Aug. 30, 1955 B. E. R. LÖFQVIST 2,716,564

ARRANGEMENT FOR ATTACHING A DRILL CROWN TO A DRILL STEEL OR DRILL STEELS TO EACH OTHER

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FIG.1

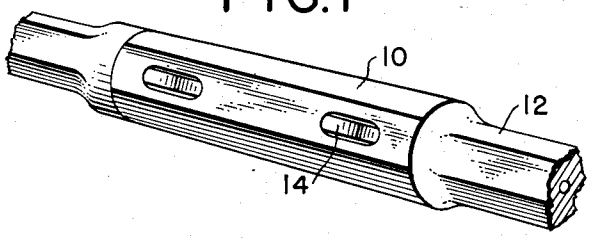


FIG.3

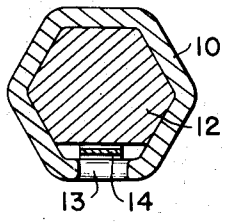


FIG.2

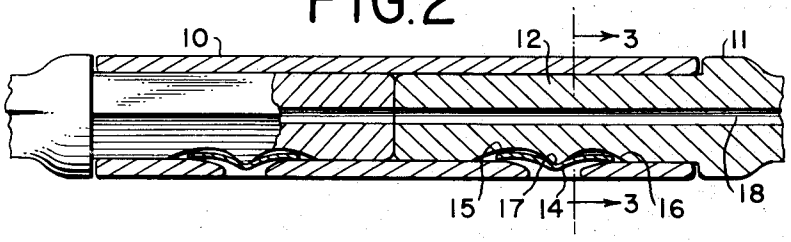


FIG.4

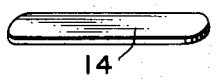


FIG.5

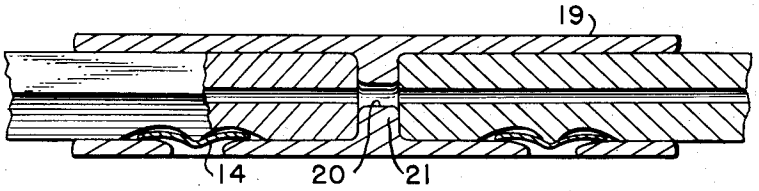


FIG.6

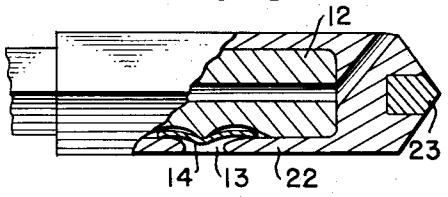


FIG.7

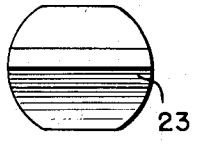
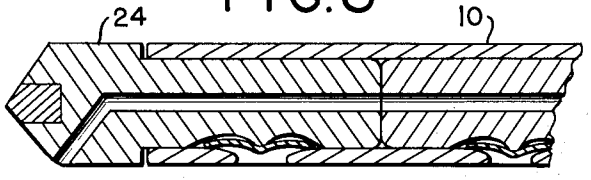


FIG.8



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ARRANGEMENT FOR ATTACHING A DRILL CROWN TO A DRILL STEEL OR DRILL STEELS TO EACH OTHER

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8 Claims. (Cl. 285—174)

This invention relates to an arrangement for attaching a drill crown to a drill steel or two drill steels to each other or the like.

It has long been known to provide rock drills with an interchangeable crown and likewise of lengthening drill steels by joining a number of single drill steels to each other. For this purpose the crown and the steels have preferably been provided with screw-threaded end portions which were attached to each other by means of a threaded sleeve or rod fitted on or in the threaded end portions. It has been found, however, that even if the screw threads are made very shallow there arise breakages in the threads, owing to the hammer blows and the stresses on the screw thread when the drill is being rotated. Trials have moreover been made with taper type pin and socket connections, but the results with these have likewise been unsatisfactory.

