K. HAUSSNER.

RETARDING APPARATUS FOR GUNS HAVING DIFFERENTIAL RECOIL.

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955,795. **Patented Apr. 19, 1910.**

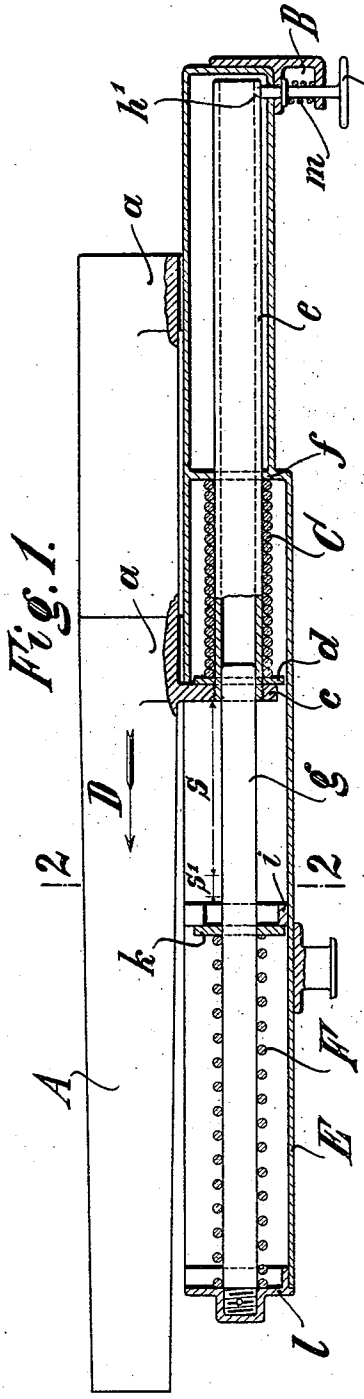

Fig. 1.

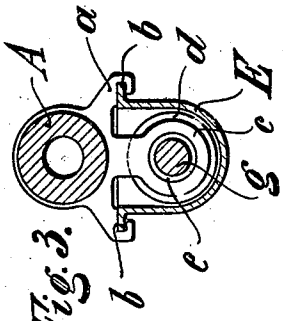

Fig. 3.

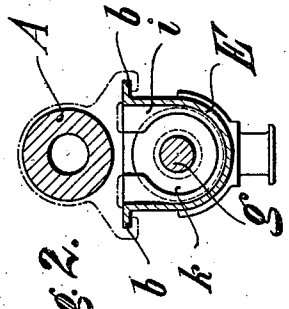

Fig. 2.

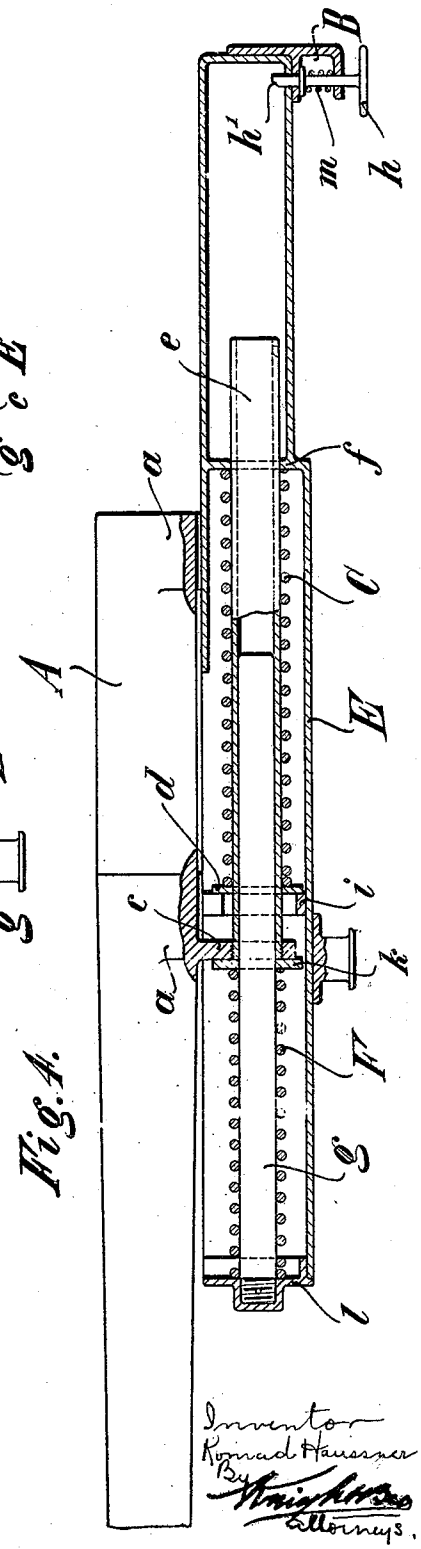

Fig. 4.

