

(No Model.)

2 Sheets—Sheet 1.

J. J. E. H. PAYNE.

GAS CYLINDER FOR ELEVATING HEAVY ORDNANCE.

No. 437,237.

Patented Sept. 30, 1890.

Fig. 1.

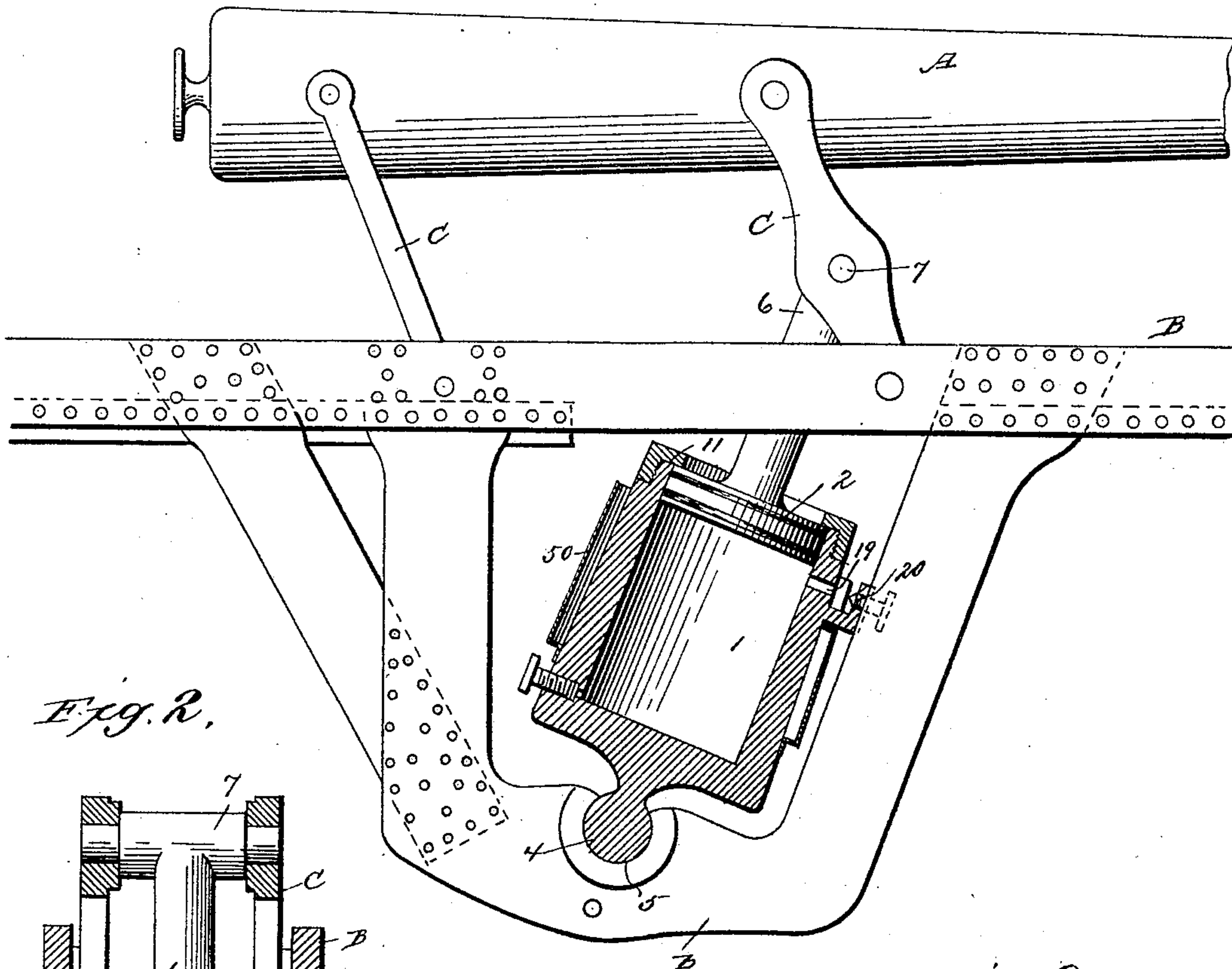
