

(No Model.)

2 Sheets—Sheet 1.

L. DÉNOYELLE.

APPARATUS FOR MODERATING THE RECOIL OF GUNS.

No. 481,647.

Patented Aug. 30, 1892.

FIG. 1.

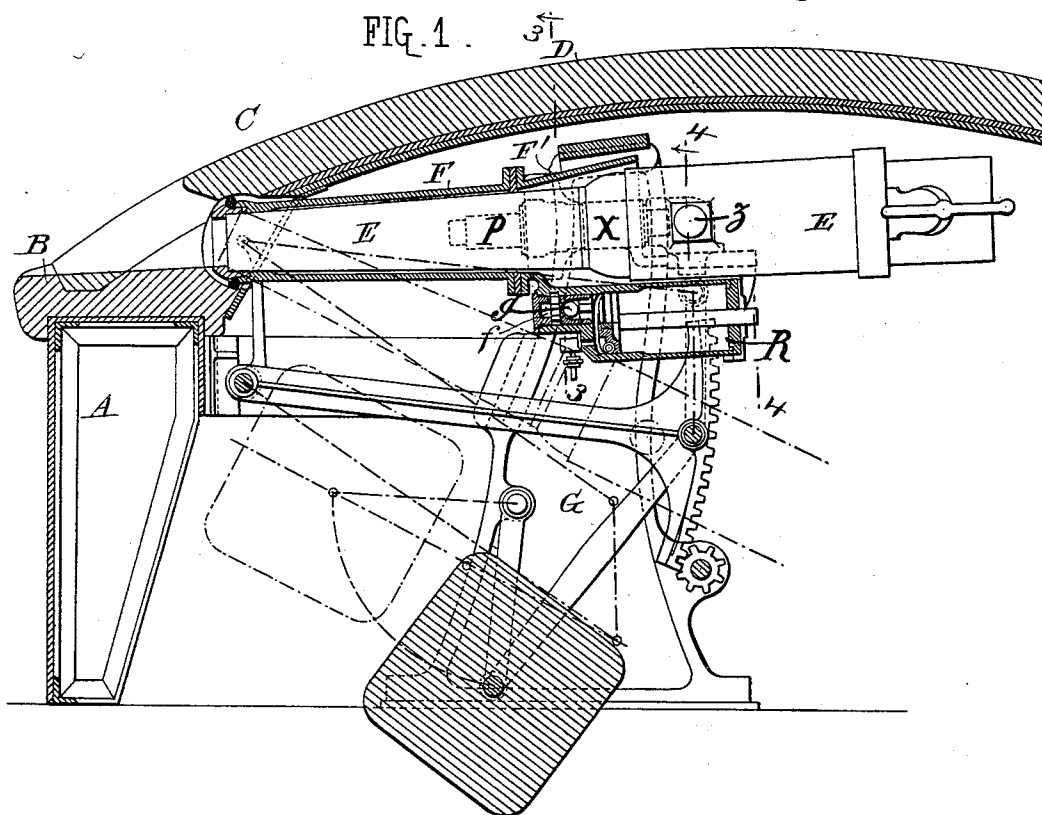
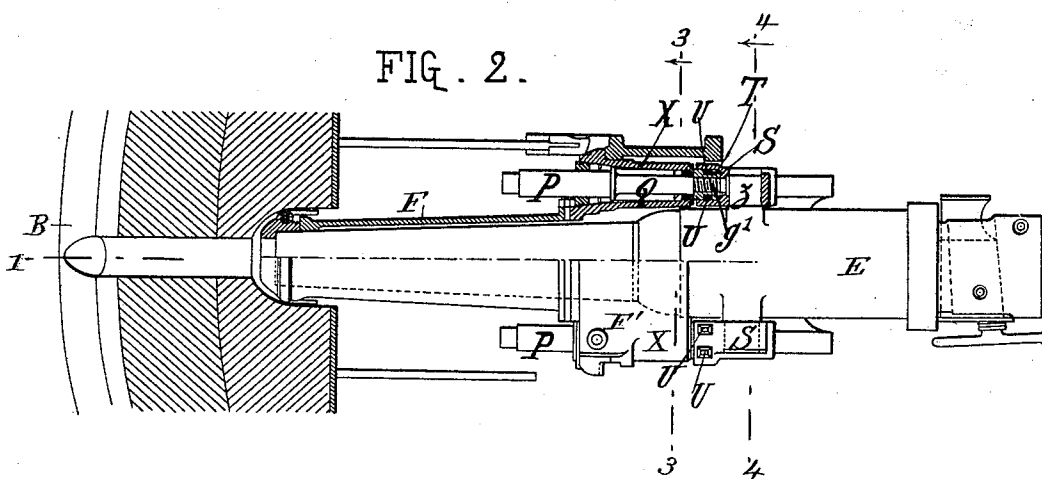


