United States Patent

[11] 3,601,205

[72] Inventor **Ewald H. Kurt**
Phillipsburg, N.J.

[21] Appl. No. **26,364**
[22] Filed **Apr. 7, 1970**
[45] Patented **Aug. 24, 1971**
[73] Assignee **Ingersoll-Rand Company**
New York City, N.Y.

[54] **ROCK DRILL**
7 Claims, 6 Drawing Figs.

[52] **U.S. Cl.** **173/105,** 173/145, 173/162
[51] **Int. Cl.** **E21c 1/00**
[50] **Field of Search** 173/105, 104, 162, 171, 90, 106–109, 160, 145

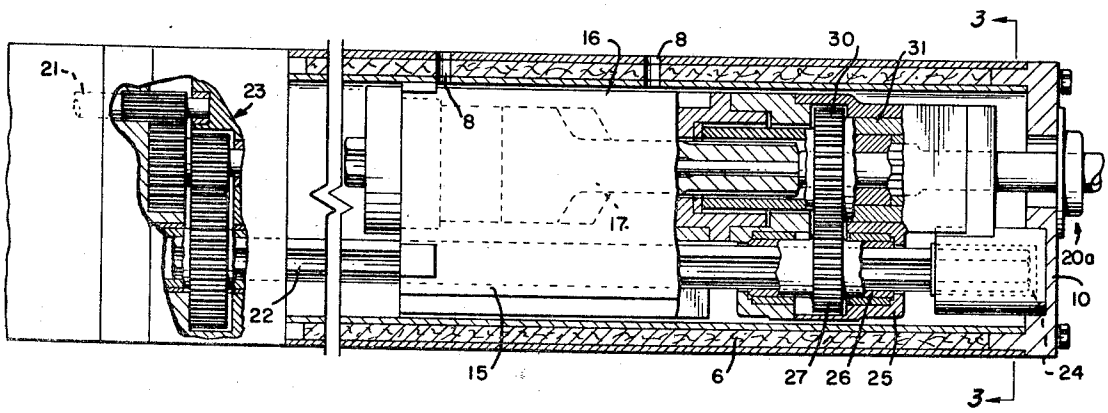
[56] **References Cited**

UNITED STATES PATENTS

2,136,315	11/1938	Pettit	299/37
2,287,059	6/1942	Platts et al.	173/150
2,675,213	4/1954	Poole et al.	173/145
2,895,715	7/1959	Stenuck	173/160
3,481,411	12/1969	Wood	173/171

Primary Examiner—James A. Leppink
Attorneys—Frank S. Troidl, David W. Tibbott and Bernard J. Murphy

ABSTRACT: A rock drill assembly which includes a drilling machine mounted within a sound-absorbing container. The container is longer than the length of the drilling machine so that the container acts as the guide for the drilling machine as the machine is advanced into the material being drilled. The drill is provided with bearings which engage the inside of the container for guiding the movement of the drill within the container. Apparatus is provided for advancing and retracting the drilling machine relative to the container. There may be apparatus for independently rotating the drill steel relative to the container.



