

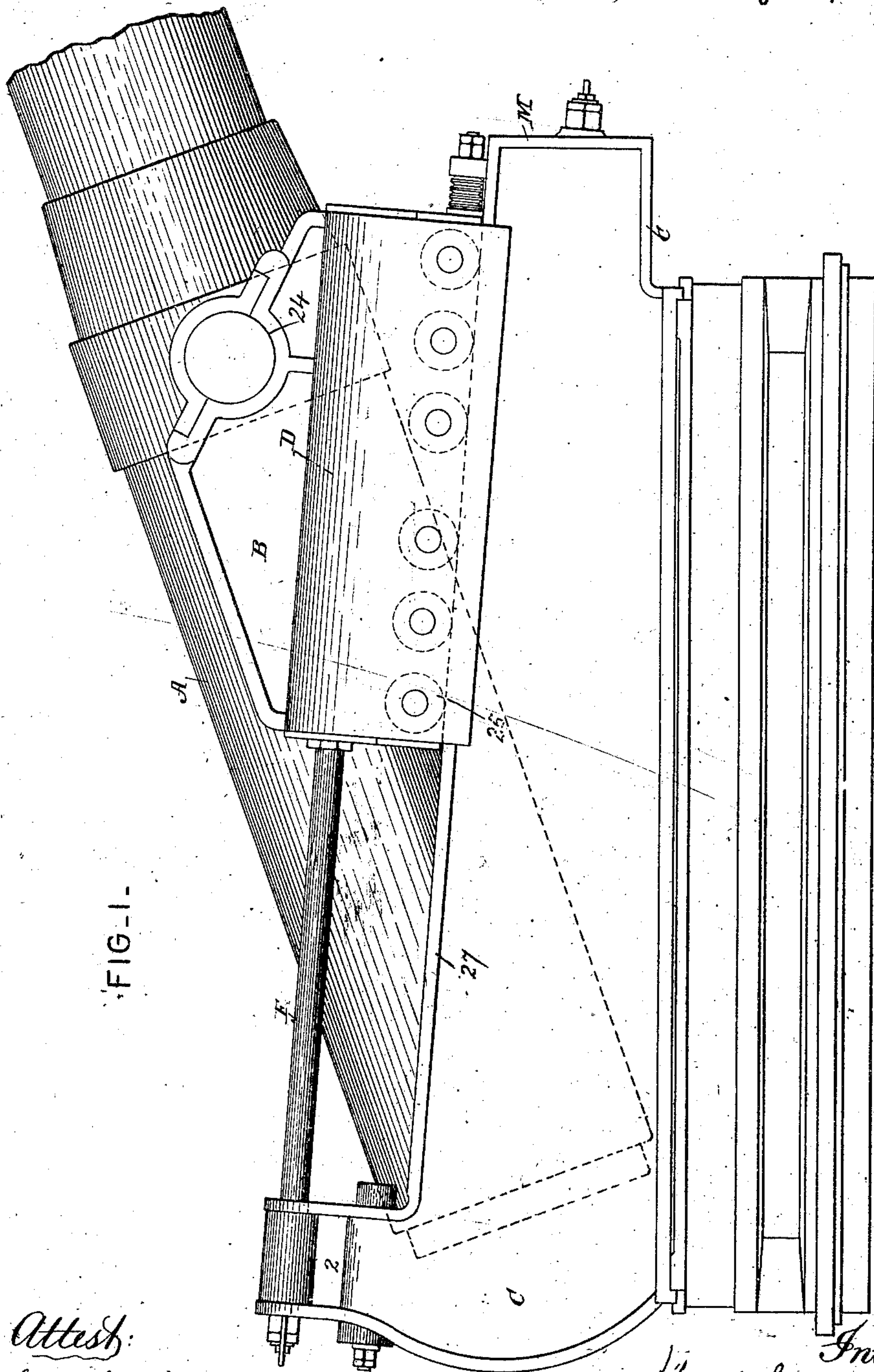
(No Model.)

5 Sheets—Sheet 1.

H. SCHNEIDER.
RECOIL CHECK FOR ORDNANCE.

No. 428,960.

Patented May 27, 1890.



Attest:

Geo. T. Smallwood
Jas. K. McCallister

Inventor:
Henri Schneider by
Pollak & Mauro his attorney

(No Model.)

5 Sheets—Sheet 2.

H. SCHNEIDER.
RECOIL CHECK FOR ORDNANCE.

No. 428,960.

Patented May 27, 1890.

