

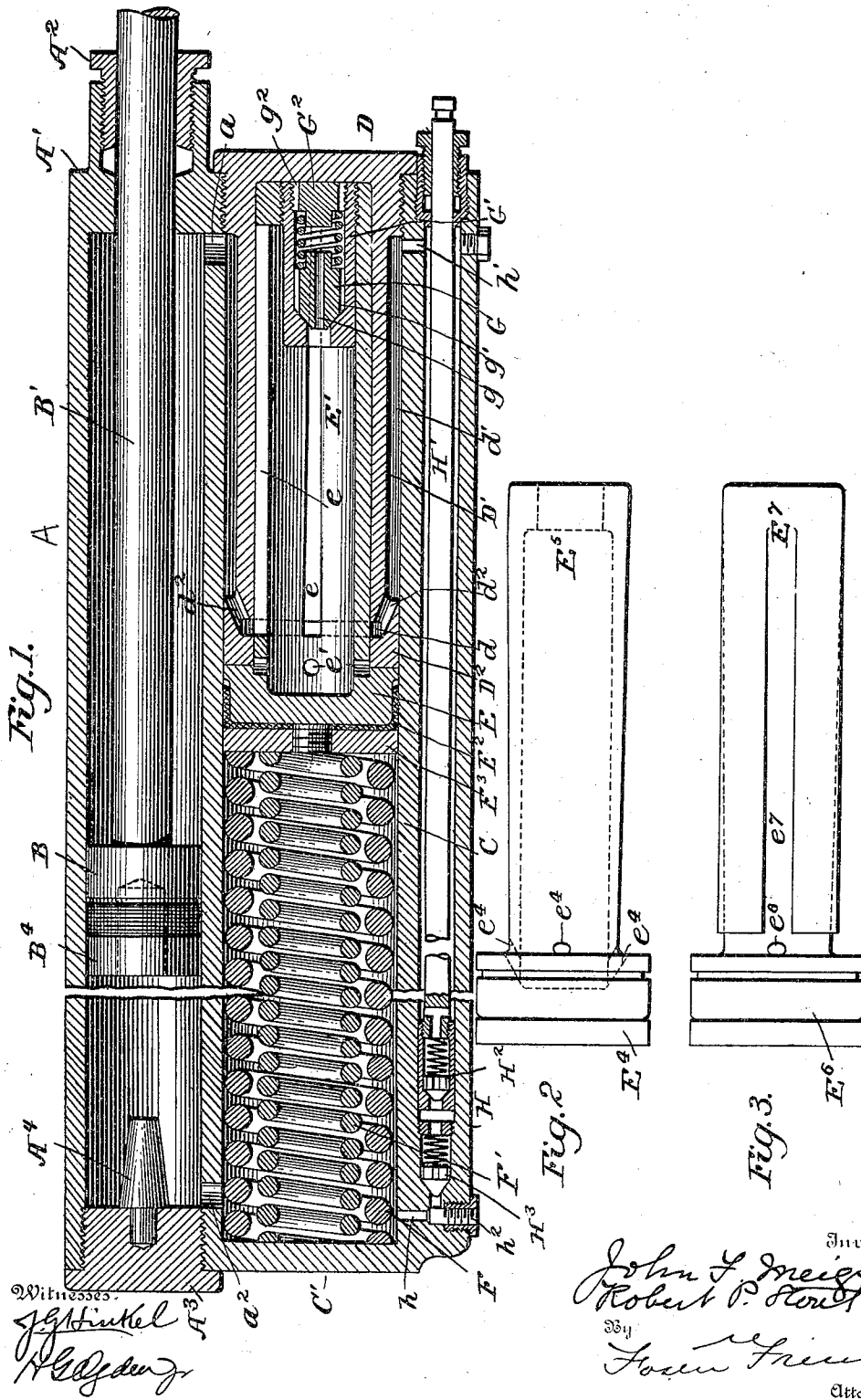
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J. F. MEIGS & R. P. STOUT.
COMBINED RECOIL CHECK AND RECUPERATOR.

APPLICATION FILED JAN 31, 1901.

NO MODEL.



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UNITED STATES PATENT OFFICE.

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COMBINED RECOIL-CHECK AND RECUPERATOR.

SPECIFICATION forming part of Letters Patent No. 771,829, dated October 11, 1904.

Application filed January 31, 1901. Serial No. 45,455. (No model.)

To all whom it may concern:

Be it known that we, JOHN F. MEIGS and ROBERT P. STOUT, citizens of the United States, residing at Bethlehem, in the county of Northampton and State of Pennsylvania, have invented certain new and useful Improvements in Combination Recoil-Checks and Recuperators, of which the following is a specification.

Our invention relates to a combined recoil-check and recuperator for guns, and has for its object to improve and simplify such devices; and the invention consists in the various features of construction and arrangement of parts having the general mode of operation substantially as hereinafter more particularly set forth.

