

No. 807,384.

PATENTED DEC. 12, 1905.

W. H. KELLER.
HANDLE FOR PNEUMATIC TOOLS.
APPLICATION FILED MAR. 29, 1904.

2 SHEETS—SHEET 2.

Fig. 4.

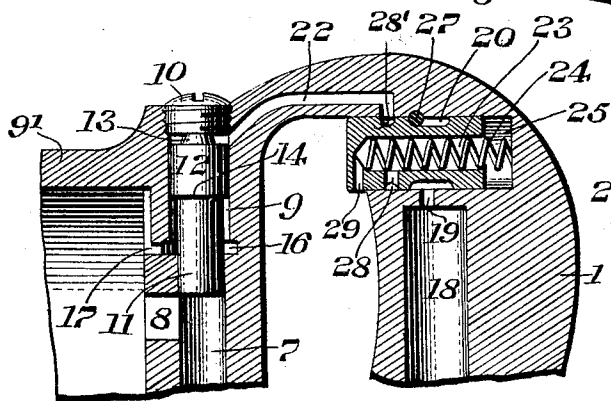
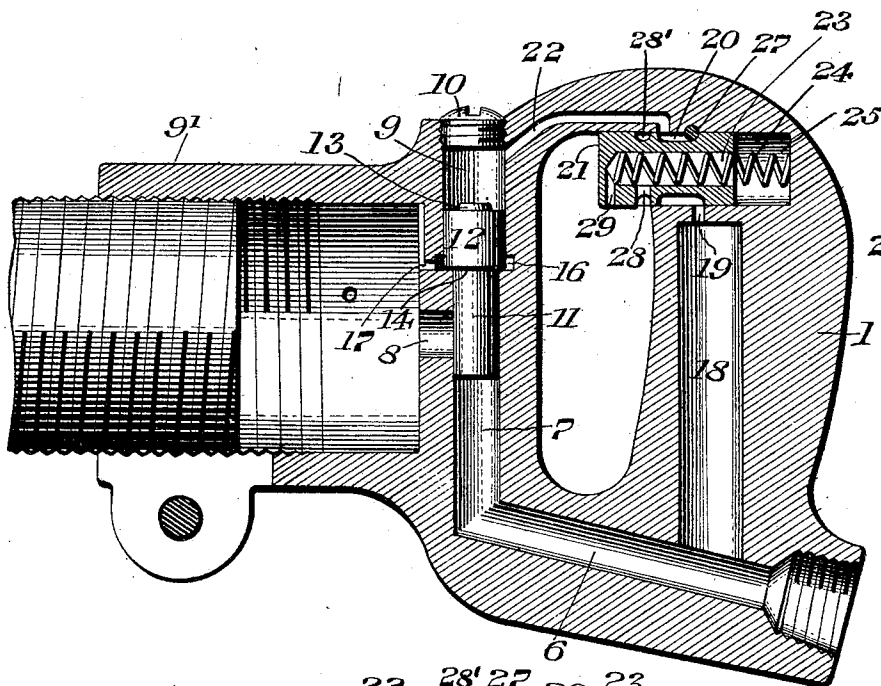


Fig. 5.

Witnesses

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HANDLE FOR PNEUMATIC TOOLS.

No. 807,384.

Specification of Letters Patent.

Patented Dec. 12, 1905.

Application filed March 29, 1904. Serial No. 200,645.

To all whom it may concern:

Be it known that I, WILLIAM H. KELLER, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Improvement in Handles for Pneumatic Tools, of which the following is a specification.

My invention relates to a novel construction of pneumatic-tool handle wherein the throttle-valve proper is located wholly outside of the grasping portion of the handle and provision is made for the automatic operation of said valve in the desired direction by fluid-pressure without the intervention of any throttle-valve lever or other similar device.

To the above ends my invention consists, broadly, of the novel combination of a throttle-valve for a pneumatic-tool handle operated in both directions by fluid-pressure alone.

It also consists of a novel construction and arrangement of ports and passages whereby fluid-pressure is conducted to the desired portions of the throttle-valve proper.

