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C. GILLIÉRON.

ROCK DRILLING MACHINE.

APPLICATION FILED JAN. 27, 1903.

NO MODEL.

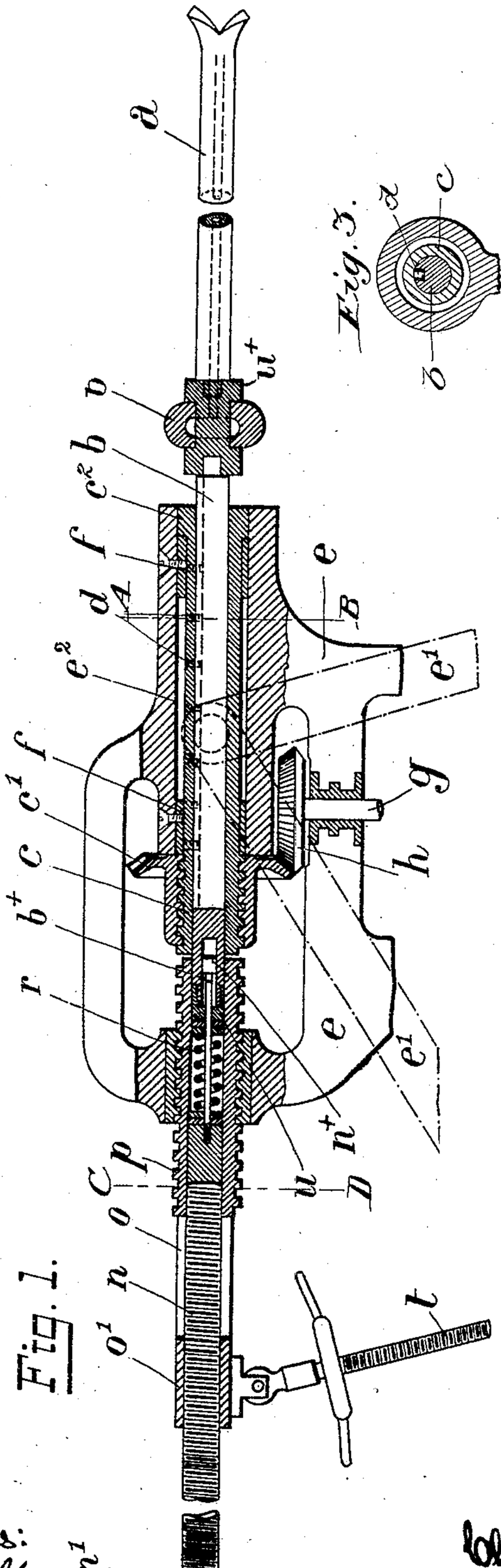

Fig. 1.

Fig. 3.

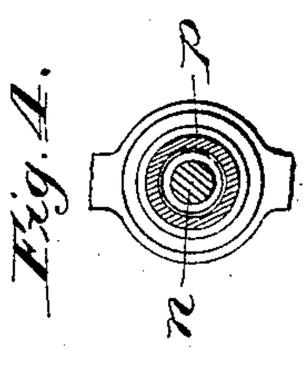

Fig. 4.

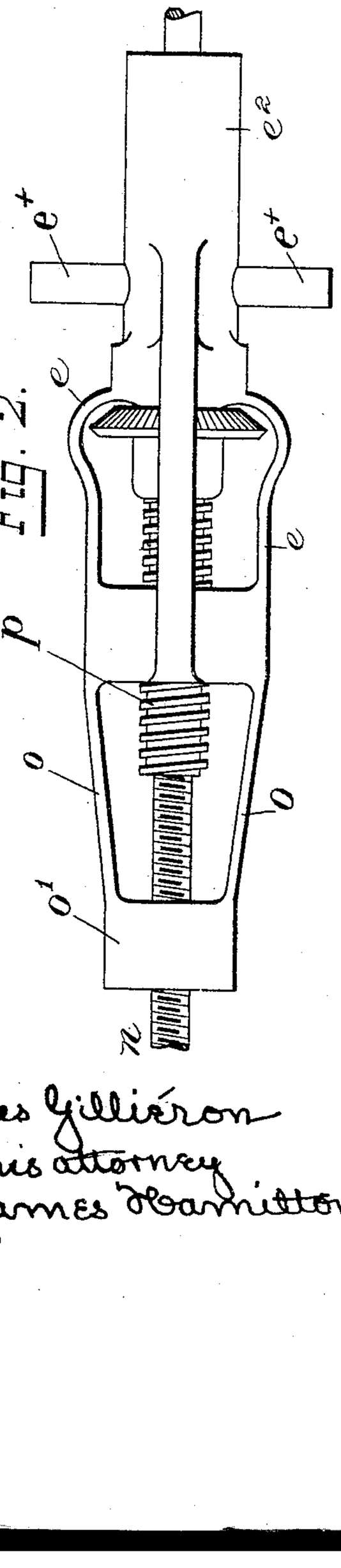

Fig. 2.