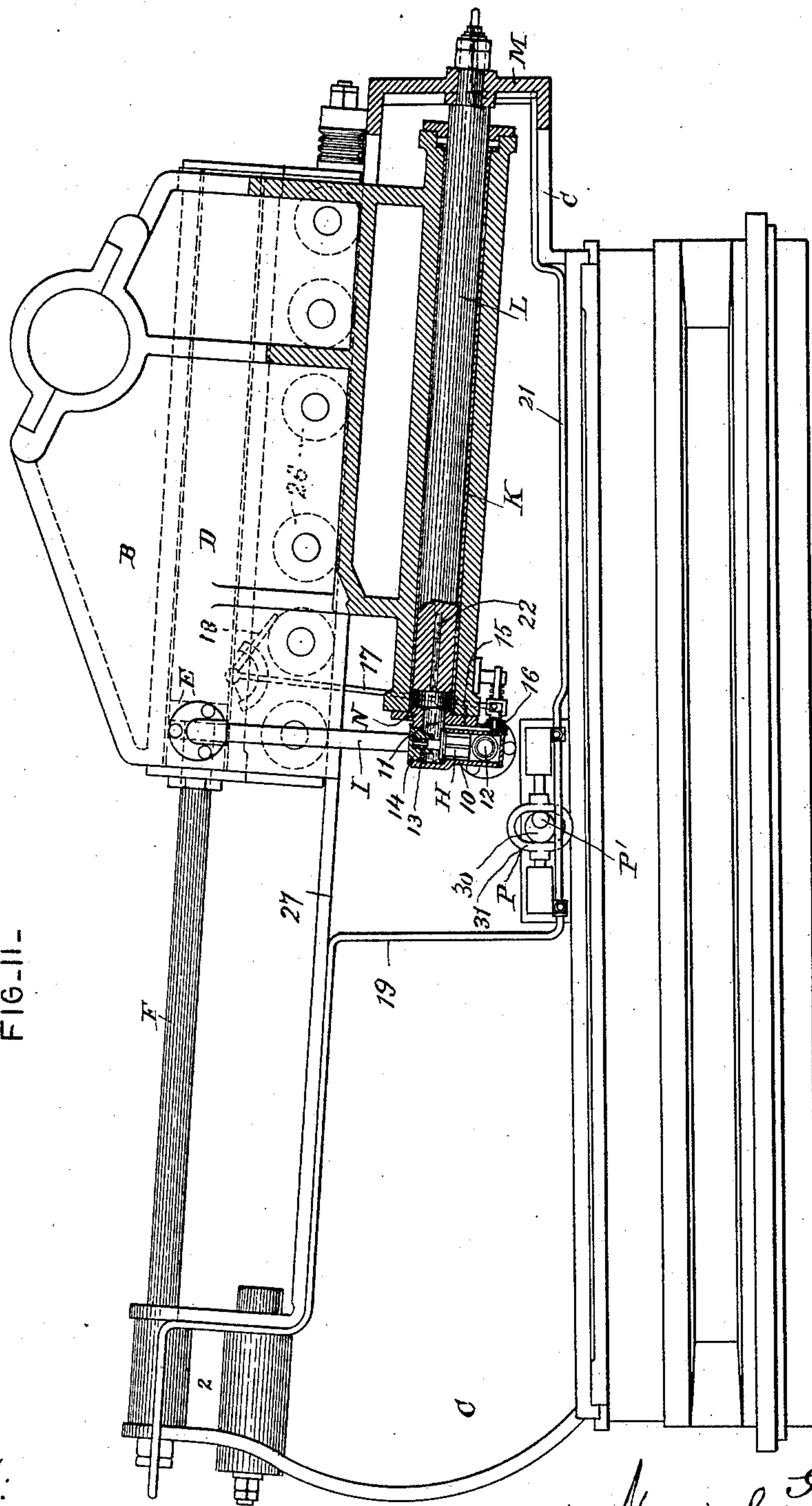


FIG. II-

Attest:

Geo. T. Smallwood,
Jas. H. McLaughlin

Inventor:
Henri Schneider by
J. R. Mauro
his attorney.

(No Model.)

5 Sheets—Sheet 3.

H. SCHNEIDER.
RECOIL CHECK FOR ORDNANCE.

No. 428,960.

Patented May 27, 1890.

