

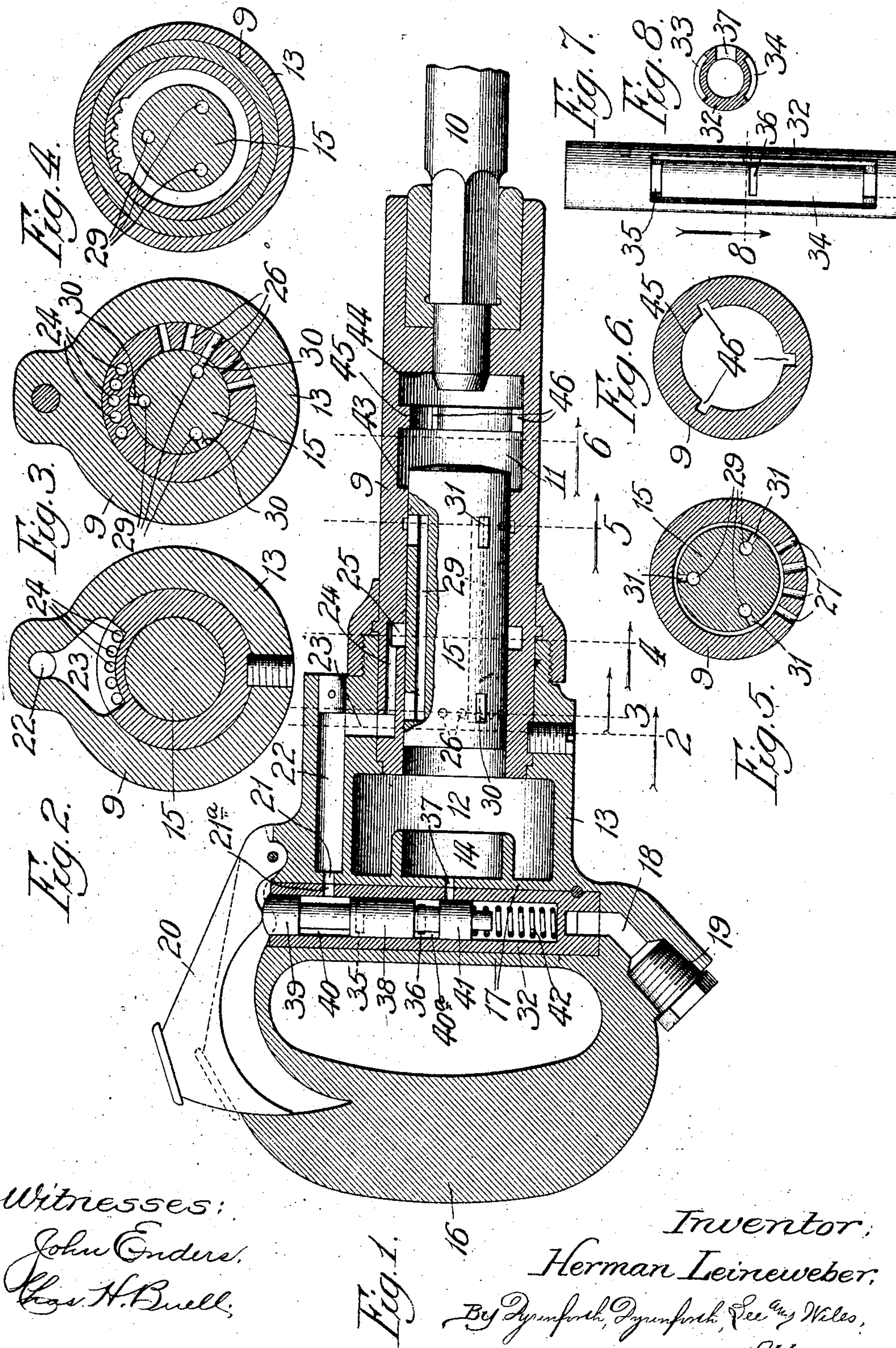
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PATENTED DEC. 4, 1906.

