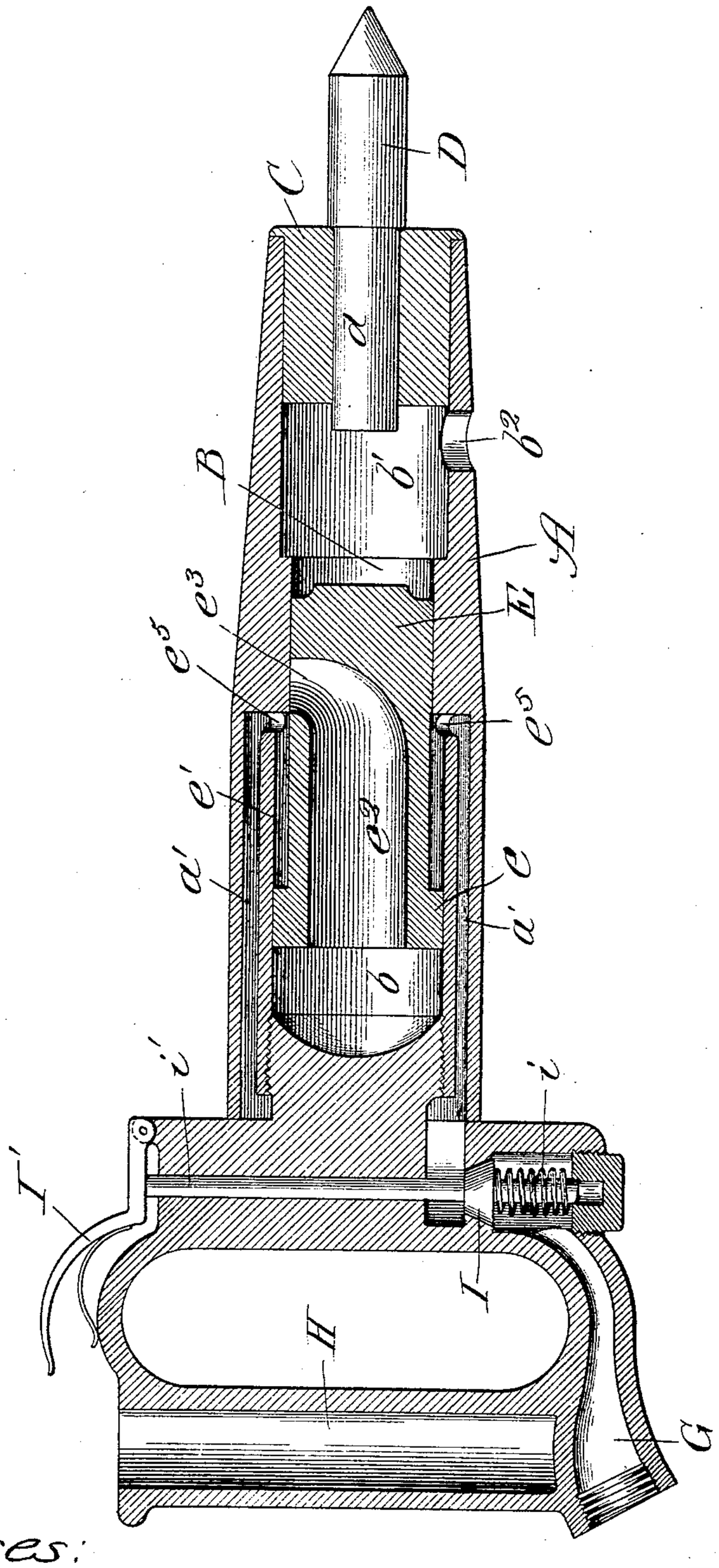
No. 618,100. Patented Jan. 24, 1899.

C. H. JOHNSON.

PORTABLE PNEUMATIC HAMMER.

(Application filed Apr. 13, 1896. Renewed Dec. 21, 1898.)

(No Model.)



Witnesses:
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UNITED STATES PATENT OFFICE.

CHARLES H. JOHNSON, OF SPRINGFIELD, ILLINOIS, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE JOHNSON-PARFIT TOOL COMPANY, OF SAME PLACE.

PORTABLE PNEUMATIC HAMMER.

SPECIFICATION forming part of Letters Patent No. 618,100, dated January 24, 1899.

Application filed April 13, 1896. Renewed December 21, 1898. Serial No. 699,953. (No model.)

To all whom it may concern:

Be it known that I, CHARLES H. JOHNSON, a citizen of the United States, residing at Springfield, Illinois, have invented certain new and useful Improvements in Portable Pneumatic Hammers, of which the following is a specification.

The object of my invention is to provide a simple, economical, and efficient pneumatic hammer of the percussion type; and the invention consists principally in combining a casing of suitable size and shape provided with an operating-tool in one end thereof, a piston-hammer in such casing, and means for admitting fluid-pressure constantly to one side of the piston and intermittently to the other side to reciprocate the same and cause it to impact the operating-tool.

The invention consists, finally, in the features, combinations, and details of construction hereinafter described and claimed.

The accompanying drawing illustrates a longitudinal sectional view of a hammer made in accordance with my improvements.

