

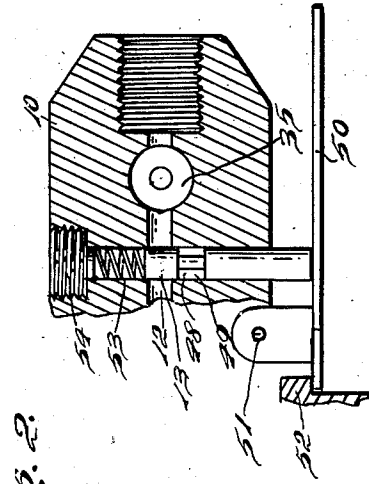
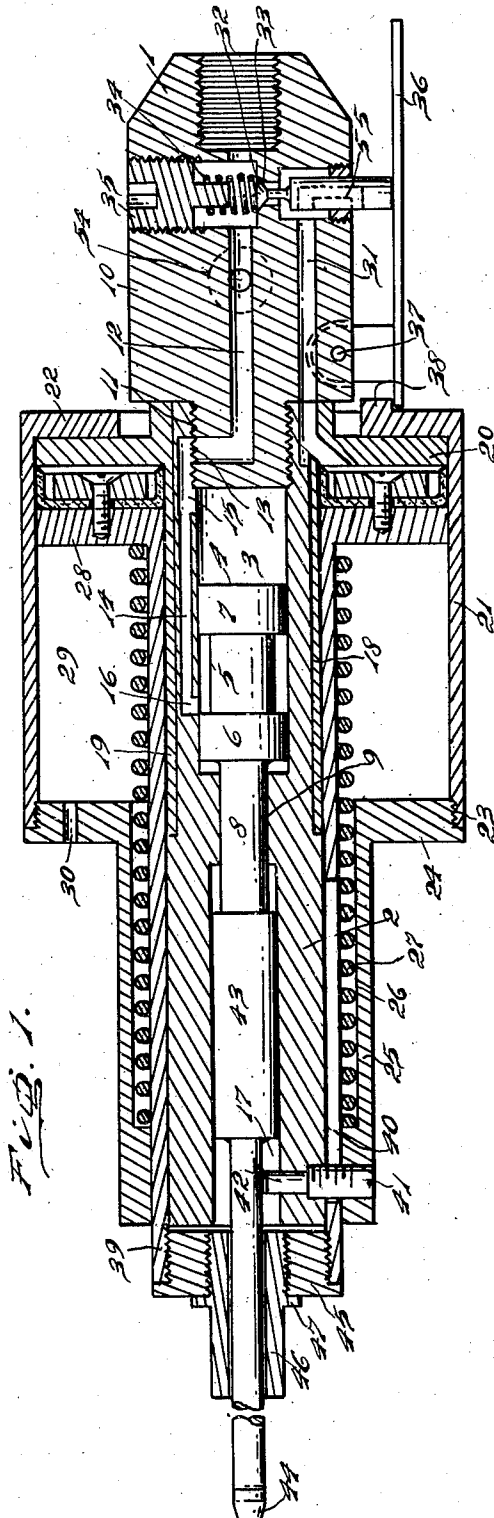
Aug. 21, 1945.

K. GIMPEL

2,383,380

PNEUMATIC PUNCH

Filed April 25, 1944



INVENTOR
Karl Gimpel
by
Herbert L. Haubauer
ATTORNEY

UNITED STATES PATENT OFFICE

2,383,380

PNEUMATIC PUNCH

Karl Gimpel, Philadelphia, Pa.

Application April 25, 1944, Serial No. 532,602

7 Claims. (Cl. 125—33)

In expanding tubes into a cylinder head, it is now customary for one workman with a power tool to drive a punch into the end of the tube which is to be expanded. A second workman at the opposite end of the tube drives the punch out of the tube by inserting a long rod into the tube and striking it with a hammer.

