(No Model.)

R. M. JONES.

ELECTRIC ROTARY DRILLING MACHINE.

No. 495,738 Patented Apr. 18, 1893.

Fig. 1.

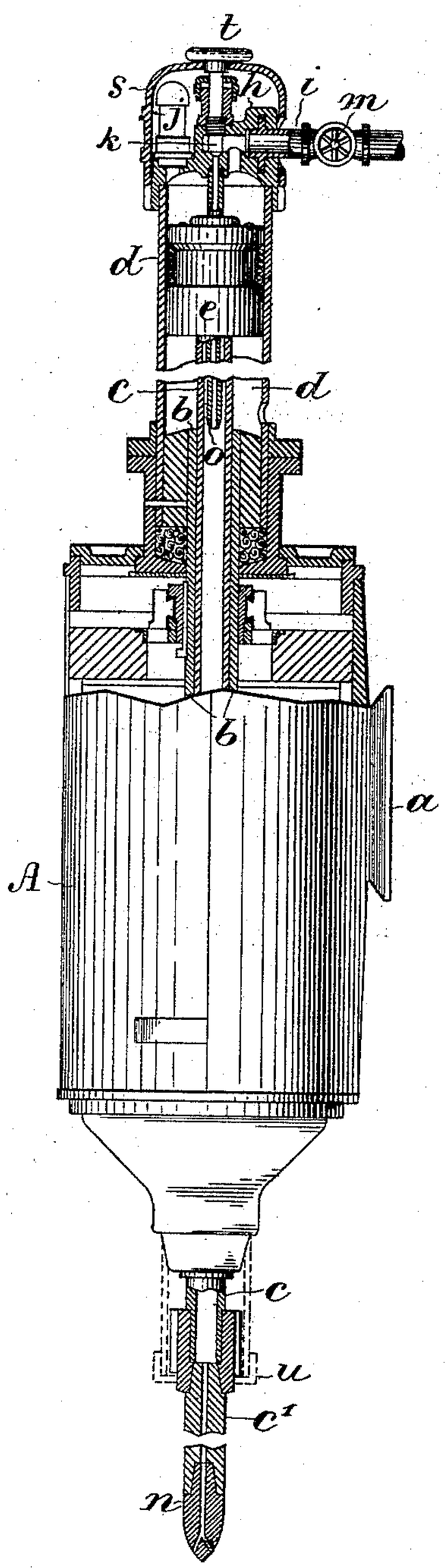


Fig. 2.

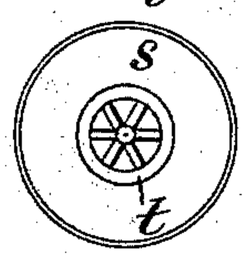


Fig. 3.

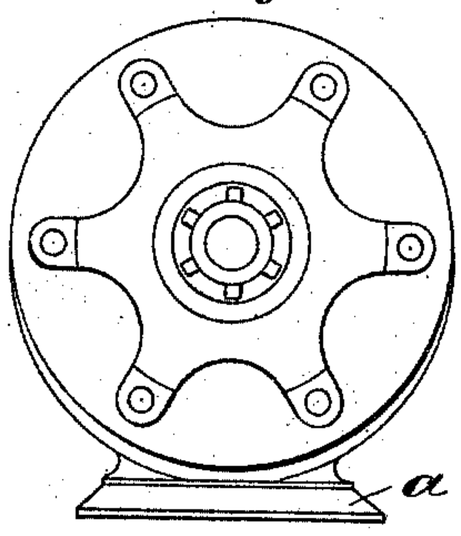


Fig. 4.

