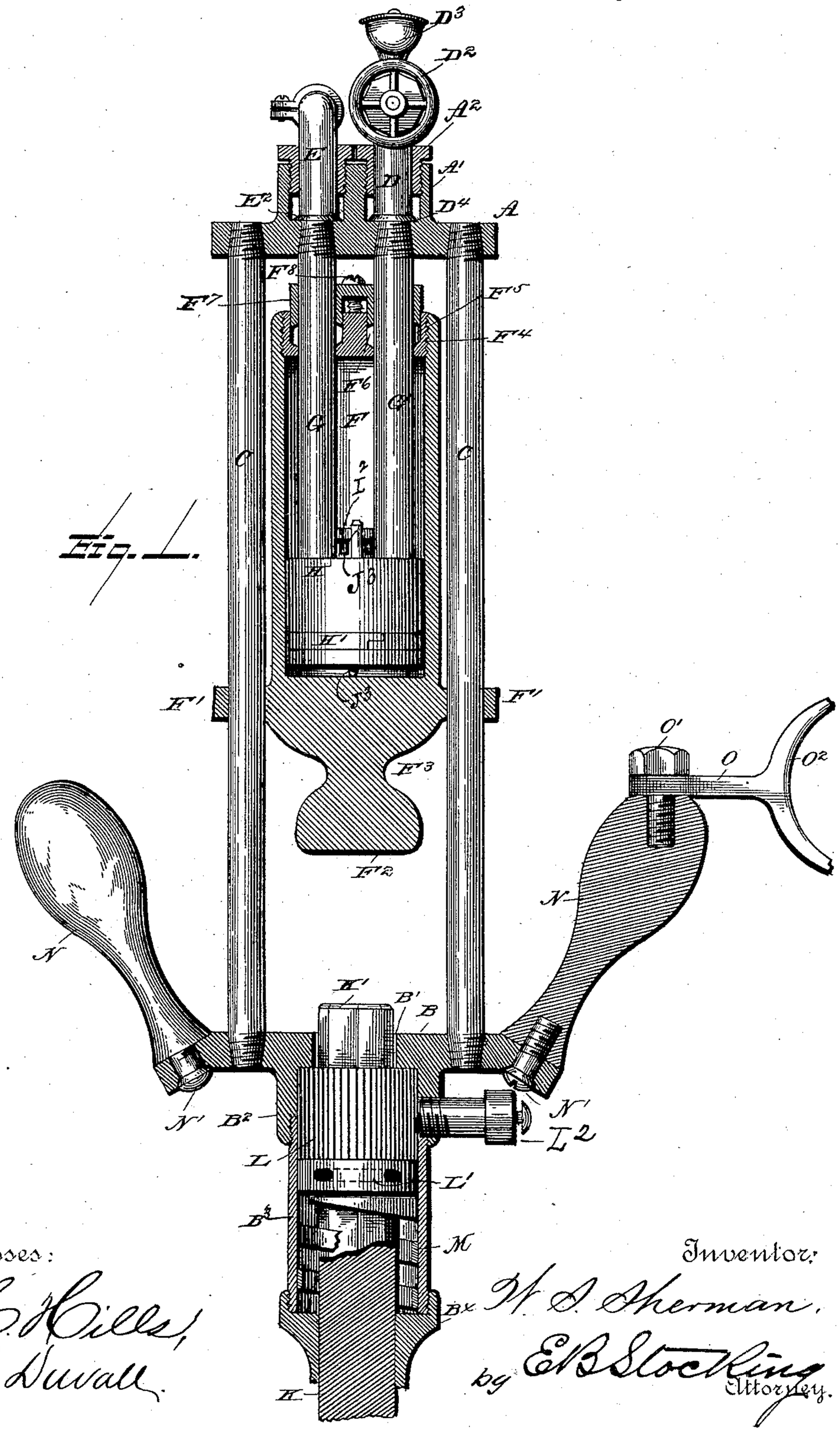
(No Model.) 2 Sheets—Sheet 1.

