No. 614,160.

Patented Nov. 15, 1898.

H. BREITENSTEIN.

PNEUMATIC HAMMER.

(Application filed July 6, 1896.)

(No Model.)

Fig. 1.

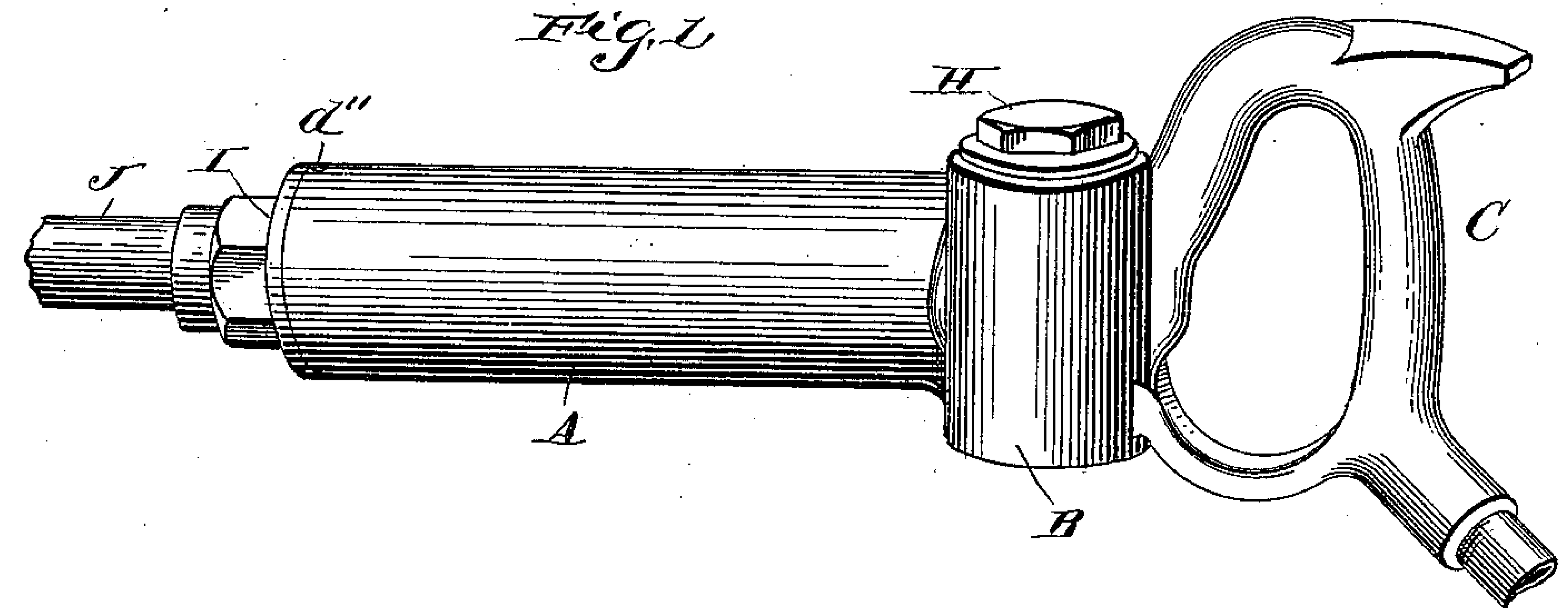


Fig. 2.