My invention further consists of a novel construction of manually-operated button adapted to be manipulated by the thumb or finger of the user, whereby the actuation of the throttle-valve, located outside of the grasping portion of the handle, is effected.

It further consists of other novel features of construction, all as will be hereinafter fully set forth.

Figure 1 represents a longitudinal sectional view of a handle for a pneumatic tool embodying my invention, showing the throttle-valve in open position and with the manually-operated button as depressed by a thumb or finger of the user. Fig. 2 represents a sectional view similar to Fig. 1, but showing the throttle-valve in closed position and the manually-operated button in position ready to be depressed by the thumb or finger of the operator. Fig. 3 represents a perspective view of the manually-operated button in detached position. Figs. 4 and 5 represent sectional views of another embodiment of my invention wherein the manually-operated button is shown as having a slightly-different location from that shown in Figs. 1 and 2.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings, 1 designates the grasping portion of a handle 2.

3 designates a neck securing the grasping portion of the handle to the body 4, the upper part of the grasping portion being secured to said body by an upper neck 5.

6 designates a pressure-supply duct located in the neck 3 and wholly outside of the handle proper, as well as its grasping portion, said pressure-supply duct leading into the duct 7, whence the compressed air is led from the port 8 into the valve-box and cylinder of the tool, it being understood that the body 4 is secured to said cylinder by means of the internally-threaded sleeve 9', which is provided with suitable fastening devices. The duct 7 is enlarged at a point above the port 8 to form a valve-chamber 9, the upper portion of said chamber being closed by the plug or closure 10.

11 designates the throttle-valve, the same consisting of a cylindrical or other shaped body having the enlarged head 12, which is provided with the extension 13 and the shoulder 14, it being understood that when said valve 11 is in closed position, as seen in Fig. 2, the shoulder 14 rests upon the juxtaposed wall 15, which is provided with the recess 16, having the port 17 leading therefrom eventually to the exhaust port or ports in the sleeve 9'.

18 designates a live-air duct which extends through the grasping-handle proper and is provided with a by-pass 19, which leads live compressed air when the parts are in the position seen in Fig. 2 around the neck 20 of the button 21 through the port 22 into the upper portion of the chamber 9. The button 21 is provided with the chamber 23, within which is contained the spring 24, the lower portion of which contacts with the abutment 25, while its upper portion contacts with the wall 26, it being apparent that said button 21 is prevented from dislodgment by the pin 27.

28 designates a relief-port whereby the air contained in the chamber 9 is permitted to exhaust through the passage 22, port 28, and chamber 23, through the port 29, to the atmosphere when the parts are in the position seen in Fig. 1.

The operation is as follows: The parts are

normally in the position seen in Fig. 2, wherefrom it will be apparent that live air is passing through the ducts 6 and 7 and also through the duct 18, by-pass 19, and the passage 22, so that it will be seen that live-air pressure is acting on the large differential area of the throttle-valve of the chamber 9 and also upon the small differential area in the duct or chamber 7, whereupon by reason of the differences in area the valve 11 will always assume the position seen in Fig. 2 when the button 21 is also in the position seen therein. When it is desired to open the port 8 for live air, it is only necessary for the operator to depress the button 21 by his thumb or finger from the position seen in Fig. 2 into the position seen in Fig. 1, whereupon the groove 28' moves into alinement with the port 22, so that a communication is formed from the port 22 to the atmosphere by means of the groove 28', port 28, chamber 23, and port 29. The pressure on the throttle-valve 11 now being unbalanced, since the chamber 7 is open to the atmosphere it will be apparent that the live-air pressure within the ducts 6 and 7 will cause the throttle-valve 11 to instantly move into the position seen in Fig. 1, the movement in the upward or open position of said throttle to the position seen in Fig. 1 being limited by reason of the closure 10, while its movement in its lower or closed position is limited by the contact of the shoulder 14 with the wall 15. So long as it is desired for the tool to remain operative the button 21 is retained in its depressed position (seen in Fig. 1); but when it is desired to stop the operation of the tool the operator simply removes his finger or thumb from the button 21, whereupon by reason of the spring 24 the parts assume the position seen in Fig. 2, wherefrom it will be seen that live-air pressure passes through the by-pass 19 around the neck 20 and through the passage 22 into the valve-chamber 9, and by reason of the action of the live air on the large differential area of the head 12 the throttle-valve 11 instantly closes and assumes the position seen in Fig. 2, where by the provision of the recess 16 and the port 17 it will be seen that any air in the valve-chamber 9 underneath the shoulder 14 can readily flow through the port 17, and thus through the exhaust-port 30 in the sleeve 9' to the atmosphere.

