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HAND PIECES OR HOLDING DEVICES FOR ROTARY TOOLS AS USED BY DENTISTS

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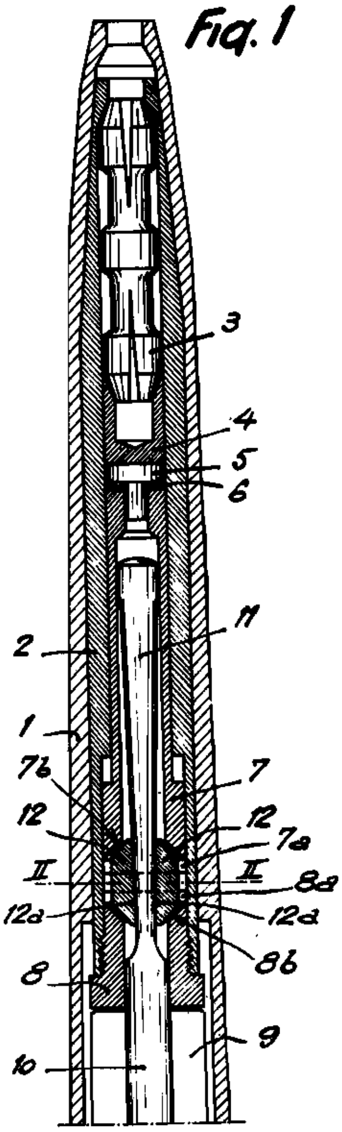
Fig. 1



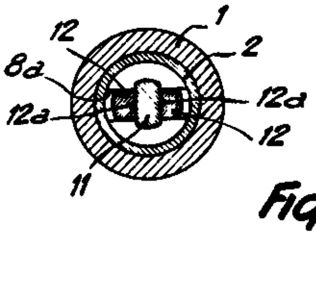
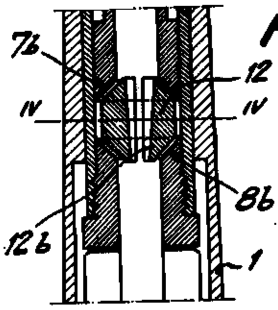


Fig. 2

Fig. 3



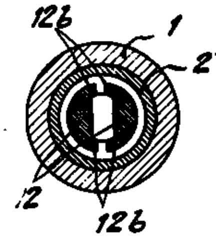


Fig. 4

Fig. 5

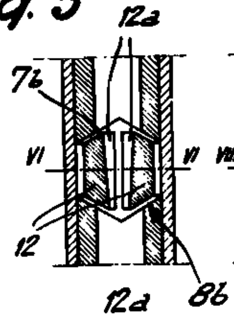
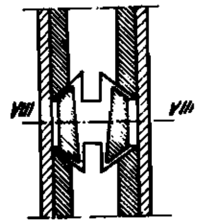
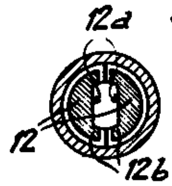


Fig. 7





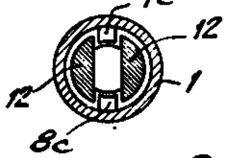


Fig. 6

Fig. 8

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ALIEN PROPERTY CUSTODIAN

HAND PIECES OR HOLDING DEVICES FOR ROTARY TOOLS AS USED BY DENTISTS

Claude Etienne Garnier, Besancon, France; vested in the Alien Property Custodian

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The present invention relates to the hand pieces or holding devices for rotary tools as used by dentists.

These devices include, inside a fixed outer body or sleeve, a socket rotating together with the driving axis or shaft and, inside this socket, a jaw-holder in which is mounted the end of the tools or other small instruments of this kind which are to be caused to rotate. These instruments are fixed to the rotating axis or shaft by tightening the grasp of the jaw-holder, this tightening being obtained by longitudinally pushing said jaw-holder toward the end of the socket in which it is housed, whereby, in the course of this longitudinal displacement, the end of the jaw-holder engages in a cone formed inside the socket so as to bring the jaws toward each other and tightly to grasp the instrument between said jaws.

Up to the present time, this longitudinal displacement of the jaw-holder has been obtained through the sliding displacement of an inner inclined surface which pushes said holder in either of the two following manners:

(a) Through a small lever contained in the socket in which the jaw-holder is housed; or

(b) Through the action of two balls, also contained in this socket, and which are forced radially, by the sliding motion of an inclined surface of the rotating axis or shaft, between two circular conical cups, one of which bears against one end of the jaw-holder, while the other one is fixed to the rear end of the socket; this radial movement of the balls thus causes said conical cups to be moved away from each other in the longitudinal direction and therefore produces the desired longitudinal displacement of the jaw-holder.

Both of these devices involve serious disadvantages:

The device including a small lever is very difficult to manufacture and it is very complicated to be taken to pieces.

In the device including balls, said balls, which are necessarily very hard, contact the surfaces of the cups with which they are to cooperate only at one point, so that, after a certain time, they project into the surface of said cups and deform them. Furthermore, as these cups are of circular cross-section, it is necessary to keep the balls in opposed diametral relation to each other, at least when assembling the parts, by means of a cage which is necessarily rather weak. Finally, as the rotation of the tool or instrument is imparted through the central axis or shaft which carries the inclined surface serving to force the balls radially, the drive of the socket is obtained only through the wedging of these balls.

The object of the present invention is to provide a device which avoids the above mentioned drawbacks.

