(No Model.)

J. MANNING.

PNEUMATIC HAMMER.

No. 574,924. Patented Jan. 12, 1897.

Fig. 1.

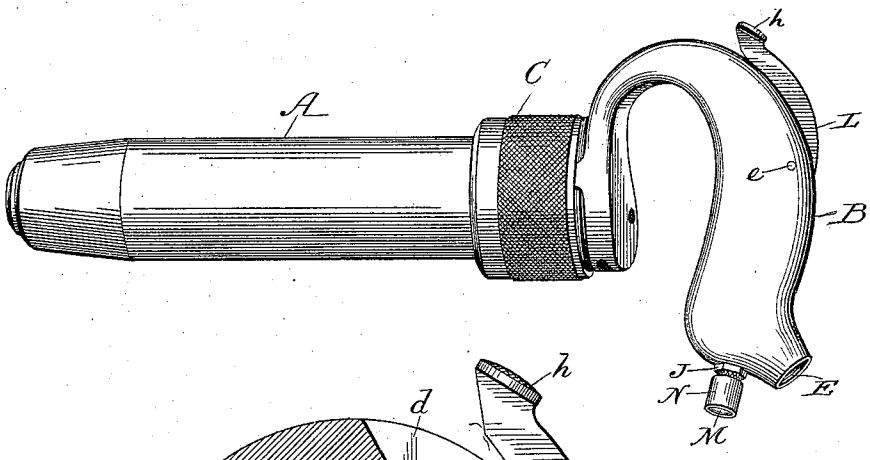
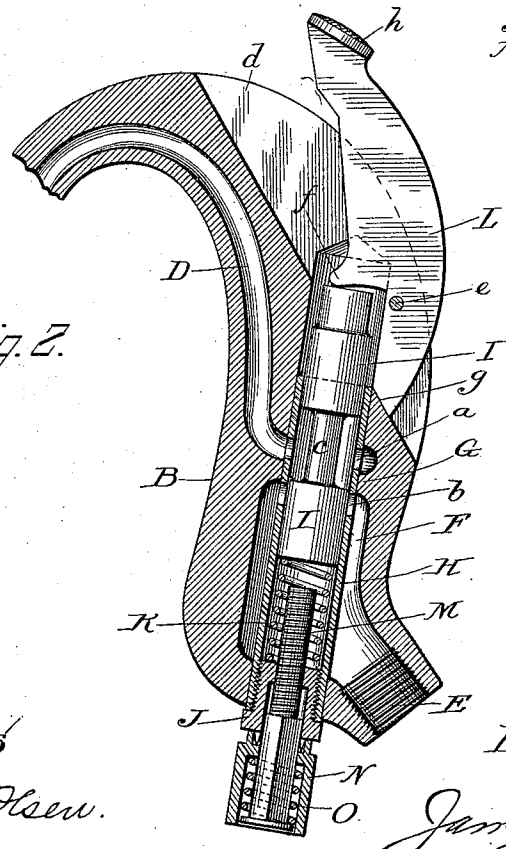


Fig. 2.



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JAMES MANNING, OF OMAHA, NEBRASKA.

PNEUMATIC HAMMER.

SPECIFICATION forming part of Letters Patent No. 574,924, dated January 12, 1897.

Application filed March 23, 1896. Serial No. 584,464. (No model.)

To all whom it may concern:

