the positions which they assume when the operating-handle is moved to the limit of its rearward travel;

Fig. 5 is a longitudinal sectional view taken on the line 5—5 of Fig. 1, but on a larger scale;

Fig. 6 is a transverse sectional view taken on the line 6—6 of Fig. 1;

Fig. 7 is a similar view taken on the line 7—7 of Fig. 1;

Fig. 8 is a transverse sectional view taken on the line 8—8 of Fig. 1;

Fig. 9 is a broken perspective view of the forward portion of the guide-tube; and

Fig. 10 is a perspective view of the tubular transmitting-member.

The particular slide-action firearm herein chosen for the illustration of the present invention includes a receiver **20** provided with an internal mechanism-receiving chamber **21**, in the usual manner of firearms. Secured in any approved manner to the rear end of the receiver **20** is a buttstock **23** and projecting from the forward end of the said receiver is a barrel **24**.

Supported at its rear end in the forward portion of the receiver **20** and extending forwardly from the said receiver beneath the barrel **24** is a guide-tube **25** which is supported at its forward end by a bracket **26** secured to the said barrel **24**. The said guide-tube **25** is formed with two longitudinal guide-slots **27**—**27** respectively located at diametrically-opposite points thereon and has mounted upon it, with capacity for both reciprocating and turning movement, a tubular transmitting-member **28** which serves in a manner as will hereinafter appear to transmit motion from an operating-handle or fore-end **29** to a cartridge-extractor. The said operating-handle **29** is formed with a longitudinal passage **30** in which is accommodated a portion of the guide-

tube 25, the transmitting-member 28, and other features, as will hereinafter appear.

Installed in the forward end of the longitudinal passage 30 in the operating-handle 29 is a guide-sleeve 31 having an inwardly-projecting flange 32 bearing upon the periphery of the guide-tube 25, before referred to. The said guide-sleeve 31 is firmly anchored to the operating-handle 29, as is particularly well shown in Fig. 5, by two (more or less) diametrically-opposite screws 33—33.

Mounted in the under face of the operating-handle 29, adjacent the forward end thereof, is a cup-shaped escutcheon 34 in which is seated the head 35 of an actuating-screw 36 which extends upwardly through the lower wall of the guide-sleeve 31, through both of the guide-slots 27—27 in the guide-tube 25, and thence into the upper wall of the guide-sleeve 31, as clearly shown in the drawings. The screw 36, just referred to, also passes through two corresponding helically-inclined actuating-slots 37—37 formed at diametrically-opposite points in the forward portion of the tubular transmitting-member 28.

Located in the rear portion of the longitudinal passage 30 in the operating-handle 29 is a head 38 which is located at the forward end of a reciprocating action-slide 39. The head 38 is formed with a forwardly-opening cylindrical socket 40 into which extends, with capacity for rotary movement, the head 41 of the tubular transmitting-member 28. To retain the said head 41, just referred to, in the socket 40 against undue axial movement therein, the forward portion of the socket 40 is threaded and receives an externally-threaded thimble 42, the rear edge of which acts against the forward edge of the head 41 to restrain the same against movement out of the said socket 40, thus permitting the head 41 and the transmitting-member 28 as a whole to rotate with respect to the head 38 of the action-slide 39 and to longitudinally shift the latter.

Immediately to the rear of the helically-inclined actuating-slot 37, before referred to, is a longitudinally-extending guide-slot 43, which is intersected at its rear end by a helically-inclined cam-slot 44 which, however, slopes in the opposite direction and has a helix angle much less than the helix angle of the said actuating-slots 37—37. At a point opposite its point of intersection with the relatively-long guide-slot 43, the cam-slot 44 intersects a relatively-short guide-slot 45. Adapted to ride in the guide-slots 43 and 45, as well as in the cam-slot 44, for the purpose as will hereinafter appear, is the head 46 of a cam-stud 46a securely riveted or otherwise secured in the guide-tube 25, as is particularly well shown in Fig. 8.