Witnesses:
G. L. Hamilton
A. J. Sweeney

Charles Gilliéron
by his attorney
James Hamilton

No. 771,625. Patented October 4, 1904.

UNITED STATES PATENT OFFICE.

CHARLES GILLIÉRON, OF VIÈGE, SWITZERLAND.

ROCK-DRILLING MACHINE.

SPECIFICATION forming part of Letters Patent No. 771,625, dated October 4, 1904.

Application filed January 27, 1903. Serial No. 140,743. (No model.)

To all whom it may concern:

Be it known that I, CHARLES GILLIÉRON, engineer, a citizen of the Republic of Switzerland, and a resident of Viège, Switzerland, have invented certain new and useful Improvements in and Relating to Rock-Drilling Machines, of which the following is a specification.

The rock-drilling machines known up to now have the disadvantage that when suddenly meeting a harder portion of rocks the drill-advancing mechanism of the said machines is stopped automatically, the drill then working idle and being rapidly worn out. Some of them have a spring-controlled advancing device by means of which the drill is pressed forward with a yielding pressure. With such machines, however, if the rock becomes very hard the advancing device becomes ineffective and the drill polishes itself against the rock. Such machines have, further, an advance-screw rotating with the drill and pressed forward with the drill, such screw being thus submitted to a great pressure, causing a rapid wear of the same as well as a great loss of motive power. In the present invention are these disadvantages removed by inserting a spring between an independently-hand-controlled advance-screw and the rotating drill. The pressure of the drill against the rock can thus at will be increased or reduced during the drilling, and particularly if the drill is meeting hard rock the pressure can be increased without causing the advance device to become ineffective, so as to avoid the idle running and the polishing of the drill. The advance-screw being further not rotative with the drill, the machine runs with little wear and good efficiency with regard to the motive power employed.

The annexed drawings show a rock-drill machine constructed according to my invention.

Figure 1 is a lateral view, partly in section, and Fig. 2 a plan view, of those portions of the drilling-machine which are necessary for the understanding of the invention. Fig. 3 is a sectional view on line A B, Fig. 1. Fig. 4 is a sectional view on line C D, Fig. 1.

The shaft *b*, bearing the drill *a*, is arranged in the interior of a sleeve *c*, bearing a conical wheel *c'*, screwed and keyed on the sleeve, said wheel gearing with a conical gear-wheel *h*, the shaft *g* of which may be acted upon by any suitable motor whatever, so as to cause the rotation of the sleeve *c*, in which the shaft *b* may be displaced either backward or forward in a longitudinal direction. The transmission of the rotating movement from the sleeve *c* to the shaft *b* is effected by means of screws *d*, which engage in a longitudinal groove of the said shaft *b*. Sleeve *c* is located in a socket or casing e^2, in which two annular bearings *f* are secured by screws, by means of which the friction between sleeve and socket is reduced. The backward longitudinal movement of sleeve *c* within the socket or casing e^2 is prevented by an annular collar c^2 of sleeve *c*, which rests on the forward annular bearing *f*, and the forward longitudinal movement of sleeve *c* is prevented by gear-wheel *c'* abutting against the rear end of casing e^2. The socket or casing e^2 is carried by a frame *e* of any suitable construction whatever, and the said frame *e* is pivotally connected to a framework *e'*. (Shown in dotted lines.)

The moving ahead or backward of the drill is effected by hand by means of a screw *n*, which is acted upon by a hand-wheel *n'*. Screw *n* is screwed in the nut *o'*, which is in turn fixed on two arms *o* of the frame *e*. The free end of said screw is guided by slidingly engaging the sleeve *p* with even inner surface, the exterior of which is provided with screw-threads. Said sleeve *p* is screwed on the frame *e* in such a manner that it is exactly in line with the sleeve *c*. The one end of shaft *b* is also slidingly engaged in the sleeve *p*, and between the front end of screw *n* and the back end of shaft *b* there is inserted a spiral spring *r*, which is pressing against suitable steel washers in order to reduce the friction between shaft *b* and the said spring *r*, such steel washers being intercalated on the one hand between the extremities of screw *n* and the spiral spring and on the other hand between the latter and the end of the drill-shaft *b*. With a view of allowing the said screw *n*

to be able to retract the shaft b the latter is provided at its rear extremity with a cylindrical cavity $b^{\times}$, the end of which is provided with a cover u and in which plays a piston $n^{\times}$, the rod of which is screwed in the extremity of the said screw n, this device being intended to allow the shaft b to be retracted by means of screw n whenever screw n is being rotated backward. The piston or headed rod $n^{\times}$ in connection with the spring r comprises a yielding coupling device or coupler by which the lengthwise movements of the screw are transmitted to the shaft b, while the rotary motion of the shaft b is not permitted to affect the screw. To allow a changement of inclination of shaft b and drill, the frame e is connected, by means of two pivots $e^{\times}$ and of a setting-screw t, to the framework e' of the machine.

