

(No Model.)

4 Sheets—Sheet 1.

T. NORDENFELT.
GUN MOUNTING.

No. 360,537.

Patented Apr. 5, 1887.

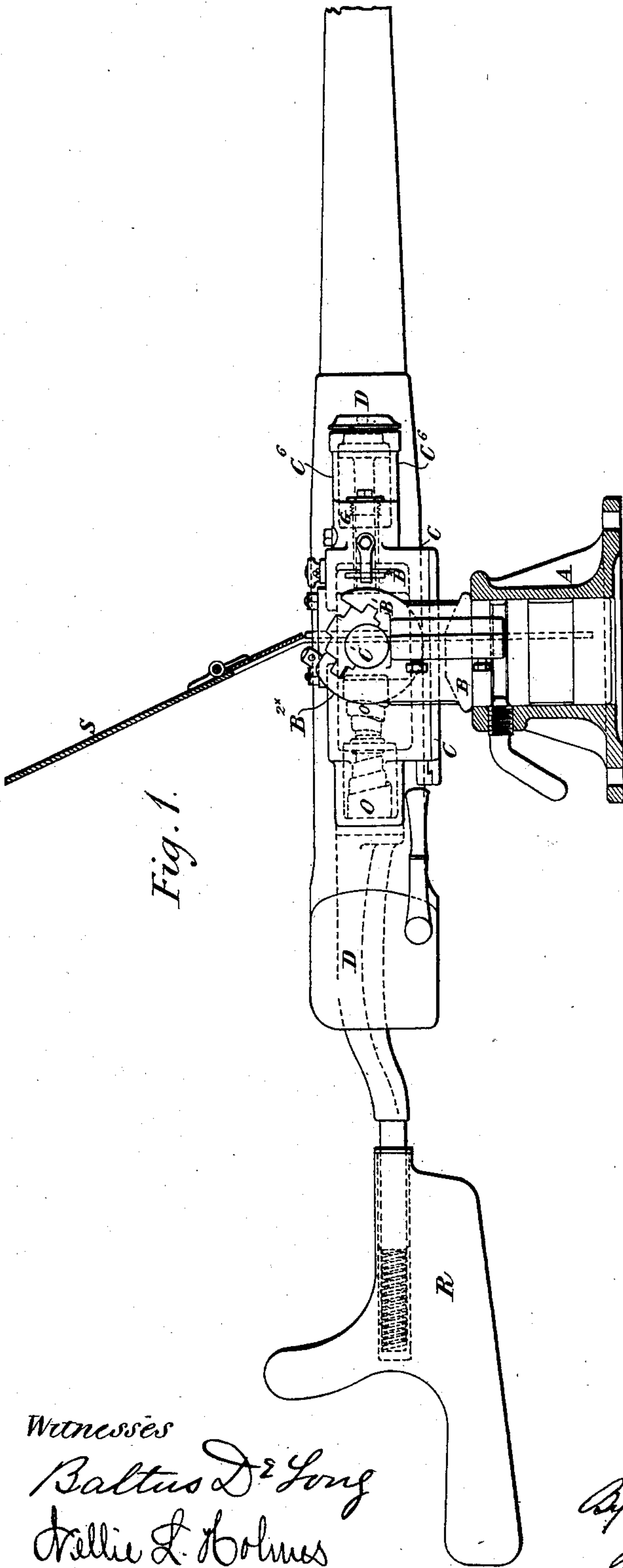


Fig. 1.

