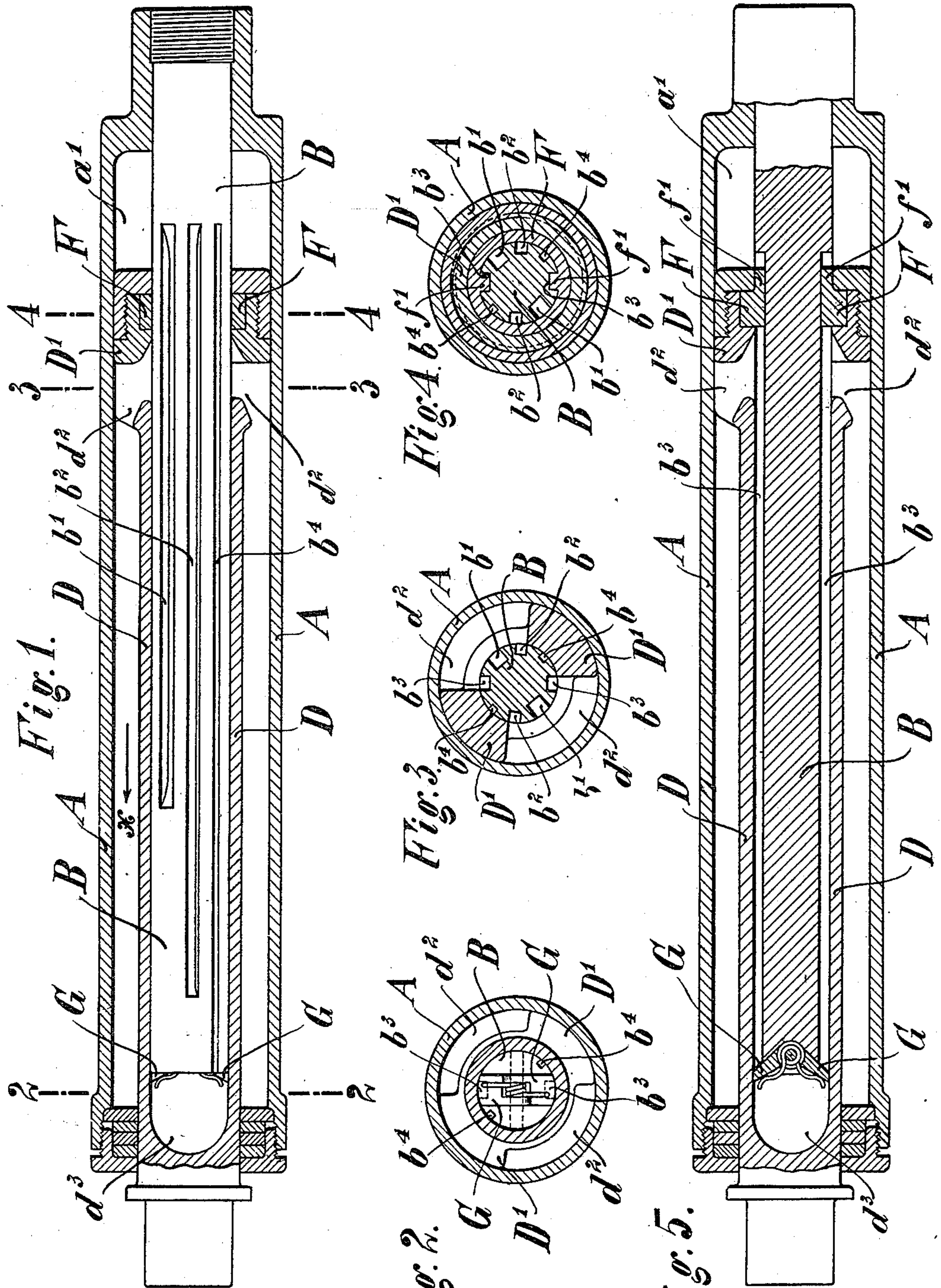


W. HEILEMANN.

FLUID BRAKE.

APPLICATION FILED APR. 30, 1907.



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FLUID-BRAKE.

No. 869,366.

Specification of Letters Patent.

Patented Oct. 29, 1907.

Application filed April 30, 1907. Serial No. 371,076.

To all whom it may concern:

Be it known that I, WALTER HEILEMANN, 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 fluid-brakes and the object of the invention is to provide an improved means for regulating the return movement in those fluid-brakes for guns in which channels for the passage of the brake-fluid from one side to the other of the piston are provided between the inner wall of the hollow piston rod and a counter-rod projecting into the piston-rod.

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

Figure 1 shows the brake partly in longitudinal section and partly in side view; Figs. 2, 3 and 4 are sectional views on line 2—2, 3—3 and 4—4, Fig. 1, looking from the left, and Fig. 5 is a view corresponding to that shown in Fig. 1 but showing that part in section which is shown in elevation in Fig. 1.

A is the brake-cylinder. The piston rod D and the piston D' are provided with a longitudinal bore d^1 into which projects a counter-rod B which is rigidly secured to the brake cylinder and is of the same diameter as the bore d^1 . In the surface of the counter-rod B are cut two pairs of channels b^1 b^2 of different length and having their depth decreasing in the direction of the arrow x (Fig. 1). These channels together with two passage-ways d^2 in the piston D' provide communication between the fluid spaces of the brake cylinder on both sides of the piston. By changing the angular position of the rod B with the channels b^1 b^2 relatively to the passage-ways d^2 of the piston D' the length of recoil can be regulated. The structure so far described is, however, old and it is therefore unnecessary to describe the mode of operation in detail.

