No. 748,513. PATENTED DEC. 29, 1903.

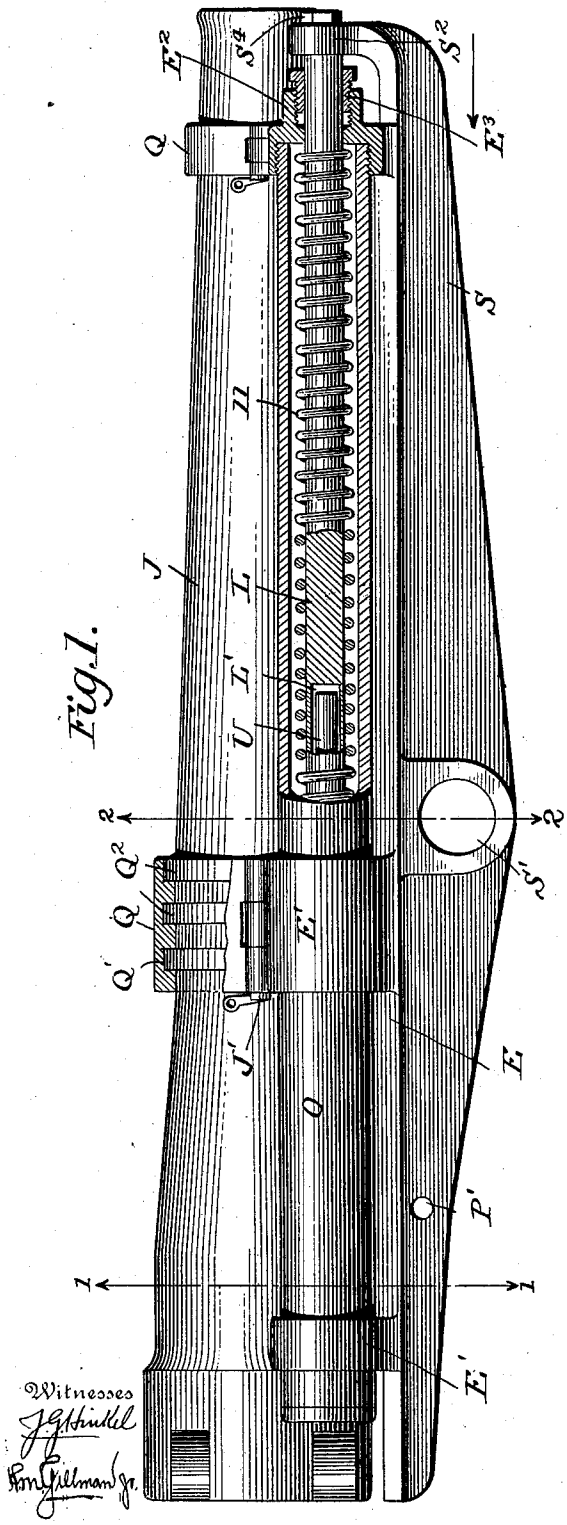
J. F. MEIGS & R. P. STOUT.

RECOIL CHECK FOR GUNS.

APPLICATION FILED JAN. 20, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.



Witnesses
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Fig. 4.

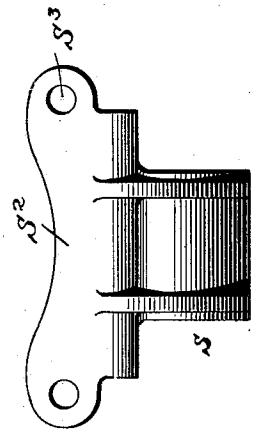


Fig. 3.

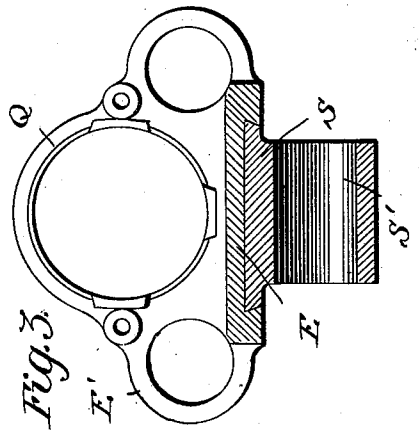
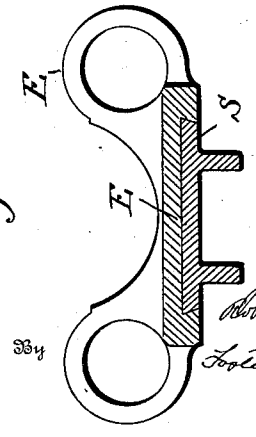


Fig. 2.



