United States Patent

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[33] **Sweden**
[31] **16794/1967**

[54] **SLIDE SUPPORTED ROCK DRILL**
11 Claims, 6 Drawing Figs.

[52] **U.S. Cl.** **173/57,** 173/160
[51] **Int. Cl.** **E21c 5/02,** E21c 7/10
[50] **Field of Search** 173/141-160, 57

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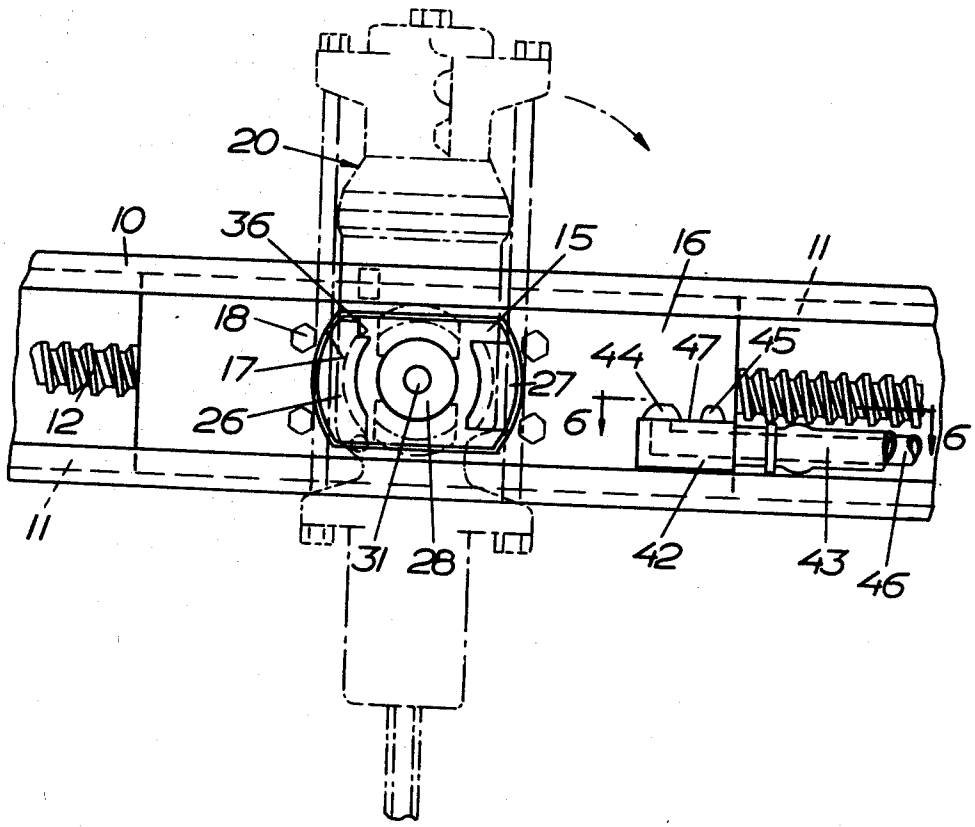
ABSTRACT: Bayonet lock elements for a rock drill on the slide of a feed shell are disposed in a plane substantially parallel with the rock drill guide means of the shell and constitute together with corresponding bayonet lock elements on the rock drill a quick release coupling through the medium of which the rock drill is coupled to the slide with the axis thereof parallel with said guide means. Passage connecting means for connecting supply conduits for compressed air and water to the rock drill may be interconnected automatically simultaneously with the bayonet lock elements when the rock drill is coupled to the slide.



