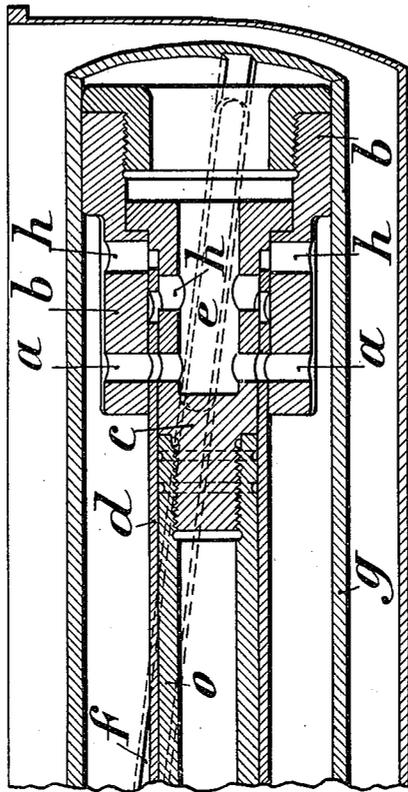


K. VÖLLER.  
 HYDRAULIC BRAKE FOR GUNS.  
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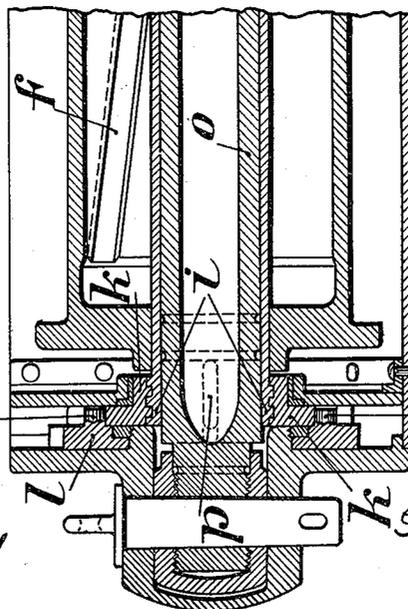
1,010,707.

Patented Dec. 5, 1911.

3 SHEETS—SHEET 1.



*Fig. 1.*



WITNESSES

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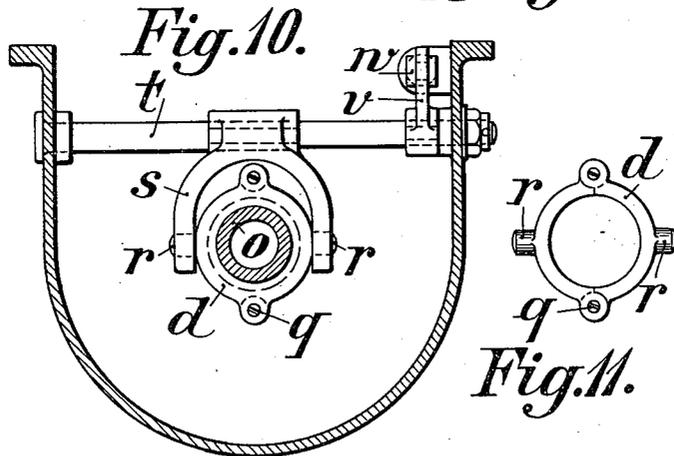
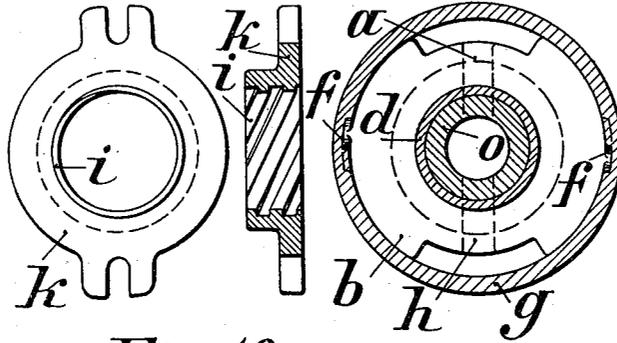
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3 SHEETS—SHEET 2.



*Fig. 7. Fig. 8. Fig. 9.*



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3 SHEETS—SHEET 3.

