

(No Model.)

2 Sheets—Sheet 1.

W. J. HOYLE, Dec'd.

W. D. BALDWIN, Administrator.

MOUNTING FOR HEAVY ORDNANCE FOR LAND DEFENSES.

No. 381,980.

Patented May 1, 1888.

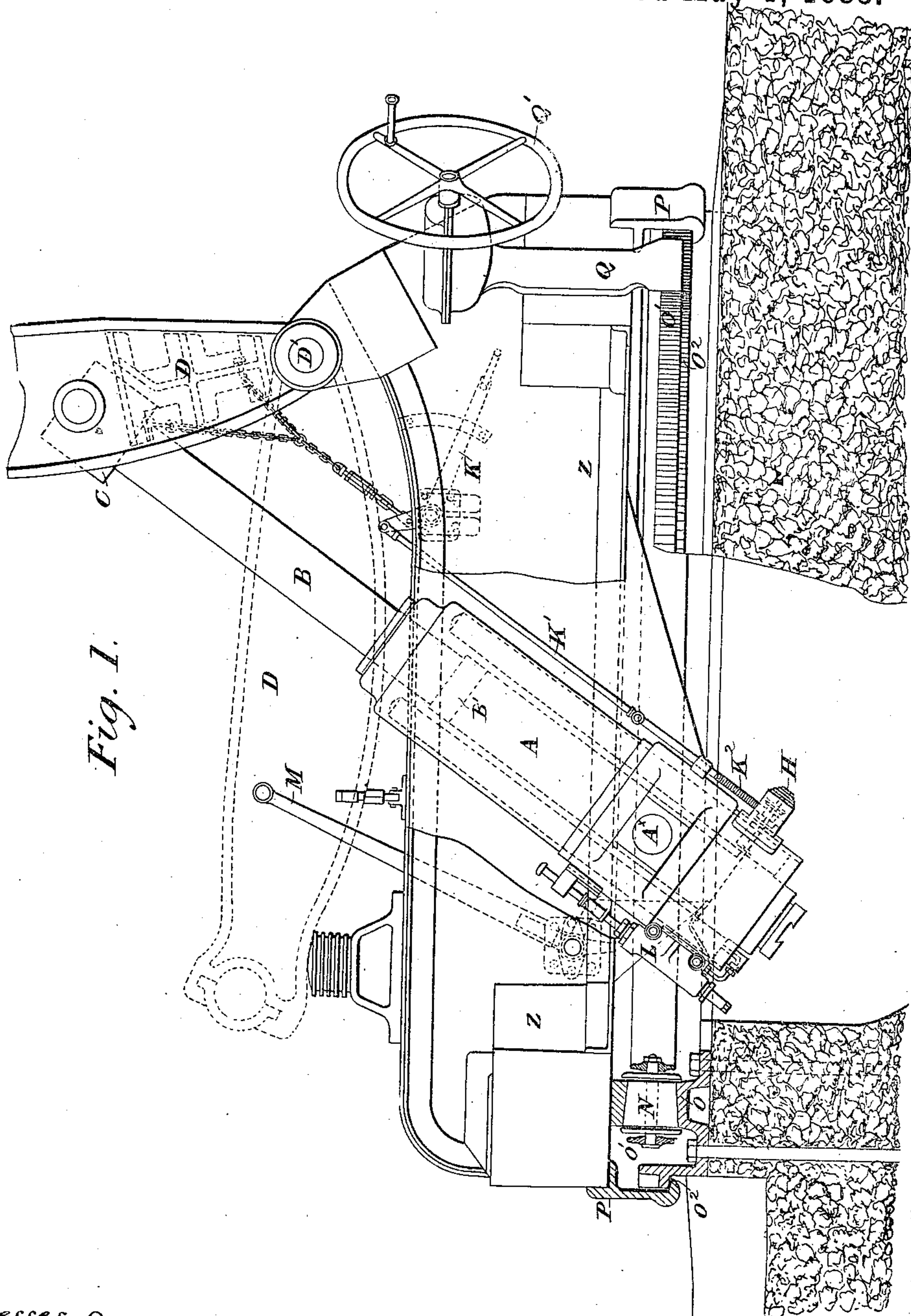


Fig. 1.

Witnesses.
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(No Model.)

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2 Sheets—Sheet 2.

