

PATENT SPECIFICATION (11)

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(54) DENTAL HANDPIECE

(71) We, KALTENBACH & VOIGT, a German Kommanditgesellschaft of 795 Biberach/Riß Bismarckring 39 Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a dental handpiece adapted to drive a dental instrument and comprising a sleeve portion within which a driving shaft can be rotatably mounted for rotating the dental instrument when the latter is coupled with the handpiece, and a coolant supply arrangement for providing a supply of coolant to the dental instrument in use of the handpiece.

It is known to us in Germany to provide a dental handpiece in which the coolant supply arrangement comprises a discharge pipe element, an inlet pipe element provided on the sleeve portion, and a flexible coolant pipe interconnecting said elements. If it is desired to replace an existing sleeve portion with a new sleeve portion in the dental handpiece, the coolant pipe must first be freed from the existing sleeve portion, and after connecting the new sleeve portion, the coolant pipe must be then pushed onto the inlet pipe element. Furthermore, even when employing an excessive length of flexible coolant pipe, free rotation of the sleeve portion relative to the discharge pipe element of the coolant supply arrangement of more than 360° is not possible, because the coolant pipe winds itself around the sleeve portion or the discharge pipe element and thereby provides resistance to further rotation of the sleeve portion. Thus, the extent of rotation permitted for the sleeve portion is limited, depending upon the length of coolant pipe employed.

According to the invention there is provided a dental handpiece adapted to drive a dental instrument and comprising a sleeve portion within which a driving shaft can be rotatably mounted for rotating the dental instrument when the latter is coupled with the handpiece, a coolant supply portion connectable to said sleeve portion in such man-

ner as to permit relative rotation therebetween and having conduit means fluid-communicable with conduit means in, or associated with, the sleeve portion to enable provision of a supply of coolant to a dental instrument in use of the handpiece, in which the fluid connection between the conduit means of the sleeve and coolant supply portions comprises an at least part annular passage provided at an interface between the sleeve portion and the coolant supply portion.

Thus, according to an embodiment of dental handpiece, it is possible to provide for easy connection of a replacement sleeve portion to a coolant supply portion of the dental handpiece while ensuring that fluid communication can take place between the conduit means provided in said portions.

The passage provided at the interface between the sleeve portion and the coolant supply portion may be an annular passage, in which case unlimited free relative rotation is permitted between the sleeve portion and the coolant supply portion. However, this is not essential and, if only limited relative rotation is required i.e. less than 360°, then the passage may comprise a part annular passage and comprise a number of circumferentially spaced portions.

To facilitate leak-free connection of the coolant supply portion to the sleeve portion, it is preferred that a pair of sealing elements be provided to act as a seal against coolant leakage from said passage, said elements being disposed one on each side thereof. Preferably, the sealing elements comprise O-rings.

One form of preferred construction for the coolant supply portion includes a guide element which is rotatably mountable within the sleeve portion, the conduit means of the coolant supply portion having a component extending radially outwardly of the guide element to communicate with the passage.

A further preferred construction for the coolant supply portion includes a sleeve element which is capable of overlapping the sleeve portion in a direction parallel to the handpiece axis, the conduit means of the

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coolant supply portion having a component extending radially inwardly of the sleeve element to communicate with the passage.

Another possible construction for the coolant supply portion includes provision of a radial face which is engageable with a corresponding face of the sleeve portion, the conduit means of the coolant supply portion having a component extending generally parallel to the handpiece-axis to communicate with the passage.

The invention will now be described in more detail, by way of example only, with reference to the accompanying drawings in which:—

Figure 1 is a longitudinal sectional view of a first embodiment of dental handpiece according to the invention;

Figure 2 is a similar view of a second embodiment of dental handpiece according to the invention; and

Figure 3 is a similar view of a third embodiment of a dental handpiece according to the invention.