W. S. SHERMAN.

DRILLING OR CHIPPING DEVICE.

No. 387,115. Patented July 31, 1888.

Fig. 1.



Witnesses:

L. C. Hills,

W. S. Duvall.

Inventor:

W. S. Sherman,

by E. B. Stocking

Attorney.

(No Model.)

2 Sheets—Sheet 2.

W. S. SHERMAN.

DRILLING OR CHIPPING DEVICE.

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Fig. 2.

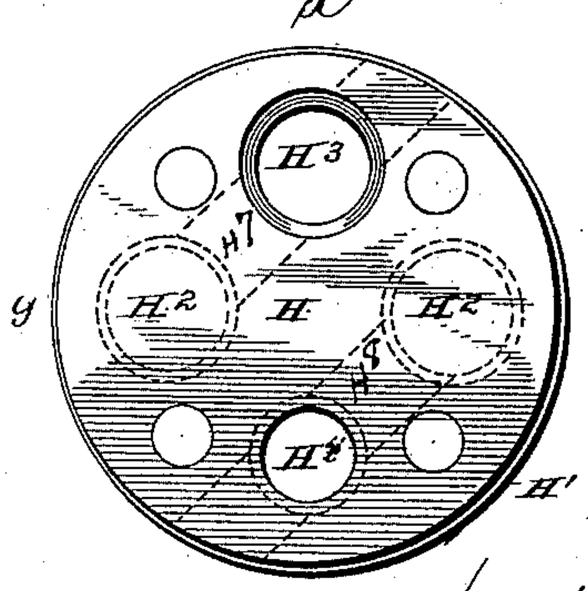


Fig. 3.

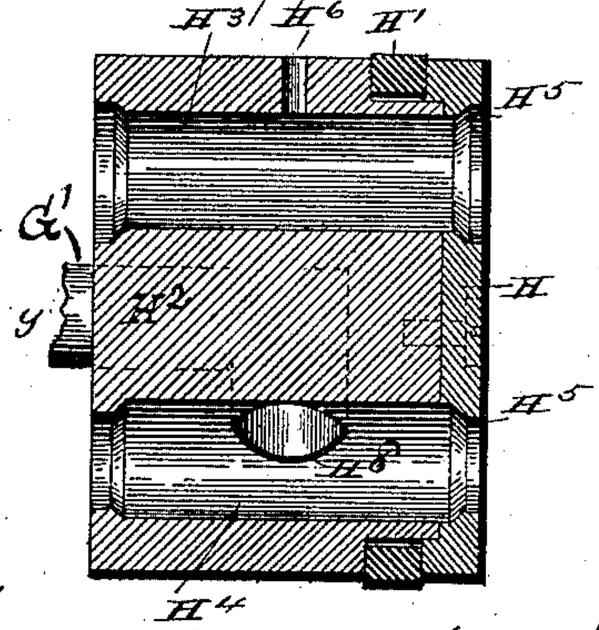


Fig. 4.

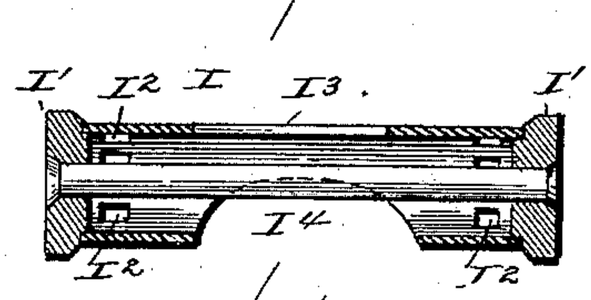


Fig. 5.

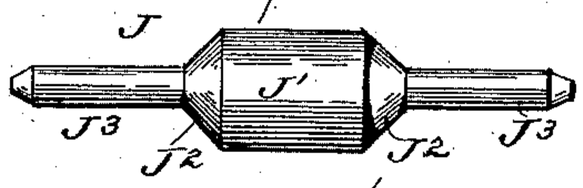


Fig. 6.

