ABSTRACT: The present invention concerns an arrangement for guiding a rock drill, the arrangement consisting of a base, a body, a turnplate turnable about a horizontal axis and attached to the body, a jib attached to the turnplate and turnable in a plane passing through the axis of the turnplate, and a feed device attached to the free end of the jib and turnable in the same plane, in which device a drill has been mounted, the jib and body on one hand and the feed device and jib on the other hand being mutually connected by hydraulic cylinders, which cooperate in such manner that the drilling front, or the direction of the feed device, automatically remains unchanged regardless of the motions of the jib, and in which for the purpose of performing W-cut drilling the body has been journaled to be turnable about a vertical axis. The basis is provided with an angular scale and the body being correspondingly provided with an index, or vice versa.
ARRANGEMENT FOR GUIDING A ROCK DRILL

Devices, in which the direction of the feed device attached to the jib automatically remains unchanged, regardless of the position of the feed device in the height and lateral directions, are known. All the holes to be drilled in the head of the gallery will automatically be parallel with each other.

However, it is frequent practice in the working of the gallery head to apply so-called W-cut drilling, which implies that at least the holes located closer to the center of the tunnel are drilled at an inclination against the vertical bisecting plane of the tunnel so that the holes, two and two, can be said to form wedges. It is then necessary to change the direction of the drilling front, that is, of the feed device.

Up to now the direction of the drilling front has been changed, for instance, by turning the vehicle or trolley on which the arrangement is placed, as desired. However, turning the vehicle or trolley in the cramped space of the tunnel is rather awkward and time-consuming. Moreover, the change in direction of the drilling front is not nearly always as accurate as would be consistent with a perfect result of work.

Also such arrangements are known in which the feed device can be turned with reference to the jib by means of a separate hydraulic cylinder. But since the drill operator stands far away from the feed device, usually at a distance of several meters and since the drill rod, 10 meters even, can approximately assess the direction of the drilling front. A separate person is needed for this task, who stands close to the feed device and estimates its direction. In addition to the fact that an extra person is thus required, the drawback is also present that, because of human imperfection there occur considerable deviations from the intended direction.

The aim of the present invention is to afford an arrangement by means of which the direction of the drilling front can be changed rapidly and with absolute accuracy. A feature of the invention is that for the performing of W-cut drilling, the body has been journalled on the base, in a manner previously known in itself, to be turnable about a vertical axis and that the base has been provided with an angular scale and the body, correspondingly, provided with an index, or vice versa. By turning the body through a desired angle about the vertical axis, the direction of the drilling front can be accurately changed and W-cut drilling can thus be performed.

It is certainly previously known practice to journal the body, to which the jib has been pivoted, to be turnable about a vertical axis. But in previously known arrangements the jib has not been connected to a turntable turnable about a horizontal axis and the direction of the feed device does not automatically remain unchanged in them, regardless of the movements of the jib. For this reason it is only possible to perform W-cut drilling with previously known arrangements if the trolley is laterally displaced in the tunnel from one point to another and in that case, too, the W-cut drilling angles will be inaccurate.

Since the place of work of the drill operator is in the immediate vicinity of the body, it is easy for him in an arrangement according to the invention to estimate the turning angle of the body. According to the invention, the turning angle can be checked by virtue of the arrangement that the base has been provided with an angular scale and the body, correspondingly, provided with an index or pointer, or vice versa.

The invention is described in the following with reference to the attached drawing, which presents an arrangement according to the invention in top view, the end of the gallery having been sectioned with a horizontal plane.

The consists of the base 1, upon which the body 2 has been fitted. The body comprises the turntable 3, which can be turned about a horizontal axis with reference to the body 2. To the side of the turntable 3 there has been turnably attached the jib 4, which may be turned by means of the hydraulic cylinder 5. To the free end of the jib 4 the feed device 6 has been turnably attached. On the feed device 6 the drill 7 has been mounted, from which the drill rod (not depicted) projects toward the head of the gallery.

