T. WARSOP.
ROCK DRILL AND OTHER PERCUSSION TOOL.
APPLICATION FILED SEPT. 8, 1904.

PATENTED DEC. 17, 1907.

Witnesses.

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ROCK-DRILL AND OTHER PERCUSSION-TOOL.

Application filed September 8, 1894. Serial No. 25,787.

To all whom it may concern:

Be it known that I, THOMAS WARSOP, a subject of the King of Great Britain and Ireland, residing at Coniston, in the county of Lancaster, England, have invented certain new and useful Improvements in Rock-Drills and other Percussion-Tools, for which I have applied for a patent in Great Britain, No. 22,410, dated October 14, 1903; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention consists of an improved rock drill or other percussion tool and the like, operated by motors driven by petrol or other compounds. For this purpose I use one or more cylinders the piston or pistons of which are actuated by petrol or other inflammable substance, vaporized, compressed and fired therein in the usual manner, or vaporized and compressed in another cylinder. This piston has attached to it a connecting rod actuating a crank shaft fitted with one or more fly wheels or disks, and the necessary gear wheels or other means for controlling the cylinder exhaust or other valves. The crank shaft revolves in suitable bearings formed in the frame or casting which carries the cylinder at one end, and at the other end carries the rotating gear for turning the spindle or socket in which is fixed the steel drill, jumper or other tool for boring holes in the rock, for performing other work. The spindle or socket carrying the jumper or other tool is attached to a motor piston by a suitable casting slotted or formed to receive the connecting rod and allow the crank to revolve therein. By this means the reciprocating motion of the piston is conveyed to the drill spindle and to the jumper or other tool carried by it, the latter forming holes in the rock and the like, or performing other work by a percussion and gradually rotative action, when so required, in the usual manner.

In order to minimize as far as possible the vibration or shocks to the machine when the jumper or tool strikes the rock or other substance, and also to facilitate the crank shaft and other parts turning the dead center when the striking takes place, at which time the piston is at the outer end of its stroke, I employ one or more suitable elastic cushions which may, as shown, be arranged between sections of the connecting rod or at any other part of the appliance, as desired or preferred. The described parts are covered or protected where necessary, and are carried by and slide in a cradle or carriage fitted with a feed screw, handle and the like, all carried by a tripod or stretcher bar, or by other suitable means in the usual manner.

The invention in detail is set forth in the following description and illustrated in the accompanying drawing in which

Figure 1 is a vertical section of my improved rock drill on line 1—2 of Fig. 2. Fig. 2 is a side elevation. Fig. 3 is a front elevation partly in section. Fig. 4 is a sectional view on line 3—4 of Fig. 1. Fig. 5 is a sectional view on line 5—6 of Fig. 1.

Referring to the drawing by letter, A designates the cylinder of the motor which is provided with cooling ribs A'.

B is the piston having the connecting rod C pivoted thereto at one end and actuating at the other end the crank D' with crank shaft D attached to same.

P are two fly wheels or disks fixed on the crank shaft, one at each side.

E E are the bearings in which the crank shaft D revolves. These bearings are fixed to the casing P P which carries the cylinder A of the motor at one end and the rotating gear G and guides for the casing K and spindle H at the other end.

O O are the gear wheels, one fixed on the crank shaft. D for actuating, by means of a tappet T, the exhaust valve S carried in a casing from the cylinder A in the usual manner. The exhaust gases leave the cylinder A by the passage S', past valve S and thence away by outlet S'.

V is the electric ignition plug for igniting the charge in the customary manner.

X is the admission valve for admitting to the cylinder A, at the necessary times, a charge of inflammable mixture by pipe R' from the carburetter which is placed at any convenient distance away from the drill.

To the piston B there is attached the saddle K made with the slots K' in each side and so formed that the connecting rod C and crank D' turn freely therein. The other end of saddle K is formed circular and slides up and down in a suitable guide D' carried by the casing P. Up the circular end of saddle K a hole is bored in which fits the upper end of spindle H. This end has a neck formed in the casing, fitted with the loose collar H' and secured in saddle K by the cotters H, all in
such a manner that spindle H may be turned round in the saddle by the rotating wheel G, inclined slot in spindle H and pawl Q provided with a key G' entering the inclined slot, as the spindle H reciprocates, as is customary in percussion drills. The spindle H is formed at its lower end with a suitable socket in which is fixed the steel drill or jumper J for boring or other purposes. It will thus be seen that the reciprocating action of the piston B in the cylinder A is communicated by the saddle K and spindle H to the drill J, which latter bores holes in the rock or the like by a percussive and gradually rotating action.

The connecting rod C has formed with it between its two bearings a suitable spring or springs I, L, or other cushion, so as to minimize, as far as possible, the shocks to the machine when the drill or jumper strikes the rock, and to allow the crank and connecting rod to turn the dead center when this striking takes place, the spring or springs forming an elastic cushion for that purpose.

The machine enclosed in casing P slides in grooves formed on each side of same in the saddle M which is attached by trunnion M' to a tripod stand, heading or stretcher bar or the like in the usual manner.

N is the feed screw, turning on nuts N' attached to P, for feeding forward the drill as the hole is being bored.

Q is the bridge carrying screw N from saddle M.

The crank shaft D of the motor is started by turning a handle placed on either end of the shaft, and the action of the whole is such that the reciprocating action of the piston B in cylinder A caused by the explosion of inflammable mixture in same is communicated by the saddle K to the spindle H and drill J which bores holes in the rock or the like, as before explained.

I claim as my invention.

1. In a percussion tool the combination with a petrol motor having a cylinder and a piston operated therein, of a crank shaft, a flywheel on said crank shaft, a connecting rod formed of two parts connecting the crank and piston, a cushioning spring uniting the two parts of the connecting rod, a reciprocating drill spindle, and a saddle directly connecting the drill spindle to the piston.

2. In a percussion tool the combination with a petrol motor having a cylinder and a piston operating therein, of a drill spindle and a connection directly connecting the drill spindle and piston, a crank shaft, a flywheel on said crank shaft, and a connecting rod connecting said crank shaft and piston, said connecting rod having a cushioning spring forming a part thereof.

3. The combination in rock drills and the like, of cylinder A, piston B, coupling saddle K, connecting rod C, spring L, crank D, shaft D', fly wheels F F', with the drill spindle H, rotating gear G G', and casing P, substantially as shown hereinbefore for the purposes specified.

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Witnesses:

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