

No. 720,494.

PATENTED FEB. 10, 1903.

G. W. SDEM.
HYDRAULIC POWER MACHINE.

APPLICATION FILED NOV. 12, 1902.

NO MODEL.

3 SHEETS—SHEET 1.

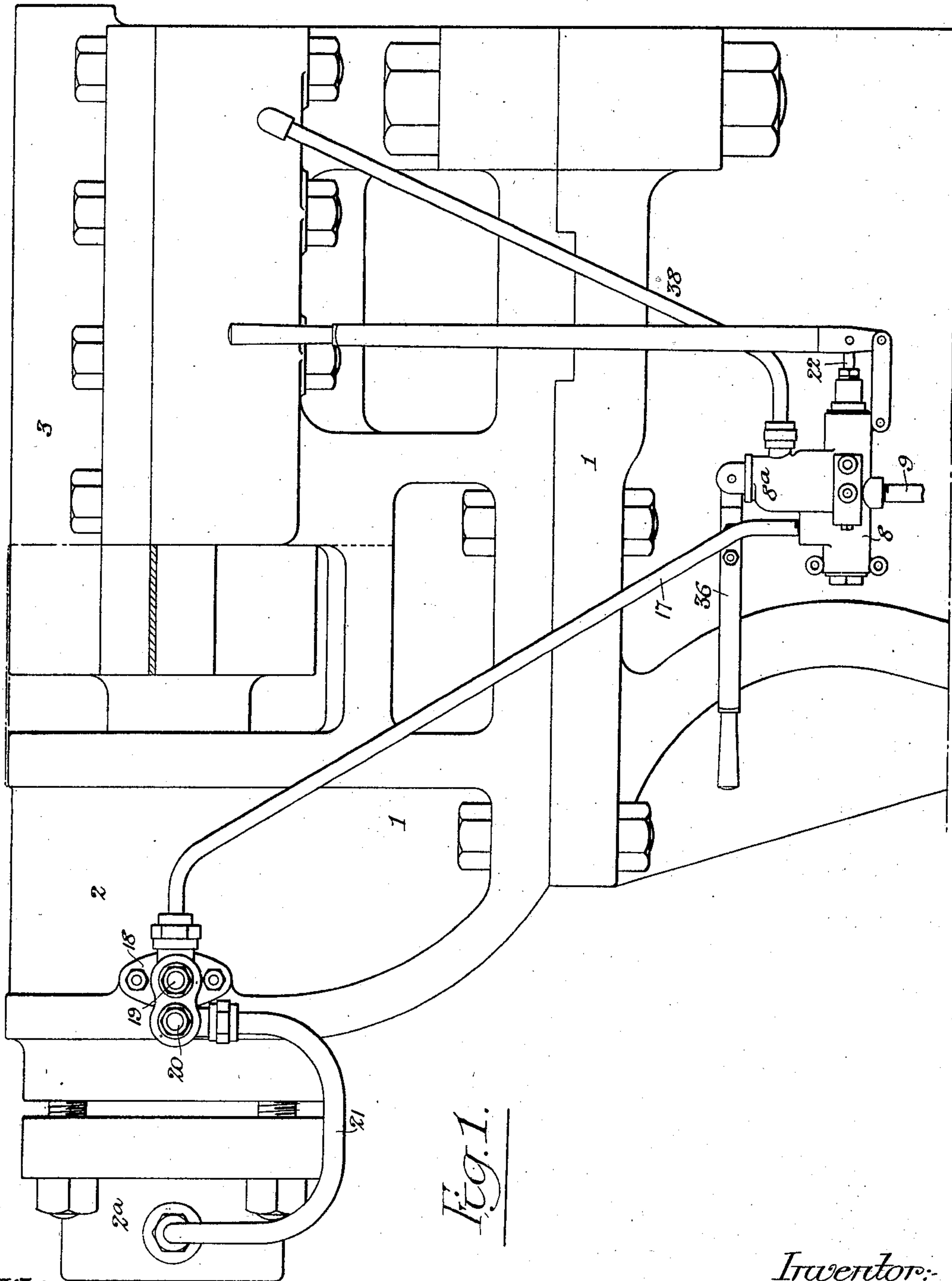


Fig. 1.

