

No. 895,349.

PATENTED AUG. 4, 1908.

T. DONOHUE.
PNEUMATIC TOOL.
APPLICATION FILED SEPT. 12, 1907.

Fig. 1.

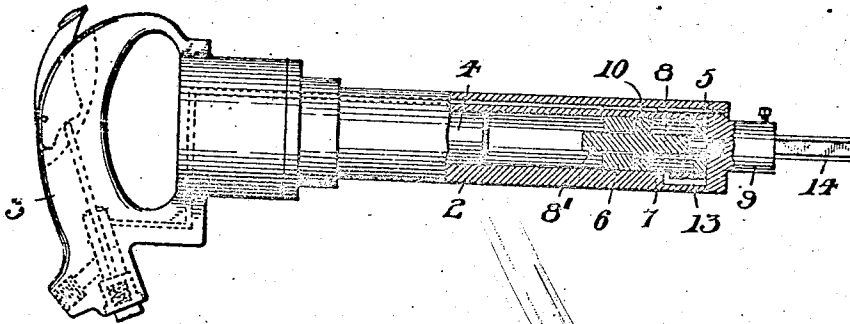


Fig. 2.

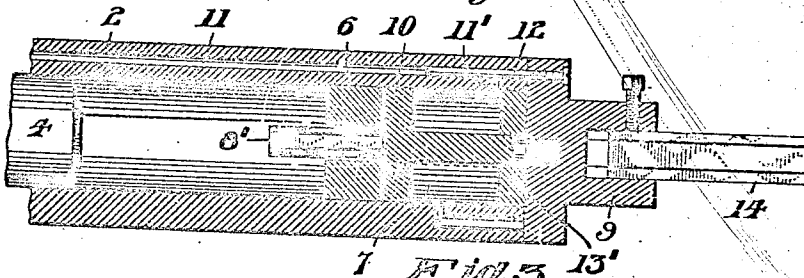
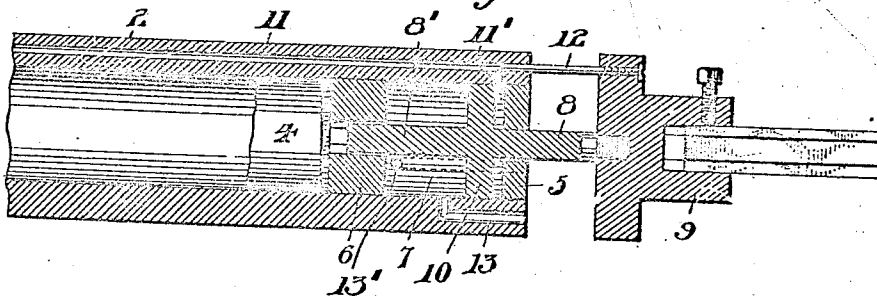


Fig. 3.



witnesses:

J. P. [Signature]
Adm. [Signature]

Inventor
Thomas Donohue,
By [Signature] atty.

UNITED STATES PATENT OFFICE.

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PNEUMATIC TOOL.

No. 895,349.

Specification of Letters Patent.

Patented Aug. 4, 1908.

Application filed September 12, 1907. Serial No. 392,522.

To all whom it may concern:

Be it known that I, THOMAS DONOHUE, a resident of Avella, in the county of Washington and State of Pennsylvania, have invented certain new and useful Improvements in Pneumatic Tools, of which the following is a specification.

This invention relates to that type of portable pneumatic tools, such as riveting hammers, chippers etc., which when in use are held in close engagement with the work, thus preventing the riveting, chipping or other tool from being driven out of the forward end of the cylinder by the blows from the hammer piston. Tools of this character are not available for drilling, as when boring holes in or through coal and other substances, as in such use it is manifestly impossible to keep the front end of the rapidly operating tool in constant engagement with the work, its progress through the material being too rapid to permit of this. And even if it were possible to thus maintain the tool, it is clear that when the tool has worked its way through the material it would be projected entirely clear of the cylinder, this in the absence of means for limiting the outward movement of the tool in the cylinder. Furthermore, with hammers, chippers, etc., as now constructed and operated, the tool is in engagement with the work when the blows are delivered by the hammer piston, resulting in a dead or solid impact.

In drilling coal, etc., it is desirable to have the tool thrown forward against the work in response to each blow of the hammer piston and to have it retracted after each blow and in initial or starting position for each subsequent blow. Also in work of this character it is necessary to limit the outward movement of the tool, for in the absence of limiting means it would soon be projected entirely clear of the cylinder. With these objects in view, I have provided an ordinary portable hand-held tool with a tool or drill holder having a piston which operates in a piston chamber at the outer end of the tool cylinder, with means preferably controlled by the tool holder for admitting compressed air in front of the piston on each stroke of the tool and just before it reaches the outward limit of its movement, the air thus admitted operating to cushion the stop of the holder and to return it to inward or starting position.