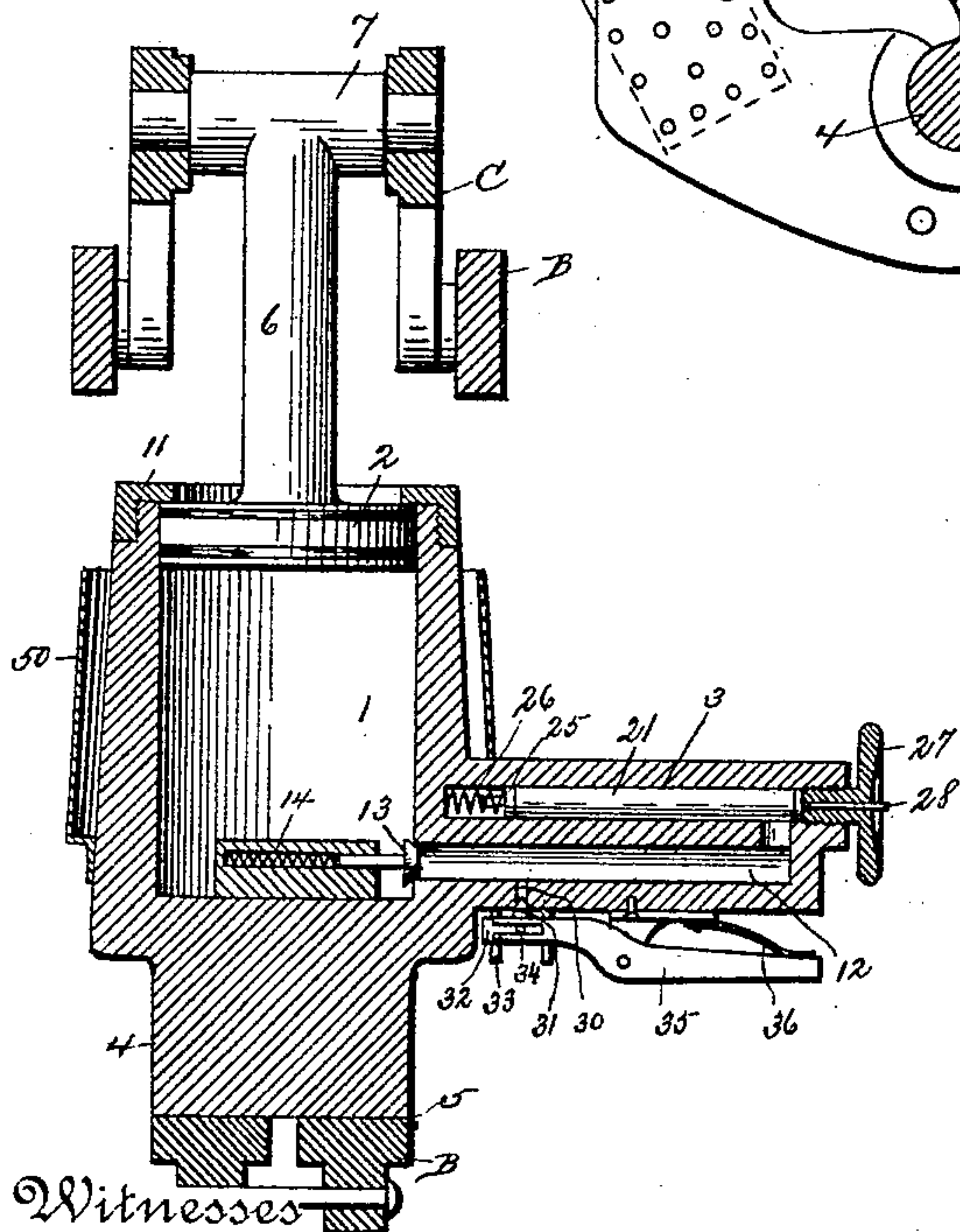
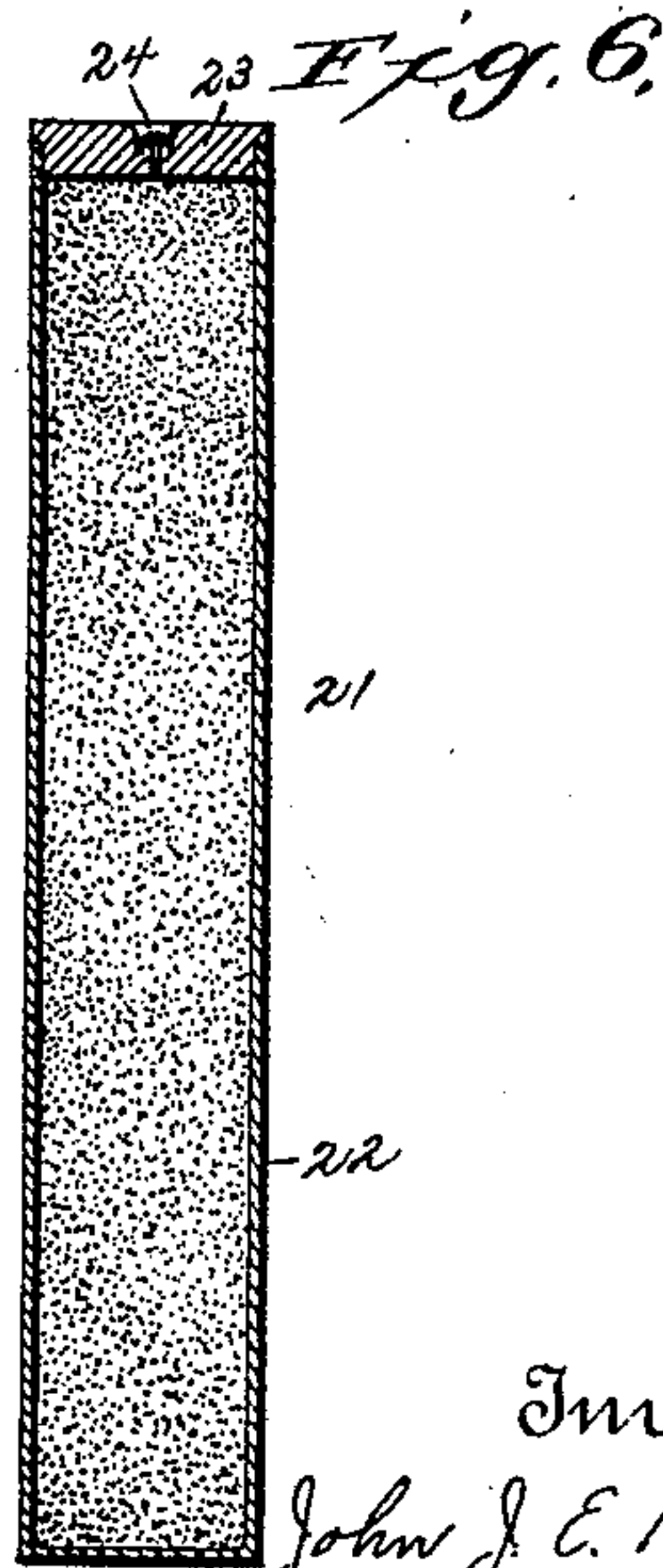