Witnesses
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UNITED STATES PATENT OFFICE.

KONRAD HAUSSNER, OF EISENACH, GERMANY.

RETARDING APPARATUS FOR GUNS HAVING DIFFERENTIAL RECOIL.

955,795. Specification of Letters Patent. Patented Apr. 19, 1910.

Application filed June 17, 1909. Serial No. 502,848.

To all whom it may concern:

Be it known that I, KONRAD HAUSSNER, a subject of the Emperor of Germany, residing at Eisenach, Germany, have invented certain new and useful Improvements in Retarding Apparatus for Guns having Differential Recoil, of which the following is a specification.

The present invention relates to the type of recoil guns which has, in addition to the recuperator, a means associated therewith for restraining the gun-barrel from moving forwardly out of the guides of its carriage under certain conditions of firing.

When, in a gun having differential recoil, the explosion of the powder charge does not take place through any cause, say owing to miss-fire for example, or if delayed ignition takes place, or if only blank cartridges are fired, the barrel will move forward beyond the calculated running-out path and might in such cases either fall forwardly out of the guides of the upper carriage, or strike with such violence against some part of the carriage that certain of the parts or the whole of the carriage would be damaged. In order to obviate this disadvantage, the herein described improvement is employed, according to which the barrel is arrested by a brake or an accumulator which absorbs the work stored up in the barrel during forward movement, preferably during an extent of forward movement equal to at least half the caliber of the barrel of the gun, in order to avoid overstraining the parts of the carriage.

The invention is shown by way of example, in the accompanying drawings, wherein:

Figure 1 shows a gun partially in longitudinal section having differential recoil with a spring accumulator serving as the arresting device, Fig. 2 is a transverse section on the plane 2—2 looking from the rear, Fig. 3 is the same transverse section looking from the front and, Fig. 4 is again a longitudinal section through the upper carriage, the barrel being shown after a miss-fire has occurred in the position in which it compresses the spring accumulator which serves as the arresting device.

Referring in detail to the structure shown, the barrel A rests and is guided by means of its lugs *a a* on the guide ribs *b b* of the upper carriage. When the gun is fired, ignition of the charge takes place after the barrel traverses the path *s* and after the farther course s^1 the return of the barrel takes place. The running-out spring C is carried upon the hollow spring-supporting cylinder *e*, which latter is rigidly connected to the barrel projection *c*, and is guided by the rear spring abutment *f*. The front spring abutment is formed by the disk *d* which bears against the barrel projection *c* and is loosely mounted on the spring supporting cylinder. The locking mechanism B which holds the barrel in the loading and pointing position, consists of the safety pin *h*, the forward obliquely shaped end h^1 of which is caused to enter the hole in the spring supporting cylinder by means of the spring *m*.

The spring accumulator F, which comes into operation when the path $s+s^1$ of the barrel is exceeded, is carried upon the spring-supporting cylinder *g*, over which the hollow spring-supporting cylinder *e* pushes itself when the barrel runs out in the direction of the arrow D. The front end of the spring accumulator bears against the front end wall *l* of the upper carriage, and its rear end bears against the disk *k* which is carried loosely upon the spring-supporting cylinder *g* and the bearing *i* rigidly connected to the upper carriage. The spring F, which is preferably in a previously or initially stressed state, is so calculated that it can store up again the whole of the *vis viva* of the barrel arising from the running-out gear C.

As can be seen from Fig. 3, the barrel projection *c* is so shaped, that it can pass without hindrance through the bearing *i*. On the other hand, the disk *d* is prevented by the same bearing *i* from moving farther forward, and consequently forms, as can be seen from Fig. 4, an immovable abutment for the running-out gear C, the result of which is that the latter can no longer act upon the barrel and so not unnecessarily forms a counter-action for the spring F.