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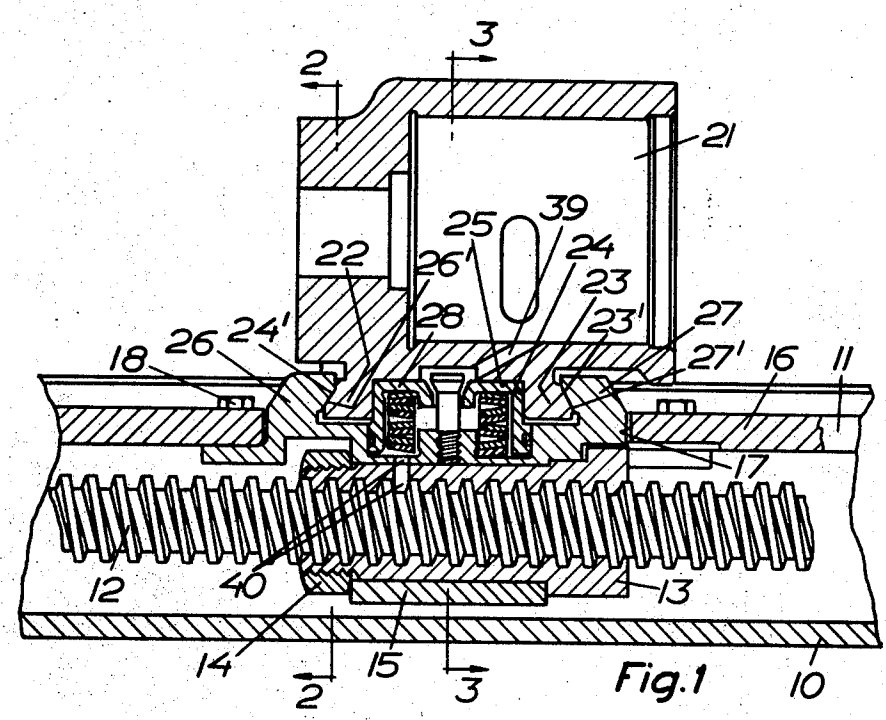

Fig. 1

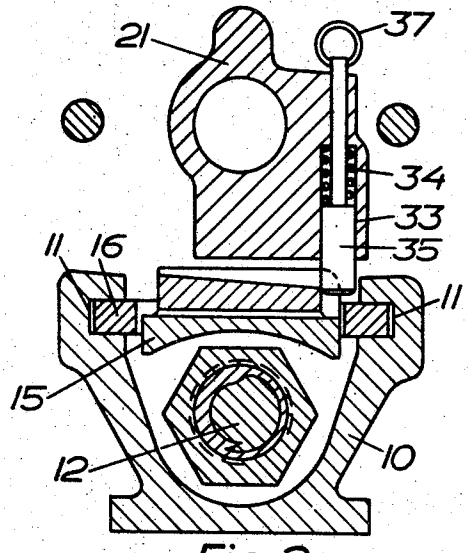

Fig. 2

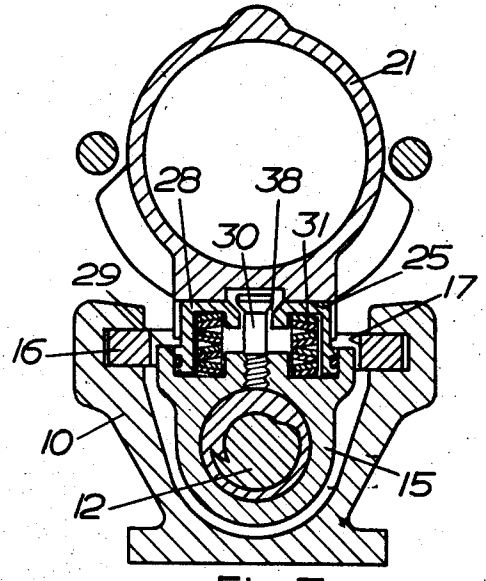

Fig. 3

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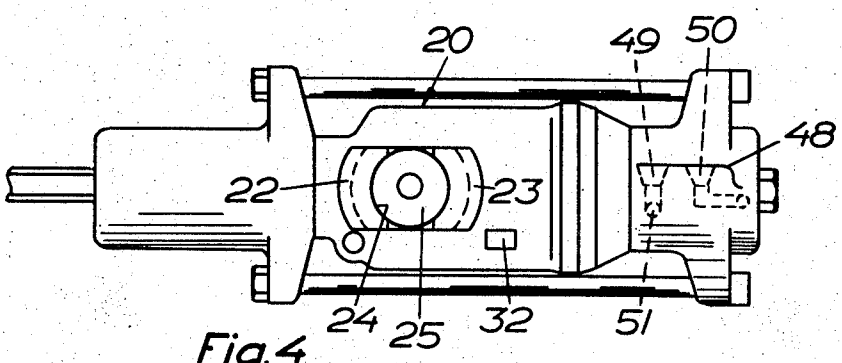