Referring now to Figure 1 of the drawings, there is shown a dental handpiece which is adapted to drive a dental instrument and comprises a sleeve portion within which a driving shaft can be rotatably mounted for rotating the dental instrument when the latter is coupled with the handpiece, and a coolant supply portion connectable to the sleeve portion in such manner as to permit relative rotation therebetween.

The dental handpiece comprises a sleeve portion 1 in which a driving shaft 2 is rotatably mounted, the shaft 2 being centrally located and supported in bearing (not shown), and being adapted to be driven by any suitable rotary drive means provided in a coolant supply portion 3. A dental instrument e.g. a drill (not shown) can be coupled with the handpiece by being mounted in the left hand end, as drawn, of the sleeve portion 1 and coupled drivingly with the shaft 2. On the end of the sleeve portion 1 opposite to the "dental instrument" end i.e. the right-hand end as seen in the drawing, there is arranged the coolant supply portion 3 which houses conduit means of a coolant supply arrangement for supplying coolant towards the dental instrument in use of the handpiece. The portion 3 is rotatably connectable to the sleeve portion 1 by coupling means designated generally by reference numeral 4. It will be evident from Figure 1 that a releasable coupling is provided between the sleeve portion 1 and the portion 3, while permitting relative rotation to take place between the portions. The coolant supply arrangement comprises conduit means 5 provided in or associated with the portion 3, and also in or associated with the portion 1. The conduit means of portion 3 comprises a coolant pipe or duct 6 which is in fluid communication

with a coolant pipe or duct 8 of the portion 1 via a passage provided in an interface between an extension guide portion 13 of portion 3 and the internal surface 12 of sleeve portion 1.

The passage provided in the interface comprises an annular channel 7 which, in the arrangement shown in Figure 1, is formed in the surface 12 of the sleeve portion 1. The coolant pipe 6 communicates with channel 7 by means of a first inwardly inclined portion, extending parallel to the handpiece axis A, and then a radially outwardly extending portion or component. The extension guide portion 13 is secured to the portion 3 and is mounted within sleeve portion 1 in such manner as to permit relative rotation to take place therebetween. It will be evident that, by provision of annular channel 7 extending completely around the circumference of the surface 12, fluid communication can be maintained between coolant pipe 6 and coolant pipe 8 for all circumferential positions taken up by the portions 1 and 3 relative to each other.

To provide a seal against leakage of coolant from the channel 7, a pair of sealing elements 9 and 10 are provided, one on each side of the channel, and preferably in the form of O-rings. Thus, suitable sealing against leakage is provided at the interface between the external surface of the portion 13 and the internal surface 12 of the sleeve portion 1.

Although the channel 7 is illustrated in Figure 1 as being provided wholly in the surface of sleeve portion 1, the construction may be modified if desired so as to provide the channel 7 wholly in the external surface of portion 13, or the channel 7 may be provided partly in the external surface of portion 13 and partly in the internal surface 12 of portion 1. Furthermore, while the channel 7 will be a complete annular channel extending through 360° continuously in order to permit fluid communication between pipes 6 and 8 for all relative angular displacements of the portions 1 and 3, it is possible, if desired, for the channel 7 to be a part annular channel if it is not essential to provide universal fluid communication for all relative angular displacements.

Referring now to Figure 2 of the drawings, parts corresponding with the previous embodiment are designated by the same reference numerals and need not be described in detail again. In this arrangement, the channel 7 is formed wholly in a cylindrical internal surface of a sleeve element 11 of coolant supply portion 3. The sleeve element 11 extends in overlapping relationship to the sleeve portion 1 in a direction parallel to the handpiece axis so that, as in the previous embodiment, a passage is provided at an interface between portions 1 and 3. Again, sealing

elements 9 and 10 are provided, but in contrast to the previous embodiment, the coolant pipe 6 extends radially inwardly to communicate with channel 7, whereas coolant pipe 8 in portion 1 extends radially outwardly to communicate with channel 7.