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RECOIL CHECK FOR GUNS.

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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 5.

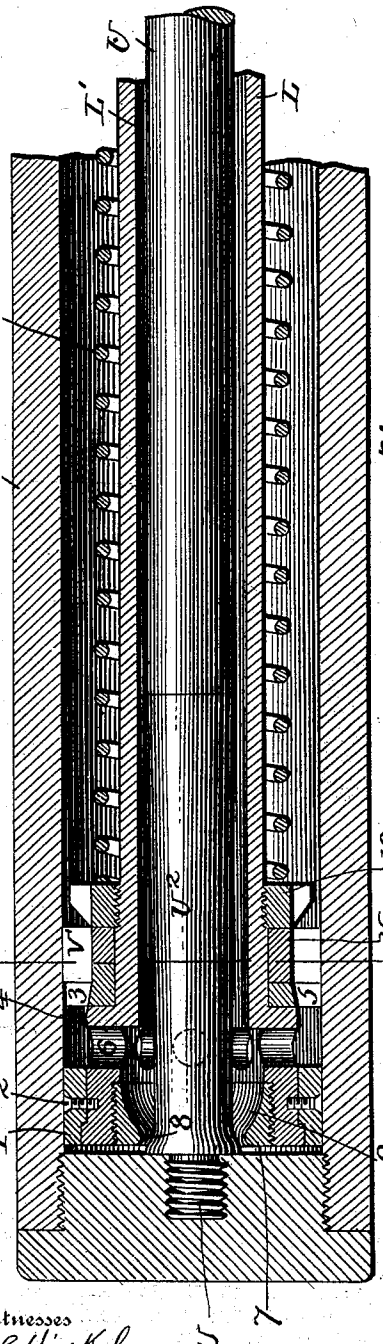


Fig. 8.

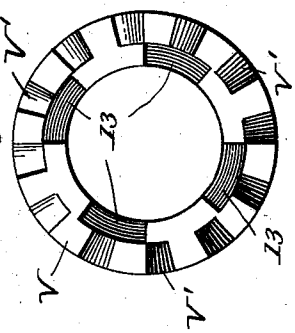


Fig. 7.

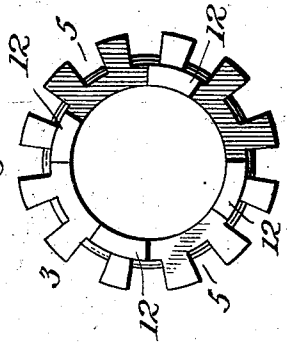
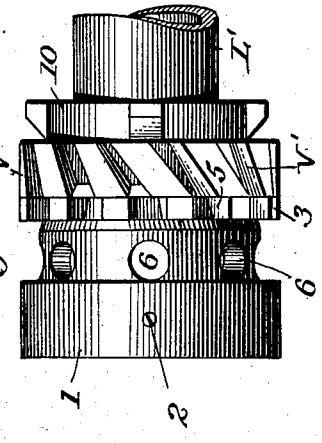


Fig. 6.



Witnesses

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No. 748,513. Patented December 29, 1903.

UNITED STATES PATENT OFFICE.

JOHN F. MEIGS AND ROBERT P. STOUT, OF BETHLEHEM, PENNSYLVANIA, ASSIGNORS TO BETHLEHEM STEEL COMPANY, OF SOUTH BETHLEHEM, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

RECOIL-CHECK FOR GUNS.

SPECIFICATION forming part of Letters Patent No. 748,513, dated December 29, 1903.

Original application filed September 20, 1901, Serial No. 75,852. Divided and this application filed January 20, 1902. Serial No. 90,556. (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 Recoil-Checks for Guns, of which the following is a specification.

Our invention relates to improvements in gun-carriages, and more particularly to carriages for field-guns of the type illustrated and described in our prior application for Letters Patent, Serial No. 75,852, filed September 20, 1901, of which the present application is a division; and it has for its object to provide an improved recoil-check for the gun.

Our invention consists in the arrangement of the recoiling parts in such manner as to give a maximum recoiling weight with a minimum lift of the wheels of the gun when fired and a minimum recoil of the carriage on the ground.

