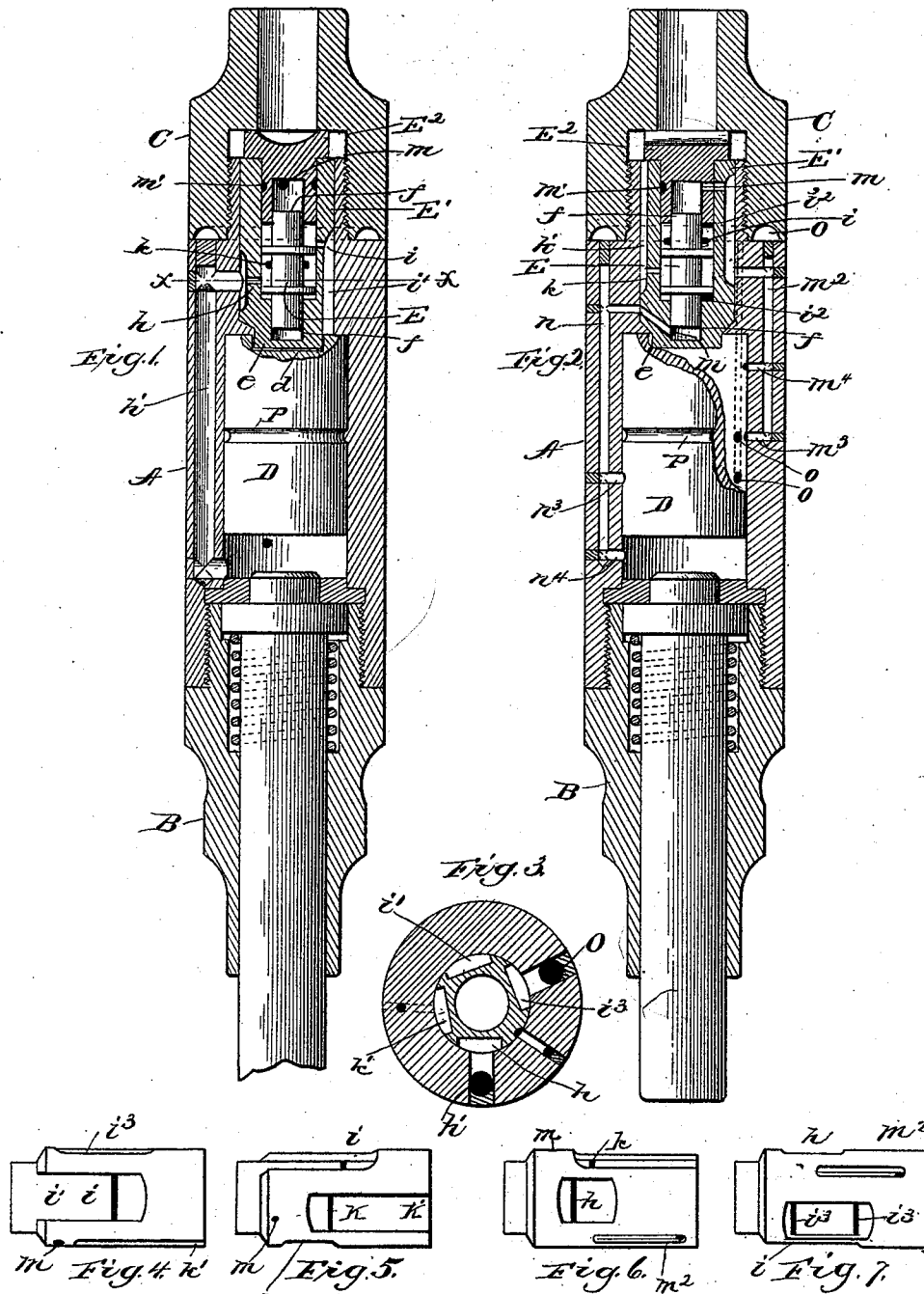


(No Model.)

D. DRAWBAUGH.
PNEUMATIC TOOL.

No. 530,934.

Patented Dec. 18, 1894.



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PNEUMATIC TOOL.