FIG. 2.



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FIG. 5.

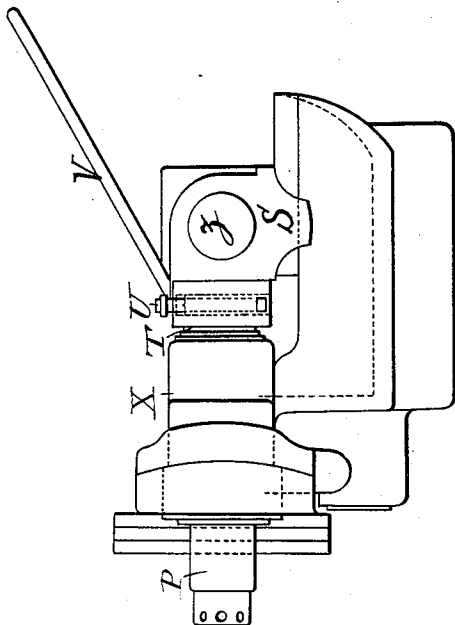
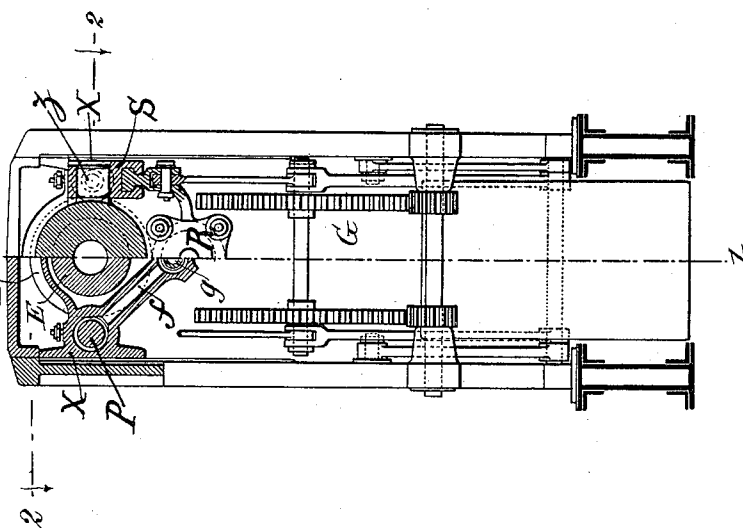


FIG. 3, FIG. 4.



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UNITED STATES PATENT OFFICE.

LÉON DÉNOYELLE, OF PARIS, FRANCE, ASSIGNOR TO THE COMPAGNIE ANONYME DES FORGES DE CHATILLON ET COMMENTRY, OF SAME PLACE.

APPARATUS FOR MODERATING THE RECOIL OF GUNS.

SPECIFICATION forming part of Letters Patent No. 481,647, dated August 30, 1892.

Application filed October 15, 1890. Serial No. 368,247. (No model.)

To all whom it may concern:

Be it known that I, LÉON DÉNOYELLE, a citizen of the Republic of France, residing in Paris, France, have invented certain new and useful Improvements in Apparatus for Moderating the Recoil of Guns, of which the following is a specification.