In constructing a hammer fitted with my improvements I make a casing A of the desired size, shape, and strength to inclose and support the different parts in their operative positions. This casing is provided with a central axial bore or opening B, one portion of which, *b*, I term the "main-pressure" chamber and the other portion, *b'*, near the front end an "exhaust-chamber." The front end of this central bore or opening is provided with a plug C, having also an axial opening, in which is easily fitted the shank *d* of an operating-tool D of the desired size and type. The tool shown in the drawing is a chisel, though a drill or other desired tool may be used, and, as above stated, is loosely fitted in the same, so as to have an easy longitudinal movement. It must be understood, however, that the tool should not be fitted so loosely as to cause it to drop out easily when held in a position that would permit of the same.

A piston-hammer E is provided and fitted in the axial bore of the casing, so that it may partake of a reciprocating movement therein. This piston-hammer has a head portion *e* of slightly-larger diameter than the body portion, which acts to divide the main-pressure chamber in such a manner that between the body of the piston and the walls of the casing there is formed an annular pressure-chamber *e'*. The piston is further provided with an opening e^2 in its rear portion, connecting with the main-pressure chamber and extending clear through to one side, as at e^3, for the purpose of alternately connecting the main-pressure chamber with the annular pressure-chamber, or what I will hereinafter term the "constant-pressure" chamber, when at one end of its stroke and with the exhaust-chamber *b'* when at the other limit of its stroke.

The casing is provided with an inlet-passage *a'*, which has connections with the main inlet G, arranged in a portion of the casing adjacent to the handle portion H. This passage is provided with a spring-actuated throttle-valve I, normally closed by means of the helical spring *i* and the stem *i'*, which is arranged to be contacted and actuated by an actuating-lever I'. This inlet-passage is connected with the constant-pressure or annular chamber of the cylinder by means of the perforations e^5, so that it will be seen that when the throttle-valve is opened this annular chamber is furnished with a constant supply of fluid-pressure—hence the term "constant-fluid-pressure" chamber. The exhaust-chamber is provided with an exhaust-opening b^2, leading into the open air, and of such a size as to permit the exhaustion of the fluid-pressure without any appreciable back pressure.

It will be noticed on examination of the drawing and the above description that the surface presented by the piston in the main-pressure chamber is of a larger superficial area than the surface presented in the constant-pressure chamber, so that when pressure is admitted to the main-pressure chamber it acts to overcome the constant pressure in the other chamber and drive the piston forward, the main advantages resulting from this construction therefore being that it necessitates but one movable part, one inlet-passage, and one exhaust-passage. The reciprocations of the hammer portion may be

changed to fast or slow, heavy or light, as desired, by changing the relative superficial areas of the piston in the constant and main pressure chambers.

The operation of my hammer is as follows: The handle portion is grasped by one hand and the throttle-valve opened by pressing the valve-lever with the thumb. Fluid-pressure immediately flows from the source of supply into the constant-pressure chamber and moves the piston-hammer to its rear limit of motion until the passage e^2 connects the constant and main pressure chambers. The fluid-pressure immediately entering the large pressure-chamber acts to overcome the pressure in the constant-pressure chamber and drive the hammer forward to contact the operating-tool. As the piston-hammer reaches its forward limit of motion the exhaust and main-pressure chambers are connected by means of the passage e^2, thus permitting the fluid-pressure to be exhausted from such chamber and the fluid-pressure in the constant-pressure chamber to draw back the piston-hammer to the opposite limit of its stroke. The operations are continued as long as desired, or until the fluid-pressure is shut off from the pressure-chamber.

It will be noticed from the drawing that when the piston-hammer commences to make its return stroke the exhaust-chamber b' is connected, by means of the opening e^2, with the main-pressure chamber b until the opening e^3 through the piston becomes closed. After this point is reached, the main-pressure chamber being closed, the fluid therein begins to compress, and when the piston reaches the point where the opening e^3 begins to open into the constant-pressure chamber e' this pressure in the main-pressure chamber is still further increased by the admission of the operating fluid under the pressure given by the main supply. When this pressure so generated in the main-pressure chamber reaches a point where it more than balances the pressure in the constant-pressure chamber on the annular ring plus the dynamic energy of the moving piston, the piston is brought to a stop and the motion reversed. It is an important part of the construction of this machine to so proportion the area of the annular ring upon the piston and the full area of the piston in accordance with the weight of the piston and the length of the stroke and also the time of opening and closing of the ports or openings that the piston is brought to a rest and its motion reversed before reaching the back end of the cylinder.

While I have described my invention with more or less minuteness as regards details as being embodied in certain precise forms and as being adapted to certain uses, I do not desire to be limited thereto unduly, no more than is pointed out in the claim. On the contrary, I contemplate all proper uses, changes in form, construction, and arrangement, the omission of immaterial parts, and the substitution of equivalents as circumstances may suggest or render expedient.

I claim—

In a machine of the class described, a casing provided with a fluid-pressure chamber and inlet and exhaust openings, an operating-tool in one end thereof, a reciprocating piston-hammer in the casing arranged to contact the operating-tool at one limit of its stroke and to divide the pressure-chamber into two chambers so as to present a larger superficial area of piston in one chamber than in the other, means whereby fluid-pressure is admitted constantly to one end of the piston and through the piston is alternately admitted to and exhausted from the other end of the piston, the superficial areas of the two chambers so proportioned and arranged with relation to each other and to the weight and length of stroke of the piston and time of opening and closing the communication between the two chambers as to bring the piston on its return stroke to a point of rest without striking the rear head of the cylinder, substantially as described.

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Witnesses:
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