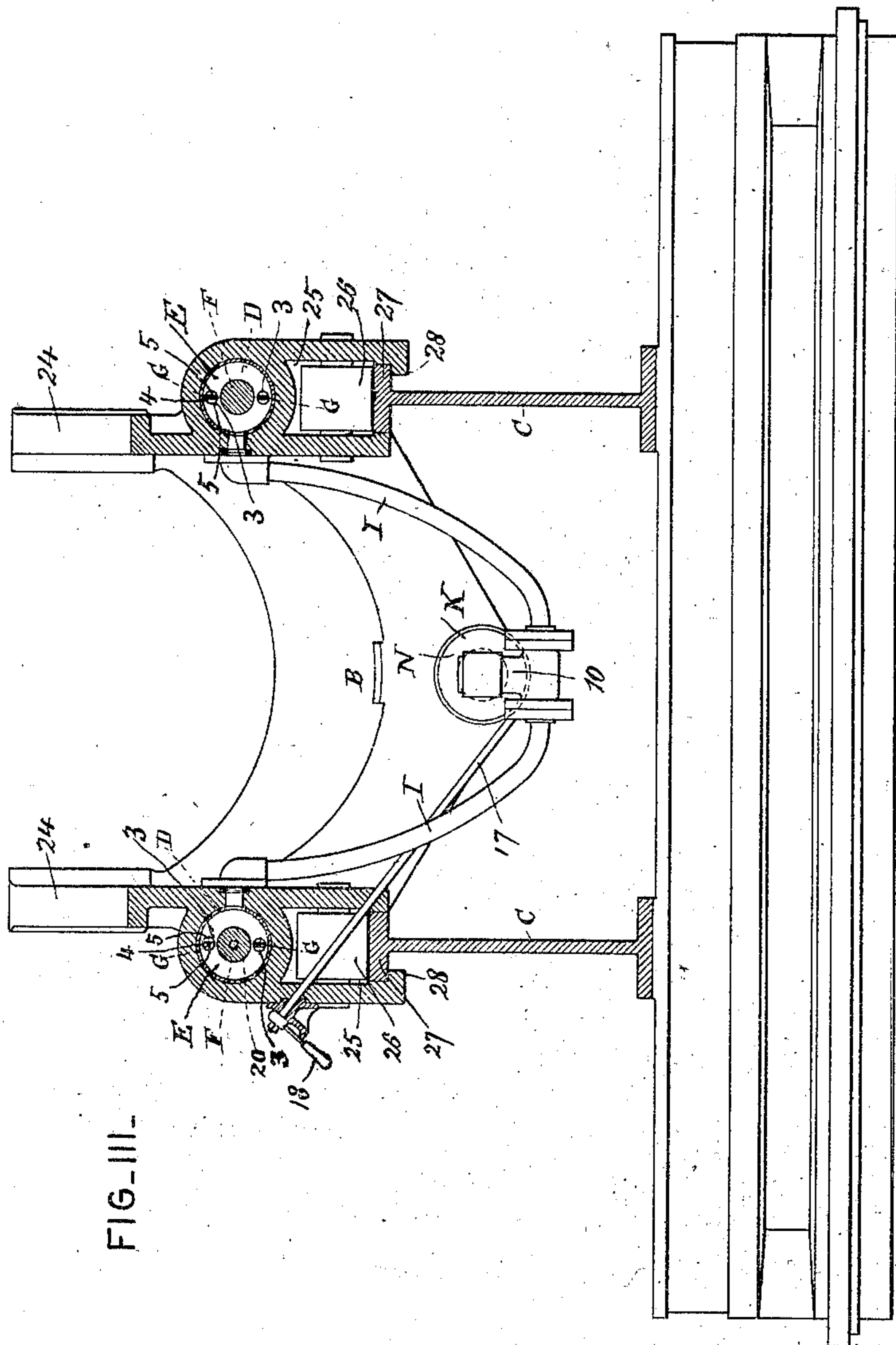


FIG. III.

Attest:

Geo. T. Smallwood
Jas. H. McArthur

Inventor:

Henri Schneider by
Pollok & Mauro his
Attorneys.