This invention relates to apparatus for moderating the recoil of the gun.

This improved apparatus consists in its preferred form in the arrangement on each side of the gun of cylinders, in each of which is a piston connected to the gun, a liquid being arranged behind each piston and communication afforded for this liquid with a third cylinder located below the gun, and back of the piston of which is a resisting-spring. By means of the recoil the liquid contained in the two lateral cylinders is forced into the lower cylinder, passing through the ball-valve. In this cylinder is compressed the spring behind the piston. When the recoil is completed, the spring reacts on the piston of the lower cylinder and the liquid is forced back, passing through adjustable openings and into the lateral cylinder for bringing the gun back into the firing position.

The improved apparatus has been constructed with a view of permitting a rapid examination and easy repair of the various organs in connection with the service which is required of it. In addition the construction of the apparatus is such that the mounting and dismounting, and even the displacement of the gun, are rendered very easy.

This improved apparatus is illustrated in its preferred form in the accompanying drawings, in which—

Figure 1 is a vertical section of a turret, showing the gun in side elevation and its sheath and adjacent parts in longitudinal mid-section. Fig. 2 is a fragmentary horizontal section of the turret, showing the gun and its sheath and adjacent parts in elevation at the lower half and the sheath in horizontal mid-section at the upper half. Figs. 3 and 4 are vertical cross-sections of the gun, Fig. 3 being the left-hand side of the figure, cut on the line 3 3 in Figs. 1 and 2 through one recoil-cylinder, and Fig. 4 being the right-hand

side of the figure, cut on the line 4 4 in Figs. 1 and 2 through one trunnion. Fig. 5 is a fragmentary side elevation, on a larger scale, of the trunnion-shoe and side cylinder of the gun, showing the lever for disconnecting the shoe from its piston-rod when the gun is to be dismounted.

Referring to the drawings, let A indicate the framework of an ordinary turret; B, the sill thereof; C, the armor-plate constituting the roof D thereof; E, the gun; F, a sheath inclosing the muzzle end thereof, and G the mechanism for supporting and manipulating the gun. These parts may be of any suitable or well-known construction.

According to this invention I provide cylinders X X, arranged at the opposite sides of the gun E, which cylinders inclose pistons P P, the piston-rods Q Q of which are connected to the gun, preferably by connection to the trunnion-shoes S S of the gun. These trunnion-shoes S are preferably movable with the gun in longitudinal direction on suitable tracks.

z z indicate the trunnions of the gun, which are engaged by the shoes S.

The liquid contained behind the pistons P P in the cylinders X X can communicate with another cylinder R, preferably below the gun, this communication being afforded by conduits f f, leading, preferably, to a ball-valve g. (Seen in Fig. 1.) Preferably the conduits f f of the valve are adjustable or of an adjustable cross-section, as shown in Figs. 1 and 3, to allow of the regulation of the strength and extent of the recoil. A piston (seen in Fig. 1) arranged in the cylinder R receives the action of the liquid forced thereinto from the cylinders X X, and a resisting-spring is interposed back of this piston to resist its backward movement under the liquid-pressure during the recoil and upon the termination thereof to restore it to its forward position, and thereby by driving the liquid out of the cylinder R and back into the cylinders X X to restore the gun to its normal position.

For facilitating the mounting and dismounting and the replacement of the gun according to this invention a special connec-

tion of the piston-rods Q Q with the shoes S S, which embrace the trunnion z of the gun, is provided. This connection is preferably effected as follows: On the threaded end g' of each piston-rod Q is secured a cylindrical head T, preferably of bronze, which head is preferably received in a cavity or recess formed in the shoe S. Two keys, with heads U U, are preferably placed at each side of the longitudinal axis of the head T, passing through apertures in the shoe S and through corresponding grooves or recesses in the head, as seen in Figs. 2 and 5, serving thereby to lock these parts together. This connection gives the piston-rods the necessary minimum diameter for the resistance which they are required to develop while permitting their quick disconnection from the shoes, and thereby insuring a rapid dismounting of the gun.

