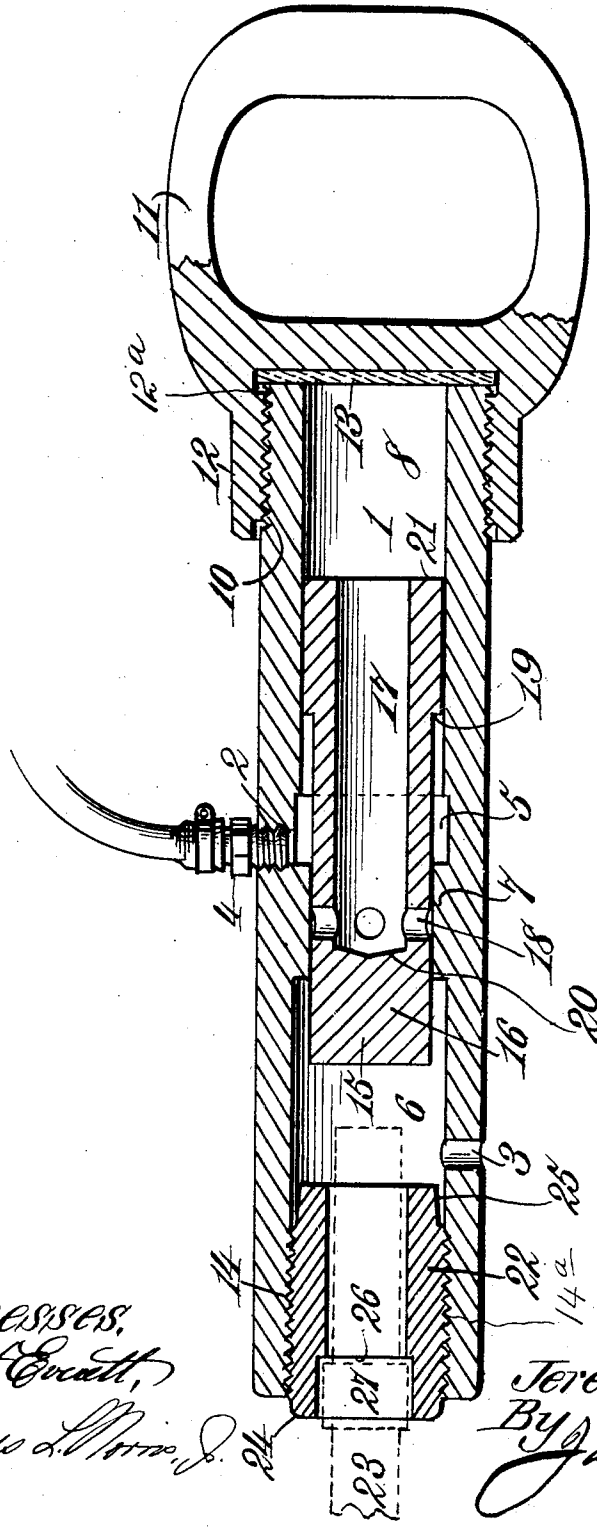
No. 805,222. PATENTED NOV. 21, 1905.

J. MURPHY.

PNEUMATIC HAMMER.

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Witnesses,
Robert Ewalt,
James L. Norris, Jr.

Inventor,
Jeremiah Murphy
By James L. Norris
Atty.

UNITED STATES PATENT OFFICE.

JEREMIAH MURPHY, OF LEADVILLE, COLORADO, ASSIGNOR TO CHARLES T. CARNAHAN, OF LEADVILLE, COLORADO.

PNEUMATIC HAMMER.

No. 805,222. Specification of Letters Patent. Patented Nov. 21, 1905.

Application filed March 10, 1905. Serial No. 249,500.

To all whom it may concern:

Be it known that I, JEREMIAH MURPHY, a citizen of the United States, residing at Leadville, in the county of Lake and State of Colorado, have invented new and useful Improvements in Pneumatic Hammers, of which the following is a specification.

This invention relates to pneumatic hammers known as "pneumatic hand-tools" and which are particularly adapted for use in connection with percussion-drills for drilling openings in rock for blasting purposes in mining, and has for its object to simplify the construction of such hammers in a manner as hereinafter more specifically referred to, so that the hammer will be efficient and at the same time inexpensive in cost of construction and maintenance, not liable to get out of order through complication of parts, and in which the shock or vibration shall be reduced to a minimum.

