No. 872,996. PATENTED DEC. 3, 1907.

H. HELLMAN & L. C. BAYLES.

WATER SUPPLYING ATTACHMENT FOR ROCK DRILLING MACHINES.

APPLICATION FILED JULY 24, 1906.

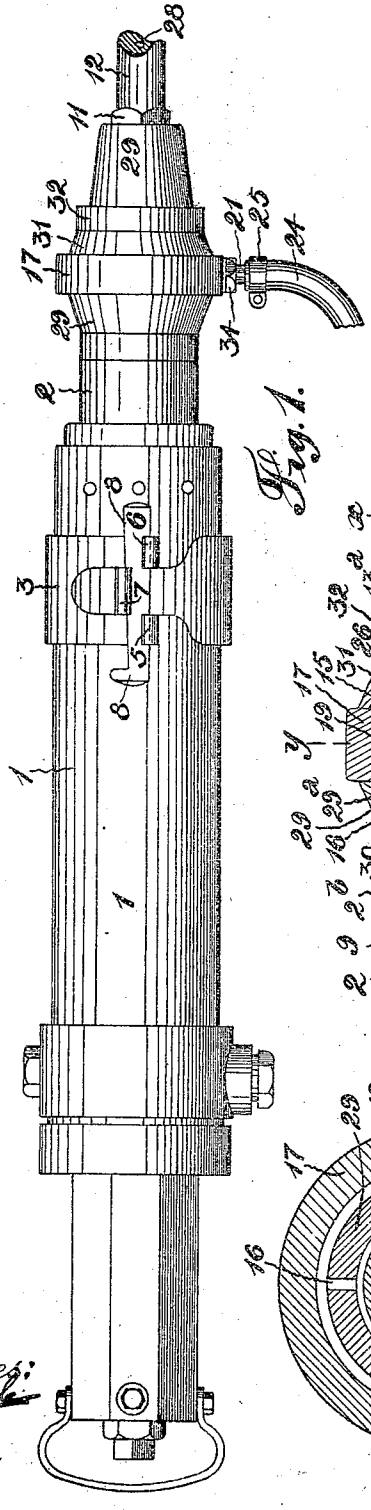


Fig. 1.

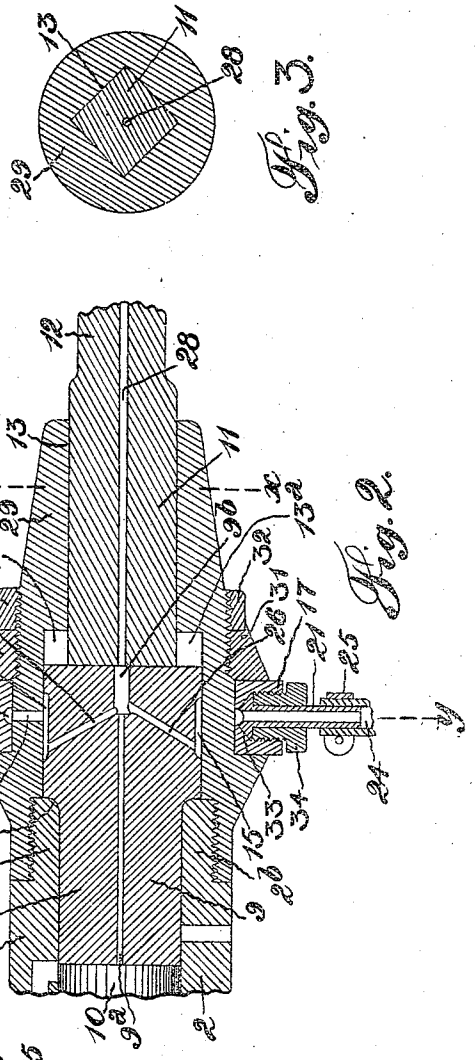


Fig. 2.

Fig. 3.