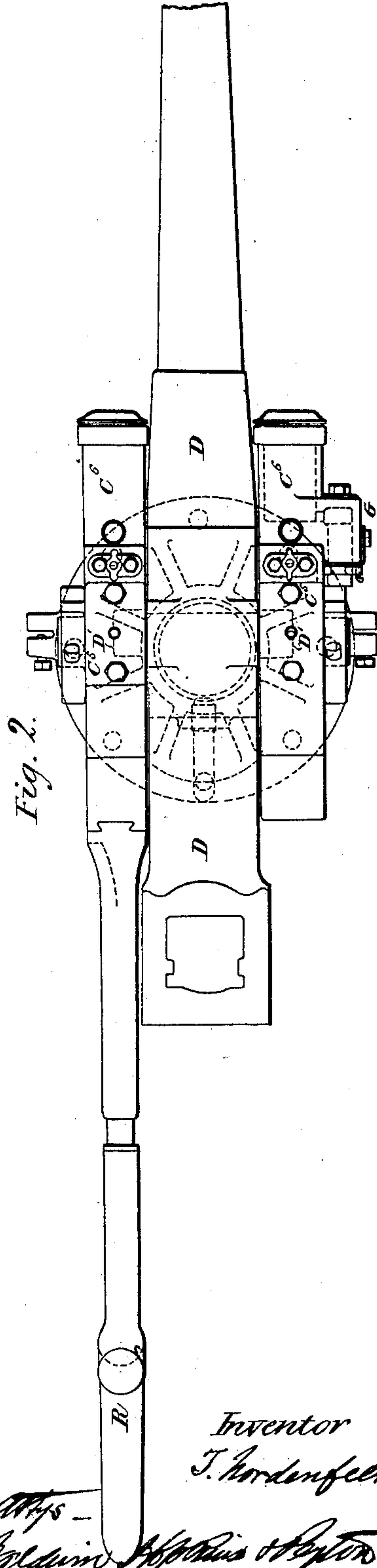


Fig. 2.

Witnesses

Baltus D^r Long
Willie L. Holmes

Inventor

T. Nordenfelt

By Atty -
Goldman, Morris & Peyton.

(No Model.)

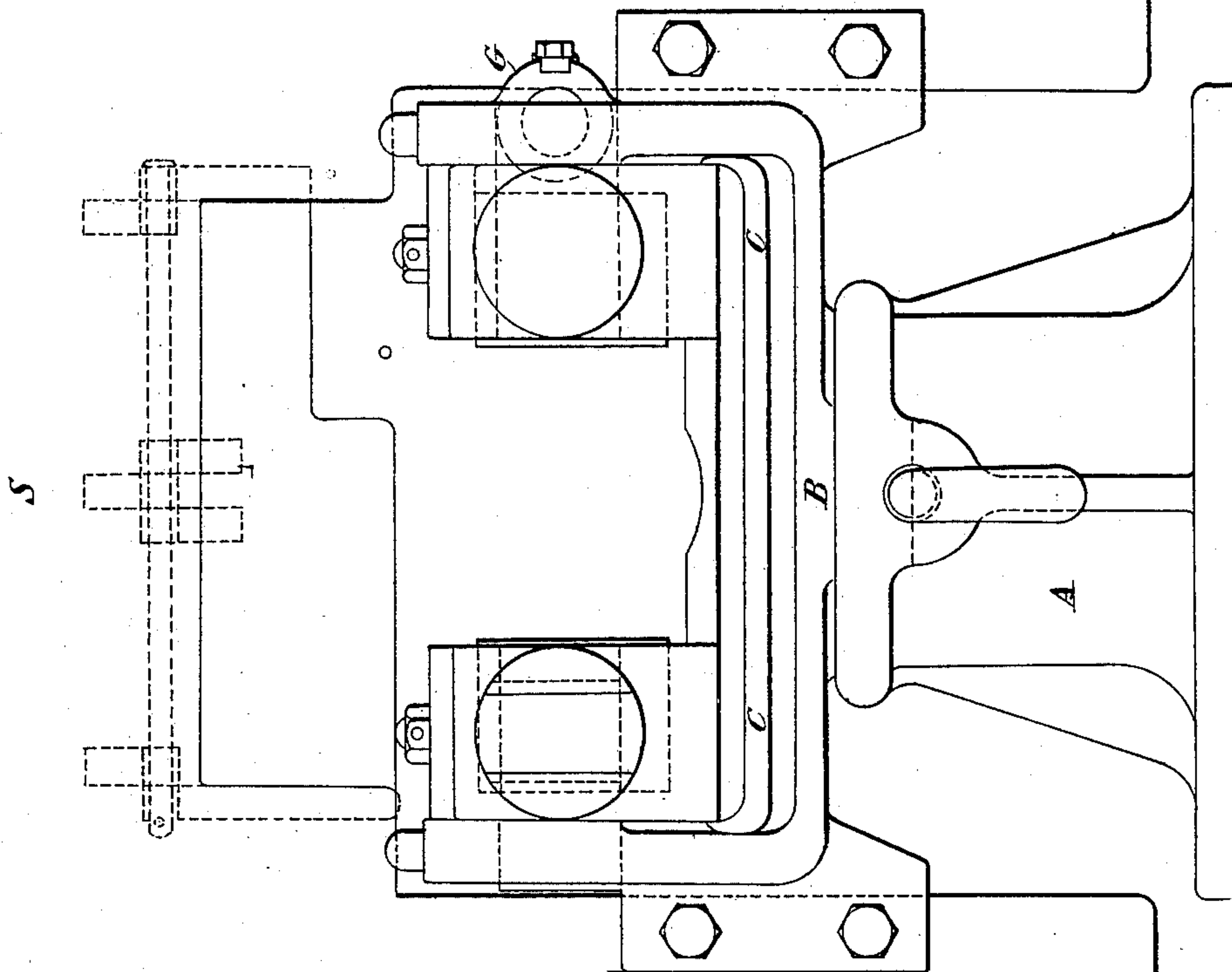
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Fig. 3.