Fig. 2.



Witnesses

O. H. Smith
Thomas Durant



Inventor

John J. E. H. Payne,

By his Attorneys

Chas. H. Clum

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Fig. 3.

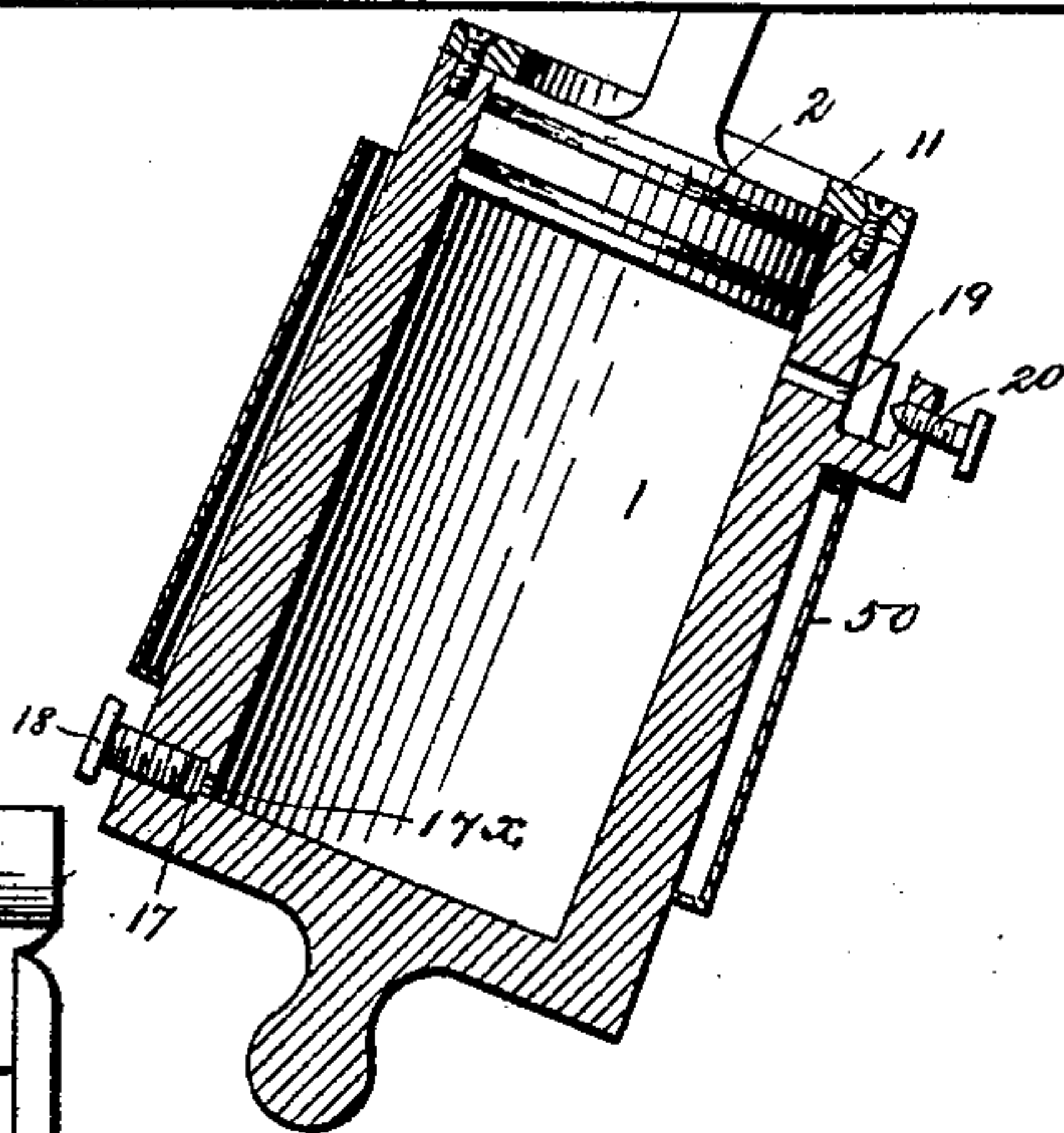
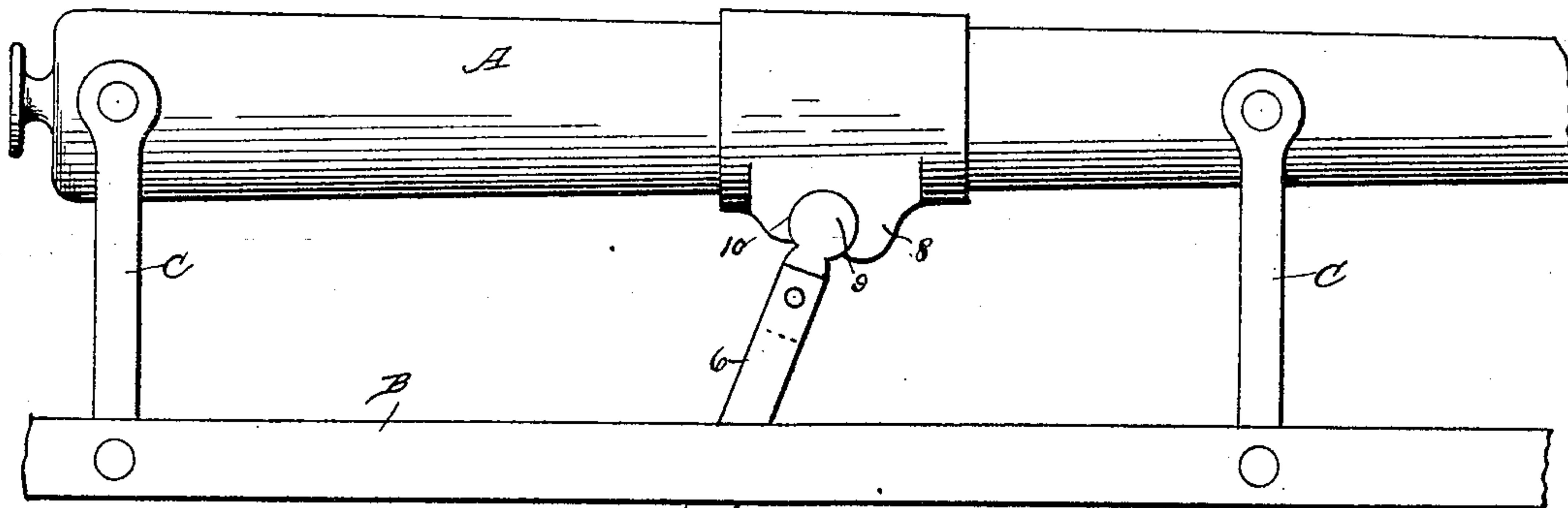
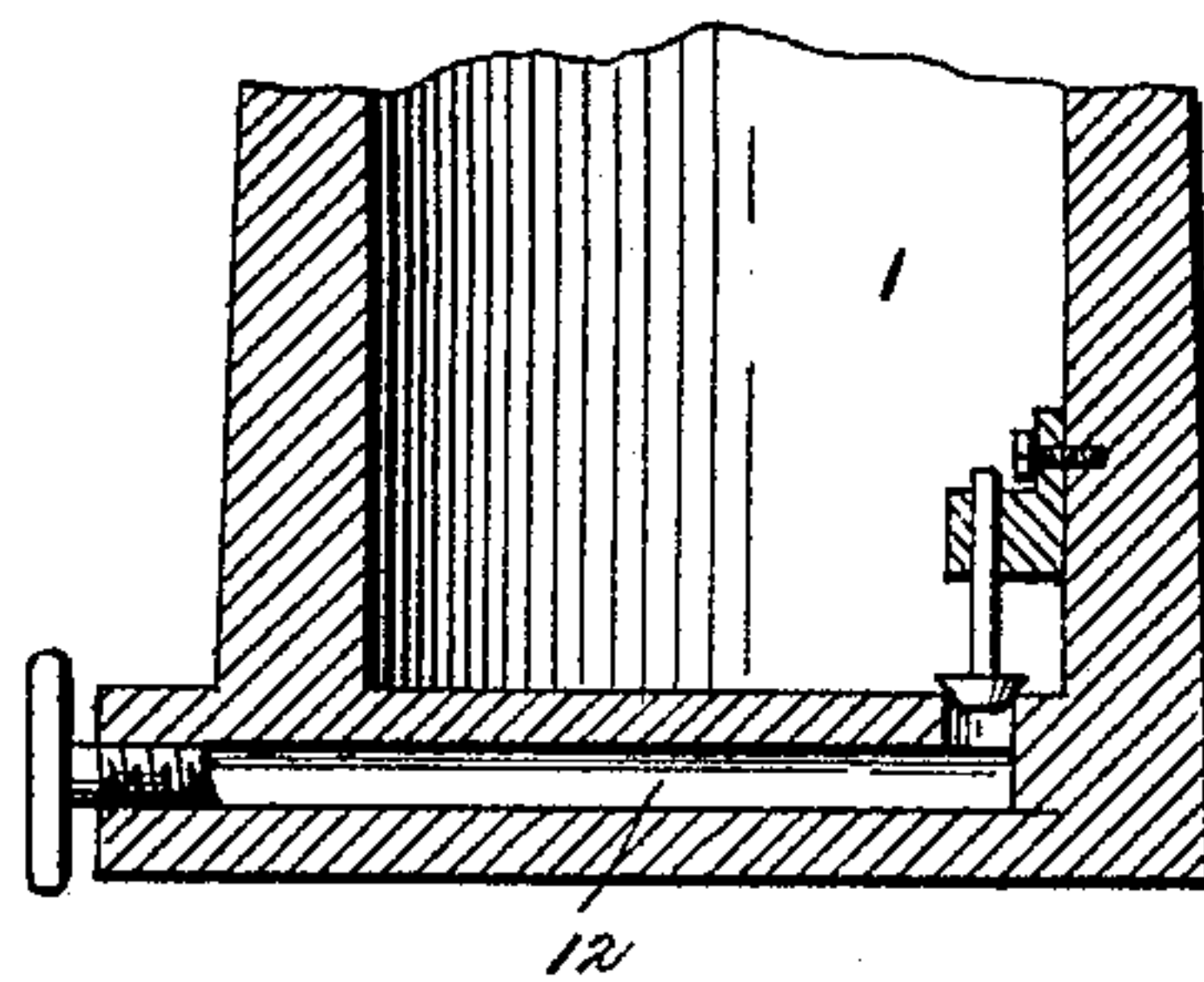