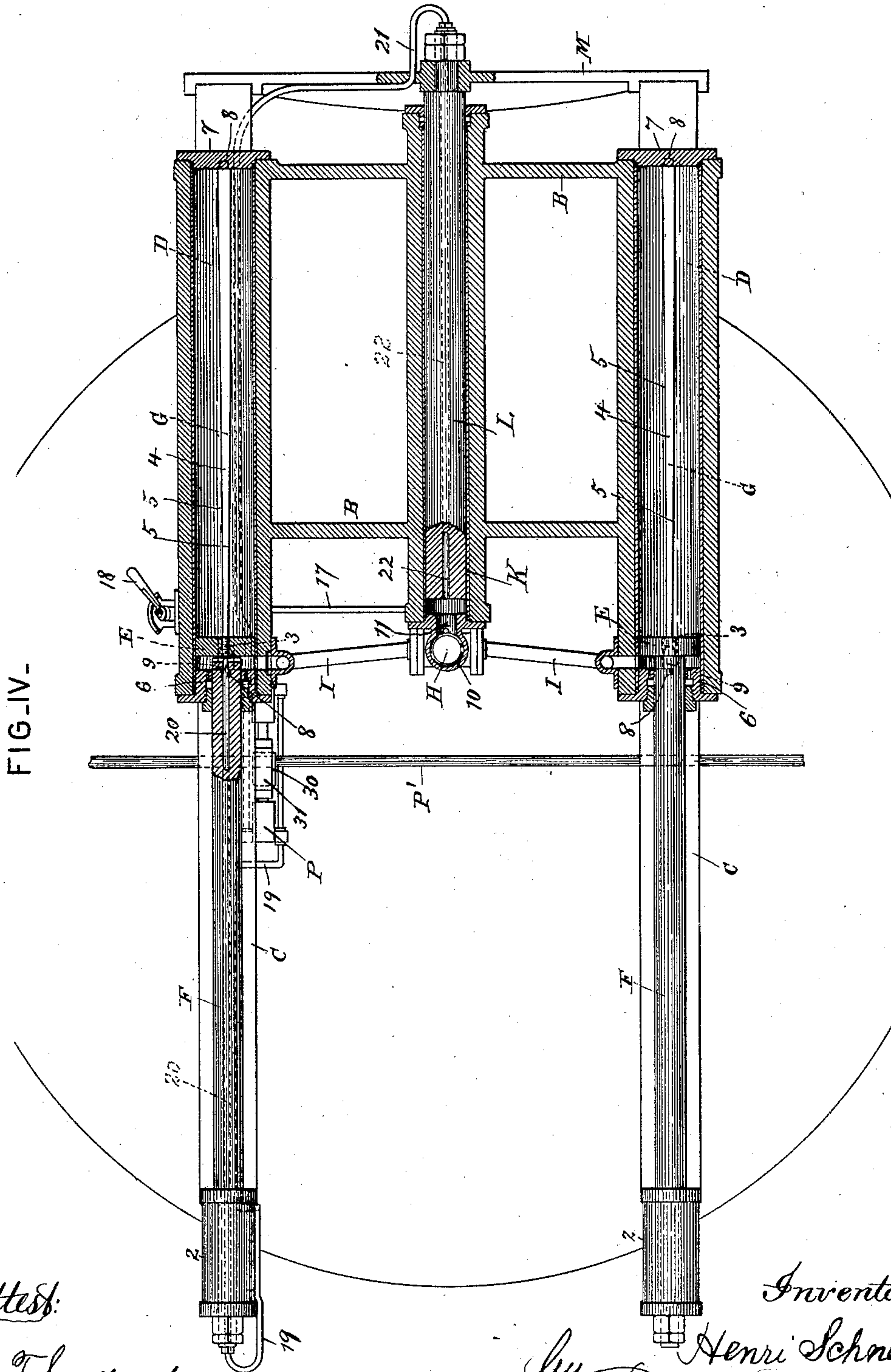
(No Model.)

5 Sheets—Sheet 4.

H. SCHNEIDER.
RECOIL CHECK FOR ORDNANCE.

No. 428,960.

Patented May 27, 1890.



Attest:

*Geo. T. Smallwood,
Jas. H. McArthur*

Inventor:

*by Henri Schneider
Pollak & Mauro his
Attorneys*

(No Model.)

