(No Model.)

J. BOYER.

PNEUMATIC TOOL.

No. 549,102. Patented Nov. 5, 1895.

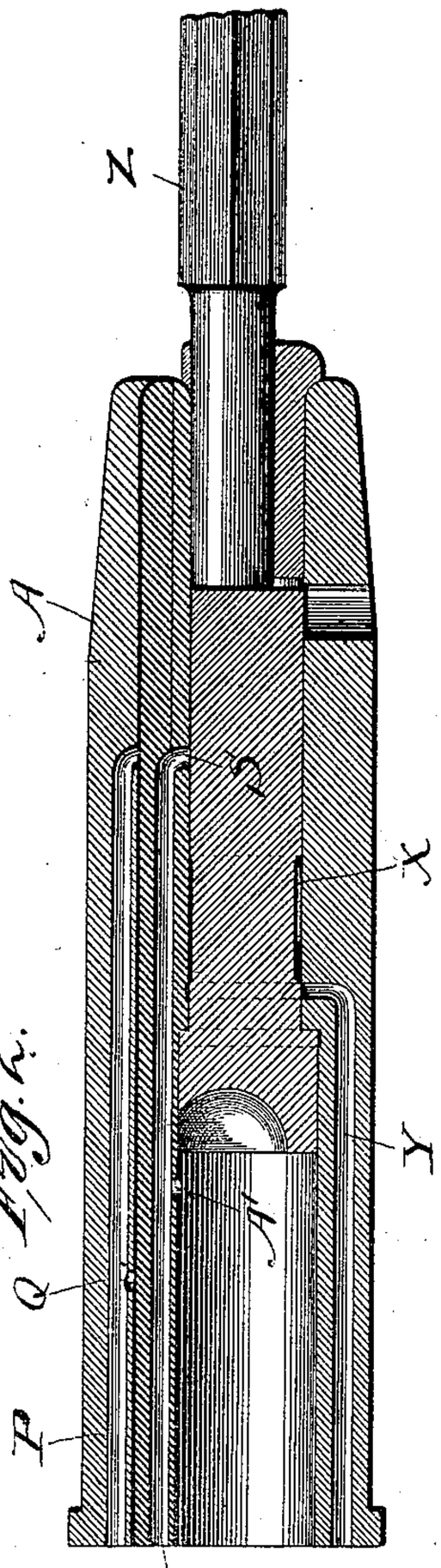

Fig. 2.