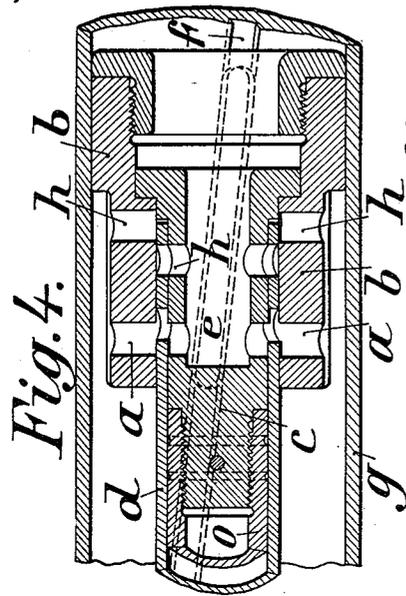


Fig. 4.

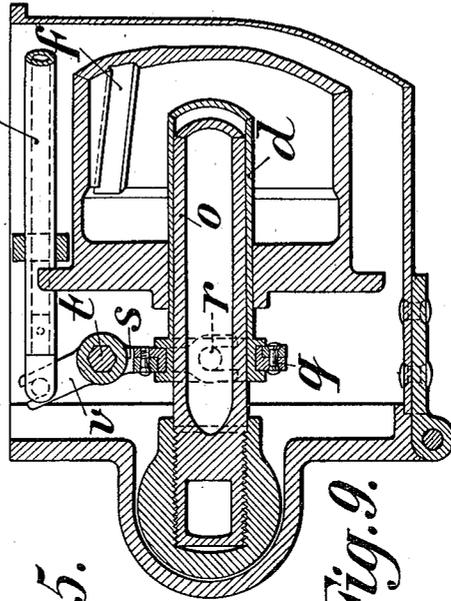


Fig. 9.

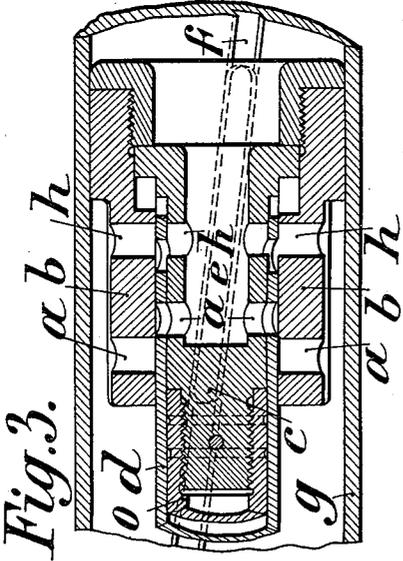


Fig. 3.

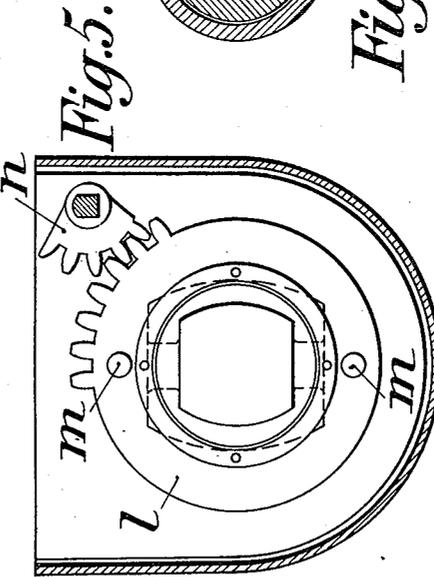


Fig. 5.

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# UNITED STATES PATENT OFFICE.

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## HYDRAULIC BRAKE FOR GUNS.

1,010,707.

Specification of Letters Patent.

Patented Dec. 5, 1911.

Application filed February 11, 1907. Serial No. 356,798.

To all whom it may concern:

Be it known that I, KARL VÖLLER, engineer, a subject of the German Emperor, residing at 17 Füllicherstrasse, Dusseldorf, Germany, have invented certain new and useful Improvements in Hydraulic Brakes for Guns; 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.

This invention relates to a hydraulic brake for guns having a recoiling barrel, in which the piston is guided in the known manner by two longitudinal grooves in the brake cylinder, and by its rotation during the recoil and the return of the gun barrel gradually closes and reopens the passages for the liquid for the purpose of throttling the braking action of the latter.

According to the present invention the piston can turn on the head of the piston rod and can slide in an axial direction to the extent of the cross section of the passages for the fluid, and upon the piston rod there is mounted a sliding sleeve which engages between the piston rod and the piston and is also movable axially for the purpose of controlling the passages for the fluid so as to diminish the recoil.