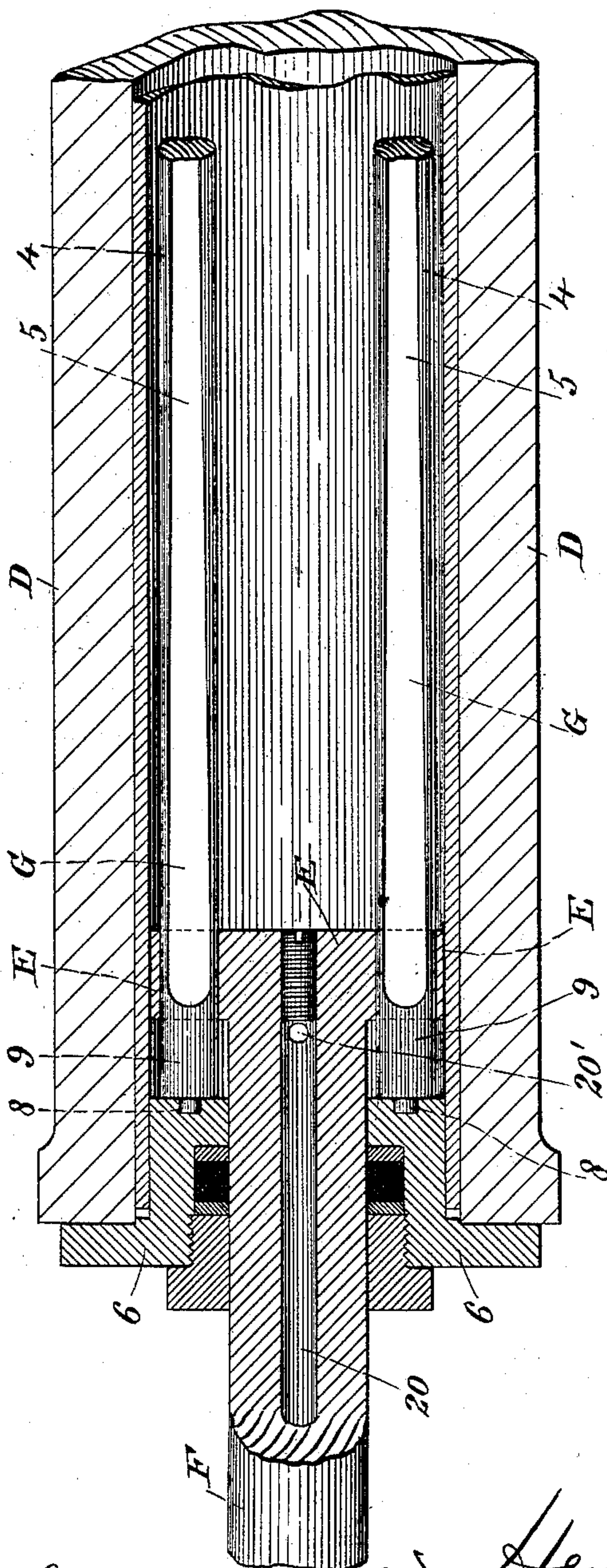
5 Sheets—Sheet 5.

H. SCHNEIDER.
RECOIL CHECK FOR ORDNANCE.

No. 428,960.

Patented May 27, 1890.

FIG. V.



attest:
Geo. T. Smallwood.
Rafar L. Hogue.

Inventor:
Henri Schneider
by J. P. Mauro his attorney

UNITED STATES PATENT OFFICE.

HENRI SCHNEIDER, OF PARIS, FRANCE.

RECOIL-CHECK FOR ORDNANCE.

SPECIFICATION forming part of Letters Patent No. 428,960, dated May 27, 1890.

Application filed January 17, 1890. Serial No. 337,194. (No model.)

To all whom it may concern:

Be it known that I, HENRI SCHNEIDER, a citizen of the Republic of France, residing at No. 56 Rue de Provence, Paris, France, have
5 invented a new and useful Improvement in Recoil-Checking and Gun-Operating Apparatus for Ordnance, which improvement is fully set forth in the following specification.

This invention, while it has reference also
10 to other parts of the mounting and operating apparatus, relates more particularly to hydraulic buffers or brakes in which a cylinder and piston are employed, connected, respectively, with the top carriage and chassis of the
15 gun-mounting, (or vice versa,) and in which, also, one or more ports controlled by plug-valves are employed to permit the water or other liquid to pass the piston through openings diminished in size automatically with
20 the recoil movement of the top carriage on the chassis.

The invention consists in a new or improved valve (or arrangement of ports and plug-valves) whereby practical advantages are secured—such, for example, as simplicity, efficiency, non-liability to get out of order, and the like; and it also further comprises certain additional parts, improvements, and combinations, all of which can most conveniently
30 be described in connection with the accompanying drawings.

Figure I is a side elevation of a gun mounted and provided with the recoil-checking and gun-operating apparatus in accordance with
35 the invention, (the means for training and elevating the gun, which form no part of the invention and which may be of any suitable description, being omitted.) Figs. II, III, and IV are respectively a longitudinal, a cross,
40 and a horizontal section of a part of the gun-mounting and recoil-checking and gun-operating mechanism. Fig. V is a detail view in longitudinal section in the axis of one of the recoil-cylinders.