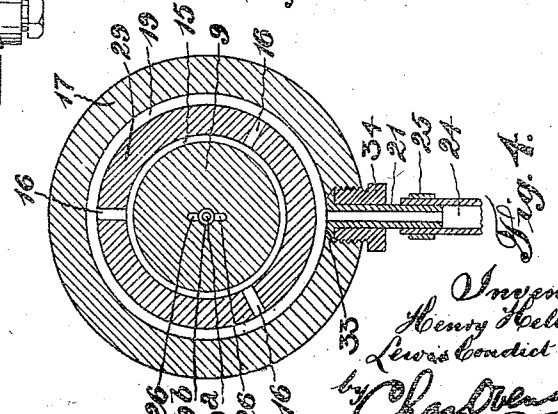


Fig. 4.

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UNITED STATES PATENT OFFICE.

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WATER-SUPPLYING ATTACHMENT FOR ROCK-DRILLING MACHINES.

No. 872,996. Specification of Letters Patent. Patented Dec. 3, 1907.

Original application filed July 12, 1905, Serial No. 269,405. Divided and this application filed July 24, 1906. Serial No. 327,470.

To all whom it may concern:

Be it known that we, HENRY HELLMAN and LEWIS CONDICT BAYLES, citizens of the United States, and residents of Johannesburg, Transvaal, have invented certain new and useful Improvements in Water-Supplying Attachments for Rock-Drilling Machines, of which the following is a specification.

This invention has reference to rock-drilling machines or engines and to means or contrivances for supplying water, preferably combined with a quantity of the actuating gaseous fluid, through the drill or bit to the cutting extremity thereof, said actuating fluid preferably serving as the means for drawing and conveying the water through the steel.

It is designed with the object of preventing the diffusion of the rock-drill dust or minute particles of rock into the surrounding atmosphere, which is responsible for the high rate of mortality among rock-drill operators. Although this is the primary object of the invention other important advantages accrue to the use of the invention, as by washing out the cuttings of the drilling or boring tool it is found that the efficiency of the drill is materially increased, that the tool does not so readily lose its edge and that the drilling is performed with increased speed.

The object of the present invention is to provide simple and compact means which are preferably permanently attached to the machine or engine so that the changing of the drills or bits is not impeded.

The present improvement is a division of an application filed by us on the 12th July, 1905, under official Serial Number 269405.

We will at once proceed with a detailed description of the invention by aid of the accompanying sheet of drawings, in which

Figure 1 is an elevation of a rock-drilling machine, with the invention applied thereto; Fig. 2 is a longitudinal section of a portion of said machine, drawn to an enlarged scale; Fig. 3 is a transverse section of Fig. 2, on the line *x—x;* Fig. 4 is a transverse section of Fig. 3, on the line *y—y.*

In the drawing 1 designates the outer cylindrical protective casing of the machine in which the power cylinder 2 is slidingly and rotatively mounted. The power cylinder 2 is constructed with a forward extension or front head 2^a for carrying the drill steel.

The casing 1 is shown carried or supported by means of the sleeve or clamp 3 for fixing it to an ordinary column clamp or other suitable support. The sleeve or band 3 is shown severed or split, one of the ends being constructed with a bifurcation or with the two projections 5, 6, and the other with a projection 7 fitting into said bifurcation. The ends of the part 7 and the two parts 5, 6, are turned up in the form of hooks and between them is inserted a tapered key 8 which when driven in one direction forces the part 7 into the bifurcation formed between the parts 5, 6, and so securely binds the sleeve or band 3 round the protective casing 1. The casing 1 may be adjusted longitudinally of the band or sleeve 3 in either direction as may be desired to advance or recede the machine in relation to the rock face or point at which it is desired to operate upon. This feature, although described, does not constitute a feature of the present invention but forms the subject matter of an application filed July 24, 1906, Serial No. 327469, for Letters Patent of the United States.

The protecting casing 1 at the forward end is constructed of approximately the same internal diameter as the external diameter of the power cylinder 2 so that the power cylinder is capable of sliding freely backwards and forwards through its bearing in this end of the casing 1.