Our invention further consists in the construction of the recoil-check hereinafter to be described.

We obtain the maximum recoiling weight possible by combining the whole weight of the gun and gun-cradle, the recoil of which together is much less than would be the recoil of the gun alone, and although the recoiling weight in this way is very materially greater than the weight of the gun alone, yet the gun may be of the full weight possible, and it is also possible by our construction to get a longer recoil of the gun on the carriage—about half the length of the gun—which further contributes to keeping the gun quiet and unmoved on the ground when the gun is fired. If the gun be slid in the cradle fast to the slide-frame, leaving the recoil-cylinders behind, (which is the usual construction,) the recoil would be much greater—that is, the carriage would run farther back on the ground and the wheels would jump higher off the ground.

Our invention is more fully set forth and illustrated in its many features of construction and operation in the accompanying specification and drawings, in which—

Figure 1 is a side view of the gun in its cradle, the slide-frame, and a recoil-cylinder, partly in section. Fig. 2 is a sectional view of the cradle and slide-frame on the line 1 1 of Fig. 2. Fig. 3 is a sectional view of the cradle and slide-frame on the line 2 2 of Fig. 2. Fig. 4 is a front end view of the slide-frame looking in the direction of the arrow, Fig. 1. Fig. 5 is a longitudinal view, partly in section, through a recoil-cylinder with some of the parts broken away. Fig. 6 is a side view of part of a piston-rod, showing the rotating valve. Fig. 7 is an end view of the slotted collar on the line 4 4 of Fig. 5 looking in the direction of the arrow X; and Fig. 8 is an end view of the rotating valve looking in the direction of the arrow Y, Fig. 5.

Arranged to slide upon the slide-frame S is a gun-cradle E, provided with hollow supports E′ at the rear end for the rear portions of the recoil-cylinders O and also provided with supports E^2 at the front end for the front portions of the recoil-cylinders, the supports E^2 being shown as having sockets in which the ends of the cylinders are adapted to screw, so that a fluid-tight joint may be formed, these bushings also being arranged to receive glands E^3 for compressing a packing for making a fluid-tight joint around the piston-rods L.

Hinged straps Q, having grooves Q′ in their inner portions adapted to engage collars Q^2 on the gun J, are also connected to the cradle so that when the straps are closed about the gun J and secured by pins J′ the gun is movable with the cradle. Any suitable means may be provided for connecting the gun to the cradle so that it is movable therewith, and we have shown only one convenient form of means. The locking devices may also be of any character desired.

As hereinbefore stated, the recoil-cylinders O, constituting the recoil-check of the gun, are secured to the gun-cradle in such manner as to move therewith upon recoil, the gun-cradle and cylinders therefore recoiling together.

The piston-rods L are connected in any suitable manner to the end portion S^2 of the slide-frame S. As shown, the rods are passed through apertures S^3 in the portion S^2 and are

secured therein by means of nuts S^4, so that the piston-rods L are connected to the slide-frame S and are stationary relative to the cradle and cylinders.

The piston-rods L are each formed with a hollow portion L', Figs. 1 and 5, and are provided with pistons at their rear ends in the form of piston-rings 1, suitably secured to the piston-rods, as shown in this instance by means of screws 2. The piston-rods are preferably of forged steel, while the piston-ring should be of any suitable material, as brass. In the following description but one recoil-cylinder, its piston, and parts will be described, it being understood that both recoil-cylinders and their parts shown are of the same construction, and whether two or more recoil-cylinders are used it will be understood that they should all be constructed substantially the same.

Referring now more particularly to Figs. 5, 6, 7, and 8, a ring 3 is connected to the hollow portion L' of the piston, preferably seated against a collar 4, which ring may be of any suitable material and is provided with slots 5 in its periphery. This ring is shrunk upon the piston or otherwise fixedly connected to it, so as not to be movable thereon. Suitable means are provided for allowing the passage of fluid to and from the rear to the inside of the piston, as shown in this instance, apertures 6 being provided between the ring 3 and piston-ring 1 in the shell of the piston-rod, so that fluid passing through the slots 5 in the ring 3 finds its way to the rear of the piston through the apertures 6. Within the rear end of the hollow portion of the piston and, as shown, situated beneath the piston-ring is secured a throttling-ring 7, of any suitable form, but which is shown as internally tapered, with rounded edges at the opening 8.