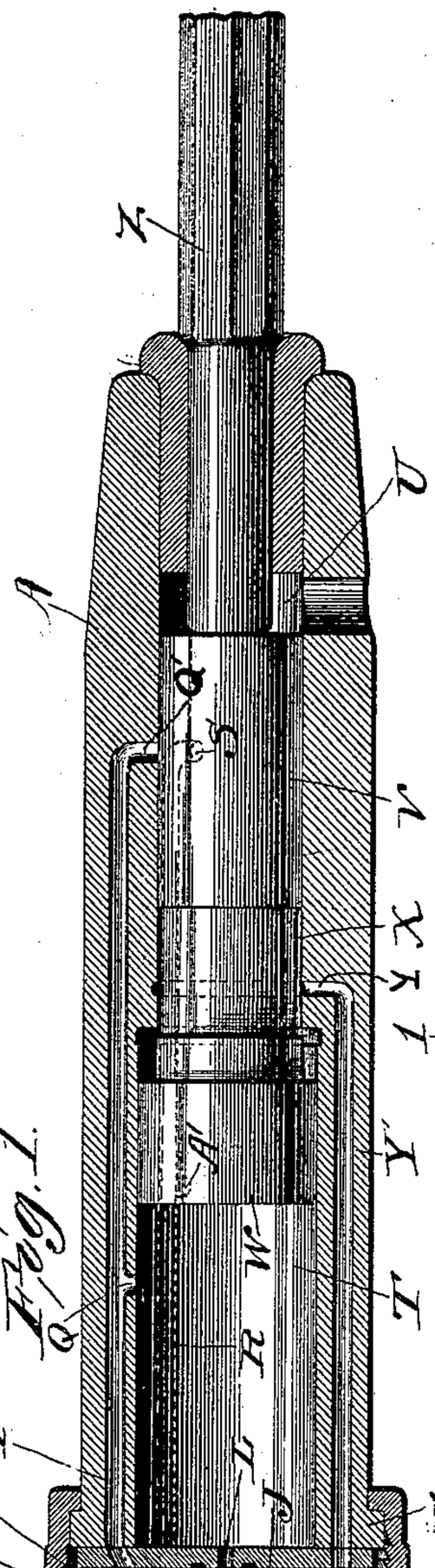

Fig. 1.

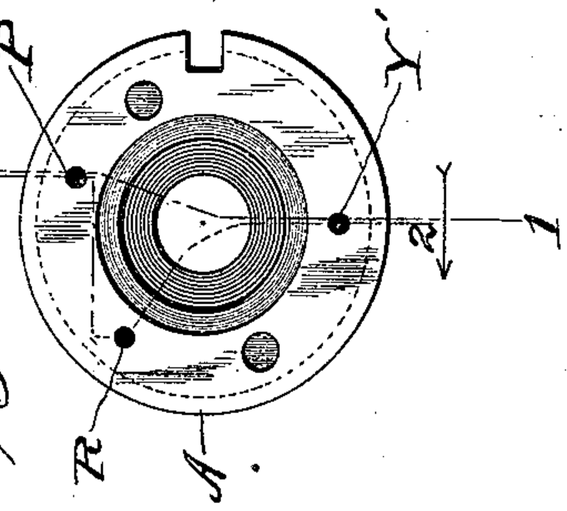

Fig. 3.

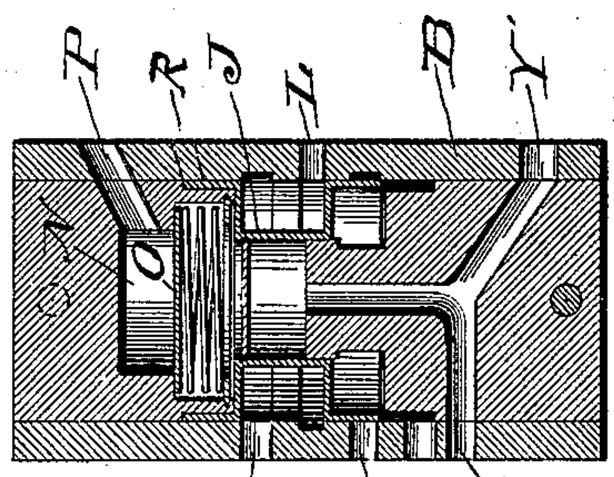

Fig. 4.

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JOSEPH BOYER, OF ST. LOUIS, MISSOURI.

PNEUMATIC TOOL.

SPECIFICATION forming part of Letters Patent No. 549,102, dated November 5, 1895.

Application filed August 10, 1895. Serial No. 558,840. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH BOYER, a citizen of the United States, residing at the city of St. Louis, in the State of Missouri, have invented a certain new and useful Improvement in Pneumatic Tools, of which the following is a description, reference being had to the accompanying drawings, forming part of this specification.

My invention has been illustrated in the accompanying drawings, and will hereinafter be described, as an improvement upon the tool recently patented to me by Letters Patent of the United States, No. 537,629, dated April 16, 1895; but the several features of my invention are not restricted in their utility and application to that or any other particular tool, but may be employed to advantage in widely-differing tools, as will be apparent from the detailed description hereinafter given.

In the accompanying drawings, Figure 1 is a vertical longitudinal section of the complete tool approximately on the line 1 1 of Fig. 3; Fig. 2, a longitudinal section of the piston-chamber and piston approximately on the line 2 2 of Fig. 3; Fig. 3, a view of the rear end of the cylinder or piston-chamber, showing the position of the several ducts in the wall of the cylinder; and Fig. 4 an enlarged vertical section of the valve-chamber and valve with the valve in opposite position from that shown in Fig. 1.