Referring to the accompanying drawings, wherein we have illustrated a preferred embodiment of our invention, Figure 1 is a longitudinal vertical section of a combined recoil-check and recuperator; and Figs. 2 and 3 are respectively plan views of recuperator or running-out pistons, showing different ways of throttling or controlling the pressure.

In the construction of devices of this character it is exceedingly desirable to make them as light as possible and still of sufficient strength to withstand the shocks to which they are subjected, and, further, to so construct, arrange, and operate the parts that there will be a practically uniform pressure on the water or other fluid under all conditions, and, further, to so construct, arrange, and operate the parts that the recoil of the gun will be properly taken up and the running out or recuperation of the gun will be accomplished without shock or jar and within the proper and desired time. It is with these general objects and others in view that we have constructed our improved apparatus and which we will now describe.

In the drawings, A represents a recoil-cylinder mounted to move, in which is a recoil-piston B, connected to a piston-rod B', which is adapted to be connected in the usual manner to the gun. This piston-rod B' passes through the head A' of the cylinder, which head is provided with a suitable packing A²,

and the other head, A³, of the cylinder is preferably provided with an internal projection A⁴, adapted to enter an opening B⁴ in the piston and cushion the same in a manner well understood.

Connected to the recoil-cylinder and in the present instance practically formed integral therewith is a running-out or recuperating cylinder C, which is shown as closed at one end, as C', and at the other end is open and receives a sleeve or casing D, which is adapted to be secured thereto in any suitable way, as by being screwed therein, as shown. This sleeve or casing D forms a cylinder for the stem or piston-rod E' of the running-out piston E, which piston moves in the cylinder C, being provided with suitable washers or leathers E² and piston-nut E³ or made in any other well-known and suitable way. Also mounted in the running-out cylinder C are the recuperator spring or springs F F', two concentric springs being shown in the present instance extending from the head C' to the nut E³. The sleeve or casing D is provided with a reduced portion D', extending nearly throughout its length and adapted to communicate with the recoil-cylinder A through an opening a at or near the extreme limit of the cylinder, as shown. The sleeve D is provided with a head D², fitting the cylinder C and having in its inner face a groove or passage d, which in the present instance is shown as a circular groove, and which communicates with the longitudinal space or conduit d', between the reduced portion D' of the sleeve and the inner surface of the cylinder C by means of one or more passages d². The passages a and d² are offset longitudinally and preferably are at opposite ends of the conduit d'.

The stem or piston-rod E' of the piston E is hollow, as shown, and is constructed so as to automatically act as a throttling device to the fluid entering or passing into the piston-rod for operating the same, and while it may be variously constructed to accomplish this result we have shown several simple constructions. Thus in Fig. 1 the stem E' is provided

with one or more tapering slots $e e$, extending through the stem and arranged to throttle the fluid passing through the passages d^2 of the sleeve and thence through the slot or slots $e e$ into the valve-stem.

Mounted in the hollow stem is a valve-casing G' , in which is a spring-seated valve G , which valve is provided with an opening, as g , of a size to properly control the counter recoil or return to battery of the gun. This valve is also provided with a number of grooves or openings g' in its side, and in the valve-casing in the present instance there is shown a plug G^2 , having passages g^2 at its side. The hollow valve-stem is also provided with one or more openings e' , which are arranged adjacent the meeting ends of the sleeve or casing D and the piston E and permit the flow of any fluid which may get between these parts into the interior of the stem as the piston is seated on the sleeve in its running-out operation.

In the construction shown there is a passage a^2 between the recoil-cylinder and the recuperating-cylinder at their outer ends in order to permit any fluid which may possibly leak beyond the piston B into the recoil-cylinder to flow into the recuperating-cylinder or that portion of it containing the recuperating-springs, which portion may act as a storage or drip reservoir.

In the piston shown in Fig. 2 the piston-head E^4 is substantially the same as the piston E ; but the stem E^5 instead of being provided with the tapering slot or slots e is tapering throughout its entire length from its end toward the head E^4 and it is provided with openings e^4 for the passage of fluid into the interior of the stem. The piston E^6 (shown in Fig. 3) has its stem E^7 provided with tapering grooves e^7 instead of tapering slots, and it is also provided with openings e^6 for the passage of the fluid into the interior of the stem. These pistons and stems shown in Figs. 2 and 3 illustrate how the same general results may be obtained by modified constructions which are substantially the equivalents of each other in this combination.

It will be seen that the recuperating-cylinder C acts as a reservoir for fluid and any fluid that escapes past the pistons, either in the recoil-cylinder A or the recuperating-cylinder C , will be collected in the front end of the recuperating-cylinder, the passage a^2 furnishing a means of communication between the cylinders on the non-pressure sides of the pistons.

We provide a pump H , of any suitable construction, (shown as a hand-pump,) one end of the cylinder of which is connected to the reservoir by a passage h , and the other end is connected to the pressure side of the cylinder by the passage h' . The pump-rod H' carries a suitable box or valve H^2 , and another box

or valve H^3 is mounted in the cylinder, and these are so arranged that the fluid can be drawn from the non-pressure side of the cylinders and forced into the pressure sides, so as to fill the pressure sides of both cylinders or put the fluid under initial pressure, as desired. The passage h may be closed by a stop-valve or screw-plug h^2 when the pump is not in operation.