The power cylinder 2 is at its forward end shown constructed with an external screw-thread round a reduced portion 2^b. Over this portion is screwed the front head or the member which constitutes a forward extension of power cylinder 2. The forward extension or front head 29 is constructed with a hole 13 of square or other polygonal cross section, and at the rear of the hole 13 with a cylindrical cavity 13^a. In the forward end of the power cylinder 2 is located an impact piece 9 which serves to receive the impacts of the power piston 10 or reciprocating percussive member and to transmit the same to the drill bit or boring tool 12. The impact piece 9 in its rear portion is made a sliding fit in the bore of the power cylinder 2 and in its front portion is made somewhat larger and a sliding fit in the cylindrical cavity 13^a in the rear end of the forward extension or front head 29. The cavity 13^a in the front head 29 being of greater diameter than the bore of the cylinder 2 forms an abutment or shoulder 30 for the enlarged front portion of the impact

piece 9. The shank end 11 of the drill steel or bit 12 is made of the same shape in transverse section as the transverse section of the hole 13 in the front head 29 so that it may slide longitudinally thereof but is compelled to rotate with it. A hole 28 is formed longitudinally of the drill steel along which the air and water is conducted to the cutting extremity of said bit, which converts the comminuted rock or cuttings into sludge and prevents it emanating from the borehole in the form of dust.

A small hole 9^a is formed longitudinally of the impact piece 9 through which a quantity of the actuating fluid may pass from the front end of the power cylinder 2 to assist in forcing the water through the steel 12 and ejecting the cuttings from the bottom of the hole being drilled. In the front end of the impact piece 9 is formed a hole 9^b somewhat larger in diameter than the hole 9^a which leads into or communicates with it at the bottom.

Round the enlarged part of the impact piece 9 is formed an annular groove 15 and from the annular groove ports or passages 26 are formed communicating with the hole 9^b at or near the bottom or at the point where the hole 9^a opens into it. These ports or passages 26 are as shown preferably angularly disposed in relation to the longitudinal axis of the impact piece 9 and inclined in a forward direction from the annular groove 15 to the hole 9^b. The ports 26 serve as the water ducts along which the water passes from the annular groove 15 to the hole 9^b and from the latter along the coincident hole 28 in the drill steel 12. The actuating gaseous fluid passing along the hole 9^a as it enters the hole 9^b expands, and by tending to create a vacuum in the water ducts 26 draws the water by suction and conveys it along the hole 28 in the drill steel 12 to the cutting extremity thereof.

In a recess formed around the forward extension or front head 29 is arranged a swivel ring 17. This swivel ring 17 on the one side rests against a shoulder 29^a formed by an abutment on the front head 29 and on the other side is held in position by means of a nut 31 and lock-nut 32 screwed over the front head 29. The swivel ring 17 is constructed with an internal annular groove or recess 19 and through the front head 29 are formed holes 16 which place said annular groove 19 in communication with the annular groove 15 in the impact piece 9. As the impact piece 9 has a limited movement inside the front head 29, (when it pushes the drill steel 12 forward) the annular groove 15 is made sufficiently wide to remain in communication with the ports 16 in the front head 29 at any position said impact piece 9 may assume in the front head 29.

In a hole in the swivel ring 17 which communicates with the annular groove 19 is arranged a hose stem 21 formed with a head or enlargement 33 at the inner end. The stem 21 is attached to the swivel ring 17 by means of the screw plug 34. To the outer extremity of the stem 21 is attached a hosepipe 24 by means of the hose clamp 25. This construction provides a convenient detachable connection between the hose 24 and swivel 17 and obviates the defects of the previous construction of such devices. The hosepipe 24 may lead to any source of water supply from which the water will be drawn by suction or forced by pressure into the swivel ring 17 and from the latter through the impact piece 9 to the drill steel 12.

What we claim as our invention and desire to protect by Letters Patent is:—

1. In a rock-drilling machine or engine, in combination, a cylinder, a swivel mounted on the front end thereof, a drill steel slidably and non-rotatably positioned in the front end of the cylinder, and formed with a longitudinal port leading to the cutting end, ports placing the swivel in communication with said longitudinal hole and means for conducting water to the swivel.