Fig.4

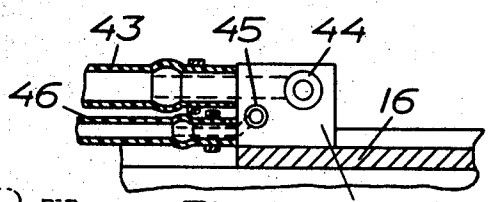

Fig.6

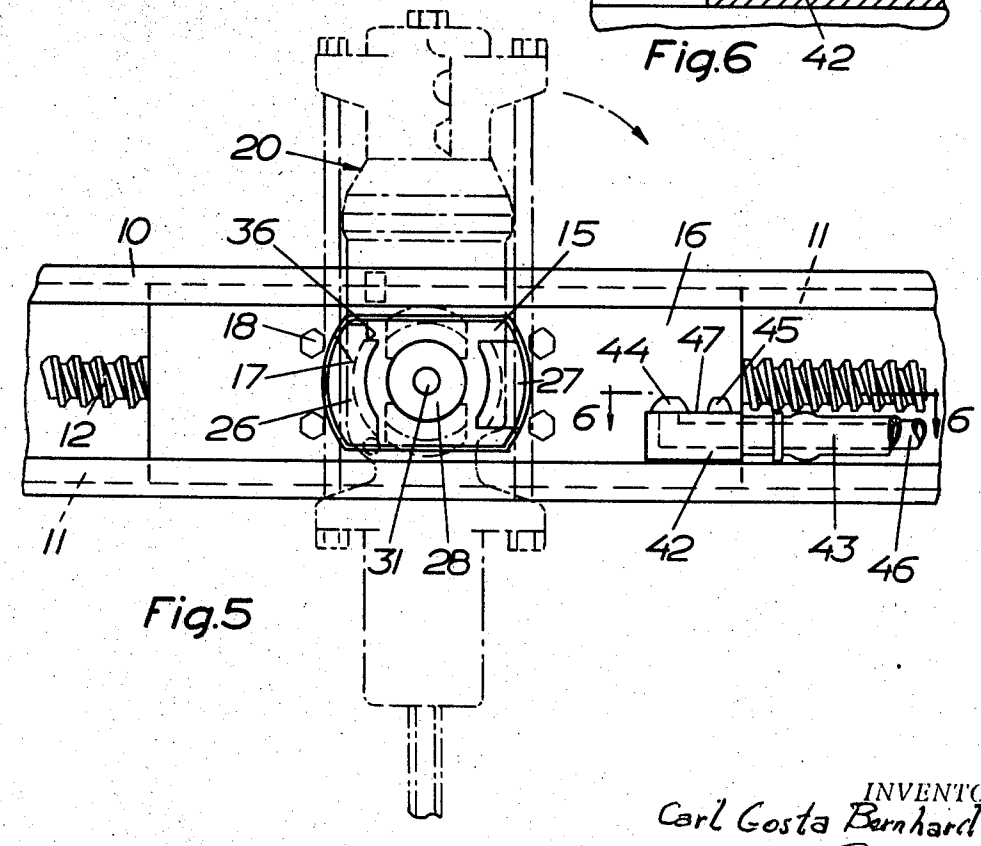

Fig.5

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SLIDE SUPPORTED ROCK DRILL

This invention relates to rock drills and more particularly to slide supported rock drills removably connected to a slide for conjoined movement therewith by power back and forth along a feed shell. In connection with exchange of or service on such rock drills of conventional construction much time is lost for disassembling the rock drill from the slide and for reassembling and aligning thereon the same or another rock drill made ready for work. Conventional slides usually incorporate bolts, nuts, and washers in the connection and during exchange operations loose such elements can easily be lost so that the time loss is increased. The exchange also has to be made by some kind of auxiliary instruments increasing the cost of exchange. Further time consuming operations are the disconnection and connection of the fluid supply conduits on the rock drill by which the latter is supplied as with compressed air and water. It is an object of the invention to provide a slide supported rock drill in which the time loss for disassembling and assembling operations is minimized very appreciably. Another object of the invention is to perform such disassembling and assembling operations by a quick release connection without the use of auxiliary instruments. A still further object of the invention is to provide means for minimizing the time spent for disconnecting and connecting all the fluid supply conduits on the rock drill.