The same letters of reference are used to indicate identical parts in all the figures.

My invention may be said to consist in three features—first, novel means relating to the use of the pressure medium for giving the piston its backward or return stroke; second, in means for causing the tool to be automatically thrown out of operation, even though the pressure-supply is not cut off, whenever the cutting-tool is not in position to receive the blow of the piston, and, third, in a novel throttle-valve for controlling the admission of the pressure-supply.

In the tool of my prior patent above referred to the piston was reset or given its return stroke by means of a coiled spring confined in the front end of the piston-chamber, the pressure-supply being intermittently admitted only to the rear end of said chamber. I have found it undesirable, however, to use such resetting-springs in tools of large size, and in the tool of my present application I employ the pressure medium both for driving the piston forward to deliver its blow and for resetting it, and the feature of my invention relating thereto will be first described.

As in my prior tool, the cylinder or piston-chamber A has fitted against its open rear end a valve-block B, containing a valve-chamber and an automatic valve controlling suitable ports, while fitted against the rear side of said valve-block is a head-block or handle-base C, and the three parts are secured together by means of a coupling-sleeve D, engaging a flange E upon the rear end of the cylinder and screwed at its opposite end upon the head-block C. The block C is formed integral with the grasping-handle F, through which passes the inlet-duct G for the pressure-supply. The automatic valve is substantially the same in construction and operation as that in my prior tool and may be briefly described. The cylindrical valve-chamber formed in the block B is closed at its upper end by a plug H and at its lower end by a plug I, and in the space between these two plugs is confined the waste-valve J. The left-hand or rear wall of the valve-chamber is provided with two ports, the upper being an inlet-port communicating with the pressure-supply duct G and the lower being an exhaust-port communicating with the exhaust-duct K. When the valve is in its lower position, Fig. 1, the inlet-port is closed and the exhaust-port open, and when it is moved to its upper position, Fig. 4, the exhaust is closed and the inlet opened. In both positions of the valve the port L in the front side of the valve-chamber opening into the rear end of the piston-chamber remains open, this port being opposite the waist of the valve throughout the valve's movement. The waist of the valve is closed by a diaphragm at its upper end, forming a chamber fitting over a central vertical extension of the plug I, which closes the lower end of the valve-chamber, and this plug and its extension have passing through them a duct M, communicating with the pressure-supply duct G, so that a constant pressure is admitted to the under side of the valve. The plug H at the upper end of the valve-chamber has formed in its lower side a chamber N, the upper half of which, of smaller diameter than

the lower, is separated from the latter by a thin circular disk O, fitting against the shoulder formed by the enlarged lower half of the chamber and yieldingly held in position by a coiled spring confined in the lower half of the chamber and bearing against the disk. This disk constitutes a check-valve, which will yield to pressure above it and permit such pressure to pass downward into the lower half of the chamber and act upon the upper side of the valve J, and which will serve to confine such pressure in the chamber above the valve J when the supply of pressure is cut off. Communicating with the upper half of the chamber N is a duct P, leading forward through the wall of the piston-chamber and opening into the latter by a port Q, while communicating with the lower half of the chamber N beneath the check-valve is a second duct R, leading forward through the wall of the piston-chamber and opening into the latter by a port at S, this latter duct and port being shown in dotted lines in Fig. 1 and in full lines in Fig. 2. The pressure-supply, when admitted to the upper side of the valve J through the duct P, acts upon a larger area of the valve than does the pressure admitted to the under side of the valve through the duct M and acting upon the diaphragm in the waist of the valve, so that whenever pressure is admitted to the upper side of the valve the pressure against the under side of the valve will be overcome and the valve forced downward to the position in Fig. 1, and as the check-valve O will confine the pressure so admitted to the upper side of the valve the latter will be held in its lower position until the pressure so holding it is permitted to escape through the exhaust-duct R, as hereinafter described, and as also fully explained in my prior patent.