The dismounting is effected in the manner shown in Fig. 5. A special lever V is provided, preferably engaging under the head U of each key, which suffices when the long arm of the lever is acted upon to extract the key from its seat and disengage it from the head T and shoe S. When the four keys have been thus extracted, the shoes S are free to disconnect from the piston-rods Q Q, and the gun can be dismounted in any suitable manner, either under the action of gravity or of any suitably-placed supports, so that it slides on the guiding-faces of the shoes or is directly lowered to a lower stage, where a new gun for replacing it is located. The new gun can then be placed in position in any suitable manner, its shoes being connected to the piston-rods Q Q as soon as they are passed over the heads T T of these rods by inserting the keys in position to lock these heads to the shoes. The facility of maneuvering thus obtained allows precious time to be gained when it is required to replace a gun which has been rendered useless. Preferably the side cylinders X X and the lower cylinder R and the communicating conduits are formed integrally with the rear portion F' of the sheath F; but this is not essential.

It will be seen that my invention provides an improved means for effecting the moderation of the recoil of guns and for connecting and disconnecting the gun to the recoil apparatus, which is simple, efficient, and rapid in operation.

What I claim is—

1. In a recoil apparatus for guns, the combination, with a shoe for engaging a trunnion of the gun and movable therewith, of a recoil-cylinder, a piston therefor having a piston-rod, and a connection between said rod and said shoe, consisting of a head on the one, a recess adapted to receive said head on the other, and a removable key for locking said head in said recess, adapted to be removed by a lever, whereby the gun can be separated from the recoil-cylinder by removing said key, and thereby its ready replacement is permitted.
2. In a recoil apparatus for guns, the com-

ination, with the gun, of the shield F', recoil-cylinders X X, arranged at the respective sides of the gun, formed integrally with said shield, pistons P P, arranged in said cylinders and having rearwardly-extending piston-rods Q Q, connected, respectively, to the trunnions of the gun, a third cylinder R, arranged beneath the gun and formed integrally with said shield, conduits communicating between said recoil-cylinders and said third cylinder, a piston within the latter, a liquid medium contained in said recoil-cylinders and adapted when the pistons thereof are moved under the recoil of the gun to be forced through said conduits into said third cylinder, and thereby to move the piston of the latter, and a resisting-spring acting to resist the movement of the piston in said third cylinder, whereby when the gun recoils its recoil is transmitted through said liquid medium to said spring and is taken up by the latter, and on the termination of its recoil under the reaction of said spring the gun is restored to position, said parts constructed substantially as and for the purpose set forth.

3. In a recoil apparatus for guns, the combination of two recoil-cylinders arranged at the respective sides of the gun in front of its trunnions and parallel with its longitudinal axis, pistons arranged in said cylinders and having rearwardly-extending piston-rods connected at their rear ends to the gun and movable parallel with its axis and in a plane coincident with the axis of its trunnions, a third cylinder, conduits communicating between said cylinders, a piston within the third cylinder, a liquid medium contained in said recoil-cylinders and adapted when the pistons thereof are moved under the recoil of the gun to be forced through said conduits into said third cylinder, and thereby to move the piston of the latter, a resisting-spring acting to resist the movement of the piston in said third cylinder, whereby when the gun recoils its recoil is transmitted through said liquid medium to said spring and is taken up by the latter, and on the termination of its recoil under the reaction of said spring the gun is restored to position, and a separable connection between said piston-rods and the gun, consisting of a head on the one, a recess on the other, and a removable key for locking said head in said recess, said connection constructed when disengaged to permit the dismounting of the gun by its direct rearward movement in direction coincident with its longitudinal axis, whereby other than axial movement is unnecessary to the separation of the gun from its recoil apparatus, substantially as and for the purpose set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

LÉON DÉNOYELLE.

Witnesses:

R. J. PRESTON,
MICHEL COQUART.