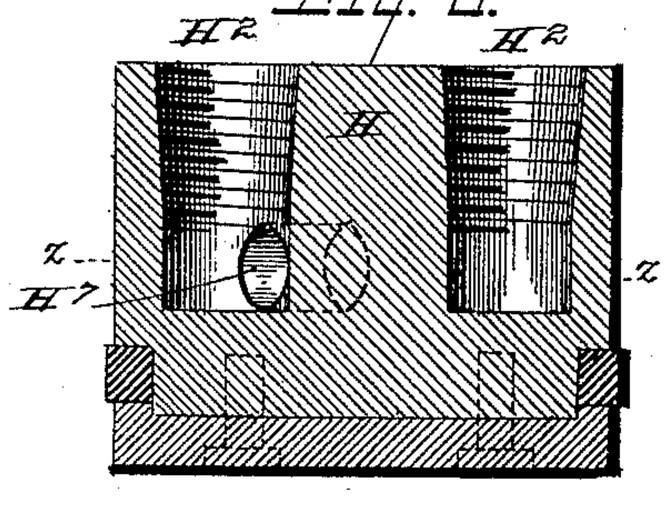


Fig. 7.

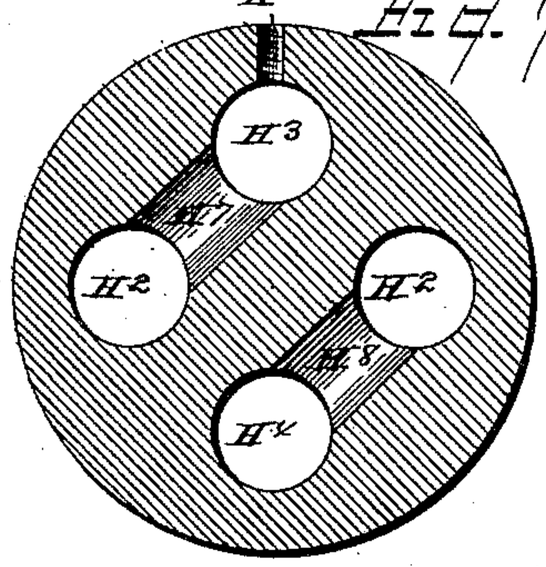


Fig. 8.

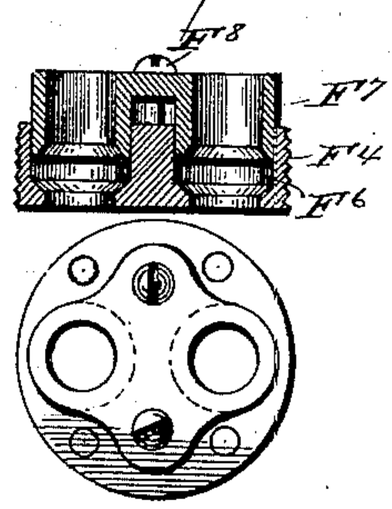


Fig. 9.

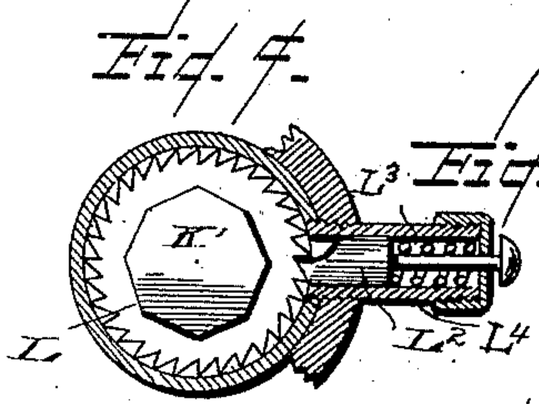


Fig. 11.

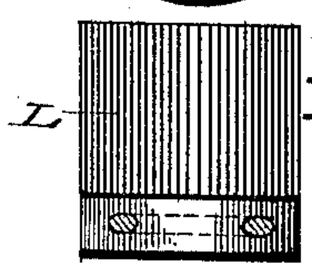


Fig. 10.

