

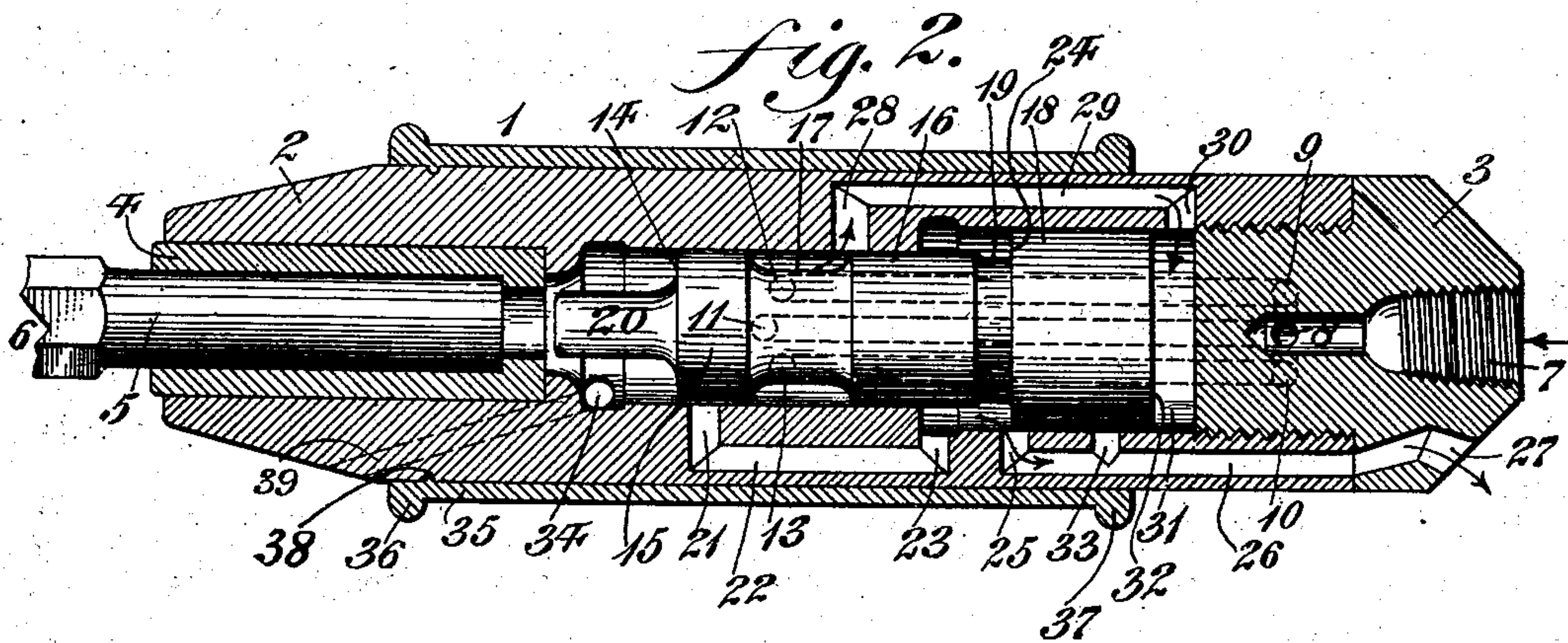
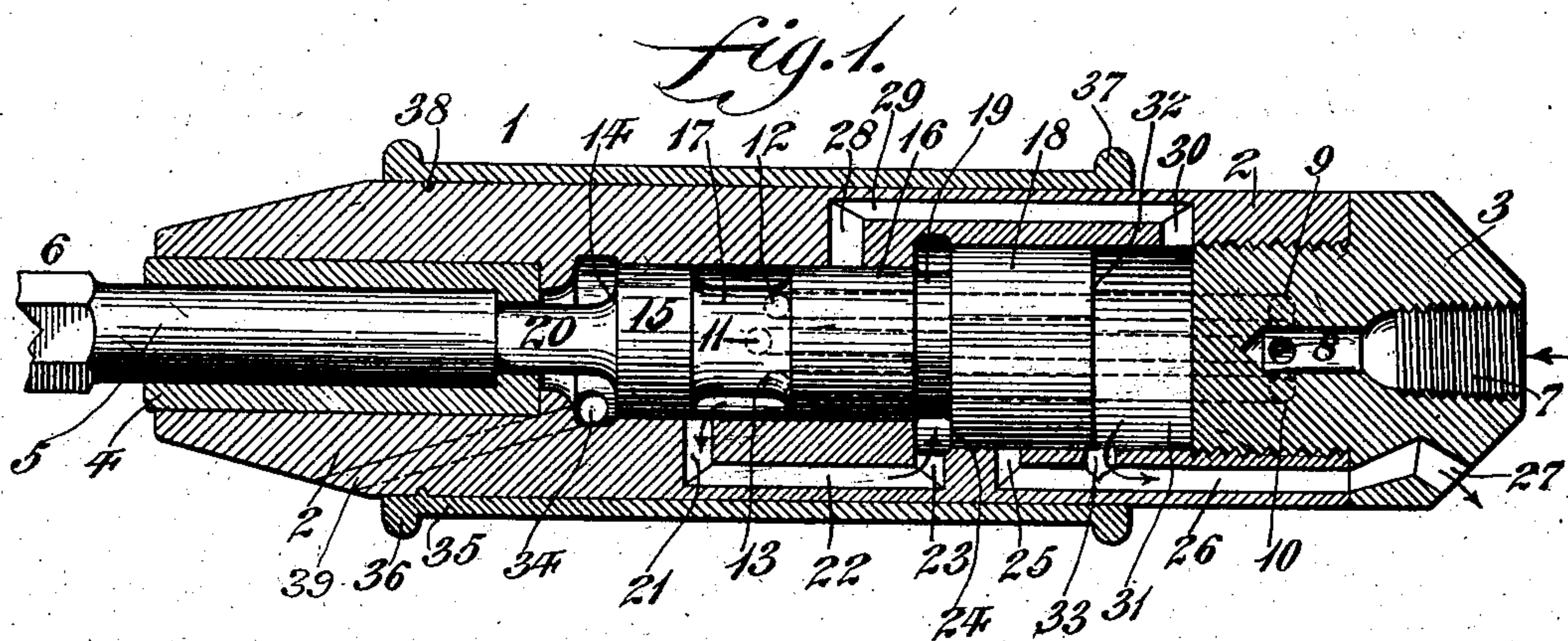
No. 726,074.