The gun A is mounted on trunnions in the top carriage B, which traverses in ways of the chassis C. To check the recoil, the top carriage is provided with cylinders D, in which
45 are pistons E, having their piston-rods F fixed in lugs 2 of the chassis. When the top carriage B is forced back by the recoil, the liq-

uid which fills the recoil-cylinders D is compressed between the pistons and the opposite cylinder-heads, and is forced out through contracted openings, the size of which regulates
55 the velocity wherewith the top carriage may move on the chassis, as is well understood.

In accordance with the present improvement in the valve apparatus for controlling the flow of said liquid the valve for each recoil-cylinder is formed by rods G of a general taper or wedge shape, which project through straight-way ports 3 in the piston E intermediate the piston-rod F and the periphery of the piston. When the top carriage is
60 moved back, the valve-rods G move past the piston alongside the piston-rod. The piston-rod may therefore be solid, (although for objects hereinafter explained it is designed to provide a small passage in one of the two piston-rods shown,) and the valve-rods and ports
65 do not interfere with the packing of the piston to make a close joint between itself and the cylinder-wall. This valve is also very simple and most effective and one not liable
70 to get out of order. The valve-rod may be less or more in number, and it may be added that they may be of any suitable form and supported in any suitable way, so far as the general feature of having them project
80 through straight-way ports in the piston between the piston-rod and the periphery of the piston is concerned; but it is of practical importance to embody in the valve, also, the following special features—that is to say: 85

First. For each piston a number of valve rods and ports (more than one) are employed, and they are arranged symmetrically about the axis of the piston, so that the diminutions of pressure on the piston in consequence of
90 the openings through it at said ports will balance each other on oppositesides of said axis, and any tendency to twist the piston in the cylinder be thus avoided. As shown, the ports 3 and valve-rods G for each piston are two in
95 number, and they are arranged on diametrically-opposite sides of the piston-axis at the same distance therefrom.

Second. Each valve-rod is formed with longitudinal bearing-surfaces 4 between the taper
100 or wedge faces 5, which bearing-surfaces fit against and slide over the walls of the ports

3 as the valve-rods are moved with the gun-carriage. (See Figs. II, III, and V.)

Third. The rods are best formed (and are so shown) of cylindrical bars of the same cross-section as the bore of the ports through which they pass, slabbed off obliquely to the axis of the rods to an equal extent on a number (two, as shown) of sides at equidistant points (diametrically opposite, as shown) from each other, thus leaving a number of equal flat wedge or taper faces 5 alternating with a similar number of equal curved bearing-surfaces 4.

Fourth. Each rod has a bearing at each end, being confined, as shown, between the heads 6 and 7 of the recoil-cylinder, and having projections 8, which enter holes in said heads.

Fifth. In order to utilize the recoil valve or valves for arresting the forward motion of the gun when it reaches firing position, the rods of the respective valves are each provided at the small end of the wedge or taper of the rod with a head, as at 9, which closes its port and prevents the passage of water or other recoil-checking liquid through the piston when the gun has run out or been run out to the desired extent.

The improvements as thus far described may be used with any suitable means for receiving the liquid which is forced through the piston. In practice, however, and as shown, the new or improved valve is employed in connection with a buffer, in which the liquid, after being forced through the piston E, is in part discharged from the recoil-cylinder D through a pipe I, past a self-closing or check valve H, into a receiving-cylinder K, the valve H preventing the return of the liquid when the top carriage comes to rest, and consequently holding the said carriage and gun in the retracted position to which they have been brought by the recoil. In the receiving-cylinder shown there is a plunger L, secured at the front end to a transom M of the chassis. As the pistons E therefore move inward in the recoil-cylinders D the plunger L is withdrawn from the receiving-cylinder K and leaves just sufficient space to receive the liquid, which, having been forced past the pistons E through the ports 3, is forced out of the recoil-cylinders by the entry of the piston-rods thereinto, said plunger having a cross-section equal in area to the sum of the cross-sections of the piston-rods F.

To effect the connection of the one or more discharge-pipes, as I, through a self-closing or check valve with the receiving-cylinder, the following new or improved construction is adopted—that is to say: The head N of the receiving-cylinder K is cast or otherwise provided on the outside just beyond the said cylinder with a valve-chamber 10 transverse to the length of said cylinder, and is connected by passages 11 and 12, respectively, with the interior of said cylinder K and the discharge pipe or pipes I. The valve H in this chamber is held to its seat by a spring 13, contained in a recess in the plug 14, which

closes the opening for the introduction of the valve in the top of the valve-chamber 10. The passage 11 extends through the inner face of the cylinder-head N and the passage 12 to the outside thereof, said passage, as shown, being branched in order to receive the discharge-pipes for the two recoil-cylinders.