Referring now to Figure 3 of the drawings, parts corresponding with the previous embodiments are designated by the same reference numerals and will not be described in detail again. In this arrangement, the extension guide portion 13 of coolant supply portion 3 has a radial surface 14 engageable with a corresponding surface of portion 1 thereby to form an interface between portions 1 and 3. The channel 7 is formed wholly in the radial surface of portion 1, whereas the sealing elements 9 and 10 are provided wholly in the radial surface 14 of portion 13. Evidently, the coolant pipe 6 has a component parallel to axis A by which it communicates with channel 7.

The coolant pipe or duct 8 illustrated in the drawings passes to a location externally of the sleeve portion 1 and can then pass to a suitable spraying device provided adjacent to the dental instrument. However, if desired, the coolant pipe 8 may pass within the body of the sleeve portion 1 to the spraying device, or may pass at least partly within the hollow space defined by the sleeve portion 1. However, as the coolant pipe 8 does not cause any real trouble if it runs along the outside of the sleeve portion 1, this may provide a simpler construction with the pipe 8 running parallel to the axis A to communicate with the spraying device arranged (by any one of known methods) to direct coolant towards, or in the region of, the dental instrument.

In the illustrated embodiments, the channel 7 is a wholly annular channel extending through 360°. However, if relative rotation of less than 360° is permissible, then the channel 7 may be a part annular channel.

Furthermore, the channel 7 (part annular) may comprise a number of circumferentially spaced portions, each of which portions can connect the conduit means of the coolant supply portion 3 and the sleeve portion 1, through respective arcuate portions of relative rotational movement between the portion 1 and the portion 3.

WHAT WE CLAIM IS:—

1. A dental handpiece adapted to drive a dental instrument and comprising a sleeve portion within which a driving shaft can be rotatably mounted for rotating the dental instrument when the latter is coupled with the handpiece, a coolant supply portion connectable to said sleeve portion in such manner as to permit relative rotation therebetween and having conduit means fluid-communicable with conduit means in, or associated with, the sleeve portion to enable

provision of a supply of coolant to a dental instrument in use of the handpiece, in which the fluid connection between the conduit means of the sleeve and coolant supply portions comprises an at least part annular passage provided at an interface between the sleeve portion and the coolant supply portion.

2. A dental handpiece according to claim 1, in which said passage comprises a channel formed in a surface part of the coolant supply portion, and/or in a surface part of the sleeve portion engageable with the surface part of the coolant supply portion.

3. A dental handpiece according to claim 2, in which the channel is a wholly annular channel.

4. A dental handpiece according to claim 2, in which the channel comprises a number of individual circumferentially spaced portions.

5. A dental handpiece according to any one of the preceding claims, including a pair of sealing elements arranged to act as a seal against coolant leakage from said passage and disposed one on each side thereof.

6. A dental handpiece according to any one of the preceding claims, in which the coolant supply portion includes a guide element rotatably mountable within said sleeve portion, said conduit means of the coolant supply portion having a component extending radially outwardly of said guide elements to communicate with said passage.

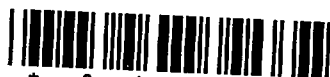
7. A dental handpiece according to any one of claims 1 to 5, in which the coolant supply portion includes a sleeve element capable of overlapping said sleeve portion, in a direction parallel to the handpiece axis, said conduit means of the coolant supply portion having a component extending radially inwardly of said sleeve element to communicate with said passage.

8. A dental handpiece according to any one of claims 1 to 5, in which the coolant supply portion has a radial face engageable with a corresponding face of the sleeve portion, said conduit means of the coolant supply portion having a component extending generally parallel to the handpiece axis to communicate with said passage.

9. A dental handpiece according to any one of the preceding claims, including rotary drive means mounted for rotation in said coolant supply portion and connectable to said driving shaft.

10. A dental handpiece according to claim 1 and substantially as hereinbefore described with reference to, and as shown in the accompanying drawings.

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elements 9 and 10 are provided, but in contrast to the previous embodiment, the coolant pipe 6 extends radially inwardly to communicate with channel 7, whereas coolant pipe 8 in portion 1 extends radially outwardly to communicate with channel 7.