SPECIFICATION forming part of Letters Patent No. 530,934, dated December 18, 1894.

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To all whom it may concern:

Be it known that I, DANIEL DRAWBAUGH, of Eberly's Mill, in the county of Cumberland and State of Pennsylvania, have invented certain new and useful Improvements in Pneumatic Tools; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the letters of reference marked thereon.

This invention relates to improvements in pneumatic tools for use in carving stone, repoussé work, &c., and consists in certain novel details of construction and combinations and arrangements of parts, all as will be now described and pointed out particularly in the appended claims.

Referring to the accompanying drawings: Figure 1 is a longitudinal section through a tool embodying the present improvements. Fig. 2 is a similar view showing the ports and passages for carrying the compressed air for operating the valve, the beater being partially broken away. Fig. 3 is a cross section on the line $x-x$, Fig. 1. Figs. 4, 5, 6 and 7 are elevations of the valve casing showing all the ports.

Like letters of reference in the several figures indicate the same parts.

The tool in the present instance as formerly, is preferably formed with an integral body casing lettered A in the drawings to which is fitted the nose piece B for the reception of the tool stock or tool, and a cap piece C to which the pressure supply connection is made, the interior of these parts being cored and bored out for the reception of the working parts.

If reference be had to my prior patent, No. 472,495, it will be seen that the beater and valve are arranged in alignment and in the present tool this arrangement is preferably preserved, the letter, D indicating the beater and E the valve, this latter being mounted in a valve casing E' made separate from and inserted in the body casing. The opening between the cylinder or that part of the casing in which the beater works and the chamber for the valve casing is relatively large, and

the valve casing itself is provided with an elongated end e which passes through into the cylinder and is adapted to fit into a recess d in the rear end of the beater with sufficient accuracy to form a cushion to arrest the beater on its rearward movement.

The chamber in which the valve works is formed with an enlarged central portion and reduced ends, usually by boring the upper end of the valve casing of proper diameter for the enlarged central portion, then boring the reduced lower portion and finally fitting a plug E^2 in the upper end, having a reduced cavity therein corresponding to the lower portion of the chamber. Obviously, this chamber may be formed in other ways, it only being essential that it be formed for the reception of a valve having reduced ends f and large central flanges for controlling the air and exhaust ports leading to and from the cylinder for operating the beater. These last ports and passages are quite similar to those heretofore employed, save that the ports are brought more closely together in the valve chamber and consequently the valve needs have only a very short movement. As shown in Fig. 1 the port h opens into a passage h' leading to the lower end of the cylinder and the port i opens into a passage i' formed by cutting out a portion of the valve casing, leading to the upper end of the cylinder. The live air port k is located between the ports h and i and is always open to pressure through the passage k' , Figs. 3 and 5. The exhaust ports i^2 i^2 are located outside of the ports h and i toward each end of the chamber and communicate by passage i^3 with the exhaust port. See Figs. 3 and 7. From this it will be seen, that when the valve is shifted in one direction or the other air will be alternately admitted and exhausted from the ends of the cylinder and the beater will be reciprocated thereby and its blow delivered as it reaches the forward end of its movement on the inner end of the tool stock, which is utilized to operate the chisel or other tool.

The valve it will be particularly observed, is balanced and by reducing the diameter of the ends it is made extremely light requiring little air to operate it with the greatest ra-

pidity and at the same time, its vibrations are not felt in the practical running of the tool.

The ports for admitting air to shift the valve, enter at the ends of the reduced portions of the chamber at $m m$. At the upper end the port is formed in the plug, the latter being externally grooved at m' to register in any position with the passage m^2 leading down through the casing wall to the cylinder where it terminates in two ports $m^3 m^4$, the former in position to be covered at all times by the beater, and the latter in position to be uncovered just as or slightly before the beater reaches the lower end of its stroke, thereby admitting pressure from the upper end of the cylinder to the upper end of the valve, shifting the latter and consequently setting the main air ports to reverse the beater.

