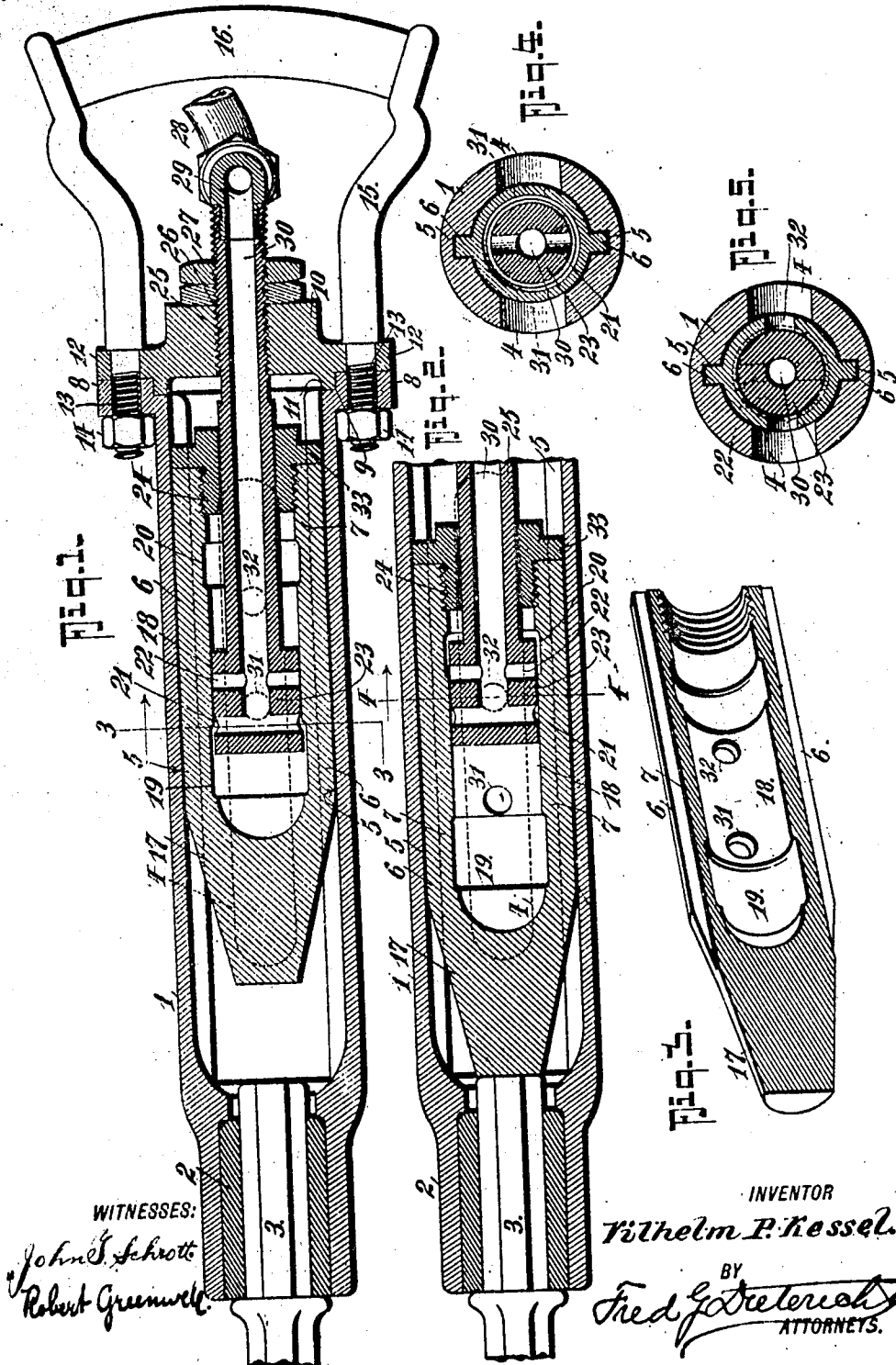


V. P. KESSEL.
PNEUMATIC HAMMER.
APPLICATION FILED OCT. 7, 1912.

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1,050,951.



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UNITED STATES PATENT OFFICE.

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ROCK DRILL COMPANY, OF SAN FRANCISCO, CALIFORNIA, A COPARTNERSHIP.

PNEUMATIC HAMMER.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, VILHELM P. KESSEL, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Pneumatic Hammers, of which the following is a specification.

My invention relates to the art of pneumatic hammers for use in rock drilling apparatus, riveting apparatus, pile driving apparatus, drop hammer forging apparatus, and the like, and the invention primarily has for its object to simplify and reduce the expense of construction of such apparatus and to increase the strength of hammer and efficiency of operation.

In its general nature the invention comprises a support in which the drill or riveting tool, as the case may be, is adapted to be held and which carries the usual handle for the operator. The support also serves to contain the reciprocating hammer cylinder in which the stationary piston operates.

In its more subordinate nature the invention includes those novel details of construction, combination and arrangement of parts, all of which will be first fully described, and then be specifically pointed out in the appended claims, reference being had to the accompanying drawing, in which:—

Figure 1 is a vertical longitudinal section of the invention as applied for use on rock drills, the hammer cylinder being positioned near the rearward limit of its stroke. Fig. 2 is a detail section similar to Fig. 1 showing the hammer cylinder in its impacting position. Fig. 3 is a longitudinal sectional perspective of the hammer cylinder. Figs. 4 and 5 are cross sections on the lines 3—3 and 4—4 respectively of Figs. 1 and 2 respectively.

