United States Patent [19]

Strömmes

[11] **3,744,575**

[45] **July 10, 1973**

[54] **ROCK DRILL FEED BAR**

[75] Inventor: **Axel Strömmes,** Borlange, Sweden

[73] Assignee: **Atlas Copco Aktiebolag,** Necka, Sweden

[22] Filed: **Sept. 1, 1971**

[21] Appl. No.: **176,927**

[30] **Foreign Application Priority Data**

Sept. 8, 1970 Sweden 12137/70

[52] **U.S. Cl.** **173/31,** 173/43, 173/152

[51] **Int. Cl.** **E21c 5/11,** E21c 9/00

[58] **Field of Search** 173/28, 34, 43, 152, 173/31

[56] **References Cited**

UNITED STATES PATENTS

2,899,034	3/1959	Cowan	173/31
2,274,728	3/1942	Osgood	173/34
3,399,734	9/1968	Folinsbee	173/43 X

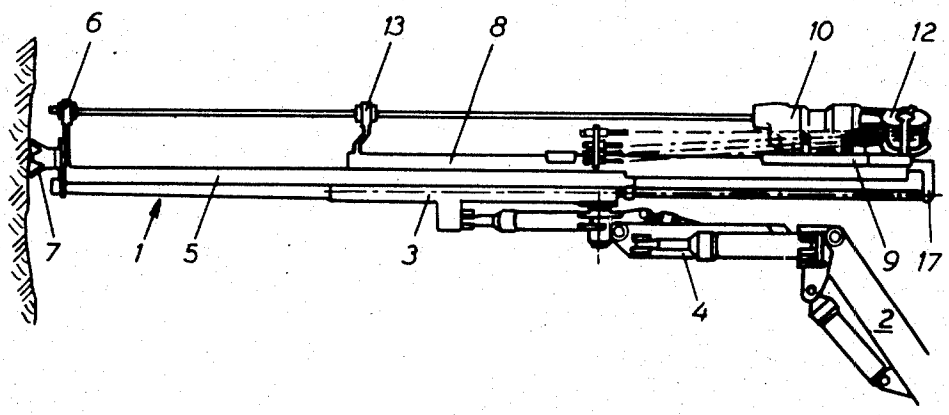
Primary Examiner—Ernest R. Purser

Attorney—Munson & Fiddler

[57] **ABSTRACT**

A rock drill feed bar supported by a drill boom is longitudinally displacable as well as extendable. For that reason it comprises a first, a second and a third bar member which are slidably attached to each other. The first bar member is box-shaped and undisplacably connected to the drill boom and lodges a hydraulic piston-cylinder actuating device which is arranged to move the bar members relative to each other for accomplishing extension and longitudinal displacement of the feed bar. A rock drill carrying slide and a hose reel are guided upon the third bar member and are arranged to be fed along this bar member by means of a feeding device.

