F. BÖMINGHAUS.

FLUID BRAKE.

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927,936.

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Fig. 1.

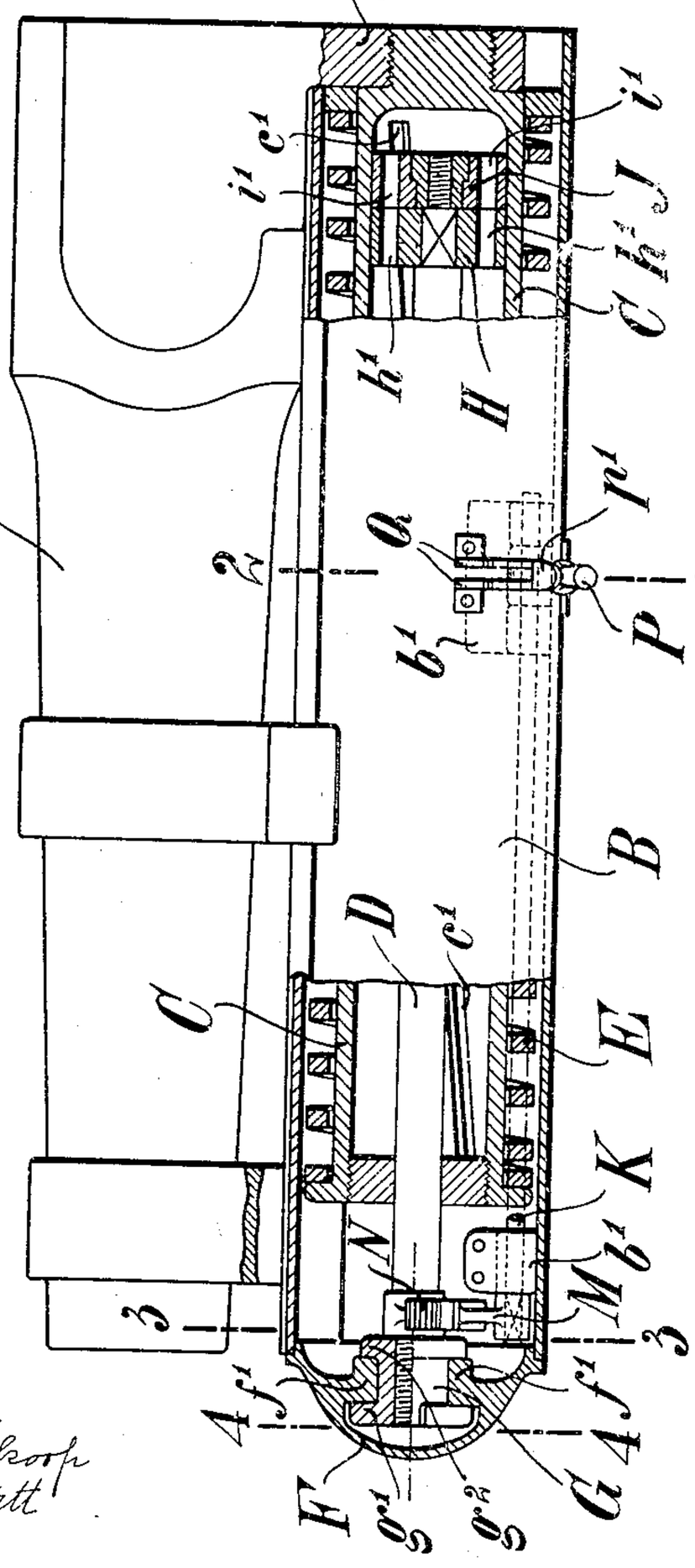

Fig. 2.

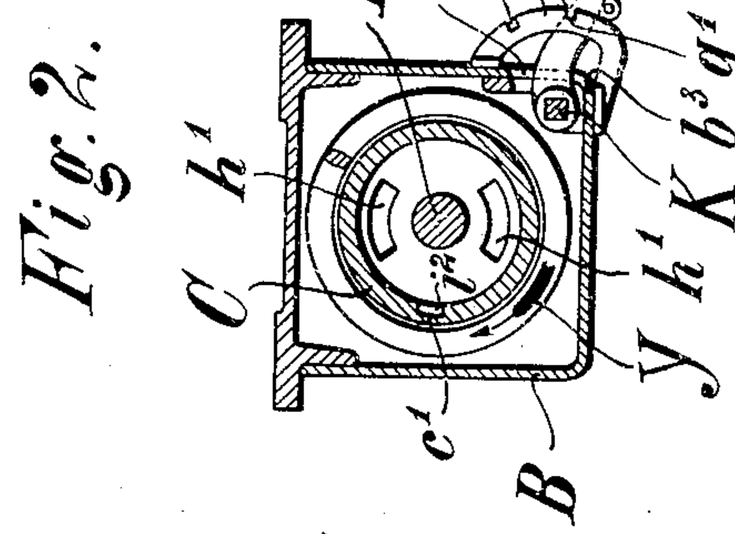

Fig. 6.