For these and other purposes there is according to the invention provided a slide supported rock drill comprising a feed shell, parallel guide means extending along said feed shell, a slide guided for movement along said feed shell on said guide means, feeding means on said shell for moving said slide back and forth along said guide means, a first pair of bayonet lock elements on said slide in a plane substantially parallel with said guide means, a rock drill, a second pair of spaced bayonet lock elements on said rock drill and cooperating with said first pair of elements for forming therewith a quick release bayonet coupling having a coupled position in which the axis of said rock drill is parallel with said guide means and an uncoupled position in which said axis is transverse to said guide means.

The above and other objects of the invention will become obvious from the following description and from the accompanying drawings in which a preferred embodiment of the invention is illustrated by way of example. It should be understood that this embodiment is only illustrative of the invention and that various modifications thereof may be made within the scope of the claims.

In the drawings:

FIG. 1 shows a longitudinal section through the cylinder of a rock drill fixed to a slide on a feed shell incorporating the invention;

FIG. 2 is a section on the line 2–2 in FIG. 1;

FIG. 3 is a section on the line 3–3 in FIG. 1;

FIG. 4 is a view from below of a rock drill on a somewhat smaller scale and incorporating the invention;

FIG. 5 shows on the same scale as FIG. 4 a top view of a feed shell with a slide incorporating the invention and by dash and dot lines in FIG. 5 there is outlined the rock drill shown in FIG. 4 placed on the slide in uncoupled position but ready to be coupled manually thereto; and

FIG. 6 finally is a view partly in section on the line 6–6 in FIG. 5.

In the FIGS. a feed shell 10 is provided with parallel longitudinally extending guide means 11 such as guideways. At the ends, not shown, of the feed shell 10 is rotatably journaled a feed screw 12, which preferably is connected to a rotary compressed air driven motor, not shown, on the feed shell 10. Along the feed screw 12 there is displaceable a feed nut 13 which by means of an end nut 14 is affixed to a drill holding bracket 15.

Along the guide means 11 is displaceable a slide 16 made as a quadrangular plate with a central opening 17 therein. The drill holding bracket 15 is screwed to the slide 16 by suitable screws 18 and its upper portion extends through the central opening 17 in the slide 16.

For drilling purposes there is fixed to the slide 16 a rock drill 20 with the longitudinal axis thereof in the drilling direction parallel with the guide means 11. The cylinder 21 of the rock drill 20 carries a pair of connecting or bayonet lock elements 22, 23 spaced from each other in the longitudinal direction of the rock drill 20 and provided with helical surfaces 22^1, 23^1 turned away from each other and directed to face the cylinder 21 obliquely in upward direction. Centrally between the connecting elements 22, 23 the cylinder 21 is provided with a cylindrical recess 24 with a bottom shoulder 25.

On the drill holding bracket 15 of the slide 16 there are formed a pair of connecting or bayonet lock elements 26, 27 arranged with a somewhat larger spacing than the connecting elements 22, 23 of the rock drill 20 and spaced one after the other in the feeding direction of the slide in a plane substantially parallel with the guide means 11. The connecting elements 26, 27 carry opposed helical surfaces 26^1, 27^1 turned towards the drill holding bracket 15 obliquely in downward direction. The drill holding bracket 15 carries centrally between the connecting elements 26, 27 a cylindrical body 28 intended for slidable cooperation with the cylindrical recess 24 of the rock drill 20 and abutting therein on the bottom shoulder 25. The body 28 consists of a sleeve axially slidably and sealingly guided in a recess 29 in the drill holding bracket 15. By a spring 31 suitably built up by spring rings, the body or sleeve 28 is pressed under precompression against the conical head of a headed screw member 30 which is screwed to the drill holding bracket 15 and passes centrally through a valve opening 38 centrally in the bottom of the sleeve 28. The spring 31 is compressed between the drill holding bracket 15 and the bottom of the sleeve 28 striving to shut the valve opening 38 of sleeve 28 against the head of member 30.