5 Claims, 5 Drawing Figures



PATENTED JUL 10 1973

3,744,575

SHEET 1 OF 2

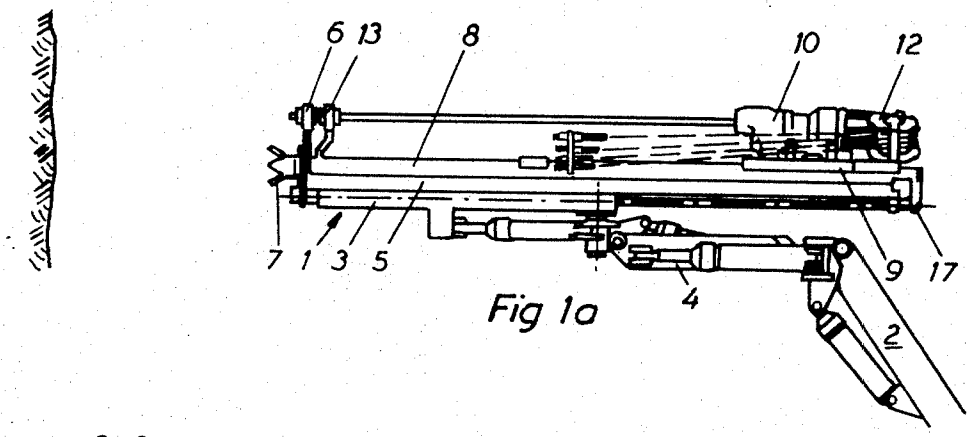


Fig 1a

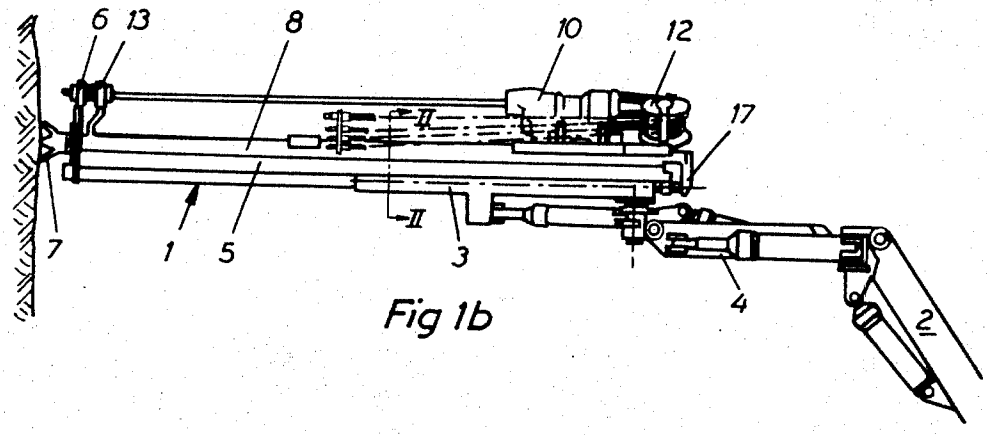


Fig 1b

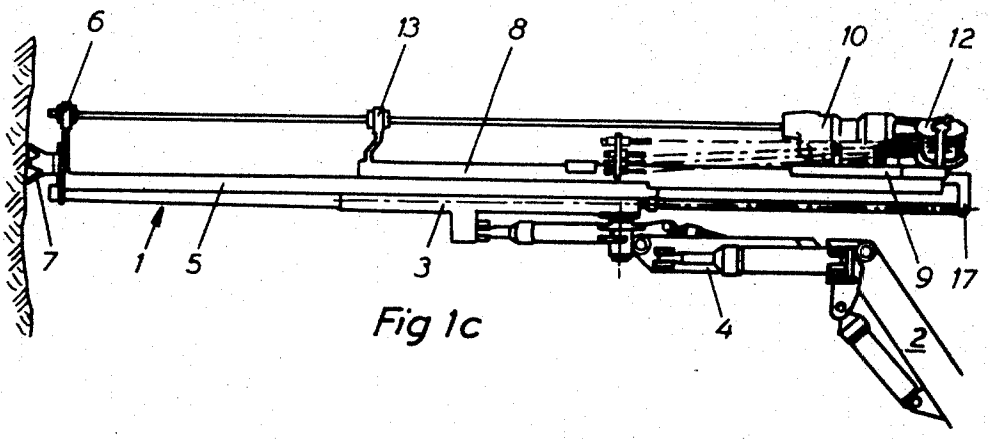


Fig 1c

AXEL STRÖMNES

INVENTOR.

BY MUNSON & FIDDLER,

Attorneys.