Be it known that I, JAMES MANNING, a citizen of the United States, residing at Omaha, in the county of Douglas and State of Nebraska, have invented a certain new and useful Improvement in Pneumatic Hammers, of which the following is a description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to pneumatic hand-tools or hammers which are used for cutting and chipping stone and metals, calking boilers, and beading flues, and similar work, and in which a rapidly-reciprocating piston contained within the barrel or cylinder of the machine and operated by compressed air or other motive fluid acts upon or hammers the chisel or other working tool, whose shank is loosely inserted through an opening in one end of the cylinder in position to receive the blows of the piston. The speed and force of the strokes of the piston vary in any given hammer with variations in the pressure of the motive fluid, the piston reciprocating faster and striking harder under a high pressure than under a low one. It often happens in the practical use of the hammers that the same hammer will be used for different classes of work, for some of which harder and more rapid blows of the piston are desirable than for others; and it may also happen that a given hammer may be used for the same class of work under different pressures at different places. The supply of motive fluid admitted to the machine is controlled by a suitable throttle-valve located in a convenient part of the machine, as in the handle, for instance, and operated by the thumb or finger of the workman who holds the hammer. By opening the throttle-valve to a greater or less extent to admit a greater or less supply of motive fluid the speed and force of the strokes of the piston may be regulated to some extent, so that uniformity of stroke under varying pressures or varying strokes under a uniform pressure may be obtained; but in the machines of this class with which I am familiar no means have been provided for regulating the movement of the throttle-valve, so that in the practical use of the machines where they are subjected to the severe vibrations caused by the strokes of the piston and have to be firmly held by the operator it has been found extremely difficult, and to a large extent impossible, for the operator to control the extent of opening movement of the throttle-valve for the purpose mentioned or to steadily maintain it in any partly-open position, with the result that while the tool is in use the throttle-valve is held open to its full limit and the full supply of motive fluid admitted to the machine.

My invention has for its object the provision of means for regulating the extent of movement of the throttle-valve, so that the operator may adjust the parts to admit any desired proportion of the full supply of motive fluid to the machine, and consequently regulate the pressure thereof within the machine and the speed and force of the strokes of the piston under its action. To this end I provide an adjustable stop coöperating with the throttle-valve to arrest its opening movement at any point desired, so as to admit any proportion of the full supply of motive fluid from the minimum to the maximum quantity.

I have illustrated my invention as applied to a familiar form of pneumatic hammer, such as shown in Letters Patent of the United States No. 549,102, issued to Joseph Boyer, in which hammer the inlet-passage for the motive fluid extends through the grasping-handle of the machine and in which the reciprocating throttle-valve is interposed in said passage and held in position to close the passage by the action of a spring and adapted to be pressed in the opposite direction to open the passage by a lever or thumb-piece projecting into convenient reach of the operator's thumb or fingers, all as will be explained in connection with the accompanying drawings, in which—

Figure 1 is a view in approximately side elevation of the one of the pneumatic hammers above referred to, while Fig. 2 is a middle vertical section of the handle thereof.

In Fig. 1 of said drawings, A represents the cylinder or barrel of the machine, which contains the reciprocating piston; B, the handle of the machine, and C the coupling by which

the handle is secured to the barrel and within which is located the automatic valve which controls the admission of the motive fluid to and its exhaust from the piston-chamber.

D is the air inlet or passage, extending entirely through the handle B, communicating at one end with the valve-chamber within the coupling C and opening at its opposite end through the lower end of the handle by a threaded opening E, adapted to receive the nipple to which the usual flexible tube conveying the motive fluid to the machine is attached. The air-inlet D in the lower part of the handle is enlarged in the present instance to form a chamber F, which is separated from the upper portion of the inlet by a transverse partition or diaphragm G. Extending upward through the handle from its bottom and intersecting this diaphragm G is a cylindrical bore in which is tightly fitted a tubular casing H, having ports *a*, opening into the upper portion of the inlet D above the diaphragm, and ports *b*, opening into its lower position or chamber F beneath the diaphragm.

