

COUPLING DEVICE

The invention relates to a coupling device for drill rods, in particular for earth drilling apparatuses.

It is known to mutually connect single drill strings of a drill rod by means of screw bolts. This provides a reliable and stable rotational connection. In the same way a connection of the drill rod to a drill drive is brought about. However, this kind of connection proves to be very time consuming.

The invention is based on the o b j e c t to provide a coupling device for drill rods, by means of which both a quick and reliable connection can be produced.

The object is solved in accordance with the invention by a coupling device having the features of claim 1. Preferred embodiments are indicated in the dependent claims.

The coupling device for drill rods according to the invention comprises a receiving socket for receiving a connecting portion of a drill rod, wherein a locking device with a locking element is provided, which is supported in an adjustable manner between a release position and a locking position, in which the locking element engages into a corresponding recess of the connecting portion. With the coupling device according to the invention a quick semi-automatic or fully automatic coupling with a drill rod is rendered possible. As a result, the working operation during drilling is facilitated and accelerated.

A preferred embodiment of the invention resides in the fact that the locking device has a housing arranged on the outer side of the receiving socket and in that a sliding element is supported in the housing for adjusting the locking element. In this way a stable and reliable operation of the coupling device according to the invention is achieved.

The sliding element can be operated manually or by an operable adjusting member, such as a motor or an adjusting cylinder.

In accordance with the invention a particularly advantageous embodiment results from the fact that the sliding element is designed as a pivotably supported bolt having a cam, which engages into an obliquely extending slotted link in the housing. Through this cam mechanism a turning movement can be transformed into an axial adjusting movement. This mechanism allows for a good force application even in manual operation.

To this end it is preferred according to the invention that a pivot lever is provided for pivoting the bolt, which is connected to the bolt at a rear portion thereof. Depending on the length of the pivot lever a correspondingly great torque can be applied in a simple manner which proves to be of advantage for a reliable locking. The pivot lever can be designed both for manual operation and for an operation by means of a remote-controlled adjusting member.

Furthermore, according to the invention it is preferred that the locking element is supported on the sliding element in a radially movable and resilient manner. During the use of drill rod elements considerable signs of wear, such as notches and deformations may occur, which only permit large-tolerance fits. In addition, there is the risk that e.g. soil material and rock can gather on the connecting portion of the

drill rod so that a locking is only possible with great difficulty. The specific movable and resilient support of the locking element on the sliding element itself allows for a certain compensation, so that a good locking is ensured in these cases, too.

For a good rotational connection provision is made according to the invention for axial ribs to be arranged on an inner side of the receiving socket, which can be brought into engagement with corresponding axial grooves of the connecting portion in order to produce a rotational connection. In particular, this can be a keyway profile. Through an axial sliding into one another a stable and extremely fixed rotational connection is thus produced. In such case it is possible that the locking element only ensures an axial locking. The recess in the connecting portion can be a circumferential groove in this case, more particularly a rectangular groove, into which a corresponding rectangular profile of the locking element engages.

For an especially stable connection it is of advantage in accordance with the invention that three locking devices are provided, which are arranged in an evenly distributed manner at the outer circumference of the receiving socket.

By preference, the coupling device according to the invention is employed in a drilling apparatus having a drill drive for driving a drill rod.

Advantageously, the receiving socket is fixed to the output shaft of the drill drive. In earth drilling apparatuses the output shaft usually projects downwards so that the coupling device according to the invention is arranged below the drill drive.

Furthermore, provision is made in accordance with the invention for the drill drive to be supported on a carriage that is guided in a movable manner on a mast. In this arrangement the coupling device in accordance with the invention can be adjusted together with the carriage along the mast so that when a new drill rod element is installed the coupling device provides for a quick and reliable connection between the upper connecting portion of the newly installed drill rod and the drill drive.

The invention will be described further by way of embodiments, which are shown schematically in the accompanying drawings, wherein:

Fig. 1 shows a partially sectional view of a coupling device according to the invention in the release position;

Fig. 2 shows a partial view of the coupling device in accordance with Fig. 1 in the locking position;

Fig. 3 shows a side view of the coupling device of Fig. 1 and Fig. 2;

Fig. 4 shows a connecting portion of a drill rod and

Fig. 5 shows a partial view of a drilling apparatus with the coupling device according to the invention.