In order to gradually throttle the fluid upon recoil, and thus equalize the pressure and obtain a uniform recoil, a throttling-bar U is connected in any suitable manner, as by a screw and socket U', to the cylinder O and is extended into the hollow portion L' of the piston sliding therein. This throttling-bar U is provided with a tapered portion U^2, tapering from the front toward the rear, which tapered portion is adapted to slide through the opening 8 in the throttling-ring 7 and cause a gradual throttling of the fluid upon recoil, since the gun, the cradle, the recoil-cylinder, and the throttling-bar connected to the recoil-cylinder all move to the rear when the gun is discharged, and the fluid passing through the apertures 6 into the chamber 9 and from thence to the rear of the piston is gradually throttled between the throttling-ring 7 and the throttling-bar U. Further throttling means are provided through the operation of a rotating valve V, movable upon the hollow portion L' of the piston and arranged adjacent to the ring 3, with the slots or valve-openings 5 in its periphery. While the function of this rotating valve V will be to throttle the fluid somewhat, because of certain spiral openings V', arranged in its periphery at substantially an angle of forty-five degrees, at the same time the ultimate function of our rotating valve is different, as will hereinafter appear. This rotating valve V may be of any suitable material, as bronze, and is arranged loosely upon the piston-rod with a limited rotation relative to the ring 3. A ring-nut 10 is shown connected to the piston-rod by screw-threads, adapted to seat the rotating valve V against the ring 3, and this ring-nut 10 also forms an abutment for the compression-spring 11, arranged within the recoil-cylinder and around the piston-rod and abutting at its forward end against the cylinder, so that upon recoil this spring is compressed and tends to restore the parts to operative position upon the back stroke. This compression-spring may be arranged in any suitable manner to accomplish the end in view; but we have simply shown it within the recoil-cylinder and arranged in the manner described for convenience and simplicity of construction.

Upon an examination of Fig. 7, being a view of the ring 3 on the line 4 4 of Fig. 5 looking in the direction of the arrow X, it will be seen that this ring 3 is provided with lugs 12, shown in this instance as each covering a definite angular portion of the surface of the ring—namely, about thirty-five degrees—while upon an examination of Fig. 8, being a view of the rotating valve V, Fig. 5, looking in the direction of the arrow Y, it will be seen that the rotating valve is provided with recesses 13 for the reception of the lugs 12, these recesses each covering an angular portion of the rotating valve of about forty-five degrees, so that the rotating valve may have a play of about ten degrees relatively to the ring 3. Upon recoil the pressure of the fluid as it passes through the spiral openings V' of the rotating valve V will cause it to move in a clockwise direction looking in the direction of the arrow X as far as the lugs 12 on the ring 3 will permit. The parts are then in the positions shown in Fig. 6, the slots 5 in the ring 3 and the spiral openings V' in the rotating valve V being in conjunction.

During recoil the fluid passing through the spiral openings V', through slots 5, and through the aperture 6 is throttled between the throttling-bar U and the throttling-ring 7 and passes to the rear of the piston; but upon the back stroke or counter-recoil when the gun and cradle are being returned upon the slide-frame through the action of the spring 11 the motion of the fluid through the spiral openings V' tends to rotate the valve V in a direction counter-clockwise looking in the direction of the arrow X, partially closing the slots 5 in the ring 3 to a predetermined position controlled by the relative size of the lugs 12 on the ring 3 and recesses 13 in valve V, thus damping the return stroke and preventing sharp impact between the movable

parts of the gun-carriage and the stationary parts upon this return stroke.

It will thus be seen that we provide a fluid-recoil check for guns having a cylinder and piston, one of which is movable relatively to the other, that means are provided for allowing the passage of fluid to and from the rear of the piston and means are also provided for throttling the fluid on recoil, and that there is a rotating valve in the cylinder operated by fluid-pressure only for controlling the passage of fluid and a spring or any other suitable means operating to return the parts after recoil. In other words, our rotating valve for controlling the passage of fluid is not positively actuated by any mechanical connection with a moving part, but is operated by fluid-pressure in the cylinders only. Our rotating valve in the cylinder operates to control the passage of fluid on the back stroke to damp the movement of the parts in returning to operative positions and prevent concussion and impact between the stationary and moving parts, and it will thus be seen that the spiral openings in our rotating valve coöperate with a plurality of valve openings or slots in the ring on the piston-rod, and the operation is such that said valve-openings remain open on recoil, but are closed to a predetermined point on the back stroke.