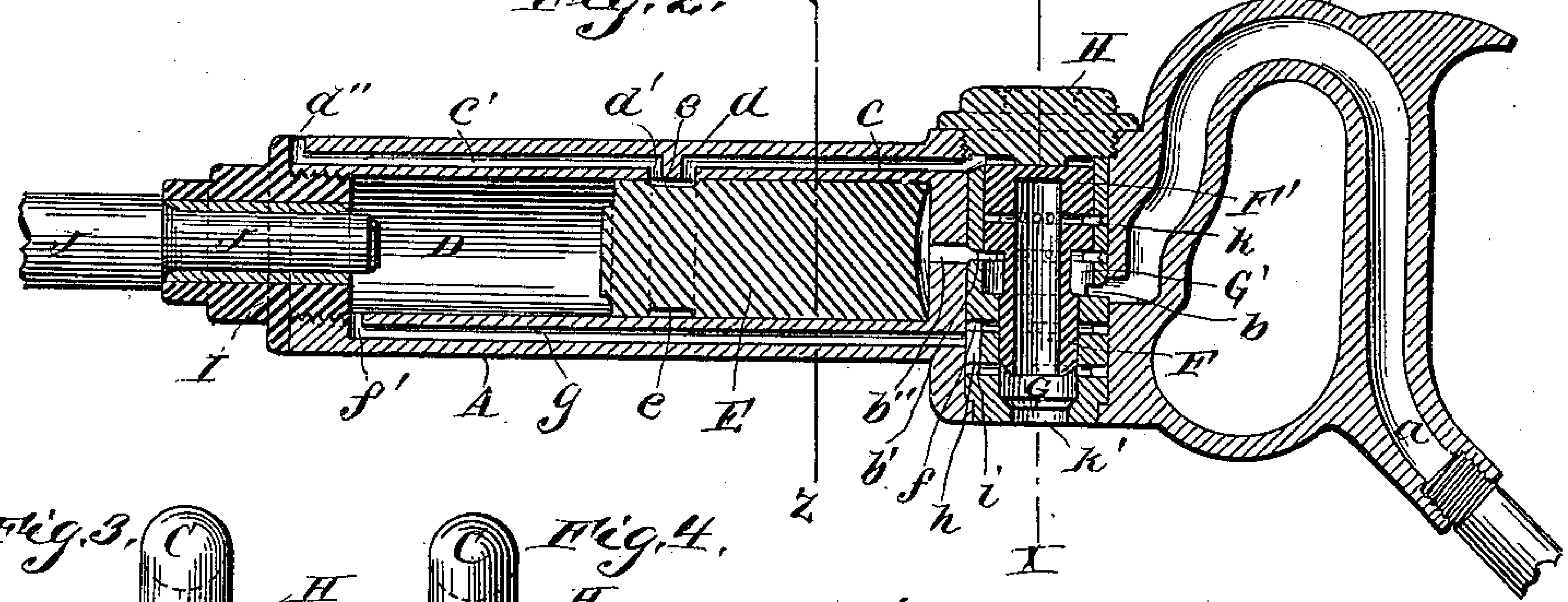


Fig. 3.

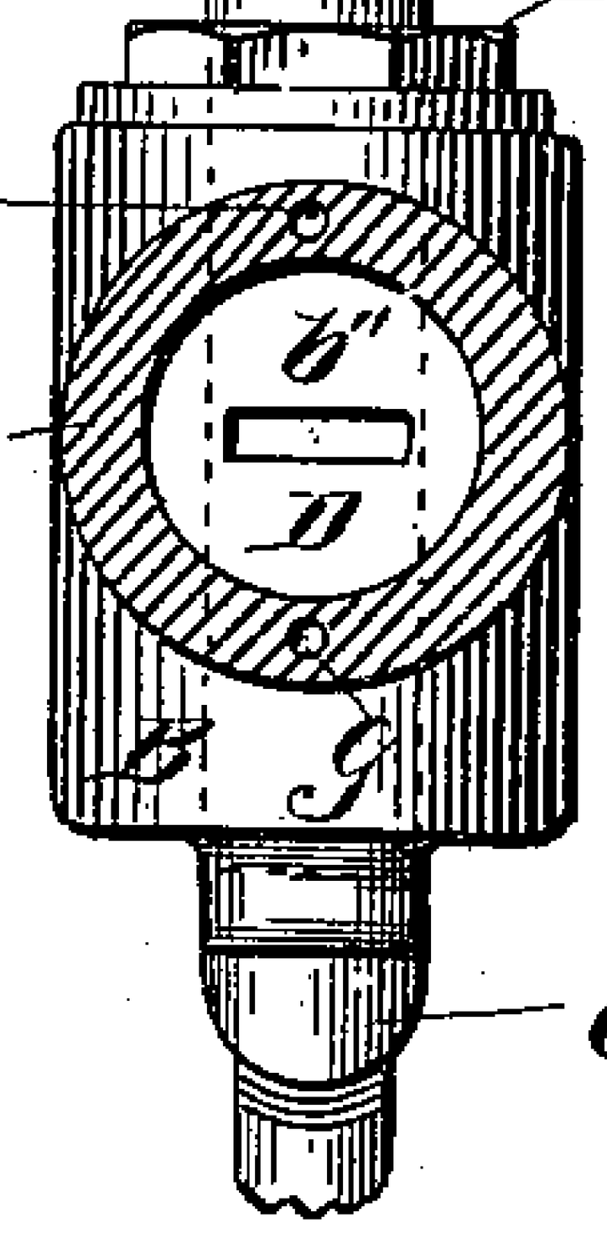


Fig. 4.

