

UNITED STATES PATENT OFFICE.

HARRY A. SPILLER, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE PNEUMATIC GUN CARRIAGE AND POWER COMPANY, OF WHEELING, WEST VIRGINIA, AND WASHINGTON, DISTRICT OF COLUMBIA.

PNEUMATIC RECOIL-CHECK FOR GUN-CARRIAGES.

SPECIFICATION forming part of Letters Patent No. 552,075, dated December 24, 1895.

Application filed October 30, 1891. Serial No. 410,392. (No model.)

To all whom it may concern:

Be it known that I, HARRY A. SPILLER, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Pneumatic Recoil-Checks for Gun-Carriages; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to recoil-checks for gun-carriages.

The object is to produce an apparatus or system to elevate or depress a gun to any desired angle, to take up the recoil and counter-recoil of the same, and return it to loading position without shock to the structure.

With these objects in view, the invention consists in a recoil-check for gun-carriages, comprising a main cylinder containing a piston adapted to move in the same, an auxiliary cylinder or reservoir for containing a fluid under pressure, such as compressed air, arranged adjacent to the main cylinder and communicating therewith at a point beneath the piston, means by which the compressed fluid from the reservoir may be admitted beneath the piston at will to move the same, and means by which this fluid under pressure, after raising the piston in its cylinder, may be conveyed to the reservoir; furthermore, in a recoil-check for gun-carriages, comprising a main cylinder having a piston-rod moving in the same, a head on the piston-rod provided with passages, a cylindrical rod passing within the piston, means for adjusting the position of the rod, an auxiliary compressed fluid-containing chamber, means by which the compressed fluid may be admitted at will beneath the piston-head to move the same, and means by which the fluid, after raising the piston, may automatically flow to the auxiliary chamber; furthermore, in a recoil-check for gun-carriages, comprising a main cylinder, the lower head of which has for a fluid under pressure a passage from an auxiliary or storage chamber arranged adjacent to the main cylinder and communicating with the same at a point beneath the pis-

ton, a piston-rod in the main cylinder provided with a piston-head having chambers for the passage of a compressed fluid from a point beneath the piston-head upward, means by which the compressed fluid may be admitted beneath the piston to move the same, means for controlling the passage of this fluid from an auxiliary chamber to the main cylinder, and means for allowing the fluid to escape from the main cylinder; furthermore, in a recoil-check for gun-carriages, comprising a main cylinder provided with trunnions by which it is supported in position on the carriage, a piston-rod adapted to move in the main cylinder and provided with a head having passages in the same for compressed fluid, a rod within the piston, a guide collar or sleeve to move over the rod, having ports, the rod to slide over the ports regulating the passage of a compressed fluid through the same, mechanism for adjusting the position of the rod, and means for indicating on a scale the adjustment of the same, and at once the exact position of the rod; furthermore, in a main cylinder provided with trunnions by which the cylinder and its attending mechanism are supported in position on the carriage, and containing a piston-rod adapted to move in the same and having a head provided with passages through it from below upward, an annular chamber within the piston-rod, a cylindrical rod in this chamber within the piston-rod, a guide collar or sleeve on the cylindrical rod, ports in the collar by means of which communication to the annular chamber within the piston-rod from below is had, the said rod having its lower portion somewhat smaller than its body, this smaller portion being screw-threaded and extending downward through the lower head of the main cylinder into a cap fixed to the bottom of the main cylinder, mechanism connected with and operating to adjust the rod to open and close the passages in the piston-head and the ports in the guide-sleeve, as desired, a circular passage in the lower head of the main cylinder having communication to underneath the piston-head by passages controlled by valves, and communication into the same from above by ports controlled by valves, an auxiliary chamber adjacent to the