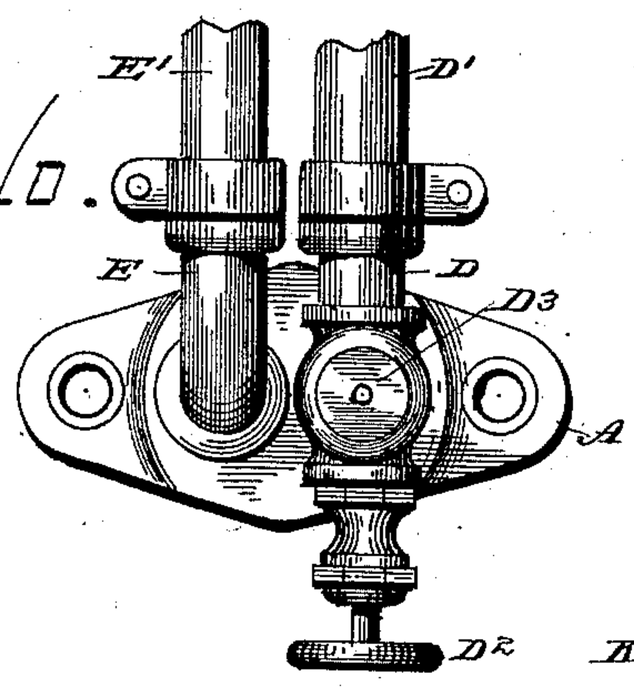


Fig. 12.

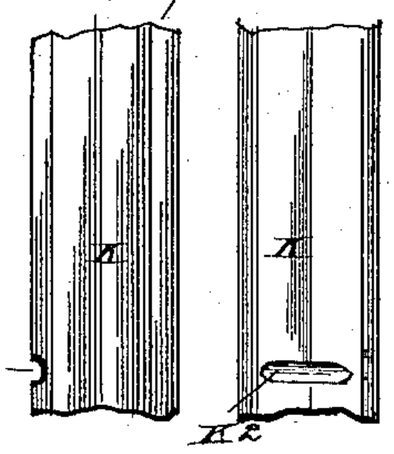
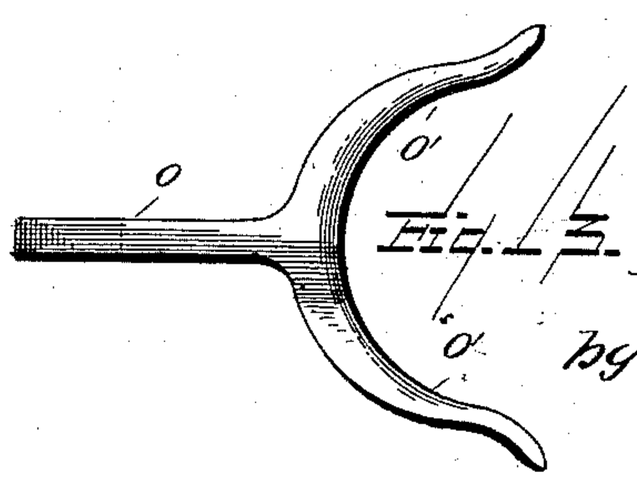


Fig. 13.



Witnesses:
L. C. Hills,
W. S. Sewall.

Inventor:
W. S. Sherman
by E. B. Stocking
Attorney.

UNITED STATES PATENT OFFICE.

WILLIS S. SHERMAN, OF MARINETTE, WISCONSIN.

DRILLING OR CHIPPING DEVICE.

SPECIFICATION forming part of Letters Patent No. 387,115, dated July 31, 1888.

Application filed September 3, 1887. Serial No. 248,719. (No model.)

