No. 632,134. Patented Aug. 29, 1899.

J. F. MEIGS & R. P. STOUT.

RECOIL MECHANISM FOR GUN MOUNTS.

(Application filed Jan. 19, 1899.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

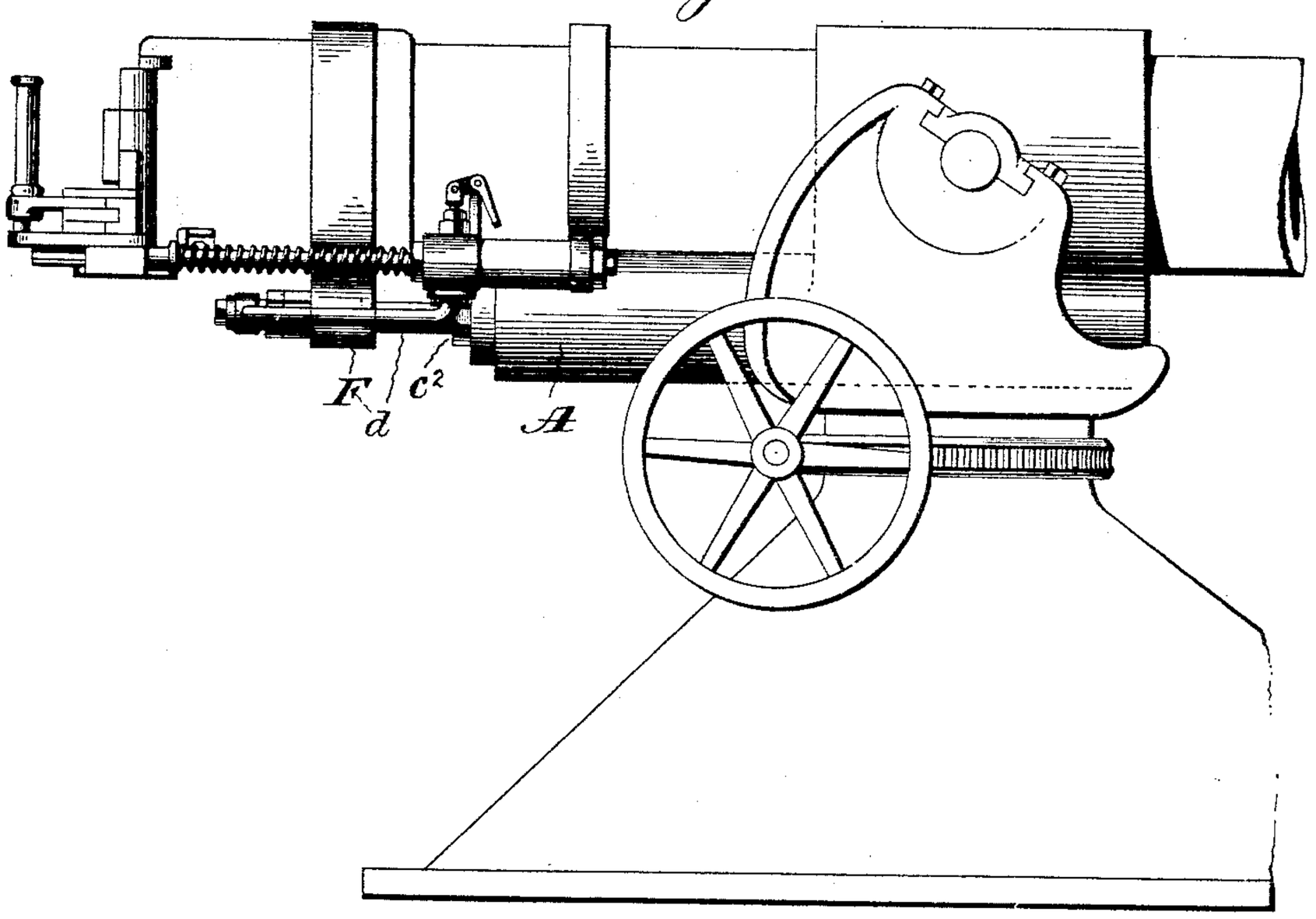
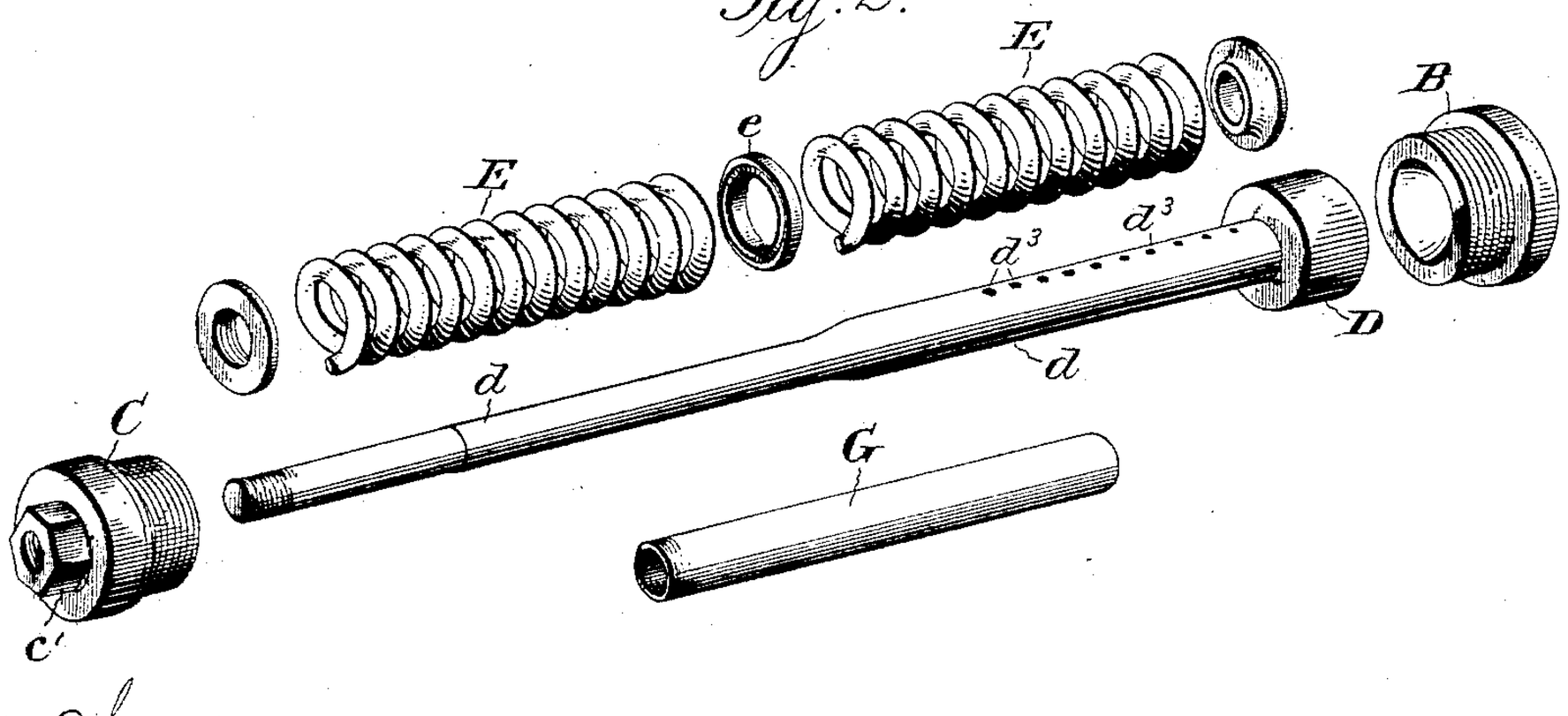