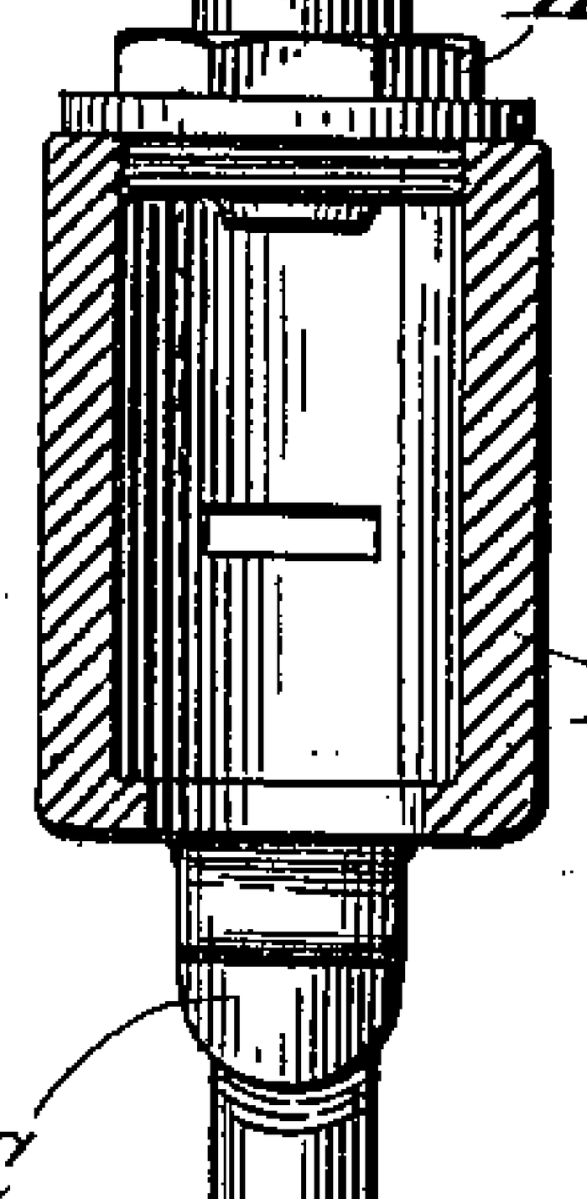


Fig. 6.

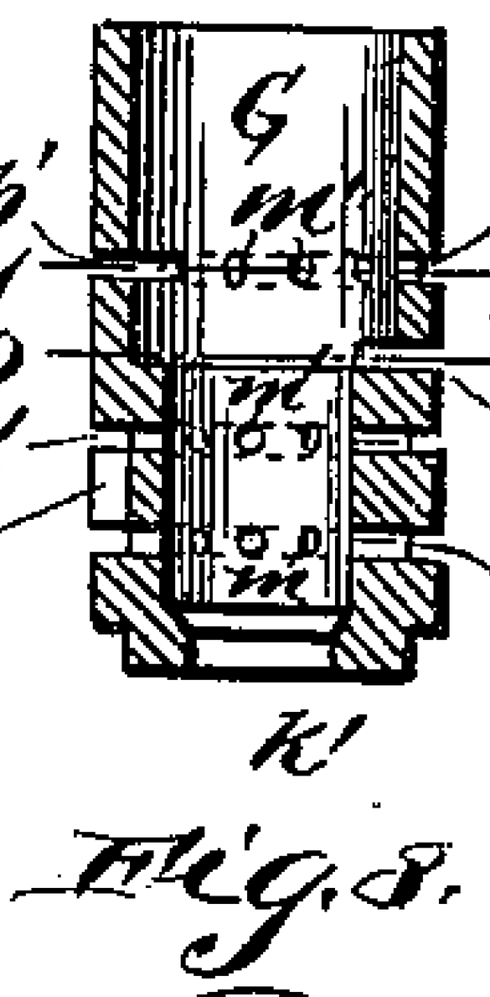


Fig. 5.

