

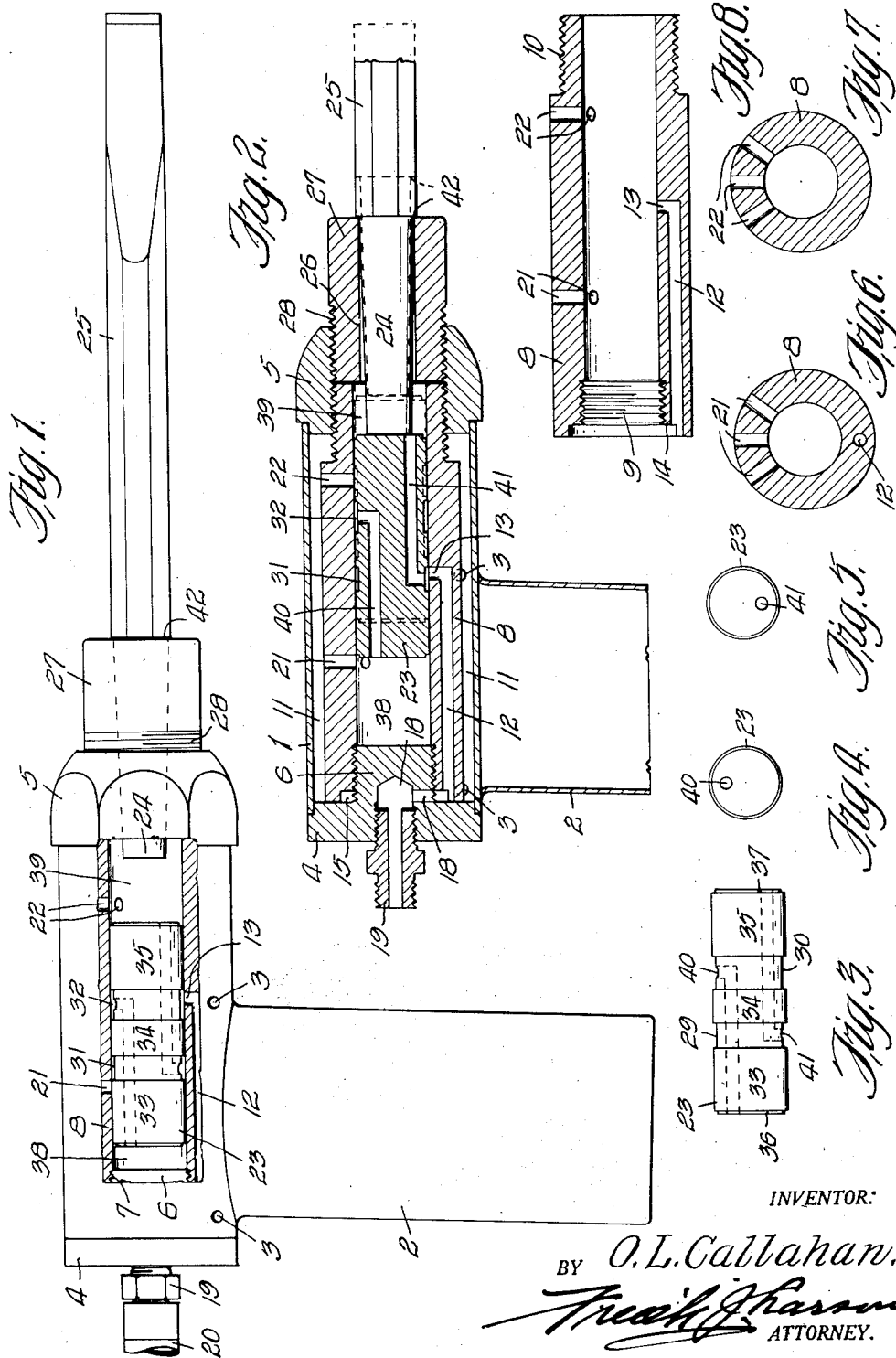
Dec. 19, 1933.

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1,940,388

PNEUMATIC HAND TOOL

Filed April 30, 1932



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UNITED STATES PATENT OFFICE

1,940,388

PNEUMATIC HAND TOOL

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Application April 30, 1932. Serial No. 608,471

3 Claims. (Cl. 121-17)

This invention relates to pneumatic hand tools, and, it is a distinct and practical improvement to overcome certain practical objections to, and defects in tools of like character.

5 The object of my invention is to provide a pneumatic hand tool which operates by means of a rapid succession of blows against a cutting, gouging, drilling and similar tool.

10 A further object of the invention is the provision of a tool of the class mentioned, wherein the impact may be readily varied from light to heavy, or any intermediate stage, and wherein the impact can be readily stopped without the manipulating of a trigger.

15 A further object of the invention is the provision of a simplified form of reciprocating member for the tool.

20 A still further object of the invention is the provision of a pneumatic hand tool, which possesses advantages in points of simplicity and efficiency, and, at the same time proves itself comparatively inexpensive in cost of manufacture.