The cylinder or piston-chamber A is bored to form two chambers of different diameters, the rear one T being the larger and the forward one U the smaller. The piston consists of a long body V, fitting in the smaller chamber U, and an enlarged but short head W, fitting in the larger chamber T. A short distance from its front end the body V of the piston is circumferentially grooved or cut away at X to form an annular chamber around it, and communicating with this chamber by a port Y is a duct Y′, connected at its front end to the duct M heretofore referred to, so that pressure is admitted to said annular chamber whenever the latter stands opposite the port Y. This port will be closed body of the piston V at the right of the space X whenever the piston is moved rearward toward its limit of stroke, and will be opened again when the piston is moved forward to deliver a blow to the tool. The pressure so admitted to the space or chamber X will pass into the front end of the large piston-chamber T, except when the piston is moved forward far enough, as hereinafter described, for the body of the piston at the left of the space X to enter the rear end of the small piston-chamber and thereby cut off any connection between the space X and the chamber T, as, for instance, in Fig. 2.

Now the operation of the parts so far described is as follows: In Fig. 1 the piston is shown at nearly its forward limit of stroke, its extreme front end being in contact with the rear end of the cutting or other working tool Z, which is fitted in the front end of the cylinder A, as usual. The valve J is in its lower position, with the inlet-port closed and the exhaust-port open, so that the pressure in the chamber T in rear of the piston is free to escape through the valve-chamber and exhaust duct K. Assuming in Fig. 1 that the piston is still moving forward instead of starting backward, the contact of its front end with the end of the tool Z (the working or cutting end of the latter being in contact with the object being operated upon), will arrest its forward movement, permitting the piston to move very slightly beyond the position shown in Fig. 1. The pressure admitted from the duct Y′, through the port Y and space X, to the front end of the piston-head W will start the piston backward. As soon as the piston has moved far enough for the body of the piston at the right of the space X to pass and close the port Y, as before described, the admission of pressure to the front end of the chamber T will be cut off, so that the further rearward movement of the piston to its limit of stroke will be caused solely by the expansive force of the pressure already admitted to the chamber T and the momentum of the piston. At about the time or soon after the piston reaches the position in its backward movement which causes the port Y to be closed and admission of pressure to the chamber T cut off, as above described, the extreme forward end of the piston will clear and uncover the port S, forming the end of the exhaust-duct R, whereupon the pressure which has been confined against the upper side of the valve J will be released and exhausted through said duct and port, and the pressure at the under side of the valve will throw the latter upward and close the exhaust-duct K and open the inlet-port from the pressure supply-duct G, as in Fig. 4. The pressure-supply will then be admitted to the rear end of the chamber T and act upon the piston to throw it forward to deliver its next blow. As soon as the piston has moved forward far enough for the rear end of its head W to clear the port Q, pressure will be admitted from the chamber T through said port and the duct P to the upper side of the check-valve O again and will pass the same and act upon the upper side of the valve J and throw the latter downward to the position shown in Fig. 1, thereby again cutting off the pressure-supply and opening the exhaust. The piston will be carried on forward by the diminishing pressure behind it and by its own momentum, against the re-

sistance of the pressure admitted from the duct Y′, to the front end of the chamber T, until arrested by the contact of its front end with the tool Z, Fig. 1, whereupon such pressure will again start the piston backward and the operation above described be repeated. Inasmuch as the latter part of the forward stroke of the piston is effected by expanding or diminishing pressure behind it, aided by its own momentum, and is resisted by pressure admitted in front of the piston and acting upon a small area thereof, it follows that the blow delivered to the tool will be a quick elastic one, from which the piston will instantly rebound, much the same as where the piston is moved forward and completes its stroke against the increasing resistance of a spring, as in the tool shown in my prior patent, and hence will produce less shock and jar than where the piston strikes the tool a dead blow with the force of full pressure behind it. So, too, inasmuch as the backward movement of the piston is completed under the action of expanding pressure in the front end of the chamber T, aided by its own momentum, this part of the operation is much like that in my prior tool, where the piston is reset by the spring, whose pressured iminishes or ceases as the piston approaches its rearward limit of movement. The employment of the spring in my prior tool produced an ease of action and caused an absence of the shock and jar common to tools of this character to a marked degree, and in my present tool, by the novel construction above described, I have produced a very similar action with the use of the pressure medium as the resetting means.