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Fig. 2.

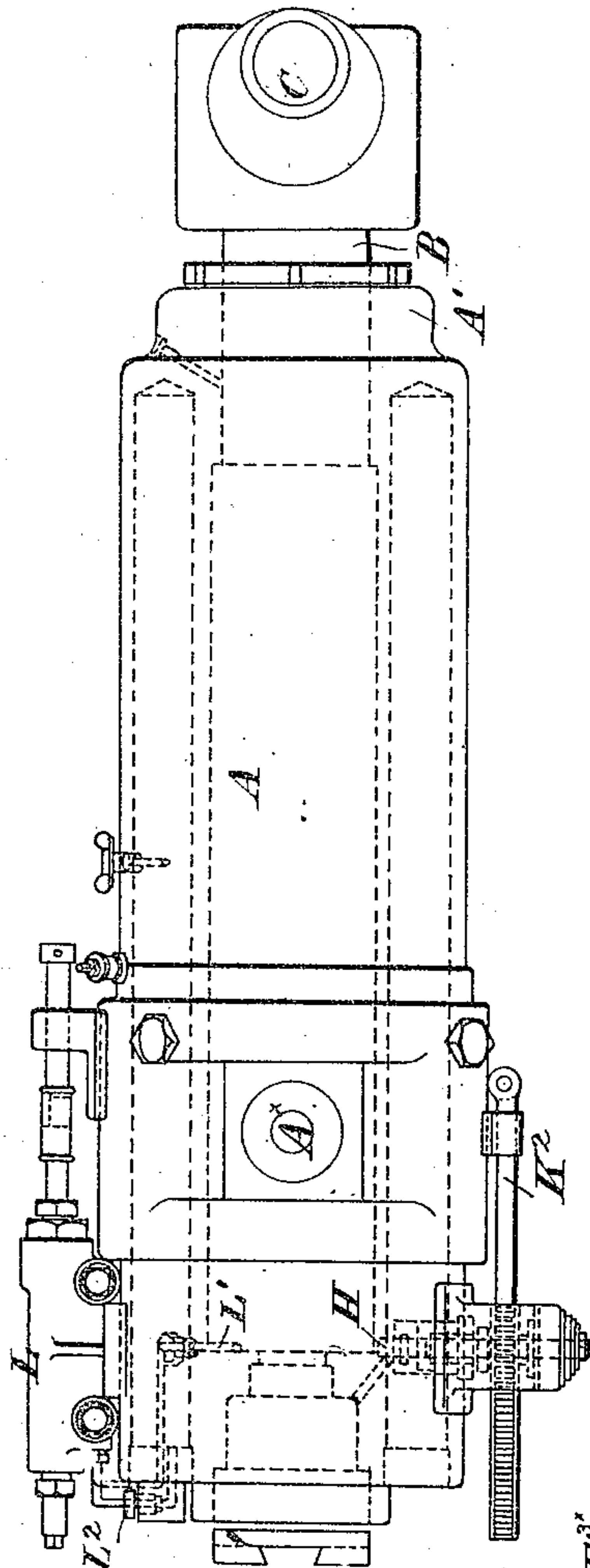


Fig. 3.