To all whom it may concern:

Be it known that I, WILLIS S. SHERMAN, a citizen of the United States, residing at Marinette, in the county of Marinette, State of Wisconsin, have invented certain new and useful Improvements in Drilling or Chipping Devices, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention has relation to drills adapted to be worked by either steam or compressed air; and among the objects in view are to provide a device for drilling rock, chipping iron, and also for general work in stone and metals.

Other objects and advantages of the invention will hereinafter appear, and the novel features will be particularly pointed out in the claims.

Referring to the drawings, Figure 1 is a substantially vertical section of a drill constructed in accordance with my invention, parts being shown in side elevation, and the hammer being in position to deliver a stroke. Fig. 2 is a plan of the piston-head. Fig. 3 is a transverse section on the line *x x* of Fig. 2; Fig. 4, a longitudinal section of the exhaust-valve; Fig. 5, a side elevation of the supply-valve; Fig. 6, a longitudinal section on the line *y y* of Fig. 2; Fig. 7, a transverse section on the line *z z* of Fig. 6; Fig. 8, a section in detail of the piston-rod packing-box and a plan view of the same. Fig. 9 is a plan view of the drill-head and its revolving mechanism, portions being in section. Fig. 10 is a plan of the top yoke of the drill, showing the supply and exhaust pipes; Fig. 11, a detail in side elevation of the ratchet-wheel mounted upon the drill-head. Fig. 12 are details in side elevation of portions of the drill-rod, and Fig. 13 is a detail in plan of a drill-supporting attachment.

Similar letters of reference indicate similar parts throughout the drawings.

A and B represent the upper and lower yokes, respectively, of the frame-work of the drill, which yokes are connected by vertical guides C formed of hollow tubes, the ends of which are screwed into the yokes.

Upon the yoke A are formed stuffing-boxes A′ having central perforations for the passage of supply and exhaust pipes D and E, respectively, said pipes being held in place and made capable of turning by means of stuffing-box glands A^2 and flanges D^4 E^2, the latter screwed into said stuffing-boxes. By this means the supply and exhaust pipes may be turned in any direction convenient to the operator. Flexible pipes D′ E′ connect the before-mentioned exhaust and supply pipes with the source of supply, (not shown,) the supply-pipe D being provided with an ordinary throttle, D^2, and oil-supply D^3.

F represents a combined cylinder and hammer mounted within the frame work and adapted to slide upon the guide-tubes C by means of lateral guide-lugs F′ embracing said tubes. At the lower end of the cylinder, and in this instance integral therewith—but it may be secured thereto if desired—is formed the hammer-head F^2, joined to the bottom of the cylinder by a reduced neck portion, F^3, so that any spreading thereof will take place in the neck and head, and thereby do no injury to the cylinder.

The top of the cylinder is interiorly screw-threaded, as at F^4, and mounted therein is the cylinder-head F^5, perforated and formed with the stuffing-boxes F^6, provided with stuffing-box glands F^7, made adjustable therein by means of a cap screw or screws, F^8.

The pipes D and E are flared or flanged to form seats or sockets E^2 D^4, and terminating in these seats and screw-threaded into the yoke A are hollow piston-rods G G′, the lower ends of which terminate within the cylinder, passing through the head thereof and connected to the piston-head H, which is provided with the usual piston-packing, H′. By reason of the connection just described between the supply and exhaust pipes and the piston-rods, said pipes may be swung from one side to the other of the apparatus independent of the piston-rods.

The piston H is provided with longitudinal screw-threaded bores H^2, (see Fig. 2,) into which the tubes G G′ are secured.

Leaders or transverse channels H^7 H^8 connect with valve-openings H^3 H^4 for the exhaust and supply valves I and J, respectively. The valve-bore H^3 is provided with outwardly-inclined valve-seats H^5, against which the flared heads I′ of the valve I is adapted to rest. The valve I consists of a hollow sleeve having heads I′ at each end connected by a rod, and provided

with ports I^2 for the egress of the exhaust-steam above and below the piston-head. A slot, I^3, registers with an aperture, H^6, in the piston-head, and from this aperture into the slot a pin passes and prevents the exhaust-valve I from turning. An opening, I^4, is formed in the valve I at about its center, and is adapted to be in constant communication with leader H^7 to exhaust-pipe aperture H^2 in opening H^4.