The connecting or bayonet lock elements 22, 23, 26, 27 are arranged for positive interengagement through the medium of their helical surfaces 22^1, 23^1, 26^1, 27^1 and provide a quick release bayonet coupling. The coupling operation of this coupling is illustrated in FIG. 5. With the bayonet lock elements 22, 23 shown in FIG. 4 turned towards the slide 16 and with the longitudinal axis of the rock drill 20 transverse to the feed shell 10, the coupling operation is performed by the rock drill 20 being placed in the position illustrated in FIG. 5 so that the body 28 of the slide 16 falls into the recess 24 of the rock drill 20. The rock drill 20 now rests through the medium of the shoulder 25 pivotally against the upper side of the body 28 and is supported elastically by the spring 31. Thereupon the rock drill 20 is turned with the body 28 as a pivot and providing together with the recess 24 and shoulder 25 guiding surfaces for such pivotal movement clockwise in FIG. 5 to a position in which the longitudinal axis of the rock drill 20 becomes parallel with the guide means 11 and coincides with the drilling direction. During the turning motion the helical surfaces 22^1, 23^1 cooperate each with one of the helical surfaces 27^1, 26^1 in a manner to push downward the rock drill 20 and the body 28 against the action of spring 31 whereby a retaining frictional force is created between the helical surfaces 22^1, 23^1 and 26^1, 27^1. On the underside 23^1he rock drill 20 is fixed a lug 32 providing an abutment which in the coupled position of the quick release bayonet coupling abuts on one side extremity of the coupling element 27 preventing continued clockwise turning of the rock drill 20. Forwardly on the underside the rock drill cylinder 21 is provided with a detent 35 manually retractable into a bore 33 against the action of a spring 34, which detent in coupled position falls into a recess 35 at one side of the connecting element 26 thereby locking the rock drill 20 in said coupled position.

When the rock drill is to be uncoupled from the slide 16, the detent 35 is lifted manually by a ring 37 which is attached to the rear end of the detent 35 extending through the cylinder 21, whereupon the rock drill 20 may be turned freely counterclockwise to the position shown in FIG. 5 and may be lifted from the cylindrical body 28. During respectively coupling and uncoupling movements the detent 35 will rest slidably against the upper side of the connecting element 26 with the

spring 34 tensioned and thus the detent 35 will fall automatically into the recess 36 when taking up aligned position thereover.

At depression of the body 28 during coupling of the connecting elements 22, 23, 26, 27 there is opened the valve opening 38, FIG. 3, in the body 28 around the head of the screw member 30 so that an auxiliary exhaust passage 39 in the cylinder 21 of the rock drill 20, which passage 39 receives exhaust air during the movements of the hammer piston, not shown, in the cylinder 21, is communicated with the interior of the body 28. The interior of the body 28 in its turn is in communication with the surrounding atmosphere via a passage 40 to the internal threads of the feed nut 13. As a result the spring 31 and the feed screw 12 are lubricated by the oil drops normally contained in the exhaust air. At uncoupling of the quick release coupling the valve opening 38 is automatically closed and penetration of dirt into the body 28 is prevented.