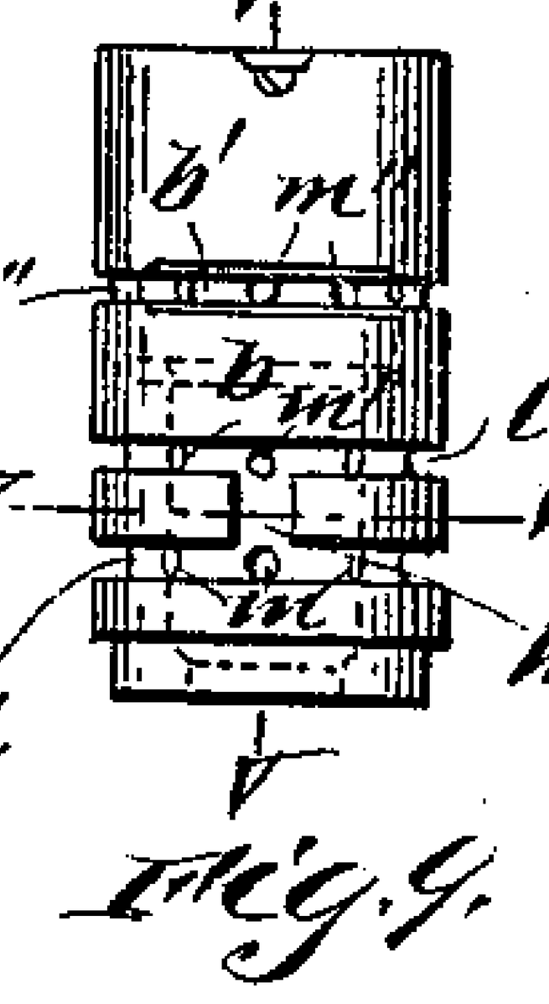


Fig. 7.

Fig. 8.

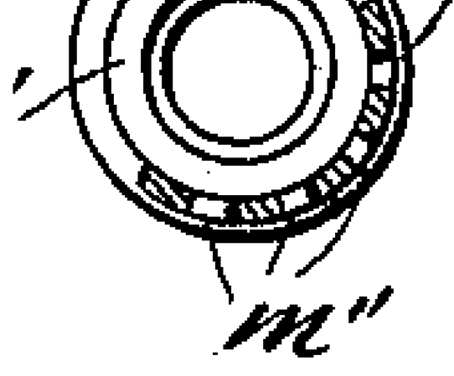


Fig. 9.

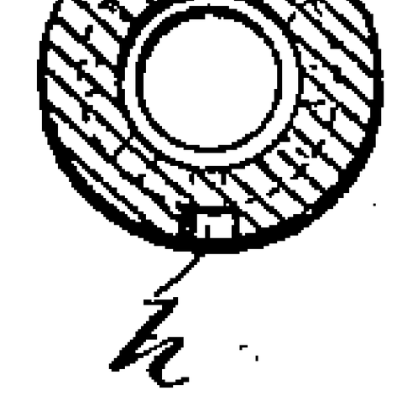


Fig. 10.

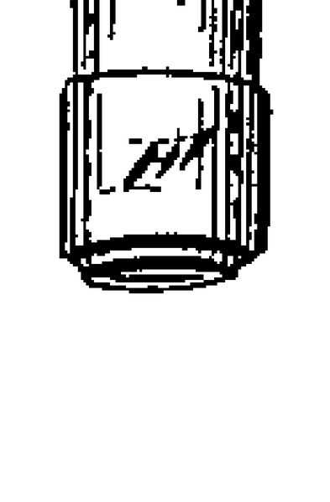
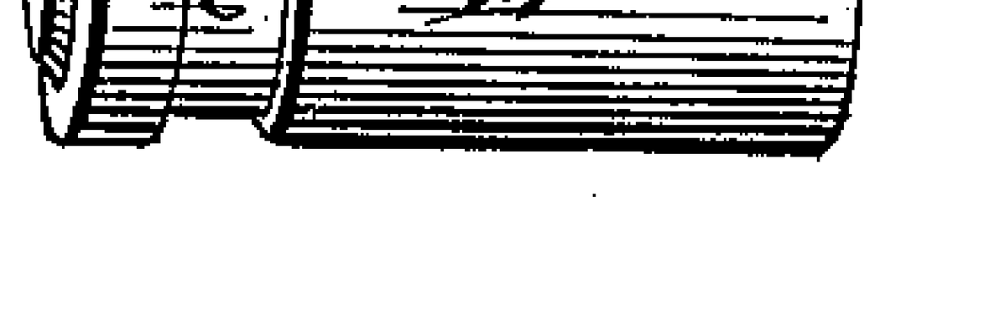


Fig. 11.