It will be noticed that in the drawings the duct P is shown extended forward of the port Q and opening at its extreme forward end into the small piston-chamber U by a port Q′. This is not essential, and the duct may end at the port Q, as in the tool of my prior patent. The forward extension here shown is provided for the purpose of preventing the possibility of sufficient pressure passing from the front end of the chamber T to the upper side of the valve J at the beginning of the forward movement of the piston to force the valve J downward to its lower position, the extension of the duct and the port Q′ thus serving as a relief-passage from the front end of the chamber T, through which the air in front of the piston-head may escape at the beginning of the forward movement of the piston, as well as through the port A′ and duct R and port S. Both the ports Q′ and S are closed by the front end of the piston V soon after it begins its forward movement.

The second feature of my invention relates to the means for automatically stopping the operation of the tool when the cutting or working tool is removed from or not held in working position in the front end of the cylinder. In the practical use of these tools it is intended that the operator shall with his hand which grasps the handle of the tool hold open the throttle-valve which controls the admission of the pressure-supply to the tool, and that the moment he quits using the tool and lays it down or releases his grasp upon the handle the throttle-valve shall be automatically closed by the spring acting upon it and the pressure-supply be cut off from the tool, so that the piston will cease to reciprocate. It has been found, however, that many workmen, to avoid the necessity of maintaining a pressure of their fingers or thumb upon the lever controlling the throttle-valve, will at the beginning of work press said lever down to position to open the valve and then tie it in such position, so that the pressure-supply will be admitted to the tool until they again release the lever and allow the throttle-valve to close. Owing to this practice among workmen, it follows that the tool continues in constant operation from the time the throttle-valve is first opened until it is finally permitted to close, no matter whether the tool is actively at work during a greater or less portion of such time.

It may frequently happen that the operator may lay the tool down at intervals in his work and leave it in full operation for considerable periods of time, and thus subject it to much unnecessary wear. To guard against such misuse and abuse of tools of this character I have devised means for automatically stopping the operation of the tool, or at least so diminishing the stroke of the piston as to avoid any considerable wear and tear on the tool, whenever the cutting-tool is removed from working position in the front end of the cylinder. The means devised for this purpose may be now described as follows:

In using tools of this character the operator with one hand holds the tool Z in position, while with the other he grasps the handle of the tool and holds it. While the tool is at work, and the cutting end of the tool Z in contact with the object being operated upon, the pressure exerted upon the tool Z will maintain it in substantially the position shown in Fig. 1, instantly returning it thereto after each blow from the piston. If, however, the tool Z be removed, or the resistance offered to its forward movement be taken away, then the piston will be arrested at the forward end of its stroke solely by the air in the front end of the chamber T, and consequently will move somewhat farther forward than it does when it contacts with the tool at work. In the movement of the piston from its rearward to its forward position the valve J, as before described, is shifted to close the inlet-port and open the exhaust-port as soon as the rear end of the piston-head passes and opens the port Q, which admits pressure to the upper side of the valve and moves it downward, and the pressure so admitted to the upper side of the valve is there confined by the check-valve until at the return backward movement of the piston the exhaust-