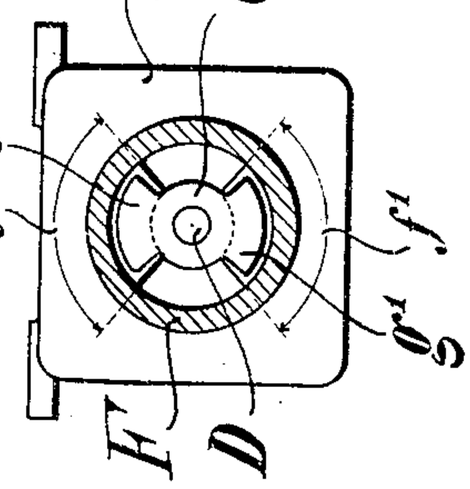

Fig. 5.

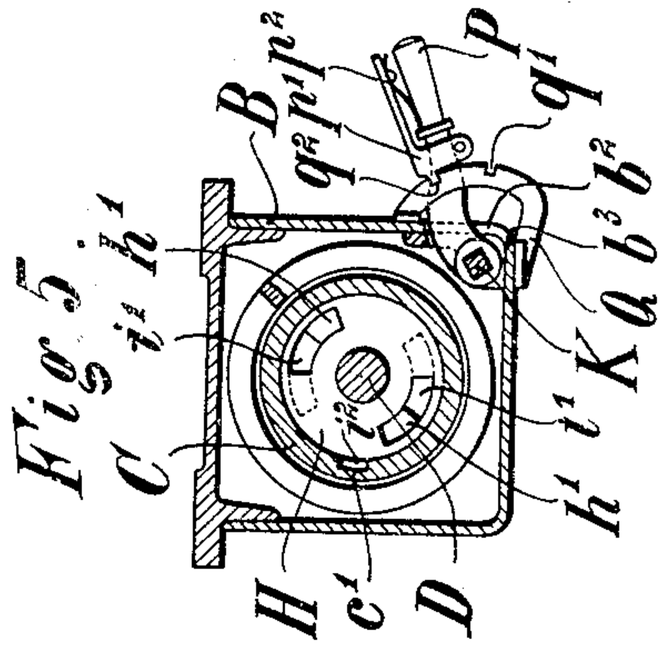

Fig. 4.

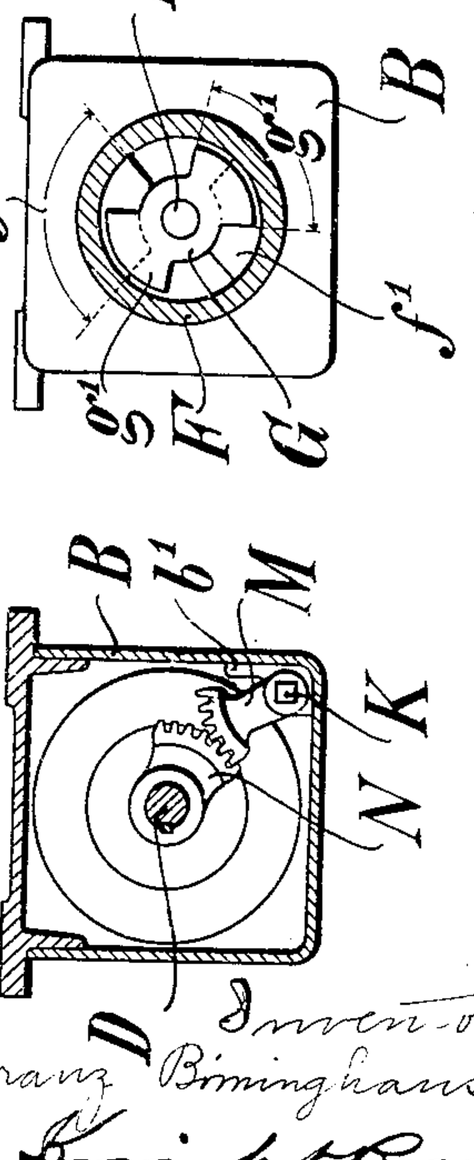

Fig. 3.

Witnesses:
J. M. Wynkoop
L. R. Hewitt

Inventor
Franz Bömminghaus
By Knight Bros.
Attys.

