No. 834,187.

PATENTED OCT. 23, 1906.

C. T. CARNAHAN.

PNEUMATIC HAMMER.

APPLICATION FILED MAR. 9, 1906.

Fig. 1.

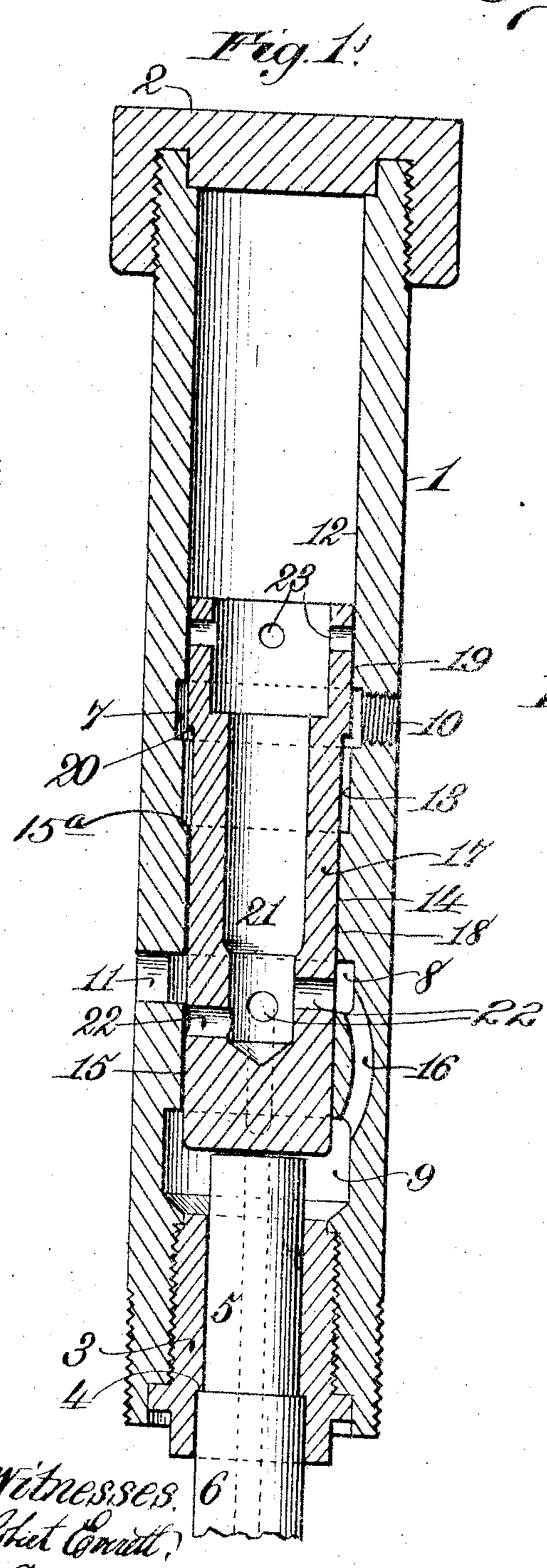


Fig. 2.