2. In a rock-drilling machine or engine, in combination, a cylinder with a recess formed at the front end thereof, a swivel located in said recess, a drill steel loosely and non-rotatably positioned in the forward end of the cylinder in advance of the swivel, means for introducing water to the swivel and means for placing the swivel in communication with a longitudinal hole in the steel.

3. In a rock-drilling machine or engine, in combination, a cylinder formed with a recess at the front end thereof, a swivel located in said recess, a drill steel loosely and non-rotatably positioned in the forward end of the cylinder in advance of the swivel, means for introducing water to the swivel and means for placing the swivel in communication with a longitudinal hole in the steel, and means permitting a quantity of the actuating fluid to pass from the cylinder along the drill steel along with the water.

4. In a rock-drilling machine or engine, in combination, a cylinder formed with a recess at the front end thereof, a swivel mounted within the recess, a drill steel loosely and non-rotatably positioned in the forward end of the cylinder and formed with a longitudinal hole leading to the cutting end, a reciprocating percussive member and an impact piece positioned in the front end of the cylinder and adapted to receive and transmit the impacts of said percussive member to the drill steel, said impact piece being formed with ports in communication with the swivel and with the longitudinal hole in the steel, and means for introducing water into the swivel.

5. In a rock-drilling machine or engine, in combination, a cylinder, a swivel mounted

on the forward end thereof, a drill steel loosely and non-rotatably positioned in the forward end of the cylinder formed with a longitudinal hole leading to the cutting end, a reciprocating percussive member and an impact piece positioned in the front end of the cylinder and adapted to receive and transmit the impacts of said percussive member to the drill steel, said impact piece being formed with ports in communication with the swivel and with a longitudinal hole coinciding with the longitudinal hole in the steel along which a quantity of the actuating fluid may pass with the water to the longitudinal hole in the steel.

6. In a rock-drilling machine or engine, in combination, a cylinder, a swivel mounted on the front end thereof, means for conducting water to said swivel, a drill steel having a longitudinal port, said drill steel having a portion of its shank of polygonal cross section and fitting a polygonal hole in the front end of the cylinder, an impact piece located in the forward end of the cylinder at the rear of the drill steel and having ports placing the swivel in communication with the longitudinal hole in the drill steel and a port through which a quantity of the actuating fluid passes to draw the water and convey it through the drill steel.

7. In a rock-drilling machine or engine, in combination, a power cylinder carrying percussive apparatus, said cylinder being constructed with an annular recess around its forward end, a swivel mounted in said recess, an annular cavity formed between the swivel and the bottom of the recess, an impact piece in the forward end of the power cylinder, an annular cavity between said impact piece and the power cylinder, said power cylinder having ports placing the cavities between the impact piece and the cylinder and the cylinder and swivel in communication, the impact piece having a longitudinal hole and ports placing the cavity between the impact piece and cylinder in communication with said longitudinal hole, a drill steel loosely and non-rotatably positioned in the forward end of the cylinder and having a longitudinal hole leading to the cutting end thereof with which the longitudinal hole in the impact piece communicates.

8. In a rock-drilling machine or engine, in combination, a power cylinder, a reciprocating percussive member therein, the cylinder having a forward extension carrying a drill steel slidingly and non-rotatively positioned therein, the steel having a longitudinal hole leading to the cutting end to which a quantity of the actuating fluid is admitted and means for conducting water to said longitudinal hole.

9. In a rock-drilling machine or engine, in combination, a power cylinder, a reciprocating percussive member therein, the cylinder having a forward extension, a drill steel slidingly and non-rotatively positioned in said extension, an impact piece at the rear of the drill steel, a swivel on said extension, means for conducting water to the swivel, the drill steel having a longitudinal hole leading to the cutting end thereof, the impact piece having ports for conducting a quantity of the actuating fluid to the drill steel and water from the swivel, and means for introducing water to the swivel.

10. In a rock-drilling machine or engine, in combination, a power cylinder, a casing in which the power cylinder is slidingly and rotatively mounted, a drill steel operatively carried in the front end of the power cylinder, the steel having a longitudinal hole leading to the cutting end through which a quantity of the actuating fluid may pass, a swivel mounted on the front end of the power cylinder, means for conducting water to the swivel and ports placing the swivel in communication with the longitudinal hole in the steel.