Witnesses

Baltus D^r Long
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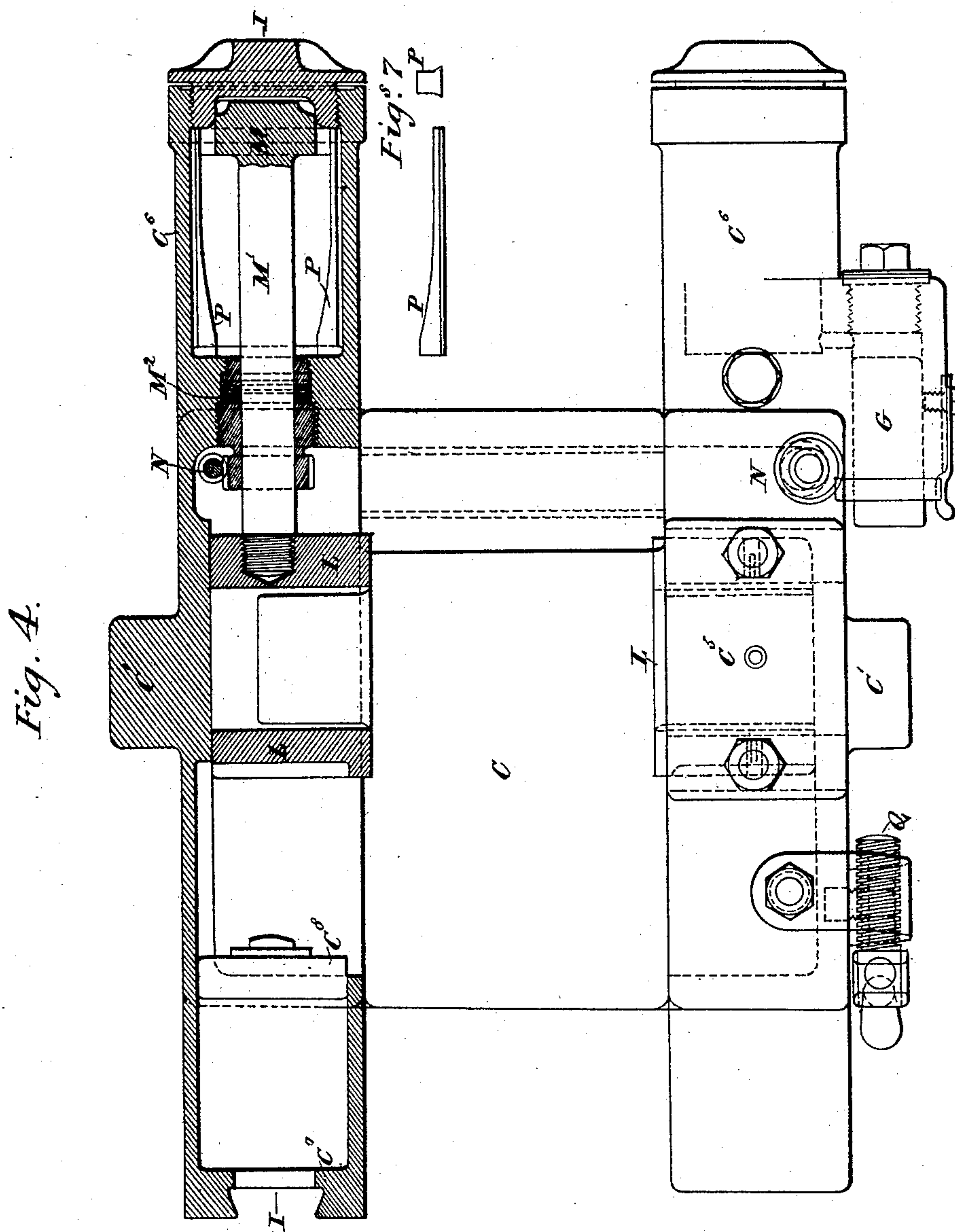
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T. NORDENFELT.
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No. 360,537.