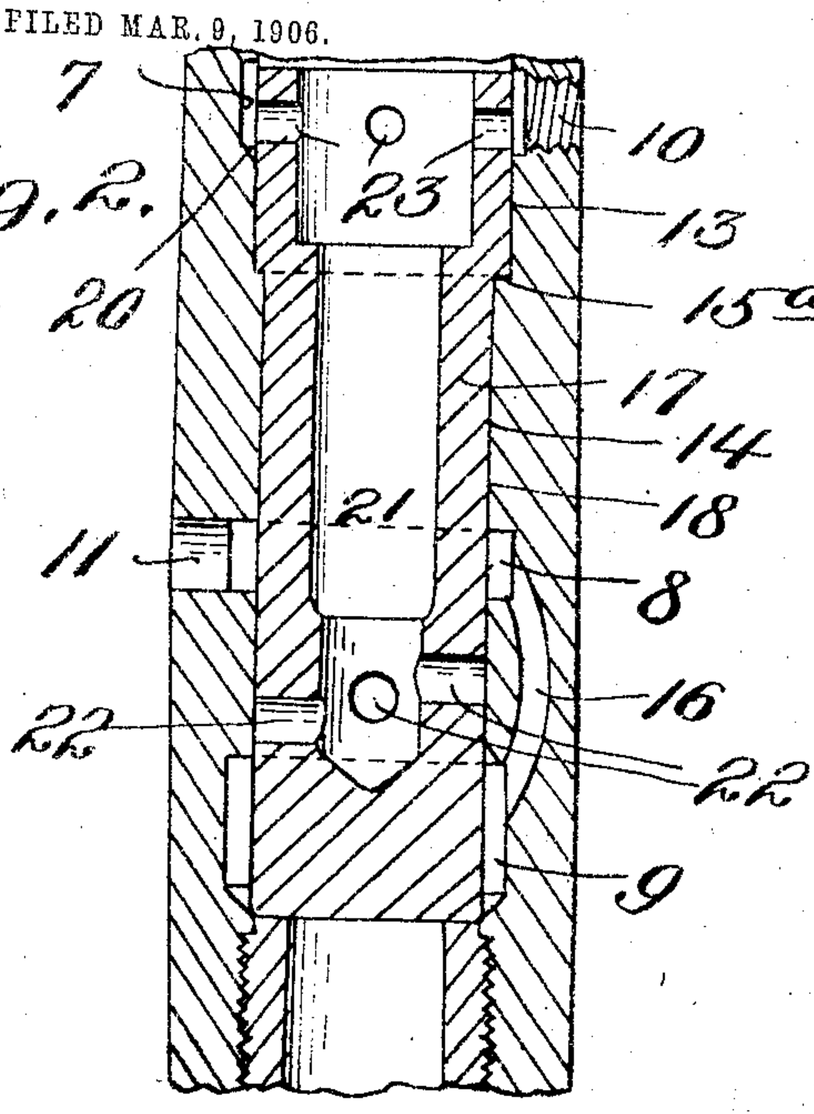
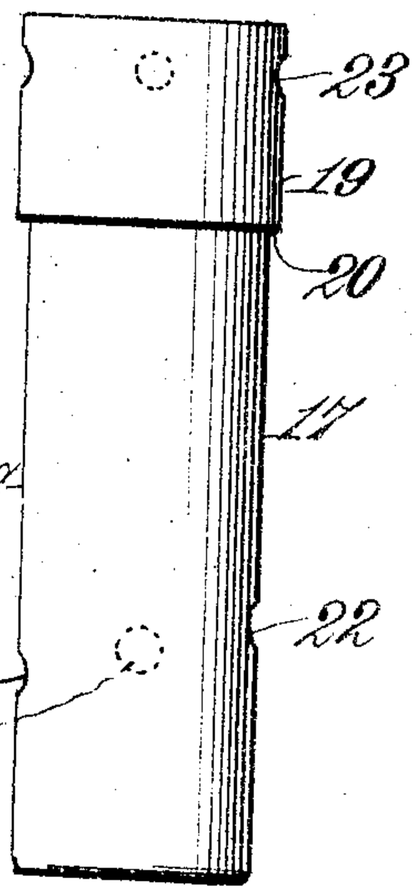


Fig. 3.



Witnesses.
Robt Gould,
Ernest E. Kearer

Inventor:
Charles T. Carnahan.
By James L. Norris
Atty.

UNITED STATES PATENT OFFICE.

CHARLES T. CARNAHAN, OF DENVER, COLORADO.

PNEUMATIC HAMMER.

No. 834,187. Specification of Letters Patent. Patented Oct. 23, 1906.

Application filed March 9, 1906. Serial No. 305,171.

To all whom it may concern:

Be it known that I, CHARLES T. CARNAHAN, a citizen of the United States, residing at Denver, in the county of Denver and State of Colorado, have invented new and useful Improvements in Pneumatic Hammers, of which the following is a specification.