PATENTED AUG 24 1971

3,601,205

SHEET 1 OF 2

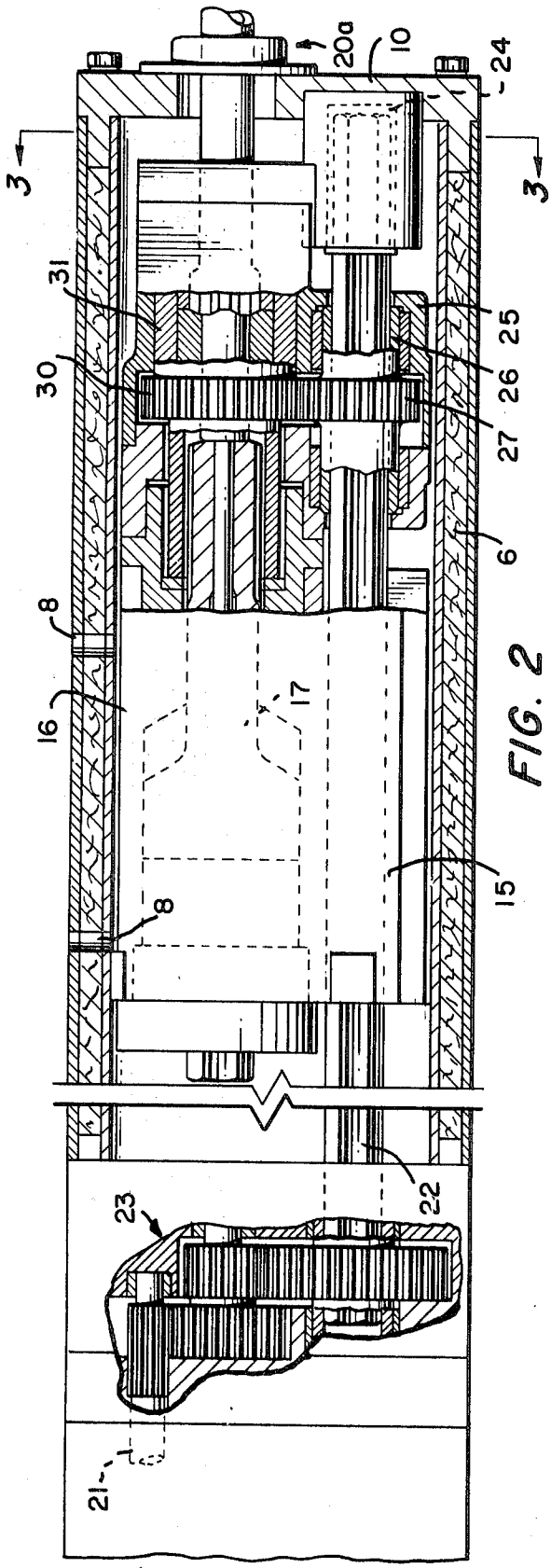


FIG. 2

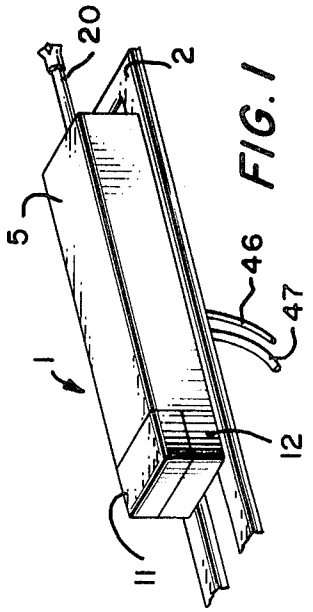


FIG. 1

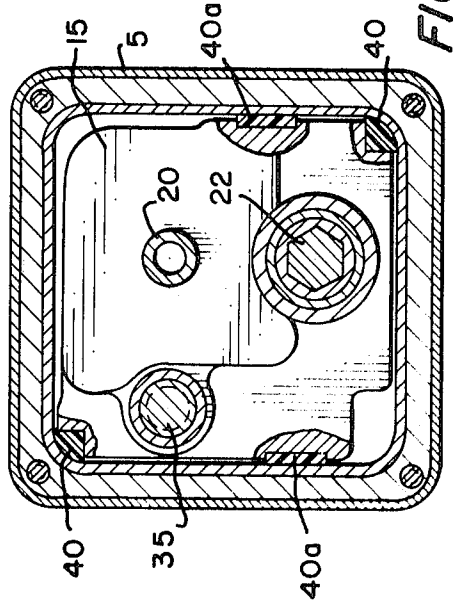


FIG. 3

INVENTOR
EWALD H. KURT
BY
Bernard J. Murphy
AGENT

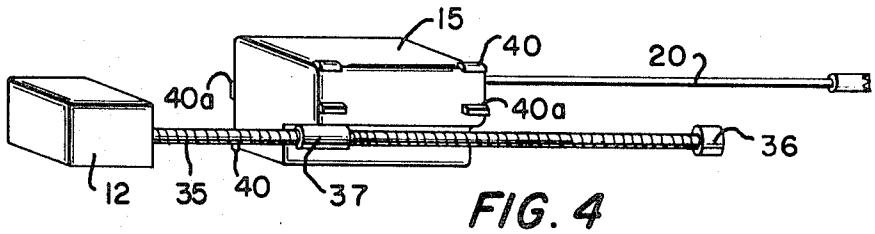


FIG. 4

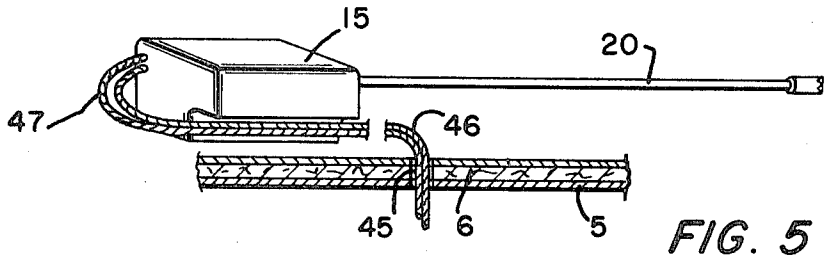


FIG. 5

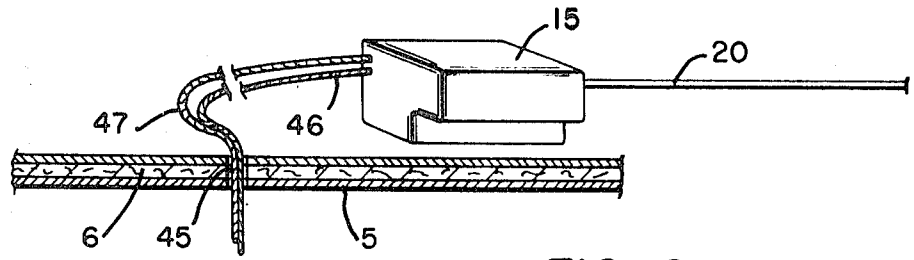


FIG. 6

INVENTOR
EWALD H. KURT
BY
Bernard J. Murphy
AGENT

ROCK DRILL

BACKGROUND OF THE INVENTION

This invention relates to rock drills and in particular to a rock drill assembly which is designed to reduce the transmission of the noise produced by the drilling machine to the noise produced by the drilling machine to the operator and surrounding areas.

It is well known that rock drills make an excessive amount of noise which is irritating to both the operator and to those working near the drilling machine. This noise is particularly irritating when the drilling machine is being used for underground work, such as in a mine, or in urban centers where the machine is being used for construction work. Although some efforts have been made to reduce the noise produced by such machines, to date, none of these efforts have been entirely satisfactory.

In general, there are two sources of noise associated with most rock drills. One is the noise produced by the exhaust of the drilling machine. A second source of noise is that produced by the piston of the drilling machine impacting the rock drill rod or drill bit. Heretofore, most efforts to reduce the noise associated with the operation of a rock drill have centered around the provision of mufflers to reduce the exhaust noise of the rock drill. Little has been done to reduce the noise produced by the impacting of the drill piston against the rock drill rod. By the present invention I have provided a muffler-type housing substantially surrounding the entire drilling machine which serves to muffle both the exhaust noise and the noise produced by the piston impacting the workpiece.

Prior to the present invention, housing have been placed around rock-drilling machines. In some instances, this housing is merely a tent placed around the machine. Such arrangements have not proved entirely effective in reducing noise and are rarely used. In addition, the operator must work inside the tent and hence he is still subjected to the noise. Other housing such as that shown in U.S. Pat. No. 2,136,315, have been designed to reduce some noise. The housing shown in this patent will not, however, provide adequate muffling and can not be used with drills other than paving breakers because of its poor drill feed arrangement. Other housings have been provided for rock-drilling machines such as that shown in U.S. Pat. No. 1,591,048. The housing used in this patent is designed primarily for protection of the drill rather than for the muffling of noise, and the drill feed system is adequate only for limited drilling depths.

SUMMARY

It is therefore the principle object of this invention to provide a novel rock drill assembly in which the noise produced by the operation of the drilling machine is muffled to both the operator and those people working near the drill.

It is another object of this invention to provide a muffled rock-drilling machine which may be used for drilling relatively deep holes. It is a still further object of the present invention to provide a rock drill assembly in which the drilling machine is mounted within a muffler and the muffler acts as the drill guide for the full stroke of the drill machine.