The object of this invention is to devise novel means combined with the power tool to retract the punch, thereby dispensing with one workman, and materially reducing the time which is necessary for the operation.

With the foregoing and other objects in view as will hereinafter clearly appear, my invention comprehends novel mechanism for retracting a punch after it has been driven into a tube.

It further comprehends novel retracting mechanism and novel means for combining it with a power tool.

It further comprehends novel mechanism for mounting the punch.

Other novel features of construction and advantage will hereinafter appear in the detailed description and the appended claims.

For the purpose of illustrating the invention, I have shown in the accompanying drawing a preferred embodiment thereof which in practice will give satisfactory and reliable results. It is however to be understood that this embodiment is typical only and that the various instrumentalities of which the invention consists can be variously arranged and organized and the the invention is not limited to the exact arrangement and organization of these instrumentalities as herein shown.

Figure 1 is a longitudinal section of a power tool having punch retracting mechanism embodying my invention.

Figure 2 is a section taken substantially on line 2—2 of Figure 1.

Similar numerals of reference indicate corresponding parts.

Referring to the drawing:

1 designates a power tool, illustrated as being in the form of a pneumatic tool, of the hammer type, and in conjunction with which novel punch retracting mechanism is employed.

The power tool 1 has a piston cylinder 2 provided with a piston chamber 3 in which a piston 4 is adapted to reciprocate. The piston 4 has an annular groove 5 contributing to form heads 6 and 7, and is provided with a forwardly projecting impact portion 8 of reduced diameter and guided in a bore 9.

The rear end of the piston chamber is closed by

an end cap or plug 10, forming a grasping portion, and having a portion of reduced diameter in threaded engagement with the cylinder as at 11. The rear end of the cap is adapted to be connected with a source of motive fluid supply which passes through a passage 12 controlled by a manually actuated valve 13.

The passage 12 leads to a passage 14 in the cylinder 2, and the passage 14 communicates by ports 15 and 16 to effect the reciprocation of the piston.

A punch receiving bore 17 leads from the bore 9 and opens through the forward end of the cylinder.

The rear portion of the cylinder 2 is recessed at 18 to receive a bearing cylinder 19 which extends into an annular plate or ring 20. A cylinder 21 has a rear flange 22 overhanging the ring 20 and in threaded engagement at its forward end as at 23 with an annular flange 24 of an outer casing 25, the forward portion of which has a close fit on the cylinder 2. The casing 25 has an annular recess 26 to receive a spring 27, the rear end of which abuts against a piston 28 in a piston chamber 29. A relief port 30 opens through the forward end of the piston chamber 29.

In order to actuate the piston 28, a by-pass 31 leads from the inlet passage 12 to the piston chamber 29 in rear of the piston 28. The by-pass 31 is controlled by a valve 32 cooperating with a valve seat 33 and is normally retained in engagement with such seat by a spring 34 the outer end of which abuts against a threaded plug 35. The valve stem of the valve 32 bears against a manually actuated lever 36 pivoted at 37 in the end cap 10 and cooperating with a stop 38.

The piston 28 has a forwardly projecting sleeve 39, provided with a slot 40. A removable plug 41 is threaded into the casing 26 and the cylinder 2 and extends through the slot 40 and has a reduced end 42 extending into the bore 17 in advance of the head of a punch 43 having its forward end tapered as at 44. The forward end of the sleeve 39 is closed by a flanged plug 45 in threaded engagement with it. A tubular contact member 46 is threaded into the plug 45 and has a flange 47 bearing against the plug 45. The stem of the punch is guided in the member 46 and when removed from the plug 45 a punch can be inserted or removed upon moving the plug 41 outwardly.

The inlet passage 12 is controlled by the valve 13 movable in a bore 48 in the end cap 10 and having an annular groove 49. The stem of the valve 13 bears against a manually actuated lever

50 pivoted at 51 and cooperating with a stop 52 on the cap flange 22. A spring 53 interposed between the end of the valve and a threaded plug 54 normally maintains the valve 13 in its closed position.