H. LEINEWEBER.

PNEUMATIC TOOL.

APPLICATION FILED AUG. 27, 1906.



Witnesses:
John Enders.
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Fig. 1.

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UNITED STATES PATENT OFFICE.

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PNEUMATIC TOOL.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, HERMAN LEINEWEBER, a citizen of the United States, residing at South Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Pneumatic Tools, of which the following is a specification.

My invention relates to improvement in the class of valveless pneumatic tools employing a reciprocating piston-hammer actuated against the tool proper by air-pressure centrally introduced alternately against the ends of the piston by way of air-chambers provided at its opposite ends in the casing.

The primary object of my invention is to overcome a defect in tools of the class referred to, which consists in the tendency of the piston, when the tool is laid aside or its operation is interrupted, to attain the "dead-point" in the casing, which renders the starting of its operation more or less difficult. This tendency is due to practically unavoidable leakage past the piston of air-pressure between the aforesaid air-chambers, whereby the pressure becomes equalized in both chambers, causing the piston to seek the midway or dead-point position between them.

A further object of my invention is to improve the implement in the matter of a guide detail for the reciprocating piston to reduce to the minimum the wear upon it, and accordingly the extent of leakage past it from wear.

Referring to the accompanying drawings, Figure 1 is a longitudinal section of a pneumatic tool embodying my invention. Figs. 2, 3, 4, 5, and 6 are sections taken, respectively, at the lines 2, 3, 4, 5, and 6 on Fig. 1 and viewed as indicated by arrows; Fig. 7, a view in elevation of the duct containing bushing for the valve which controls the admission of air-pressure to the tool, and Fig. 8 a section taken at the line 8 on Fig. 7 and viewed in the direction of the arrow.

The casing 9 has inserted into one end the desired tool proper, 10, shown broken, and contains the air-chambers 11 and 12 in its opposite end portions, part of the casing shown being the hollow head 13, forming the larger chamber 12 and provided on its outer closed end with a central hollow boss 14 for cushioning the back stroke of the piston 15.

and the tool-handle 16 is on this head. A housing 17 is formed to extend diametrically across the closed end of the head portion 13 of the casing adjacent to the handle and terminates at one end in a restricted extension 18, communicating with the nipple 19, to which is attachable the usual flexible tube (not shown) for supplying the operating air-pressure to the implement.

Near the opposite end of the housing 17, adjacent to which is fulcrumed the thumb-lever or trigger 20, is provided a port 21 in the chamber-wall, registering with an air-passage 22, formed longitudinally in the wall of the casing-head and which is closed at its forward end, adjacent to which it is expanded inwardly to form the lateral extension 23, which leads to and covers a plurality of air-inlet passages 24, extending longitudinally in the casing-wall to an annular pressure-feeding chamber 25, formed about the interior of said wall. A series of exhaust-ports 26 (shown as five in number) radiate through the casing-wall near the chamber 12, and similar exhaust-ports 27, of which four are shown, are provided in the casing near the chamber 11. The piston 15, which reciprocates between the boss 14 and the stem of the tool 10, is closed at both ends and contains a desired number of ducts 29, each terminating at its opposite ends, respectively, in lateral openings 30 and 31 in the piston near its ends.

The parts thus far described present no features of novelty, but afford a desirable, though not the only construction, with which to employ my improvements hereinafter described.

