(No Model.)

C. H. JOHNSON.

PNEUMATIC HAMMER.

No. 592,116. Patented Oct. 19, 1897.

Fig. 1.

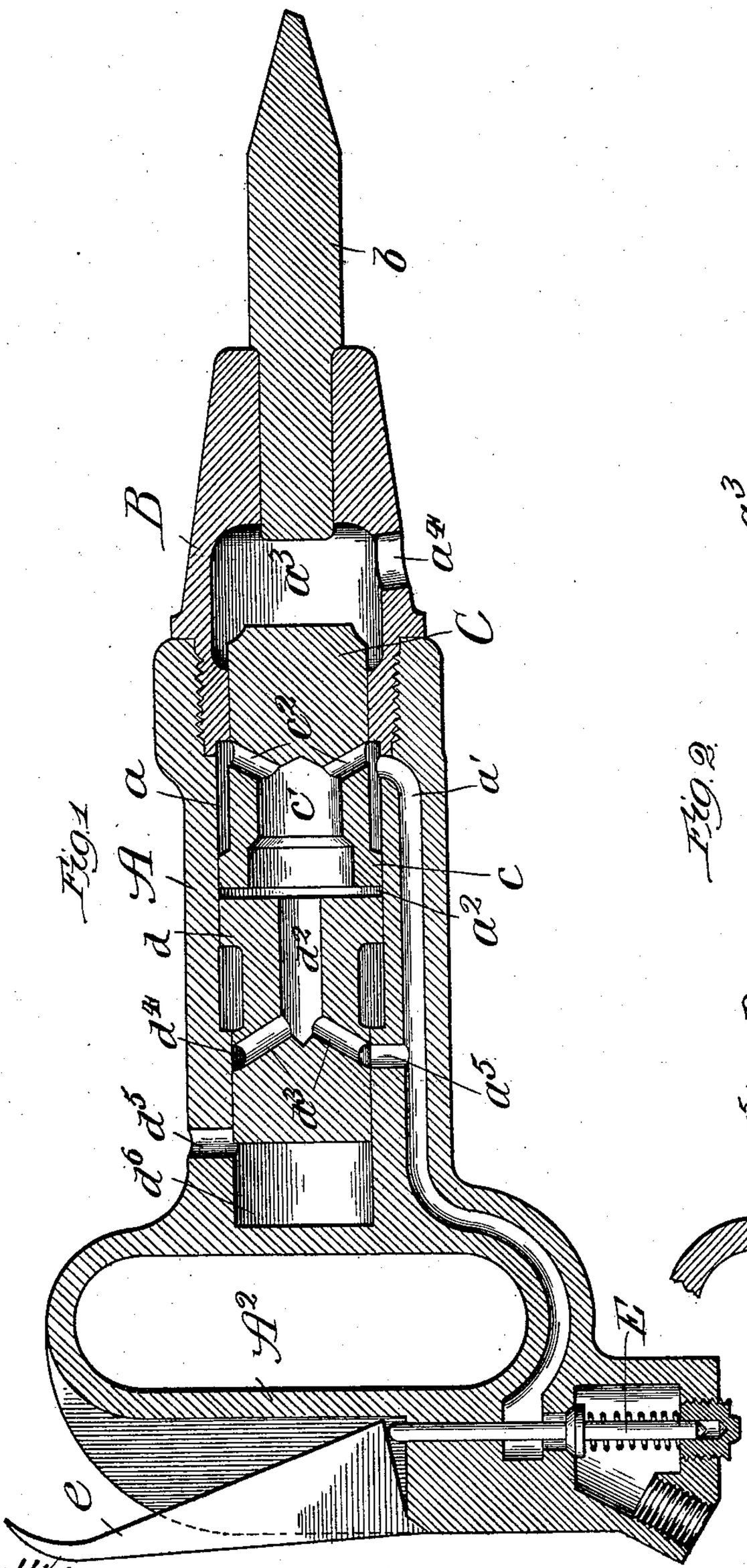
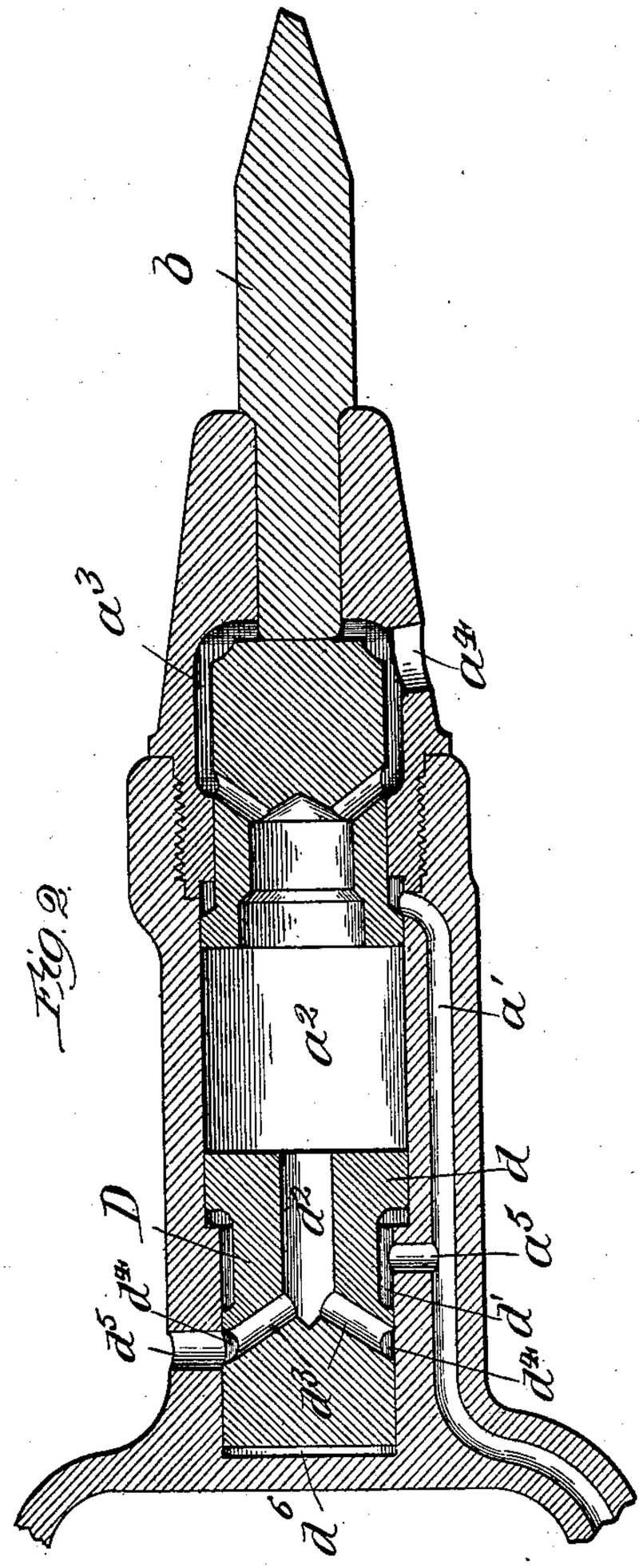