Patented Apr. 5, 1887.



Witnesses
Baltus De Jong
Katherine L. Holmes

Inventor
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Gallatin, Hopkins & Peyton

(No Model.)

4 Sheets—Sheet 4.

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Fig. 5.

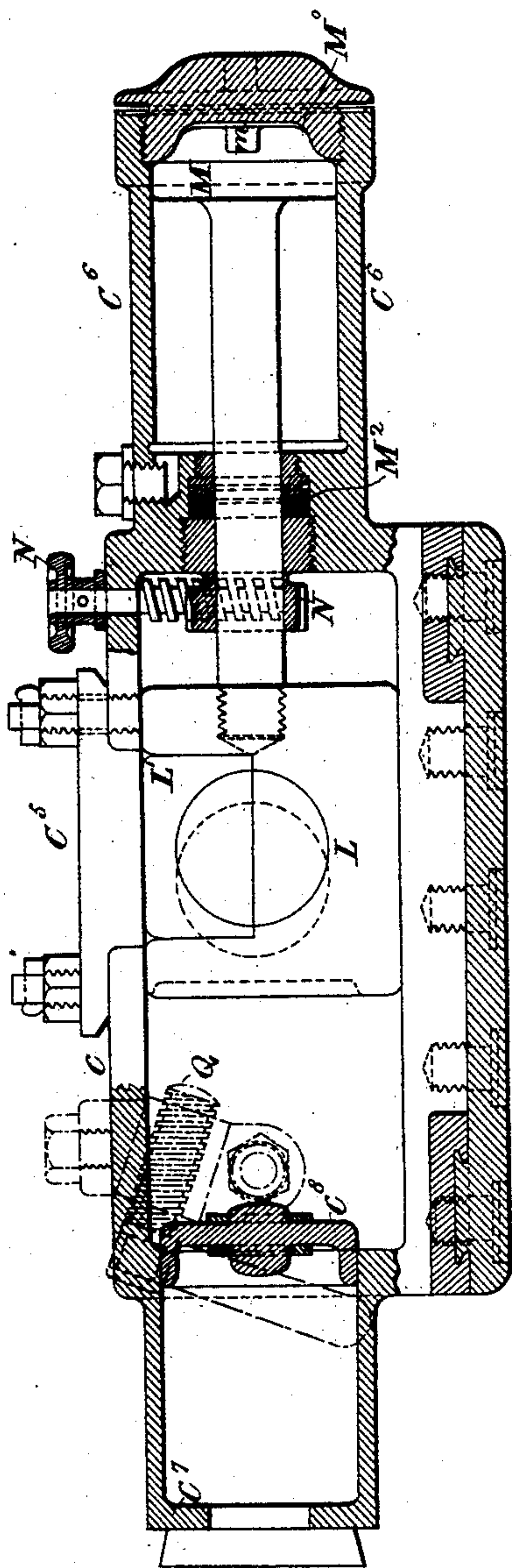
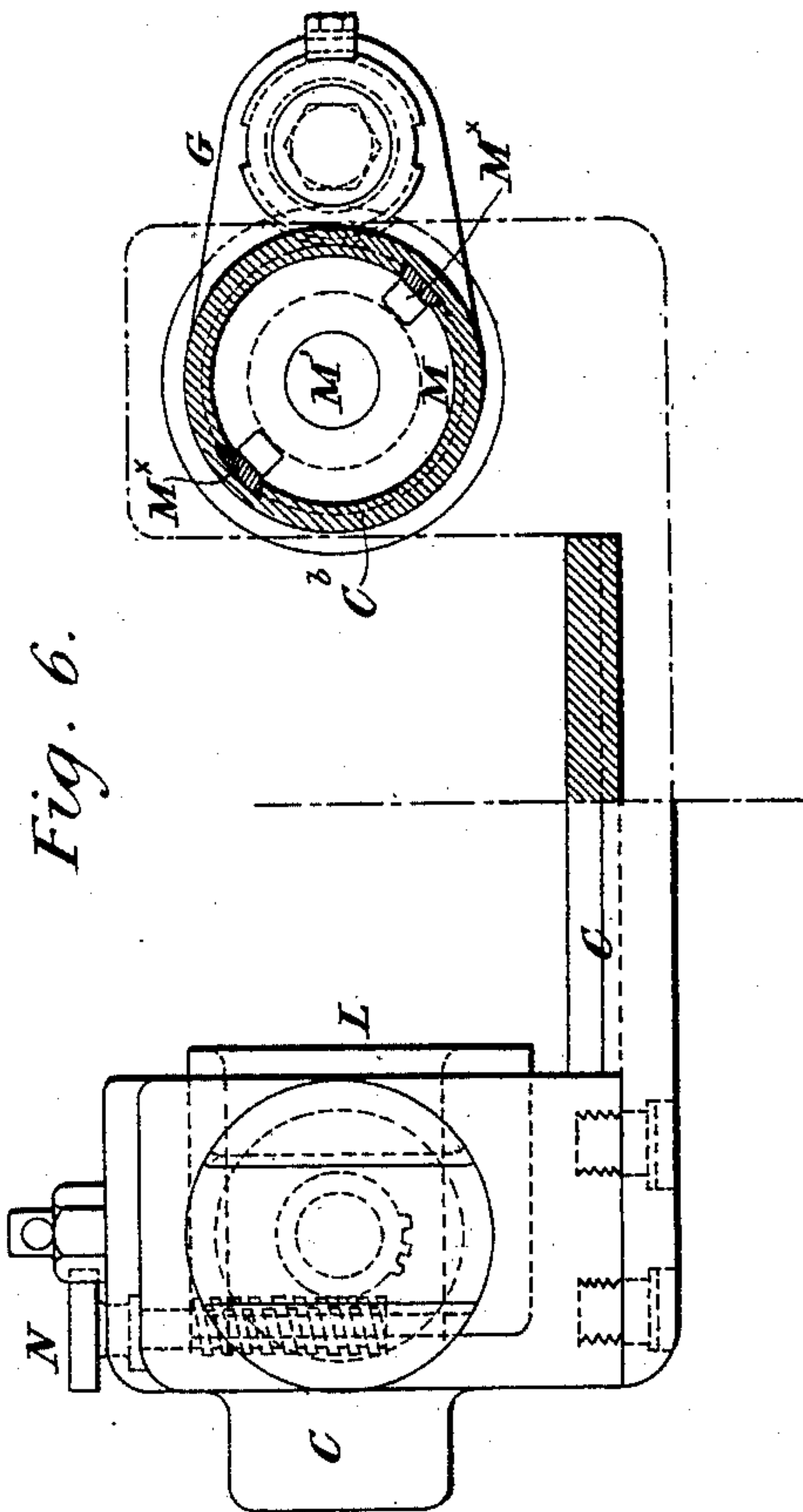


Fig. 6.