In the accompanying drawings, Figure 1 is a view partly in side elevation and partly in section of a portable pneumatic tool con-

structed in accordance with the invention. Fig. 2 is a longitudinal sectional view on a larger scale of the outer portion of the same, showing the tool holder retracted, and Fig. 3 is a similar view showing the same in extended position.

Referring to the drawings, 2 designates the cylinder or body of a tool, 3 the handle end thereof, and 4 the hammer piston. All of these parts may be constructed in accordance with any of the familiar designs of portable hand-held tools of this character well known in the art.

Cylinder 2 is made somewhat longer than heretofore, with the outer end of its bore closed by head 5, and inward from this head is head 6, with the space between these heads forming piston chamber 7 through which extends stem 8 carrying at its outer end the holder or chuck 9 for drill or other tool 14. The inner portion 8' of stem 8 extends through an opening in head 6 and receives the blows from hammer piston 4 in the same manner that the blows are imparted to the inner end or shank of the chisel or other tool in the present familiar forms of implements of this character.

Secured to stem 8 within chamber 7 is piston 10, and opening into the forward end of the chamber at 11 is duct 11 in the wall of the cylinder 2 which extends toward the handle end thereof where it is open to the source of compressed air. This duct is also extended through the outer extremity of cylinder 2, and movable therein is valve 12 which is secured to and movable with holder or chuck 9, this valve being in the form of a pin which operates to close communication between the duct and chamber 7 when the tool holder is in inward position, and which opens said duct to the chamber when the tool holder and piston 10 approach the outward limit of their movement in response to a blow from hammer piston 4. And with the duct thus opened, compressed air is admitted to the outer or forward end of chamber 7 which operates to cushion the stop of the holder and piston, and acting expansively on piston 10 throws it and the holder or chuck backward or inward to starting position, the action in this regard being as rapid as the strokes of hammer piston 4; so that stem projection 8' is in position to receive each forward blow of said piston. Chamber 7 may be provided with port 13 for exhausting the air therefrom. A similar port 13' leads

from the rear end of chamber 7 to relieve any pressure that might otherwise occur on the rear face of piston 10 due to the passage of air through head 6 and around stem 8' into chamber 7.

With the implement thus constructed, it is necessary to hold the tool against the face of the work to confine the tool within the cylinder. And in addition to controlling the outward movement of the tool, the latter and the blow-receiving stem are returned after each blow and in position to receive the next impact from the hammer piston. The energy utilized in retracting the tool is wholly independent of the working stroke and its impelling force, no portion of the latter being consumed or stored for retracting the tool as is the case in those forms of apparatus in which a tool-retracting spring is compressed by the working stroke.

I claim:—

1. The combination with the blow-imparting hammer of a pneumatic tool and housing therefor, of a tool holder movable independently of the hammer and adapted to receive tool projecting blows therefrom, a suitably housed piston movable with the tool holder, and means actuated by the forward movement of the tool holder for subjecting said piston to tool-retracting air pressure.

2. In a pneumatic tool, the combination of a tool holder, means for imparting tool-projecting blows thereto, a suitably housed piston rigid with the holder with an air duct extending to the housing and a valve passage intersecting said duct, and a valve in the passage arranged in a plane parallel with the plane of movement of the tool holder and secured thereto and closing the duct and excluding tool-holder-retracting air-pressure from the housing save when the holder and valve are in outward position.

3. In a pneumatic tool, the combination of a tool holder, a piston secured thereto, a cylinder in which the piston moves, a compressed air inlet for the cylinder, and a valve for the inlet rigid with the tool holder, the

valve opening on the outward stroke of the holder and closing on the inward stroke.

4. In a pneumatic tool, the combination of a reciprocating tool holder, a cylinder and a piston therein for effecting the retraction of the holder, a compressed air duct leading to the cylinder with a valve passage intercepting the duct, and a pin-like valve in said passage fixed to and movable with the tool holder and operating to open and close said duct.

5. In a pneumatic tool, the combination with the cylinder and the hammer piston, of a tool holder adapted to receive outward blows from the hammer piston, and air pressure means controlled by the movement of the holder for retracting the latter after each blow.

6. In a pneumatic tool, the combination of a tool body, a tool holder, means within the body for imparting outward blows to the holder, a piston secured to the holder, a chamber in which said piston moves with a passage for compressed air leading to the outer end of the chamber, and a valve movable with the holder for closing and opening said passage.

7. In a pneumatic tool, the combination with a cylinder, the hammer piston therein, and compressed air connections and valve-mechanism for controlling the movement of the hammer piston, of a tool-holder adapted to receive outward blows from the hammer piston, a piston movable with the holder, a chamber in which said piston moves, the cylinder having a duct communicating at its upper end with the compressed air connection and at its lower end with the outer end of said piston chamber, the duct being extended to the outer end of the cylinder, and a pin secured to the holder and fitting the duct and closing the same to the chamber when the holder is in inward position.

In testimony whereof I affix my signature in presence of two witnesses.

THOMAS DONOHUE.

Witnesses:

L. M. IRWIN,
DON J. HILL.