The construction and function of a coupling device according to the invention will be described by way of Figs. 1 to 3. The coupling device 10 has a sleeve-shaped receiving socket 12, on the inner side of which axial ribs 28 are arranged for forming a keyway profile. On the outer side three locking devices 14 are arranged, which are mutually offset by 120°.

Each locking device 14 comprises a sleeve-shaped housing 18, in which an approximately rectangular locking element 16 is supported in a movable manner. The front of the rectangular locking element 16 has a concave design to match the connecting portion to be locked. Moreover, a cylindrical, bolt-shaped sliding element 20 is supported in the housing 18 in an axially adjustable and pivotable manner. In the housing 18 an obliquely extending groove is applied that forms a slotted link 24. A cam 22 engages into the slotted link 24, which is arranged in a fixed manner on the bolt-shaped sliding element 20. By means of a pivot lever 26 fixed at the end of the sliding element 20 that projects from the housing 18 the sliding element can be pivoted by 180° in the present embodiment. Due to the interaction between the cam 22 and the slotted link 24 the sliding element is moved axially. As a result, the locking element 16 is adjusted from a retracted release position shown in Fig. 1 into a locking position according to Fig. 2.

The locking element 16 is resiliently supported on the sliding element 20. To this end the locking element 16 has a central bore 30 and the sliding element 20 has a central pin 32. Between the bore 30 and the pin 32 a helical spring 34 is arranged which pushes the sliding element 20 and the locking element 16 apart from each other. To delimit the sliding path a screw bolt 36 with a stop nut is arranged.

In Fig. 4 a connecting portion 62 is shown schematically, which can be welded to the free end of a drill rod. The connecting portion 62 has axial grooves 66 that correspond to the axial ribs 28 on the inner side of the receiving socket 12 so as to form a keyway connection. For engagement into the locking element 16 an annular groove is formed as a recess 64 on the connecting portion 62. The width of the groove

corresponds to the width of the locking elements 16 so that they can engage in the recess 64 to produce an axial locking.

In Fig. 5 the arrangement of the coupling device 10 according to the invention on a drilling apparatus 70 is shown. The drilling apparatus 70 has a mast 78, along which a carriage 76 is guided and driven in a movable manner. On the carriage a drill drive 72 is supported that consists of a motor and a flanged-on gear. The receiving socket 12 of the coupling device 10 is welded to an output shaft 74 of the drill drive 72. For the coupling of a drill rod 60 it has a connecting portion 62 that has been described earlier on in conjunction with Fig. 4. A rotationally fixed connection is achieved by the mutually corresponding keyway profiles, whereas an axial locking is achieved through the locking elements 16 of the coupling device 10.

CLAIMS

1. Coupling device for drill rods comprising a receiving socket for receiving a connecting portion of the drill rod,

wherein

at least one locking device with a locking element is provided, which is supported in an adjustable manner between a release position and a locking position, in which the locking element engages into a corresponding recess of the connecting portion, the recess is formed as an annular groove for producing an axial locking, for forming a keyway profile on an inner side of the receiving socket axial ribs are arranged, which can be brought into engagement with corresponding axial grooves of the connecting portion in order to produce a rotational connection, the locking device has a housing arranged on the outer side of the receiving socket and a sliding element is supported in the housing for adjusting the locking element.

2. Coupling device according to claim 1,
w h e r e i n
the sliding element is designed as a pivotably supported bolt having a cam, which engages into an obliquely extending slotted link in the housing.
3. Coupling device according to claim 2,
w h e r e i n
a pivot lever is provided for pivoting the bolt, which is connected to the bolt at a rear portion thereof.
4. Coupling device according to claim 1,
w h e r e i n
the locking element is supported on the sliding element in a radially movable and resilient manner.
5. Coupling device according to claim 1,
w h e r e i n
three locking devices are provided, which are arranged in an evenly distributed manner at the outer circumference of the receiving socket.
6. Drilling apparatus comprising a drill drive for driving a drill rod,
w h e r e i n
a coupling device according to claim 1 is provided.

7. Drilling apparatus according to claim 6,

w h e r e i n

the receiving socket is fixed to the output shaft of the drill drive.

8. Drilling apparatus according to claim 6,

w h e r e i n

the drill drive is supported on a carriage which is guided in a movable manner on a mast.