According to a feature of the present invention, the longitudinal displacement of the jaw-holder, in order to tighten the jaws thereof on the tool, is obtained by radially forcing wedges of suitable shape between two sleeves arranged substantially as the cups above referred to, but provided on their adjacent ends with oblique surfaces constituting both housings and friction surfaces for said wedges. The wedges are provided on the one hand with a flat face which bears against the oblique face of the inclined surface carried by the rotating axis or shaft, and, on the other hand, two faces, which are also flat, cooperating with the oblique surfaces of the sleeves.

With such a device, a longitudinal sliding of the inclined surface causes the wedges to move outwardly and this outward motion produces, through the cooperation of the oblique surfaces of the wedges and of the sleeves respectively, the desired relative longitudinal displacement of the jaw-holder and of the socket.

In order to keep the wedges in connect working position, I may provide a special shape of the surfaces which laterally limit the friction surfaces of the sleeves. I may also make these wedges of a special shape so that they partly surround the piece carrying the inclined surface or I combine both of these features.

With such a wedging system, as the contacting surfaces are of relatively large area, no deformation can occur and as the wedges are necessarily kept in proper position, they constitute keys for transmitting the rotary motion of the shaft to the socket.

Other features of the present invention will result from the following detailed description of some specific embodiments thereof.

Preferred embodiments of the present invention will be hereinafter described, with reference to the accompanying drawing, given merely by way of example and in which:

Fig. 1 is a longitudinal section of the front part of the tool holding device according to the invention;

Fig. 2 is a cross-sectional view on the line II—II of Fig. 1;

Fig. 3 is a partial view analogous to Fig. 1, showing another embodiment of the device according to the invention;

Fig. 4 is a cross-sectional view on the line IV—IV of Fig. 3;

Fig. 5 is a part sectional view analogous to Figs. 1 and 3, and showing a third embodiment of the invention; the central piece which carries the inclined control surface being not shown in this view;

Fig. 6 is a cross-sectional view on the line VI—VI of Fig. 5;

Fig. 7 is a longitudinal sectional view analogous to Fig. 5 and corresponding to a modification;

Fig. 8 is a cross-sectional view on the line VIII—VIII of Fig. 7.

The tool holding device shown by the drawings (Figs. 1 and 2) includes, in the usual manner, an external body 1 in which a socket 2 is adapted to turn. A jaw-holder 3 is housed inside this socket 2. The tightening of said holder 3, for fixation of the tool to the end thereof, is obtained by pushing said holder outwardly in the longitudinal direction inside socket 2.

At the rear end, jaw-holder 3 is mounted in a piece 4 which bears, through piece 5 and adjustment rings 6, against a sleeve 7, which constitutes one of the two sleeves above mentioned. The other sleeve, designated by reference numeral 8, is fixed to the rear end of socket 2 by means of screw threads. This sleeve further bears against the usual piece 9 inside which the axis or shaft 10, which transmits the rotating motion, is journalled. This axis or shaft 10 carries the double inclined surface 11, of small inclination, which is to cooperate, with wedges 12 as above explained. This portion 11 of shaft 10 extends through the bores of sleeves 7 and 8.

Wedges 12 are mounted on either side of piece 11. They bear against the inclined surface of this piece through their respective faces 12*a*. They cooperate laterally with the walls of notches 7*a* and 8*a* provided in the ends of sleeves 7 and 8 respectively, so that the rotating movement of wedges 12, imparted thereto by piece 11, is transmitted to these sleeves 7 and 8. Sleeves 7 and 8 are further provided with oblique faces adapted to cooperate with corresponding oblique faces of wedges 12. It will be readily understood that these wedges are thus always kept in the correct position shown by the drawing.

It will also be clear that the apparatus can be taken to pieces by merely unscrewing sleeve 8, and that the reassembling of the parts is very simple owing to the fact that the wedges can readily be engaged into their housings.

When piece 11 is pulled with respect to the outer body 1, the inclined surfaces of said piece 11 act against wedges 12, between which it slides, whereby said wedges are forced outwardly between sleeves 7 and 8. As sleeve 8 is fixed to socket 2 and the latter bears against piece 9, this outward movement of the wedges necessarily produces the sliding displacement of sleeve 7, piece 4 and jaw-holder 3; the latter is therefore wedged into the conical housing provided at the end of socket 2, and caused tightly to hold the tooth inserted between its jaws.

Of course, I can vary the number and shape of the wedges and also the dihedral angles of the oblique parts without departing from the spirit of the invention.

In the example of Figs. 3 and 4, the friction surfaces 7*b* and 8*b* of the sleeves are constituted by conical surfaces and the wedges are provided with surface elements of the same shape adapted to cooperate therewith. In this case, these wedges are kept in position along piece 11 by the fact that they include extension portions 12*b* through which they partly envelope piece 11.

The embodiment illustrated by Figs. 5 and 6 is analogous to that of Figs. 3 and 4, with however the difference that friction surfaces 7*b* and 8*b*, instead of being of conical shape, are flat shaped, forming two dihedral angles disposed opposite each other and between which the wedges are housed.

Finally, in the embodiment of Figs. 7 and 8, the sleeves are provided with analogous flat friction surfaces, but the wedges do not envelope piece 11. In this case, they are kept in position by two projections 7*c* and 8*c*, diametrally opposed to each other.

It should be noted that, according to the present invention, the oblique or conical friction surfaces may be replaced on one of the sleeves, and the corresponding side of the wedges, by a mere perpendicular abutment.

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