The present invention relates to a device for connecting a member, for instance an abrasive disk, axle, crank or the like to the end portion of a spindle or shaft.

The connecting device may be preferably used with dental mandrels where an abrasive disk or the like is detachably secured by means of a screw to the end part of a spindle in such a manner as to prevent the abrasive disk or the like from becoming loose independently of the direction of rotation of the mandrel.

The connecting device is of the sort where the end part of the spindle, on which is mounted the abrasive disk or the like, has a screw-threaded bore extending axially from the end of the spindle, said end part also being exteriorly provided with threads having greater pitch than the threads of said bore. The end part of the spindle is embraced by a sleeve provided with inner threads, corresponding to the outer threads of said part. A screw-member having a head passes into the bore and serves to clamp the abrasive disk or the like against the outer end of said sleeve in such a way that the abrasive disk due to the difference in pitch of the said threads is prevented from becoming loose no matter the direction in which it is rotated.

The main characteristic feature of the present invention is that the spindle is provided with a collar, the annular edge of which, facing said sleeve, having one or more stop members, which, when the sleeve during its screwing movement on the spindle has come to a certain inner position, cooperate with one or more corresponding stop members on the end edge of said sleeve so as to prevent a further screwing-in movement of the sleeve before said sleeve is pressed against the collar, a jamming of the sleeve in its threads thereby being prevented. By this arrangement the sleeve is kept free to react instantaneously to the rotation movements of the abrasive disk or the like.

The invention comprises further an adjustable locking device, by which the sleeve can be locked to the spindle or released from it in such a way, that the mandrel or the like by a single manipulation can be readily and easily transformed from being a two-directions mandrel, clamping the abrasive disk whether it is rotated forward or backward, into a normal one-direction mandrel, where the abrasive disk only then is being tightly clamped when the mandrel rotates in one direction, or vice versa.

Other characteristic features of the invention will appear in the description to follow, reference being made to the annexed drawings, which illustrate various embodiments of the invention and in which:

Figure 1 is a side view of the mandrel considerably enlarged,

Figure 2 is a sectional view on line 2—2 of Figure 1, and

Figure 3 is partly a side view of the mandrel and partly a longitudinal sectional view of the same.

Figure 3a is a plan view of a locking member, and

Figure 3b is a side view of the same.

Figure 4 is a side view of the mandrel with the locking member released.

Figure 5 illustrates on a smaller scale an alternative construction of the mandrel with the locking member in operative position, and

Figure 6 illustrates the same with the locking member in inoperative position.

Figure 7 is a side view of another alternative construction of the mandrel considerably enlarged and with the locking member in operative position, and

Figure 8 is a side view of the same with the locking member in inoperative position.

Figure 9 is a sectional view on line 9—9 of Figure 7.

On the drawing, 1 indicates a relatively thin, short spindle with an exteriorly threaded end part 2, at the inner end of which is provided a collar 3. Said end part 2 also is provided with an axially extending threaded bore, the threads of which having a finer pitch than the external threads. Into this axial bore is screwed a screw 4 having a head 5, which is provided with a washer 6 and which is adapted to press an abrasive disk 8 or the like against the outer end surface of an internally threaded sleeve 7 mounted upon the end part 2.

The above described construction has the result that the abrasive disk is automatically clamped tightly to the mandrel during the rotation in either a clockwise or counter-clockwise direction. During the rotation of the mandrel in one direction the frictional contact between the screw head 5 and the disk 8 namely gives said screw 4 the tendency to be screwed inwards into said bore, the screw head thus being pressed more tightly against the disk, while during rotation in the reverse direction the screw 4 and the sleeve 7 tend to unscrew owing to the friction between the disk 8 and the sleeve 7, said sleeve, however, advancing faster due to difference in pitch of the internal and external threads and thereby clamping the disk 8 against the screw head 5. The end
surface of the sleeve 1 may conveniently be made uneven to increase the frictional contact against the abrasive disk or the like.

To insure that the sleeve 1 always reacts to the frictional action of the disk 3 when said disk tends to unscrew from the spindle, the annular edge of the collar 3 facing the sleeve 1 is provided with one or more stop members, the operative surface 12 of which is entirely or approximately situated in an axial plane. The end of the sleeve 1 facing the collar 3 is provided with one or more corresponding stop members 12, which cooperate with the stop members of the collar in such a manner that when the sleeve 1 during the screwing movement has come to a certain inner position on the mandrel, said stop members 12 butt against each other and stop a further screwing movement of the sleeve before the inner end of the sleeve is pressed against the collar with such a force that the sleeve is being jammed in its threads.

In order that the mandrel, as here described, may be easily and readily transformed into a one-direction mandrel, where the abrasive disk is tightly held only during rotation in one direction, an adjustable locking device is provided, by means of which the sleeve 1 can be temporarily locked in relation to the spindle. For this purpose the collar 3 is provided with a longitudinally extending slot, the bottom of which is on the same level as the recessed plane surface 9 at one side of the spindle 1. This plane surface 9 extends somewhat behind the collar 3 to a shoulder 9; and also somewhat in front of the collar into the threaded part 2, as shown. The threads of the sleeve 1 are provided with a corresponding longitudinally extending groove corresponding to said slot.