PATENTED APR. 21, 1903.

H. G. KOTTEN.
PNEUMATIC TOOL.

APPLICATION FILED JULY 17, 1901.

NO MODEL.



Witnesses

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UNITED STATES PATENT OFFICE.

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PNEUMATIC TOOL.

SPECIFICATION forming part of Letters Patent No. 726,074, dated April 21, 1903.

Application filed July 17, 1901. Serial No. 68,593. (No model.)

To all whom it may concern:

Be it known that I, HERMAN G. KOTTEN, a citizen of the United States, residing in the city, county, and State of New York, have invented a new and useful Improvement in Pneumatic Tools, of which the following is a specification.

My invention consists, broadly, of a valveless pneumatic tool having a differential-diameter piston, wherein means are provided for permitting the pressure to exhaust from the small pressure area of the piston when the latter has made its extreme backward stroke, whereby there will be no cushion on said piston when it delivers its forward blow upon the shank of the chisel or other tool employed.

My invention also consists of the novel arrangement and location of the inlet and exhaust ports and passages common to the cylinder and piston of the tool, whereby said piston is reciprocated and the exhaust therefrom permitted at the proper intervals, so that the piston is caused to strike a full and unobstructed blow upon the chisel at its forward stroke.

It also consists in providing a plurality of inlet ports and passages for the motive fluid and arranging one of the latter so that it will be only partly open when the others are closed, so as to permit the entrance of but a small portion of the motive fluid to effect the return of the piston.

It also consists of a novel construction of a differential piston.

It further consists of novel details of construction, all as will be hereinafter more fully described, and pointed out in the claims.

Figures 1 and 2 represent longitudinal sectional views of a valveless pneumatic tool embodying my invention, showing the piston thereof in its different or extreme positions.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings, 1 designates a pneumatic tool consisting of the cylinder 2, having the inlet-piece 3 and the nose-piece or bushing 4, in which latter is received the shank 5 of the working tool 6.

7 designates the main inlet-port, which communicates with the passages 8, 9, and 10, which discharge into the main inlet-ports 11, 12, and

13, respectively, it being noted that the inlet-port 11 is somewhat lower than the ports 12 and 13.