UNITED STATES PATENT OFFICE.

FRANZ BOMINGHAUS, OF ESSEN-ON-THE-RUHR, GERMANY, ASSIGNOR TO FRIED. KRUPP, AKTIENGESELLSCHAFT, OF ESSEN-ON-THE-RUHR, GERMANY.

FLUID-BRAKE.

No. 927,936. Specification of Letters Patent. Patented July 13, 1909.

Application filed April 30, 1907. Serial No. 371,077.

To all whom it may concern:

Be it known that I, FRANZ BÖMINGHAUS, a subject of the Emperor of Germany, and a resident of Essen-on-the-Ruhr, Germany, have invented certain new and useful Improvements in Fluid-Brakes, of which the following is a specification.

The present invention relates to recoil guns with fluid brake and especially to the type in which a part of the brake is adjustable from the outside for the purpose of regulating the length of recoil.

The object of the invention is to so connect the adjustable part of the brake with the part of the gun supporting the same that the adjustable part can be easily and rapidly inserted and detached.

One embodiment of the invention is shown in the accompanying drawings, by the way of example.

Figure 1 shows those parts of the gun to which the invention relates, partly in side view and partly in vertical longitudinal section; Figs. 2, 3 and 4 are sections respectively on lines 2—2, 3—3 and 4—4, Fig. 1, looking from the left; Figs. 5 and 6 are views corresponding to those shown in Figs. 2 and 4 but with the brake adjusted to another position.

The gun barrel A is mounted to slide on the track carrier B, the interior of which contains the hydraulic brake C D and the recuperator spring E. The brake cylinder C is rigidly secured to the horn a' of the breech of the gun barrel, while the piston rod D is rotatably but non-slidably mounted, as will be hereinafter further described, in the cap F which closes the carrier B. The cap F is detachably mounted on the track-carrier B in any suitable manner. The brake piston consists as usual of a body H rigidly secured to the piston rod D and a rotary disk J which are provided with passage ways h' and i' respectively. The rotary disk has a projection i^2 (Figs. 2 and 5) which engages in a curved groove c' (see in particular Fig. 1) cut in the wall of the brake cylinder C.

In order to make it possible to adjust the piston rod D from the outside a shaft K is provided which extends within the track carrier B and parallel to the piston rod and is journaled in bearings b' on the track carrier. The shaft K is positively connected to the piston rod by means of a pair of intermeshing tooth sectors M N (Figs. 1 and 3) and is provided with an adjusting lever P on that end of the shaft that is nearest the breech of the gun barrel. The lever P projects through a slot b^2 in the carrier B and carries a locking dog p' which is under the action of a spring p^2 (Figs 2 and 5). Through the medium of the locking dog the adjusting lever P, and consequently also the shaft K and the piston rod D, can be secured in two different angular positions relatively to two notched segments Q which are arranged on the carrier B and which are provided with two notches q' and q^2 for the locking dog p'.

A bayonet joint serves to connect the piston rod D with the cap F in a manner similar to what is customary when non-rotatable piston rods are employed. This bayonet joint consists of two inwardly extending or sector-shaped flaps f' arranged diametrically opposite one another in the cap F and two correspondingly shaped projections g' on a head G which is rigidly secured on the piston rod D. The height of the flaps f', measured in the radial direction is so selected that the flaps leave between them a free opening corresponding to the cross-section of the head G. The head G is provided with a flange g^2 which, together with the projections g', prevents axial movement of the piston rod D relatively to the cap F.

When the parts assume the positions shown in Figs. 1 to 4 the brake is adjusted for the long recoil. The locking dog p' of the adjusting lever P engages in the notches q' of the segments Q (Fig. 2); the parts g' f' of the bayonet joint lie against each other only at a portion of their width, measured in the tangential direction (Fig. 4); the passage ways i' of the rotary disk J register completely with the passage ways h' of the piston body H (Fig. 2). If it is desired to shorten the length of the recoil to about half of what it is in this position of the parts, the locking device p' q' is released and the adjusting lever P is swung in the direction of the arrow Z (Fig. 2) into the position shown in Fig. 5 and the dog p' is brought into engagement with the notch q^2 in the segments Q (Fig. 5). The turning of the adjusting lever P is partaken of by the shaft K and, through the medium of toothed sectors M N, by the piston rod D which is turned in the direction of the arrow Y (Fig. 2) together

with its head G and the piston body H. This has the result that, when the adjusting lever P has been shifted, the projections g' of the head G lie against the flaps f' of the cap F along their entire width (Fig. 6) and the passage ways i' become half covered by the piston body H in the manner shown in Fig. 5.

