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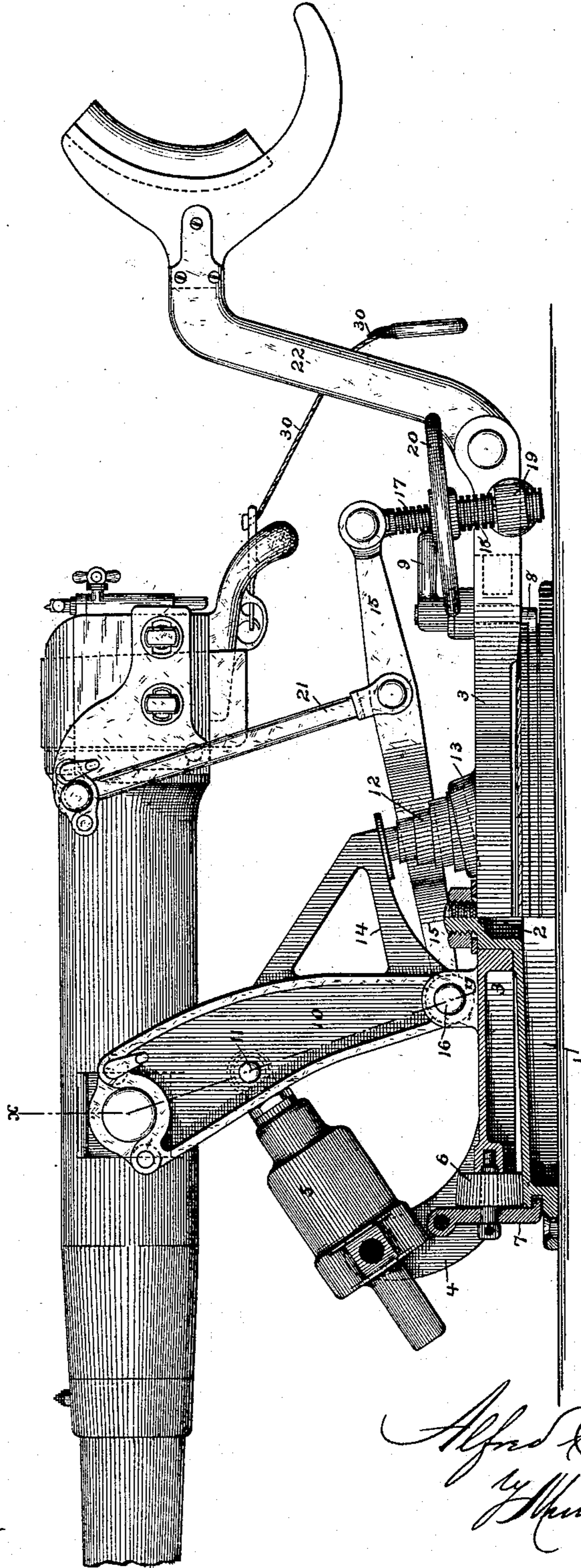
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A. C. KOERNER.
OPERATING ORDNANCE.

No. 407,018.

Patented July 16, 1889.

Fig. 1.



Attest:

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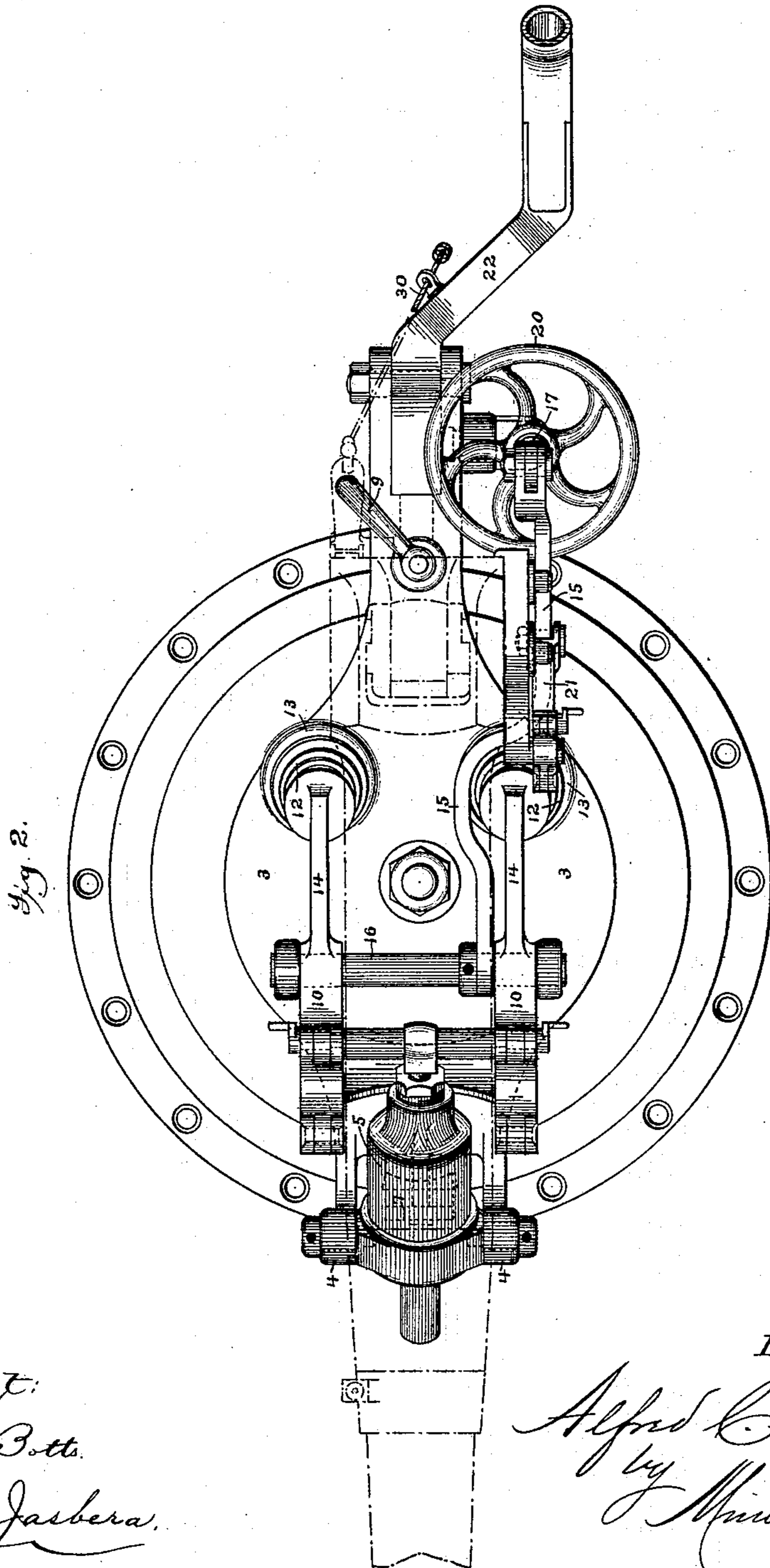
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