The action-slide 39, above referred to, extends parallel with the guide-tube 25 along one side thereof and in spaced relationship with respect thereto, and has its rear end entered into the receiver 20, in the usual manner of slide-action firearms, and as is shown in Fig. 1. The rear end of the action-slide 39 is provided with a stud 47 by means of which it is operatively coupled to a breech-bolt 48, by the entry of the said stud into a usual L-shaped groove 49, formed in the side-wall of the said breech-bolt. The particular type of breech-bolt employed requires no detail description herein other than to state that the breech-bolt is formed with an upwardly-extending locking-lug 50 which is adapted to enter a locking-recess 51 formed in the under side of the upper wall of the receiver 20, as is shown in Fig. 1.

The breech-bolt 48, above referred to, carries an extractor 52 which is adapted to engage with the forward face of the head 53 of a cartridge-case 54 located in the cartridge-chamber 55 in the rear end of the barrel 24, all for the purpose of extracting the said cartridge-case from the cartridge-chamber after the gun has been fired and the breech-bolt retracted preparatory to reloading.

For the purpose of making clear the operation of the novel extractor-operating mechanism before described, let it be assumed that the parts are in the position in which they are shown in Fig. 1 and that the firearm has just been discharged.

Under the conditions above described, the next step in the normal operation of the firearm is to remove the cartridge-case 54 of the now-fired cartridge from the cartridge-chamber 55 of the barrel 24. This action may be effected by exerting a rearward draft upon the operating-handle or fore-end 29. When rearward draft is exerted upon the operating-handle 29 to move the same from the position in which it is shown in Fig. 1 into the position in which it is shown in Fig. 2, the actuating-screw 36 will, of course, move rearwardly with the said operating-handle, through the guide-slots 27 in the guide-tube 25. In so moving, the actuating-screw 36 will, through the medium of the actuating-slots 37, tend to turn the transmitting-member or sleeve 28, but since, during the motion described, the cam-stud head 46 (which is a fixed feature of the firearm) is located in the guide-slot 45, the turning movement of the member 28 can not as yet take place. The result of the initial rearward draft upon the operating-handle 29 will, therefore, be to slide the transmitting-member 28 rearwardly in a straight path with the effect of similarly moving the action-slide 39. In this manner, the action-slide will be moved rearwardly a distance sufficient to cause its stud 47 to downwardly rock the rear end of the breech-bolt 48, to thus disengage its locking-lug 50 from the locking-recess 51 preparatory to the rearward travel of the said breech-bolt. At the time that the operating-handle 29 and the parts connected thereto have reached the positions in which they are shown in Fig. 2, the tubular transmitting-member 28 will have been moved rearwardly sufficiently to bring its cam-slot 44 into registration with the head 46 of the cam-stud 46a, thereby relieving the said transmitting-member of restraint against turning movement on the guide-tube 25.

The further movement of the operating-handle 29 will now cause the actuating-screw 36 to act through the inclined actuating-slots 37—37 to cause the turning of the transmitting-member 28. The turning movement, just referred to, will cause the rear wall of the cam-slot 44 therein to ride against the rear face of the head 46 of the cam-stud 46a, thereby causing a very forceful, though relatively slow and short, rearward movement of the action-slide 39 and hence of the breech-bolt 48 and the extractor 52 carried thereby. During the phase of movement just referred to, it will be noted that the operating-handle 29 must move the relatively-long distance represented by the length of the actuating-slots 37—37 measured in a direction lengthwise of the transmitting-member 28, in order to effect the rearward camming of the action-slide 39 the slight

axial distance represented by the difference between the opposite ends of the cam-slot **44**. The multiplication of force, just referred to, is in the structure shown about four to one and will, therefore, enable the user of the firearm to free the cartridge-case **54** in the event that it should be adhered to the walls of the cartridge-chamber **55**, by the exertion of but a relatively nominal force.

After the cartridge-case **54** has been freed from adhesion to the surface of the cartridge-chamber **55**, as above described, the parts will have reached the positions in which they are shown in Fig. 3, in which the transmitting-member **28** has been turned to the limit of its movement so as to bring the guide-slot **43** therein beneath the guide-tube **25** and hence in line with the head **46** of the cam-stud **46a**.