In the housing 17 is rigidly confined a tubular bushing 32, open at its end nearest the lever 20, but closed at its opposite end, except for two grooves 33 34, formed longitudinally in opposite sides of its wall to produce with the wall of the surrounding housing (of which the bushing forms a lining and is to all intents and purposes a part) air-ducts communicating at one end with the nipple 19 and terminating at their opposite ends in ports 35, formed through the bushing to connect the ducts with the interior thereof, and similar ports 36 extend transversely from the ducts through the walls of the bushing beyond the center of the boss 14, adjacent to a port 37, provided at said center in the bush-

ing-wall and opening into the pressure-chamber 12. Another port 21^a is provided in the wall of the bushing at a point to register with the port 21. Within the bushing is reciprocally confined a spring-pressed closely-fitting solid cylindrical valve 38, having a head 39 adjacent to the trigger 20, a circumferential recess 40 adjacent to that head, a head 41 on its opposite end against which its controlling-spring 42 is confined, and adjacent to the last-named head 41 a circumferential recess 40^a, normally registering with the ports 36.

To operate the tool, supposing the piston to be in its most advanced position to start with, pressure on the trigger 20 moves the valve 38 against the resistance of the spring with the eventual effect of registering the recess 40 with the ports 35, whereby communication is established of the ducts 33 34 with the port 21^a, registering with that recess, and air-pressure may thus pass from the ducts through the ports 21^a and 21, passage 22, and passage 24 into the feeding-chamber 25 to enter the rear ends of the piston-ducts 29 and passing through the latter reach the chamber 11 for driving the piston backward, whereupon the pressure-feed from the chamber 25, then registering with the forward ends of the piston-ducts, passes through the latter into the chamber 12 to exert the force for driving the piston forward. As the piston clears the exhaust-ports near its opposite ends the pressure exhausts from the adjacent chamber 11 or 12, as the case may be. Should the piston, however, occupy the central dead-point position referred to, it must to be operated be preparatorily actuated to the end of its stroke, else, obviously, the pressure-supply from the feeding-chamber 25 to either power-chamber 11 or 12 is closed by the piston. The described valve construction serves to preparatorily drive the piston to the end of its forward stroke, since in moving the valve by manipulating the trigger 20 the recess 40^a is first brought into registration with the port 37, which is in the nature of a supplemental port, since it permits the air-pressure fed to that recess to enter the chamber 12 and supplement the pressure already in that chamber to act against the piston and drive it forward by overcoming the pressure at its impact end in the chamber 11. As in the inward movement of the valve the recess 40^a clears the ports 36 the valve closes them, and the recess 40 is brought into registration with the ports 35 to admit from the ducts 33 34 the pressure to the port 21^a for regularly working the piston. When the operator releases the trigger, the valve resumes under the pressure of the spring 42 the normal position in which it is illustrated.

It will be observed that with the valve 38 in its normal position the ports 36 are nearer the upper end of the recess 40^a, say, by one

thirty-second of an inch, than are the ports 35 to the corresponding end of the recess 40, so that in the inward movement of the valve the ports 36 will be about half closed before the ports 35 are opened, and that the arrangement of parts is such as to simultaneously register the ports 37 and 21^a, respectively, with the recesses 40^a and 40.

About the inner wall of the chamber 11, preferably midway between the shoulder 43 and the bearing 44 for the tool-stem, is formed an annular guide-bearing 45 of a diameter to fit around the piston and provided at intervals with transverse slots 46 to afford communication between the parts of the chamber 11 at its opposite sides when the piston is within the bearing 45. Where the fit of the piston in the section of the casing snugly surrounding it is inaccurate or becomes impaired, the extent of its projection in making the forward stroke beyond the shoulder 43 tends to render it wobbly, with the effect of increasing the wear upon it. This is prevented by the piston working through the guide-bearing, which serves to shorten the space in which it is unsupported in passing through the chamber 11 and to sustain and guide it.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a pneumatic tool, the combination of a casing carrying at one end the tool, a reciprocating piston in the casing, air-chambers in the opposite ends of said casing, between which the piston works, one of said chambers having a supplemental inlet-port communicating with the supply of air-pressure for reciprocating the piston, and a valve controlling said communication, for the purpose set forth.

2. In a pneumatic tool, the combination of a casing carrying at one end the tool, a reciprocable piston in the casing, air-chambers in the opposite ends of said casing, between which the piston works, a housing having a supplemental port leading into the rear end chamber and through which the air-pressure is supplied to said chambers for reciprocating the piston, and a valve in said housing controlling communication therewith through said supplemental port, for the purpose set forth.

