Oct. 28, 1924. 1,513,220

C. B. COATES

POWER HAMMER

Filed Aug. 14, 1922

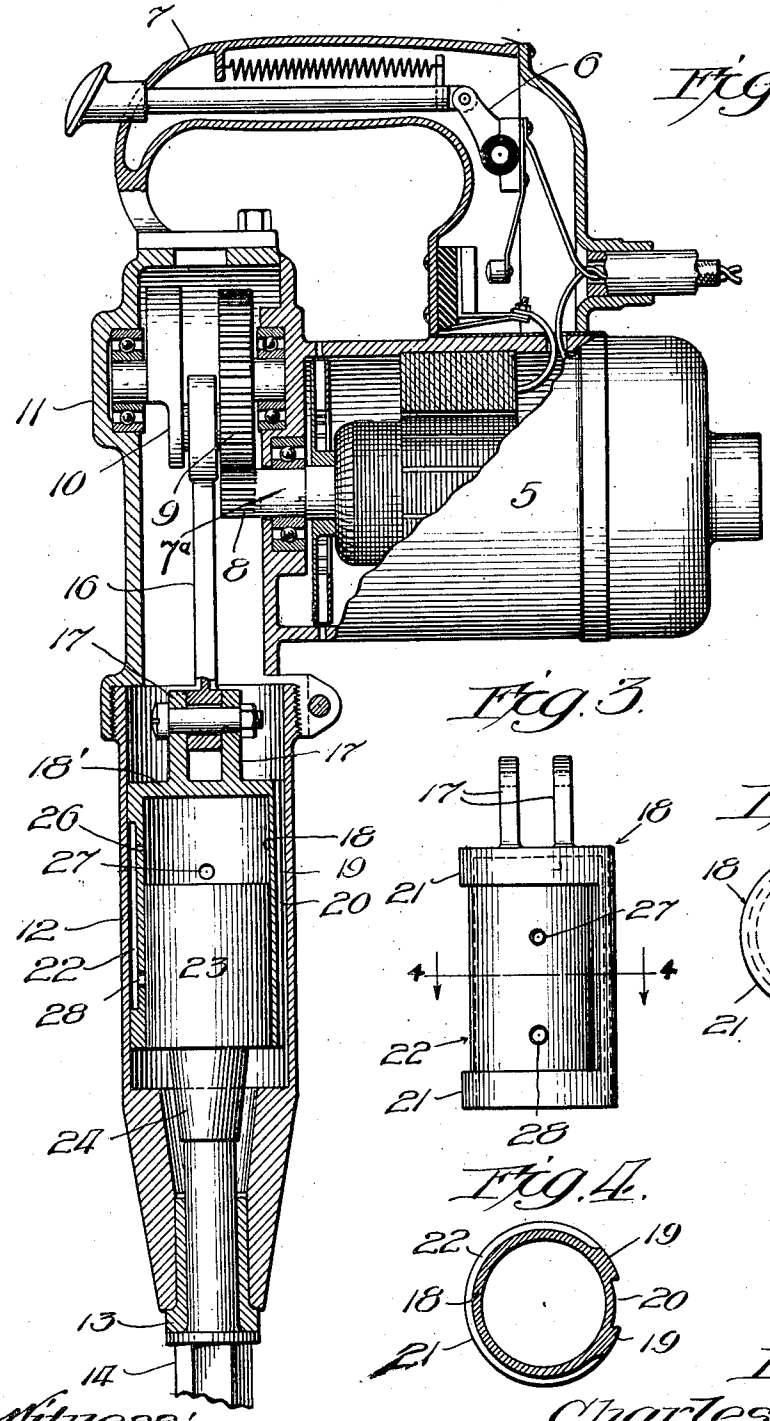


Fig. 1.

Fig. 3.

Fig. 2.

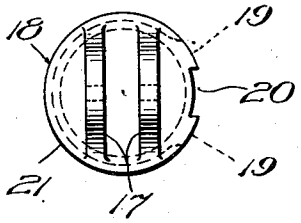


Fig. 4.

Witness:
Harry S. Gaither

Inventor:
Charles B. Coates

By Reator, Hibben, Davis & Macauley
Attys

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UNITED STATES PATENT OFFICE.