It will be apparent that in the broad principle of my invention the manually-operated button 21 can be located in a vertical, horizontal, or inclined position, and it can, furthermore, be located so as to be operated by a finger of the operator, if desired, without departing from the spirit of my invention. It will also be apparent that the construction of the throttle-valve 11 may be varied and that other forms of a differential or other throttle-

valve may be employed without departing from the spirit of my invention.

In the construction seen in Figs. 4 and 5 I have shown the button 21 as located in a horizontal position, or, in other words, moving at an angle to the throttle-valve 11, and as the principal distinction between the structures seen in Figs. 1 and 2 and Figs. 4 and 5 resides simply in the location and direction of movement of the button 21 I have numbered the corresponding parts of Figs. 4 and 5 the same as in Figs. 1 and 2. Referring first to Fig. 4, it will be seen that when the parts are in the position seen therein the live air is passing through the duct 18, port 19, around the neck 20 of the button 21, and thence through the passage 22 into the valve-chamber 9, and by reason of the pressure upon the differential area or head 12 the throttle-valve 11 will be caused to always assume the position seen in Fig. 4, whereby the port 8 will be closed. When it is desired to start the tool, the operator by means of his aforesaid finger causes the button 21 to assume the position seen in Fig. 5, whereupon the pressure above the head 12 is permitted to flow to the atmosphere through the passage 22, groove 28', port 28, passage 23, and port 29, whereupon the live-air pressure in the duct 7, acting upon the small differential area or bottom of the valve 11, will cause the latter to assume the position seen in Fig. 5. Upon the removal of the finger of the operator from the button 21 the spring 24 will cause the same to assume the position seen in Fig. 4, whereupon live-air pressure once more flows through the port 19, around the neck 20, and through the passage 22 into the chamber 9, and valve 11 assumes its closed position seen therein.

I desire to call especial attention to the fact that in my present invention there is no necessity for the employment of a spring-pressed lever or similar device to act upon the throttle-valve 11 and that the movement of said throttle-valve in both directions is effected by fluid-pressure alone. Furthermore, by locating the manually-operated button in the position seen and by dispensing with the levers or their mechanical equivalents, I am enabled to reduce to a minimum the liability of the tools by the throttle-valve lever being accidentally depressed. This is a common occurrence in devices of the character now in use.

So far as I am aware I am the first in the art to employ a throttle-valve of any character controlling the inlet-port of a pneumatic tool in conjunction with devices for operating the same in both directions by fluid-pressure alone, and my claims to this feature are therefore to be interpreted with corresponding scope.

I desire to direct especial attention to the fact that the parts 1 and 2, which I have re-

ferred to, respectively, as the "grasping portion" of the handle and the "handle," are practically synonymous and that the pressure-supply duct 6 not only does not pass through the handle proper, but is located wholly outside of the handle proper, as well as the grasping portion of said handle, which is also true of the duct 7 and the throttle-valve 11, which is also located wholly outside of the handle, as well as its grasping portion. I desire to also call attention to the fact that the button 21 is in no sense a throttle-valve, nor does it control the port 8, whereby the compressed air is led to the pneumatic tool proper, since the entire control of said port 8 is effected by the throttle-valve 11, as has been clearly explained.