3. In a pneumatic tool, the combination of a casing carrying at one end the tool, a reciprocable piston in the casing, air-chambers in the opposite ends of said casing, between which the piston works, a housing on the outer wall of the rear chamber through which the air-pressure is supplied to the chambers for reciprocating the piston, said housing containing a supplemental port through which it communicates with said rear chamber, and a valve in the housing controlling said communication, for the purpose set forth.

4. In a pneumatic tool, the combination of a casing carrying at one end the tool, a reciprocable piston in the casing, air-chambers in the opposite ends of said casing, between which the piston works, a housing extending across the outer wall of the rear chamber and through one end of which the air-pressure is supplied to the chambers for reciprocating the piston, said housing containing a port through which it communicates with said rear chamber, a spring-pressed valve reciprocally confined in the housing and controlling said communication, and a trigger supported on the casing to engage said valve, for the purpose set forth.

5. In a pneumatic tool, the combination of a casing carrying at one end the tool, a reciprocable piston in the casing, air-chambers in the opposite ends of said casing, between which the piston works, a housing extending across the outer wall of the rear chamber and adapted to be connected at one end with the supply of air-pressure to said chambers through the piston, for reciprocating it, said housing containing a longitudinal duct leading from said end and ports at different points along its length connecting said duct with the interior of the housing, ports leading through the housing-wall respectively into said rear chamber and to the passages in the implement through which air-pressure is introduced into said chambers to reciprocate the piston, a spring-pressed valve reciprocally confined in the housing and having recesses to register with said ports leading from the housing through its wall and with the ports leading from said ducts into the interior of the housing, and a trigger supported on the casing to engage said valve, for the purpose set forth.

6. In a pneumatic tool, the combination of a casing carrying at one end the tool, a reciprocating piston in the casing, air-chambers in the opposite ends of said casing, between which the piston works, a housing extending across the outer wall of the rear chamber and adapted to be connected at one end with the supply of air-pressure to said chambers through the piston, for reciprocating it, said housing containing a longitudinal duct leading from said end and ports at different points along its length connecting said duct with the interior of the housing, ports leading through the housing-wall respectively into said rear chamber and to the passages in the implement through which air-pressure is introduced into said chambers to reciprocate the piston, a spring-pressed valve reciprocally confined in the housing and having recesses to register with said ports leading from the housing through its wall and with the ports leading from said ducts into the interior of the housing, and a trigger supported on the casing to engage said valve, for the purpose set forth.

cating piston in the casing, air-chambers in the opposite ends of said casing, between which the piston works, a housing extending across the outer wall of the rear chamber, a bushing in said housing adapted to be connected at one end with the supply of air-pressure to said chambers through the piston for reciprocating it, said bushing containing, in opposite sides, longitudinal grooves forming with the housing ducts leading from said end and containing ports into which said ducts open at different points in the bushing-wall, ports leading through the bushing-wall respectively into said rear chambers and to the passages in the implement through which air-pressure is introduced to said chambers to reciprocate the piston, a spring-pressed cylindrical valve reciprocally confined in the bushing and having recesses to register with said ports leading from the bushing through its wall and with ports leading from said ducts into the interior of the bushing, and a trigger supported on the casing to engage said valve, for the purpose set forth.

7. In a pneumatic tool, the combination of a casing carrying at one end the tool and containing air-chambers in its opposite ends, a piston confined in the casing to be reciprocated therein by air-pressure introduced alternately into said chambers against the piston ends, and a guide-bearing for the piston, consisting of a ring about the inner wall of the casing in the forward chamber between its ends, said ring being slotted to permit communication through it of the parts of the chamber at its opposite sides, for the purpose set forth.

HERMAN LEINEWEBER.

In presence of—

L. HEISLAR,
J. H. LANDES.