Fig. 2.



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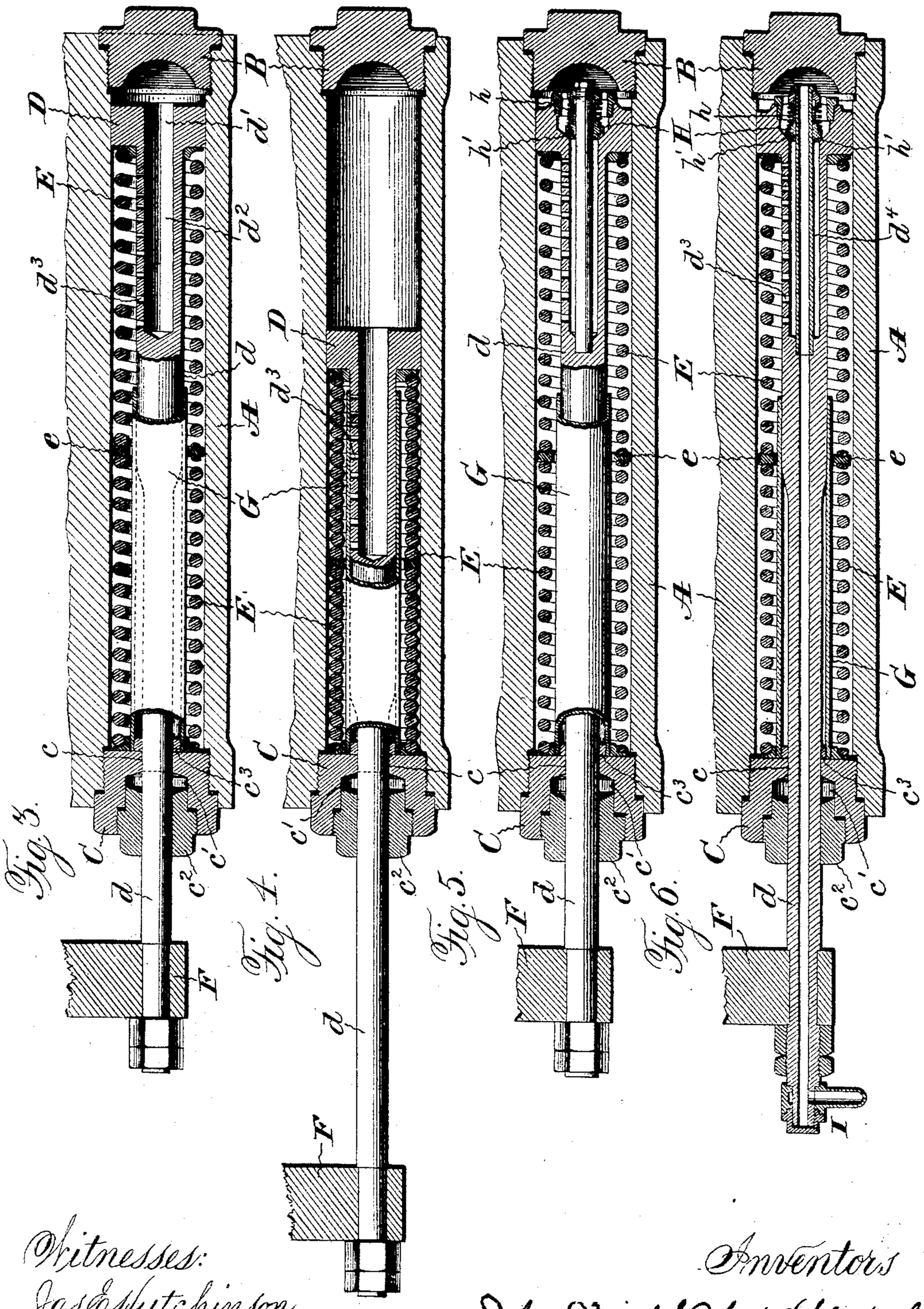

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Crandell and Crandell, their Attys

UNITED STATES PATENT OFFICE.

JOHN FORSYTH MEIGS AND ROBERT PAUL STOUT, OF SOUTH BETHLEHEM, PENNSYLVANIA, ASSIGNORS TO THE BETHLEHEM IRON COMPANY, OF SAME PLACE.

RECOIL MECHANISM FOR GUN-MOUNTS.

SPECIFICATION forming part of Letters Patent No. 632,134, dated August 29, 1899.

Application filed January 19, 1899. Serial No. 702,672. (No model.)