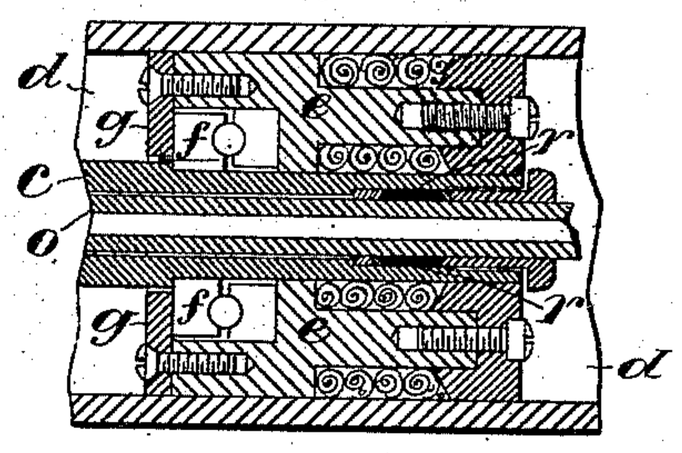
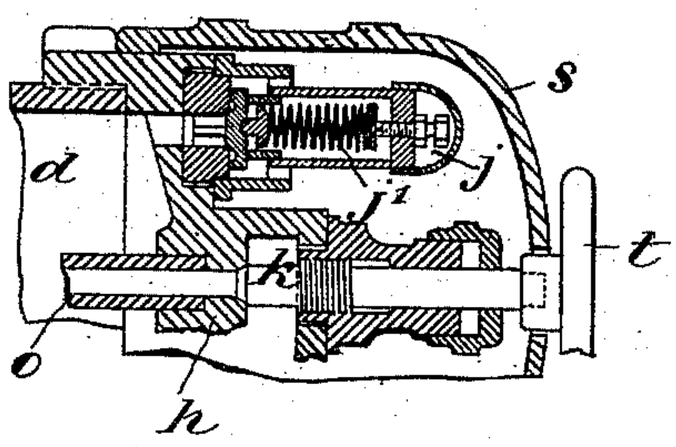


Fig. 5.



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ELECTRIC ROTARY DRILLING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 495,738, dated April 18, 1893.

Application filed June 30, 1892. Serial No. 438,506. (No model.)

To all whom it may concern:

Be it known that I, ROBERT M. JONES, a citizen of the United States, and a resident of the city and county of Salt Lake, in the Territory of Utah, have invented certain new and useful Improvements in Rotary Drilling-Machines, of which the following is a specification.

My invention relates especially to that class of drilling machines in which the drill or tool rotates and the object of the invention is to provide an improved feeding mechanism for the drill which will be fully described hereinafter and its novel features carefully defined in the claims.

I have herein shown my invention embodied in a drilling machine employing an electric motor for driving it, the drill shaft being splined in the hollow armature shaft of the motor, and the appurtenances connected with the feeding mechanism carried by the motor frame; but I do not herein claim the particular construction of the motor, as this is embodied in another application filed by me; indeed, so far as my present invention is concerned any suitable mechanism may be employed for driving the drill shaft.

In the accompanying drawings—Figure 1 is a longitudinal section of the machine, as to its upper part, and an elevation as to its lower part. Figs. 2 and 3 are, respectively, upper and lower end-elevations. Fig. 4 is an enlarged sectional detail of the piston on the drill shaft; and Fig. 5 is a similar sectional detail of the relief valve and its spring.

A represents the motor frame or casing, as a whole, provided with an enlargement or boss, *a*, for securing the machine to an ordinary mining column or tripod. The armature shaft, *b*, of the motor is tubular and has bearings in the frame, and the hollow drill shaft, *c*, extends and plays through the motor shaft, being splined therein so that it may move freely therethrough longitudinally for feeding the drill up to its work.