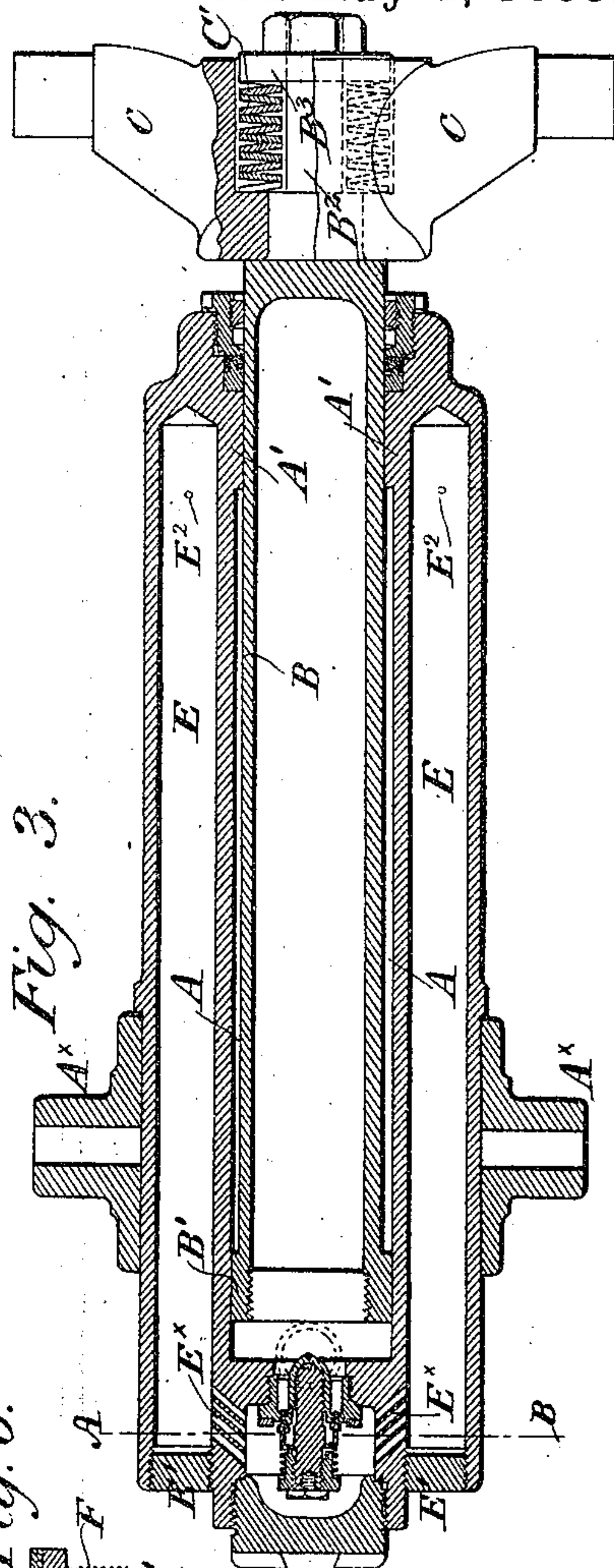


Fig. 6.