Without limiting ourselves to the precise details of construction and arrangement shown and described, we claim as our invention, and desire to obtain by Letters Patent, the following:

1. In a gun-mount for field-guns, the combination of a slide-frame, a cradle adapted to slide thereon, a gun movable with the cradle, a fluid-recoil cylinder connected to the cradle, a piston and piston-rod connected to the slide-frame, means for allowing the passage of fluid to and from the rear of the piston, means for throttling the fluid on recoil, a rotating valve on said piston-rod operated by fluid-pressure only, and controlling the passage of fluid during the counter-recoil, and means for returning the parts to operative position after recoil, substantially as described.

2. In a gun-mount for field-guns, the combination of a slide-frame, a cradle adapted to slide thereon, a gun movable with the cradle, a fluid-recoil cylinder connected to the cradle, a piston and piston-rod connected to the slide-frame, means for allowing the passage of fluid to and from the rear of the piston, means for throttling the fluid on recoil, a rotating valve on said piston-rod provided with spiral openings whereby the valve is rotated by the passage of fluid through said openings, and means for returning the parts to operative position after recoil, substantially as described.

3. In a recoil-check for guns, the combination of a cylinder movable with the gun, a relatively stationary piston and hollow piston-rod, a tapered throttling-bar in the piston-rod movable with the cylinder and operating to throttle the fluid on recoil, means for allowing the passage of fluid to and from the rear of the piston, a rotating valve having openings disposed at an angle to the line of travel of the fluid for controlling the passage of fluid on the back stroke, and means for returning the parts to operative position after recoil, substantially as described.

4. In a fluid-check for guns, the combination of a cylinder and piston-rod, one of which is movable relatively to the other, a piston connected to said piston-rod, means for allowing the passage of fluid to and from the rear of the piston, means for gradually throttling the fluid in its passage to the rear of the piston on recoil, a ring on the piston having openings therethrough, a rotating valve on the piston operated by fluid-pressure only and provided with spiral openings controlling the openings in the ring, means limiting the rotation of the valve so that the openings in the ring remain open on recoil but are closed to a predetermined point on the back stroke, and a compression-spring for returning the parts to operative position after recoil, substantially as described.

5. In a fluid-recoil check for guns, the combination of a cylinder and a piston, one of which is movable relatively to the other, means for allowing the passage of fluid to and from the rear of the piston, means for gradually throttling the fluid in its passage to the rear of the piston on recoil, a ring on the piston having openings therethrough, a rotating valve on the piston provided with openings at an angle to the axis of the valve and controlling the openings in the ring, means limiting the rotation of the valve so that the openings in the ring remain open on recoil but are closed to a predetermined point on the back stroke, and a compression-spring for returning the parts to operative position after recoil, substantially as described.

6. In a fluid-recoil check for guns, the combination of a cylinder and a piston, one of which is movable relatively to the other, means for allowing the passage of fluid to and from the rear of the piston and for throttling the fluid on recoil, a rotating valve for controlling the passage of fluid on the back stroke, said valve having means engaging the fluid-current, and means for returning the parts to operative position after recoil, substantially as described.

7. In a fluid-recoil check for guns, the combination of a cylinder movable with the gun, a relatively stationary piston and piston-rod in the cylinder, means for allowing the passage of fluid to and from the rear of the piston, means for gradually throttling the fluid in its passage to the rear of the piston on recoil, a rotating valve on the piston-rod having spiral openings coöperating with a plurality of valve-openings in a part of the pis-

ton-rod, means limiting the rotation of the valve so that said valve-openings remain open on recoil but are closed to a predetermined point on the back stroke, and a compression-spring for returning the cylinder after recoil, substantially as described.

8. In a gun-mount for field-guns, the combination of a slide-frame, a cradle adapted to slide thereon, a gun movable with the cradle, fluid-recoil cylinders connected to the cradle, hollow piston-rods provided with piston-rings in the cylinders and connected to the slide-frame, openings in the piston-rods for the passage of fluid to and from the rear of the piston-rings, fixed rings on the piston-rods having slots in their peripheries, rotating valves having spiral slots in their peripheries coöperating with the slots in said rings, and compression-springs in the cylinders for returning the cradle and gun after recoil, substantially as described.