Witnesses:-

Chas DeLeon
Herman E. Mettles.

Inventor:-

George W. Sdem,

by his Attorneys:-

Howson & Howson

No. 720,494.

PATENTED FEB. 10, 1903.

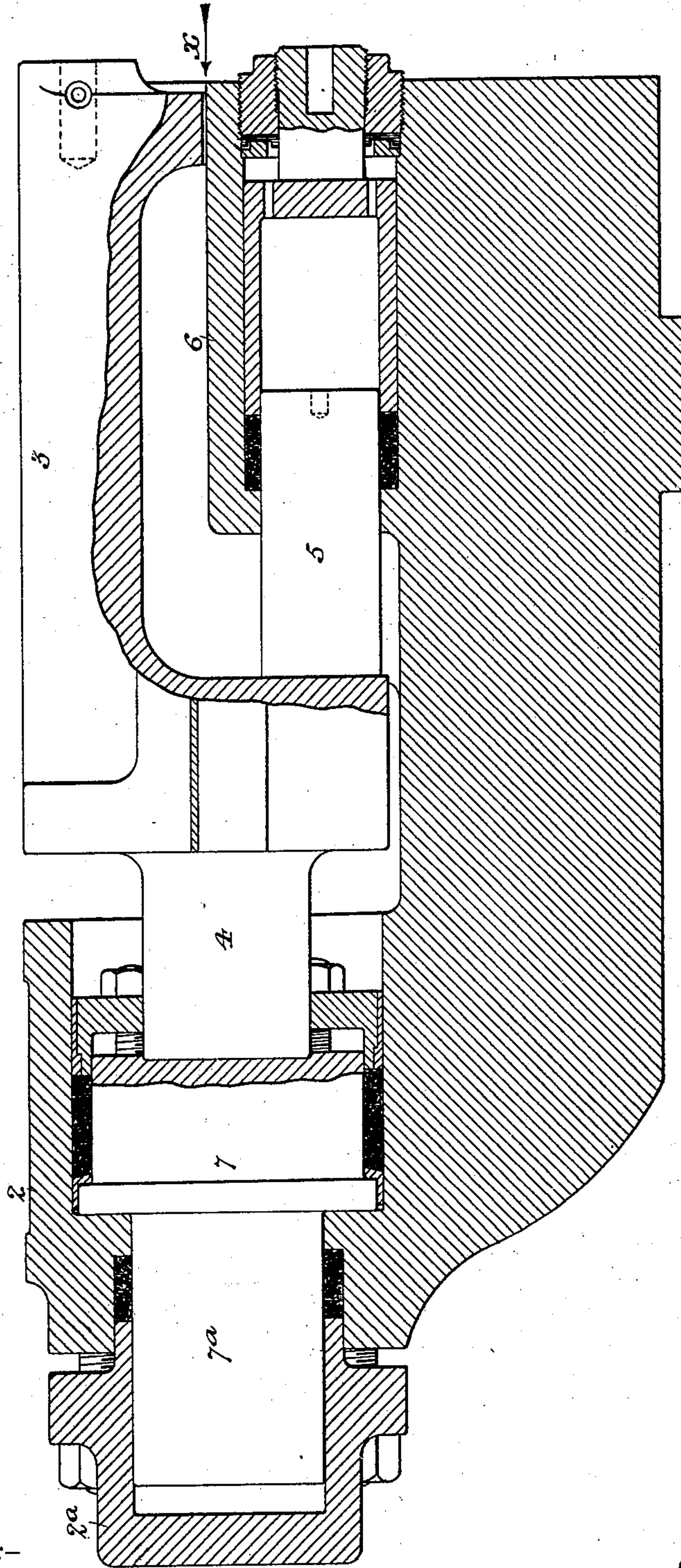
G. W. SHEM.
HYDRAULIC POWER MACHINE.

APPLICATION FILED NOV. 12, 1902.

NO MODEL.

3 SHEETS—SHEET 2.

Fig. 2.



Witnesses:-

Chas Wilson
Herman E. Mettius

Inventor:-
George W. Shem
by his Attorneys

Howson & Howson

No. 720,494.