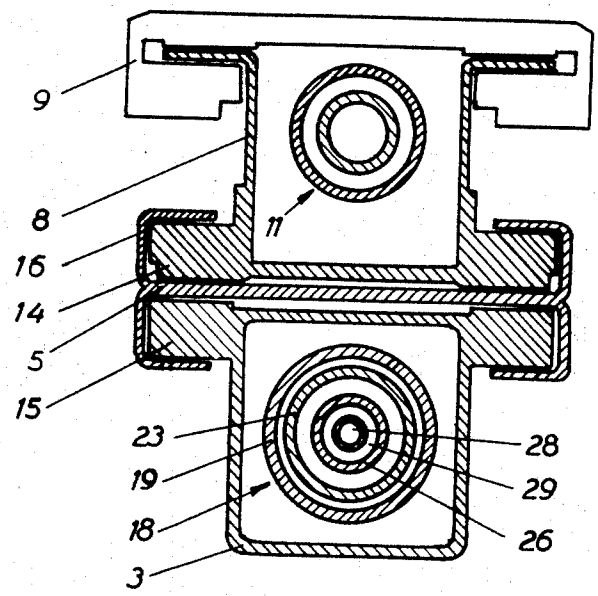


Fig 2

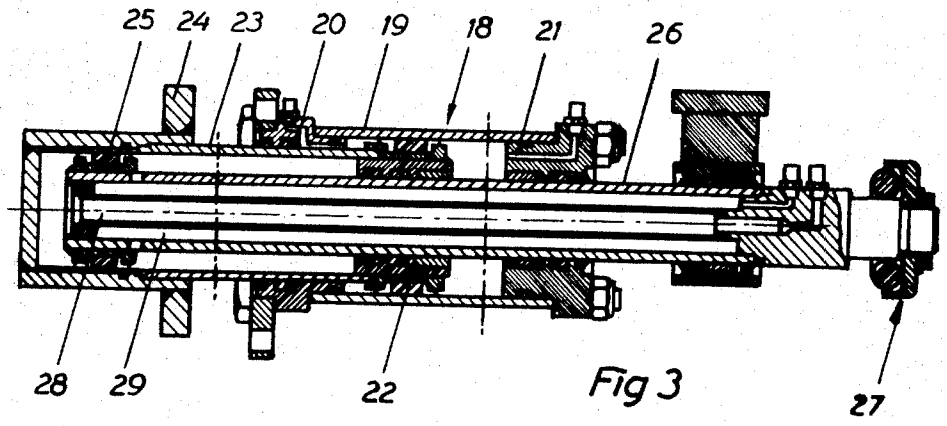


Fig 3

AXEL STROMNES

INVENTOR.

BY MUNSON & FIDDLER,

Attorneys.

ROCK DRILL FEED BAR

BACKGROUND OF THE INVENTION

This invention relates to a rock drill feed bar.

Ordinary rock drill feed bars are disadvantageous in that their availability is limited for use in narrow drifts and tunnels. There is an tendency to use a rock drill not only as a drifter for tunneling but also for other drilling purposes, for instance for roof bolting. As it is economically advantageous, to use as long drill rods as possible, ordinary rock drill feed bars have been adapted thereto and have today a length of 4–5m. That great length limits their availability in narrow tunnels and necessitates the use of feed bars of different lengths, one long type for drifting and other shorter types for other boring purposes, such as roof bolting. Thus one problem is how to carry out all drilling operations in small area tunnels using only one type of feed bar.

Another problem connected with drilling with a feed bar supported rock drill is that the forward end of the feed bar has to rest against the rock surface at the beginning of the drilling operation. That means that the feed bar has to be longitudinally displacable relative to its support which may consist of a drill boom.

The main object of the invention is to solve both of these problems at the same time by making a feed bar which is extendable as well as longitudinally displacable.

Another object of the invention is to make a very compact actuating means for accomplishing the above-mentioned movements of the feed bar.

BRIEF DESCRIPTION OF THE DRAWINGS

A preferred embodiment of the invention is hereinafter described with references made to the drawings in which

FIG. 1*a* shows a rock drill feed bar according to the invention in a shortened and retracted position.

FIG. 1*b* shows the same feed bar in a forwardly displaced and shortened position.

FIG. 1*c* shows the same feed bar in a forwardly displaced and extended position.

FIG. 2 shows a cross section along line II—II in FIG. 1*b*.

FIG. 3 shows a shortened longitudinal section through a hydraulic actuating means, the purpose of which is to accomplish the extension as well as the longitudinal displacement of the feed bar.

SUMMARY OF THE INVENTION

In FIGS. 1*a–c*, the feed bar is generally indicated by the reference numeral 1 which is supported hy a drill boom 2. The feed bar comprises a first bar member 3 which is pivotably attached to a swingable link arm 4 at the outer end of the drill boom 2. This arrangement makes it possible to swing the feed bar in vertical as well as horisontal planes by means of the boom for positioning the rock drill into the desired coordinates.

