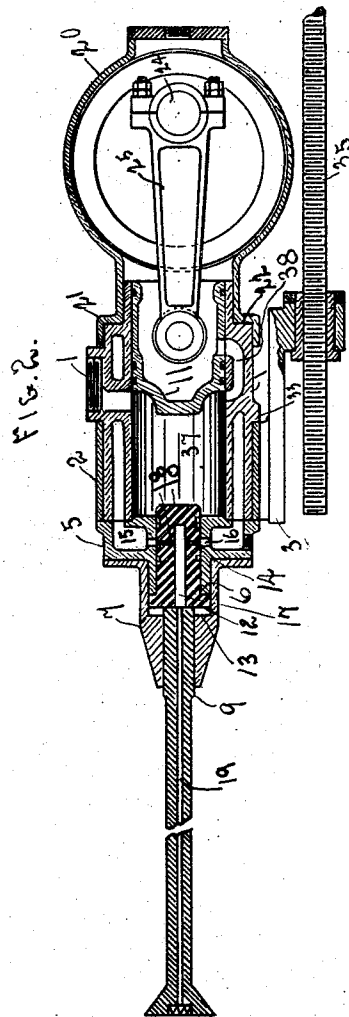
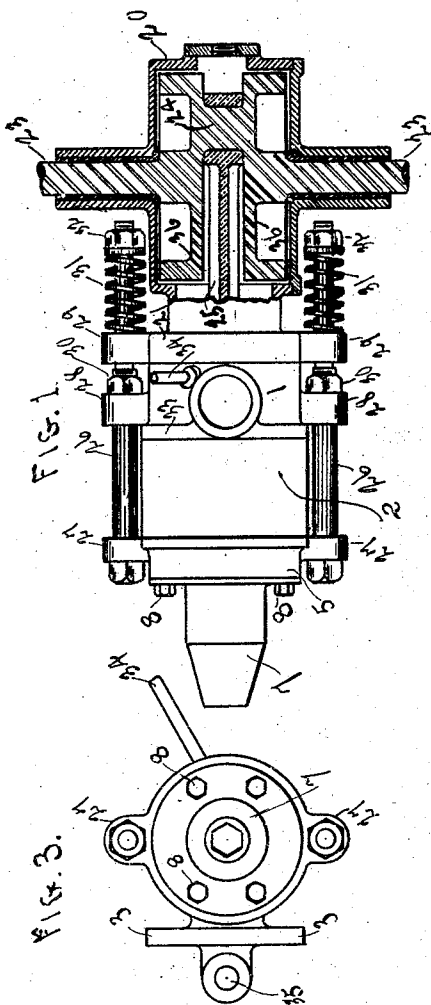


L. L. SCOTT.
 ROCK DRILLING MACHINE OR ENGINE.
 APPLICATION FILED SEPT. 9, 1908.

937,872.

Patented Oct. 26, 1909.



WITNESSES:
J. H. Young
H. Howard

INVENTOR.
Louis L. Scott

UNITED STATES PATENT OFFICE.

LEWIS L. SCOTT, OF JOPLIN, MISSOURI.

ROCK-DRILLING MACHINE OR ENGINE.

937,872.

Specification of Letters Patent.

Patented Oct. 26, 1909.

Application filed September 9, 1908. Serial No. 452,319.

To all whom it may concern:

Be it known that I, LEWIS L. SCOTT, a citizen of the United States, residing at Joplin, in the county of Jasper and State of Missouri, have invented certain new and useful Improvements in or Relating to Rock-Drilling Machines or Engines, of which the following is a specification.

This invention relates to rock drilling machines or engines, and has for its object the production of a machine or engine of the nature indicated, which shall be small and compact, simple and inexpensive, and particularly adapted to mining work in "stopes."

One feature of the machine or engine lies in the fact that all moving and vital parts are entirely inclosed and are thereby protected from damage consequent upon rough handling such machines usually receive at the hands of their operators.

Another feature of a machine or engine constructed in accordance with my invention, lies in the fact that all of the energy stored up in the moving parts is used in doing effective work on the drilling tool; thus obtaining the result of a free piston drill.

Another valuable feature is that the cushioning springs are located on the outside of the machine and are under the operator's observation at all times, and can be easily replaced (should they break), without having to tear the machine apart.

My invention consists of various features of construction and arrangement of parts, and accomplishing the results as hereinafter described, illustrated in the accompanying drawings and particularly pointed out in the appended claims.