Fig. 2.



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UNITED STATES PATENT OFFICE.

CHARLES H. JOHNSON, OF SPRINGFIELD, ILLINOIS, ASSIGNOR OF ONE-HALF TO WILLIAM BARRET RIDGELY, OF SAME PLACE.

PNEUMATIC HAMMER.

SPECIFICATION forming part of Letters Patent No. 592,116, dated October 19, 1897.

Application filed February 15, 1897. Serial No. 623,496. (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, in the county of Sangamon and State of Illinois, have invented certain new and useful Improvements in Portable Pneumatic Hammers and Similar Tools, of which the following is a specification.

The object of my invention is to make a simple, economical, and efficient portable pneumatic hammer; and the invention consists in the features, combinations, and details of construction hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a longitudinal sectional view of a hammer constructed in accordance with my improvements, showing the parts in their retracted position; and Fig. 2, a similar view showing the parts in their striking position.

In the art to which this invention relates it is well known that the movements of the piston-hammer in each direction produce a reactionary movement on the part of the casing, and that this reactionary movement and recoil due to the blow is very severe upon the operator of the machine, and limits the size and power of machines which can be practically operated.

The principal object of my invention, therefore, is to provide a portable pneumatic hammer with a single hammer and a counterbalancing-piston, which effectively removes the above objections, and by reducing the jar and strain upon the operator makes it practicable for a man to operate a machine of greater size and efficiency.

In the accompanying drawings I have illustrated one of the many forms in which my invention may be constructed, and in which A is the casing, having a cylindrical bore or opening of two different diameters extending longitudinally into the same and threaded at its forward end to receive the extension B. The casing A is provided with the air-passages a' and a^5, and an opening on its side d^5.

B is an extension of the casing A, provided with a longitudinal bore of two different diameters and is pierced at its forward end to receive the shank of the tool to be operated upon. On the side of this extension is an opening or exhaust-port a^4.

To operate on the tool, I provide a reciprocating hammer C, and mount it in the bore of the cylinder. This piston-hammer is made of two different diameters, one of which forms a piston-head c, fitting the larger bore of casing A, and the other the smaller bore of extension B, so that an annular fluid-pressure chamber a is thus formed between the cylinder-casing and the piston-hammer. This fluid-pressure chamber is what I term a "constant" fluid-pressure chamber, and is connected with a source of fluid-pressure supply by means of an inlet-port a', so that fluid-pressure may be admitted to the same to move the piston-hammer to its retracted position, as shown in Fig. 1 of the drawings.

To move the piston-hammer in its opposite direction, so as to perform the striking blow, I preferably provide such hammer with a longitudinal passage c' and substantially radial openings c^2, so as to permit fluid-pressure to flow to the chamber a^2 at the rear of the piston-hammer and move the hammer to a striking position, as shown in Fig. 2. When in the striking position, the longitudinal passage connects the pressure-chamber a^2 with the exhaust-chamber a^3, from which it passes out through exhaust-port a^4.