Upon the first bar member 3 there is arranged a second bar member 5 which is longitudinally displacable relative to the first bar member. At its forward end, the second bar member 5 is provided with a drill rod centralizer 6 and a spur 7. The latter is adapted to rest against the rock surface at the beginning of a drilling operation.

Furthermore, the second bar member 5 supports a third bar member 8 which is longitudinally displacable relative to the second bar member. Upon the third bar member 8 there is guided a rock drill slide 9 which carries a rock drill 10. The third bar member 8 also supports an ordinary feed device generally indicated at 11 (see FIG. 2) which is arranged to feed the rock drill 10 along the third bar member 8. The feed device consists preferably of a piston-cylinder device which drives the rock drill slide by means of one or more drive chains.

Moreover, the bar members are provided with elongated guides which have vertical as well as horisontal guide surfaces. See FIG. 2. The guides of the first and third bar members, 3 and 8 respectively, are constituted by elongated ribs 14 and 15 which cooperate with guide flanges 16 on the second bar member 5.

Upon the third bar member 8 there is also guided a hose reel 12 which is moved along the third bar member by means of the feed device simultaneously with the rock drill but at half the speed. The hose reel is designed to control the tension in the hoses which supply the rock drill with compressed air and flushing medium.

At its forward end, the third bar member 8 is provided with a drill rod centralizer 13 which serves as an intermediate drill centralizer when the third bar member is in its retracted position. See FIG. 1*c*.

The first bar member 3 is box-shaped and encloses a hydraulic actuating device 18. This actuating device is arranged to accomplish the longitudinal movement of the second and third bar members together relative to the first bar member 3 and of the third bar member relative to the second bar member.

As being apparent from FIG. 3, the actuating device 18 consists of a main cylinder 19 which is provided with hydraulic fluid passages 20 and 21 for alternatively supplying and draining the cylinder 19. A piston 22 is movably arranged within the main cylinder 19 and is connected to a piston rod 23 which extends out of the cylinder 19 at the forward end of the latter. The piston rod 23 is provided with a coupling means 24 for connection with a corresponding means on the second bar member 5.

The piston rod 23 is tubular and constitutes a second cylinder in which is arranged a second piston 25. The piston 25 is connected to a piston rod 26 which extends out of the main cylinder 19 at the rear end of the latter. At its outer end, the piston rod 26 is provided with a coupling device 27 by which it is connected to a corresponding device 17 on the third bar member 8.

The second cylinder 23 communicates with hydraulic fluid passages 28 and 29 in the piston rod 26. The passage 28 is constituted by a tube which is coaxial with and located within the piston rod 26. The passage 29 is constituted by the annular space between the tube and the inner wall of the piston rod 26.

The feed bar according to the invention operates as follows:

when drilling a hole in the rock formation at certain coordinates, the feed bar is directed into position by swinging of the drill boom 2 and the swingable arm 4. Then, hydraulic fluid is supplied to the main cylinder 19 of the actuating device through the rear passage 21, whereupon the piston 22 is forced forwards. The piston 22 pushes, by means of the piston rod 23, the second bar member 5 forwards until the spur 7 gets into contact with the rock surface. Any fluid flow, to or from the internal cylinder, is not initiated at this stage. Thus

the inner piston **25** remains stationary relative to the inner cylinder **23** and is displaced together with the latter relative to the main cylinder. That means that the second and third bar members, **5** and **8** respectively, are advanced together toward the work surface without any relative displacement, whereby, the feed bar retains its length.

As the spur **7** abuts against the rock surface, hydraulic fluid is supplied to the front part of the internal cylinder **23** via the passage **28.** The piston **25** is thus forced backwards, pushing the third bar member **8** backwards by means of the piston rod **26.** Fluid flow is not initiated to or from the main cylinder **19** so the piston **22** remains stationary relative to the main cylinder. Therefore the spur **7** retains its position, resting against the rock surface.

The rearward movement of the third bar member **8,** which determines the extension of the feed bar, continues until it attains a length which corresponds to the length of the drill rod to be used. When the selected length is reached, the movement of third bar member **8** is a rested relative to the second bar member **5** to prevent further backward movement. This arrestment is carried out by means of a chain (not shown). Other types of locking devices may, of course, be used.