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UNITED STATES PATENT OFFICE.

HENRY BREITENSTEIN, OF LARAMIE, WYOMING.

PNEUMATIC HAMMER.

SPECIFICATION forming part of Letters Patent No. 614,160, dated November 15, 1898.

Application filed July 6, 1896. Serial No. 598,142. (No model.)

To all whom it may concern:

Be it known that I, HENRY BREITENSTEIN, a citizen of the United States, residing at Laramie, in the county of Albany, State of Wyoming, have invented a new and useful Improvement in Pneumatic Hammers, of which the following is a specification.

My invention relates to improvements in pneumatic hammers; and it primarily has for its object to provide a simple and inexpensive mechanism easily operated and very effective for the desired purpose.

With other objects in view, which will appear hereinafter, the invention consists in novel features of construction and detail combination of parts such as will be first described in detail and then specifically pointed out in the appended claims, reference being had to the accompanying drawings, in which—

Figure 1 is a perspective view of the hammer. Fig. 2 is a longitudinal section through the center of the entire machine. Fig. 3 is a cross-section at Z Z, Fig. 2. Fig. 4 is a cross-section at X X, Fig. 2. Fig. 5 is an elevation of the valve-bushing. Fig. 6 is a section of the valve-bushing at V V, Fig. 5. Fig. 7 is a sectional plan at O O, Fig. 6. Fig. 8 is a sectional plan at Y Y, Fig. 6. Fig. 9 is a sectional plan at W W, Fig. 5. Fig. 10 is a perspective view of the valve. Fig. 11 is a perspective view of the hammer or piston.

Referring by reference characters to the drawings, Fig. 1 represents the casing or shell, which is composed of A, B, and C. A is the part containing the hammer E. B is the valve-chamber, containing the valve-bush G G′ and the valve F F′. C is the handle.

In Fig. 2, D is the cylinder-bore, in which the hammer E moves back and forth. H is the valve-chamber cap. I is the tool-holder or cylinder-cap, and J is the tool.

I need not confine myself to this style of cylinder. The type of cylinders known as the "differential," with pistons of varying diameters, may in some cases be used to advantage.

Air is admitted under constant pressure through the passage *a* in handle C, entering valve-chamber B and valve-bush G′ through port *b*. The valve F F′ operates over the inlet-port *b′* in valve-bush G′ and over inlet-port *f* and exhaust-port *i* in valve-bush G.

The operation is as follows: When the piston E is in the position shown in Fig. 2, there is communication with open air between valve exhaust-port *d″* and valve-chamber B through duct *c*, port *d*, groove *e* in piston or hammer E, port *d′*, duct *c′*, and valve exhaust-port *d″*. The part of valve F′ being of larger diameter than the part of valve F, it will be held in this position until the hammer E is forced forward in cylinder D by the motive agent entering inlet-port *b′* in valve-bush G′ and port *b″* in valve-chamber B in line with port *b′* until the back of hammer E opens the port *d*, when the fluid-pressure will enter the valve-chamber B over the top of valve F′, through port *d* and duct *c*, when, owing to the varying diameters of valve F′ F, as above described, it will be moved downward to its lowermost travel to bevel-seat in valve-bush G, closing exhaust-port *i* and opening the inlet-port *f* in valve-bush G, which leads to front of cylinder D through port *f*, ducts *h g*, and port *f′*, admitting the fluid-pressure to front of cylinder D. At the same time the groove *k* in valve F′ is brought in register with port *b′ b″*, allowing pressure in back of cylinder D to escape through ports *b″ b′*, groove *k*, and holes *k″*, through center of valve F′ F, which is made hollow, as shown by dotted lines in Fig. 10, and out of opening *k′* in valve-bush G. With the tool J inserted in tool-holder I and held against the object to be operated upon, as will be hereinafter more fully described, the hammer E will be moved back, thereby fully opening the port *f′*, allowing the motive agent to force hammer E backward to its farthermost travel, when the groove *e* in hammer E will open the ports *d′ d*, allowing the fluid-pressure that held valve F′ F down to exhaust from valve-chamber B and over top of valve F′, through the duct *c*, port *d*, groove *e* in hammer E, port *d′*, duct *c′*, and valve exhaust-port *d″*. The valve F′ being of greater area than the part of valve F, it will be moved upward against the valve-chamber cap H, again opening the inlet-port *b′ b″* and exhaust-port *i* and closing the inlet-port *f* in valve-bush G, allowing the operation to be repeated.