From the foregoing description of the parts in operation it will be seen that the piston-hammer is moved backward and forward by the direct and expansive force of the fluid-pressure—preferably compressed air.

To counterbalance the operation of the piston-hammer and minimize or absorb the shock incident thereto, I provide an auxiliary piston D or plunger, and mount it in the cylindrical bore of the cylinder-casing. This auxiliary plunger is made of two diameters, so as to provide an inner head d, and a reduced diameter between which and the casing is formed an annular pressure-chamber d'. This plunger is further provided with a longitudinal passage d^2 and radial openings d^3 and an annular groove d^4, connecting the outer ends of the radial openings d^3. The inlet-passage a' is provided with a port a^5, that alternately, by means of the movements

of the auxiliary plunger, communicates with the annular pressure-chamber and by means of the groove d^4 with the radial passages in such plunger, so as to act to move the plunger forward when the piston-hammer is being moved backward, and brings its radial passages into alinement with the fluid-pressure inlet or port, as shown in Fig. 1. At this point both of the longitudinal passages of the piston-hammer and the auxiliary plunger are connected with the fluid-pressure inlet, and fluid-pressure is admitted into the chamber a^2 between the same, which, acting directly at first and then expansively, moves the parts in an opposite manner to compel the hammer to do its striking operation and the plunger to balance the shock of the strike almost identically at the same period of time, when the parts occupy the position shown in Fig. 2, and the passages d^3 and c^2 are brought into communication with the exhaust-ports a^4 and d^5 and the pressure permitted to exhaust.

It will be noted that when, upon its backward stroke, the rear end of the plunger D passes the port d^5 the exhaust from the chamber d^6 is cut off and the air confined in the chamber d^6 is compressed, forming a cushion and preventing the plunger from striking the casing. If at any time the plunger D should move to any position forward of that shown in Fig. 1, the air-passage A^5 would be closed and fluid-pressure could be admitted through a' to the annular space a only, which would return both hammer C and plunger D to the position shown in Fig. 1 and the tool would resume operation.

The fluid-pressure inlet is provided with a throttle-valve E and a lever e in the handle portion A^2, by which such throttle-valve may be operated as desired.

It will be seen from an inspection of the drawings and the foregoing description that I have provided a tool possessing all the simplicity and economy of a single-acting piston-hammer and which is very efficient, in that the blow is delivered by a hammer of the desired weight and durability, and that the movements of such hammer are counterbalanced by the movements of an auxiliary mechanism. The parts are so designed that the counterbalancing device by slight mechanical changes may be simply and economically applied to any of the single-acting hammers now in use.

While I have described my invention with more or less minuteness as regards details, and as being embodied in certain precise forms, I do not desire to be limited thereto unduly, or any more than is pointed out in the claims. On the contrary, I contemplate all proper changes in form, construction, and arrangement, the omission of immaterial elements, and the substitution of equivalents as circumstances may suggest or necessity render expedient.

I claim—

1. In a piston-hammer, the combination of a casing provided with a longitudinal bore and fluid-pressure inlets and outlets, a reciprocating piston-hammer mounted in one end of the bore and provided with a headed portion at its inner end so as to provide an annular chamber between it and the casing and with a longitudinal passage to admit pressure and exhaust it from the interior, a movable counterbalancing-plunger arranged in the longitudinal bore of the cylinder-casing at the opposite end and provided with a headed portion at its inner end to form an annular passage between it and the casing, substantially as described.

2. In a piston-hammer, the combination of a casing provided with a longitudinal bore and fluid-pressure inlets and outlets, a reciprocating piston-hammer mounted in one end of the bore and provided with a headed portion at its inner end so as to provide an annular chamber between it and the casing and with a longitudinal passage to admit pressure and exhaust it from the interior, a movable counterbalancing-plunger arranged in the longitudinal bore of the cylinder-casing at the opposite end and provided with a headed portion at its inner end to form an annular pressure-chamber between it and the casing and a longitudinal passage to admit fluid-pressure to the interior of the chamber between it and the piston-hammer so as to move the parts in an opposite manner, substantially as described.

3. In a pneumatic hammer, the combination of a casing provided with a longitudinal bore and fluid-pressure inlets and outlets, a reciprocating piston-hammer arranged in one end of the bore having a headed inner portion to provide a constant fluid-pressure chamber which communicates with the fluid-pressure inlet and a longitudinal passage to alternately admit pressure to and exhaust it from the rear of the hammer, and a reciprocating counterbalancing-plunger arranged end to end with the hammer and having an inner headed portion to provide an annular pressure-chamber and with a longitudinal passage for admitting and exhausting fluid-pressure to and from the space between it and the hammer both of such the chamber and passage being arranged to be alternately connected and disconnected with the fluid-pressure inlet, substantially as described.

CHARLES H. JOHNSON.

Witnesses:
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