CHARLES B. COATES, OF ERIE, PENNSYLVANIA, ASSIGNOR TO CHICAGO PNEUMATIC TOOL CO., OF ERIE, PENNSYLVANIA, A CORPORATION OF NEW JERSEY.

POWER HAMMER.

Application filed August 14, 1922. Serial No. 581,594.

To all whom it may concern:

Be it known that I, CHARLES B. COATES, a citizen of the United States, residing at Erie, Erie County, and State of Pennsylvania, have invented certain new and useful Improvements in Power Hammers, of which the following is a specification.

My invention relates to a power hammer preferably, though not necessarily, operated by an electric motor as the prime mover and adapted to hammering purposes, such as chipping, drilling, and riveting by means of a chisel, drill, rivet set, or the like to one end of which the striking member of the drill imparts its blow. A hammer of this general type is shown in a co-pending application Serial No. 583,118, filed August 21, 1922, by J. W. Cunningham, in which is disclosed a hollow cylinder directly reciprocated by the motor to cause the piston mounted in the cylinder to deliver its blow upon the inner end of the shank of the working tool. It is customary in this type of tool to vent the forward or lower end of the barrel to the atmosphere to permit the free escape of air therefrom on the forward or down stroke of the cylinder and piston and the free admission of air thereto on the rearward or up stroke of the cylinder and piston, thus eliminating any pressure below the cylindrical piston on its down stroke and any tendency to produce a partial vacuum below it on its up stroke. Such venting of the tool is objectionable as the air drawn into the tool through the vents is charged with dust and dirt which materially retard and impair the efficient operation of the tool. The principal object of my invention is to employ an imperforate barrel which is not vented to the surrounding atmosphere, and provide novel and simple means for performing in an efficient and reliable manner the above functions accomplished by vents to the atmosphere. In the form of embodiment which I describe herein, such improved means comprises a groove in the wall of the cylinder, serving as a by-pass around the cylinder from one end of the barrel to the other.

Other features of advantage and utility in my power-hammer will be apparent from the description hereinafter given.

In the drawings, Figure 1 is a central sectional elevation of my power-hammer; Fig. 2 is a top plan view of the power operated hollow cylinder; Fig. 3 is a side elevation of such cylinder; and Fig. 4 is a section taken on the line 4—4 of Fig. 3.

The machine comprises essentially the motor structure and its housing or casing at the upper or rearward end of the tool and the barrel connected therewith containing the working parts, one of which is operated directly by the motor, the barrel also being adapted to receive the working tool at its lower or forward end. The motor, shown in the drawings, is an electric motor of any desired type, but it is obvious that any other form of motor may be employed if desired. The motor is mounted in the casing or housing 5 and is controlled by the manually operated switch 6 mounted in the usual handle 7 gripped by the hand of the operator. The inner end of the armature shaft 7^a of the motor is provided with a pinion 8 meshing with a gear 9 integral with the crank shaft 10 suitably journaled in bearings in the crank casing 11.

The hammer barrel 12, which may be of any suitable dimensions, is preferably secured to the lower end of the crank case and is preferably screw threaded at its upper end in order to screw into a threaded opening in the crank case. The lower end of the barrel is provided with an opening in which by preference is arranged a bushing 13 to receive the shank of the chisel or drill 14.

A connecting rod 16 is connected at its upper end to the crank shaft 10 and is connected at its lower end by a pin to parallel ears 17 integral with the upper end or head 18′ of the hollow air-cylinder 18. The cylinder 18 on one side is provided with two integral ribs 19 parallel with the axis of the cylinder and forming a groove 20 extending from one end of the cylinder to the other. Integral flanges or ribs 21 on the upper and lower ends of the cylinder merge at their ends into the vertical ribs 19 and the flanges and ribs have a sliding fit with the walls of the barrel. These flanges and ribs also bound an annular space 22 between the interior walls of the barrel and the walls of the

cylinder. A piston 23 is adapted to reciprocate in the cylinder 18 and has on its lower end a projection 24 through which the piston imparts its blow to the upper or rear end of the tool 14. The lower end of the cylinder 18 is open and the cylinder is provided with ports 26, 27 and 28 which are so arranged and proportioned that the piston is raised with the cylinder during the up or rear stroke of the latter and is caused to impart a quick, snappy and powerful blow to the tool 14 on the down or forward stroke of the cylinder, as described in the aforesaid Cunningham application.