Referring to the accompanying drawings which form a part of this specification, Figure 1 is a horizontal plan, shown partly in section, of my improved rock drill. Fig. 2 is a vertical longitudinal section of same. Fig. 3 is an end view of Fig. 1.

Like parts are represented by similar numerals of reference in the several views.

The numeral 1 represents the power cylinder of an internally fired rock drilling engine. Although I wish it distinctly understood that my invention contemplates its adaptation to use in electric motor driven drill, where power is applied to a crank shaft to reciprocate the piston, or percussive member. The cylinder 1 is rotatively

carried by the casting 2; the ways 3 form a part of the casting 2 and serve as slides which can be mounted on a shell and tripod support commonly used on rock drills. The head 5 closes the front end of the cylinder 1 and has a cylindrical projection 6 over which fits the casting 7. The casting 7 is secured to the cylinder 1 by the studs 8, which also help to secure the head 5 to the cylinder 1; the outer end of the casting 7 is constructed with a hole of square or polygonal cross section and into it is projected the shank of the drill steel 9, which is made of corresponding section. The internal shape of the casting 7 and the corresponding external shape of the drill shank compels the drill tool to rotate in unison with the power cylinder 1.

The head 5 is bored out to receive the impact piece 10 which serves for receiving and transmitting to the drilling tool 9 the impacts of the reciprocating percussive member 11. The impact piece 10 projects into the cylinder 1 and is constructed at its forward end with an enlargement 12, which prevents its entering said cylinder beyond a certain point. The casting 7 is bored out to fit over the projection 6 of the head 5; and this bore is carried beyond the end of the projection 6 so that the enlargement 12 of the impact piece 10 works in same. The shoulder 13 of the casting 7 forms a stop for the impact piece 10. Around the impact piece 10 is formed an annular groove 14. The water space 15 and the groove 14 of the impact piece 10 are placed in communication by the radial ports 16, formed in the head 5. A port 17 is provided in the impact piece 10. One or more holes 18 are drilled in the impact piece 10 which place the annular recess 14 in communication with the hole 17. The drill steel 9 may be constructed with the hole 19 which coincides with the hole 17 in the impact piece 10, so that water from the space 15, (which may be supplied to said space from any source of water supply), may pass into the longitudinal hole 19 of the steel 9 and be carried to the cutting extremity of the drill bit. The crank case 20 has a small projecting cylinder 21 which is bored out to fit over the back end of the cylinder 1, and is slidingly mounted on same. The shoulder 22 of the cylinder 1 forms a stop, (in one direction), for the crank case 20. The crank case 20 carries the journals 23

of the crank shaft. The crank arms 36 serve as balance wheels and join the main shafts 23 through the pin 24. The piston 11 which reciprocates in the cylinder 1 is connected to the crank pin 24 through the connecting rod 25. The bolts 26 pass through the lugs 27 of the head 5, also through the lugs 28 of the cylinder 1 and through the lugs 29 of the crank case 20. The said bolts 26 are secured to the cylinder 1 and the head 5 by the nuts 30. The bolts 26 project beyond the lugs 29 of the crank case 20, and over these projecting ends the coil springs 31 are placed. These springs 31 bear against the face of the lugs 29 and the tension on same is adjusted by the nuts 32. The springs 31 normally hold the crank case 20 against the shoulder 22 of the cylinder 1 for a purpose to be described later.

The external circumference of the front end of the cylinder 1 is machined round so that the cylindrical casting 2 fits over same, and said cylinder, (and all parts secured thereto), are free to be rotated in the casting 2. The shoulder 33 on the cylinder 1 and the lugs 27 of the head 5 prevent said cylinder 1 from moving longitudinally in the casting 2. The lever 34 is secured to the cylinder 1 and is used to rotate said cylinder back and forth. The amount of rotation will depend on the number of points on the drilling steel; if eight pointed steel is used the amount of rotation required would be back and forth through an arc of 45°.

The cylinder 1 and all connected parts are adjustable by the screw 35, or by some other equivalent or convenient device, in connection with which the usual shell and tripod support may be utilized.