Such being the general construction of the parts of our improved apparatus, its operation will be readily understood by those skilled in the art. It is understood that the cylinder A is filled with some proper fluid between the piston B and the opening a and space d' around the sleeve or casing D and also the interior of the stem E' of the piston E , and this fluid may be under an initial or desired pressure. When the gun is fired and the piston B is operated through its connection with the gun through the piston-rod B' , this fluid is forced through the opening a under pressure, through the space d' , through the passages d^2 into the groove d , and thence through the tapering slots e into the interior of the stem E' , and thence through the opening g of the valve G and through the passages g^2 of the plug G^2 , and thus acts as a fluid-pressure on the piston E , moving it under such pressure to compress the spring or springs $F F'$. As soon as this pressure increases the valve G is forced open against its spring, so that the fluid also passes through the openings g' , and as the stem moves out of the sleeve the gradually-contracting slots or grooves act as throttles, gradually increasing their throttling action, so as to secure uniform pressure on the fluid in the apparatus. It will be seen that the opening a being at the extreme limit of the recoil-cylinder permits the piston B to move throughout the entire length of the cylinder and that the sleeve with its reduced portion and passages communicating with said opening a and extending upward, so as to control or throttle the flow of fluid to the piston E , also permits the proper operation of the device throughout practically the whole length of the stem E' , and by this means we are enabled to get a very compact apparatus with the greatest amount of operative fluid to take up the recoil. When it is desired to run out the gun or return it to firing position, the recuperator-springs $F F'$ of course exert their pressure upon the piston E , and the valve G becomes seated in the position shown in Fig. 1, and the opening g therein acts as a throttle or controlling device controlling the flow of fluid back through the stem E' and into the cylinder A through the opening a , and the gun is automatically brought to firing position without shock or jar. The openings e' , as before stated, permit the clearance of any fluid which may be between the end of the sleeve D and the face of the piston E , and the

passage a^2 serves to clear the end of the cylinder A if perchance fluid leaks or otherwise passes into that portion of the cylinder.

It will be seen that the whole construction is exceedingly simple and compact and permits of the proper regulation of the flow of fluid, so as to maintain a practically equal pressure thereon and so that the recoil may be properly taken up and the gun restored to firing position without shock, jar, or strain.

What we claim is—

1. In a combined recoil-check and recuperator for guns, the combination with a recoil-cylinder and piston therein, of a running-out cylinder, a piston therein having a hollow piston-rod, and a longitudinal conduit having offset openings communicating respectively with said recoil-cylinder and hollow piston-rod, for the purpose set forth.

2. In a combined recoil-check and recuperator for guns, the combination with a recoil-cylinder and piston therein, of a running-out cylinder arranged adjacent to and parallel with said recoil-cylinder, a piston in the running-out cylinder having a hollow piston-rod and a longitudinal conduit communicating at one end with the recoil-cylinder and at its other end with the said hollow piston-rod, for the purpose set forth.

3. In a combined recoil-check and recuperator for guns, the combination with a recoil-cylinder and piston therein, of a running-out cylinder, a piston therein having a hollow piston-rod, a sleeve interposed between the piston-rod and running-out cylinder, and a longitudinal passage between the recoil-cylinder and the hollow piston-rod, substantially as described.

4. In a combined recoil-check and recuperator for guns, the combination with a recoil-cylinder and piston therein, of a running-out cylinder, a piston therein having a hollow piston-rod, a sleeve interposed between the piston-rod and running-out cylinder and having fluid-passages communicating with the recoil-cylinder, and throttling devices controlling

the flow of fluid to the piston-rod, substantially as described.

5. In a combined recoil-check and recuperator for guns, the combination with a running-out cylinder, of a piston therein having a hollow stem, a valve-casing mounted in the stem and having an opening communicating with the hollow stem, and a plug-valve in said casing having an opening of a size to control the counter recoil, substantially as described.

6. In a combined recoil-check and recuperator for guns, the combination with a running-out cylinder, of a piston therein having a hollow stem, a valve-casing mounted in the stem and having an opening communicating with the hollow stem, and a spring-actuated plug-valve within said casing having a restricted passage of a size to control the counter recoil, substantially as described.

7. In a combined recoil-check and recuperator for guns, the combination with a recoil-cylinder and piston therein, of a running-out cylinder, a piston therein having a hollow stem, a sleeve interposed between the stem and running-out cylinder, passages for the flow of fluid between the recoil-cylinder and stem, and a valve within the stem provided with a passage controlling the flow of fluid from the hollow piston to the running-out cylinder, substantially as described.

8. In a combined recoil-check and recuperator for guns, the combination with the recoil-cylinder and running-out cylinder having a communicating passage on their non-pressure sides, of a pump connected between the pressure and non-pressure sides of said cylinders, substantially as described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

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Witnesses:

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