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PATENTED DEC. 25, 1906.

G. LUGER.
RECOIL OPERATED FIREARM.
APPLICATION FILED MAR. 5, 1906.

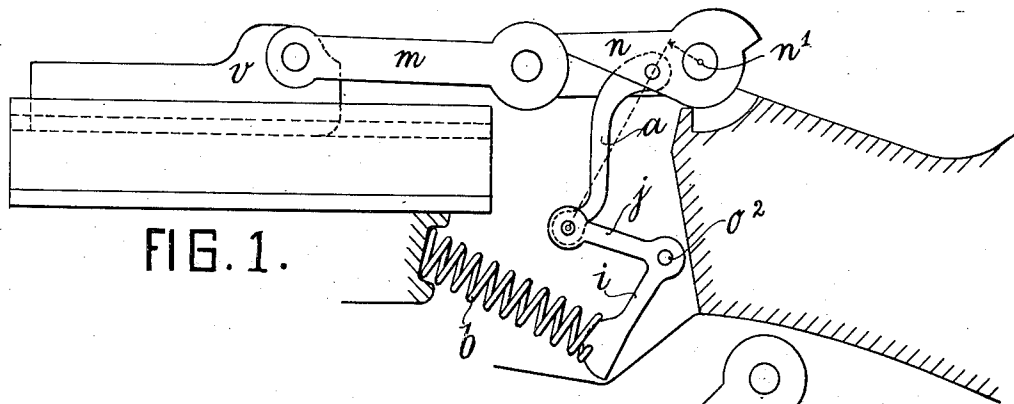


FIG. 1.

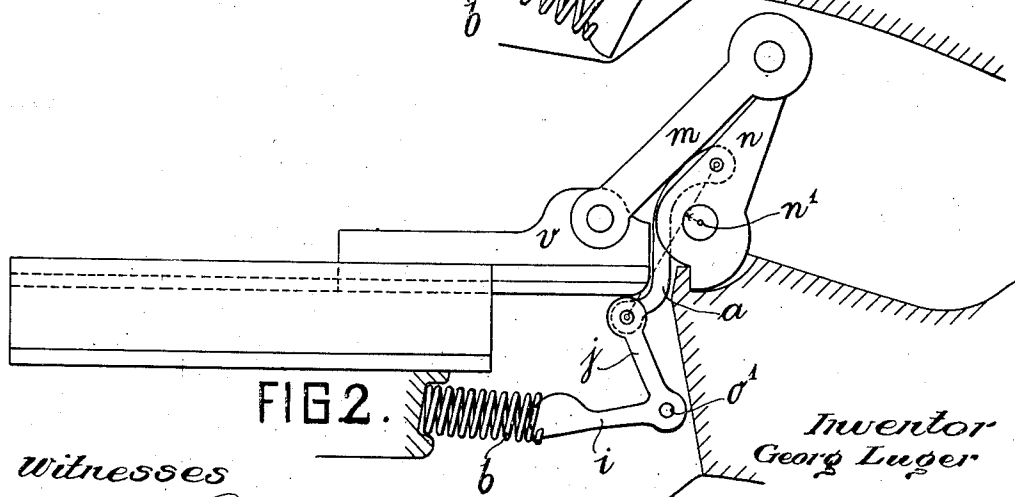


FIG. 2.

Witnesses

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GEORG LUGER, OF CHARLOTTENBURG, GERMANY.

RECOIL-OPERATED FIREARM.

No. 839,778.

Specification of Letters Patent.

Patented Dec. 25, 1906.

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To all whom it may concern:

Be it known that I, GEORG LUGER, a subject of the Emperor of Austria-Hungary, residing at 28 Weimarer strasse, Charlottenburg, Germany, have invented new and useful Improvements in Recoil-Operated Firearms, of which the following is a specification.

This invention has reference to that class of recoil-operated firearms in which the breech-bolt is actuated by toggle-links, and the object is to provide improved spring devices for the toggle-links whereby the full efficiency of the spring tension and leverage will be utilized to close the toggle-links, but will be less effective as a retarding force when the links are opening in consequence of the recoil.

In the accompanying drawings, Figure 1 shows the parts in the positions they normally assume—that is, while the breech-bolt and toggle-links are closed. Fig. 2 illustrates the open positions following the recoil.