The object of the present invention is to provide an arrangement for attaching a drill crown to a drill steel or drill steels to each other in such a manner that risk of damage owing to fractures will be eliminated completely or to a considerable extent. The arrangement should be inexpensive to manufacture and, unlike the taper type connections, be easily disconnected.

The principal feature of the present invention consists in that the ends of the drill steels and/or an end portion of the drill crown are formed with shallow recesses or depressions separated by a ridge or the like and in that the parts are attached to each other by means of a sleeve provided with one or more holes through which locking members are inserted in the depressions. The depressions have preferably the form of two grooves arranged close together one behind the other in the longitudinal direction of the drill and the locking member may consist of a plate spring, or the like.

According to the invention the sleeve may be formed integral with the drill crown or the drill steel or it may be entirely separate so that two drill steel ends may be inserted and locked in same. An important feature is that the finished joint has some play, that is, allows sufficient space for the drill to move freely especially in the longitudinal direction. In this way fatigue stresses on the sleeve and the drill steels are reduced.

The principal function of the locking member is to hold together the various parts while the drill is being drawn out of the drill hole. During the actual drilling the locking member serves no special purpose. When the drill is being drawn out the sleeve moves a little in relation to the steel end or the drill crown end so that the locking member is held firmly between the ridges on the said ends and the edges of the sleeve hole thus locking the parts to each other.

The arrangement according to the invention is particularly well adapted for joining together drill steels having shafts with collars formed on them. The length of the sleeve should preferably be somewhat shorter than the distance between the collars of the drill steel ends lying dead against each other in the joint. The collars

prevent movement of the sleeve while drilling is proceeding so that no risk arises of damage to the locking members. For making connections there is no need to take the steel out of the hole because the sleeve may be fitted and the joining performed while the drill remains in the bore hole.

Some embodiments of the invention are illustrated in the accompanying drawings, in which:

Fig. 1 is a perspective view of an arrangement according to the invention, and

Fig. 2 is a side view partly in section of the same arrangement.

Fig. 3 is a cross section on larger scale through the arrangement according to Fig. 2 viewed along the line 3—3, and

Fig. 4 is a perspective view of a locking member.

Fig. 5 is a view of an embodiment different from that of Fig. 2, and

Figs. 6 and 8 illustrate various arrangements for locking drill crowns to drill steels, while

Fig. 7 is a view of a drill crown seen from above.

In Figs. 1–4, **10** designates a sleeve which holds together drill steel ends **12** having collars **11**. The sleeve has two holes **13**, in which the locking members **14**, which may suitably be plate springs, are inserted so that their end portions engage respectively in two recesses or depressions **15** and **16** which have a ridge **17** between them. Since the locking elements or plates **14** are of flexible spring material it is possible to resiliently bend them into U-shape for inserting the ends through the openings **13** into the corresponding depressions **15**, and then, by pressing the bent plates inwardly, to cause them to partially straighten and snap into their locking positions with their center portions engaged against the respective ridges **17**. The thickness of locking members **14** is greater than the smallest distance from ridges **17** to the plane of the corresponding inner faces of the sleeves **10**. A through rinsing hole of the drill steel is designated by **18**. The sleeve is suitably made slightly shorter than the distance between the collars **11** when the steel ends lie dead against each other. The locking members allow a certain play between the parts forming the joint. Rotation of the parts in relation to the sleeve and to each other may suitably be prevented by the inside wall of the sleeve having polygonal form, for example, square or hexagonal.

The sleeve **19** shown in Fig. 5 is provided with a partition wall **21** traversed by a hole **20**, against which wall the steel ends lie during drilling work. This prevents movement of the sleeve lengthwise of the drill and thus the locking members are not stressed during the drilling operation.