The operation will now be apparent to those skilled in this art and is as follows.

The tubes are inserted in their heads and the ends swaged over. The forward end of the punch is inserted into the tube and the lever 50 moved inwardly, thereby advancing the valve 13 and the motive fluid is admitted to the piston chamber 3 to effect the reciprocations of the hammering piston 4 in the well known manner. As soon as the punch has been driven into the end of the tube, the operator actuates the valve lever 36 and motive fluid enters the piston chamber 29 and moves the piston 28 forwardly. Since the power tool is being held against the work, the contact member 46 will move forwardly against the cylinder head carrying the tubes, and force the power tool rearwardly, thereby retracting the punch from the tube. The piston 28 is returned by its spring 27, and pressure in front of the piston on its forward stroke is relieved through the port 30.

When it is desired to change the punch 43, the plug 41 is unscrewed and also the contact member 46.

It will be apparent that by the use of a power tool to drive the punch and also to retract and withdraw it from its tight fit in the tube a material saving is obtained both in time and labor and in the cost of the operation of securing the tubes in their heads or end members.

When the valve 32 is in its closed position as shown in Figure 1, the pressure in rear of the piston 28 is relieved to the atmosphere through a passage 55 which is closed when the valve 32 is opened.

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

1. A power tool having a cylinder to receive a working tool, a piston chamber and a piston in the piston chamber to act on the working tool, means to admit motive fluid to the piston chamber to reciprocate the piston, an outer cylinder forming with the tool cylinder an outer piston chamber, a piston in said outer piston chamber and slidable on said tool cylinder and having a sleeve projecting beyond the forward end of said tool cylinder, a tubular contact member at the forward end of said sleeve through which the working tool can pass, and manually actuated means on the power tool to control admission of motive fluid to advance said second piston.

2. A power tool having a cylinder to receive a punch and a piston chamber with a reciprocating piston therein to act on said punch, means to control admission of motive fluid to reciprocate said piston, an outer cylinder forming with the first cylinder a second piston chamber, a second piston in said second piston chamber, a contact member at the forward end of said second piston and along which said punch passes, and means to actuate said second piston, said second piston being advanced towards the work to force the power tool rearwardly and thereby retract the punch.

3. A power tool having a cylinder to receive a punch and a piston chamber with a piston therein to act on said punch, means to control admission of motive fluid to the piston chamber to reciprocate said piston, an outer cylinder forming with the first cylinder a second piston chamber, a second piston in said second piston chamber, a contact member at the forward end of said second piston and through which the punch passes, and means to actuate said second piston, said second piston being advanced towards the work to force the power tool rearwardly and thereby retract the punch.

4. A power tool having a cylinder to receive a punch and having a piston chamber with a piston therein to act on said punch, means to control admission of motive fluid to the piston chamber to reciprocate said piston, an outer cylinder forming with the first cylinder a second piston chamber, a second piston in said second piston chamber, a contact member detachably connected with the forward end of said second piston, through which the punch passes and of greater diameter than the punch to provide for the removal of the punch when the contact member is disconnected from its piston, and means to actuate said second piston, said second piston being advanced towards the work to force the power tool rearwardly and thereby retract the punch.

5. The construction set forth in claim 4 having in addition means to limit the forward movement of the punch.

6. A power tool having a cylinder to receive a punch and a piston chamber with a piston therein to act on said punch, and having a manually controlled inlet passage to admit motive fluid to the piston chamber to reciprocate said piston, an outer cylinder forming with the first cylinder a second piston chamber, a second piston in said second piston chamber and having a forwardly projecting sleeve, a tubular contact member through which the punch passes and connected with the forward end of said sleeve, and means to bypass motive fluid from said inlet passage to advance said second piston, said second piston being advanced towards the work to force the power tool rearwardly and thereby retract said punch.

7. The construction set forth in claim 6 having in addition a spring to return said second piston to its rearward position.

KARL GIMPEL.