port S is opened and the pressure permitted to escape. Now it will be understood that if, instead of holding the pressure at the upper side of the valve J until it is permitted to exhaust through the port S, it be permitted to exhaust at the end of the forward stroke of the piston, so that the valve J will be then shifted and new pressure admitted to the rear end of the chamber T, the piston, as it completes its forward movement and rebounds from contact with the tool *z* and the air in the front end of the chamber T and begins its backward movement, will be met and arrested by the newly-admitted pressure in rear of it before it has moved but a slight distance rearward, and that it will thereupon be driven forward again. Now I have brought about this mode of operation by providing a second exhaust-passage from the upper side of the valve J, opening into the chamber T at a point adapting it to be uncovered by the piston when the latter makes what may be termed an "abnormal" forward stroke—that is, moved farther forward than it normally does when the tool is at work. This exhaust may consist of a separate passage extending from the space at the upper side of the valve forward through the wall of the cylinder and opening into the piston-chamber at the point specified, or the same result may be accomplished by simply providing a short passage or port from the exhaust-duct R into the chamber, as shown at A′. When the tool is at work, the piston is arrested in its forward movement at a point slightly beyond the position shown in Fig. 1, so that the port A′ is not uncovered, and the normal operation of the tool heretofore described takes place; but when the resistance offered by the tool Z to further forward movement of the piston is removed, and the piston moves forward far enough to uncover the port A′, then the pressure at the upper side of the valve J, which is holding the valve in its lower position, as in Fig. 1, with the exhaust open and the inlet-port closed, will escape through the duct R and port A′ into the chamber T, and the pressure against the under side of the valve J will thereupon lift the latter and close the exhaust K and open the inlet-port and admit pressure to the rear end of the chamber T. A new supply of pressure will thus be admitted to the chamber T behind the piston while the latter is at the forward end of the chamber and prevent any considerable backward movement of it. The pressure thus admitted to the chamber T will pass through the ports A′ and Q and ducts R and P to the upper side of the valve J and throw the latter downward again to the position shown in Fig. 1, whereupon the pressure in the chamber T will escape and the valve be thrown upward again to admit a new supply of pressure to the chamber, and so on as long as the piston remains in its extreme forward position with the port A′ uncovered.

It will be understood that whenever the piston is moved forward of its normal position, so as to uncover the port A′ and bring about the operation above described, the body of the piston at the left of the space X will enter the rear end of the small piston-chamber U and thereby cut off the admission of the pressure from the duct Y′ to the front end of the chamber T, so that such pressure will not act upon the piston-head W to move the piston backward. There will, of course, be some pressure confined in the front end of the piston-chamber after such supply from the duct Y′ has been cut off, but this will gradually escape around the piston, so that the latter will finally come to the position shown in Fig. 2 and remain in substantially that position, with perhaps an exceedingly slight reciprocating movement, due to the rapid admission and exhaust of pressure from the chamber T behind the piston, while the valve J continues its reciprocations, as above stated. Upon reinserting the tool Z in the end of the holder, as in Fig. 2, and forcing it inward until the piston is moved rearward far enough to close the port A′ and open communication between the duct Y′ and the front end of the chamber T the normal operation of the machine, with full reciprocations of the piston, will be immediately resumed.

From the foregoing description it will be understood that if, with the throttle-valve held open, the operator at any time lays down the tool or ceases to hold it in working position the normal operation will immediately cease, and that as soon as the cutting-tool is replaced and put in working position the normal operation will be resumed. So far as I am aware, this is an entirely new result in pneumatic tools, and I am the first to accomplish it by any means or in any manner whatsoever. This feature of my invention, therefore, is of corresponding scope and is not limited beyond the terms of the respective claims relating to it.

The remaining feature of my invention relates to the novel throttle-valve located in the handle of the tool for controlling the admission of the pressure-supply to the tool. As seen in Fig. 1, the duct G, through which the pressure-supply is admitted, extends downward and passes through the lower end of the handle by an enlarged threaded opening B′, adapted for the reception of the threaded nipple or coupling upon the end of the flexible tube through which the pressure-supply is conveyed to the tool. The duct G in its passage downward through the handle is enlarged at two points to form two transverse chambers C′ D′. Extending upward into the handle from its lower end is a bore E′, passing through the chambers C′ D′, while tightly fitted in said bore is a tube or casing F′, provided with ports G′, opening into the chamber C′, and ports H′, opening into the chamber D′. Fitting in this tubular casing is a cylindrical valve I′, having at its middle a reduced waist portion. Confined in the