With the foregoing and other objects in view the invention consists of the novel construction, arrangement, and combination of parts hereinafter more specifically described, and illustrated in the accompanying drawing, which forms a part of this specification and wherein is shown the preferred embodiment of the invention; but it is to be understood that changes, variations, and modifications can be resorted to which come within the scope of the claim hereunto appended.

In the drawing is illustrated a longitudinal sectional view of a pneumatic hammer or hand-tool constructed in accordance with this invention.

The pneumatic hammer according to this invention is portable and is known as "valveless," in which the striking piston or hammer proper constitutes in itself the controlling-valve by means of which its motion is reversed.

Referring to the drawing by reference characters, 1 denotes the cylinder of the hammer open at each end and with the wall thereof imperforate, with the exception of a transversely-extending inlet-port 2 and a transversely-extending outlet-port 3. The port 2 is screw-threaded, so as to receive the nipple 4, which communicates with a compressed-air supply, and said port 2 is arranged approximately centrally of the cylinder 1. The port 3 is formed in the cylinder near one end thereof, or, in other words, at a point intermediate the port 2 and the drill-receiving end of the cylinder 1.

The cylinder 1 is bored in such a manner as to form an air-receiving chamber 5 and an exhaust-chamber 6, the chamber 5 communicating with the port 2 and the chamber 6 communicating with the port 3, and interposed between the chambers 5 and 6 is an annular shoulder 7, forming the bottom wall of the chamber 5 and the top wall of the chamber 6, or, in other words, the shoulder acts as a means for permanently closing communication between the chambers 5 and 6 otherwise than through the piston or hammer to be hereinafter referred to. The chamber 5 opens at its top into an air-expansion chamber 8, whose diameter is not as great as the chamber 5, and said chamber 8 extends from the chamber 5 to the inner end of the cylinder 1. The inner end of the cylinder 1 is exteriorly screw-threaded, as at 10, and which receives the gripping-handle 11. The latter terminates in an interiorly-screw-threaded annular cap 12, adapted to engage the screw-threads 10, thereby connecting the cap and handle to the cylinder. The cap 12 is provided with a recess 12^a, adapted to receive a sealing medium 13 for closing the inner end of the cylinder 1. Said sealing medium 13 when in position abuts directly against the edge of the inner end of the cylinder and is clamped into position through the medium of the cap 12 when the latter is screwed upon the cylinder 1.

The outer end of the cylinder 1 is provided with left and right interior screw-threads 14 14^a, respectively, which terminate at a point removed from the outlet 3, and the function of said screw-threads 14 14^a will be hereinafter referred to.

The reference character 15 denotes the hammer or piston having its lower portion solid, as at 16, forming what may be termed the "head" of the hammer, and the remaining portion of the length of the hammer or piston 15 is hollow, so as to form an expansion-chamber for the motive fluid, as at 17, which opens into the expansion-chamber 8 and also communicates with a plurality of transversely-extending ports 18, said ports 18 adapted at certain positions of the hammer or piston to communicate with the chambers 5 and 6. The piston or hammer 15 is further provided with an exteriorly-arranged pressure-shoulder 19, which associates with the incoming motive

fluid, so as to cause the return stroke of the piston or hammer 15, and the said piston or hammer 15 is further provided with an interiorly-arranged conical pressure-surface 20, which associates with the pressure-surface 21 of the piston or hammer, so that on the expanding of the motive fluid in the chambers 8 and 17 against the said surfaces it will cause the instroke of the hammer or piston.

The cylinder 1 has arranged in its outer end a sleeve 22, forming a drill-socket to receive the shank of the drill, the latter being shown in dotted lines and indicated by the reference character 23. The sleeve 22 is exteriorly screw-threaded and engages with the threads 14. The threads of the sleeve 22 do not extend from end to end of the sleeve, but terminate at a point removed from the inner and outer ends. By terminating the threads at a point removed from the outer end the sleeve 22 when in operative position projects from the outer end of the cylinder, as at 24, which projecting end is rounded. The threads of the sleeve, as stated, terminate at a point removed from the inner end thereof and which forms a smooth inner portion 25, which is formed in a conical manner, so as to project away from the inner face of the cylinder 1, and which facilitates the insertion and removal of the sleeve 22 within and from the cylinder. The sleeve 22 is of such length that when it is in position in the cylinder to have its inner end in close proximity to the outlet 3 and the said inner end of the sleeve 22, as well as the inner end of the shank, receives the blows of the hammer or piston. By providing the sleeve 22 it forms a stop for the blows of the hammer, if through any cause the shank is not properly positioned, and, furthermore, it overcomes the employment of an entirely new cylinder if the shoulder now in general use, which forms a part of the cylinder to receive the blows from the hammer, is battered or broken away, owing to the fact that if the sleeve 22 becomes injured in any manner it can be removed and a new one inserted; otherwise if the inner face of the cylinder 1 was provided with the annular shoulder and said shoulder was battered or broken away or injured in any manner and the operation of the engine, owing to such fact, was retarded it would necessitate an entirely new cylinder, whereas if the sleeve 22 becomes injured it can be very easily removed and a new one inserted. The inner face of the sleeve 22 is formed with a shoulder 26, which acts as an abutment for the stop-collar 27 of the drill.