In general, the foregoing and other objects will be carried out by providing a rock drill comprising: a hollow casing; a drilling machine mounted for reciprocal movement within said casing; means operatively connected to said drilling machine for reciprocating said drilling machine within said casing; and guide means positioned between said drilling machine and said casing for guiding the movement of said drilling machine within said casing; said casing adapted to muffle the nose produced by said drilling machine.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be described in connection with the annexed drawings wherein:

FIG. 1 is a perspective view of the drilling machine of the present invention;

FIG. 2 is a sectional view of the drilling machine of the present invention;

FIG. 3 is a sectional view taken on the line 3—3 of FIG. 2 looking in the directions of the arrows;

FIG. 4 is a schematic view of the advancing and retracting apparatus used in connection with the present invention; and

FIGS. 5 and 6 are generally schematic views of the air supply arrangement used with the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings, there is shown in FIG. 1 a rock-drilling machine generally indicated at 1 which is mounted on any suitable supporting frame 2. The support frame need not include any guide, as used on conventional drills used in mining operations, because the drill is guided by the muffler housing. The rock drill includes a muffler-type housing or casing 5 which is a double wall container provided with insulating material or sound-absorbent material 6 (See FIG. 2) between the walls thereof. Although a double wall housing is illustrated, a single wall container can be used where the additional sound reduction is not required or where the additional protection of the outer can is unnecessary. A hatch (not shown) may be provided in the casing 5 to permit access to the rock-drilling machine or to add rods to the drill string in deep hole work. A hatch is not considered to be an essential part of the present invention. The casing container is provided with a plurality of holes 8 for permitting the exhaust of fluid from the rock-drilling machine.

The casing 5 is preferably rectangular in cross-sectional configuration as shown in FIGS. 1 and 3 and is of a length equal to the desired feed of the drill. If the drill rods to be used with the drill are twelve feet in length the casing 5 should be at least 12 feet plus the length of the drilling machine mounted in the casing. In the embodiment shown, the casing is open-ended; a plate 10 closes one end, and the rotation and feed motors 11 and 12, respectively, are mounted to the other, open end. The plate 10 is provided with an opening therein for the penetration of the drill rod 20. A rock drill generally indicated at 15 is mounted for reciprocal movement within the casing 5. The machine shown is a conventional rock drill including a drill casing 16 and a piston 17 mounted for reciprocal movement in the casing 16 and adapted to deliver an impact to a drill steel 20. As the piston 17 impacts the drill steel 20 a drill bit mounted on the end of the steel penetrates into the material being drilled.

It is essential that the rock-drilling machine advance within container, as the hole being drilled deepens, so that the drill steels 20 will follow the bit down the hole. With the present invention, the conventional drill guide and drill advance arrangement has been eliminated. The muffler-type casing 5 serves as the drill guide. The drill 15 is dimensioned so that at least a portion of the machine is positioned in each corner of the casing 5. This is clearly shown in FIG. 3. Bearings 40, of triangular cross section, made from a suitable material, such as nylon, are mounted in two corners of the drill 15 and engage corresponding corners of the casing 5 to act as a guide for the drill. Further flat bearings 40*a* are disposed between juxtapositioned lateral walls of the drill casing 16 and the housing casing 5, also to guide the drill 15. These bearings prevent rotation of the machine 15 relative to the casing 5 as well as guide the reciprocal movement of the machine. In order to advance and retreat the drilling machine within the casing 5, a rotary motor 12 is mounted on the back of the casing 5. A feed screw 35 is connected to the motor 12 and is rotatably mounted in the casing 5 by means of a bearing 36 in the front of the casing 5. The feed screw 35 passes through a nut 37 fixed to the drill 15. As the feed screw is rotated, the drill will advance or retract, depending upon he direction of rotation, relative to the casing 5. In modern rock drills, the drill steel is rotatable independently of the operation of the