lower end of the casing F′ is a coiled spring J′, which yieldingly holds the valve I′ in the upper position shown, in which position it closes the ports H′, opening into the chamber D′. Fitting in a narrow slot K′, formed in the upper rear side of the handle, is a lever L′, pivoted at M′ and provided with a shoulder bearing upon the upper end of the valve I′. The upper end of this lever projects above the handle and is provided with a thumb-piece N′, by which it may be depressed into the slot K′. When so depressed, the shoulder, bearing upon the upper end of the valve I′, will press the latter downward against the resistance of the spring J′ and open the ports H′, whereupon the pressure-supply admitted to the chamber D′ will pass through the ports H′ and upward through the casing F′, around the waist of the valve, and thence out through the ports G′ into the chamber C′, and thence through the duct G to the tool. Upon releasing the lever L′ the spring J′ will restore the valve to normal position and cut off the pressure-supply. This automatic stopping of the operation of the piston construction furnishes a very efficient, easily-operated, and durable throttle-valve for controlling the admission of pressure to the tool.

Having thus described my invention, I claim—

1. In a pneumatic tool, the combination of a cylinder bored to form two piston chambers of different diameters, a pressure supply duct opening into the smaller chamber, a piston having an enlarged head fitting in the larger chamber and a smaller body portion fitting in the smaller chamber, said smaller portion being provided with a depression or cut-away space so located as to furnish communication between the pressure supply duct and front end of the larger piston chamber when the piston is in forward position, and to cut off such communication as the piston approaches rearward position, and an automatic valve for intermittently admitting pressure to and exhausting it from the larger chamber behind the piston-head, substantially as described.

2. In a pneumatic tool, the combination of the cylinder A bored to form the two piston chambers, T and U, the piston having the enlarged head W fitting in the chamber T, and the smaller body portion V fitting in the chamber U, the portion V of the piston being provided with the cut-away space X adapted to pass wholly or partly into and out of the chamber T in the reciprocations of the piston, the duct Y′ communicating with the pressure supply and opening into the chamber U opposite the space X, and an automatic valve for controlling the admission of pressure to and its exhaust from the chamber T behind the piston-head W, substantially as described.

3. In a pneumatic tool, the combination, with the piston and the working tool acted upon by said piston, of means controlled by said working tool for automatically throwing the machine out of normal operation when said tool is removed from working position.

4. In a pneumatic tool, the combination, with the piston and the working tool acted upon by said piston, of means controlled by said working tool for automatically throwing the machine out of normal operation when said tool is removed from working position and for causing it to resume normal operation when said tool is restored to working position.

5. In a pneumatic tool, the combination, with the piston and the working tool whose shank receives the impact of the piston at the end of its forward stroke and aids in arresting and limiting the movement of the piston, of means controlled by the position of the piston for automatically stopping the operation of the latter when, by the removal of the resistance offered by the working tool, it is permitted to exceed its normal forward limit of movement, for the purpose described.

6. In a pneumatic tool, the combination, with the piston and ports for admitting pressure to the piston chamber in front of and behind the piston, of means controlled by the position of the piston for cutting off the admission of pressure to the front end of the chamber and admitting it to the rear end thereof when the piston exceeds its normal forward limit of movement, whereby when the piston is permitted to exceed such movement its reciprocation automatically ceases and it comes to rest in the front end of the piston chamber.

7. In a pneumatic tool, the combination, with the piston and the working tool whose shank receives the impact of the piston at the end of its forward stroke and aids in arresting and limiting the movement thereof, of means controlled by the position of the piston for admitting pressure behind the piston when the latter, by the removal of the resistance offered by the working tool, is permitted to exceed its normal forward limit of movement, for the purpose described.

8. In a pneumatic tool, the combination, with the piston and the working tool whose shank receives the impact of the piston at the end of its forward stroke and aids in arresting and limiting the movement thereof, of means for cutting off the admission of pressure to the front of the piston and admitting it behind the piston when the latter, by the removal of the resistance offered by the working tool, is permitted to exceed its normal forward limit of movement, for the purpose described.

9. In a pneumatic tool having provision whereby when the piston is moved beyond its normal forward limit of stroke it ceases to reciprocate and comes to rest in the front end of the piston chamber, the combination, with such piston and an automatic valve for controlling the admission of pressure to the piston chamber, of the working tool whose shank normally receives the impact of the piston at

the end of its forward stroke, and means co-operating with the piston and valve whereby when the piston is moved from the front end of the piston chamber by the insertion of the working tool in position its operation will be automatically restored.