PATENTED FEB. 10, 1903.

G. W. SHEM.
HYDRAULIC POWER MACHINE.

APPLICATION FILED NOV. 12, 1902.

NO MODEL.

3 SHEETS—SHEET 3.

Fig. 3.

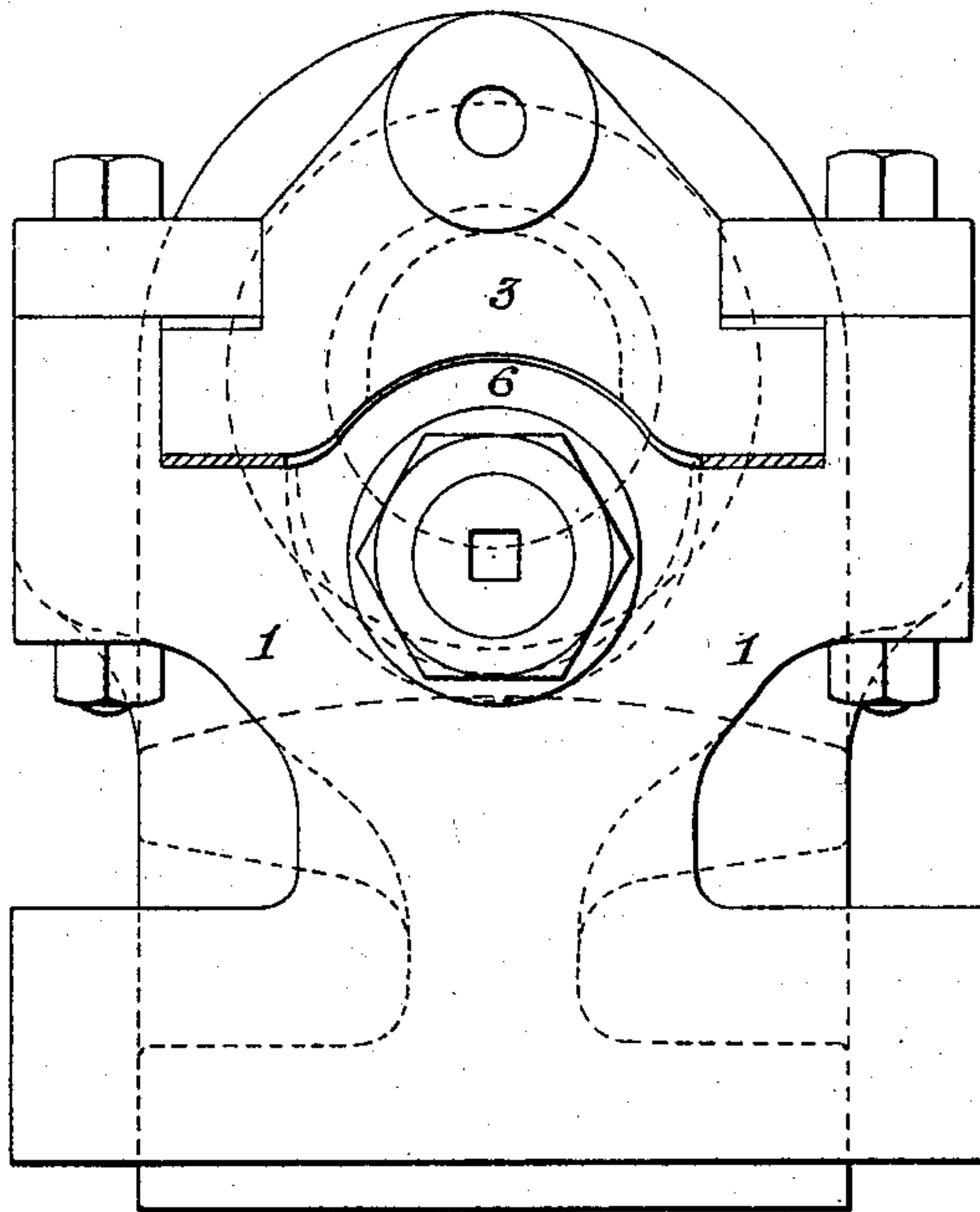
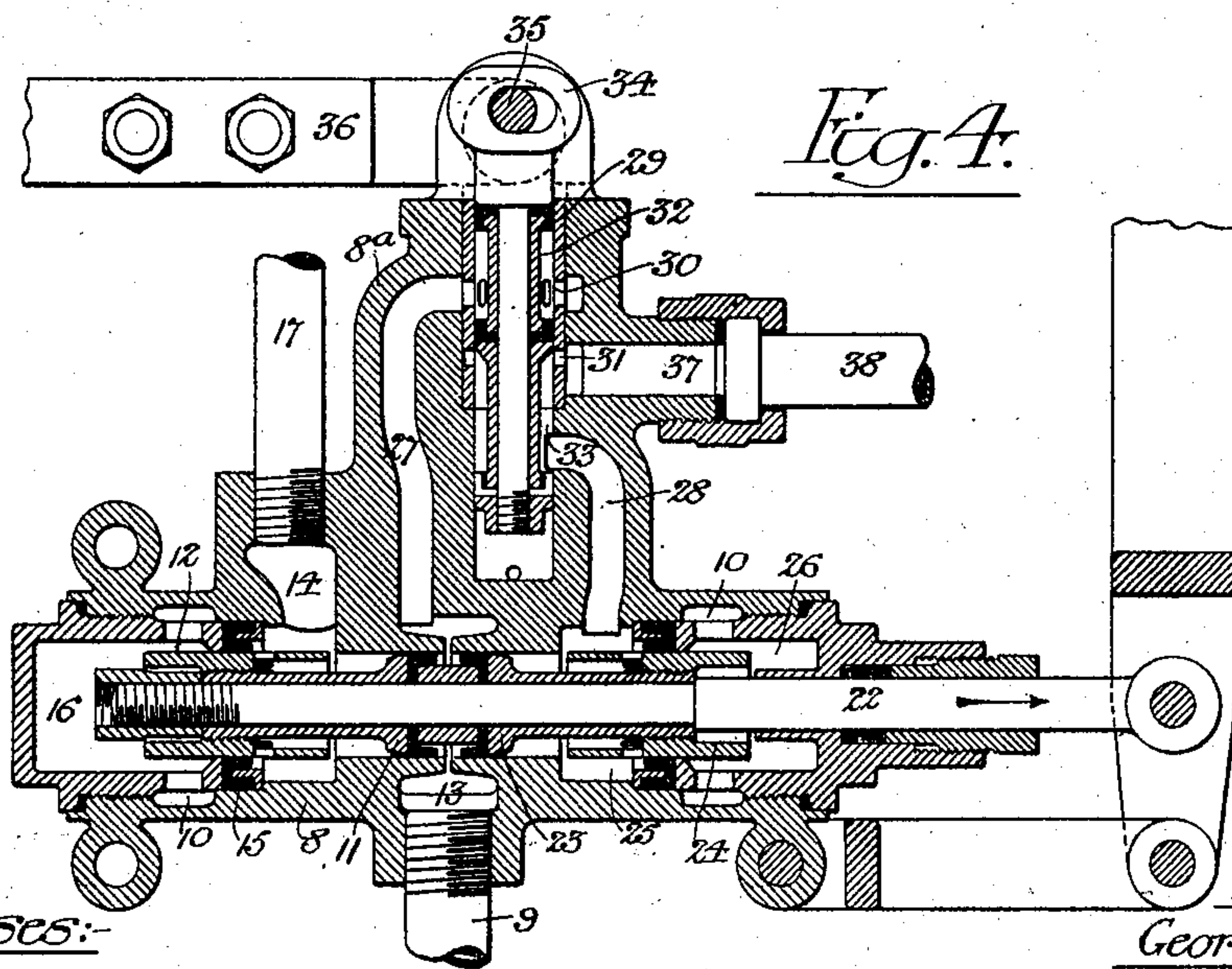