Witnesses

Baltus D. Long
John L. Holmes

Inventor

T. Nordenfelt

By atty -
Gallun, H. B. & H. B.

UNITED STATES PATENT OFFICE.

THORSTEN NORDENFELT, OF WESTMINSTER, ENGLAND, ASSIGNOR TO THE
NORDENFELT GUNS AND AMMUNITION COMPANY, (LIMITED,) OF SAME
PLACE.

GUN-MOUNTING.

SPECIFICATION forming part of Letters Patent No. 360,537, dated April 5, 1887.

Application filed September 14, 1886. Serial No. 213,512. (No model.)

To all whom it may concern:

Be it known that I, THORSTEN NORDENFELT, a subject of the King of Sweden, residing at 53 Parliament Street, in the city of Westminster, England, civil engineer, have invented certain new and useful Improvements in Gun-Mountings, of which the following is a specification.

This invention has for its object improvements in gun-mountings of the class in which there is employed a trunnioned frame, by the movements of which the gun may be elevated and depressed, instead of being rocked on its own trunnions.

My improvements apply, especially, to guns which are carried upon a forked support with a stem which drops into a socket at the top of a suitable standard. At the upper ends of the fork are bearings which receive trunnions formed upon a frame, into which the gun is dropped, and in which it is so held that it can move longitudinally in recoil and in returning to the firing position. The gun itself also has trunnions or equivalent supporting projections at its sides, and these are received into bearing-blocks, which can slide along guides upon the trunnioned frame. The trunnioned frame carries a pair of hydraulic controlling-cylinders, one on either side of the gun. In these cylinders are pistons. Rods extend back from these pistons and are fixed to the blocks, into which the gun-trunnions are received. Behind the blocks are coiled springs with abutments upon the trunnioned frame, and they tend constantly to press the gun forward as far as the guides in the frame will allow the blocks to go. When the gun is fired, the recoil is resisted by the pistons in the controlling-cylinders and proceeds only as the liquid in the cylinders is able to find passage from one side of the piston to the other. After recoil the springs send the gun forward again into position to be again fired.

I provide for the passage of the liquid in the hydraulic control-cylinders from one side of the piston to the other in well-known way, as by boring the cylinder taper, and in such a way as to allow between the piston and the side of the cylinder a suitable amount of wa-

ter-way in every part of the stroke; or, as a well-known equivalent for the purpose, I bore the cylinder truly and fix longitudinal ribs within it. The piston in this case is notched to allow it to pass freely along the ribs, and the ribs are so fashioned as to leave a suitable amount of water-way in every part of the stroke. When the gun is fired, by the time that it has gathered any considerable velocity in recoil there is a sufficiently clear passage from one side of the piston to the other, which is gradually reduced until the gun comes to rest. While the gun is running out, also, its motion is in like manner controlled, and the gun comes to the firing position without shock. These arrangements are applicable to other mountings in which hydraulic compressors are employed to control the movements of guns.

In order that my 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 is a side elevation of a gun carriage or mounting constructed according to my invention. The gun is shown in place upon it. Fig. 2 is a plan of the same. Fig. 3 is a rear elevation of the carriage without the gun. Fig. 4 is a plan, partly in section, of the trunnioned frame. Fig. 5 is a vertical section on the line I I in Fig. 4. Fig. 6 is a rear elevation, partly in section, of the trunnioned frame. Fig. 7 shows separately one of the strips fixed within the hydraulic cylinders.

A is a socket or pedestal carrying the forked standard or support B, which is able to rotate about a vertical axis.

B' are bearings on this support, which receive the trunnions C' on the trunnion-frame C.

D is the gun. The gun is provided with small projections or trunnions D' D', and these fit into recesses in blocks L L.