10. In a pneumatic tool, the combination, with the piston chamber, piston and valve mechanism, of means controlled by the piston and co-operating with the valve mechanism for causing the valve to admit pressure to the piston chamber behind the piston when the piston exceeds its normal forward limit of movement, for the purpose described.

11. In a pneumatic tool, an air port or passage arranged to be uncovered by the piston when the latter exceeds its normal forward limit of movement, and co-operating with the valve mechanism, when so uncovered, to cause the pressure supply to be admitted to the piston chamber behind the piston, for the purpose described.

12. In a pneumatic tool, the combination of the piston chamber and piston, means for resetting the piston after it has moved forward to deliver its blow to the tool, a valve for controlling the admission of pressure to and its exhaust from the piston chamber behind the piston, and a passage communicating at one end with the valve chamber and opening at the other into the piston chamber by a port adapted to be uncovered by the piston when the latter exceeds its normal forward limit of movement, and operating when so uncovered to cause the valve to admit pressure to the piston chamber behind the piston, for the purpose described.

13. In a pneumatic tool, the combination of the piston chamber and piston, means for resetting the piston after it has moved forward to deliver its blow to the tool, a valve for controlling the admission of pressure to and its exhaust from the piston chamber behind the piston, means at one side of the valve for moving it in one direction, a passage communicating at one end with the valve chamber at the opposite side of the valve and at its other end opening into the piston chamber by a port adapted to be uncovered by the piston as the latter approaches its normal forward limit of movement, an exhaust passage communicating with the same end of the valve chamber and opening at its opposite end into the piston chamber by a port adapted to be uncovered by the piston as the latter approaches the end of its return rearward movement, and an exhaust passage communicating with the same side of the valve chamber and opening into the piston chamber by a port adapted to be uncovered by the piston when the latter exceeds its normal forward limit of movement, for the purpose described.

14. In a pneumatic tool, the combination of the piston chamber and piston, means for resetting the piston after it has moved forward to deliver its blow to the tool, a valve for controlling the admission of pressure to and its exhaust from the piston chamber behind the piston, means for exerting a constant pressure against one side of said valve, a passage communicating with the chamber at the opposite side of the valve and controlled by the piston to admit pressure to such opposite side of the valve when the piston approaches its forward limit of movement, a check valve in said passage, an exhaust passage communicating at one end with the space between the check valve and main valve and opening at its opposite end into the piston chamber by a port adapted to be uncovered by the piston as the latter approaches its rearward limit of movement, and an exhaust passage communicating with the valve chamber between the check valve and main valve and opening into the piston chamber at a point adapting it to be uncovered by the piston when the latter exceeds its forward limit of movement, for the purpose described.

15. In a pneumatic tool, the combination of the piston chamber and piston, a pressure supply duct for admitting pressure to the chamber in front of the piston, to reset the latter, a valve controlling the admission of pressure to and its exhaust from the piston chamber in rear of the piston, a pressure supply duct for constantly admitting pressure to one side of said valve, a passage communicating with the piston chamber and controlled by the piston for intermittently admitting pressure to the opposite side of said valve, a check valve in said passage, and an exhaust passage communicating with the space between the check and main valve and opening into the piston chamber by two ports, one adapted to be uncovered by the piston as the latter approaches its rearward limit of movement, and the other to be uncovered by it when it exceeds its normal forward limit of movement, for the purpose described.

16. In a pneumatic tool, the combination, with the handle F having the pressure supply duct G led through it, said duct having the chambers C′ D′ in said handle, the bore E′ intersecting said chambers and having the tubular casing F′ tightly fitted in it, said casing being provided with the ports G′ H′, the valve I′ fitted in said casing and having the reduced waist portion and enlarged ends, the spring J′ confined in said casing and yieldingly holding the valve in position to close one of said ports, and the lever L′ pivoted in the slot K′ in the handle and co-operating with the upper end of the valve I′, substantially as described.

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