To all whom it may concern:

Be it known that we, JOHN FORSYTH MEIGS and ROBERT PAUL STOUT, of South Bethlehem, in the county of Northampton, and in the State of Pennsylvania, have invented certain new and useful Improvements in Recoil Mechanism for Gun-Mounts; and we do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of a gun and mount containing our invention. Fig. 2 is a perspective view of the parts of our device separated from each other. Fig. 3 is a central longitudinal section of the cylinder and a broken longitudinal section of the operative parts when occupying their relative normal positions. Fig. 4 is a like view of the same in the relative positions given by the recoil of the gun. Fig. 5 is a central longitudinal view of the device when provided with means for controlling the speed of the counter-recoil; and Fig. 6 is a like view of the same, having such construction as to permit the energy of the counter-recoil to be utilized for the operation of hydraulic mechanism attached to the gun.

Letters of like name and kind refer to like parts in each of the figures.

The object of our invention is to enable the recoil of a gun to be more easily controlled and permit of the utilization of the energy developed by such recoil; and to such end our invention consists of the mechanism and parts thereof combined and arranged to operate in the manner and for the purpose substantially as hereinafter shown and described.

In the carrying of our invention into practice we employ a cylinder A, which is formed upon or secured to a gun-mount and has its front end closed by a screw-plug B or other suitable means and its rear end closed by a similar screw-plug C, through which latter plug is provided a round axial opening *c*, that is in a line with the longitudinal axis of the cylinder and is adapted to contain the rod *d* of a recoil-piston D. Within the outer end of said plug C is formed a stuffing-box *c'*, that receives and contains a gland c^2, which construction enables the joint between said piston-rod and plug to be packed and made liquid-tight, while permitting the former to move freely through the latter.

The piston D, attached to the front end of the rod *d*, has such construction as to produce between its periphery and the inner surface of the cylinder A a liquid-tight sliding joint and is held normally at the front end of such cylinder by means of a spiral spring E, which spring is coiled around said piston-rod and extends between the rear face of said piston and the inner end of the plug C. Said spring is preferably made in two sections, with their contiguous ends engaging an annular block *e*, that laterally loosely fills the bore of the cylinder and constitutes a sliding support for said spring-sections and prevents at that point lateral displacement or buckling, as would otherwise occur.

Within the piston D is provided a round axial recess *d'*, which coincides with a like recess d^2, that extends axially rearward within the rod *d* to any desired distance, and in and through the wall of such hollow portion of said rod—preferably its upper side—are provided a number of radial openings d^3 d^3, which are preferably round in cross-section, but may have any other shape desired and may have equal or unequal areas, as desired.

The rear end of the piston-rod *d*, outside of the cylinder A, passes through and is secured to a yoke F, which is attached to or forms part of the gun, so that when such gun is fired its recoil will cause the piston D to move rearward within the cylinder A and compress the springs E and E. The space within said cylinder being filled with oil or other suitable liquid such rearward movement of said piston will operate to compress the liquid in its rear and cause it to flow through the openings d^3 d^3 and recess d^2 d^2 into the space in front of such piston, the amount of such flow, and consequently the rearward speed of the piston, being determined by the areas of said openings d^3 d^3 and the consequent degree of freedom permitted for the passage of oil from the rear side to the front side of said piston.

In order that the resistance to the rearward movement of the recoil-piston may be regu-

lated to adapt it to the needs of the gun, a sleeve G is placed within the cylinder A, with its rear end secured to or within the plug C, and is made longitudinally adjustable thereon within desired limits, preferably by threading the rear end of the sleeve and screwing the same within a correspondingly-threaded hub c^3, which is formed upon or attached to the inner end of the plug C, the arrangement being such that by rotating said sleeve in one direction it will be moved rearward with relation to the cylinder A, while by rotation in another direction said sleeve will be moved forward. When now the recoil of the gun moves the piston rearward, the portion of the rod d outside of the sleeve G will pass within the front end of the latter until the openings d^3 d^3, beginning with the rearmost opening, are successively covered and the flow of oil through the same nearly or quite cut off and the resistance to the rearward movement of said piston correspondingly and progessively increased. It will be readily seen that by adjusting the sleeve forward within the cylinder the progressive retardation of the piston will begin at an earlier period of the movement of the latter and the ultimate resistance increased, while by a rearward adjustment of said sleeve a correspondingly opposite result will be obtained.