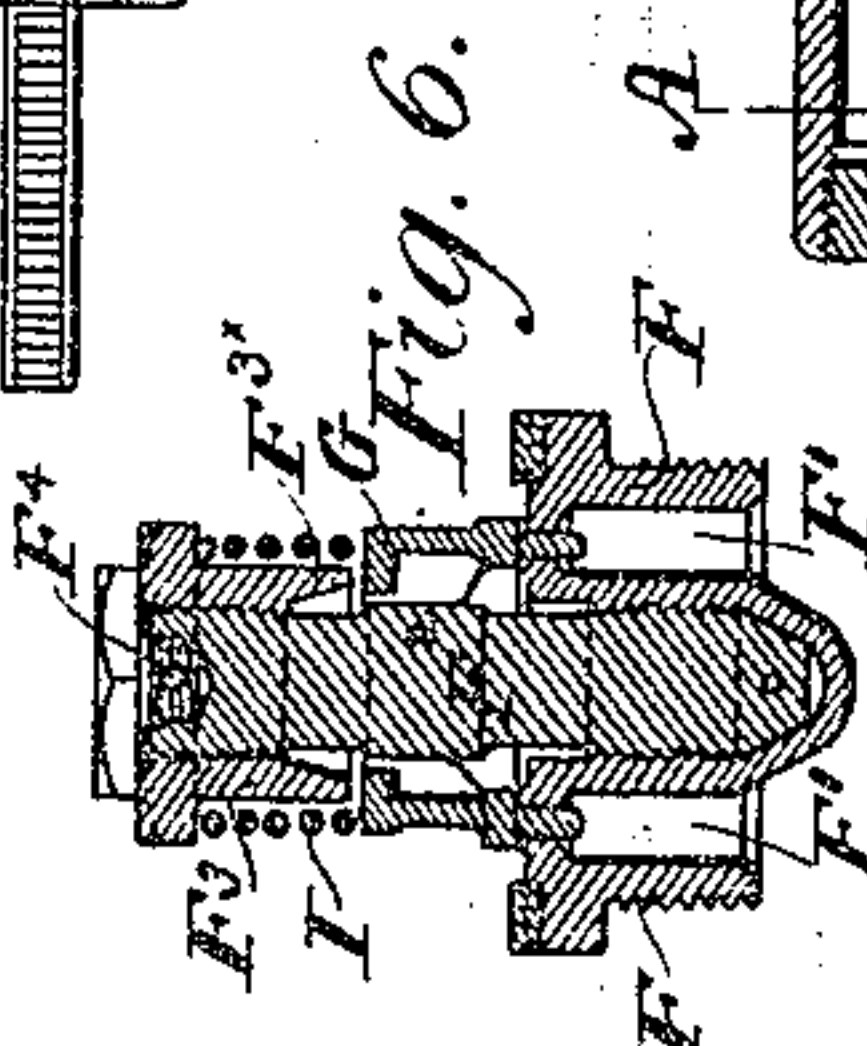


Fig. 4.