Fitting within the tubular casing H is the reciprocating valve I, consisting in the present instance of two cylindrical heads or ends closely fitting the bore or casing and a reduced middle portion or waist *c*. The lower end of the valve-casing H is closed by a screw-plug J, confined between which and the lower end of the valve I is a coiled spring K, which presses the valve upward and yieldingly holds it in the normal position shown, in which position its lower end or head entirely closes the ports *b* and thereby cuts off the admission of the motive fluid to the machine. The upper part of the handle has in it a narrow slit or saw cut *d*, in which fits the operating-lever L for the throttle-valve, said lever being pivoted at *e* and provided with a shoulder or projection *f*, which bears upon the upper end of the valve I. The contact of the extreme lower end of the lever L with the bottom of the slit *d* at *g* limits the movement of the lever under the action of the spring K and serves as a stop to limit the upward movement of the valve. The upper portion of the lever L projects outside the slit *d* and is provided upon its end with a thumb-piece *h*, by pressing upon which the lever may be rocked on its pivot and its upper end forced down into the slit *d*, causing its shoulder *f* to press the valve I downward against the resistance of the spring K and open the ports *b* to admit the motive fluid to the machine. Upon releasing the lever L the spring K will immediately reset the parts and close the valve.

So much of the construction as has been above described is substantially the same as that illustrated in the Boyer patent above mentioned; but with nothing more than this it is extremely difficult for the operator to regulate the opening movement of the valve, or to open it to any position less than full-open position and maintain it in such intermediate position while the tool is in operation, with the result that in the practical use of such a tool, particularly in the larger sizes where the vibration is greatest, the operator is obliged to open the valve to its full extent and hold it in such fully-open position, thereby admitting the full supply of the motive fluid to the machine at all times and causing the piston to reciprocate with a maximum speed and force.

For the purpose of enabling the valve to be opened to any degree desired and to be readily maintained in such partly-open position during the operation of the machine I have provided the adjustable stop before mentioned for limiting the downward or opening movement of the valve I under the pressure applied to the operating-lever L. In the particular form shown this adjustable stop consists of a screw M, which is passed through a threaded opening in the screw-plug J, which closes the lower end of the valve-casing H, said screw passing upward within the spring K into position for its upper end to stand in the path of movement of the lower end of the valve I. By turning this screw in one direction or the other its upper end may be raised or lowered to arrest the downward movement of the valve at different points, and thus regulate the opening movement thereof and the amount of motive fluid admitted to the machine. To facilitate the adjustment of the screw M for this purpose and to hold it in its different adjusted positions, the lower half of the screw is made square in cross-section and has fitted on it a cylindrical thumb-piece N, whose upper end or head is provided with a squared opening fitting the squared head of the screw M, and within which is confined a coiled spring O, bearing at its lower end against the flanged lower end of the head of the screw M and at its upper end against the head of the thumb-piece N and acting to constantly press the latter upward.

The screw-plug J is provided with a cylindrical recess or bore of sufficient diameter to receive the upper end of the squared portion of the screw M and permit it to freely turn therein. The lower end of the screw-plug J and the upper end of the thumb-piece N have coöperating clutch-teeth formed upon them, the engagement of which, when the thumb-piece is in its normal upper position, will prevent said thumb-piece and consequently the screw M from turning. When it is desired to adjust the screw M, it is merely necessary to grasp the thumb-piece N and pull it downward slightly against the resistance of the spring O to disengage the clutch-teeth, and then turn it in the desired direction. Upon releasing the thumb-piece, after the screw has been adjusted as desired, the spring O will throw it upward again and reëngage the clutch-teeth, and the screw M be thus securely held in its adjusted position, and loosening or displacement of it by the vibration and jars of the ma-

chine when in operation, or by contact of anything with its lower end, effectively prevented.

By the employment of my invention upon a machine of this character it is possible to so adjust the throttle-valve that without any care upon the part of the operator while using the machine the desired character of stroke of the piston may be attained and steadily maintained under the various conditions mentioned. Thus if a given tool is being used at one place under sixty pounds pressure and it is desired to use it for the same sort of work at another place where the pressure is eighty or a hundred pounds, by adjusting the stop so that the throttle-valve can be opened only a certain distance the machine may be used under the higher pressure with substantially the same action of the piston as under the lower pressure. So, too, if it is desired to use a given tool for several different classes of work, in some of which it is necessary or advantageous to have hard and rapid blows of the piston, while in others slower and easier blows are desirable, the throttle-valve may be so adjusted in changing the machine from one class of work to the other that under the same initial pressure of the motive fluid the desired actions of the piston may be readily obtained. By this means the admission of the motive fluid may be so regulated that the piston may be run at any desired rate of speed, from one slow enough to permit the reciprocations to be counted up to a maximum speed of several thousand strokes per minute, and the same tool be thus adapted for effective work under widely-varying conditions.

