No. 771,205. PATENTED SEPT. 27, 1904.

F. F. HEPLER.

DRILLING MACHINE.

APPLICATION FILED JULY 2, 1903.

NO MODEL. 3 SHEETS—SHEET 1.

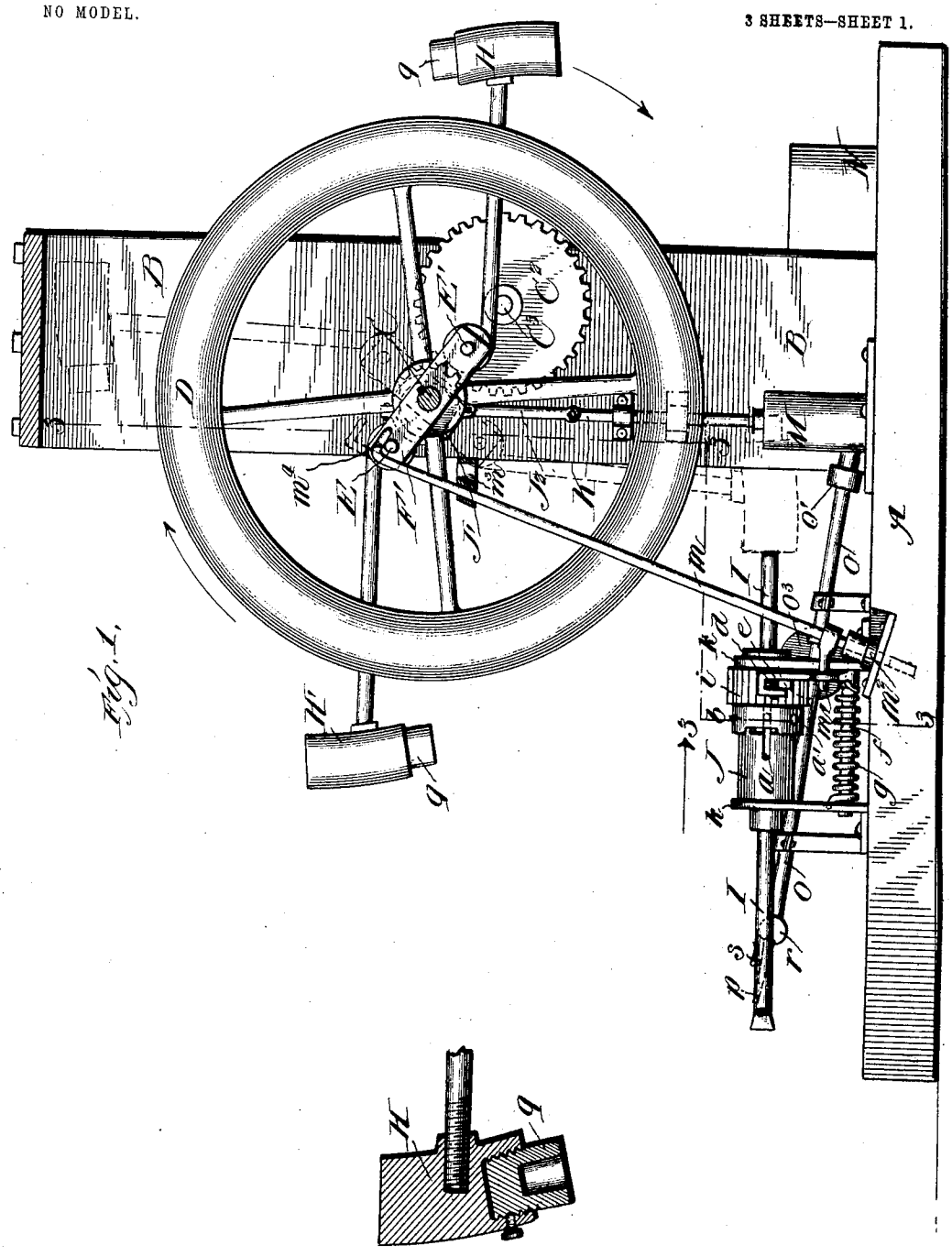

Fig. 1.