When removing the rock drill 20 from the slide 16 for servicing or for exchange, the air supply hose, the water supply hose and control hoses, if present, all must be disassembled from the rock drill 20 when mounted on a conventional slide. For purpose of eliminating such time-consuming repeated need, in the inventive embodiment there is fixed to the slide 16 a connection housing 42 to which the air hose 43 supplying the rock drill with compressed air is connected ending via an internal air conduit in the housing 42 at an air connecting nipple 44. A similar connecting nipple 45 is carried by the housing 42 adjacent to the air connecting nipple 44 and communicates via a conduit in the housing 42 with a water hose 46 supplying flushing water to the rock drill 20. The nipples 44, 45 constitute quick release passage connecting means of the slide 16 and are arranged adjacent to an end plane 47 of the housing 42 which plane is parallel with the guide means 11 and perpendicular to the slide 16. A similar end plane 48 is arranged on the rock drill 20 and is provided with recesses 49, 50 constituting quick release passage connecting means of the rock drill 20 of which the recess 49 is intended for sealing and releaseable cooperation with the nipple 44 and the recess 50 with the nipple 45. The recess 49 communicates with a complementary conduit or air supply passage 51 to the distributing valve and the impact motor, both not shown, of the rock drill 20, while the recess 50 has communication with another complementary conduit being the flushing tube, likewise not shown, of the rock drill 20. During coupling of the rock drill 20 with the slide 16 the end plane 48 in FIG. 5 is turned to immediate vicinity of the end plane 47 whereby the nipples 44, 45 get sealing contact with the recesses 49, 50. The rock drill 20, by reason of the intercoupling movement, will thus be automatically connected to the air and water sources. At uncoupling of the rock drill 20 from the slide 16, the hoses 43, 46 remain fixed to the slide 16 while the rock drill 20 is released automatically at the passage connecting means 44, 49 and 45, 50, respectively. Further connecting nipples and cooperating recesses may in case of demand be arranged at the end planes 47, 48 for releasable connection of for example control passages to the rock drill 20.

The screw feed hereinabove only shown as an example may be substituted by any other suitable type of feed suited for combination with the quick release bayonet coupling for affixing the rock drill quickly releasably on the slide.

I claim:

1. A slide supported rock drill comprising a feed shell, parallel guide means extending along said feed shell, a slide guided for movement along said feed shell on said guide means, feeding means on said shell for moving said slide back and forth along said guide means, a first pair of bayonet lock elements provided directly on said slide in a plane substantially parallel with said guide means, a rock drill, a second pair of spaced bayonet lock elements on said rock drill and cooperating with said first pair of elements for forming therewith a quick release bayonet coupling between the slide and the rock drill having a coupled position in which the axis of said rock drill is parallel with said guide means and an uncoupled position in which said axis is transverse to said guide means.

2. A slide supported rock drill according to claim 1 in which said first and second pairs of bayonet lock elements are spaced in the longitudinal direction of respectively the feed shell and the rock drill.

3. A slide supported rock drill according to claim 1 in which centrally between said second bayonet lock elements on the rock drill and between said first bayonet lock elements on said slide there are arranged cooperating guiding surfaces for journaling the rock drill pivotally on the slide during the coupling movements when said bayonet lock coupling is coupled and uncoupled.

4. A slide supported rock drill according to claim 1 in which there are provided cooperating abutments on said slide and said rock drill for defining, with said abutments in engagement with one another, said coupled position in which the axis of said rock drill is parallel with said guide means, and a releasable locking members on said rock drill and cooperating with said slide for releasably locking said rock drill against movement relative to said slide in said coupled position thereof.

5. A slide supported rock drill actuated by compressed air and comprising a feed shell, parallel guide means extending along said feed shell, a slide guided for movement along and on said guide means, a feed nut connected to said slide, a feed screw rotatably mounted on said feed shell in parallel relation to said guide means and in threaded engagement with said feed nut for moving said slide back and forth along said guide means, a first pair of spaced connecting elements on said slide, a rock drill having an auxiliary exhaust passage thereon, a second pair of spaced connecting element on said rock drill and cooperating with said first pair of connecting elements for forming therewith a quick release coupling having a coupled position in which the axis of said rock drill is parallel with said guide means and an uncoupled position separate from said coupled position, normally closed valve means on said slide in communication with said feed nut and said feed screw therein, and abutment means on said rock drill adjacent to said auxiliary exhaust opening for moving said valve means to the open position thereof for communicating thereby said exhaust opening with said feed screw when said quick release coupling is in said coupled position.