The further rearward movement of the operating-handle **29** will now effect the movement of the parts from the positions in which they are shown in Fig. 3 into the positions in which they are shown in Fig. 4, during which movement the guide-slot **43** will ride rearwardly with respect to the cam-stud **46a** and other fixed parts of the firearm until the forward wall of the said slot abuts against the head **46** of the said cam-stud, in the event that the rearward travel of the said transmitting-member is not previously checked by such stop-means as may be provided for checking the rearward movement of the breech-bolt **48**. The cartridge-case **54** will now have been completely withdrawn from the cartridge-chamber **55** for ejection by any suitable ejector-means, not shown.

After the complete extraction of the cartridge-case **54**, as above described, the user of the firearm will exert a forward thrust upon the operating-handle or fore-end **29** to thus move the parts from the positions in which they are shown in Fig. 4 through the successive stages represented by Figs. 3 and 2, and finally into the positions in which the parts are shown in Fig. 1, preparatory to again discharging the firearm followed by another cycle of operation like that before described.

The invention may be carried out in other specific ways than those herein set forth without departing from the spirit and essential characteristics of the invention, and the present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive, and all changes coming within the meaning and equivalency range of the appended claims are intended to be embraced therein.

I claim:

1. A pump-action firearm including in combination: a barrel having a cartridge-chamber; a cartridge-extractor for extracting cartridges from the cartridge-chamber of the said barrel; a reciprocating operating-handle for operating the said cartridge-extractor; and force-multiplying means operatively interposed between the said reciprocating operating-handle and the said extractor and constructed and arranged to multiply the force applied to the said operating-handle and transmit the movement of the latter to the said extractor to move the same rearwardly at a relatively-slow rate to free a cartridge-case from the cartridge-chamber, and then transmit the said movement at a more rapid rate to further rearwardly move the said extractor to complete the extraction of the said cartridge-case.

2. A pump-action firearm including in combination: a barrel having a cartridge-chamber; a cartridge-extractor for extracting cartridges from the cartridge-chamber of the said barrel; a reciprocating operating-handle for operating the said cartridge-extractor; and force-multiplying means operatively interposed between the said reciprocating operating-handle and the said extractor and including a rotary transmitting-member constructed and arranged to multiply the force applied to the said operating-handle and transmit the movement of the latter to the said extractor to move the same rearwardly at a relatively-slow rate to free a cartridge-case from the cartridge-chamber, and then transmit the said movement at a more rapid rate to further rearwardly move the said extractor to complete the extraction of the said cartridge-case.

3. A pump-action firearm including in combination: a barrel having a cartridge-chamber; a cartridge-extractor for extracting cartridges from the cartridge-chamber of the said barrel; a reciprocating operating-handle for operating the said cartridge-extractor; and force-multiplying means operatively interposed between the said operating-handle and the said extractor and including a rotary and reciprocable transmitting member constructed and arranged to multiply the force applied to the said operating-handle and transmit the movement of the latter to the said extractor to move the same rearwardly at a relatively-slow rate to free a cartridge-case from the cartridge-chamber, and then transmit the said movement at a more rapid rate to further rearwardly move the said extractor to complete the extraction of the said cartridge-case.

4. A pump-action firearm including in combination: a barrel having a cartridge-chamber; a cartridge-extractor for extracting cartridges from the cartridge-chamber of the said barrel; a reciprocating operating-handle for operating the said cartridge-extractor; and force-multiplying means operatively interposed between the said reciprocating operating-handle and the said extractor and including a rotary and reciprocable trnsmitting-member having inclined slots therein constructed and arranged to multiply the force applied to the said operating-handle and transmit the movement of the latter to the said extractor to move the same rearwardly at a relatively-slow rate to free a cartridge-case from the cartridge-chamber, and then transmit the said movement at a more rapid rate to further rearwardly move the said extractor to complete the extraction of the said cartridge-case.

