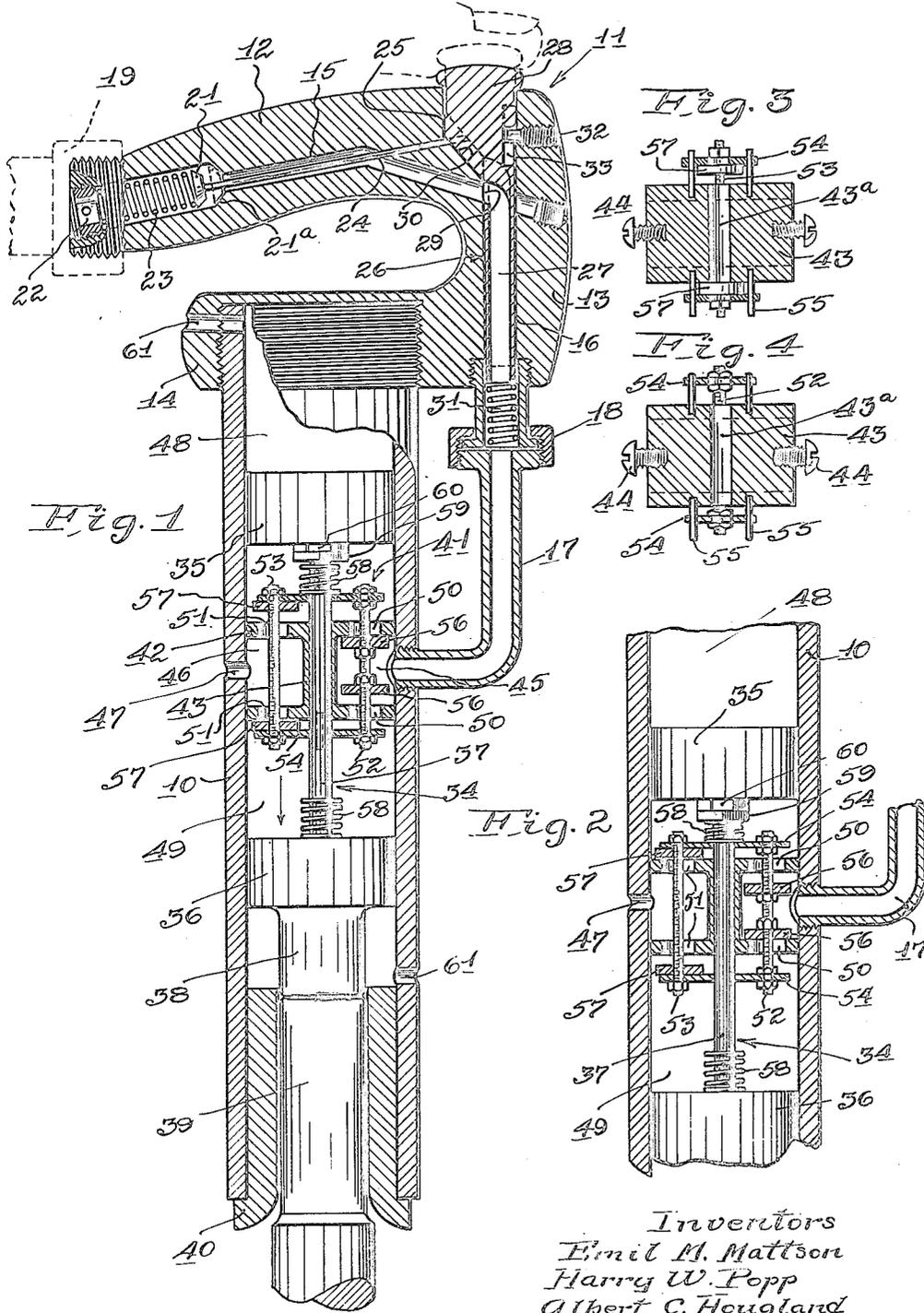


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E. M. MATTSON ET AL.
PNEUMATIC HAMMER.
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UNITED STATES PATENT OFFICE.

EMIL M. MATTSON AND HARRY W. POPP, OF MINNEAPOLIS, AND ALBERT C. HOUGLAND, OF ST. PAUL, MINNESOTA, ASSIGNORS, BY MESNE ASSIGNMENTS, TO JOHN L. CRUMP, OF ST. PAUL, MINNESOTA.