L' L' are pieces which fill the recesses in the blocks L L over the trunnions of the gun. The blocks L L are received into chambers formed one on either side in the trunnioned frame C. There is an opening in the top of the chamber, and by this the block L and fill-

ing-piece L' is inserted, and by it also the trunnions of the gun pass when the gun is dropped into its place. When all is in position, the covers C⁵ are bolted onto the top of the trunnioned frame, and the blocks L L are then confined in their places in the trunnioned frame, so that they (and also the gun) can only move longitudinally within this frame.

C⁶ C⁶ are the main hydraulic cylinders. They form part of the trunnioned frame and are in front of its trunnions, as well as in front of the side projections or trunnions of the gun, lying parallel to the gun, one on either side of it. In each cylinder there is a piston, M, having a rod, M', passing out from the cylinder by a cupped leather at M². The outer end of the rod M' is attached to the block L.

N is a screw, by which the gland at M² is turned to tighten it upon the cupped leather, or to unscrew it when the cupped leather has to be renewed.

O O are coiled springs abutting upon the trunnioned frame at C⁷ C⁷ and upon the hinder part of the blocks L L. The springs tend to bring the parts into the position in which they are represented in the drawings, with the pistons M M abutting against the covers which close the hydraulic cylinders C⁶ at their fore ends. On each side the two coiled springs, forming a pair, abut upon a piston-like guide, C⁸, which is able to slide in a recess formed for it in the trunnioned frame C.

P P are the regulating-strips, fixed within the cylinders C⁶ C⁶. They project, as will be seen, into the notches M^x in the pistons M. As the recoil proceeds they gradually fill these notches and leave less space for the passage of liquid from one side of the piston to the other. Thus the strips P regulate the speed with which the gun moves, both in recoil and return; and by altering the dimensions of the strips this speed can be adjusted as desired. Similarly, when the gun is returned to the firing position by the operation of the springs O, a projection, M^o, on the piston enters a cavity, nearly fitting it, in the cylinder-cover. In this projection are passages *m*, which are progressively closed as the projection on the piston enters the cavity. The forward movement of the piston and of the gun is checked by the resistance offered to the escape of liquid from the cavity in the cylinder-cover.

G G are small hydraulic cylinders in connection with the cylinders C⁶. They contain rams, which, when the recoil takes place, press

upon stationary concentric surfaces B² around the trunnion of the trunnioned frame and resist any change in the elevation of the gun, as will readily be understood.

Q is a pressure-screw, which can be tightened by hand against a concentric surface, B^x.

The gun here shown is not provided with mechanical gear for elevating or training it; but this is effected by means of a crutch-lever, R, against which the shoulder of the gunner is pressed.

S is a shield to protect the gunners. It is attached to the trunnion-frame C.

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, substantially as set forth, of the trunnioned frame, its support, the gun movable longitudinally in the trunnioned frame, two hydraulic cylinders upon the trunnioned frame, one on either side of the gun and in front of the trunnions of the frame, pistons in these cylinders with piston-rods connected with the gun, and springs upon the trunnioned frame on either side of the gun and behind the trunnions of the frame, for the purpose set forth.

2. A gun-carriage comprising a trunnioned frame, within which the gun is supported and moves longitudinally, and the hydraulic cylinder or cylinders formed or fixed upon the trunnioned frame and containing pistons or equivalent parts having connection with the gun, and which during the recoil of the gun drive liquid through a passage or passages, which, as the recoil proceeds, are progressively contracted, substantially as set forth.

3. The combination, substantially as set forth, of the trunnioned frame, its support, the gun provided with trunnions or supporting projections and movable longitudinally in the trunnioned frame, two hydraulic cylinders upon the trunnioned frame, one on either side of the gun and in front of its trunnions, pistons in these cylinders, with piston-rods having connection with the gun, and springs upon the trunnioned frame on either side of the gun and behind its trunnions, for the purpose described.

THORSTEN NORDENFELT.

Witnesses:

W. R. LUNN,
T. J. NORRIS.