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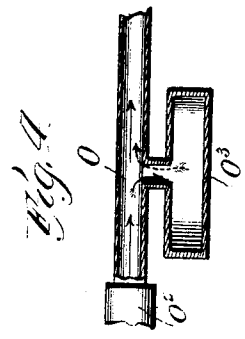

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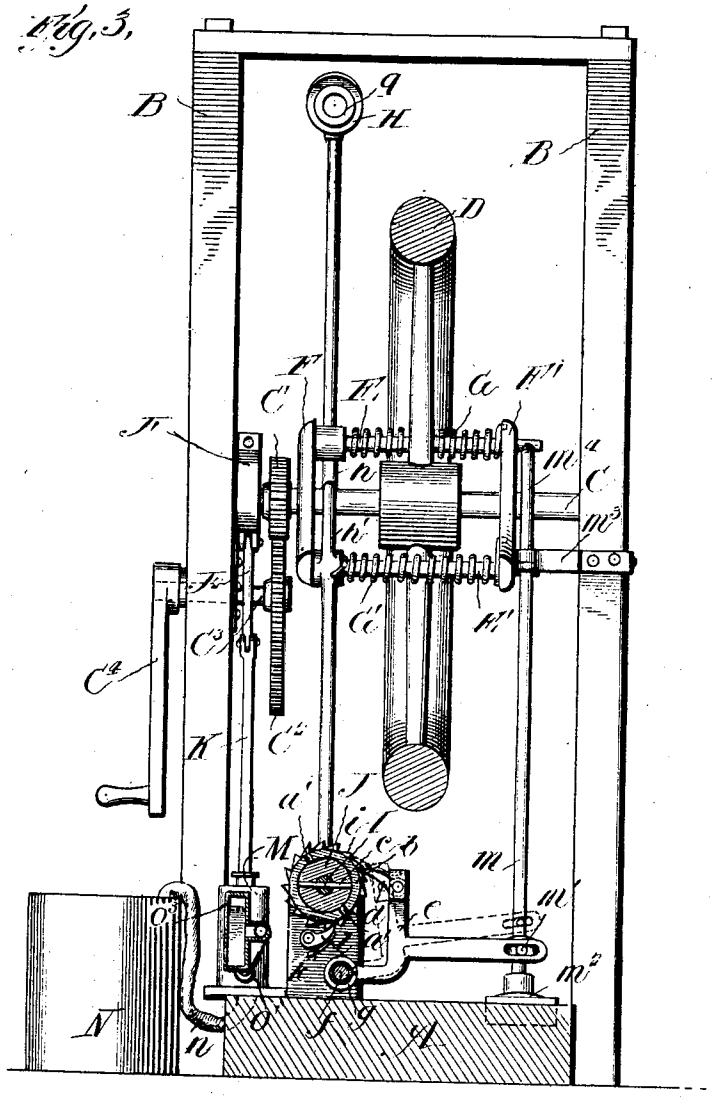
NO MODEL. 3 SHEETS—SHEET 3.

Fig. 3.



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UNITED STATES PATENT OFFICE.

FAY F. HEPLER, OF CRESCENT CITY, CALIFORNIA, ASSIGNOR OF TWO-THIRDS TO JOSEPH N. BRITTEN AND RENÉ R. SNOWDEN, OF CRESCENT CITY, CALIFORNIA.

DRILLING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 771,205, dated September 27, 1904.

Application filed July 2, 1903. Serial No. 164,046. (No model.)

To all whom it may concern:

Be it known that I, FAY F. HEPLER, of Crescent City, in the county of Del Norte and State of California, have invented a new and useful Improvement in Drilling-Machines, of which the following is a specification.

My invention is in the nature of an improved rock-drilling machine of that type in which a set of rotating hammers are made to act upon the end of the drill-bit and the latter is turned and also in which means are provided for forcing a continuous stream of water into the drill-hole beside the drill-bit to soften the rock and to clear out the cuttings, so that the operation may be continuous.

My invention consists in the novel construction and arrangement of parts acting upon this principle, which will be hereinafter described, and pointed out in the claims.

Figure 1 is a side elevation from one side of the drilling-machine, partly broken away. Fig. 2 is a similar view from the opposite side. Fig. 3 is a transverse vertical section on the two planes indicated by the interrupted lines 3 3 3 3 of Fig. 1, and Fig. 4 is a sectional view of a detail.

In the drawings, A represents a base, and B an upright frame rising therefrom, upon which my drilling-machine is mounted. C is the main shaft, which is arranged horizontally in bearings in the upright frame and on which shaft is fixed a heavy balance-wheel D. To this shaft is also rigidly connected a yoke-shaped frame composed of two rods E E′, arranged parallel to the shaft, one on each side of the shaft and extending through the plane of the balance-wheel, and two cross-pieces F F′, connecting the ends of the rods and also connected in the middle to the main shaft, with which they revolve. On these rods E E′ are mounted the hammers H H′, which are rendered yielding on their centers by coil-springs G G′, which are wrapped about the rods E E′ and have one end attached to the yoke-shaped frame and the other ends to the hammers. The range of pivotal movement of these hammers about their centers is limited by stop extensions *h h′*, projecting from the hammers and resting against the main shaft. When the main shaft is rotated, the hammers are revolved and swung to give the desired blow on the drill-bit and then yielding on their centers against the tension of the springs pass by the end of the drill-bit.