To allow the liquid to flow slowly from the receiving-cylinder to the recoil-cylinder in returning the top carriage to firing position, a small by-pass 15 is formed in the cylinder-head N around the valve H, and this by-pass is provided with a valve 16, which is opened, when desired, by a rock-shaft 17, connected with the valve-stem and extending through one of the cheeks of the top carriage B to the outside thereof, where it is provided with an operating-handle 18. The liquid, passing through this by-pass, enters the recoil-cylinders by the pipes I, which thus act as inflow as well as discharge pipes.

In order to most conveniently connect the recoil and receiving cylinders with each other, the receiving-cylinder is placed in advance of the recoil-cylinders, which advanced position also has the advantage of giving more room to the hinder portion of the gun.

In practice the buffers should be so regulated as to arrest the motion of the top carriage in recoil just before it reaches the end of its course on the chassis. To enable it to be moved to the full end of its course, a hand-pump P is placed on the gun-mounting and is connected through the suction-pipe 19 and passage 20 in one of the piston-rods F with one of the recoil-cylinders D and through the discharge-pipe 21 and passage 22 in the plunger L with the receiving-cylinder K. By this pump, therefore, the liquid may be withdrawn from the cylinder D and forced into the receiving-cylinder K with the result of moving the top carriage back on the chassis. The pump could be connected with both recoil-cylinders; but a connection with one is sufficient. By making the pump exhaust the liquid from the receiving-cylinder K and force it into the recoil-cylinders the gun could be run out by hand, provided the valve H is held down with sufficient force. As shown, however, the rails of the chassis are inclined on top, as is common, so that the top carriage tends to move forward by gravity, and it is not necessary to employ a pump, but only to open the valve 16 and allow the weight of the gun and top carriage to force the liquid from the receiving into the recoil cylinders.

By making the passage 20 communicate with the recoil-cylinder D behind the piston E, as shown at 20', the liquid compressed by the piston during the recoil is not in communication with that in the passage 20 and pipe 19, except through a throttled opening or openings, (namely the ports 3, as shown, which are reduced in their openings by the valve-rods G,) and the valves and other parts of the pump P are subjected to no greater pressure than is necessary to lift the valve H in order

to allow the liquid to flow from the recoil to the receiving cylinder. As shown, the passage 20 is bored through the piston, for convenience of manufacture, and then closed at the end by a screw-plug.

The top carriage shown embodies some features of utility which have not heretofore been adverted to, since the improvements previously described are of more general application than to this precise carriage, although particularly applicable thereto.

The recoil-cylinders D, it will be observed, are formed in the cheeks of the top carriage and are interposed between the trunnion-beds 24 and a roller-space 25, whose walls (projecting beyond the rollers 26, journaled in said walls) receive between them the tops 27 of the chassis-rails. The rollers run on the rails. Claws 28 on the top carriage prevent its leaving the rails.

The recoil and receiving cylinders are all formed in the material of the top carriage (the recoiling-cylinders in the cheeks and the receiving-cylinder in the transom) and extend through the same from front to back of even diameter throughout. This construction affords great facility for casting and boring. The cheeks of the top carriage are inclined at the top upward from both ends to the middle, and the trunnion-beds 24 are placed on the forward inclines 29. This construction brings the material in the position best adapted to resist the stresses of the recoil. In connection with the forward position of the trunnion-beds 24, the forward position of the receiving-cylinder K in advance of the recoil-cylinders D (which has already been described) is specially advantageous in allowing more room under the hinder part of the gun. The pipes I communicate through side openings with the recoil-cylinders and through the rear cylinder-head N with the receiving-cylinder K.

The pump P may be operated in any suitable way. It is advantageous, however, to work it by means of a transverse operating-shaft P' and suitable connecting mechanism, such as the eccentric 30 and yoke 31, connected with the piston-plungers. The transverse shaft P' may extend beyond the gun-mounting, to be there revolved at the side of the gun by suitable cranks or handles.

I claim as my invention or discovery—

1. In combination with the top carriage and chassis of a gun-mounting and a cylinder and piston connected, respectively, with said top carriage and chassis, the valve formed by straight-way ports in the piston intermediate the piston-rod and the periphery of said piston, and valve-rods of a general taper or wedge shape projecting through said ports and movable with said cylinder past said piston alongside said piston-rod, substantially as described.

2. In combination with the cylinder and piston of a hydraulic buffer, the valve formed by a number of straight-way ports in the piston intermediate the piston-rod and the pe-

riphery of the piston, arranged symmetrically about the axis of the piston, and a number of valve-rods of a general taper or wedge shape, one projecting through each of said ports, substantially as described.