the passages C² and C to the space c' under the piston-head, and then through the ports a⁴ and passages a⁶ to above the piston-head. The fluid passing through the ports a⁴ in the sleeve or collar a⁵ enters the annular chamber A² around the slide-rod A⁴ in the piston, partly or completely filling the same, as desired, while the fluid passing up through the passages a⁶ in the piston-head enters and partly or completely fills the annular space E around the piston-rod in the cylinder. When these annular chambers A² and E contain the desired quantity of fluid, the slide-rod A⁴ is adjusted to close the ports a⁴ and the passages a⁶. The valve D² is then turned to close the passage D and the valve C⁵ to close the passage C⁴. Then the fluid in the reservoir is raised to a tension which, when it is admitted under the piston-head by opening the passage D, will be sufficient to force the piston upward until the gun mounted thereon is elevated to battery. As the piston moves upward, the fluid in the space E at its top offers a certain amount of resistance, forming a positive elastic cushion in the nature of a buffer to take up any jar when the piston-head approaches the top of the cylinder A; but as the pressure increases to a certain predetermined degree it overcomes the resistance offered by a spring check-valve e⁸, the lift of which is controlled by a regulating-screw e² at the top of a side pipe E', located outside of and adjacent to the main cylinder, which side pipe connects the spaces above and below the piston-head and conveys the compressed fluid from near the top of the main cylinder, above the piston-head, to underneath the same, thus allowing the piston to complete its upward movement. Any portion of the fluid which is not forced out of the annular space E through this side pipe E' escapes by leakage around the piston-head into the space c' below the same until equilibrium is established. The fluid in the chamber A² also escapes by leakage into the hollow rod A⁴ during the short lapse of time when the piston is being forced upward.

Upon the discharge of the gun, the energy of the recoil forces the piston-rod downward in its cylinder against the compressed fluid underneath the piston-head. The springs to close the non-return valves c are of such a tension that when a certain degree of pressure against them is reached they will allow the valves to open, and the compressed fluid rushes through these openings into the circular passage C, and thence through the passage C² into the reservoir C³. As the downward descent of the gun slackens slightly before the piston-head gets to its lowest position, the valves c are closed as the pressure against them decreases, and there will be a small quantity of air still remaining in the space c' under the piston-head. By the slight

overtravel of the ports a⁶ through the cylindrical rod A⁴ a portion of compressed fluid under the piston escapes into space E, whereupon an equilibrium pressure will be restored below the degree necessary to raise the piston, and at the same time the piston slowly settles until the gun thereon is at "rest" or in loading position.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a recoil-check for gun-carriages, a main cylinder containing a piston, having passages, a chamber within the piston-rod, a rod passing within the piston-rod and having a guide-sleeve or collar provided with ports from below the piston-rod to the chamber within the piston rod, mechanism for adjusting the position of the rod, and means for conveying the fluid under pressure beneath the piston-head to force the piston upward, substantially as described.

2. In a recoil-check for gun-carriages, a main cylinder, containing a piston, a chamber within the piston-rod, a rod passing within the piston-rod and having a guide-sleeve or collar provided with ports, mechanism for adjusting the position of the rod, means for conveying the fluid under pressure beneath the piston-head to force the piston upward, and means for liberating the fluid under pressure from the chambers above the piston-head, substantially as described.

3. In a recoil-check for gun-carriages, a main cylinder, a piston-rod moving in the cylinder, an auxiliary chamber adjacent to the cylinder, connections between these chambers, means for controlling the connections, a chamber within the piston-rod, passages connecting to these chambers from below the piston, means for controlling these connections, and passages for conveying the compressed-fluid beneath the piston-head to force the piston upward, substantially as described.

4. A recoil-check for gun carriages, comprising a main cylinder provided with trunnions by which it is supported in position on the carriage, a piston rod adapted to move in the main cylinder and provided with a head having passages from below upward through the piston, a valve rod passing within the piston, a guide-collar or sleeve on the said rod having ports, the valve rod being adapted to slide over the ports to regulate the passage of the compressed-fluid through the same, mechanism for adjusting the position of the valve rod, and means for indicating the adjustment of the same, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

HARRY A. SPILLER.

Witnesses:

DAVID H. MEAD,
F. B. KEEFER.