To make the weight of the hammer-head adjustable to the hardness of different kinds of rock, each hammer-head is formed with a screw-threaded socket, and screw-threaded plugs *q* are screwed therein and retained by a set-screw. These plugs are hollowed out or otherwise made of different weights to increase or diminish the weight of the hammer-head according to circumstances.

To rotate the main shaft C, it has keyed to it a pinion C′, which is engaged by a larger gear-wheel C^2 on a short shaft C^3, which latter is provided with a crank C^4 for turning it by hand or may have a power-pulley for driving it from an engine by power received through a belt.

On the base A in horizontal position and placed so as to receive the stroke of the head of the hammer is the drill-bit I, which has an ordinary chisel-shaped edge. This drill-bit plays through a cylindrical head J, to which it is locked, so as to revolve with it but slide through it. This is accomplished by means of longitudinal slots *a* in the drill-head, a ring *b* on the drill-head, and a pin *c*, which passes through the slots of the drill-head and also through a hole in the drill-bit. There are also corresponding holes *a′* in the ring, which when turned into coincidence with the slots of the head allow the pin to be knocked out and the drill-bit removed from the head. When the ring is so turned as to throw its holes *a′* out of coincidence with the slots, the pin is held in place against falling out.

To turn the drill-head, there is formed on one end of the same a ratchet-wheel *i*, with which engages a feed-pawl *d*, carried by a vibrating arm *e*. This arm rocks on a fulcrum-rod *f* and is thrown down by a coil-spring *g*, wrapped about the fulcrum-rod, which latter is fixed at its ends in the two uprights *k k*, which carry the drill-head. A detent *l* en-

gages with the ratchet-wheel to hold it while the feed-pawl is moving back for its stroke. The feed-stroke of the pawl is given it by a lift-rod m, which has a pin m' on its lower end that plays in a slot of the arm e. This lift-rod has a cushion-buffer m^2 at its lower end where it stops against the base, and the upper end extends through a guide m^3 and is bent over at m^4 to form a catch that is engaged by the protruding ends of the rods E E′ as they revolve with the main shaft. By this means the feed-pawl is alternately advanced and retracted to feed the ratchet of the drill-head bit.

On the main shaft C beside its pinion there is arranged an eccentric J′ and rod J^2, which is made to act upon the plunger K of a pump M. This pump has the usual inlet and outlet valves v v' and draws water from any suitable reservoir N through a pipe n and forces it through a pipe o and nozzle p into the hole being drilled. The pipe o has a union-coupling o' and an ordinary connection at o^2, and in its length is arranged a circular air-chamber o^3, from the center of which the pipe o emerges as it extends to the nozzle. This air-chamber is made flat or with a short axis and its plane is parallel to the delivery-pipe. The object of the air-chamber is to make the flow of water continuous, and the object in having the pipe proceed from the center of the air-chamber is to permit the air-cushion above the water in the air-chamber to be retained in all positions of the pipe, whether drilling in a horizontal, a vertical, or an inclined position. There is also in the length of the pipe o a ball-joint r where the nozzle joins onto it, so that the nozzle may be turned in any direction, and in the nozzle there is also a stop-cock s by which the water may be cut off. In the pipe o there is also a check-valve v with a proper tension for checking the flow of water below a certain pressure.

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

1. In a drilling-machine a spring-hammer mechanism comprising a central shaft bearing a rigidly-attached balance-wheel, cross-pieces F F′ rigidly attached to the shaft on opposite sides of the balance-wheel, rods E and E′ arranged parallel to the shaft and connecting the ends of the cross-pieces and extending through the plane of the balance-wheel, helical springs arranged on these rods and locked thereto at one end, and swinging hammers pivoted on the said rods and connected to the helical springs and having their inner ends extending to and stopping against the central shaft substantially as shown and described.

2. A drilling-machine comprising a central shaft bearing a rigidly-attached balance-wheel, cross-bars F F′ attached rigidly to the shaft on opposite sides of the balance-wheel, rods E E′ arranged parallel to the shaft and connecting the ends of the cross-bars and extending through the plane of the balance-wheel, helical springs arranged on the parallel rods, swinging hammers pivoted on the said rods and having their inner ends extended to the central shaft, a lift-rod m with hooked upper end arranged to be engaged by the parallel rods, a drill with drill-head bearing a ratchet, a rock-shaft with a helical spring arranged parallel to the drill, and an arm on said rock-shaft bearing a pawl at its upper end acting upon the ratchet of the drill-head, said arm being connected to the lift-rod substantially as shown and described.

3. A drilling-machine comprising a drill-bit and means for operating it, and a pump connected to and operated by the drilling-machine, a delivery-pipe from the pump and a flat air-chamber arranged in a plane parallel to the delivery-pipe and having an open communication at its axial center with the delivery-pipe to maintain the air-cushion in all positions of the delivery-pipe substantially as described.

FAY F. HEPLER.

Witnesses:
JOS. P. CRAWFORD,
JAS. PURDY.