3. In combination with the cylinder and piston of a hydraulic buffer, the valve formed of straight-way ports in the piston and a valve-rod projecting through each of said ports of a general taper or wedge shape, with longitudinal bearing-surfaces fitting against and sliding over the walls of said ports, substantially as described.

4. In combination with the cylinder and piston of a hydraulic buffer, the valve formed of straight-way ports in the piston, and a valve-rod for each port, with a number of equal flat wedge or taper faces alternating with a similar number of equal curved bearing-faces, substantially as described.

5. In combination with the cylinder and piston of a hydraulic buffer, the valve formed of straight-way ports in the piston intermediate the piston-rod and periphery of the piston, and a valve-rod of a general taper or wedge shape for each port, the valve-rod having a bearing at each of its ends on opposite sides of said piston, substantially as described.

6. In combination with the cylinder and piston of a hydraulic buffer, the valve formed of straight-way ports in the piston intermediate the piston-rod and the periphery of the piston, and a valve-rod of a general taper or wedge shape projecting through each port, provided with a head of a size to close said port at the small end of the taper or wedge, substantially as described.

7. The combination of a recoil-cylinder closed at one end and provided with a stuffing-box at the other, a piston provided with straight-way ports intermediate the piston-rod and the periphery of the piston, a piston-rod fastened to said piston and working through said stuffing-box, a gun-carriage and chassis to which said cylinder and piston-rod are respectively secured, valve-rods of general taper or wedge shape movable with the said cylinder and projecting one through each of said ports, a receiving-cylinder closed at one end and provided with the stuffing-box at the other, and a plunger working through said stuffing-box, said receiving-cylinder being connected with the rear end of said recoil-cylinder by a pipe or passage, and it and the said plunger being secured to said top carriage and chassis, respectively, substantially as described.

8. In a hydraulic buffer, the combination, with the recoil-cylinders, of a receiving-cylinder having a head provided with a valve-chamber transverse to the length of the cylinder, and passages extending from opposite ends of said valve-chamber, respectively, through the inner face of the said head and to the outside thereof, substantially as described.

9. In combination with the two recoil-cyl-

inders on the top carriage, their pistons connected with the chassis, their discharge-pipes, the body of the receiving-cylinder on the top carriage, its head provided with a stuffing-box, and the plunger secured to the chassis and working through said stuffing-box, the cylinder-head secured to the opposite end of said receiving-cylinder from said stuffing-box, provided with a valve-chamber formed therein transverse to the length of the receiving-cylinder, and a self-closing or check valve in said chamber, which latter is connected at one end by a passage with the interior of the said receiving-cylinder and at the other end by a branched passage with the discharge-pipes of the said recoil-cylinders, substantially as described.

10. In combination with the top carriage, chassis, recoil and receiving cylinders on the top carriage, recoil-pistons, piston-rods and plunger connected with the chassis, automatic plug-valves with rods of a general taper or wedge shape for ports in said pistons, pipes and valve-chamber connecting said cylinders with each other, and self-closing or check valve in said valve-chamber, the hand-pump having its valve-boxes connected with a receiving-cylinder by a passage and with one at least of the recoil-cylinders by a passage which communicates with the space around the piston-rod behind the piston of such cylinder, substantially as described.

11. The top carriage having, respectively, in the cheeks under the trunnion-beds and in the transom under the gun-space recoil and receiving cylinders, all extending through the

said carriage from end to end, with even diameter throughout, and provided with rollers in a space under each recoil-cylinder and with walls extending beyond said rollers to receive between them the tops of the chassis-rails, substantially as described.

12. The top carriage having the trunnion-beds in advance of the middle and having recoil-cylinders in the cheeks under said trunnion-beds, and a receiving-cylinder in the transom set in advance of said recoil-cylinders and provided with pipes connected with side openings in the recoil-cylinders and communicating with the receiving-cylinder through the rear head thereof, substantially as described.

13. In combination with the top carriage, the recoil and receiving cylinders and connecting-pipes on said top carriage, the chassis, the pistons in said recoil-cylinders, the piston-rods and plunger connected with said chassis, the pump on the stationary part of the gun-mounting, having its valve-boxes in communication with the receiving-cylinder and one at least of said recoil-cylinders, and provided with an operating-shaft transverse to the length of the chassis, and mechanism connected with said shaft for working said pump, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

HENRI SCHNEIDER.

Witnesses:

CHARLES BRÉBONY,
EDWARD P. MACLEAN.