5. A pump-action firearm including in combination: a barrel having a cartridge-chamber; a cartridge-extractor for extracting cartridges from the cartridge-chamber of the said barrel; a reciprocating operating-handle for operating the said cartridge-extractor; and force-multiplying means operatively interposed between the said reciprocating operating-handle and the said extractor and including a rotary and reciprocable transmitting-member having an inclined slot of relatively-great helix angle and an inclined slot of relatively-lesser helix angle constructed and arranged to multiply the force applied to the said operating-handle and transmit the movement of the latter to the said extractor at a relatively-slow rate to free a cartridge-case from the cartridge-chamber, and then transmit the said movement at a more rapid rate to complete the extraction of the said cartridge-case.

6. A pump-action firearm including in combination: a barrel having a cartridge-chamber; a cartridge-extractor for extracting cartridges from the cartridge-chamber of the said barrel;

a reciprocating operating-handle for operating the said cartridge-extractor; and force-multiplying means operatively interposed between the said reciprocating operating-handle and the said extractor and including a rotary and reciprocable transmitting-member having an inclined slot of relatively-great helix angle, a longitudinal slot, and an inclined slot intersecting the said longitudinal slot and having a relatively-lesser helix angle than the first-mentioned inclined slot, the said force-multiplying means being constructed and arranged to multiply the force applied to the said operating-handle and transmit the movement of the latter to the said extractor at a relatively-slow rate to free a cartridge-case from the cartridge-chamber, and then transmit the said movement at a more rapid rate to complete the extraction of the said cartridge-case.

7. A pump-action firearm including in combination: a barrel having a cartridge-chamber; a cartridge-extractor for extracting cartridges from the cartridge-chamber of the said barrel; a reciprocating operating-handle for operating the said cartridge-extractor; and force-multiplying means operatively interposed between the said reciprocating operating-handle and the said extractor and including a rotary and reciprocable transmitting-member having an inclined slot of relatively-great helix angle, two laterally-displaced longitudinal slots, and an inclined slot intersecting both of the said longitudinal slots and having a helix angle less than the helix angle of the first-mentioned inclined slot, the said force-multiplying means being constructed and arranged to multiply the force applied to the said operating-handle and transmit the movement of the latter to the said extractor at a relatively-slow rate to free a cartridge-case from the cartridge-chamber, and then transmit the said movement at a more rapid rate to complete the extraction of the said cartridge-case.

8. A pump-action firearm including in combination: a barrel having a cartridge-chamber; a cartridge-extractor for extracting cartridges from the cartridge-chamber of the said barrel; a guide-member extending in substantial parallelism with the said barrel; a reciprocating operating-handle for operating the cartridge-extractor and slidable upon the said guide-member; and force-multiplying means operatively interposed between the said reciprocating operating-handle and the said cartridge-extractor and including a rotary and reciprocable transmitting-member mounted upon the said guide-member and having inclined slots therein constructed and arranged to multiply the force applied to the said operating-handle and transmit the movement of the latter to the said extractor to move the same rearwardly at a relatively-slow rate to free a cartridge-case from the cartridge-chamber, and then transmit the said movement at a more rapid rate to further rearwardly move the said extractor to complete the extraction of the said cartridge-case.

9. A pump-action firearm including in combination: a barrel having a cartridge-chamber; a cartridge-extractor for extracting cartridges from the cartridge-chamber of the said barrel; a guide-member extending in substantial parallelism with the said barrel; a reciprocating operating-handle for operating the cartridge-extractor and slidable upon the said guide-member; and force-multiplying means operatively interposed between the said reciprocating operating-handle and the said cartridge-extractor and including a rotary and reciprocable transmitting-member mounted upon the said guide-member and having an inclined slot of relatively-great helix angle and an inclined slot of relatively-lesser helix angle constructed and arranged to multiply the force applied to the said operating-handle and transmit the movement of the latter to the said extractor at a relatively-slow rate to free a cartridge-case from the cartridge-chamber, and then transmit the said movement at a more rapid rate to complete the extraction of the said cartridge-case.