In order to regulate the return movement, the following improvements are provided: In the surface of the rod B a pair of channels b^3 are cut and extend to the free end of the rod. The channels b^3 are of comparatively great cross-section which is uniform throughout the length of the channels and they are so located that they communicate with the passage-ways d^2 at any angular position of the rod B relatively to the piston D'. In the piston is rotatably but non-slidably arranged a ring F which surrounds the rod B and is provided with projections f' which project into the channels b^3 and serve the purpose of closing the channels b^3 towards the piston-side (a') of the brake cylinder during the entire recoil and return movement and at any adjustment of the brake. On the free end of the rod B,

a spring pressed flap valve G is arranged opposite each channel b^3 . A further pair of channels b^4 , also cut in the surface of the rod B, keep the hollow space b^3 of the piston rod in continuous communication with the piston side (a') of the brake cylinder. The cross-sectional circulation area of the channels b^4 is small as compared with the cross-sectional circulation area of the channels b^3 .

By reason of the above-described arrangement a portion of the fluid on the piston-rod side of the brake cylinder will, on recoil, be obliged to flow through the passage-ways d^2 and the channels b^3 into the hollow space d^3 of the piston-rod, the valves G being opened by the fluid. On the return movement, however, the brake-fluid cannot pass the same way from the hollow space d^3 of the piston rod to the fluid spaces of the brake cylinder as it did on recoil, as the valves G now act as check-valves. The passage must therefore take place through the channels b^4 .

The improved means for regulating the return movement guarantees the filling of the hollow space of the piston rod and also insures a dependable braking action of the return movement as the filling channels b^3 are closed by the projection f' of the ring F during the entire recoil.

Without making any departure from the spirit of the invention, I may use more than two filling channels for the hollow space of the piston rod or I may use only one, which then would have to be of corresponding dimensions.

Although the invention is shown applied to a brake having variable length of recoil, it is obvious that it may be used in brakes having uniform long or short recoil.

Having thus described the invention, what is claimed as new is:

1. In a fluid brake, the combination with a cylinder, a piston having a hollow piston rod, and means providing communication between opposite faces of the piston, of a counter rod movable in the hollow piston rod and having a channel in its surface providing communication between one side of the piston only and the hollow space at the end of the piston rod and having a channel in its surface providing communication between the other side of the piston and the hollow space at the end of the piston rod, and means permanently closing said first-named channel to the last-named side of the piston.

2. In a fluid brake, the combination with a cylinder, and a piston having a hollow piston rod and provided with a passageway communicating with the hollow of the rod and with one side of the piston, of a counter-rod having a channel in its surface to communicate with the passageway and with the other side of the piston, and having a channel in its surface communicating with the passageway and with the hollow space of the piston rod, and means preventing the passage of a fluid through the latter channel to the last-named side of the piston.

3. In a fluid brake, the combination with a cylinder, and a piston having a hollow piston rod and provided with a passageway communicating with the hollow of the rod and with one side of the piston, of a counter rod having a channel in its surface to communicate with the passageway and with the other side of the piston, and having a channel in its surface communicating with the passageway and with the hollow space of the piston rod, and a projection extending from the piston into the last-named channel.
4. In a fluid brake, the combination with a cylinder, and a piston having a hollow piston rod and a passageway providing a communication between the hollow space and one of its faces, of a counter-rod movable in the hollow space and provided with a plurality of channels of different lengths and with channels in its surface to provide communication between the hollow space and the passageway, the piston rod and the counter rod being relatively movable to permit different of the first-named channels to lie opposite the passageway in the piston, and means carried by the piston, rotatable relatively thereto and entering the second named channels to prevent passage of a fluid to the opposite side of the piston.
5. In a fluid brake, the combination with a cylinder and a piston having a hollow piston rod and a passageway providing a communication between the hollow space and one of its faces, of a counter rod movable in the hollow space and provided with a plurality of channels of different lengths, and with channels in its surface to provide communication between the hollow space and the passageway, the piston rod and the counter rod being relatively movable to permit different of the first-named channels to lie

opposite the passageway in the piston, and a ring carried by and rotatable relatively to the piston and having projections entering the second-named channels.

6. In a fluid brake, the combination with a cylinder and a piston having a hollow piston rod and provided with a passageway communicating with the hollow of the rod and with one side of the piston, of a counter rod having in its surface a channel to communicate with the passageway and with the other side of the piston, a channel communicating with the hollow space of the rod and the last-named side of the piston and a channel communicating with the passageway and with the hollow space of the piston rod, and a flap valve arranged on the free end of the counter rod and closing the last-named channel during return.

7. In a fluid brake, the combination with a cylinder, a piston having a hollow piston rod, and means providing communication between opposite faces of the piston, of a counter rod movable in the hollow piston rod and having a channel in its surface providing communication between one side of the piston and the hollow space of the piston rod and having a channel in its surface providing communication between the other side of the piston and the hollow space of the piston rod, means permanently closing said first-named channel to the last-named side of the piston, and means closing said first-named channel to the first-named side of the piston only during return.

The foregoing specification signed at Düsseldorf, Germany, this fourteenth day of March, 1907.

WALTER HEILEMANN.

In presence of—

ALFRED POHLMAYER,
M. ENGELS.