Referring now to Figure 3 of the drawings, parts corresponding with the previous embodiments are designated by the same reference numerals and will not be described in detail again. In this arrangement, the extension guide portion 13 of coolant supply portion 3 has a radial surface 14 engageable with a corresponding surface of portion 1 thereby to form an interface between portions 1 and 3. The channel 7 is formed wholly in the radial surface of portion 1, whereas the sealing elements 9 and 10 are provided wholly in the radial surface 14 of portion 13. Evidently, the coolant pipe 6 has a component parallel to axis A by which it communicates with channel 7.

The coolant pipe or duct 8 illustrated in the drawings passes to a location externally of the sleeve portion 1 and can then pass to a suitable spraying device provided adjacent to the dental instrument. However, if desired, the coolant pipe 8 may pass within the body of the sleeve portion 1 to the spraying device, or may pass at least partly within the hollow space defined by the sleeve portion 1. However, as the coolant pipe 8 does not cause any real trouble if it runs along the outside of the sleeve portion 1, this may provide a simpler construction with the pipe 8 running parallel to the axis A to communicate with the spraying device arranged (by any one of known methods) to direct coolant towards, or in the region of, the dental instrument.

In the illustrated embodiments, the channel 7 is a wholly annular channel extending through 360°. However, if relative rotation of less than 360° is permissible, then the channel 7 may be a part annular channel.

Furthermore, the channel 7 (part annular) may comprise a number of circumferentially spaced portions, each of which portions can connect the conduit means of the coolant supply portion 3 and the sleeve portion 1, through respective arcuate portions of relative rotational movement between the portion 1 and the portion 3.

WHAT WE CLAIM IS:—

1. A dental handpiece adapted to drive a dental instrument and comprising a sleeve portion within which a driving shaft can be rotatably mounted for rotating the dental instrument when the latter is coupled with the handpiece, a coolant supply portion connectable to said sleeve portion in such manner as to permit relative rotation therebetween and having conduit means fluid-communicable with conduit means in, or associated with, the sleeve portion to enable

provision of a supply of coolant to a dental instrument in use of the handpiece, in which the fluid connection between the conduit means of the sleeve and coolant supply portions comprises an at least part annular passage provided at an interface between the sleeve portion and the coolant supply portion.

2. A dental handpiece according to claim 1, in which said passage comprises a channel formed in a surface part of the coolant supply portion, and/or in a surface part of the sleeve portion engageable with the surface part of the coolant supply portion.

3. A dental handpiece according to claim 2, in which the channel is a wholly annular channel.

4. A dental handpiece according to claim 2, in which the channel comprises a number of individual circumferentially spaced portions.

5. A dental handpiece according to any one of the preceding claims, including a pair of sealing elements arranged to act as a seal against coolant leakage from said passage and disposed one on each side thereof.

6. A dental handpiece according to any one of the preceding claims, in which the coolant supply portion includes a guide element rotatably mountable within said sleeve portion, said conduit means of the coolant supply portion having a component extending radially outwardly of said guide elements to communicate with said passage.

7. A dental handpiece according to any one of claims 1 to 5, in which the coolant supply portion includes a sleeve element capable of overlapping said sleeve portion, in a direction parallel to the handpiece axis, said conduit means of the coolant supply portion having a component extending radially inwardly of said sleeve element to communicate with said passage.

8. A dental handpiece according to any one of claims 1 to 5, in which the coolant supply portion has a radial face engageable with a corresponding face of the sleeve portion, said conduit means of the coolant supply portion having a component extending generally parallel to the handpiece axis to communicate with said passage.

9. A dental handpiece according to any one of the preceding claims, including rotary drive means mounted for rotation in said coolant supply portion and connectable to said driving shaft.

10. A dental handpiece according to claim 1 and substantially as hereinbefore described with reference to, and as shown in the accompanying drawings.

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