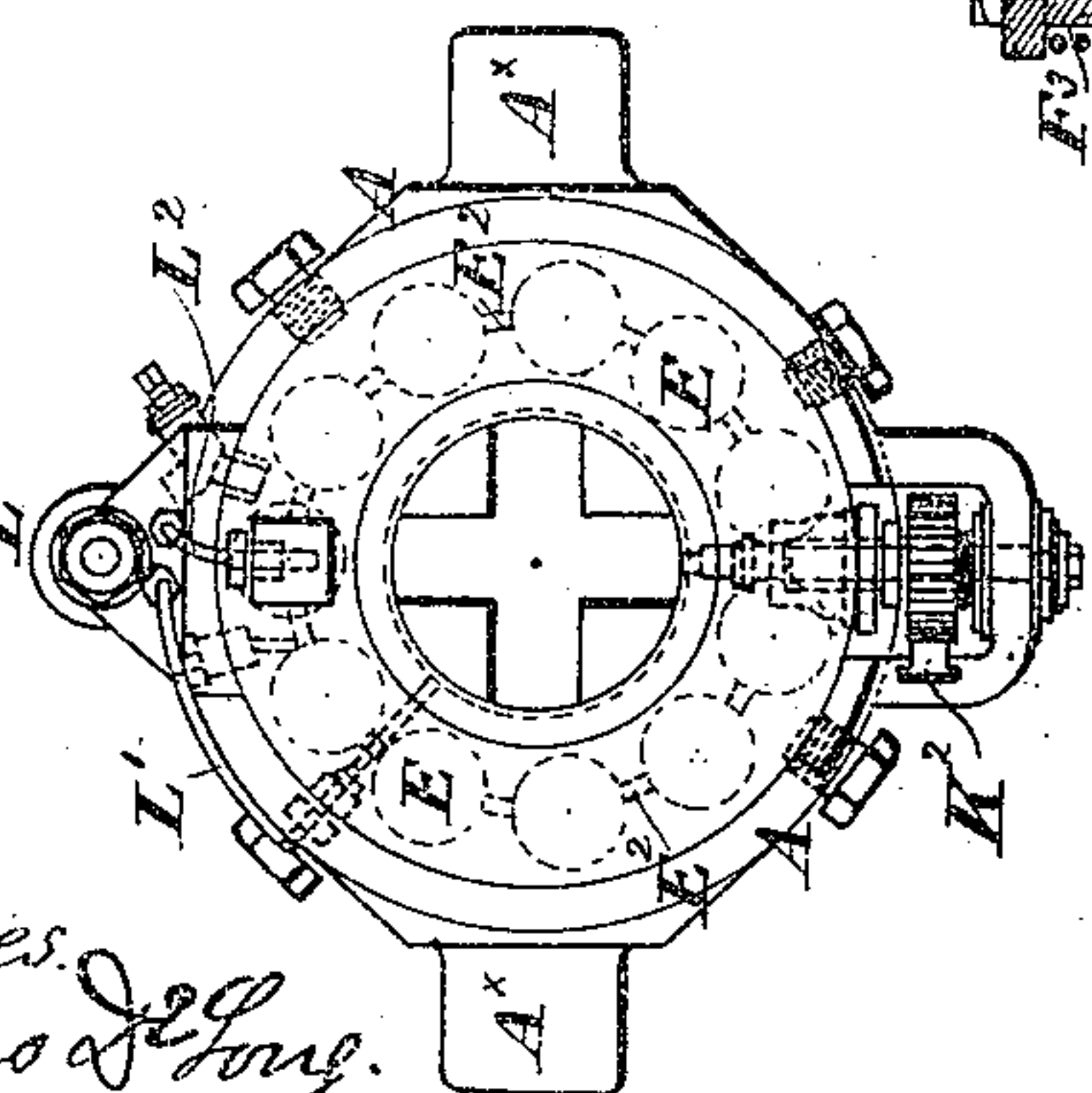
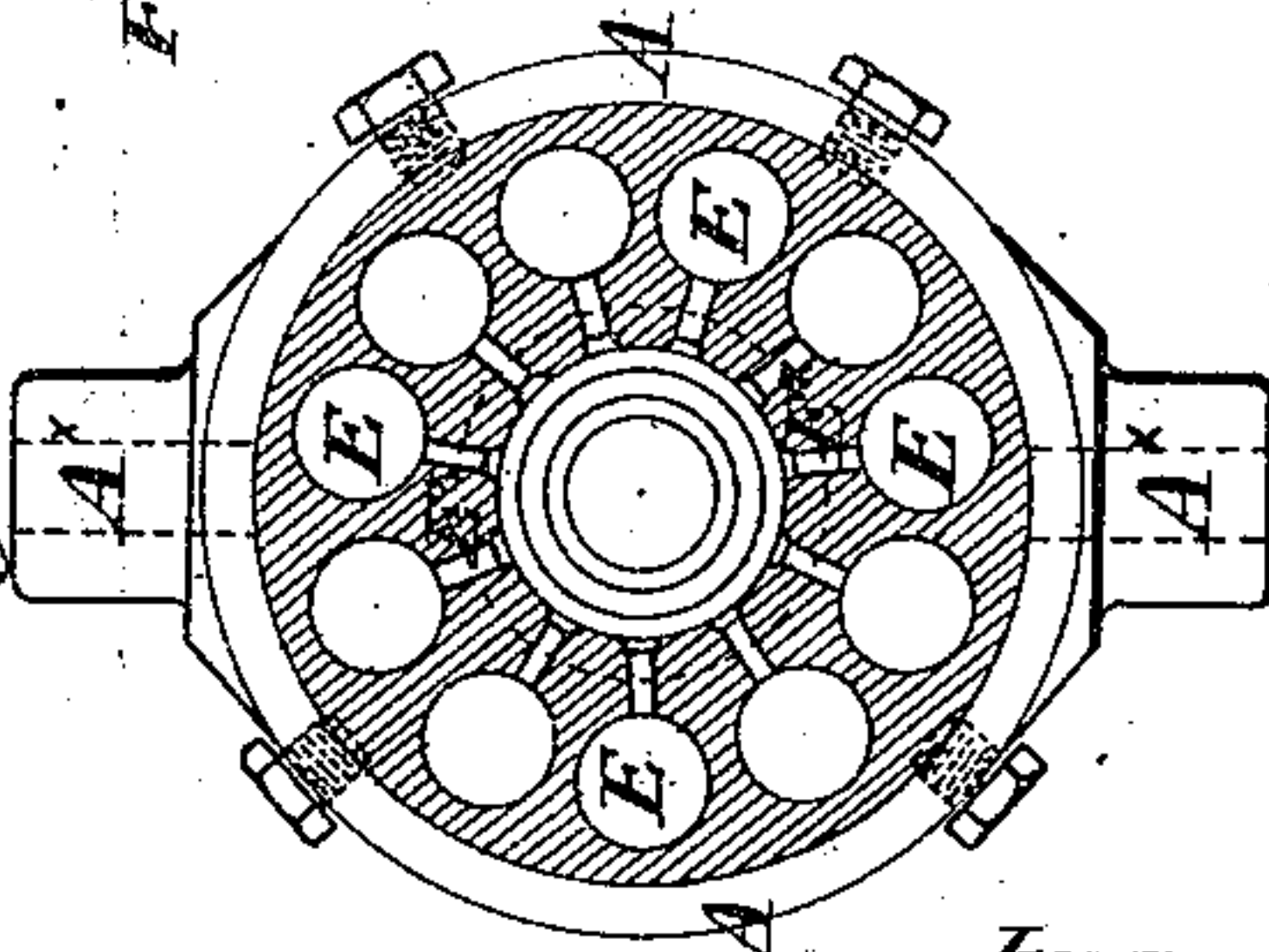


Fig. 5.