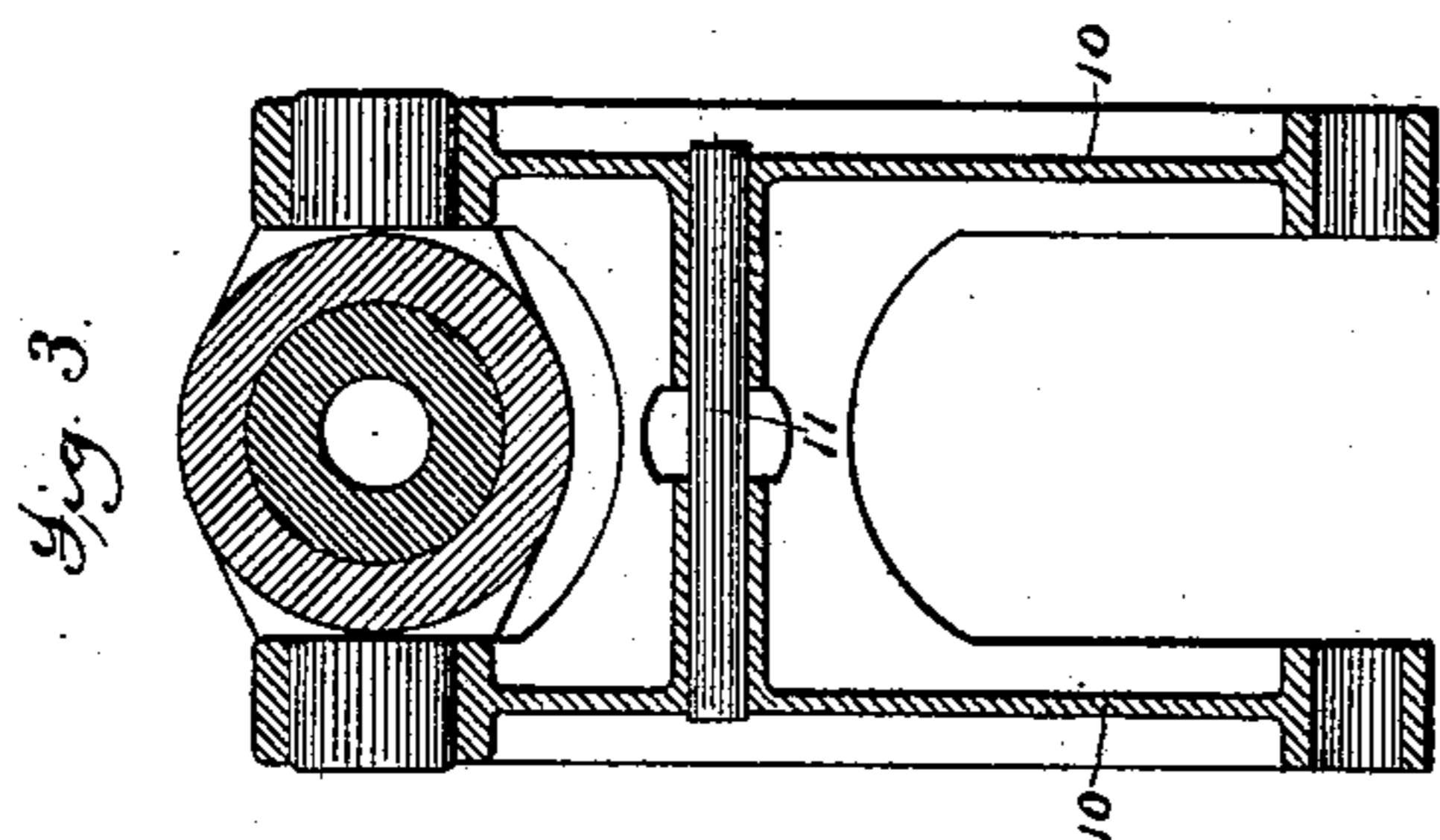
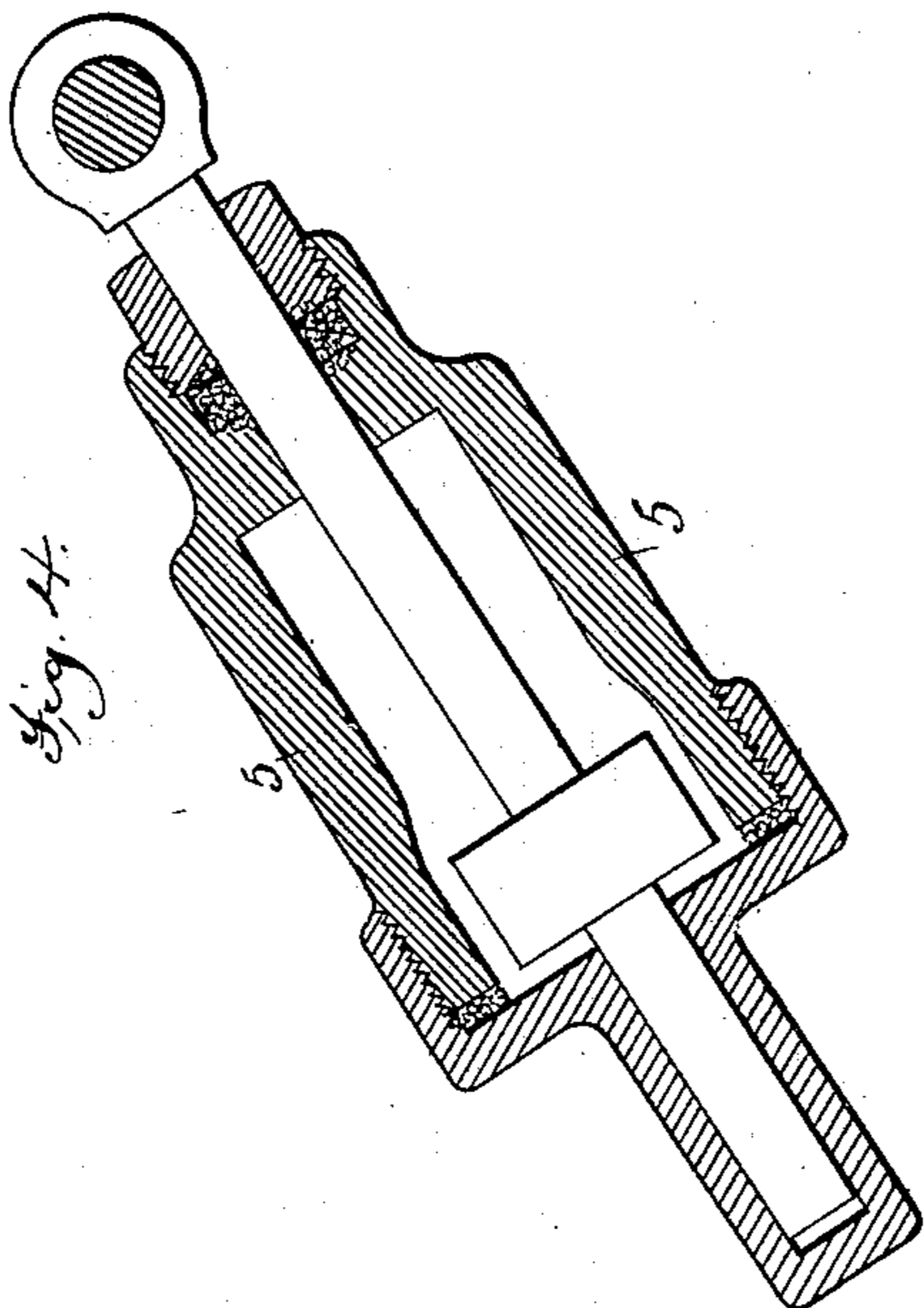
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UNITED STATES PATENT OFFICE.