The lower port m of the valve chamber opens into passage n similar to passage m^2 only extending down to the lower end of the cylinder, where it terminates in ports n^3 and n^4 arranged similar to the ports m^3 and m^4 . The ports m^3 and n^3 it will be observed from Fig. 2 are located a distance apart corresponding approximately to the length of the stroke of the beater, or more properly in transverse planes this distance apart, inasmuch as the position of the passages and ports around the casing is quite immaterial, and exhaust ports $o o$ are located in the same planes and in communication with the main exhaust passage O . The beater has simply one central circumferential groove P , therein, which, when the beater is at the upper extremity of its stroke connects the port m^3 and one of the exhaust ports and when at the opposite end of its stroke connects the port n^3 and one of the exhaust ports.

It is desirable that the ports be so arranged that the exhaust takes place from one end of the valve as pressure is admitted at the opposite end, but it will be understood that the specific location of the ports shown is not essential, inasmuch as it may be desirable to change the instant of cut off and admission according as it is desired to deliver an elastic or a dead blow on the tool or its stock, such changes being within the skill of any mechanic having an understanding of steam engineering.

The beater in the present form of tool, it will be observed is practically solid, no cutting or forming of chambers therein being required, save for the very small groove passage and the cushion chamber at the rear end.

By forming the cushion chamber in the beater itself with this construction, the air may be compressed therein to any degree or a sufficient degree to arrest the beater and what is of equal importance the air port opening at the end of the beater prevents the beater from itself cutting off the air supply.

Having thus described my invention, what I claim as new is—

1. In a pneumatic tool, the combination

with the casing bored out longitudinally to form the cylinder and valve casing chamber opening into the same and the beater recessed at one end, of the valve casing having the air passage leading to the upper end of the cylinder channeled in one side and having its lower end at one side of said channel projecting into the cylinder for cooperation with the recess in the beater to form an air cushion and a valve in said valve casing; substantially as described.

2. In a pneumatic tool, the combination with the casing bored out longitudinally to form the communicating cylinder and valve casing chamber with an intermediate reduced portion or seat cut away at one side, the beater working in the cylinder and having the cylindrical recess in its rear end, of the valve casing fitting in the valve chamber and having the reduced forward end projecting into the cylinder for entering the recess in the beater to form an air cushion and the air passage channeled therein at one side of said reduced portion and the valve working in the valve casing for controlling the beater; substantially as described.

3. In a pneumatic tool, the combination with the casing containing the cylinder and the beater, of the valve casing having the chamber therein formed with the reduced lower end, the plug fitting in said chamber having the reduced opening therein forming part of the chamber, and the valve for controlling the beater, having the reduced ends working in the reduced portions of the chamber formed in the valve casing and plug respectively; substantially as described.

4. In a pneumatic tool, the combination with the casing and beater working therein, of the valve casing having ports and passages registering with ports and passages in the main casing for transmitting pressure to control the beater and valve respectively, a plug fitting in the valve casing having a passage therein for the transmission of pressure to one end of the valve and an external groove for registering with a passage in the valve casing, whereby the plug does not have to be adjusted with relation to said passage; substantially as described.

5. In a pneumatic tool, the combination with the casing having the cylinder and pressure actuated valve, of the beater having the circumferential groove extending around the same, passages leading from opposite ends of the valve to the cylinder and terminating in ports located in different transverse planes, and exhaust ports located in substantially the same transverse planes as the ports to the passages leading to opposite ends of the valve, whereby the groove in the beater will connect the ports located in the same planes when at opposite extremes of its movement; substantially as described.

6. In a pneumatic tool, the combination with the casing having the cylinder and pressure actuated valve, of the beater having the

circumferential groove extending around the same, passages leading from opposite ends of the valve to the cylinder and terminating in ports m^3 m^4 and n^3 n^4 , all of said ports being located in different transverse planes with the ports m^3 and n^3 so located as to be covered by the beater at all times and to register alternately with the circumferential groove therein and exhaust ports located in substantially the same transverse planes as the ports m^3 and n^3 whereby communication is alternately opened between said last men-

tioned ports and the exhaust ports, said ports m^4 and n^4 being so located that they will be uncovered respectively as the beater reaches the opposite extreme of its movement allowing pressure to pass to opposite ends of the valve; substantially as described.

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