25 With the above and other objects in view, the invention consists in the novel features of construction, arrangement and combination of parts hereinafter more fully described and finally pointed out in the claims hereto appended.

30 Referring to the accompanying drawing forming a part of this specification, wherein like characters of reference denote similar parts throughout the several views:

35 Fig. 1 is a side elevation of my improved tool, showing a part of the casing as broken away, a part of the cylinder in cross section, the reciprocating member being shown in its back stroke position.

40 Fig. 2 is a central longitudinal sectional view of the tool embodying my invention, the reciprocating member being shown in its power stroke position.

Fig. 3 is a side elevation of the reciprocating member.

45 Fig. 4 is a view looking at one end of the reciprocating member.

Fig. 5 is a view looking at the opposite end of the reciprocating member.

50 Fig. 6 is a transverse sectional view of the cylinder taken through one set of exhaust ports.

Fig. 7 is a transverse sectional view of the cylinder taken through the other set of exhaust ports.

Fig. 8 is a central longitudinal sectional view of the cylinder.

55 In carrying out the aim of my invention, I employ a suitable tubular casing member 1 from

which depends a suitable handle 2 by means of which the tool is gripped with one hand. The casing member 1 is provided with a plurality of air outlets, or exhaust openings 3 adjacent the upper end of the handle 2. The cylindrical casing member 1 is held in position and supported by and between a suitable end cap 4 and a nut 5.

The cap 4 is provided with a central stud 6 provided with external screw threads 7 with which one end of a cylinder 8, which is internally screw threaded, as at 9, is screw threadedly connected. The opposite end of the cylinder 8 is reduced in diameter and provided with screw threads 10 and to which the nut 5 is screw threadedly connected for supporting the cylinder 8 centrally of the casing 1. The cylinder 8 is of less diameter than the inside diameter of the casing 1, thus an exhaust chamber 11 is formed completely around the cylinder 8. The wall of the cylinder 8 is provided with a longitudinal opening 12 which extends from the outer end of the cylinder 8 which engages the cap 4, to a point approximately midway the ends of the cylinder where it joins a transverse inlet port opening 13, which port opening is open to the bore of the cylinder 8. The outer end of the opening 12 joins with a recess 14 in the outer end face of the cylinder 8 and forms an annular chamber 15 around the screw threaded stud 6 of the cap 4. The chamber 15 is open to one end of a transverse opening 17 in the cap stud 6, the opposite end of which opening 17 is open to an internally screw threaded bore 18 central of the cap and stud and into which is screw threadedly connected a suitable fitting 19 to which an air hose 20 is suitably connected and which leads from a suitable source of air supply under pressure. The source of supply is not shown.

The wall of the cylinder 8 opposite the inlet port 13 is provided with two sets of air outlet openings, or exhaust ports, which are designated 21 and 22, respectively. These two sets of exhaust ports are arranged to either side of the inlet port 13 and permits of exhaust from opposite ends of the cylinder, as will be apparent hereinafter.

A suitable cylindrical reciprocating member 23 is mounted within the cylinder 8 and it serves as a hammer, or plunger for successively striking the shank 24 of a suitable mechanic's tool. The shank end 24 of the cutting, gouging, drilling or similar tool 25 is cylindrical and tapered and is supported against lateral displacement in the bore 26 of a suitable tool holder 27, which tool holder is provided with screw threads 110

28, so that the same can be screw threadedly connected with the outer end of the nut 5 and in axial alignment with cylinder 8.

The cylindrical reciprocating member 23 is provided on opposite sides of the mid portion thereof with a pair of peripheral operating grooves designated 29 and 30. These grooves 29 and 30 form annular inlet port areas designated 31 and 32, respectively, when the reciprocating member 23 is mounted in the cylinder 8. The operating grooves 29 and 30 are so spaced on the reciprocating member as to form three body portions 33, 34 and 35, which are of equal diameter. As shown in Figs. 2 and 3 of the drawing, the operating groove 30 is wider than operating groove 29 and the operating groove 30 is of uniform depth throughout its width for prolonging the admission of fluid pressure to one end of the reciprocating member. This causes greater force to be applied on the rear end of the reciprocating member in its power stroke than to the forward end of the reciprocating member on the return stroke. The extremities of the reciprocating member 23 are preferably, for highest efficiency, slightly reduced in diameter for a short distance only, as at 36 and 37. End 37 of the reciprocating member 23 is the striking end thereof, as is manifest.

The reciprocating member 23 when mounted in the cylinder 8 due to its length relative to the length of the cylinder bore, divides the cylinder 8 into two end chambers designated 38 and 39.

The reciprocating member 23 is provided with a pair of suitable combined transverse and longitudinally disposed air passages, or openings designated 40 and 41. The inner transverse end of opening 40 is open to the peripheral groove 29 of the reciprocating member 23 and the port area 31, while the outer end of the longitudinal portion of the opening 40 is open to end 36 of the reciprocating member 23 and to the end chamber 38 of the cylinder 8. The inner transverse end of opening 41 is open to the peripheral groove 30 of the reciprocating member 23 and the port area 32, while the outer end of the longitudinal section of the opening 41 is open to the end 37 of the reciprocating member 23 and the end chamber 39 of the cylinder 8.