ALFRED CHRISTOPHER KOERNER, OF PARIS, FRANCE, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE HOTCHKISS ORDNANCE COMPANY, (LIMITED,) OF LONDON, ENGLAND.

OPERATING ORDNANCE.

SPECIFICATION forming part of Letters Patent No. 407,018, dated July 16, 1889.

Application filed December 18, 1885. Serial No. 186,055. (No model.)

To all whom it may concern:

Be it known that I, ALFRED CHRISTOPHER KOERNER, a subject of the Queen of England, residing at Paris, in the Republic of France, have invented certain new and useful Improvements in Naval Carriages for Rapid-Firing and other Guns, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

Rapid-firing guns for naval service require a carriage of special design which offers the greatest facilities for rapid pointing of the gun, and in which the pointing and firing of the same are within the control of the hands of a single man, in order to obtain the greatest accuracy of fire under the continual movements of the vessel carrying the gun and the changing position of a moving enemy. The gun, in fact, to be highly efficient must be always ready for firing, and, as the rapidity of firing a gun of this class is entirely dependent on the rapidity and facility with which it is possible to point it, devices accomplishing these ends are of especial importance and utility.

The carriage herein described is arranged for the Hotchkiss rapid-firing gun; but it can by slight modifications be adapted to the Nordenfelt or any other system of gun.

The carriage is constructed on the well-known Albini principle with respect to a recoil mechanism, consisting of a hydraulic cylinder connected to two rocking arms, the lower end of each of which is journaled to a base-plate, and the upper end of each of which acts as a trunnion-bearing for the gun.

The invention comprises a structure and combinations of parts whereby a swiveling frame turning upon a stationary bed or pivot-plate is made to carry all of the movable parts of the carriage and the gun—in combining therewith a shoulder-piece for training the gun horizontally, an elevating mechanism for training the gun vertically, clips for guiding the horizontal movements, and means for locking the swiveling-plate stationary.

The invention also includes an improved construction of the cylinder of the hydraulic

recoil device, and further comprises an auxiliary spring-recoil device connected with the rocking trunnion-arms, and a means for securing a parallel motion of the gun during recoil, all of which is specifically hereinafter pointed out.

In the annexed drawings, Figure 1 is a side elevation, and Fig. 2 is a plan view, illustrating my improved naval carriage mounting a Hotchkiss rapid-firing gun. Fig. 3 is a vertical section on lines *x y* of Fig. 1, showing in detail the rocking arms to which the hydraulic cylinder is connected. Fig. 4 is a longitudinal sectional elevation of the hydraulic cylinder.

The bed-plate 1 and pivot 2 consist of a single casting, which is bolted to the deck or other suitable part of the vessel. Upon the same is mounted a swiveling frame 3, which carries all the moving parts of the carriage. Its forward end is turned up to form supporting-arms 4, in which is pivoted the hydraulic cylinder 5. This frame is free to swing about the pivot 2, having one or more rollers 6 under its front end to facilitate movement, while it is held to the bed-plate by a front clip 7 and a rear clip 8, each bearing under a flange of the bed-plate. The rear clip 8 is fitted with a screw-clamp 9 to hold and set the gun in any desired position of training, if required.