The jib 4 has moreover been connected to the turntable 3 by means of a hydraulic cylinder 8, and the feed device 6 has furthermore been connected to the jib 4 by the hydraulic cylinder 9. These cylinders 8 and 9 have been mutually connected with fluid conduits (not depicted). Now when the jib 4 is turned by means of the hydraulic cylinder 5 with reference to the turntable 3, fluid is transferred from cylinder 8 into cylinder 9 so that the feed device turns by a corresponding amount with reference to the jib 4. As a result the feed device retains the direction of the turning axis of turntable 3, regardless of the movements of the jib 4. In other words, the drilling front remains unchanged although the turntable 3 is turned about its axis or the jib 4 is turned with reference to the turntable 3.

According to the invention, the body 2 has been journalled on the base 1 to be turnable about a vertical axis. The base 1 has been provided with an angular scale 10 and the body, correspondingly, with an index or pointer 11. It is obvious that the angular scale and index may be interchanged. The direction of the drilling front can be easily and accurately measured with the aid of an arrangement according to the invention. This is particularly required when the head of the tunnel, 12, is worked according to the so-called W-cut drilling method. In the case illustrated by the drawing, six holes have been drilled in the head of the tunnel on either side of the centerline. The two outermost holes 13 and 14, and naturally those above and below them, are parallel to the tunnel axis. In the case in which the holes 13 and 14 and the other holes paralleling them were produced, the turntable 3 has been turned about its axis and the jib 4 has been turned with reference to the turntable 3 at transition from one hole to another as required, at which point the drilling front has remained unchanged.

Subsequently, the body 2 has been turned with the aid of an arrangement according to the invention through a given angle with reference to the base 1, and the hole 15 and all other holes parallel to this hole have been drilled. Furthermore, the body 2 has been turned with reference to the base 1 in accordance with a given drilling schedule, and the holes 16 and 17 and 18 and all the other holes paralleling this drilling front have been drilled. In corresponding manner, the holes in the other half of the tunnel head have been drilled. The holes pointed in oblique direction then combine to form wedge-shaped configurations.

I claim:

1. A rock drilling apparatus comprising a base, a drill having an axis or rotation, first means interconnecting said drill to said base for universal articulation of the axis of rotation of said drill relative to said base, and second means interconnecting said drill to said first means for controlling the articulation of said drill relative to said base and for maintaining a selected articulation of said drill constant during a change in the articulation of said first means interconnecting said drill to said base.

2. A rock drilling apparatus as claimed in claim 1 wherein said first means interconnecting said drill to said base for universal articulation includes a body journaled on said base for swivel movement in a first plane, a turntable journaled on said body for swivel movement in a second plane transversely of said first plane, a job pivotally supported on said turntable, and a guide pivotally supported on said jib remote from said turntable, said drill being elongate and rotatably supported on said guide.

3. A rock drilling apparatus as claimed in claim 2 wherein said second means interconnecting said drill to said first means for controlling the articulation of said drill includes first power means supported on said turntable and cooperating with said jib for selectively adjusting the angular position of said jib, second power means supported on said turntable and cooperating with said jib for sensing a change in the angular position of said jib as adjusted by said first power means, third power means supported on said jib and cooperating with said second power means and said guide for maintaining the angular position of said jib as adjusted by said first power means, and means interconnecting with said second and third means for channeling.
3. An intelligence medium of sensed quantity from said second power means to said third power means.

4. A rock drilling apparatus as claimed in claim 3 wherein said first, second, and third power means each includes a hydraulic cylinder, said second and third power means being interconnected by a conduit for channelling a specific quantity of fluid from the second power means to the third power means, which quantity of fluid defines a change in the articulation of the jib and effects an adjustment in the articulation of the guide thereby maintaining the articulation of the drill constant.

5. A rock drilling apparatus as claimed in claim 1 wherein said base includes an angular scale and said body includes an index cooperating with said scale.