11. In a rock-drilling machine or engine, in combination, a power cylinder, a casing in which the power cylinder is rotatively and slidingly mounted, a drill steel slidingly and non-rotatively positioned in the front end of the power cylinder, said steel having a longitudinal hole leading to the cutting end, an impact piece positioned in the front end of the power cylinder, a reciprocating percussive member, the impact piece serving to receive and transmit the impacts of said member to the drill steel, a swivel mounted on the front end of the cylinder, ports through the impact piece for permitting a quantity of the actuating fluid to pass to the steel and for conducting water from the swivel so that it is conveyed to the cutting point of the steel by said actuating fluid and means for conducting water to the swivel and from the latter to the longitudinal port in the impact piece.

12. In a rock-drilling machine or engine, in combination, a power cylinder and a reciprocating percussive member therein, a casing in which the power cylinder is rotatively and slidingly mounted, a drill steel having a longitudinal hole leading to the cutting end thereof and a portion of its shank of polygonal cross section fitting a hole of corresponding section in the front end of the cylinder a swivel carried by the power cylinder, and means for conducting water to said swivel and from the latter to the longitudinal hole in the steel.

13. In a rock-drilling machine or engine, in combination, a power cylinder and a reciprocating percussive member therein, a casing in which the power cylinder is rotatively and slidingly mounted, a drill steel having a longitudinal hole leading to the cutting end thereof and a portion of its shank

of polygonal cross section fitting a hole of corresponding section in the front end of the cylinder, a swivel carried by the power cylinder, an impact piece positioned in the forward end of the power cylinder at the rear of the drill steel, said impact piece having ports which permit a quantity of the actuating fluid to pass to the hole in the drill steel and ports along which water may pass from the swivel to said longitudinal hole, and means for conveying water to the swivel.

14. In a rock-drilling machine or engine, in combination, a power cylinder, a casing in which said cylinder is rotatively and slidingly mounted, a front head fixed to the forward end of said power cylinder, a swivel ring on the front head, means for placing said swivel ring in communication with a source of liquid supply, a drill or bit operatively carried by the front head and formed with a longitudinal hole communicating with the interior of the cylinder and with the swivel ring and means for conducting water to the swivel ring.

15. In a rock-drilling machine or engine, in combination a power cylinder and a reciprocating percussive member therein, a casing in which said cylinder is rotatively and slidingly mounted, a front head fixed to the front end of the power cylinder, a swivel ring mounted on the front head and forming an annular cavity between it and the front head, means for placing the swivel ring in communication with a source of liquid supply, a drill bit or tool slidingly and non-rotatively fitting the front head and formed with a longitudinal hole communicating with the interior of the cylinder and leading to the cutting end, an impact piece positioned at the rear end of the drill steel and adapted to receive and transmit the impacts of the reciprocating percussive member, said impact piece being constructed with a longitudinal port for permitting a quantity of the actuating fluid to pass through it to the longitudinal hole in the drill steel and with angular forwardly inclined ports placing its longitudinal hole in communication with an annular space formed between it and the interior of the front head and ports in the front head placing the cavities between the front head and swivel and front head and impact piece in communication.

16. In a rock-drilling machine or engine, in combination, a power cylinder, a casing in which said power cylinder is slidingly and rotatively carried, a swivel piece carried on the front end of the power cylinder, a hose stem constructed with a head or enlargement fitting a recess in said swivel and a screwed plug for retaining said hose stem in position while permitting it to rotate about its point of attachment to the swivel.

17. In a rock-drilling machine or engine, in combination, a power cylinder and an impact piece, the latter constructed with a longitudinal hole permitting the passage through it of a quantity of the actuating fluid and with ports communicating with and conducting water to said longitudinal hole, the longitudinal hole being increased in diameter forward of the point where the water ducts communicate with it.

In witness whereof we have hereunto set our hands in the presence of two subscribing witnesses.

HENRY HELLMAN.
LEWIS CONDICT BAYLES.

Witnesses:
CHAS. OVENDALE,
R. OVENDALE.