When the tool 25 is manually held in the position as shown in full lines in Fig. 2, so that the shoulder 42 of the tool 25 is in contact with the tool holder 27, the port area 31 around the reciprocating member 23 will register with the inlet port 13 of the cylinder 8 permitting air under pressure to pass through passage 41 and enter the end cylinder chamber 39 causing the reciprocating member or hammer 23 to be moved to the left until the end 36 of the hammer passes or closes the exhaust ports 21 thereby releasing the air from cylinder chamber 39 through exhaust ports 22.

Now, just prior to the opening of the exhaust ports 22, the ported area 32 around the reciprocating member 23 will register with the inlet port 13 of the cylinder 8 permitting air under pressure to enter the passage 40 of the reciprocating member 23 and enter the end cylinder chamber 38, thereby forcing the reciprocating member 23 to the right in a hammer blow against the inner end of the cutting or similar tool 25 until the ported area 31 around the reciprocating member 23 again registers with the inlet port 13 to again admit air to the end chamber 39 of the cylinder 8. Simultaneously with the

ported area 31 again registering with the port 13, the air in the end chamber 38 of cylinder 8 is exhausted through the exhaust ports 31 of the cylinder 8. The alternate opening and closing of the inlet port 13 with the ported areas 31 and 32 around the reciprocating member 23 will set up rapid reciprocation of the hammer or reciprocating member 23, thus imparting successive blows to the inner end of the cutting or similar tool 25, as is manifest.

The length of the stroke of the reciprocating member or hammer 23 can be regulated by the distance the shank end 24 of the cutting or similar tool 25 enters the end chamber 39 of the cylinder 8.

When it is desired to stop reciprocation of the hammer 23, the tool shank 24 is extracted from the cylinder chamber 39 just sufficient to permit the ported area 31 around the reciprocating member 23 to pass the inlet port 13 in the power stroke of the hammer 23. Thus, the tool shank 24 will act as a valve and cut off any possible admission of air into the cylinder chamber 39 to return the hammer 23 to its left hand position, as shown in dotted lines in Fig. 2.

From the foregoing description, it is apparent that I have designated a pneumatic hand tool which is simple in construction, highly efficient in operation, easily operated, readily assembled and disassembled, and the provision of a device with which many kinds and styles of tools can be employed for use in shops, or other places, for cutting metal, gouging holes in metal, brick, concrete, plaster and similar materials and for other purposes too numerous to mention.

The many advantages of the herein described invention will readily suggest themselves to those skilled in the art to which it appertains.

From the foregoing description, it is evident that a simple device for this purpose has been disclosed, but it is to be understood that I do not desire to restrict, or limit myself to the very details of the construction shown and described, which is merely illustrative, it being obvious that changes, not involving the exercise of invention, may be made without conflicting or departing from the spirit of the invention within the scope of the appended claims.

What I claim is:

1. An air hammer having, in combination, a barrel provided with a single fluid inlet and two sets of fluid outlets, an apertured plug connected to one end of the barrel, said barrel having its end wall adjacent the plug provided with a recess to provide an annular fluid passage around the plug for communication with the fluid inlet, an elongated piston mounted within the barrel, two spaced operating grooves extending circumferentially around said piston, one of said operating grooves being wider than the other operating groove and of uniform depth throughout its width, a port leading from narrower operating groove to the front wall of the piston and a port leading from the wider groove to the rear wall of the piston for prolonging the admission of fluid to the cylinder to the rear end of the piston to apply greater force to the piston in its power stroke than during its return stroke.

2. An air hammer having in combination, a cylinder, a piston reciprocably mounted in the cylinder, a single fluid inlet for the cylinder disposed approximately midway the ends thereof, two sets of fluid outlets disposed adjacent the end walls of the piston when in its extreme end positions within the cylinder, said piston having

- two annular operating grooves in spaced relation on opposite sides of the midway section of the piston, one of said operating grooves being wider than the other operating groove and of uniform depth throughout its width, said piston having two ports with their outer orifices in the end walls of the piston and their inner orifices in their respective operating grooves and the port having its inner orifice in the wider operating groove being directed to the rear of the piston so that the admission of fluid into the cylinder to the rear end of the piston is prolonged to effect greater force on the piston in its power stroke than on its return stroke.
3. An air hammer having, in combination, a cylinder, an impact member reciprocably mounted in the cylinder, a single fluid inlet for the cylinder, spaced fluid outlets adjacent the ends of the cylinder adapted to be opened and closed by the ends of the impact member moving past the outlets during reciprocating movements of the impact member, two spaced operating grooves extending circumferentially around said impact member, one of said operating grooves being wider than the other operating groove, a conduit leading from each operating groove to opposite end walls of the impact member and the conduit leading from the wider operating groove communicating with the rear end of the cylinder so as to prolong the admission of fluid under pressure from the single fluid inlet into the rear end of the cylinder to build up greater fluid pressure behind the impact member in its power stroke than during its return stroke.
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