In Fig. 6 the drill crown **22** is itself formed as a sleeve and is placed on to the drill steel end **12**, to which it is attached by means of the locking member **14** inserted through the hole **13**. A hard metal insert fixed in the crown is designated by **23**. Fig. 8 shows a drill crown connected to a drill steel by means of a separate sleeve **10**.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In connecting arrangements, a sleeve having an open end and an opening through one side, a shaft inserted in said sleeve and having a depression in one side in position to be opposite the opening through the side of the sleeve, the depression being comprised of two longitudinally successively arranged recesses in said shaft, said recesses being separated by a ridge, an elongated locking element arranged with one of its ends in each of said recesses respectively and having a thickness greater than the smallest distance between the ridge and the plane of the inner surface of the sleeve, the longitudinal extent of said opening being smaller than the

longitudinal extent of said depression and also smaller than the longitudinal extent of said locking member in coupled position.

2. An arrangement according to claim 1 and in which the shaft is provided with a shoulder engaging the open end of the sleeve for locating the depression opposite the opening through the side of the sleeve, and for transmission of axial working forces so as to prevent application of such forces to the locking element.

3. Apparatus according to claim 1 and in which the inside of the sleeve and the shaft are of polygonal shape in transverse cross section to prevent relative turning.

4. Apparatus according to claim 1, and in which the sleeve is considerably longer than the portion of the shaft inserted therein, and is provided with a second opening through its side beyond the inner end of said shaft, a second shaft inserted in said sleeve from the opposite end from the first shaft, said second shaft also having a depression similar to that of the first shaft, and a resilient locking element similarly arranged in the depression of said second shaft.

5. Apparatus according to claim 1 and in which the end of the sleeve opposite the inserted shaft is formed as a drilling tool.

6. In connecting arrangements a sleeve having an open end and an opening through one side, a shaft inserted in said sleeve and having a depression in one side in position to be opposite the opening through the side of the sleeve, said depression being composed of two substantially longitudinally successively arranged recesses in said shaft, and being separated from each other by a ridge, an elongated resilient locking element located in said recess and having a thickness greater than the smallest distance between the ridge and the plane of the inner surface of the sleeve the longitudinal extent of said opening being smaller than the longitudinal extent of said depression and also smaller than the longitudinal extent of said locking member in coupled position so as to be jammed between the ridge and the ends of the opening through the wall of the sleeve when the sleeve and shaft are moved axially relative to each other so as to prevent removal of the shaft from the sleeve, said sleeve being considerably longer than the portion of the shaft inserted therein, and being provided with a second opening through its side beyond the inner end of said shaft, a second shaft inserted in said sleeve from the opposite end from the first shaft, said second shaft also having a depression similar to that of the first shaft, and a resilient locking element similarly arranged in the depression of said second shaft, and both of said shafts being provided with shoulders engaging the respective ends of said sleeve for preventing axial movement of the sleeve relative to the shafts.

7. In connecting arrangements, a sleeve having an open end and an opening through one side, a shaft inserted in said sleeve and having a depression in one side in position to be opposite the opening through the side of the sleeve, said depression being composed of two substantially longitudinally successively arranged recesses in said shaft, and being separated from each other by a ridge, a resilient locking element located in said recess and having a thickness sufficient to be jammed between the ridge and the ends of the opening through the wall of the sleeve when the sleeve and shaft are moved axially relative to each other so as to prevent removal of the shaft from the sleeve, said sleeve being considerably longer than the portion of the shaft inserted therein, and being provided with a second opening through its side beyond the inner end of said shaft, a second shaft inserted in said sleeve from the opposite end from the first shaft, said second shaft also having a depression similar to that of the first shaft, and a resilient locking element similarly arranged in the depression of said second shaft, said sleeve being provided with a partition between the inner ends of said shafts for engagement by said shaft ends for the transmission of axial thrust forces, said partition being provided with a hole extending therethrough for transmission of fluid.

8. Apparatus according to claim 1 and in which the locking member is a flat spring.

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