Fixed at its lower end to the upper end of the motor frame is a cylinder, *d*, which incloses the upper end of the drill shaft *c*, concentrically. Within the cylinder *d*, and embracing the drill shaft, is a piston, *e*, which is collared on the drill shaft so as to move endwise with the latter, but the shaft rotates in the piston. The piston is packed to prevent leakage between it and the cylinder and between it and the drill shaft; and it also has a ball thrust-bearing, *f* (see Fig. 4) which is secured to the piston by a disk or ring, *g*, as clearly shown. This bearing reduces the friction incident to the pressure on the piston when the drill is at work and the rapid rotation of the drill in the piston while the latter is under pressure. The upper or outer end of the cylinder *d*, is closed by an irregularly formed fitting, *h*, which is fitted with a hose-terminal or nipple *i*, a relief valve *j*, and a throttle or controlling valve, *k*. The nipple *i*, is provided with a valve or cock, *m*, which controls the admission of fluid under pressure, as water or compressed air, to the upper end of the cylinder *d*, above the piston *e*, in such a manner as to drive the piston and drill shaft downward in the cylinder and thus force the drill, *n*, into the substance being bored, with a force proportioned to the pressure of the fluid which acts on the piston. A comparatively slender tube, *o*, is secured in the fitting *h*, at its upper end and extends through a stuffing box *r*, down in the hollow of the drill shaft. The upper end of the tube *o* is open to the fluid inlet from the nipple *i*, but the entrance of the fluid at the upper end of the tube is controlled by the valve *k*. When this valve is opened the fluid, or a part of it, will pass down through the tube *o*, the drill shaft and its extension *c'*, to the tubular drill, where it serves, as supplied in proper quantity, to clear out the débris from the hole being drilled. The relief valve *j* may be adjusted in the usual manner by varying the tension of its spring, *j'*, so as to reduce the pressure on the piston *e*. This valve is best illustrated in Fig. 5. Over the end of the cylinder *d* is screwed a cap *s*, which protects the valve and the other parts it incloses from injury. There is an opening in the side of this cap for the nipple *i*, and any fluid flowing from the relief valve may pass off about the nipple. The hand-wheel, *t*, on the stem of the valve *k*, is removable, and when it is removed, the upper end of the valve stem will be within the cap *s*, and by it protected from injury. When the drill is removed from the shaft, the latter may be pushed up into the armature shaft and cylinder *d*, and the chuck

for holding the drill may then be covered and protected by a cap which screws onto the motor frame. I have indicated this protecting cap by dotted lines at *u* in Fig. 1.

It will be obvious that the details of construction of my machine may be varied to some extent without departing from my invention and I do not, therefore, limit myself to the precise details of construction herein shown.

In Fig. 1 the extension of the drill shaft and the cylinder *d*, are represented as partly broken away for lack of room; but these parts may be of any reasonable length.

Having thus described my invention, I claim—

1. In a rotary drilling machine, the combination with the frame and an electric motor mounted therein, of the fluid-pressure cylinder secured at one end to the frame and axially aligned with the tubular shaft of the motor armature and provided with a valve-controlled inlet at its outer end, the tubular drill-shaft within said cylinder and splined in the armature shaft, the drill, the piston in the cylinder and collared on the drill-spindle, said piston having packing between its outer face and the cylinder and between its inner face and the drill-shaft, a tube connected at one end with a branch of the fluid inlet to the cylinder and extending into the inclosed outer end of the drill shaft, a valve for regulating the entry of water to the outer end of said tube, and a relief valve on said fluid-pressure cylinder, substantially as set forth.

2. In a rotary drilling machine, the combination with the drill, a tubular drill-shaft, the frame, and means for rotating said shaft, of the fluid pressure cylinder, *d*, fixed to the frame and inclosing the upper end of the drill-shaft, the piston, *e*, collared on the drill-shaft within the cylinder *d*, the fitting *h*, inclosing the outer end of the cylinder and having in it a main inlet for the fluid, provided with a nipple, and two branch inlets, one leading directly into the cylinder and the other connecting with a tube *o*, the said tube, fixed in the fitting and extending telescopically into the outer end of the drill-shaft, whereby the fluid is admitted to the drill, the valve *k*, arranged to control the admission of fluid to the drill, and a relief valve *j*, to limit the pressure within the cylinder behind the piston, substantially as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

ROBERT M. JONES.

Witnesses:
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