Upon maximum extension of the feed bar, the third bar member **8** is automatically stopped when the piston **25** reaches its rear end position.

The purpose of the arresting device is to define the maximum length of the feed bar that corresponds to the length of a selected drill rod. The arresting device prevents the drill bit from being restricted into the drill centralizer **6** upon return movement of the feed device.

When the feed bar has assumed its correct position, resting against the rock surface, and having been extended to its proper length, a drill rod is inserted in the rock drill **10.**

The rock drill is started and is advanced by the feeding device **11.** The feeding movement is accomplished by forward movement of the rock drill relative to the third bar member **8** on one hand and by forward displacement of the third bar member **8** relative to the second bar member **5** on the other hand. The latter movement is accomplished by introducing hydraulic fluid into the rear part of the inner cylinder through the passage **29.** The two movements take place simultaneously.

Because of the fact that the third bar member **8** is also displaced, an extended feed length is obtained.

When a hole is completed, the feeding is interrupted and the rock drill is stopped. Then, hydraulic fluid is supplied to the front part of the inner cylinder through the passage **28** at the same time as the conventional feeding device **11** is reversed. The rock drill and the drill rod are withdrawn to their original positions.

When boring of a second hole, using the same drill rod, the feed bar **1** is shifted to other coordinates by means of the drill boom **2.** Then, the axial position of the feed bar is adjusted so that the spur **7** the rock surface. This longitudinal displacement of the feed bar is carried out in the same way as at the beginning of the first described drilling operation, namely by supplying hydraulic fluid to the rear part of the main cylinder **19.** The rock drill is started and the feeding and actuating devices are activated so as to make the slide **9** and the third bar member **8** feed the rock drill forwards. Another hole is now being drilled.

When drilling transverse holes in narrow drifts or tunnels the third bar member **8** is locked in its forwardmost positon relative to the second bar member by means of the locking device, whereby the feed bar attains its shortest length. In this contracted position, the feed bar requires a very small space for drilling holes in different directions in a tunnel. On the other hand drifting tunnels the locking deivce is not used but the maximum when length of the feed bar is utilized for drilling with long drill rods.

Regardless whether the feed bar is contracted or extended it can always be displaced longitudinally in order to engage the spur **7** with the rock surface.

In spite of being extendable as well as longitudinally displaceable, the feed bar according to the invention is very compact. This result is obtained mainly by the fact that there is only one actuating device which has two functions and which is common for the extension movement as well as for the longitudinal displacement.

Owing to the compactness of the actuating device, it could be located within the first bar member and make the feed bar compact.

The invention is not limited to the described embodiments but can be freely varied within the scope of the claims.

What I claim is:

1. A feed bar for a rock drill rod comprising:

a first bar member ridgidly connected to a drill boom for directing the rock drill towards a work surface;

a second bar member slidably engaging said first bar member and a third bar member slidably engaging said second bar member;

said third bar member slidably supporting the rock drill;

said second bar member having a work surface engaging member;

actuating means effective to move said second bar member together with said third bar member relative to said first bar member in a direction toward the work surface until said surface engaging member abuts against the work surface and thereby establishes the longitudinal displacement of the feed bar relative to the work surface.

2. A feed bar according to claim **1** in which said actuating means are further effective to move said third bar member relative to said second bar member in a direction away from the work surface upon engagement of the second bar member with the work surface and means being provided for arresting the movement of said third bar member upon having moved a predetermined distance corresponding to the length of the drill rod to be used and thereby define the drill feed range.

3. A rock drill feed bar according to claim **1,** characterized in that the first bar member is box-shaped and encloses the actuating means.

4. A rock drill feed bar according to claim **1,** characterized in that the actuating means is constituted by a piston-cylinder device which comprises a main cylinder which is rigidly attached to said first bar member, a first piston which is annular and slidably guided in said main cylinder, a first piston rod connecting said first piston and said second bar member, said first piston rod being tubular constituting a second cylinder, a second piston slidably guided in said second cylinder, and a second piston rod connecting said second piston and said third bar member.

5. A rock drill feed bar according to claim **4,** characterized in that said first and second piston rods extend in opposite directions from the main cylinder.

* * * * *