Fig. 4.



Witnesses:-

Chas Wilson
Herman E. Melius.

Inventor:
George W. Shem,

by his Attorneys

Howson & Howson

UNITED STATES PATENT OFFICE.

GEORGE W. SHEM, OF ALLIANCE, OHIO, ASSIGNOR TO CAMDEN IRON WORKS, OF CAMDEN, NEW JERSEY, A CORPORATION OF NEW JERSEY.

HYDRAULIC-POWER MACHINE.

SPECIFICATION forming part of Letters Patent No. 720,494, dated February 10, 1903.

Application filed November 12, 1902. Serial No. 131,060. (No model.)

To all whom it may concern:

Be it known that I, GEORGE W. SHEM, a citizen of the United States, residing at Alliance, Ohio, have invented certain Improvements in Hydraulic-Power Machines, of which the following is a specification.

My invention relates to hydraulic punches, riveters, and like machines in which the sliding tool-carrying head is moved in both directions by power, the purpose of my invention being to provide in a simple and inexpensive way for increasing the range of pressures exerted upon said tool-carrying head. In machines of this sort as heretofore made it is the common practice to provide a power cylinder and plunger of such construction that two, three, or more different pressures may be exerted by said plunger, and it is also usual to employ in such machines a power-actuated push-back for returning the tool-carrying head to its normal position when the pressure is released from the main power-cylinder, this back pressure in the ordinary type of machine being continuously exerted.

In my improved machine I provide a valve whereby pressure may be admitted to or exhausted from the push-back cylinder, whereby the pressures exerted upon the main plunger or piston may be either full pressures or full pressures less the push-back pressure. Hence the range of pressures is doubled—that is to say, supposing that the main cylinder and piston structure of the machine are designed to give three pressures these pressures may in my improved machine be exerted either with or without any push-back pressure, thus giving six effective pressures.

In the accompanying drawings, Figure 1 is a side view of sufficient of an ordinary riveting-machine to illustrate the application of my invention thereto. Fig. 2 is a view of the same, partly in vertical section and partly in elevation. Fig. 3 is an end view looking in the direction of the arrow α , Fig. 2; and Fig. 4 is a sectional view of the valve employed in connection with the machine.

In Fig. 1 of the drawings, 1 represents part of the fixed frame of the machine which carries the cylinder structure 2 2^a and provides guides for the sliding head 3, upon which the tool is

mounted, this tool being a rivet-set, a punch, a shear, or other form of tool, as desired. This sliding head 3 is connected by a stem 4 to the piston of the main power-cylinder 2 2^a, and it is also provided with a stem or plunger 5, which is adapted to a push-back cylinder 6 on the frame of the press.

In the present instance the main power-piston has a portion 7 contained within the cylinder 2, and a smaller piston 7^a contained within the supplementary cylinder or follower 2^a. Hence if pressure is admitted so as to act only upon the piston 7^a one degree of power will be exerted upon the sliding head 3, while if pressure is admitted so as to act only upon the annular surface of the piston 7 a second or intermediate degree of power will be exerted, and if pressure is admitted so as to act both upon the piston 7^a and the annular piston 7 a third or maximum degree of power will be exerted. Usually, however, pressure is constantly admitted to the push-back cylinder 6 so as to act upon the stem or plunger 5, and the power exerted by the main piston under either condition of working before described is therefore decreased to the extent of this back pressure.

The controlling valve-chest of the machine is represented at 8 in Fig. 1 and is shown in enlarged section at Fig. 4, said chest 8 having a pressure-supply pipe 9 and an exhaust-chamber 10. Within the bore of the chest are a throttle-valve 11 and a controlling-valve 12, the throttle-valve serving to open or close communication between the main inlet-chamber 13 of the chest and a chamber 14, and the controlling-valve 12 being ported and operating in conjunction with a fixed packing-ring 15 in the casing, so as to open communication between the chamber 14 and a chamber 16, which is in communication with the exhaust-chamber 10.

From the chamber 14 a pipe 17 leads to a valve-chest 18, having suitable valves 19 and 20, whereby in connection with a pipe 21 pressure may be admitted either to the piston 7^a, to the annular piston 7, or to both, this being the usual arrangement and forming no part of my invention. In order, however, to subject the push-back piston 5 to pressure or

release the same from pressure during the operation of the tool, the valve-stem 22 has another throttle-valve, 23, and another regulating-valve, 24, said valve 23 controlling communication between the central inlet-chamber 13 of the chest and a chamber 25, and the valve 24 controlling communication between said chamber 25 and a chamber 26, which is in communication with the exhaust-chamber 10 of the valve-chest.