This invention relates to percussive devices, more particularly that class of percussive devices styled "pneumatic drills" which are particularly adapted for use for drilling and boring when mining, and aims to provide a pneumatic drill with means, as hereinafter referred to, for automatically discontinuing the operation of the hammer of the drill when the tool of the drill is not positioned so as to receive the blow of the hammer, thereby preventing the unnecessary operation of the drill and obtaining a great saving of the motive fluid, which would not be the case if the hammer was continually operated without striking the shank of the tool.

The invention further aims to provide a pneumatic drill with means as hereinafter set forth to prevent damage to the tool-socket or bushing when the shank of the tool is not in position to receive the blows of the hammer, as in such instance the blows of the hammer fall upon the bushing or tool-socket, and in this connection it will be stated that through carelessness on the part of an operator it often happens that the body of the drill is not held firmly up against the tool, so that the shank of the tool will not receive the blows of the hammer. It is a well-known fact that an operator often positions the body of the drill with respect to the tool so that the shank of the tool does not project beyond the bushing or tool-socket to receive the blows of the hammer, and when positioned in such manner the hammer reciprocates, striking the tool-socket or bushing and causing a great deal of damage, such objection being the greatest difficulty with the pneumatic drills now in general use. Beside this, when the hammer is allowed to reciprocate in a manner as stated—that is to say, so as not to impart blows to the shank of the tool—such reciprocation of the hammer is using up any quantity of the motive fluid without beneficial results and also the operator is wasting his time. In mines it is not possible for a foreman or superintendent to keep his eye on all the operators, as it is in other classes of work, and the foreman or superintendent generally depends on sound to know whether the operators under him are as industrious as they should be. So under such conditions it was possible for an operator to run his drill as if he was working quite industriously and yet through carelessness allow the hammer to reciprocate a large part of the time without striking the shank of the tool, so as to perform the drilling or boring operation, and consequently the foreman or superintendent would know nothing about such action without being present to see the operator; but by providing a drill of the class referred to with means as hereinafter described the operator cannot cause a reciprocation of the hammer unless the tool is drilling or boring rock.

A further advantage obtained by providing a drill of the class referred to with means as hereinafter described it will not necessitate the operator manually shutting off the motive-fluid supply to discontinue the operation of the drill when the operator wishes to discontinue the drilling or boring to clean up the hole or for some other reason. It is generally the case that when the operator desires to clean up the hole when the drill is set up, or for some other purpose, after the motive fluid is cut off the operator throws the drill down in the bottom of the drift where from the movement of the operator himself stepping around or from the movement of the motive-fluid hose or from some other cause the valve will often be opened again and the drill started to operate while in the position set. When it does operate in such manner, it jumps around over the bottom of the drift and causes a great deal of trouble to the operator to catch hold of it and stop the operation thereof. When it is desired that the operator discontinue the reciprocation of the hammer or the operation of the drill, all that is necessary is for the operator to lift the body portion of the drill off the tool, and such action on the part of the operator will cause the automatic discontinuing of the operation of the drill, and there is no danger of the drill again operating until it is placed on the shank of the tool so that said shank will be positioned to receive the blows of the hammer of the drill.

The invention further aims to provide a pneumatic drill with means as hereinafter referred to and for the purpose set forth which shall be simple in its construction and arrangement, strong, durable, efficient in its use, and comparatively inexpensive when

setting up the same in connection with the drill.

With the foregoing and other objects in view the invention consists of the novel construction, combination, and arrangement of parts hereinafter more specifically described, and illustrated in the accompanying drawings, which form 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 claims hereunto appended.

In describing the invention in detail reference is had to the accompanying drawings, wherein like reference characters denote corresponding parts throughout the several views, and in which—

Figure 1 is a vertical section of the cylinder of a pneumatic drill constructed in accordance with this invention. Fig. 2 is a view similar to Fig. 1, but broken away at each end, showing the hammer at its lowermost position. Fig. 3 is a side elevation of a reciprocatory hammer.