The gun is mainly supported by the rocking arms 10 10, whose upper ends form the trunnion-bearings, their lower ends being pivoted to the swiveling frame 3. These arms 10 10 are connected by ribs and by a tubular bearing 11, (see Fig. 3,) which latter forms the axis which receives the outer end of the hydraulic piston.

The movement of the rocking arms 10 10, and consequently of the gun itself, is controlled, first, by the piston of the hydraulic cylinder, which is secured to them and regulates the recoil, and, second, by two volute springs 12 12, each let into a boss 13, provided on the frame 3, which springs are borne upon by arms 14 14, that project rearward from the rocking arms 10 10. The said springs 12 12 act in the first place to check

the recoil, and in the second place to force the gun back to its original position after firing.

The elevating and parallel motion apparatus consists of a main bar 15, whose forward end pivots on the axis 16 of the rocking trunnion-arms 10 10, while its rear end has pivoted to it the elevating-screw 17, which latter engages the internal threads of a second screw 18, whose outer threads run in a nut 19, secured to the swiveling frame 3. The upper end of the second screw 18 is provided with a hand-wheel 20 for operating it, the screws 17 and 18 being respectively right and left handed, in order that a great rapidity of motion may be obtained. A parallel-motion bar 21 connects the main elevating-bar 15 with the breech of the gun. Projecting from the rear of the swiveling frame 3 is a shoulder-piece 22, by means of which the gun is trained in direction.

The gunner bears the shoulder-piece 22 to his left shoulder, while by the hand-wheel 20 he works the elevating-screws 17 and 18 with his left hand, and fires the gun by pulling the lanyard 30 with his right hand, said lanyard being connected with any suitable firing device. By this arrangement of carriage sufficient recoil is given to the gun to greatly reduce the deck strains and without involving great extra weight or space.

Neither the elevating-screws nor shoulder-piece 22 are affected by the recoil of the gun, so that the gunner is in no danger from having his hand at either point while firing. The gunner is able to elevate and train at the same time, while his right hand is entirely free to fire the moment his aim is on.

As hitherto made, the bore of the hydraulic cylinder for the passage of the piston is the same throughout the stroke. It follows that the resistance of the piston is the same at all points of the stroke. A great advantage is found in causing the resistance to the motion of said piston to increase with the stroke. To this end the bore of the cylinder, instead of being uniformly cylindrical, as hitherto practiced, is made conical, the greatest diameter being at the commencement of the stroke when the recoil takes place and decreasing as the stroke proceeds. Thus the piston meets with the least resistance from the fluid contained in the cylinder as the stroke begins, and said resistance increases as the stroke proceeds in the same ratio as the decrease in diameter of the cylinder.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. The combination, with the gun, the supporting-frame, and the rocking trunnion-arms pivoted to the frame and supporting the gun, of the hydraulic cylinder having a piston connected to said trunnion-arms to resist the recoil of the gun, the bearing-arms 14, extending rearward from the trunnion-arms, and the springs 12, interposed between said arms 14 and the supporting-frame to resist recoil and to restore the gun after recoil, substantially as described.

2. The combination, with the gun, the supporting-frame, and the rocking trunnion-arms pivoted to the frame and supporting the gun, of the hydraulic cylinder having a conical bore decreasing in diameter rearward and provided with a piston connected to said trunnion-arms to resist the recoil of the gun, the bearing-arms 14, extending rearward from the trunnion-arms, and the springs 12, interposed between said arms 14 and the supporting-frame to resist recoil and to restore the gun after recoil, substantially as described.

3. The combination, with the bed-plate having a pivot, of a swiveling supporting-frame turning upon said pivot and having one or more rollers which travel upon the bed-plate, a front clip 7, and a rear clip 8, having a screw-clamp 9, for guiding said swiveling frame upon the bed-plate and for locking it in position, a shoulder-piece extending rearward from the swiveling frame, the rocking arms 10, pivoted to the swiveling frame and supporting the gun at their upper ends, the elevating-bar 15, pivoted to the swiveling frame and connected to the gun by the connecting-bar 21, the screw for moving said bar 15, the hydraulic cylinder having a piston connected to the rocking arms 10, the bearing-arms 14, extending rearwardly from the arms 10, and the springs 12, interposed between the arms 14 and the swiveling frame, substantially as described.

In witness whereof I have hereunto set my hand, in presence of two subscribing witnesses, this 10th day of November, 1885.

ALFRED CHRISTOPHER KOERNER.

Witnesses:

ROBT. M. HOOPER,
CH. T. THIRION.