The supply-valve is different in construction, and it consists of a valve-plug or body portion, J′, having tapered ends J^2, adapted to come in contact with internally-disposed seats H^5, formed at the ends of the valve-opening H^4 in the piston-head. Projecting pins J^3 are formed at both ends of the valve-body, said valve, like the valve I, being longer than and fitted within the piston-head and projecting beyond the same. A leader or passage, H^8, in the bore H^4 communicates with the supply-opening H^2 of the piston-head. The operation of these valves will be hereinafter described.

The bottom or lower yoke, B, is provided with a central perforation or opening, B′, which is surrounded by an annular depending flange, B^2, into which is fitted a screw-threaded thimble, B^3, having a ferrule, B^4, screw-threaded onto the lower end thereof. Into the pocket thus formed is seated the drill head or shank K′ of the drill-rod K, said head projecting through the opening B′ of the lower yoke, B, and in the direct path of the hammer F^2. The opening B′ is made sufficiently large to loosely fit the drill-head, so that any subsequent spreading of the same will not prevent its ready withdrawal.

Upon the drill-rod, near its upper end, is mounted a ratchet-wheel, L, centrally perforated to receive the drill-shank, and of a contour in cross-section adapted to conform to that of the drill. A pin or bolt, L′, is passed through the lower end of the ratchet-wheel, and projects into the bore thereof and into a notch, K^2, formed in the shank of the drill, whereby the two are connected, as shown in Figs. 1 and 12. A coiled spring, M, encircles the drill and is interposed between the ratchet-wheel—or it may be a shoulder on the rod—and the ferrule B^4, thus serving to remove the concussion from the apparatus. The rebound caused by the spring M also serves another purpose in connection with the return movement of the cylinder F, as will hereinafter appear. As shown in Fig. 9, the flange B^2 is perforated for the passage therethrough of a spring-pawl, L^2, adapted to take into the ratchet-wheel L, so that the drill-rod may be turned to deliver the stroke at the desired angle. This is done in the usual manner—namely, the apparatus is turned at the end of the stroke and the spring-pawl carries the drill with it. The apparatus is then turned in a reverse direction, and the pawl passes over the teeth of the ratchet-wheel, leaving the drill in the position desired. At each side of the yoke B are mounted handles N by means of screws or other securing devices, N′.

If desired, upon one of the handles N may be secured, by means of a bolt, O′, an arm, O, having a crotch or bifurcation, O^2, adapted to fit against the upper arm of the operator, by which the apparatus may be supported and a hand of the operator left free to turn the drill or chisel, regulate the supply of steam or compressed air, or otherwise manipulate the apparatus.

This being the construction, the operation of the drill is as follows: The machine—being connected with a source of supply—is presented to its work by the operator, who takes one of the handles N in one hand, the yoke O^2 passing against the operator's upper arm, while the other hand is left free for any desired purpose. The steam or other motive power is admitted by opening the valve D^2, and passes through the pipe G′ into the piston-head H, and by way of the steam-passage or leader H^8 communicates with the valve-seat H^4. Taking the cylinder in its upper position, as shown in Fig. 1, with the exhaust-ports I^2 and the valve-stem J^3, projecting above the piston-head, the steam passes below the body J′ of the valve out of the piston-head against the lower end of the cylinder and forces it down, causing the hammer to strike the blow on the end of the drill or other tool. During this operation the steam within the cylinder above the piston-head passes through the ports I^2 of the valve I, and into and through the leader H^7, which connects it with the exhaust-pipe G, and thence out of the machine. When the upper end of the cylinder strikes the live-steam and exhaust valves, it forces them to project from the lower end of the piston-head, so as to reverse the direction of the flow of the live and of the exhaust steam.