Referring to the drawings by reference characters, 1 denotes the cylinder or body portion of the drill, closed at one end by a cap 2 or other suitable means and at its other end provided with a screw-threaded bushing 3, constituting a tool-socket and having exterior screw-threads engaging interior screw-threads formed on the inner face of the cylinder. The bushing 3 has its inner face formed with an annular shoulder 4, against which is adapted to abut a corresponding shoulder formed on the shank 5 of the tool 6. The inner face of the cylinder 1 is formed with a recess 7, constituting a motive-fluid-receiving chamber, is further recessed, as at 8, to constitute a primary motive-fluid-outlet chamber, and is also recessed, as at 9, to constitute a second motive-fluid-outlet chamber. The cylinder 1 has its wall formed with an opening, with the wall thereof screw-threaded, as at 10, and to the said screw-threaded wall of the opening the inlet-nipple (not shown) of the motive-fluid-supply pipe or hose line is connected. The inlet-nipple is adapted to open into the motive-fluid-receiving chamber 7. Communicating with the primary motive-fluid-outlet chamber is the motive-fluid outlet 11, which is formed in the wall of the cylinder 1. The portions indicated by the reference characters 12 13 of the inner face of the cylinder 1 are of the same diameter, and the portions 14 15 of the inner face of the cylinder 1 are also of the same diameter; but the said portions 14 15 are of less diameter than the portions 12 13, and thereby there is formed at the junction of the portion 14 with the portion 13 a shoulder 15^a for a purpose to be hereinafter referred to. The wall of the cylinder 1 is formed with a plurality of passages 16, which communicate at their upper ends with the chamber 8 and at their lower ends open into the chamber 9. The function of the passages 16 will be hereinafter referred to.

The hammer of the drill is indicated by the reference character 17 and is constructed of two different diameters, the major portion of which being of less diameter than the remaining portion, said major portion being indicated by the reference character 18 and the remaining portion by the reference character 19. By constructing the hammer in a manner as stated a shoulder 20 is formed at the junction of the portion 18 with the portion 19 of the hammer 17. The diameter of the portion 18 is substantially equal to that of the diameter of either of the portions 14 15 of the inner face of the cylinder 1, and the diameter of the portion 19 of the hammer 17 is substantially equal to that of either of the portions 12 13 of the inner face of the cylinder 1. The hammer 17 is formed with a chamber, which extends from the end of the portion 19 of the hammer 17 and terminates at a point removed from the free end of the portion 18. The portion 18 is formed with a plurality of ports 22, lying in different planes and which open into the chamber 21 and constitute outlet-ports for said chamber. The portion 19 of the hammer 17 is formed with a plurality of ports 23, which open into the chamber 21 and constitute inlet-ports for said chamber 21.

The manner in which the reciprocation of the hammer 17 is automatically discontinued is as follows: In drills of the character referred to the shank 5 of the tool 6 is of such length as to project above the inner edge of the bushing 3, so that said shank will receive the blows of the hammer. If the shank does not project above the inner end of the bushing 3, then the inner end of the bushing receives the blows of the hammer. Now it will be assumed that the shank 5 extends inwardly in the cylinder 1 at a point above the inner end of the bushing 3, and when in such position and the hammer reciprocates in one direction the hammer strikes the end of the shank and stops at a point so that the motive fluid in the chamber 21 will exhaust through the ports 22 into the chamber 8, and a part of the exhaust will then pass through the passages 16 into the chamber 9 and from said chamber through the axial bore in the tool. Now it will be assumed that the shank of the tool is positioned in such a manner that it does not extend inwardly such a distance so that it will be in the path of the hammer to receive the blows thereof. Therefore when the hammer is reciprocated in one direction it will strike the inner end of the bushing 3, and when in this position the ports 22 will be closed by that portion 15 of the cylinder 1. The hammer 17 will then be positioned in the cylinder 1 so that the ports 23 will open into the chamber 7. The motive fluid which is then admitted

through the inlet-nipple passes through the ports 23 into the chamber 21 and holds the hammer down on the bushing, thereby automatically stopping the reciprocation of the hammer. Now if the body portion of the drill be pushed down on the tool, so that the tool will extend above the bushing 3, which at the same time will force the hammer in an opposite direction, the ports 23 are pushed clear of the chamber 7, and the ports 22 will then open into the chamber 8 and the motive fluid exhausted. At this position the shoulder 20 is then in the chamber 7, and the hammer makes its return stroke, owing to the pressure of the motive fluid on said shoulder 20, and moves in a return direction until ports 22 open into the chamber 7, so that the incoming motive fluid will pass through said ports 22 into said chamber 21 and above the hammer and cause the movement of the hammer in an opposite direction.