Referring to the drawings, the invention is illustrated as embodied in a small arm, although it is obviously adaptable to pistols and other firearms and to those employing a recoil-movable barrel.

The letters *m* and *n* designate the toggle-links constituting the actuating mechanism for the breech-bolt *v*, the fulcrum of the rearward link being indicated at *n'*. An S-shaped depending link *a* connects the toggle-link *n* to the upper arm *j* of a bell-crank lever fulcrumed at *o*² in the gun-case. The spring *b*, (shown in the form of a helical thrust-spring) is secured at one end to the gun-case and at the other to the lower arm *i* of the bell-crank lever. The dotted lines indicate the distance between the fulcrum *n'* and the line of action of the link *a* in the two extreme positions of the breech-bolt.

In operation when the breech-bolt is closed and the other parts are in the positions shown in Fig. 1, and assuming the gun to be loaded, its discharge or firing will cause the breech-bolt to recoil or move rearwardly under the pressure of the powder-gases created by the explosion of the cartridge. At the same time the toggle mechanism will assume the position shown in Fig. 2 against the tension of the spring and the forces of the leverage. It will be noted, however, that as the toggles rise the line of action of link *a* approaches the fulcrum *n'* and the arm *i* of the

bell-crank approaches the line of the spring-action. Thus the link, the bell-crank, and the spring assume the positions of least leverage and highest compression. In the return or closing movement of the breech-bolt the force of the compression-spring acts upon an increasing leverage of the arm *i* of the bell-crank and the link *a*. Consequently there is a double leverage between the spring and breech-bolt mechanism. It will also be noted that the full actions of the spring and leverage are about completed when the breech-bolt reaches its closed position, save for sufficient to hold the breech-bolt closed. In this way too great pressure at the closing of the breech-bolt and the consequent tendency to rapid counter action are successfully obviated.

If desired, a plurality of springs *b* may be employed, or a plate-spring may be substituted for the helical compression member shown.

I claim as my invention—

1. In a recoil-operated firearm, the combination with the breech-bolt, and the toggle-links actuating said breech-bolt, of a spring tending to hold said breech-bolt in its closed position, and means for transmitting the power of said spring to said breech-bolt in multiplied ratio comprising a lever and a link pivoted to one of said toggle-links and to said lever.

2. In a recoil-operated firearm, the combination with the breech-bolt, and the toggle-links actuating said breech-bolt, of a compression-spring tending to hold said breech-bolt in its closed position, and means for transmitting the power of said spring to said breech-bolt in multiplied ratio comprising a bell-crank lever having one of its arms secured to said compression-spring, and a link pivoted at one end to the rear toggle-link and pivoted at its other end to the other arm of said bell-crank.

3. In a recoil-operated firearm, the combination with the breech-bolt, and the toggle-links actuating said breech-bolt, of a compression-spring tending to hold said breech-bolt in its closed position, and means for transmitting the power of said spring to said breech-bolt in multiplied ratio comprising a bell-crank lever having its fulcrum in the line of action of said spring and having its lower arm secured to said spring whereby when said arm is at the point of least leverage said spring is at its highest compression, and a

link connecting the upper arm of said bell-crank to the rear toggle-link.

4. In a recoil-operated firearm, the combination with the breech-bolt, and the toggle-
5 links actuating said breech-bolt, of a compression-spring tending to hold said breech-bolt in its closed position, and means for transmitting the power of said spring to said
10 bell-crank lever having one of its arms secured to said compression-spring, and a link pivoted to the other arm of the bell-crank and to the rear toggle at a point in advance of the fulcrum of the latter, whereby when
15 said spring is at its highest compression said link is at the point of least leverage.

5. In a recoil-operated firearm, the combination with the breech-bolt and the toggle-

links actuating said breech-bolt, of a spring tending to hold said breech-bolt in its closed 20 position, a bell-crank lever having one of its arms secured to the spring, a link connecting the other arm of said bell-crank to the rear toggle, and means whereby the greatest lever-
25 ages of said bell-crank and link act on said breech-bolt in its closing movement and their least leverages are exerted when said breech-bolt is open.

In testimony whereof I have signed my name to this specification in the presence of 30 two subscribing witnesses.

GEORG LUGER.

Witnesses:

HENRY HASPER,
WOLDEMAR HAUPT.