10. A pump-action firearm including in combination: a barrel having a cartridge-chamber; a cartridge-extractor for extracting cartridges from the cartridge-chamber of the said barrel; a guide-member extending in substantial parallelism with the said barrel; a reciprocating operating-handle for operating the cartridge-extractor and slidable upon the said guide-member; and force-multiplying means operatively interposed between the said reciprocating operating-handle and the said cartridge-extractor and including a rotary and reciprocable transmitting-member mounted upon the said guide-member and having an inclined slot of relatively-great helix angle, a longitudinal slot, and an inclined slot intersecting the said longitudinal slot and having a relatively-lesser helix angle than the first-mentioned inclined slot; the said force-multiplying means being constructed and arranged to multiply the force applied to the said operating-handle and transmit the movement of the latter to the said extractor at a relatively-slow rate to free a cartridge-case from the cartridge-chamber, and then transmit the said movement at a more rapid rate to complete the extraction of the said cartridge-case.

11. A pump-action firearm including in combination: a barrel having a cartridge-chamber; a cartridge-extractor for extracting cartridges from the cartridge-chamber of the said barrel; a guide-member extending in substantial parallelism with the said barrel; a reciprocating operating-handle for operating the cartridge-extractor and slidable upon the said guide-member; and force-multiplying means operatively interposed between the said reciprocating operating-handle and the said cartridge-extractor and including a rotary and reciprocable transmitting-member mounted upon the said guide-member and having an inclined slot of relatively-great helix angle, two laterally-displaced longitudinal slots, and an inclined slot intersecting both of the said longitudinal slots and having a helix angle less than the helix angle of the first-mentioned inclined slot; the said force-multiplying means being constructed and arranged to multiply the force applied to the said operating-handle and transmit the movement of the latter to the said extractor at a relatively-slow rate to free a cartridge-case from the cartridge-chamber, and then transmit the said movement at a more rapid rate to complete the extraction of the said cartridge-case.

12. A pump-action firearm including in combination: a barrel having a cartridge-chamber; a reciprocating breech-bolt; a cartridge-extractor carried by the said breech-bolt; a reciprocating operating-handle for operating the said reciprocating breech-bolt; and force-multiplying means operatively interposed between the said reciprocating operating-handle and the said reciprocating breech-bolt, and constructed and arranged to multiply the force applied to the said

operating-handle and transmit the movement of the latter to the said breech-bolt to move the same rearwardly at a relatively-slow rate to free a cartridge-case from the cartridge-chamber and then transmit the said movement at a more rapid rate to further rearwardly move the said extractor to complete the extraction of the said cartridge-case.

13. A pump-action firearm including in combination; a barrel having a cartridge-chamber; a reciprocating breech-bolt; a cartridge-extractor carried by the said breech-bolt; a reciprocating operating-handle for operating the said reciprocating breech-bolt; and force-multiplying means operatively interposed between the said operating-handle and the said reciprocating breech-bolt and including a rotary transmitting-member constructed and arranged to multiply the force applied to the said operating-handle and transmit the movement of the latter to the said breech-bolt to move the same rearwardly at a relatively-slow rate to free a cartridge-case from the cartridge-chamber and then transmit the said movement at a more rapid rate to further rearwardly move the said extractor to complete the extraction of the said cartridge-case.

14. A pump-action firearm including in combination: a barrel having a cartridge-chamber; a reciprocating breech-bolt; a cartridge-extractor carried by the said breech-bolt; a reciprocating operating-handle for operating the said reciprocating breech-bolt; and force-multiplying means operatively interposed between the said reciprocating operating-handle and the said reciprocating breech-bolt and including a rotary and reciprocable transmitting-member constructed and arranged to multiply the force applied to the said operating-handle and transmit the movement of the latter to the said breech-bolt to move the same rearwardly at a relatively-slow rate to free a cartridge-case from the cartridge-chamber and then transmit the said movement at a more rapid rate to further rearwardly move the said extractor to complete the extraction of the said cartridge-case.

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