Having thus fully described my invention, I claim—

1. In a pneumatic hammer having an inlet-passage for the admission of the motive fluid, the combination, with the throttle-valve controlling said passage and the spring pressing said valve in one direction to close it, of an adjustable stop for limiting the movement of the valve in the opposite direction, and means for holding the stop in its different adjusted positions, substantially as and for the purpose described.

2. In a pneumatic hammer having the inlet-passage for the admission of the motive fluid extending through the handle, the combination, with the throttle-valve located in the handle for controlling said passage, a spring pressing said valve in one direction to close it, means for moving the valve in the opposite direction to open it, an adjustable stop for arresting the valve at different points in its opening movement, and means for holding the stop in its different adjusted positions, substantially as and for the purpose described.

3. In a pneumatic hammer having an inlet-passage for the admission of the motive fluid, the combination, with a reciprocating throttle-valve for controlling said passage, and means pressing said valve in one direction to close it, of an adjustable stop-screw arranged to limit the movement of the valve in the opposite direction, and means for positively but releasably holding the stop-screw in its different adjusted positions, substantially as described.

4. In a pneumatic hammer having an inlet-passage for the admission of the motive fluid, the combination, with a reciprocating throttle-valve for controlling said passage, and means pressing said valve in one direction to close it, of an adjustable stop-screw arranged to limit the movement of the valve in the opposite direction, a clutch member turning with the screw and coöperating with a fixed clutch member, and a spring for maintaining said clutch members in engagement, substantially as described.

5. In a pneumatic hammer having an inlet-passage for the admission of the motive fluid, the combination, with a reciprocating throttle-valve for controlling said passage and means pressing said valve in one direction to close it, of an adjustable stop-screw arranged to limit the movement of the valve in the opposite direction, a thumb-piece turning with the screw and having clutch-teeth formed upon it and coöperating with fixed clutch-teeth upon the hammer, and a spring for pressing the clutch-teeth upon the thumb-piece into engagement with the clutch-teeth upon the hammer, substantially as described.

6. In a pneumatic hammer, the combination of the handle B having the inlet-passage D extending through it, the throttle-valve chamber intersecting said passage, the reciprocating throttle-valve I located in said chamber, the spring K pressing said valve in one direction to close it and the lever L for moving it in the opposite direction to open it, the adjustable stop-screw M passed through a threaded opening in one end of the valve-chamber and projecting into the path of the valve, the thumb-piece N mounted upon and turning with the screw M and having clutch-teeth engaging fixed clutch-teeth at the end of the valve-chamber, and the spring O acting upon the thumb-piece N to maintain the engagement of said clutch-teeth, substantially as described.

7. In a pneumatic hammer, the combination of the handle B having the inlet-passage D extending through it, said passage being separated into two portions by the diaphragm G, the bore intersecting both portions of said passage and extending through the diaphragm G, the valve-casing H fitting in said bore and provided with the ports *a* and *b* communicating with said passage on opposite sides of the diaphragm G, the valve I in the valve-casing H, the plug J closing the lower end of the valve-casing, the spring K confined between said plug and the valve I and yieldingly holding the valve in closed position, the lever L pivoted in the slot *d* and

acting upon the upper end of the valve to depress and open it, the screw M having the threaded portion passing through a threaded opening in the plug J and projecting into the path of the valve L and having the squared lower portion extending below the plug J, the thumb-piece N fitting upon the squared portion of the screw M and provided on its upper end with the clutch-teeth coöperating with clutch-teeth upon the lower end of the plug J, and the spring O surrounding the squared head of the screw M within the thumb-piece N, substantially as described.

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Witnesses:
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