Cooling of the drill takes place in the usual manner by injecting cold water in the interior of a hollow ring v, which is idle on the intermediate piece $u^{\times}$.

The working of the machine is as follows: The shaft g is rotated by means of any motive power whatever, which causes the rotation of the sleeve c, and by means of the studs d of the shaft b and of the drill. The operator turns then the hand-wheel n' so as to press the drill against the rock with the desired pressure and maintains it pressed during all the time of the drilling by turning gradually the hand-wheel n'. If hard rock portions are suddenly met, the pressure is increased by turning more rapidly the wheel n' and the working idle of the drill is thus avoided. Guiding-sleeve p is gradually advanced by hand with the forward movement of the drill in order to always correctly guide the extremities of shaft b and screw n. If sleeve p is long enough, there is of course no necessity of moving it and of providing its outer surface with screw-threads.

Having thus fully described my invention, I claim—

1. An improved rock-drilling machine comprising the combination of a rotative shaft for carrying the drill; an independently-controlled advance-screw; and a spring-controlled coupling device connected with the opposing extremities of said shaft and said advance-screw, said coupling device transmitting to said shaft the longitudinal movements of said screw in both directions.

2. The combination in a rock-drilling machine of a device for holding the drilling-tool; a screw for giving said holding device lengthwise movement; and a spring-controlled coupler which connects said screw and device and transmits the longitudinal movements of said screw to said device in both directions.

3. The combination in a rock-drilling machine of a holding device for the drilling-tool; said tool; mechanism for rotating said holding device; a screw for giving said device lengthwise movement; and a spring-controlled coupler for connecting said device and said screw and transmitting the longitudinal movements of said screw to said device in both directions.

4. The combination in a rock-drilling machine of a drilling-tool; a device for holding said tool; a screw for giving said device lengthwise movement; a spring-controlled coupler which is connected with said device and screw and transmits the lengthwise movements of said screw to said device in both directions; and a sleeve for inclosing said coupler.

5. The combination in a rock-drilling machine of a drilling-tool; a holding device for said tool; mechanism for giving said holding device lengthwise movement; yielding connecting means interposed between said device and mechanism; and an adjustable sleeve for inclosing said connecting means.

6. The combination in a rock-drilling machine of a drill-holder; said holder being formed with a recess in one end; a device for giving said holder lengthwise movement; and a piston one end of which is connected to said device and the other end of which works in said recess.

7. The combination in a rock-drilling machine of a drill-holder; said holder being formed with a recess in one end; mechanism for giving said holder lengthwise movement; a yielding device between said holder and mechanism; a piston one end of which is connected to said mechanism and the other end of which works in said recess; means for inclosing said yielding device; and means for giving said holder rotation.

8. A rock-drilling machine comprising the combination of a support; a casing rotatably mounted in said support; a drill-holder mounted in said casing; means for rotating said drill-holder; a screw for reciprocating said drill-holder; and a spring-controlled coupling connected with the ends of said drill-holder and screw, and thereby adapted to transmit lengthwise motion of said screw in both directions to said holder.

9. In combination in a rock-drilling machine, a rotatable shaft for holding the drill; a screw for reciprocating said shaft; and a yielding coupling device connected to the opposing ends of said shaft and said screw, said coupling device transmitting the lengthwise movements of said screw in both directions without said screws being affected by the rotary motion of said shaft.

10. In combination in a rock-drilling machine, a rotatable shaft for holding the drill; a screw for reciprocating said shaft; a yielding member interposed between the opposing ends of said shaft and said screw; and a device for so coupling said ends as to transmit the lengthwise movement of said screw in both directions to said shaft without transmitting the rotary motion of said shaft to said screw.

11. In combination in a rock-drilling ma-

chine, a rotatable drill-holder; a device for moving said drill-holder lengthwise in both directions; a yielding member interposed between the opposing ends of said device and said drill-holder and adapted to store energy by the forward movement of said device; and a coupler for so connecting said ends as to transmit the lengthwise movement in both directions of said device to said shaft without transmitting the rotary motion of said shaft to said device.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

CHARLES GILLIÉRON.

Witnesses:

G. IMER SCHNEIDER,

L. H. MUNIER.