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UNITED STATES PATENT OFFICE.

WILLIAM D. BALDWIN, OF WASHINGTON, DISTRICT OF COLUMBIA,
ADMINISTRATOR OF WILLIAM J. HOYLE, DECEASED.

MOUNTING FOR HEAVY ORDNANCE FOR LAND DEFENSES.

SPECIFICATION forming part of Letters Patent No. 381,980, dated May 1, 1888.

Application filed July 27, 1887. Serial No. 245,457. (No model.) Patented in England March 6, 1886, No. 3,205, and in Italy December 31, 1886, No. 20,966.

To all whom it may concern:

Be it known that WILLIAM JENNINGS HOYLE, deceased, formerly a subject of the Queen of Great Britain, residing at The Elswick Works, Newcastle-on-Tyne, England, engineer, did invent certain new and useful Improvements in Mountings for Heavy Ordnance for Land Defenses, (for which he obtained Letters Patent in Great Britain, No. 3,205, dated March 6, 1886, and in Italy, No. 20,966, dated December 31, 1886,) of which the following is a specification.

This invention is applicable especially where the gun is raised for firing and after firing descends under shelter, and whereby the recoil-liquid is forced out of a cylinder past a valve into an air-chamber, and so a portion of the energy of the recoil is stored and rendered available to raise the gun again to a firing position. The recoil-cylinder and the air-receiver are made from one mass of forged steel. The air-receiver shown, instead of consisting of a single chamber, is obtained by boring a series of holes or cavities around the cylinder parallel to its axis. These cavities are bored from the bottom, and are afterward closed with screwed plugs tightly calked when in place. Small holes are drilled from one cavity to another at the upper end. These are sufficient to maintain equilibrium of pressure in the several cavities. By this arrangement leakage of air is effectually prevented, there being no joints except those around the screw-plugs, and these always remain covered by liquid. The recoil-valve is placed centrally at the bottom of the recoil-cylinder. It is set to open a very short distance during recoil, and the recoil is expended in part in forcing the liquid past this valve. The liquid passes from the recoil-cylinder first into the valve-chamber, and thence by passages into the air-cavities, a passage being cut from the valve-chamber to the bottom of each cavity. The valve closes to prevent return, so that the gun after recoil remains down, while the air is retained in the air-receiver under full pressure. To allow the gun to rise, a by-pass valve is opened which allows the liquid to return from the air-receiver into the recoil-cylinder. This valve is actuated by a rack which is moved by means

of a lever-handle in a direction parallel to the axis of the cylinder. A jointed rod connects the rack with the hand-lever to provide for the rocking movement of the recoil-cylinder about its trunnions. A chain connected with a moving part of the gun-mounting also automatically moves the rack and closes the by-pass valve as the gun reaches the firing position.

In order to prevent the gun overrunning the firing position, heavy restraining-chains have heretofore been employed. These chains are dispensed with, and the object is effected by means of a piston-like enlargement upon the inner end of the ram and a corresponding collar within the recoil-cylinder at its upper end. Notches are cut out both from the piston and the collar in such manner that in one position they can pass each other. In this position the ram is inserted, and it is then turned partly around and secured in its working position. This being done, it is impossible for the ram to escape from the cylinder.

The cross-head connecting the ram with the pivoted frame or side levers of the gun-mounting is provided with powerful steel springs. These springs allow a certain amount of play between the cross-head and the ram, and prevent undue strain coming either upon the recoil-cylinder or ram. The force-pump, by which by manual labor liquid can be transferred from the recoil-cylinder to the air-receiver, is mounted upon the side of the recoil-cylinder, and moves with it as the cylinder rocks upon its trunnions. The hand-lever which works the pump has, however, a fixed fulcrum and an arm engaging with the pump-rod near the trunnions, on which the recoil-cylinder oscillates, so that the connection between these parts is not interfered with by the movement of the recoil-cylinder.

The gun-mounting is not centrally pivoted, but is supported by live rollers upon a ring-rail or racer, and these rollers have flanges on both sides of the rail. This racer or ring-rail is made of a piece with a ring of teeth, with which the pinions on the training-gear engage, and also with a ring, with which clips on the movable part of the mounting engage to prevent the mounting lifting from the racer

when the gun recoils. By making the racer and these rings all of a piece fitting is much simplified, and no shifting of the foundations can afterward affect the relative positions. The training of the gun-mounting is effected by wheel-gearing, and each train of wheels is fitted up in a pillar and forms a separate piece, to be attached to the mounting and readily renewable in case of injury.