The object of the spring M, as regards the valve motion, is as follows: We will suppose, for instance, the hammer strikes the drill and that at the same time the upper cylinder-head comes in contact with the tops of the valves. Now, if the drill-shank was solid with the machine there could be no give or yielding, consequently the cylinder could not go down sufficiently far to reverse the valve or direction of steam and exhaust; so, in order to provide for this reversing of the valves and secure the return-stroke, I supply the spring M, which permits the entire machine, except the cylinder, to move up from the drill. Now, considering that the hammer has struck the drill and, from the pressure of steam, is maintained at that point, the giving or yielding of the spring, caused by the pressure of steam against the piston, causes said piston and all parts of the machine to move until the valves in the piston strike the upper head of the cylinder, which reverses them and permits steam to pass at the top of piston, causing the cylinder to move up. Furthermore, the valves will have lead enough, so that the cylinder-head will not strike the piston. Now, when the hammer is in motion, in order to drill the hole

required, the drill must be turned or manipulated by the handles N, which are revolved a quarter-turn or more, which is repeated during the operations of the hammer. A coiled spring, L^3, serves to maintain the pawl L^2 in contact with the teeth of the ratchet L. The pawl and spring is seated in a casing, L^4, having a cap secured thereon, against which the spring rests. The cap is threaded on the casing, and may thus regulate the pressure of the spring-pawl or withdraw the same entirely from the teeth of the ratchet, which is preferable when the machine is to be used for chipping, in which instance the hand of the operator grasps the shank of the chisel.

Having described my invention and its operation, what I claim is—

1. In a drill of the class described, a movable cylinder carrying a hammer, in combination with an independent drill-rod, substantially as specified.

2. In a drill of the class described, a movable cylinder carrying a hammer, and having a piston provided with exhaust and supply valves, in combination with an independent drill-rod, substantially as specified.

3. In a drill of the class described, a movable cylinder carrying a hammer and having a piston provided with exhaust and supply valves, in combination with a drill-rod, and a spring to return the hammer, reverse drill, and remove the concussion, substantially as specified.

4. In a drill of the class described, the combination, with a frame-work consisting of an upper and lower yoke connected by hollow guides, of a cylinder carrying a hammer mounted for movement in said guides, and of a stationary piston-head mounted in said cylinder, substantially as specified.

5. In a drill of the class described, the combination, with the frame-work thereof, of a drill-rod mounted therein and provided with a ratchet-wheel near its head, and of a spring-pawl adapted to take into said ratchet and turn the drill-rod, substantially as specified.

6. In a drill of the class described, the combination, with the frame-work thereof, of a supporting-bracket attached thereto and adapted to embrace the arm of the operator, substantially as shown and described.

7. The combination, with the yokes A and B, connected by the hollow guides C, of the cylinder F, having the guiding-lugs F′, embracing said rods, substantially as specified.

8. The cylinder F, formed with the hammer F^2, having the reduced neck portion F^3, in combination with the removable head F^5, having the stuffing-boxes F^6, and the glands F^7 mounted on said boxes, and adjusting-screws F^8, substantially as specified.

9. The combination of the lower yoke, B, of the frame-work, provided with the handles M, with the bracket O, secured to said handle, as at O′, and bifurcated, as at O^2, to embrace the body of the operator, substantially as specified.

10. The yoke A, having the stuffing-boxes A′ and glands A^2, in combination with the pipes D and E, flanged, as at D^4 E^2, respectively, and the piston-rods G G′, entering said yoke, substantially as specified.

11. The cylinder F, constructed as described, in combination with the piston H, having the valve I, formed with the heads I′, the ports I^2, and slot I^3, substantially as specified.

12. The yoke B, having the opening B′, flange B^2, thimble B^3, and ferrule B^4, in combination with the drill-rod K, having the ratchet L secured thereto by means of the pin or link L′, the interposed spring M, and the pawl L^2, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIS S. SHERMAN.

Witnesses:
WILLIAM C. WILSON,
JOHN P. HOLGATE.