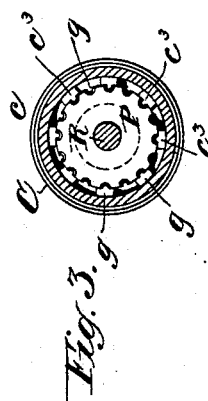
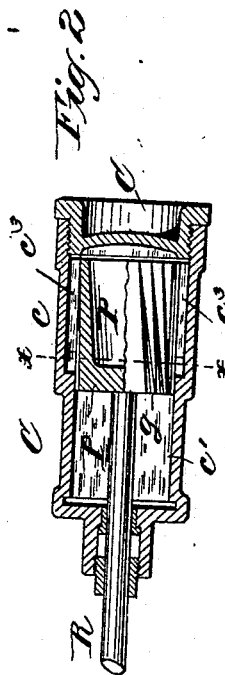
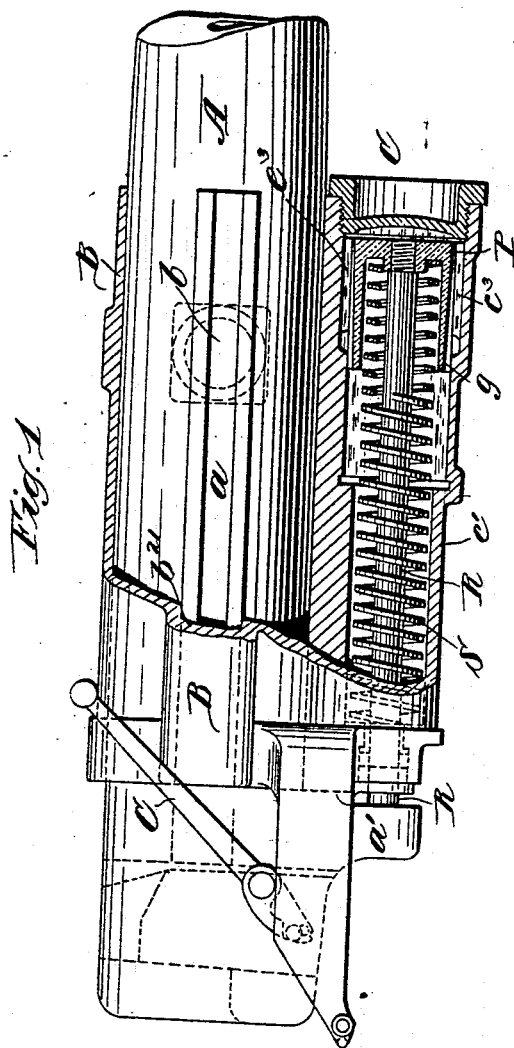


(No Model.)

E. R. VON SKODA.
RECOIL BRAKE FOR GUNS.

No. 422,099.

Patented Feb. 25, 1890.



Witnesses.
Thomson Cross
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UNITED STATES PATENT OFFICE.

EMIL RITTER V. SKODA, OF PILSEN, BOHEMIA, AUSTRIA-HUNGARY.

RECOIL-BRAKE FOR GUNS.

SPECIFICATION forming part of Letters Patent No. 422,099, dated February 25, 1890.

Application filed October 12, 1889. Serial No. 326,809. (No model.) Patented in Germany December 1, 1888, No. 47,472; in France December 1, 1888, No. 194,484; in Belgium December 1, 1888, No. 84,142; in Switzerland December 1, 1888, No. 145; in Italy January 8, 1889, XXII, 24,493, XLVIII, 120, and in Austria-Hungary March 11, 1889, No. 47,482 and No. 5,728.

To all whom it may concern:

Beit known that I, EMIL RITTER VON SKODA, a subject of the Emperor of Austria, residing at Pilsen, in the Province of Bohemia, in the Empire of Austria-Hungary, have invented certain new and useful Improvements in Recoil-Brakes for Guns, (for which I have obtained Letters Patent in Austria-Hungary, No. 47,482, dated March 11, 1889, and No. 5,728, dated March 11, 1889; in Germany, No. 47,472, dated December 1, 1888; in France, No. 194,484, dated December 1, 1888; in Belgium No. 84,142, dated December 1, 1888; in Switzerland, No. 145, dated December 1, 1888; in Italy, Reg. Gen., Vol. XXII, No. 24,493, and Reg. Att., Vol. XLVIII, No. 120, dated January 8, 1889;) and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

Referring to the drawings, Figure 1 is a sectional side elevation of so much of a gun as is necessary to illustrate my invention. Fig. 2 is a longitudinal axial section, partly in elevation, of a brake, the spring being omitted; and Fig. 3 is a cross-section taken on the line *x x* of Fig. 2.

The invention relates to means for counteracting the recoil of a gun, and commonly termed "recoil-brakes;" and it consists in a cylinder of variable cross-sectional areas for containing fluid, and a piston having longitudinal or helical grooves of variable cross-sectional areas; also, in combination with the piston, of an auxiliary power, such as a spring, substantially as hereinafter described, and as set forth in the claims.

In the accompanying drawings I have illustrated a rapid-firing gun that has an endwise motion in a suitable support, the brake-cylinder being connected with the support and the piston thereof with the gun, the latter being of the system of rapid-firing guns such as I have described in my applications for Letters

Patent filed October 4, 1889, Serial No. 325,987, and October 9, 1889, Serial No. 326,392, respectively.