9. In a gun-mount for field-guns, the combination of a slide-frame, a cradle adapted to slide thereon, a gun movable with the cradle, recoil-cylinders connected to the cradle, pistons and hollow piston-rods in the cylinders connected to the slide-frame, means for allowing the passage of fluid to and from the rear of the pistons, means for throttling the fluid on recoil, fixed rings on the piston-rods provided with slots, and rotating valves loose on the piston-rods and provided with slots at an angle to the line of movement of the valve and adapted to coöperate with the slots in the rings, means limiting the rotation of the valve so that the slots in the rings remain open for the passage of fluid on recoil but are closed to a predetermined point on the back stroke, and compression-springs in the cylinders for returning the cradle and gun after recoil, substantially as described.

10. In a fluid-recoil check for guns, the combination of a removable fluid-cylinder, a stationary hollow piston-rod in the cylinder, a piston-ring around the rear end of the piston-rod, a throttling-ring in the inside of the rear end of the piston-rod beneath said piston-ring, a throttling-bar connected to the cylinder and movable within the piston-rod said bar having a tapered portion passing through the throttling-ring in the end of the piston-rod, a ring provided with slots in its periphery said ring being fixed to the piston-rod and also having projecting lugs, apertures in the piston-rod between the slotted ring and the piston-ring for the passage of fluid to and from the rear of the piston-ring, a rotating valve loose upon the piston-rod seated against the slotted ring and having spiral slots in its periphery adapted to coöperate with the slots in the ring and also provided with recesses for the reception of the projecting lugs on said ring arranged to allow the rotation of the valve relative to the ring, a ring-nut upon the piston-rod seating the valve against the slotted ring, and a compression-spring in the cylinder abutting against said ring-nut and the forward end of the cylinder, substantially as described.

11. In a gun-mount for field-guns, the combination of a slide-frame, a cradle adapted to slide thereon, a gun movable with the cradle, a fluid-recoil cylinder connected to the cradle, a piston and piston-rod connected to the slide-frame, means for allowing the passage of fluid to and from the rear of the piston, means for throttling the fluid on recoil, a rotating valve on the piston-rod for controlling the passage of fluid during the counter-recoil, said valve having spiral openings therein, and means for returning the parts to operative positions after recoil, substantially as described.

12. In a gun-mount for field-guns, the combination of a slide-frame, a cradle adapted to slide thereon, a gun movable with the cradle, a fluid-recoil cylinder connected to the cradle, a piston and piston-rod connected to the slide-frame, means for allowing the passage of fluid to and from the rear of the piston, means for throttling the fluid on recoil, a ring on the piston having slots, a rotating valve on the piston operated by fluid-pressure only and provided with spiral openings and controlling the passage of fluid through the slots in the ring during counter-recoil, and means for returning the parts to operative position after recoil, substantially as described.

13. In a gun-mount for field-guns, the combination with a gun, cradle, and carriage, of a recoil-cylinder and a piston therein, a ring on the piston having openings therein, and a rotating valve on the piston operated by fluid-pressure and controlling the passage of fluid in one direction only through the rings, said valve having spiral openings therein, substantially as described.

14. In a gun-mount for field-guns, the combination with a slide-frame, of a cradle slidable thereon, a gun movable with the cradle, a recoil-cylinder connected to the cradle, a piston connected to the slide-frame, a ring having openings therethrough and a rotating control-valve coöperating with said ring and having spiral openings therethrough and adapted to be operated by fluid-pressure only, substantially as described.

15. In a gun-mount for field-guns, the combination with a slide-frame, cradle, and gun, of a fluid-recoil cylinder and piston, means for allowing the passage of fluid to and from the rear of the piston, means for throttling the fluid on recoil, a slotted ring and a rotating valve having spiral passages therethrough and adapted to be rotated by fluid-pressure only for controlling the passage of fluid through the ring, substantially as described.

16. In a gun-mount for field-guns, the combination with a slide-frame, cradle, and gun, of a fluid-recoil cylinder and piston, means for allowing the passage of fluid to and from

the rear of the piston, means for throttling the fluid on recoil, a ring having slots, a rotating valve having spiral passages therethrough and adapted to be operated by fluid-pressure only for controlling the passage of fluid through the ring, and means for returning the parts to operative positions after recoil, substantially as described.

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

JOHN F. MEIGS.
ROBERT P. STOUT.

Witnesses:
J. E. MATHEWS,
LEIGHTON N. D. MIXSELL.