As soon as the barrel projection *c* strikes against the disk *k*, the spring F is compressed until the barrel comes to rest. The barrel now stopped can be secured in this position by a locking mechanism not shown in the drawing, or, when there is no such mechanism, the spring F immediately forces the barrel rearward again and continues to act acceleratingly upon the barrel until the disk *k* once more bears against the bearing *i*. The rearwardly moving barrel again bears with its projection *c* against the disk *d*, and compresses the spring running-out gear C until it comes to rest. A locking mech-

anism (not shown here) is now employed to prevent the barrel from moving forward again. By means of a further device, the barrel is finally brought back into the loading and pointing position.

I claim—

1. In a gun having differential recoil, the combination with the gun-barrel, its carriage, and running-out gear, of an accumulator adapted to come into action automatically and bring the barrel to a standstill when said barrel moves out beyond the firing position, and means for arresting the movement of the running-out gear when said accumulator comes into action.

2. In a gun having differential recoil, the combination with the gun-barrel, its carriage, and running-out gear, of an accumulator adapted to come into action automatically and bring the barrel to a standstill when said barrel moves out beyond the firing position, and an abutment on the carriage for arresting the movement of the running-out gear when said accumulator comes into action.

3. In a gun having differential recoil, the combination with the gun-barrel, its carriage, and running-out gear, of an accumulator adapted to come into action automatically and bring the barrel to a standstill when said barrel moves out beyond the firing position, a shaft carried by the gun carriage on which said running-out gear and accumulator are mounted, an abutment on the gun barrel adapted to engage with the running-out gear and accumulator, and an abutment on the carriage for arresting the movement of said running-out gear when said accumulator comes into action.

4. In a gun having differential recoil, the combination with the gun-barrel (A) its carriage (E) and running out gear (C) of retarding apparatus comprising an accumulator (F), an abutment (*c*) carried by the gun-barrel and adapted to transmit the pressure on said barrel arising from the running-out gear (C) to the carriage (E); and an abutment (*i*) on the carriage adapted to engage with and support the accumulator whereby to take the load off said accumulator, and acting as an arresting device for the running-out gear.

5. In a gun having differential recoil, the combination with the gun-barrel (A), its carriage (E), and running out gear (C) of retarding apparatus comprising an accumulator (F *g k*), an abutment (*c*) carried by the gun barrel and adapted to transmit the pressure on said barrel arising from the running-out gear (C) to the carriage (E); and an abutment (*i*) on the carriage, said gun-barrel abutment (*c*) serving to receive the free end of the accumulator member (*g*), and adapted in its movements to freely pass the carriage abutment (*i*), said abutment (*i*) adapted to engage with and stop the member (*k*) and support the accumulator whereby to take the load off the accumulator, and acting as the arresting device for the running-out gear.

6. In a gun having differential recoil, the combination with the gun-barrel, its carriage and a running out gear, of retarding apparatus comprising an accumulator connected to the gun carriage, an abutment carried by the gun barrel adapted to receive the pressure exerted by the running out gear, and coöperate with said accumulator to bring the gun barrel to a standstill when the barrel moves out beyond the firing position, and a means on the carriage to take up the pressure exerted on the gun barrel by the running out gear during the action of the accumulator.

7. In a gun having differential recoil, the combination with the gun-barrel, its carriage and running-out gear, of a safety-device, adapted to come into action automatically and bring the barrel to a standstill when the same moves out beyond the firing position, and means whereby the pressure exerted on the barrel from the running-out gear is arrested during the action of the said safety-device.

8. In a gun having differential recoil, the combination with the gun-barrel, its carriage and running-out gear, of a safety-device comprising an accumulator adapted to come into action automatically and bring the barrel to a standstill when the same moves out beyond the firing position and to work a distance equal to at least half the caliber of the gun-barrel, and means whereby the pressure exerted on the barrel from the running-out gear is arrested during the action of the said accumulator.

The foregoing specification signed at Erfurt, Germany, this 4th day of June, 1909.

KONRAD HAUSSNER.

In presence of—

WILHELM FIEDLER,

CARL GRUNWALD.