In Fig. 5 is shown means whereby the speed of the reverse movement or counter-recoil of the piston may be controlled, which consists of a check-valve H, that is seated within the front open end of said piston, where it is held with an inward pressure by means of a spring h. When the recoil-piston is moved rearward by the firing of the gun, liquid flowing through the openings d^3 d^3 into the interior of the piston-rod d will move the valve H from off its seat and pass freely into the space in front of said piston; but after the recoil has been checked said valve will be again seated by the pressure of liquid in front aided by the spring h, and thus close the main passage.

In order that the liquid may pass from the front to the rear of the piston to permit the recoil-controlling mechanism to resume its normal position, restricted passages h' h' are provided between the interior of the piston-rod and the front of said piston, preferably through the valve H, the combined areas of which passages will govern and determine the time necessary for an equalization of pressure within the cylinder and the consequent speed with which the piston will move to the front limit of its motion. Of course the passages h' and h' may be formed in and through the piston instead of the valve, if preferred.

In Fig. 6 is shown a construction by means of which the energy of the counter-recoil may be utilized for operating hydraulic mechanism attached to a gun. In such construction the piston-rod d is made hollow throughout its entire length, and in and through the recess d' is secured a pipe d^4, which forms a continuation of the axial opening within said rod from said recess to its rear end. The valve H is supported upon and slides over the front end of said pipe, while to the rear end of said rod d is attached a suitable connection I, through which liquid from the cylinder is passed to the hydraulic mechanism to be operated.

Having thus described our invention, what we claim is—

1. A recoil-controlling mechanism, comprising a fluid-containing cylinder, a piston, a laterally-perforated tube connected to the piston, through which and through an opening in the piston fluid may pass from one side of the piston to the other, and a relatively-fixed sleeve around the tube that cuts off the flow of fluid through the tube, substantially as and for the purpose described.

2. A recoil-controlling mechanism for guns, comprising a fluid-containing cylinder, a piston, a tube connected to the piston, through which and through an opening in the piston fluid may pass from one side of the piston to the other, a series of passages through the wall of the tube, and a part adapted to close such passages in succession, substantially as and for the purpose described.

3. A recoil mechanism for guns, comprising a fluid-containing cylinder, a piston, a tube connected to the piston, through which and through an opening in the piston fluid may pass from one side of the piston to the other, a series of passages through the wall of the tube at different points lengthwise thereof, and a sleeve around the tube, fixed relative to the latter, substantially as and for the purpose described.

4. A recoil-controlling mechanism for guns, comprising a fluid-containing cylinder, a piston, a piston-rod, longitudinal passages through piston and piston-rod, a series of lateral passages through the latter, and a part adapted to cause the successive closing and unclosing of said lateral passages, substantially as and for the purpose described.

5. A recoil-controlling mechanism for guns, comprising a fluid-containing cylinder, a piston, a piston-rod, longitudinal passages through piston and piston-rod, lateral passages through the latter, and a sleeve around the rod, secured to a relatively-fixed part, adapted to cover said lateral passages, substantially as and for the purpose described.

6. A recoil-controlling mechanism for guns comprising a fluid-containing cylinder, a piston-rod, longitudinal passages through piston and piston-rod, a series of passages through the wall of the latter, and an adjustably-supported part adapted to successively close said wall-passages, substantially as and for the purpose described.

7. A recoil-controlling mechanism for guns, comprising a fluid-containing cylinder, a piston, a tube connected to the piston, through which and through an opening in the piston fluid may pass from one side of the piston to

the other, a perforated valve controlling the passage of fluid in either direction, a series of passages through the wall of the tube, and a sleeve around the tube adapted to close such passages in succession, substantially as and for the purpose described.

8. A recoil-controlling mechanism for guns, comprising a fluid-containing cylinder, a spring-pressed piston, a piston-rod, passages through piston and piston-rod communicating with the cylinder on opposite sides of the piston, the rod being laterally perforated to establish communication with the cylinder on one side of the piston, a valve controlling such passages, a fixed sleeve around the piston-rod and a pipe extending longitudinally through piston and rod, and communicating with a longitudinal passage through the rod, substantially as and for the purpose described.

In testimony that we claim the foregoing we have hereunto set our hands this 9th day of January, 1899.

JOHN FORSYTH MEIGS.
ROBERT PAUL STOUT.

Witnesses:
EDWARD J. MALLOY,
JAMES E. LITTLE.