6. A slide supported rock drill according to claim 5 in which said valve means on the one hand include a cylindrical hollow body axially slidably mounted on said slide between said first pair of connecting elements and having a valve opening centrally thereon, and on the other include the head of a headed valve member extending coaxially through said valve opening and said body affixed to said slide, spring means in said body extending therebetween and between said slide for urging said valve opening thereof shut against said head, and a shoulder on said rock drill forming said abutment means thereon cooperating with said body for keeping said valve opening thereon away from said head when said quick release coupling is in said coupled position.

7. A slide supported rock drill actuated by compressed air and comprising a feed shell, parallel guide means extending along said feed shell, a slide guided for movement along said feed shell on said guide means, feeding means on said shell for reciprocating said slide along said guide means, a first pair of spaced connecting elements on said slide, a rock drill, a second pair of spaced connecting elements on said rock drill and cooperating with said first pair of connecting elements for forming therewith a quick release coupling having a coupled position in which the axis of said rock drill is parallel with said guide means and an uncoupled position separate from said coupled position, supply conduits for compressed air and water connected to said slide, complementary conduits for compressed air and water in said rock drill, first passage connecting means on said slide connected each to one of said supply conduits, second passage connecting means on said rock drill connected each to one said complementary con-

duits, and said first and second passage connecting means cooperating with one another for connecting in said coupled position of said quick release coupling said supply conduits for respectively compressed air and water with said complementary conduit for compressed air and water, respectively.

8. A slide supported rock drill according to claim 7 in which said cooperating passage connecting means are respectively a nipple and a recess for sealingly receiving said nipple.

9. A slide supported rock drill comprising a feed shell, parallel guide means extending along said feed shell, a slide guided for movement along said feed shell on said guide means, feeding means on said shell for moving said slide back and forth along said guide means, a first pair of bayonet lock elements on said slide in a plane substantially parallel with said guide means, a rock drill, a second pair of spaced bayonet lock elements on the rock drill and cooperating with said first pair of bayonet lock elements for forming therewith a quick release bayonet coupling between the slide and the rock drill, said coupling having a coupled position in which the axis of the rock drill is parallel with said guide means and an uncoupled position in which said axis is transverse to said guide means, cooperating guide surfaces located centrally between the second bayonet lock elements and the first bayonet lock elements on said slide for journaling the rock drill pivotally on the slide during the coupling movements when said bayonet coupling is coupled and uncoupled, the guiding surface of the slide being formed by a cylindrical body movably mounted on the slide and movable between projected and depressed positions relative to said slide for biasing said body to the projected position thereof and for supporting it resiliently in said depressed position thereof, a cylindrical recess on the rock drill forming said guide surface thereof, said recess slidably matching said body and having a shoulder therein for abutting on said body, and said first and second pair of bayonet lock elements having cooperating helical coupling surfaces thereon for keeping through the medium of said shoulder said body resiliently in the depressed portion thereof when said bayonet lock elements are in said coupled position.

10. A slide supported rock drill comprising a feed shell, parallel guide means extending along said feed shell, a slide guided for movement along said feed shell on said guide means, feeding means on said shell for moving said slide back and forth along said guide means, a first pair of bayonet lock elements on said slide in a plane substantially parallel with said guide means, a rock drill, a second pair of spaced bayonet lock elements on the rock drill and cooperating with said first pair of elements for forming therewith a quick release bayonet coupling having a coupled position in which the axis of said rock drill is parallel with said guide means and an uncoupled position in which said axis is transverse to said guide means, supply conduits for compressed air and water connected to said slide, complementary conduits for compressed air and water in the rock drill, first passage connecting means on the slide connected each to one of said supply conduits, second passage connecting means on the rock drill connected each to one of said complementary conduits, and said first and second passage connecting means cooperating with one another for connecting in said coupled position of said quick release coupling said supply conduits for respectively compressed air and water with said complementary conduits for compressed air and water, respectively.

11. A slide supported rock drill according to claim 10 in which said cooperating passage connecting means are respectively a nipple and a recess for sealingly receiving said nipple.