In the drawing the limit of the instroke of the piston is shown in dotted lines, and the limit of the outstroke of the piston is at the inner end of the sleeve 22. It will be assumed that the position of the piston or hammer is as shown in the drawing, and the operation of the engine is that the incoming air bearing against the shoulder 19 will force the piston outwardly until the ports 18 communicate with the chamber 5. Then the incoming air will pass through the ports 18 into the chamber 17 and up into the chamber 8, where the expanding of the air acting against the surfaces 20 and 21 will cause the outstroke of the piston, so it will impart a blow to the sleeve 22 and the shank of the drill. As the piston or hammer travels outwardly the ports 18 will be inclosed by the shoulder 7, and upon said ports 18 clearing the shoulder 7 the air will be exhausted into the chamber 6 and from there out through the port 3 and also through an axial bore in the drill. (Not shown.) After this exhausting operation the pressure of the expanding air against the piston or hammer will not be as great as the incoming air. Consequently said incoming air acts against the shoulder 19 and will cause the instroke of the piston. The diameter of the piston or hammer 15 is such that there will be a close fit, but with sufficient clearance to enable the operation of the piston or hammer between the inner face of the upper portion of the cylinder 1 and the piston 15 and between the piston 15 and the shoulder 7.

From the foregoing description, taken in connection with the accompanying drawing, it will be evident that a simplified construction of pneumatic hammer or what may be termed "pneumatic hand-tool" is set up and that the circumferential or longitudinally-extending air-passages in the cylinder as now in general use are dispensed with and that the air is taken directly through a single transversely-extending inlet formed in the cylinder, and by such construction the strength and durability of the cylinder 1 is materially increased, and this is also evident owing to the fact that preferably a single outlet-port 3 is provided and which is arranged between the inlet and the inner end of the cylinder 1. It will also be evident that by constructing the handle in the manner as set forth and securing it to the inner end of the cylinder 1 it facilitates the gripping of the handle, and at the same time the handle acts as a securing means for the sealing medium for closing the outer end of the cylinder 1, and, furthermore, it is evident that, owing to the removability of the handle, if the same should become broken it would not be necessary to throw the entire tool away, as a new handle can be readily secured in position after the broken one has been removed.

The area of the pressure-shoulder 19 is less than the combined area of the pressure-surfaces 20 and 21, so that when the compressed air, gas, or other motive agent acts upon the surfaces 20 and 21 the pressure thereon will overcome the pressure on the comparatively small pressure surface or shoulder 19.

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

A portable pneumatic hammer comprising

a cylinder having a transversely-arranged inlet extending entirely through the wall thereof and a transversely-arranged outlet extending entirely through the wall thereof and with the remaining portion of the wall of the cylinder imperforated, said inlet and outlet being arranged out of alinement with respect to each other, said cylinder further provided with exterior screw-threads at its inner end and interior screw-threads at its outer end, a nipple secured in said inlet and adapted to be connected to an air-supply pipe, an annular cap having interior screw-threads engaging the exterior screw-threads of the cylinder for connecting the latter therewith, said cap further provided with a recess, a sealing medium mounted in said recess and abutting against the inner end of the cylinder and retained in position by said cap, a handle formed integrally with said cap, a removable sleeve engaging the interior screw-threads of said cylinder and constituting a drill-socket, said sleeve provided at its inner end with a conical portion projecting away from the inner face of the cylinder, and a piston operating in said cylinder and having an expansion-chamber opening into the cylinder, and further provided with ports adapted to communicate with the interior of the cylinder, said piston acting as a valve for closing said outlet-port and adapted to engage the conical portion of said cylinder.

In testimony whereof I have hereunto set my hand in presence of the subscribing witnesses.

JEREMIAH MURPHY.

Witnesses:
ERNESTINE KUEHL,
FRED. W. WATKINS,
JOHN A. EWING.