The external grooves *l l′ l″* and drilled holes *m m′ m″* in valve-bush G G′ are used to get larger area of port-openings with the shortest possible travel of valve F F′.

In using the hammer the tool J is inserted in the tool-holder I and held in one hand, while the handle C is held with the other.

I have so arranged this invention that it is automatic without the use of throttle or controlling valve to regulate the amount of air-pressure admitted to valve-bush G G′ and cylinder D through inlet-ports b' b'' and f, making it the more easy to operate.

To use the tool, the operation is as follows: Hold the handle C in one hand. With the other insert the tool J in tool-holder I and place it against the object to be operated on. A slight pressure on handle C will move the hammer E backward, allowing the fluid-pressure to be admitted through the full opening of port f', through duct g h and port f, moving the hammer E backward to its farthermost travel, when air-pressure over the valve F′ in valve-chamber B will exhaust through duct c, port d, groove e in hammer E, port d', duct c', and valve exhaust-port d''. The valve F F′ will now be moved upward against the valve-chamber cap H, closing inlet-port f and exhaust-opening through groove k, holes k'' in hollow valve F F′ and opening the exhaust-port i in valve-bush G, allowing pressure in front of cylinder D to escape through port f', ducts g h, port i, and opening k' in valve-bush G.

The tool J extends through tool-holder I one-quarter inch. The travel of hammer is regulated by the ports d d'. If now the operator desires to strike a light blow or vary the blow of hammer E against tool J, he can easily do so by grasping tool J and tool-holder I with the hand that tool J is held by, allowing the hammer E to move the tool J part way out of tool-holder I, varying pressure on handle C with the other hand, and holding it in this position, thereby regulating force of blow of hammer E against the tool J from a very light blow to the full force of hammer by holding the tool J with pressure on handle C sufficient to hold it so it will extend one-quarter inch through tool-holder I. Letting the hammer E and the pressure from cylinder D move the tool J out one-quarter inch or more, the hammer E will continue its movement back and forth in cylinder D without striking the tool-holder I or the back wall of cylinder D, the ports d' d being so arranged as to give the hammer E the necessary clearance. To stop the hammer E, withdraw the tool J. The hammer E will now move forward against the opening in tool-holder I. The valve F F′ will move downward far enough to just cover inlet-port b' b'' and not far enough to open communication to opening k' in valve-bush G through hollow valve F F′, and holes k'', groove k in valve F′. Should the valve F F′ be moved farther downward, pressure from over top of valve F′ will escape through duct c, port d into cylinder D, and out of cylinder D through ports b'' b', groove k, holes k'' in valve F′, out of opening k' through hollow valve F F′, when it will be quickly moved upward again far enough to establish an equilibrium over inlet-port b', and remain at rest in this position until tool J is inserted in tool-holder I, placed against the object to be operated on, as described above.

I am aware that others stop the movement of hammer or piston by removing the tool from tool-holder by placing additional ducts and ports in wall of cylinder and valve-chamber that are otherwise unnecessary for the operation of the hammer or piston and valve. I am further aware that they also regulate the force of the blow of hammer or piston against tool with the intervention of throttle or controlling valves. All of which I do not use, yet I obtain the same results.

I do not know of any device of this kind made automatic simply by the parts necessary to operate the hammer or piston E and valve F F′, as I have described my device above.

Having thus described the nature of this invention and the manner of carrying it into practical effect, I claim—

1. The combination of the casing A, B, and C, in one piece, with the hammer E in cylinder D, valve F F′, ducts c c' and g ports d, d', d'', and f' passage, a, in handle C ports b, b'', in valve-chamber B, ports b', f, i, duct h and opening k', in valve-bush G, G′, cap H, tool-holder I, tool J, all substantially as set forth.

2. In a pneumatic tool, the combination of the hollow valve F, F′, with annular groove k, and holes k'', controlled by hammer E which operates over ports in wall of casing, or cylinder A, substantially as shown and described.

3. The valve-bush G G′, with external annular grooves l l' l'', holes m m' m'', the bevel-seat to regulate travel of valve, and opening k', adapted to correspond with ports in valve-chamber, and ducts in cylinder, all substantially as, and for the purpose set forth.

HENRY BREITENSTEIN.

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