14 designates the reciprocating differential piston, the same being composed of the heads 15 and 16, which are of substantially the same diameter and are joined by the reduced portion, groove, or neck 17 and the enlarged head 18, which is of greater diameter than said heads 15 and 16, said head 18 being joined to the head 16 by the neck or groove 19, while the opposite extremity of the piston is provided with the striker 20.

It will be seen that the groove 17 forms a chamber between the piston and cylinder, thereby permitting the live air or other motive fluid to enter the port 21 when the ports are in the position seen in Fig. 1, said air flowing through the passage 22 and reëntering the cylinder through the port 23, thereupon acting upon the shoulder 24 and moving the piston 14 toward the inlet-piece 3 or from the position seen in Fig. 1 into the position seen in Fig. 2.

Referring now to Fig. 2, it will be seen that the exhaust-port 25 is opened when the parts are in the position seen therein, whereupon air can exhaust through the passage 26 and port 27 to the atmosphere.

Reference being still had to Fig. 2, it will be seen that the inlet-port 28 being now open through the medium of the groove 17 at the same time when the exhaust-port 25 is opened live air is permitted to enter said port 28 and passes through the passage 29 and port 30 into the chamber 31 and presses upon the large area 32 of the piston, thereby driving the latter toward the tool 6 till the striker 20 impacts against the shank 5 thereof.

When the parts are in the position seen in Fig. 1, the exhaust-port 33 is open, thereby permitting the air to pass therethrough to the passage 26 and exhaust-port 27, while the accumulating air on the front end of the piston will pass through the exhaust-port 34 and passage 39 to the atmosphere.

Since the inlet-port 11 is somewhat lower down or extends farther toward the chisel-bushing than the ports 12 and 13, it will be seen that when the piston 14 is in its extreme left-hand position the inlet-ports 12 and 13 will be closed, while the port 11 will be only

partly open to permit but a small portion of air to enter the port 21 to effect the return of the piston.

35 designates a soft-rubber jacket or grip 5 around the cylinder 2, having the beads 36 and 37 at the ends thereof to prevent the main body of the cylinder from coming in contact with the dust and also to form a shoulder for the hand, said grip being intended to take up the vibration and to insure 10 a firm hold upon the tool, said grip also having the internal bead 38, which is adapted to engage a recess in said cylinder.

The differential-diameter pistons which 15 have been heretofore employed in pneumatic tools with which I am familiar all have the disadvantage that the motive fluid acts on the small pressure area all the time, and consequently when the piston is driven forward by 20 the pressure on the larger pressure area it must overcome the pressure on the small pressure area and will therefore lose some of its power. In my invention, however, it will be seen that these difficulties are over- 25 come, since the pressure will exhaust from the small pressure area when the piston has made its extreme backward stroke, and there is consequently no cushion on said piston when it delivers its blow upon the shank 5 of 30 the chisel, whereby an exceedingly powerful, direct, and unimpeded blow is obtained, as is evident.

It will be apparent that various changes may be made by those skilled in the art 35 which will come within the scope of my invention, and I do not, therefore, desire to be limited in every instance to the exact construction herein shown and described.

Having thus described my invention, what I 40 claim as new, and desire to secure by Letters Patent, is—

1. In a pneumatic tool, a cylinder, a differential piston therein, a plurality of passages for admitting motive fluid to the exterior sur- 45 faces of the differential areas of said piston, and means for permitting the exhaust of the motive fluid from the small pressure area of said piston, when the latter has made its extreme backward stroke, without creating a 50 cushion at the front of said piston when the latter delivers its forward blow to the chisel.

2. In a valveless pneumatic tool, a cylinder, a differential piston therein, means permit- 55 ting admission of but a small portion of the motive fluid to return said piston, and means for permitting the exhaust of the motive fluid from the small pressure area of said piston, when the latter has made its extreme back- 60 ward stroke, without creating a cushion on said piston when the latter delivers its forward blow to the chisel.

3. In a valveless pneumatic tool, a cylinder, a differential-diameter piston therein, ports, 65 and passages extending parallel with the length of the piston common to said cylinder and piston, and means for permitting the exhaust of the motive fluid from the small pres-

sure area of said piston, when the latter has made its extreme backward stroke, without creating a cushion on said piston when it de- 70 liver its forward blow to the shank of the chisel.