Fig. 4.

Fig. 5.



Witnesses

E. H. Smith

Thomas Durant

Inventor
John J. E. H. Payne,

By his Attorneys

Church & Church

UNITED STATES PATENT OFFICE.

JOHN J. E. H. PAYNE, OF LIPSCOMB, TEXAS.

GAS-CYLINDER FOR ELEVATING HEAVY ORDNANCE.

SPECIFICATION forming part of Letters Patent No. 437,237, dated September 30, 1890.

Application filed March 6, 1890. Serial No. 342,841. (No model.)

To all whom it may concern:

Be it known that I, JOHN J. E. H. PAYNE, of Lipscomb, in the county of Lipscomb and State of Texas, have invented certain new and useful Improvements in Disappearing Gun-Carriages and Actuating Mechanism Therefor; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the figures and letters of reference marked thereon.

This invention relates to improvements in that class of gun-operating devices or carriages employed in the disappearing system, wherein the gun is normally concealed within a pit or behind protecting walls, and is elevated bodily when it is to be discharged; and it consists in the new and improved means for effecting the desired movements of the gun, to elevate the latter for discharge, and retract it for loading and concealment, all as herein-after fully described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a side elevation, partly in section, of an apparatus embodying my improvements. Fig. 2 is a transverse vertical section through the cylinders. Fig. 3 is a side elevation showing a slightly-modified form of connection. Fig. 4 is a detail view of the connection, Fig. 3. Fig. 5 is a detail showing modified arrangement of valve. Fig. 6 is a longitudinal sectional view of the cartridge.

Similar letters and figures of reference in the several figures indicate the same parts.

The letter A designates the gun or other body to be moved; B, the frame or support, and C devices for controlling the movement of the gun. In the example given the controlling devices are shown as two links or sets of links C, pivotally connected at opposite ends and at more or less remote points to the gun and the frame, so that as the gun is elevated or depressed by the actuating devices it will be caused to move in parallel planes. Any other approved form or construction of supports for sustaining and controlling the movements of the gun may be employed in lieu of those shown.

The adjustment or "training" of the gun may be accomplished by the application of

any of the well-known forms of adjusting devices connected to or operating upon the frame or through the gun-supports, to change the direction of the axis of the gun when in firing position.

In operating guns of this kind it has heretofore been proposed to employ hydraulic or pneumatic actuating devices for effecting the elevation of the gun; but the mechanism required therefor has proved more or less cumbersome and ineffective, particularly when applied to portable guns, owing to the somewhat complicated apparatus required for producing and maintaining the requisite pressure and the comparatively slow movement attained. To obviate these and other practical difficulties attending the use of such apparatus, I have devised my present improvements, wherein the pressure of the gases generated by the combustion of slow-burning powder or other equivalent materials in a closed chamber is made use of as a motive power, and is caused to operate through the agency of suitable actuating or connecting devices to elevate the gun or other body to be moved.

For the purpose of illustrating one mode of applying my said invention in practice I have shown in the drawings an improved form of apparatus consisting, essentially, of a cylinder or chamber provided with a movable member—such as a piston 2—through which the pressure of the gases within the chamber is transmitted, either directly or indirectly, to the gun, the latter being mounted upon suitable supports, as described, permitting or controlling the movement. Communicating with the interior of the cylinder or chamber 1 is a second or combustion chamber 3, within which the slow-burning powder is introduced and consumed. As shown in the drawings, the cylinder 1 is pivotally supported upon the frame B, its lower end being formed or provided with a transverse trunnion or semi-cylindrical pin 4, adapted to be inserted in a bearing 5 in the lower member b of the frame-work. The piston 2 is provided with a piston-rod 6, whose upper end is connected to the movable gun. In Figs. 1 and 2 this connection is made through a cross-head 7, pivoted in the forward links C, and in Figs. 3 and 4 through a head 8, provided with a transverse and semi-cylindrical journal 9,

adapted to be inserted in a bearing 10 on the gun. Suitable stops or retaining devices may be employed for limiting the outward movement of the piston—such, for example, as
 5 flanges 11, detachably secured to the end of the cylinder 1.