I am aware that it is a common right to locate the throttle-valve in the grasping part of a pneumatic tool, as in the duct 18, and that it is also a common right to locate a throttle-valve outside of the grasping part of the handle, and I am further aware that it is common right to locate the pressure-supply duct in the grasping part of a pneumatic-tool handle or wholly outside of the grasping part of said handle, and it will be understood that my present invention is devised particularly to cover the broad feature of a throttle-valve located in any suitable position so as to control the port, as 8, which leads the motive fluid to the tool by means of fluid-pressure alone, and to none of the structures of the prior art do I herein make my claim. It will be apparent to those skilled in the art that the operation of the throttle-valve 11 is practically instantaneous, since it will be apparent that when the manually-operated button is depressed from the position seen in Fig. 2 to the position seen in Fig. 1 the throttle-valve 11 will instantly open the port 8, whereupon the operation of the tool will immediately begin, which is a very important desideratum, particularly in pneumatic riveting-hammers, to which my invention is especially applicable, since it is essential that the rivet be headed while in a red-hot condition without any appreciable loss of time. I am aware that it has heretofore been common in non-analogous arts to combine a plurality of valves in a single case; but so far as I am aware I am the first to combine with a pneumatic-tool handle a throttle-valve of any kind operated in both directions by fluid-pressure, and my claims to this feature are to be interpreted with corresponding scope.

Various changes may be made by those skilled in the art which will come within the scope of my invention.

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

1. The combination of a pneumatic-tool handle, a throttle-valve outside of the grasping

portion of the handle for controlling the admission of motive fluid to a pneumatic tool and means also outside of the grasping portion of the handle for operating said valve in both directions by fluid-pressure.

2. The combination of a pneumatic-tool handle, an inlet-port for the admission of the motive fluid to the tool, a throttle-valve outside of the grasping portion of the handle for controlling said port and manually-operated means for operating said throttle-valve in both directions by fluid-pressure.

3. The combination of a pneumatic-tool handle, a port for the admission of motive fluid to the tool, a throttle-valve outside of the grasping portion of the handle for controlling said port, differential pressure areas on said throttle-valve and means for controlling the flow of the motive fluid to one of said areas.

4. The combination of a pneumatic-tool handle, a differential throttle-valve outside of the grasping portion of the handle for controlling the inlet of motive fluid to the pneumatic tool, means for permitting constant live-air pressure to act upon one area of said throttle-valve, and means for causing intermittent live-air pressure upon the other area of said throttle-valve.

5. The combination of a pneumatic-tool handle, a port for leading fluid-pressure to the tool proper, a differential throttle-valve outside of the grasping portion of the handle controlling said port, means for permitting constant live-air pressure to act upon the small area of said throttle-valve and means for permitting intermittent live-air pressure to act on the larger area of said throttle-valve.

6. The combination of a pneumatic-tool handle, a port for leading fluid-pressure to the tool proper, a differential throttle-valve outside of the grasping portion of the handle controlling said port, means for permitting constant live-air pressure to act upon the small area of said throttle-valve and means for permitting intermittent live-air pressure to act on the larger area of said throttle-valve, in combination with means for permitting an exhaust to the atmosphere from said larger area of said throttle-valve.

7. The combination of a pneumatic-tool handle, a throttle-valve outside of the grasping portion of the handle for controlling the admission of motive fluid to the tool-cylinder, live-air ducts leading to both ends of said throttle-valve, and a manually-operated button for controlling one of said ducts.

8. The combination of a pneumatic-tool handle, a differential throttle-valve outside of the grasping portion of the handle for controlling the admission of motive fluid, to the tool proper, means for limiting the movement of said throttle-valve in each direction, means for permitting constant live-air pressure upon the smaller area of said valve, and a manually-op-

erated button for controlling the admission of motive fluid to the larger area of said valve.

9. In a device of the character named, a grasping-handle, a pressure-supply duct located wholly outside of said handle for conveying motive fluid to the tool proper, a differential throttle-valve located wholly outside of the grasping portion of said handle, and having its smaller extremity acted upon by constant live-air pressure, a by-pass for leading live-air pressure to the larger area of said valve, and a manually-operated button located also outside of the grasping portion of said handle for controlling said by-pass.