PNEUMATIC HAMMER.

Application filed September 22, 1919. Serial No. 325,339.

To all whom it may concern:

Be it known that we, EMIL M. MATTSON and HARRY W. POPP, citizens of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, and ALBERT C. HOUGLAND, citizen of the United States, residing at St. Paul, in the county of Ramsey and State of Minnesota, have invented a new and useful Improvement in Pneumatic Hammers, of which the following is a specification.

Our invention relates to improvements in pneumatic hammers.

Its object is to provide a tool of this kind having improvements, particularly in the reversing mechanism and in the construction of the valved air inlet.

With these and other objects in view, which will appear in the following description, the invention resides in the novel combination and arrangement of parts and in the details of construction hereinafter described and claimed.

In the drawings, Fig. 1 is a central sectional view of our improved pneumatic hammer, showing the compound piston in its downward course; Fig. 2 is a fragmentary central sectional view thereof showing said piston at the end of its downward course and Figs. 3 and 4 are detail sectional views of the reversing-valve, which is actuated by said piston.

Referring to the drawings, we have used the reference numeral 10 to indicate the barrel of the hammer. A handle 11 therefor comprises a grip 12, a neck 13 and a head 14, the latter having a bore into which the upper end of the barrel 10 is threaded. An air conduit 15 opening at the end of the grip is inclined upward to a point midway of said grip, then downward to intersect a bore 16 passing through the neck 13. A pipe 17 including a union 18 leads from the lower end of the bore 16 to the middle of the barrel 10 and completes the air-passageway from the end of the grip 12 to said barrel; said end of the grip is threaded externally to receive the usual air hose connection 19. Within this end of the grip 12,

the air-passageway is enlarged. A beveled seat 21^a is formed at the inner end of this enlargement and the outer end thereof is threaded to receive an externally threaded ring or stop 22. A valve-head 21 is yieldingly held against the seat 21^a by means of a compression spring 23 interposed between said valve head 21 and stop 22. A stem 24 on said valve head through the upwardly inclined portion of the conduit 15 and is slidably mounted in the grip, the end of said stem projecting into an enlargement 25 of the bore 16. A thumb-valve 26 slidable within the bore 16, consists of a hollow stem 27 and a thumb-piece 28. The stem 27 fits closely in the bore 16 and is formed with a port 29 adapted to register with the conduit 15, when the thumb-valve 26 is depressed. The thumb-piece 28 fits closely in the enlargement 25 and is formed with a cam surface 30, which engages the end of the valve stem 24. The lower end of the stem 27 abuts against a compression spring 31 enclosed within the union 18 and is normally held by said spring in such position that the port 29 is removed from registration with the conduit 15 and the cam surface 30 so positioned that the valve 21 is seated by the action of the spring 23. A stop pin 32 threaded in the handle 11 and projecting into the recess 33 in the thumb-piece 28 limits the movement of the thumb-valve 26. It will be seen that when said thumb-valve is in normal position, the conduit 15 is obstructed by valve head 21 and also by the stem 27 of the thumb-valve. When it is desired to admit air to the barrel 10, the thumb-piece 28 is depressed. In this movement, the cam surface 30 engages the valve stem 24 and unseats the valve head 21 against the action of the spring 23. The port 29 in the stem 27 is also brought into registration with the conduit 15, thus opening the passageway from the end of the grip 12 to the interior of the barrel 10. Slidable within said barrel is a compound piston 34, comprising spaced piston heads 35 and 36 mounted upon a common piston