At the back of the collar 3 is arranged a longitudinally displaceable ring or sleeve 10 with an axially projecting locking rod 11, said locking rod being guided by said slot in the collar 3 and bearing slidably against the plane surface 9, the rod having the same breadth as said plane surface. When the locking device is in its locking position, the ring 10 has been pushed into contact with the collar 3 (Figures 1 and 3); the rod 11 thereby projecting into the longitudinal groove in the threads of the sleeve 7 and thus preventing the sleeve from being rotated relatively to the end part 2. When the sleeve 7 is to be released, the ring 10 is pushed back until it is stopped by butting against the shoulder 9, the rod 11 thereby coming out of engagement with the threads of the sleeve 7.

The locking device, as described above, may also be constructed in different manners, for instance as shown in Figs. 6, 8, 9. According to this construction a sleeve 14 and 14', respectively is slidably mounted on the sleeve 7 and the collar 3, said sleeve (14, 14') being provided with an internal locking pin 15 engaging a longitudinal slot 13 in the collar 3. In the sleeve 7 is provided a similar slot 13, which can be brought in alignment with said slot 13 by turning the sleeve. When the slots are in this position and the sleeve 14 and 14', respectively is being displaced from the position shown in Figure 6 or 8 into that shown in Figure 5 or 7, the front part of said pin 15 will engage the slot 13, thereby locking the sleeve 1 against rotary movement in relation to the spindle. The length of the slot 13 is so great that the slot can receive the whole pin 15 when the sleeve 14 or 14' are not in locking position, while the slot 13 has such a length that only part of the pin will engage the slot when the sleeve 14 or 14' is moved into locking position.

The only difference between the sleeves 14 and 14' is that the sleeve 14 only covers a part of the slots 13, 13', while the sleeve 14' entirely covers the slots in all positions.

From the foregoing it will be seen that the present mandrel, which besides serving as a normal one-direction mandrel, also by a single manipulation may be transformed into a two-direction mandrel and vice-versa. The mandrel is very simple and safe and need not to be thicker than a normal one-direction mandrel. Moreover, the stop members of the spindle sleeve ensure that the sleeve by being screwed onto the spindle cannot become jammed by the threads of the sleeve being pressed against the threads of the spindle. This has the result that the abrasive disk, when the mandrel is used as a two-direction mandrel, is always being clamped tightly between the screw head 5 and the sleeve 7, independently of the direction of rotation of the mandrel.

As above said, the present connecting device may be used for connecting purposes generally, and the details of construction may be varied without departing from the scope of the invention.

I claim:
1. A device for connecting a member, for instance an abrasive disk, shaft or the like, to the end portion of a spindle or shaft, especially adapted to be used in connection with mandrels, upon which end portion, which has an axially extending threaded bore and externally is provided with threads, is mounted a sleeve provided with corresponding internal threads, while into said bore is inserted a screw having a head for clamping the abrasive disk or the like to said sleeve in such a manner that the abrasive disk, due to difference in the pitch of the aforesaid threads, cannot become loose on the mandrel independently of the direction of rotation, characterized in that the spindle is provided with a collar, the annular edge of which, facing said sleeve, has at least one stop member cooperating, when said sleeve is entirely screwed in, with at least one corresponding stop member provided on the inner edge of the sleeve, in such a manner that a further screwing movement of the sleeve is prevented before the sleeve is being pressed against the collar, thereby a jamming of said sleeve in its threads is being prevented.

2. A device as claimed in claim 1, characterized in that the operative surface of each stop member is situated substantially in an axial plane.

3. A device as claimed in claim 1 characterized in the provision of an adjustable locking device by means of which said sleeve can be locked to or released from the threaded end part of the spindle in such a way that the mandrel may be transformed from being a two-direction mandrel with the abrasive disk firmly clamped when the mandrel rotates in either direction, into a normal one-direction mandrel, where the abrasive disk is firmly clamped only when the mandrel rotates in one direction, or vice versa.

4. A device as claimed in claim 3, characterized in that the locking device consists of a ring mounted slidably on said spindle behind its collar, said ring being provided, at the side of the same facing said collar, with an axially extending locking rod passing through a longitudinally extending slot in said collar and being adapted
5. A device as claimed in claim 4, characterized in that the spindle is at one side provided with a recessed plane surface extending from a point somewhat behind said collar and through the longitudinal slot of the collar into the threaded end part of the spindle, said locking rod bearing slidably against said plane surface and engaging, when in locking position, a longitudinal slot in the threads of said sleeve, a shoulder at the back end of said surface serving as a stop for said ring when this is moved backwards out of locking position.

6. A device as claimed in claim 3, characterized in that the locking device consists of a sleeve member slidably mounted upon said sleeve and collar, said sleeve member having an internal locking pin, which, depending on the position of the sleeve member, engages one or two slots in said collar and said sleeve, said slots, when the sleeve is to be locked, are being brought in flush with each other.

7. A device as claimed in claim 6, characterized in said sleeve member being so long that said slots are entirely covered in all positions of the sleeve member.

ARTHUR TINGVATNE.

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