As will be understood from the foregoing disclosure, the bayonet joint f' g' is so constructed and so arranged relatively to the members H, J, c', serving to regulate the passage of fluid, that the parts of the bayonet joint engage each other to a greater extent when the brake is adjusted for short recoil (Figs. 5 and 6) than when it is adjusted for long recoil (Figs. 1 to 4). This is done because the resistance in the brake, and consequently the strain on the parts, is greater when the recoil is short than when it is long.

If it is desired to expose the interior of the carrier B the adjusting lever P is moved into abutment with the lower edge b^3 of the slot b^2 of the carrier. The projections g' of the head G of the piston rod are then completely out of engagement with the flaps f' and, after the connection between the cap F and the carrier has been detached, the cap can be drawn out from the piston rod. It will be understood without further explanation how the gun is further disassembled and again assembled. Furthermore it is unnecessary to state the reasons why the bayonet jont makes it possible to easily and rapidly insert and remove the piston rod. The invention can also be used in the type of guns in which not the piston rod but the brake cylinder or another part of the brake is adjustable from the outside for the purpose of adjusting the length of recoil; furthermore the invention can also be used in the type of guns in which any device is inserted between the mount and that part of the brake which is adjustable to regulate the length of recoil, the office of said device being to effect an automatic adjustment of the brake when the gun is elevated.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In a recoil gun, the combination with a gun part, of a fluid brake having a piston rod, an interlocking connection between the piston rod and the gun part, and means extending to the exterior of the gun for imparting rotary adjustment to the piston rod to regulate the length of the recoil; said piston rod being adapted to be rotated by said adjusting means to a position in which it is out of interlocking engagement with said gun part to permit ready separation of the parts.

2. In a recoil gun, the combination with a gun part, of a fluid brake having two relatively adjustable parts, an interlocking connection between said gun part and one of said brake parts permitting rotary movement of the brake part relatively to the gun part, and means extending to the exterior of the gun for imparting rotary adjustment to said last-named brake part relatively to the gun part and the other brake part to regulate the length of the recoil and to vary the amount of engagement between said interlocking parts according to the length of the recoil.

3. In a recoil gun, the combination with the track carrier having a cap closing the carrier at one end, of a fluid brake mounted in the carrier and comprising a cylinder, a piston, a member controlling the flow from one side of the piston to the other and a piston rod, an interlocking connection between the piston rod and the cap of the track carrier, and means extending to the exterior of the gun for imparting rotary adjustment to said piston rod relatively to the cap and said member to regulate the length of the recoil, said piston rod being adapted to be rotated by said adjusting means to a position in which it is out of interlocking engagement with the cap to permit ready separation of the parts.

4. In a recoil gun, the combination with a gun part, of a fluid brake having two relatively adjustable parts, an interlocking connection between said gun part and one of said brake parts permitting rotary movement of the brake part relatively to the gun part, and means extending to the exterior of the gun for imparting rotary adjustment to said last-named brake part relatively to the gun part and the other brake part to regulate the length of the recoil, said adjustable brake part being adapted to be rotated by said adjusting means to a position in which it is out of interlocking engagement with said gun part to permit ready separation of the parts.

5. In a recoil gun, the combination with a gun part, of a fluid brake having two relatively adjustable parts, a connection between one of the brake parts and the gun part comprising two interlocking and relatively adjustable parts, one carried by the gun part and the other by the brake part, means for imparting relative rotary adjustment to said brake parts to regulate the length of the recoil and to vary the amount of engagement between said interlocking parts so as to bring the parts more in engagement for a short recoil than for a long recoil.

6. In a recoil gun, the combination with a gun part, of a fluid brake having a pair of relatively adjustable parts, a bayonet joint between one of said brake parts and the gun part, and means for imparting relative rotary adjustment to said brake parts and to the members of the bayonet joint to regulate the length of the recoil and to bring the

members of the bayonet joint more in engagement for a shorter recoil than for a longer recoil.

7. In a recoil gun, the combination with a gun part, of a fluid brake comprising a cylinder, a piston having a piston rod, a member controlling the flow from one side of the piston to the other, a bayonet joint connection between the piston rod and the gun part, and means for simultaneously imparting relative rotary adjustment to the piston and controlling member and to the piston rod and the gun part to regulate the length of the recoil and to bring the members of the bayonet joint more in engagement for a shorter recoil than for a longer recoil.

The foregoing specification signed at Dusseldorf, Germany, this ninth day of March, 1907.

FRANZ BÖMINGHAUS.

In presence of—
M. ENGELS,
ALFRED POHLMEYER.