In the accompanying drawings Figure 1 is a longitudinal section through the brake cylinder showing the parts during the recoil, when the gun is firing at horizontal elevation. Fig. 2 is a cross section through the piston. Fig. 3 is a part longitudinal section through the brake cylinder showing the position of the parts during the return. Fig. 4 is a like view showing the position of the parts for the recoil when the gun is fired at an elevation above the horizontal. Fig. 5 is an end elevation of the brake cylinder. Fig. 6 is a cross section showing a detail. Fig. 7 is an elevation of a detail. Fig. 8 is a longitudinal section of a detail. Fig. 9 is a part longitudinal section through the brake cylinder, and Fig. 10 is a cross section through the piston rod showing a modification. Fig. 11 is an elevation of a detail.

During the recoil the parts being in the position shown in Fig. 1 the braking fluid is pressed through the passages *a* in the piston *b*, the piston rod head *c* and the sliding sleeve *d* into the chamber *e*, and thus arrives on the other side of the piston. At

the same time the piston is turned owing to its engagement with the longitudinal grooves *f* in the brake cylinder *g*, in such a manner that it closes passages *a*, passing through the piston into the piston rod head *c*, thus throttling the braking liquid. During the return, (Fig. 3), the pressure of the liquid on the piston *b* shifts the latter on the piston rod head *c* in the axial direction, so that the recoil passages *a* are completely closed, while the return passages *h* are opened. Closing of the passages *h* occurs owing to the reversed direction of rotation of the piston *b* during the return. The braking liquid passes from the chamber *e* in the piston rod head *c*, through the passages *h* to the other side of the piston. At the termination of the counter-recoil the parts remain at rest in the position shown in Fig. 3 and occupy this position previous to and at the instant of firing. At the beginning of recoil the pressure of the fluid in the forward chamber upon the piston *b* shifts the same instantly to the position shown in Fig. 1, when the action previously described during recoil takes place.

Since, in the horizontal position of the barrel, the full cross section of the passages *h* for the return is too large, these passages are closed to the required extent by the sliding sleeve *d* which engages between the piston rod and the piston.

Fig. 4 shows the position of the piston for the recoil when the gun is elevated from the horizontal position. In this case the sliding sleeve *d* is automatically shifted axially, so that the passages *a* for the recoil are partially closed at the beginning of the recoil, whereby the throttling of the braking liquid is considerably increased, as is required to take up the energy of the recoil in a shorter distance of travel of the piston than is the case at horizontal elevation; on the other hand, the passages *h* for the return are fully opened.

The sliding sleeve *d* (Fig. 1) is provided at its forward end with a steep pitched screw thread *i* working in a forked nut *k* (Fig. 7) in gear with a toothed wheel *l* through pins *m*. This toothed wheel *l* engages with a toothed segment *n*. (Fig. 5). When the latter is turned by means of any suitable mechanism, the toothed wheel *l* and the nut *k* also turn, whereby the sliding sleeve *d* is shifted in the one direction or the

other on the piston rod *o*. To insure that the sleeve *d* shall not rotate, it carries a pair of keys *p* which engage in grooves in the piston rod *o* (Fig. 6).

5 Another construction for shifting the sliding sleeve *d* is shown in Figs. 9-11. In this case the sleeve *d* has at its forward end an annular groove in which lies a ring *q* made up of two parts hinged together, each  
10 part carrying a pin *r*. A fork *s* mounted on a hexagonal shaft *t* engages with the pins *r*. On the same shaft is mounted a lever *v* connected with a sliding rod *w*, so that by  
15 shifting the latter the shaft *t* can be turned to swing the fork *s*, and thus to slide the sleeve *d*.

The strength of the walls of the sleeve *d* is so selected that under the pressure of the liquid they spring inward, and thus press  
20 so tightly upon the piston rod that any separate packing is not necessary.

Having thus described the nature of my said invention and the best means I know  
25 of carrying the same into practical effect, I claim:

1. An hydraulic brake for guns having a recoiling barrel comprising a piston rod, a piston adapted to turn and also to slide on the said piston rod, passages through the said piston, and a sleeve adapted to slide  
30 between the said piston rod and the said piston and to throttle the said passages.

2. An hydraulic brake for guns having a recoiling barrel comprising a piston rod, a piston adapted to turn and also to slide on  
35 the said piston rod, passages through the said piston, and a sleeve adapted to slide between the said piston and the said piston rod and to throttle the said passages, the walls of the said sleeve being of such elastic  
40 material that they can be pressed against the piston rod to make a tight joint.

In testimony whereof I have hereunto affixed my signature in the presence of two witnesses.

KARL VÖLLER.

Witnesses:

ALFRED POHLMeyer,  
M. ENGELS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."