The operation of my rock drilling engine is as follows: Assuming that the machine has been mounted in requisite position to the rock face and the shank of the drill, (which is made of square or polygonal section), is projected into the piece 7, until it abuts the forward end of the impact piece 10. The feed screw 35 is then turned until the tool 19 contacts with the rock face, and so long as the feed screw is turned (in one direction), the drill is kept continuously up to its work. Assuming further that the piston 11 is being reciprocated, either by some motive power applied to the shaft 23, or by action of internally fired gases upon it, (the operation of the said internally fired engine is that of the common two cycle, where the charge of gas and air is drawn into the crank case 20, is compressed and passed into the chamber 37 through the port 38, is then exploded and exhausted in the usual manner), as the piston 11 approaches the end of its downward stroke it strikes the inner end of the impact piece 10. The impacts of the reciprocating percussive member 11 on the inner end of

the impact piece 10 are transmitted by the latter to the inner end of the drill steel 9 to penetrate the rock to form the hole. It will be noted that as the piston 11 strikes the impact piece 10 the entire energy of the reciprocating parts is delivered to and does effective work on the drilling tool. Also that when the piston 11, (which is connected to the crank pin 24, through the rod 25), strikes the impact piece 10, the energy stored in the crank shaft arms 36, (said crank shaft being carried by the crank case 20), will overpower the pressure of the springs 31, (said springs normally holds the crank case to the cylinder, as before described), and will cause the entire crank case to yield and move backward, so as to allow the said crank shaft to pass over its dead center without injury to the bearings or the said crank shaft; after the crank passes its dead center, the springs 31 will draw the said crank case back to its normal position. After the drill is in operation the lever 34, (which is secured to the cylinder 1), is moved back and forth. The internal shape of the casting 7 and the corresponding external shape of the drill steel 9 causes the latter to rotate in unison with the cylinder 1 so that the position of the cutting edges of the drilling tool is varied or altered at each successive blow.

Water may be carried to the extremity of the drill bit as before described.

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

1. In a drill, the combination of a power cylinder, a crank case formed with a tubular projection slidably fitted upon the cylinder, a shoulder formed upon said cylinder, for limiting the movement of the crank case in one direction, means for yieldingly holding the free end of said projection in contact with said shoulder, a crank shaft carried by the crank case, and a piston connected to the said shaft and adapted to reciprocate in the said cylinder, a drill bit carried by the cylinder, and impact piece located within the interior of said cylinder directly proximal to the rear end of bit, and adapted to strike the said bit, under the action of the piston, and means for advancing said cylinder and bit.

2. The combination, in a drill, of an annular casting, a power cylinder rotatably fitted therein and formed with a shoulder, a crank case formed with a tubular projection slidably fitted upon the cylinder, and with a plurality of perforated lugs, bolts secured at one end to the cylinder and having their other ends extending through the perforations in said lugs, springs located upon the projecting ends of the bolts and arranged to bear against said lugs, for normally holding the free ends of said projection against said

shoulder, and means for adjusting the tension of said springs.

3. The combination, of a drill, of an annular casting, a power cylinder rotatably fitted therein, a drill bit carried by the cylinder, means for advancing said cylinder and bit, a crank case yieldably connected to said cylinder, a crank shaft carried by the crank case, and a piston connected to said shaft and arranged to reciprocate in said cylinder.

4. The combination, in a drill, of an annular casting, a power cylinder rotatably fitted therein, a crank case yieldably connected to the rear end of the cylinder, a crank shaft carried by the crank case, an impact piece located in the forward end of said cylinder, a drill bit carried by the cylinder and loosely positioned in front of said impact piece, means for compelling the drill bit to rotate in unison with the cylinder, a piston, (connected to the said crank shaft), adapted to reciprocate in said cylinder and strike the said impact piece, (on its downward stroke), which in turn transmits said impacts to the drilling tool.

5. In a drill, the combination of a power cylinder, a crank case having a portion thereof slidably fitted upon the cylinder,

yielding connections between said portion and said cylinder, for normally holding the crank case in one position upon the cylinder, a drill bit carried by the cylinder, a crank shaft carried by the crank case, and a percussive piston operatively connected with the crank shaft.

6. In a drill, the combination of a rotatable power cylinder, a crank case yieldably connected to the cylinder, a crank shaft carried by the crank case, a drill bit carried by the cylinder and arranged to rotate therewith, an impact piece located within the interior of said cylinder directly proximal the rear end of the bit, and a piston connected with the crank shaft and arranged to strike against the impact piece, the yielding connection between the cylinder and the crank case permitting the latter to move backward at the moment of impact, so as to allow the crank shaft to pass over its dead center.

In testimony whereof I have hereunto set my hand this 5th day of September A. D. 1908.

LEWIS L. SCOTT.

Witnesses:

H. HOWARD,
J. H. YOUNG.