10. In a device of the character named, a grasping-handle, a pressure-supply duct located wholly outside of said handle for conveying motive fluid to the tool proper, a differential throttle-valve located wholly outside of the grasping portion of said handle, and having its smaller extremity acted upon by constant live-air pressure, a by-pass for leading live-air pressure to the larger area of said valve, and a manually-operated button for controlling said by-pass, said button also having a groove therein for permitting the exhaust to the atmosphere of the air above said throttle-valve.

11. The combination of a pneumatic-tool handle, a throttle-valve located outside the grasping portion of the handle and controlling the admission of motive fluid to the pneumatic tool, means for operating said valve in both directions by fluid-pressure, and a button for controlling said fluid-pressure, said button having a passage therein and exhaust-ports for permitting the exhaust from one end of said valve to flow to the atmosphere.

12. The combination of a pneumatic-tool handle, a throttle-valve located outside of the grasping portion of the handle for controlling the admission of motive fluid to the pneumatic tool, means for permitting constant live-air pressure to act upon one area of said throttle-valve, a by-pass for leading live air to the other area of said throttle-valve, a button in said by-pass for controlling the latter and exhaust-passages in said button leading to the atmosphere, said button being operated in one direction manually and in the opposite direction by a spring, and a stop limiting the movement of said button in both directions.

13. The combination of a pneumatic-tool handle, a throttle-valve for controlling the admission of motive fluid to the pneumatic tool, means for permitting constant live-air pressure to act upon one area of said throttle-valve and a button for causing live-air pressure to intermittently act upon the other area of said throttle-valve, said button having a groove and ports therein for permitting exhaust from one end of said throttle-valve to the atmosphere, and being operated in one direction manually and in the opposite direction by a

spring, and a stop limiting the movement of said button in both directions.

14. The combination of a pneumatic-tool handle comprising a body portion and a grasping portion, a differential throttle-valve located in the body portion and wholly outside of the handle proper or its grasping portion, means for permitting constant live-air pressure to act upon the lower area of said throttle-valve, a manually-operated hollow button having a passage therethrough and ports and grooves therein, a spring normally pressing said button outwardly, a pin for limiting the outward movement of said button, and a passage leading from the main supply-duct around said button to the larger area of said valve, said passage being controlled by said button.

15. In a device of the character named, the combination of a differential throttle-valve, a port controlled thereby, a wall upon which said throttle-valve normally rests, a recess in proximity to said wall, a port 17 discharging from said recess, and means for operating said throttle-valve.

16. The combination of a pneumatic-tool handle, a throttle-valve for controlling the admission of motive fluid to the pneumatic tool, said throttle-valve having a shoulder, a wall adapted to support said shoulder, a recess adjacent said wall, a port discharging from said recess and means for operating said valve in both directions by fluid-pressure.

17. In a device of the character named, an inlet-port for the admission of fluid to a pneumatic tool, a throttle-valve for controlling said port, a seat for said throttle-valve, a recess adjacent said seat, a port discharging from said recess and means for operating said valve in both directions by fluid-pressure.

18. In a device of the character named, a port for the admission of motive fluid to a pneumatic tool, a throttle-valve for controlling said port, differential pressure areas on said throttle-valve, a wall for limiting the movement of said valve, a recess adjacent said wall, a port leading from said recess and means for controlling the flow of the motive fluid to one of said areas.

19. In a device of the character named, a throttle-valve having differential pressure areas, passages for leading live air to both ends of said throttle-valve, a manually-operated button controlling one of said passages, said button being hollow and provided with exhaust-ports, an abutment below said button and a spring intermediate said button and abutment.

20. The combination of a sleeve, an integral body portion, a grasping portion attached to said body portion by upper and lower necks, a differential throttle-valve, a main pressure-supply duct located wholly outside of said grasping portion, a branch duct leading

through said grasping portion to the larger area of said valve, a manually-operated button for controlling the supply to said valve, an abutment below said button, a spring intermediate said button and abutment, a groove in said button for permitting live motive fluid to act intermittently on said valve-inlet, out-

let-ports in said button serving as exhaust-passages and means for limiting the outward movement of said button.

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Witnesses:

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