rod 37, the latter or lower piston head being supplied with a tappet 38 adapted to strike a tool 39 or other object slidably mounted in a bushing 40 secured within the lower end of the barrel 10. We place an improved reversing-valve 41 within the barrel 10 to direct the incoming air alternately against said piston heads 35 and 36, whereby the piston 34 is rapidly reciprocated, thus causing repeated impacts between the tappet 38 and the tool or other object fitted within the end of the hammer. The reversing-valve 41 includes a valve cage having two spaced discs 42 joined by a diametrical web 43. This valve cage is fixed within the barrel 10 by means of screws 44 passing through the wall of the barrel and into the web 43 and said valve cage is so located that the pipe 17 opens into the inlet chamber 45 formed between the discs 42, web 43 and the adjacent inner wall of the barrel. An exhaust chamber 46 on the opposite side of the web 43 opens into the outer air through a port 47 in the side of the barrel. The web 43 has a bore 43^a therein to receive the piston rod 37. The piston head 35 works in the cylinder 48 above the upper disc 42, while the other piston head 36 works in the cylinder 49 beneath the lower disk 42. Inlet openings 50 in the discs are formed in alignment and communicate with the inlet chamber 45. Aligned exhaust openings 51 in said discs communicate with the exhaust chamber 46 in the valve cage. Valve stems 52 and 53 passing through these aligned openings are joined at their ends by cross links 54, which are perforated to slidably receive the piston rod 37 and also guide pins 55 secured at their ends in the discs 42. Valve heads 56 threaded on the valve stem 52, within the inlet chamber 45 are designed to alternately open and close the openings 50 and valve heads 57 threaded on the valve stem 53, outside of the valve cage, are designed to alternately open and close the openings 51. Said inlet valves 56 and exhaust valves 57 are fixed upon the valve stems 52 and 53 in such relative positions that an intake opening in one disc is closed simultaneously with the exhaust opening in the other disc, or, in other words, the inlet opening to one cylinder is unobstructed simultaneously with the uncovering of the exhaust opening for the other cylinder, coiled springs 58 encircling the piston rod 37 and located between the valve cage and piston heads alternately strike the cross links 54, thus shifting the valve stems and changing the course of air from one cylinder to the other.

We provide simple and effective means, whereby the stroke of the piston 34 may be increased or diminished. That portion of the valve stem 37 adjacent to the upper

piston head 35 is threaded and supplied with an adjusting nut 59 and a lock nut 60. These nuts are interposed between the piston head 35 and the adjacent spring 58 and the adjustment thereof causes the impact of the spring 58 with the upper cross link 54 earlier or later in the stroke of the piston, as may be desired. Thus it will be seen that the working stroke of the piston may be readily regulated to suit various conditions.

Ports 61 at the extremity of the cylinders 48 and 49 are formed to permit the entry and escape of air into and from cylinders, behind the pistons 35 and 36.

In operation, the thumb-piece 28 is depressed (Fig. 1), air being admitted through the conduit 15, valve stem 27 and pipe 17 to the inlet chamber 45 of the reversing-valve 41. Said air then passes through an inlet opening 50, then unobstructed, into the communicating cylinder and forces the piston head therein to such position wherein 58 adjacent the opposite piston head strikes a cross link 54 and shifts the valves within the valve cage. This movement of the valves causes the incoming air to be directed into the opposite cylinder, against the piston head therein, thus reversing the movement of the piston. Upon the working stroke of said piston (Fig. 1), the tappet 38 propels the tool 39, which is fitted within the end of the hammer and yieldingly held therein by pressure against the work. The spent air between the valve cage and the piston head approaching said valve cage escapes through the port 47 into the outer air. Pressure of the air against the seated inlet valves 56 holds the valve stems against movement by gravity.

Changes in the specific form of our invention, as herein disclosed, and various adaptations thereof may be made within the scope of what is claimed, without departing from the spirit of our invention.

Having described our invention, what we claim as new and desire to protect by Letters Patent is:

In a device of the class described, the combination of a barrel having an air-passage leading thereto, a handle on the barrel, a compound piston in the barrel, comprising two spaced piston heads mounted on a common piston rod, a reversing-valve in the barrel, between said piston heads, said reversing-valve including a cage having an inlet chamber communicating with said air-passage and an outlet chamber communicating with the outer air, openings leading from said inlet and exhaust chambers into the cylinders on opposite sides thereof, valve stems slidable in said cage, cross links rigidly connecting said valve stems, valves on said stems for closing said open-

ings, said valves being arranged so that the inlet opening to one cylinder is unobstructed simultaneously with the uncovering of the exhaust opening in the other cylinder, springs interposed between the piston heads and said cross-links for alternately actuating said valve stems and an adjusting nut threaded on the piston rod

between one of the piston heads and the adjacent actuating spring, as and for the purposes described. 10

In testimony whereof, we have signed our names to this specification.

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