On the top of the main valve-chest 8 is a supplementary valve-chest 8^a, having a passage 27 communicating with the main inlet-chamber 13, and a passage 28 communicating with the chamber 25 of the main valve-chest. In this valve-chest 8^a is a tubular bushing 29, having upper ports 30 and lower ports 31, and free to slide in this bushing and in the continuing bore of the valve-chest 8^a is a valve 20 having an upper chamber 32 and a lower chamber 33, closed at the ends and separated from each other by suitable packing-rings.

The upper end of the stem of the valve 29 has a slotted yoke 34, which receives a crank-pin 35 on the hub of a lever 36. Hence by proper manipulation of said lever the valve 29 may be caused to assume either the upper position (shown in Fig. 4) or a lower position in the chest 8^a. The said chest 8^a has a lateral branch 37, which is connected by a pipe 38 to the push-back cylinder 6.

Supposing that the parts are in the position shown in Fig. 4, both the main cylinder and the push-back cylinder are cut off from communication either with the pressure or with the exhaust; but if the valve-stem 22 is moved in the direction of the arrow, Fig. 4, so as to open communication between the chambers 13 and 14 and 25 and 26, pressure will be admitted to the main cylinder and the push-back cylinder will be open to the exhaust. Hence there will be no resistance to the forward movement of the tool-head. If the valve-stem 22 is moved in a direction the reverse of that indicated by the arrow, so as to open communication between the chambers 14 and 16 and between the chambers 13 and 25 and close communication between the chambers 13 and 14 and 25 and 26, pressure will be exhausted from the main cylinder and admitted to the push-back cylinder, so as to retract the tool-carrying head. If, however, the valve 32 is depressed in the valve-chest 8^a, so as to open communication between the chamber 27 and the pipe 38 and cut off communication between said pipe 38 and the chamber 28, then constant pressure will be maintained in the push-back cylinder irrespective of any movement of the main valve, and all of the pressures exerted by the piston of the main cylinder will be resisted by the back pressure upon the push-back piston.

While I prefer to combine the two valves in one casing in the manner shown and de-

scribed, it will be understood that the valve 32 may be independent of the main valve, if desired. In fact, the construction of the valve mechanism may be varied in many different ways without departing from the main feature of my invention.

While I have shown my invention as applied to a machine having a main cylinder capable of exerting three different pressures, it will be understood that the invention is applicable to machines having main cylinders capable of exerting either a less or a greater number of different pressures.

Having thus described my invention, I claim and desire to secure by Letters Patent—

1. The combination of a hydraulic-power machine having a main power-cylinder and a push-back cylinder, valve mechanism for opening the push-back cylinder to the exhaust when the main cylinder is opened to the power and vice versa, and a valve whereby power may be admitted to the push-back cylinder while power is also admitted to the main cylinder, substantially as specified.

2. The combination of a hydraulic-power machine having a main power-cylinder and a push-back cylinder, with a valve-chest having a valve for governing the flow of motive fluid to and from both the main pressure-cylinder and the push-back cylinder, and a supplementary valve whereby the pressure-chamber of the main valve-casing may be permitted to communicate with said push-back cylinder independently of the operation of the main valve, substantially as specified.

3. The combination of a hydraulic-power machine, having a main cylinder and a push-back cylinder, with a valve-chest having a constant-pressure passage, a valve-controlled exhaust-passage, a passage leading to the push-back cylinder, and a valve having two chambers whereby said passage leading to the push-back cylinder may be caused to communicate either with the constant-pressure passage or with the valve-controlled exhaust-passage, substantially as specified.

4. The combination of a hydraulic-power machine, having a main cylinder and a push-back cylinder, with a valve-chest having a main valve for controlling flow of motive fluid to and from the main and push-back cylinders, a supplementary valve for admitting pressure to said push-back cylinder, independently of the main valve, and a cam-lever whereby said supplementary valve can be moved into either of its extreme positions, substantially as specified.

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

GEORGE W. SHEM.

Witnesses:

R. S. KIRK,
G. W. YANNEY.