In order that the said invention may be most fully understood and readily carried into effect, I will proceed to describe the drawings hereunto annexed.

In the drawings, Figure 1 shows a side elevation, partly in section, of the recoil-cylinder with other parts of the gun-mounting, which in its general arrangement (except as hereinafter stated) is similar to that described in another application for patent made by me, dated July 18, 1887, Serial No. 244,656. Fig. 2 shows a side elevation of the recoil-cylinder with parts connected therewith drawn to a larger scale. Fig. 3 is a longitudinal section of the same. Fig. 4 is an under side view. Fig. 5 is a transverse section on the line A B in Fig. 3. Fig. 6 shows separately, to a larger scale, a longitudinal section of the recoil-valve.

A A is the cavity of the recoil-cylinder, in which the ram B enters. This ram carries a cross-head, C, which is jointed to the gun-supporting pivoted frame formed by the side levers. There are two of these side levers, and they are connected by strong framing. A portion of one of these levers is shown and marked D. The fulcrum is at D' at the lower end of the frame upon the revolving table or platform Z. At their upper ends the side levers of the frame have bearings in which the gun is carried by its trunnions. E E are the cavities around the cylinder A, forming the air-receiver. These cavities are bored in the same mass of metal in which the cylinder itself is formed, and at their lower ends they are plugged with plugs E'.

E² E² are small perforations near the upper ends of the cavities E, by which they communicate the one with the other.

The ram B is made to enter the cylinder A from its upper end, and the piston-like enlargement B' at its lower end is notched away at intervals around the circumference to admit of this. The collar at A' at the upper end of the cylinder is similarly cut away, and when the ram is suitably placed it is able to enter the cylinder. After the ram has been so entered into the cylinder it is turned partly round to bring it to its working position, and when in this position it cannot be withdrawn from the cylinder, because the piston-like enlargement B' comes into contact with the collar A'. The connection between the ram B and the cross-head C is such as to admit of longitudinal but not of rotary movement. A cavity is formed in the cross-head, and this receives springs C' C'.

The springs represented in the drawings are

dished rings. They are arranged around a stem, B², forming a continuation of the ram B, and are compressed between the bottom of the cavity in the cross-head and a disk, B³, placed onto the stem B² and held in place by a screw and nut. The recoil-valve shown by Fig. 6 is fitted into the lower end of the cylinder A. It consists of a block, F, which is screwed into its place. In this block holes F' F' are drilled, and from the bottom of these holes a perforation passes through to the outer face of the block, where a valve-face is formed.

F² is a stem fixed into the block F, and upon this stem the annular valve G is carried. The valve is pressed toward its seat by the spring I, which abuts on the valve G, and also upon a collar, F³, screwed onto the stem F².

F⁴ is a lock-screw, to retain the collar F³ when in place. The collar F³ has a projecting rim, F^{3*}, which serves to limit the lift of the valve G, and the collar is adjusted so that the valve-opening offers considerable resistance to the water as it is driven out from the cylinder A. By adjusting the collar F³ this resistance may be made greater or less. The water, when driven out by the recoil from the cylinder A, passes by passages E* into the cavities E E, which cavities are already charged with compressed air, as explained in the application for patent hereinbefore mentioned. H is a by-pass valve consisting of a small cone forced to its seat by a screw upon its stem and a corresponding screw-thread in the passage which receives the valve. This valve closes a passage between a cylinder, A, and the space beyond the recoil-valve in communication with the cavities E. When the by-pass valve H is withdrawn from its seat, the pressure of the air in the cavities E drives the water into the cylinder A. The ram B is then forced out of the cylinder and the gun is raised to its firing position. The by-pass valve H is worked by the hand-lever K. An arm on the axis of this lever is jointed to the rod K', and this is connected to the rack K², having teeth engaging with pinion-like teeth upon the stem of the valve H. Upon the same axis with the hand-lever there is also a short lever-arm, which is connected by chains in the manner shown in Fig. 1 with the side levers, D, which carry the gun. When the gun comes up to its firing position, these chains automatically move the hand-lever and close the by-pass valve H.