The combustion-chamber or powder-receptacle 3 is preferably formed integral with or secured to the cylinder 1, with which latter it
 10 communicates through a port or opening 12, said port being controlled on the side toward the cylinder 1 by a valve 13, opening inward or toward said cylinder. The removable valve-support 14 is seated within the cylinder 1.
 15 The port 12 may be cast in the cylinder, and if bored an opening 15 may be formed in the opposite wall of the cylinder for the insertion of a boring or drilling tool, said opening being afterward closed by a screw-plug 16. One
 20 or more drainage-openings 17^x may also be formed in the lower section of the cylinder, said opening being reduced near the inner end to form a shoulder for the reception of a metal disk 17, smaller than the larger outer
 25 portion of the opening. An elastic packing-disk is inserted behind the disk 17, and the whole clamped tight by a screw 18 to form a gas-tight joint. In the upper or outer end of the cylinder one or more openings or vent-
 30 holes 19 are formed, the location being such that when the piston reaches the outer extreme of its movement in one direction it will uncover the vent and permit the gases to escape, and in order to regulate the escape of
 35 the gases contained in the cylinder, and thereby determine the time the gun shall be held in elevated position and the rapidity of its return-motion, an adjustable throttling-valve is applied to the opening 19—such, for ex-
 40 ample, as that formed by a screw 20—supported in position to approach or enter the vent-hole.

The powder (of a slow-burning variety) is preferably introduced into the combustion-
 45 chamber in the form of a cartridge 21. The cartridge is composed of a hollow case 22, of metal, paper, or other suitable material, and is provided with a removable cap or head 23, having an opening or receptacle 24 for the
 50 detonating or other material for igniting the powder within and at one end of the cartridge. At the bottom or rear end of the combustion-chamber is arranged a loose-fitting piston or washer 25, backed by a spring 26, and the
 55 outer end of said chamber is closed by a removable cap or plug 27, carrying the firing-pin 28. The passage or port 12, through which the gases are conducted to the cylinder 1, communicates with the combustion-chamber
 60 at or near the outer end in proximity to the head of the cartridge.

When the cartridge is inserted within the combustion-chamber, the spring is but partially compressed and serves to hold the car-
 65 tridge against the plug and in position to be engaged by the firing-pin. As soon as the powder within the cartridge is ignited, the

gases generated at the outer end operate to force the cartridge-shell farther back, so as to fully uncover the opening leading to the
 70 pressure-cylinder 1, by which operation the spring is still further compressed, and when the powder has been consumed and the plug is removed from the mouth of the combustion-chamber said spring operates to project the
 75 cartridge-case to such an extent that it can readily be grasped and withdrawn.

It is desirable that some means be provided for relieving the pressure in the combustion-chamber after the slow-burning powder has
 80 been consumed preliminary to the insertion of another charged cartridge. To this end, a vent or opening 30 is formed through the wall of the passage 12, and said vent is provided with a movable valve or plug for quickly open-
 85 ing and closing communication between said passage 12 and the atmosphere. One such form of adjustable valve is shown in the drawings, the same comprising a plug 31, fitted to close the opening 30 and secured to a block
 90 32, guided, as by pins 33, to reciprocate toward and from said opening. The block 32 is provided on either side with rounded bearings 34 to receive the furcated end of a lever 35, the
 95 latter being provided with a spring 36, or equivalent device, for holding the plug 31 tightly against the opening 30 to prevent the escape of the gases. The opening 30 is of relatively small area, and the spring is of such
 100 power that it will retain the plug in position to close said opening under ordinary pressures, and when it is desired to relieve the pressure within passage 12 the lever is operated against the pressure of the spring to withdraw the
 105 plug and thus permit the gases to escape.

Instead of employing a horizontal valve 13 and spring for closing the passage between the combustion and pressure chambers, a valve such as shown in Fig. 5 may be used, in
 110 which case the spring may be dispensed with, the weight of the valve being sufficient to hold it closed.

When the gun is depressed or in its lowest position, the piston in cylinder 1 is below the opening or vent 19, and the gases entering the
 115 cylinder operate under full pressure to raise the gun to firing position; but as soon as the piston uncovers said opening the gases begin to escape, thereby relieving or diminishing the pressure in a degree proportional to the
 120 size of the opening.

Should it be desired to obtain a quick return of the gun, the escape-vent or opening is enlarged by the adjustment of the throttling-valve to permit the rapid and free es-
 125 cape of the gases from within the cylinder 1, and if a slow return is required the orifice is reduced and the gases permitted to escape slowly, thereby effecting a more gradual reduction in pressure.