drill. With the present invention, a rotary motor **11** also is mounted on the back of the casing **5** for rotating the steel **20**. The motor **11** is provided with a drive shaft **21** which rotates a Kelly bar **22** through suitable gear reducing means **23**. The Kelly bar is shown as a hex but may be of any other operative configuration. The Kelly bar **22** is rotatably mounted within the casing **5** in a bearing **24**. The drilling machine **15** is provided with an underslung casing **25** at the forward end of the machine and a hex-shaped-bored, sleeve bearing **26** is rotatably mounted within the casing **25**. The bearing **26** is provided with a spur gear **27** around its outer periphery. The spur gear **27** rotatably engages a spur gear **30** on a chuck generally indicated at **31** for rotating the drill steel **20**. As the motor **11** rotates the Kelly bar **22**, the sleeve bearing **26** and spur gear **27** are rotated to rotate the spur gear **30** and the drill steel **20**. As the drilling machine **15** advances or retracts relative to the casing **5**, the drilling machine and casing **25** will move along the Kelly bar **22**.

In order to supply fluid under pressure to the drilling machine and to provide fluid for cleaning the bottom of the hole being drilled, I have provided an opening **45** in the casing **5** for the passage of fluid-supply conduits **46** and **47** into the casing **5** which are suitably connected to the backhead of the drilling machine **15**, in any conventional manner. As is clearly shown in FIGS. **5** and **6** these conduits form a loop and the loop rolls and unrolls as the drilling machine is advanced and retracted relative relative to the casing **5**.

When used underground drilling where one drill steel only is used (commonly referred to as "single pass" drilling), the drill rod is introduced thru an opening in the front plate **10** which also houses a split centralizer **20***a*. As the drill **15** is retracted to its rearmost position, the rod **20** is drawn into the casing **5**. The unit is then ready for drilling operations.

When used in surface drilling where drill rods are added to the string in order to extend the hole beyond the reach of one rod, a long, hinged hatch in the casing **5** may be used to introduce drill rods and the couplings that connect them.

From the foregoing it is apparent that the objects of this invention have been carried out. The casing **5** is a double-walled, insulated casing which deadens the noise produced by the drilling machine so that it will not adversely effect the operator and those working adjacent the machine. The casing **5** serves as both a muffler and a drill guide. The drill can be advanced and retracted relative to the casing yet the casing insures a quiet drilling machine regardless of the position of the drill **15**.

I claim:

1. A rock drill comprising:

a hollow casing;

a drilling machine mounted for reciprocal movement within said casing;

means operatively connected to said drilling machine for reciprocating said drilling machine within said casing wherein said means for reciprocating said drilling machine includes motor means mounted at one end of said casing and feed means operatively connecting said drilling machine to said motor means, said feed means being mounted within said casing; and

guide means positioned between said drilling machine and the inside of said casing for guiding the movement of said drilling machine within said casing;

said casing adapted to muffle the noise produced by said drilling machine.

2. The rock drill of claim **1** wherein said motor means is a rotary motor and said feed means includes a feed screw rotatably mounted within said casing and a nut fixed to said drilling machine; said feed screw passing through said nut so that when said feed screw is rotated, said drilling machine will move relative to said casing.

3. The rock drill of claim **1** wherein said casing includes at least a pair of spaced-apart walls and sound-absorbent material between said walls to thereby muffle the noise produced by said drilling machine.

4. The rock drill of claim **1** wherein said casing is polygonal in cross-sectional configuration and said guide means includes bearing means mounted on said drilling machine for engaging internal corners of said casing.

5. A rock drill comprising:

a housing;

a fluid-pressure-operated drilling machine including apparatus for delivering an impact to a drill steel mounted for reciprocal movement in said housing;

means operatively connected to said drilling machine for reciprocating said drilling machine relative to said housing;

conduit means extending into said housing for conducting fluid under pressure to said drilling machine for operating said drilling machine;

a drill steel extending into said housing; and

means operatively connected to said drill steel within said housing and independent of said drilling machine for rotating said drill steel relative to said drilling machine.

6. The rock drill of claim **5** wherein said means for reciprocating said drilling machine includes motor means mounted at one end of said housing, a shaft operatively connected to said motor means and rotatably mounted in said housing and means operatively connected said rotatable shaft to said drilling machine.

7. The rock drill of claim **6** further comprising guide means positioned between said drilling machine and said housing for guiding the movement of said drilling machine within said housing.