In the drawings in which like numerals designate like parts in all the figures, 1 represents the support which is in the nature of an elongated tubular casing whose front end carries the chuck 2, in which the tool 3 is held. The support 1 has oppositely disposed openings 4, which form the exhaust outlets through the casing 1. The casing 1 also is provided with oppositely disposed grooves 5 in which the feathers 6, of the hammer cylinder 7, ride during the reciprocations of the hammer cylinder. At its rear end the casing 1 is flanged, as at 8, and counterbored, as at 9, to receive the cap 10 which

has a flange 11 to rest in the counterbore 9 and a flange 12 to abut the flange 8. The cap 10 is held in place by the screws 13 and check nuts 14 of the handle arms 15 which carry the hand hold 16. The hammer cylinder 7 has a solid impacting head 17 at its front end and is bored as at 18 from its rear end to form the piston chamber. At suitable places, the hammer cylinder 7 has internal counterbores 19 and 20 to cooperate with the ports 21 and 22 respectively of the piston 23. The rear end of the cylinder 7 is closed by a threaded plug 24 which is bored to permit passage of the piston rod 25 which is of less diameter than the diameter of the bore 18, as best shown in Figs. 1 and 2 of the drawing. The piston rod 25 also extends through the cap 10 into which it is threaded, as at 26, and held by jam nuts 27. The source of working agent supply is connected by a suitable connection 28 and 29 with the piston rod 25, it being understood that the rod 25 has a passage 30 from its entrant end to the ports 22 and 21 respectively.

Between the counterbores 19 and 20 and adjacent thereto, the hammer cylinder 7 has exhaust ports 31 and 32, the front port 31 serving to exhaust the working agent between the piston 23 and the head 17, while the rear port 32 serves to exhaust the working agent between the piston 23 and the plug 24. The plug 24 has lugs 33 which also ride in the slots 5, and thus keep the plug from unscrewing and hold it always in proper position with regard to the hammer cylinder 7.

In operation working agent (steam, air, or other fluid) is admitted into the duct 30 and flows to one or the other of the ports 21 or 22 accordingly as such ports are in communication with the counterbore 19 or the counterbore 20. Assume the parts to be as shown in Fig. 1, the working agent passing through the duct 30 and port 21 will enter the cylinder 7 between the head 17 and the piston 23, thus exerting its expansive force to drive the cylinder 7 forwardly toward the position shown in Fig. 2. The movement of the piston 7 under the influence of the working agent occurs until the port 21 is covered by the cylinder 7 and the exhaust port 31 is uncovered during the forward movement of the cylinder 7. By the time the port 31 is uncovered the expansive action of the working agent will have spent itself leaving

little or no pressure in advance of the piston 23. As soon as the piston 23 has been passed by the cylinder 7 to close the port 32, the residual contents of the cylinder 7 between the piston 23 and the plug 24 will become compressed slightly to act as a cushion until the port 22 comes into register with the counterbore 20, whereupon the fluid working agent will enter the cylinder 7 between the piston 23 and the plug 24 to force the cylinder 7 from left to right in Fig. 2, thereby reversing its direction of movement. The back and forth reciprocations of the cylinder 7 continue so long as working agent is admitted into the duct 30, as will be readily understood by reference to the drawing.

It will be noted that by my construction, the parts are simplified to the greatest practicable degree and they are made light and strong. But little machining is required and special packing devices are unnecessary to prevent the escape of the working fluid, to the hindrance of the working of the apparatus.

From the foregoing description, taken in connection with the accompanying drawing, it is thought the complete construction operation and advantages of the invention will be apparent to those skilled in the art.

What I claim is:—

1. A supporting casing opened at one end, a hammer cylinder longitudinally movable in said casing, said casing having at least one longitudinal groove, and said hammer cylinder having at least one longitudinal feather or rib to operate in said groove and thereby hold said cylinder from turning on its axis, a piston held within said cylinder, a piston rod projecting into said cylinder and casing, means rigidly holding said rod to said casing, said rod having a working agent passage from its outer end to said piston, said piston having two distinct sets of radial ports in communication with said longitudinal passage of the piston rod, said hammer cylinder having grooves cooperating with said radial ports, said hammer cylinder having two distinct exhaust ports controlled by said piston, said casing having openings to receive the discharge from said

exhaust ports, substantially as shown and described.

2. A supporting casing, a hammer cylinder longitudinally movable therein, a piston within said cylinder, a piston rod projecting into said cylinder and casing, means rigidly holding said rod to said casing, said piston and cylinder having cooperative ports and grooves respectively, and means for leading working agent through said piston rod to said ports, said cylinder having exhaust ports controlled by said piston, said casing having exhaust openings registering with said exhaust ports, and means for holding said cylinder from turning to thereby maintain said exhaust ports in alinement with said casing openings regardless of the position of said hammer cylinder.

3. A supporting casing open at one end, a hammer cylinder operable in said casing and insertible through said open end, said casing having at least one longitudinal groove, and said hammer cylinder having at least one feather to cooperate with said groove, said hammer cylinder being reciprocable in said casing, a cap for closing the open end of said casing, a piston rod secured to said cap and projecting into said casing and into said hammer cylinder, a piston within said hammer cylinder on said piston rod, said hammer cylinder having an open end through which said piston rod projects, a plug threaded into said open end of said hammer cylinder, said plug having a lug to enter said casing groove, said piston rod having a hollow passage from its outer end to said piston, said piston having ports and said hammer cylinder having counterbores or grooves to cooperate with said ports for admitting the working agent to either end of said hammer cylinder, said hammer cylinder having exhaust ports controlled by said piston, and said casing having exhaust openings cooperating with said exhaust ports, substantially as shown and described.

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Witnesses:

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