The weight of the gun and its attachments is sufficient to effect its return when the pressure in the cylinder is sufficiently reduced, a pneumatic check or cushion being formed to
 130

receive the thrust of the gun when the pressure has fallen sufficiently to allow the piston to cover the escape-vent.

The cylinders may, if desired, be provided with water-jackets, as indicated at 50, for cooling the metal, and water may also be introduced within the cylinders for the same purpose.

Having thus described my invention, what I claim as new is—

1. In a gun-operating device such as described, the combination, with the gun and movable supports therefor, of an actuating mechanism adapted to be set in motion by the gases generated by the combustion of powder, the same comprising a pressure-chamber provided with a movable section or piston connected to the gun, and a combustion chamber or cylinder communicating with the pressure-chamber, substantially as and for the purpose described.

2. In combination with the gun and its movable supports, a pressure chamber or cylinder provided with a movable member or piston connected to the gun, and a vent-opening beyond said movable member when the latter is normally retracted, a combustion-chamber, and a passage leading from said combustion-chamber into the pressure-chamber through which the gaseous products are conducted, substantially as described.

3. The combination, with a gun and its movable supports, of a piston connected to the gun, a pressure-chamber for said piston provided with a vent closed by the piston when retracted and uncovered or opened when said piston is moved to elevate the gun, a closed combustion-chamber communicating with the pressure-chamber, and a valve controlling the passage between said combustion and pressure chambers, as and for the purpose set forth.

4. The combination, with the gun and its movable supports, of the piston connected to the gun, a cylinder for said piston provided with an inlet-passage and a vent-opening normally closed and opened by the advance of the piston, a combustion-chamber communicating with said inlet-passage, and a throttling-valve for the vent-opening, substantially as and for the purpose set forth.

5. The combination, with the gun and its supports, of the actuating devices for elevating the gun, said actuating devices comprising a pressure-cylinder having a throttled vent and an inlet-passage, a piston connected to the gun and working in said compression-chamber, a combustion-chamber communicating with the inlet to the compression-chamber, and a valve controlling said inlet-passage, substantially as described.

6. The combination, with the gun mounted upon links and guided thereby, of a pressure cylinder or chamber pivotally supported to oscillate in the plane of the gun, said cylinder being provided with inlet and vent openings, a piston connected to the gun and

reciprocating in said pivoted cylinder, and a closed combustion-chamber containing powder, said chamber communicating with the inlet-opening of the pressure-chamber, substantially as described.

7. The combination, substantially as described, of the gun mounted upon pivoted links, the piston connected to the gun and reciprocating in a pressure-cylinder, the latter pivotally supported to oscillate with the gun, and a combustion-chamber connected to and oscillating with the pressure-cylinder, as and for the purpose set forth.

8. The combination, with the gun and its movable supports, of a pressure-chamber, a piston connected to said gun and adapted to reciprocate within said chamber, a combustion-chamber communicating with said pressure-chamber and provided with a spring and a movable plug, and a cartridge located within the combustion-chamber between the spring and plug, substantially as described.

9. In combination with the combustion-chamber communicating with the pressure-chamber and provided at one end with a movable plug or cap, a yielding ejector within the combustion-chamber and engaging the cartridge inserted therein to press it toward said plug or cap, substantially as described.

10. In a gun-operating device such as described, the combination, with the piston, combustion-chamber, and pressure-chamber, of the vent communicating with the interior of the combustion-chamber, and a movable valve or plug controlling said vent, as and for the purpose specified.

11. In a gun-operating device such as described, the combination, with the piston, the combustion and pressure chambers, and the valve controlling the passage leading from the combustion to the pressure chamber, of the vent for relieving pressure in the combustion-chamber, and a movable valve or plug controlling said vent.

12. In a gun-operating device such as described, the combination, with the combustion-chamber, a piston connected to the gun, the pressure-chamber, and the passage leading from near one end of the combustion-chamber to the pressure-chamber, of a cartridge provided with a movable plug and detonator at one end, and a yielding-pressure device engaging said cartridge and operating to hold it projected and to permit it to be retracted when the powder is ignited.

13. The combination, with the pressure and combustion chambers and the passage connecting them, of the vent-opening, the plug controlling said vent-opening, and the lever and spring co-operating with said plug, substantially as described.

JOHN J. E. H. PAYNE.

Witnesses:

J. H. COZART,
T. J. LIGHTNER.