It will be observed that when the tool is removed, or rather the shank of the tool is not in position to receive the blows of the hammer, the shoulder 20 must pass the chamber 7, and consequently compress the motive fluid ahead of it, which is evident, owing to the arrangement of the shoulder 15ª on the inner face of the cylinder 1 and also as there is no outlet for the motive fluid. Such action cushions the blow on the bushing, so that the hammer does not come down very hard theeron. This is necessary, for if the blow of the hammer was not cushioned and the hammer should strike the bushing 3 very hard it would rebound, and consequently the reciprocation of the hammer would not be discontinued.

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

1. A pneumatic drill comprising a cylinder provided with a motive-fluid-receiving chamber, a primary motive-fluid-exhaust chamber, a second motive-fluid-exhaust chamber, passages for establishing communication between the two exhaust-chambers, an exhaust for the primary exhaust-chamber, an inlet for the receiving-chamber, and a chambered hammer provided with inlet and outlet ports adapted to communicate with the receiving-chamber and one of the exhausting-chambers.

2. A pneumatic drill comprising a cylinder provided with a motive-fluid-receiving chamber, a primary motive-fluid-exhaust chamber, a second motive-fluid-exhaust chamber, passages for establishing communication between the two exhaust-chambers, an exhaust for the primary exhaust-chamber, an inlet for the receiving-chamber, and a chambered hammer provided at one end with inlets for the chamber therein and at its other end with outlet-ports for the chamber therein, said outlet-ports lying in different planes and adapted to communicate with the receiving-chamber and one of the exhausting-chambers.

3. A pneumatic drill comprising a cylinder provided with a motive-fluid-receiving chamber, a primary motive-fluid-exhaust chamber, a second motive-fluid-exhaust chamber, passages for establishing communication between the two exhaust members, an exhaust for the primary exhaust member, an inlet for the receiving-chamber, a chambered hammer provided at one end with inlets for the chamber therein and at its other end with outlet-ports for the chamber therein, said outlet-ports lying in different planes and adapted to communicate with the receiving-chamber and one of the exhausting-chambers, and means forming a part of the cylinder and hammer for cushioning the stroke of the hammer for the purpose set forth.

4. A pneumatic drill comprising a cylinder provided with an inlet, a pair of exhaust-chambers, passages for establishing communication between the two exhaust-chambers, an outlet for one of said exhaust-chambers, and a chambered hammer provided with inlet and outlet ports adapted to communicate with the inlet of said cylinder and one of the exhaust-chambers.

5. A pneumatic drill comprising a cylinder provided with an inlet, a pair of exhaust-chambers, passages for establishing communication between the two exhaust-chambers, an outlet for one of said exhaust-chambers, and a chambered hammer provided with inlet and outlet ports adapted to communicate with the inlet of said cylinder and one of the exhaust-chambers, in combination with a tool having an axial bore communicating with one of the exhaust-chambers.

6. A pneumatic drill comprising a cylinder provided with an inlet, a primary exhaust-chamber, a second exhaust-chamber, passages for establishing communication between the two exhaust-chambers, an outlet for the primary exhaust-chamber, and a chambered hammer provided at one end with inlet-ports for the chamber therein and at its other end with outlet-ports for the chamber therein, said outlet-ports adapted to communicate with the inlet of the cylinder and with one of said exhaust-chambers and said inlet-ports adapted to communicate with the inlet of the cylinder.

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

CHARLES T. CARNAHAN.

Witnesses:
J. M. SCHUMESER,
DANIEL MURPHY.