Although the invention is more especially designed for use with the system of guns referred to, I do not desire to limit myself to this use, as it is evident that the brake-cylinder may be secured to a stationary element of a gun, such as a gun-platform, and the piston to the movable gun, or vice versa, as may be found most convenient, so that the ordinary space allowed for the recoil of guns may be greatly reduced.

In Fig. 1 I have shown the gun mounted in a support B, in which said gun has free endwise motion, the gun A being provided with ribs or tongues *a*, that fit into guide-grooves *b*²¹ of the support B, which is also provided with trunnions *b*, on which it is adapted to revolve with the gun for purposes of training. With the support B is connected or cast a brake-cylinder C, the forward portion *c* of which is of greater diameter than the rear portion *c'*. The cylinder contains a piston P, the rod R of which is connected to a lug *a'*, depending from the breech end of the gun. The piston P is of such diameter as to fit the smaller portion *c'* of the cylinder fluid-tight, but is provided with peripheral helical grooves *g*, the cross-sectional area whereof decreases gradually from the inner to the outer end of the piston, the combined grooves forming a helical peripheral fluid-passage, the cross-sectional area of which gradually decreases from the rear to the front end of the piston. The portion *c*, of greater diameter than the cylinder C, is provided with guide-ribs *c*³, that, together with the smaller portion *c'* of said cylinder, serve to guide the piston P in its movements. In its normal position the piston occupies the front end of the cylinder C, as shown in Fig. 1, and it will be seen that when the gun recoils in its support and the piston moves back the fluid in said piston will be forced into and through the grooves *c*³, and, as these grooves or channels decrease in cross-sectional area, the volume of fluid passing therethrough decreases cor-

respondingly, thus offering a gradually increasing resistance to the rearward movement of the piston and forming a variable brake. This is an important feature, as it effectually prevents any danger of breakage of the parts, which may result during the first part of the recoil.

In order to avoid the use of large brake-cylinders, and also in order to automatically return the gun to its normal position after recoil, when the brake is applied to rapid-firing guns, I employ an auxiliary power, as shown in Fig. 1, which consists of a spring S, the power of which is governed by the weight of the gun, to bring the same back into its normal position.

In practice I so construct the brake-cylinder that one half thereof is of greater cross-sectional area than the other half, although this is not absolutely necessary. In Fig. 2 I have shown a brake without the auxiliary power-spring.

It is obvious that instead of helical grooves *g* straight grooves may be employed.

The resistance to the passage of the liquid increasing in proportion to the length of the grooves, it follows that such resistance is greater in a helical than in a straight groove.

Having described my invention, what I desire to secure by Letters Patent, and claim, is—

1. A brake for ordnance, consisting of a brake-cylinder of variable cross-sectional area and adapted to contain a fluid, said cylinder being connected with a stationary element of the gun, in combination with a piston fitting the least cross-sectional area of the cylinder, connected with a movable element of the gun, and having a fluid-passage the sectional area of which varies, substantially as and for the purposes specified.

2. A brake for ordnance, consisting of a brake-cylinder adapted to contain a fluid, the forward portion of which is of greater diameter than the rear portion, said cylinder being connected with a stationary element of the gun, in combination with a piston constructed to fit the smaller portion of said cylinder, said piston being connected with a movable element of the gun and provided with peripheral grooves extending from end to end of the piston, said grooves decreasing in cross-sectional area from the rear to the front end

of said piston, substantially as and for the purposes specified.

3. A brake for ordnance, consisting of a brake-cylinder connected with a stationary element of the gun and adapted to contain a fluid, the rear portion of said cylinder being of less sectional area than the front portion, in combination with a piston constructed to fit the smaller portion of the cylinder and having helical peripheral channels for the fluid, and a coiled spring arranged to exert its power on said piston, substantially as and for the purposes specified.

4. A brake for ordnance, consisting of a brake-cylinder connected with a stationary element of the gun and adapted to contain a fluid, the rear portion of said cylinder being of less sectional area than the front portion, in combination with a piston constructed to fit the smaller portion of the cylinder and having peripheral channels for the fluid of gradually decreasing cross-sectional area from the rear to the front end of said piston, and a coiled spring arranged to exert its power on said piston, substantially as and for the purposes specified.

5. A brake for ordnance, consisting of a brake-cylinder, the outer portion *c* of which is of greater cross-sectional area than the inner portion *c'*, said outer portion being provided with guide-ribs *c''*, in combination with a piston provided with helical peripheral grooves *g*, decreasing in cross-sectional area from the inner to the outer end of said piston, substantially as and for the purposes specified.

6. A brake for ordnance, consisting of a brake-cylinder, the outer portion *c* of which is of greater cross-sectional area than the inner portion *c'*, said outer portion being provided with guide-ribs *c''*, in combination with a piston provided with helical peripheral grooves *g*, decreasing in cross-sectional area from the inner to the outer end of said piston, and the coiled spring S, substantially as and for the purposes specified.

In testimony whereof I affix my signature in presence of two witnesses.

EMIL RITTER V. SKODA.

Witnesses:

HUGO PLINET,
ADOLPH FISCHER.