It will be obvious that on the forward or down stroke of the cylinder 18 and piston 23, the air ahead of them in the lower end of the barrel is forced to escape through the groove or passage 20 to the upper end of the barrel above the cylinder 18 thus preventing the air from being trapped and compressed in the lower end of the barrel which would practically prevent the delivery of any forceful blow by the piston to the tool. On the rearward or up stroke of the cylinder, air passes from above the cylinder through the groove 20 into the lower end of the barrel and below the piston so that no partial vacuum can be created below the piston, which would prevent the proper raising of the piston due to the partial vacuum in the cylinder above the piston, as described in said Cunningham application. Therefore, my barrel is entirely imperforate so that no dust or dirt can enter the barrel and at the same time the above functions are performed through an extremely simple and cheap instrumentality, that is the groove 20, and in a highly efficient and satisfactory manner.

It is to be understood that I have shown my invention as applied to the type of power-hammer disclosed in said Cunningham application merely for the sake of illustration and that it may be embodied with equal facility in any other kind of hammer employing a reciprocating cylinder and piston therein.

I claim:

1. In a power-hammer, the combination of an imperforate barrel, a power operated hollow cylinder reciprocable therein and having its intermediate portion reduced in diameter to form a space between it and the inner walls of the barrel and having ports communicating between its interior and said space and also having a free air passage extending from one end to the other to vent the lower end of the barrel, and a piston movable in said cylinder.

2. In a power-hammer, the combination of an imperforate barrel, a power operated hollow cylinder reciprocable therein, having a free passage extending from one end of the cylinder to the other to vent the lower end of the barrel and having ports at different points intermediate its length and communicating with the interior of the cylinder, means of communication between said ports, and a piston movable in the cylinder.

3. In a power-hammer, the combination of an imperforate barrel, a power operated hollow cylinder reciprocable therein and having its intermediate portion reduced in diameter to form an air space between it and the inner walls of the barrel and having ports communicating between its interior and said space, parallel ribs on said cylinder in sliding engagement with said barrel, bounding the sides of said space and affording a groove extending from one end of the cylinder to the other to vent the lower end of the barrel, and a piston movable in said cyinder.

4. In a power-hammer, the combination of an imperforate barrel, a power operated hollow cylinder reciprocable therein and having exterior flanges and parallel longitudinally extending ribs into which the ends of the flanges merge to form a space between the cylinder and barrel bounded by said ribs and flanges and also providing a groove between the ribs to vent the lower end of the barrel, the flanges and ribs having a sliding fit with the barrel, and a piston movable in the cylinder, the latter having ports communicating with the interior of the cylinder and said space.

5. In a power-hammer, the combination of an imperforate barrel, a power operated hollow cylinder reciprocable therein having its upper end closed and its lower end open and having exterior arcuate flanges and parallel longitudinally extending ribs into which the ends of the flanges merge to form a space between the cylinder and barrel bounded by said ribs and flanges and also providing a groove between the ribs to vent the lower end of the barrel, the flanges and ribs having a sliding fit with the barrel, and a piston movable in the cylinder, the latter having ports communicating with the interior of the cylinder and said space.

6. In a power-hammer, the combination of an imperforate barrel, a power operated hollow cylinder arranged to be reciprocated in said barrel, said cylinder having an unrestricted open end, a piston freely movable in said cylinder, means whereby the reciprocation of said cylinder imparts movement to said piston to deliver blows upon a working tool through the open end of said cylinder, and means for bypassing the air around said cylinder to prevent compression and rarification of air below said piston.

7. In a power hammer, the combination of an imperforate barrel, a power operated hollow cylinder arranged to be reciprocated

in said barrel, said cylinder having a reduced central portion providing an arcuate space between it and the inner walls of said barrel and forming axially disposed ribs providing an intermediate groove for establishing communication above and below said cylinder, and a piston within said cylinder controlling ports opening into said space whereby said piston is caused to reciprocate within said cylinder in response to movement of the latter, compression and rarification of air below said piston being prevented by said groove.

CHARLES B. COATES.