L is a pump provided upon the side of the recoil-cylinder A. It has a suction-passage, L', communicating with the interior of the cylinder, and a delivery-passage, L², communicating with the air-cavities E.

M is a hand-lever for working the pump. This hand-lever is upon an axis which is carried in bearings on the platform Z, and the axis has a short arm entering between collars upon the pump-rod at a point sufficiently near to the trunnions A*, on which the cylinder A is carried, to admit of the requisite movement of the recoil-cylinder about these trunnions

without interfering with the engagement between the hand-lever and the pump-rod. By the use of this pump the gun may be brought down from the raised position without firing.

5 A central pivot for the platform Z is not provided; but it is carried by coned rollers N, which run upon a ring-rail or racer, O. The rollers have flanges on either side of the rail.

10 O' is a ring of teeth formed of a piece with the racer for use in training the gun and platform.

15 O² is another ring or flange, also formed of a piece with the racer and intended for the clips P P on the platform to engage with it, so that the recoil in no case may be able to cause the platform to lift.

20 Q is a pillar bolted onto the platform. It carries the axis of the hand-wheel Q', by turning which the gun is trained. The axis of the hand-wheel is connected by beveled gear with a vertical axis carried within the pillar, and this at its lower end carries a spur-wheel in gear with the teeth at O'.

25 No claim is herein made covering simply features or combinations of devices shown and described in the before-mentioned application, Serial No. 244,656.

30 Having now particularly described and ascertained the nature of the said invention and in what manner the same is to be performed, I declare that what I claim as the invention of the said WILLIAM J. HOYLE is—

1. The combination, in a gun-mounting, or a ram connected with a movable frame which 35 carries the gun, a cylinder into which the ram is driven by the recoil of the gun, an air-receiver formed by communicating cavities in the walls of the cylinder, a passage connecting the interior of the cylinder with the cavities of the air-receiver, a valve in this passage 40 which opens automatically to permit escape of liquid from the cylinder to the air-receiver cavities, but closes to prevent return from the cavities to the cylinder, and a by-pass valve 45 which opens a return-passage between the air-receiver cavities and the cylinder, substantially as and for the purpose set forth.

2. The combination, in a gun-mounting, of a ram connected with a movable frame which 50 carries the gun, a cylinder into which the ram is driven by the recoil of the gun, an air-receiver formed by communicating cavities in

the walls of the cylinder, a passage connecting the interior of the cylinder with the cavities in its walls, a valve in this passage which 55 opens automatically to permit escape of liquid from the cylinder to the air-receiver cavities, but closes against return, a by-pass valve which opens a return-passage between the cavities and the cylinder, and a pump with 60 its suction-pipe connected with the interior of the cylinder and its delivery-pipe connected with the cavities in the cylinder-walls, substantially as and for the purpose set forth.

3. The combination, in a gun-mounting, of 65 a ram connected with a pivoted frame which carries the gun, a cylinder into which the ram is driven by the recoil of the gun, an air-receiver adjacent to the cylinder, a passage connecting the cylinder with the air-receiver, a 70 valve in this passage which opens automatically to permit escape of liquid from the cylinder to the air-receiver, but closes against return, a by-pass valve which opens a return-passage between the air-receiver and the cyl- 75-inder, and gear connecting the by-pass valve with the gun-carrying frame, which gear closes said valve as the gun reaches the firing position, substantially as and for the purpose set forth. 80

4. The combination, in a gun-mounting, of 80 a ram connected with a pivoted frame which carries the gun, a cylinder into which the ram is driven by the recoil of the gun, an air-receiver adjacent to the cylinder, a passage con- 85-necting the cylinder with the air-receiver, a valve in this passage which opens automatically to permit escape of liquid from the cylinder to the air-receiver, but closes against re- 90-turn, a by-pass valve which opens a return-passage between the air-receiver and the cylinder, a pinion on the stem of the by-pass valve, a rack engaging with the pinion, and a chain or like connection between the rack and gun-carrying frame, substantially as and for 95 the purpose set forth.

In testimony whereof I have hereunto subscribed my name.

WM. D. BALDWIN,
Administrator of William J. Hoyle, deceased.

Witnesses:

BALTUS DE LONG,
N. L. HOLMES.