4. In a pneumatic tool, a cylinder, a differential-diameter piston therein, a plurality of inlet-passages for the motive fluid, and ports 75 leading from said passages to the interior of said cylinder at different points, whereby when said piston is in one of its extreme positions, only one of said ports will be partly open, so as to permit the admission of but a 80 small portion of the motive fluid to return said piston.

5. In a pneumatic tool, a cylinder, a differential-diameter piston therein, means for per- 85 mitting the exhaust of the motive fluid from the small pressure area of said piston, when the latter has made its extreme backward stroke, a plurality of inlet-passages for the motive fluid, and ports leading from said pas- 90 sages to the interior of said cylinder at different points, whereby when said piston is in one of its extreme positions, only one of said admission-ports will be partly open.

6. In a pneumatic tool, a cylinder, a differential piston therein, having an enlarged head, 95 provided with differential-pressure areas on opposite portions thereof, a smaller head on said piston, a neck uniting said heads, a third head on said piston, a neck uniting said two 100 last-mentioned heads, whereby a chamber constantly open to live motive fluid is formed, means for conducting motive fluid to said pressure areas from said chamber, and means for exhausting said motive fluid from said 105 pressure areas.

7. In a pneumatic tool, a cylinder, a differential piston therein, having an enlarged head, 110 provided with differential-pressure areas on opposite portions thereof, a smaller head on said piston, a neck uniting said heads, a third head on said piston, a neck uniting said two last-mentioned heads, whereby a chamber 115 constantly open to live motive fluid is formed, a striker on the forward end of said piston, means for conducting motive fluid to said pressure areas from said chamber, and means for exhausting said motive fluid from said 120 pressure areas.

8. In a pneumatic tool, a cylinder, a differential piston therein, having an enlarged head 125 provided with differential-pressure areas on opposite portions thereof, a smaller head on said piston, a neck joining said heads, a third head on said piston of the same diameter as said smaller head, a neck uniting said 130 last two mentioned heads whereby a chamber constantly open to live motive fluid is formed, and a plurality of ports discharging into said chamber at different points whereby when said piston is in one of its extreme positions 135 only a portion of one port will be open for the admission of motive fluid to return said piston.

9. The combination with the cylinder of a

pneumatic tool, of a rubber grip incasing said cylinder, beads on the outer extremities of said grip, and an internal bead on said grip, adapted to engage a contiguous recess in said cylinder.

10. A pneumatic tool consisting of a cylinder having inlet-passages therein, a differential piston in said cylinder, a plurality of longitudinal ports 11, 12 and 13 and ports and passages 21, 22 and 23 for conveying live motive fluid to the smaller area of said piston, ports and passages 28, 29 and 30 for conveying motive fluid to the larger area of said piston, and means for permitting the exhaust of the motive fluid from the smaller pressure area of said piston, when the latter has made its backward stroke without creating a cushion at the front of said piston when the latter delivers its forward blow to the tool.

11. A pneumatic tool consisting of a cylinder having inlet-passages therein of different lengths extending parallel with the length of the piston to conduct the motive fluid to the smaller pressure areas of the piston, a differential piston in said cylinder, ports and passages 21, 22 and 23 for conveying live motive fluid to the smaller area of said piston, ports and passages 28, 29 and 30 for conveying motive fluid to the larger area of said piston, and means for permitting the exhaust of the motive fluid from the smaller pressure area of said piston, when the latter has made its backward stroke without creating a cushion at the front of said piston when the latter delivers its forward blow to the tool.

12. In a pneumatic tool, a cylinder, a differential piston therein, a plurality of longitudinal passages of different lengths for admitting motive fluid to the differential areas of said piston, means for permitting the exhaust of the motive fluid from the smaller pressure area of said piston, when the latter has made its extreme backward stroke without creating a cushion at the front of said piston when the latter delivers its forward blow to the chisel, and a head on the forward portion of said piston, adapted to control the flow of motive fluid to the smaller differential area of said piston.

13. In a pneumatic tool, a cylinder, a differential piston therein, a plurality of longitudinal passages of different lengths for admitting motive fluid to the differential areas of said piston, means for permitting the exhaust of the motive fluid from the smaller pressure area of said piston, when the latter has made its extreme backward stroke without creating a cushion at the front of said piston when the latter delivers its forward blow to the chisel, and a head on the forward portion of said piston, adapted to control the flow of motive fluid to the smaller differential area of said piston, in combination with a striker on said last-mentioned head, and a port in advance of the latter leading to the atmosphere.

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Witnesses:

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