

[54] **DENTAL DRILL HANDGRIP**

[76] Inventors: **Dušan Jelićić**, Gatterstrasse 8, Gallen, Switzerland; **Ivan Jelićić**, Milosa Docerca 21, Belgrad, Yugoslavia

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[58] Field of Search ..... 32/27, 26, 49, 58, 29

[56] **References Cited**

**UNITED STATES PATENTS**

2,176,339 10/1939 Henneman..... 32/49

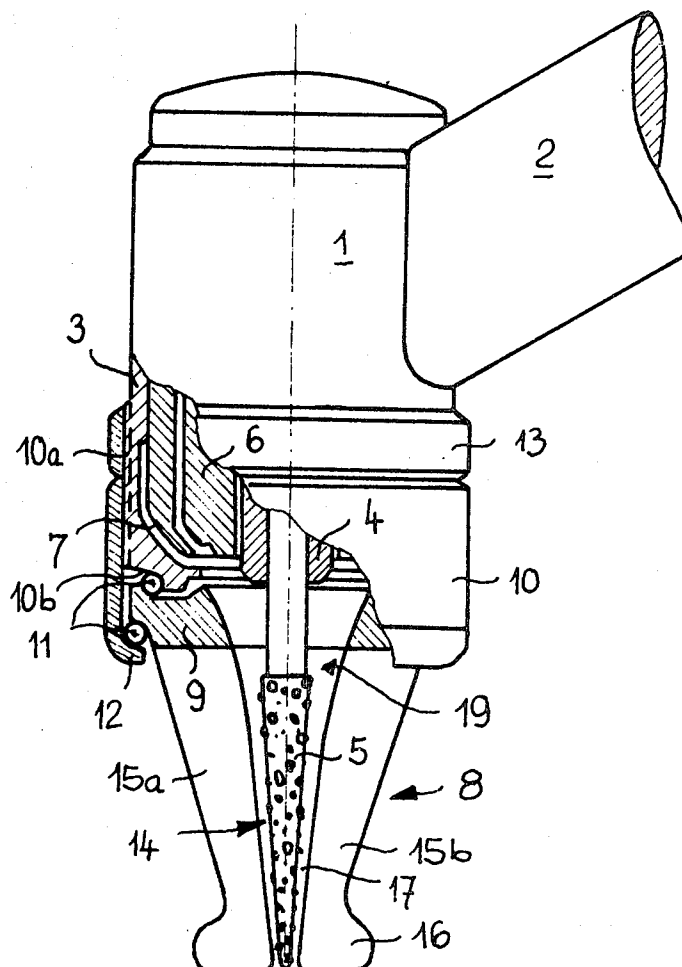
383,367 5/1888 Patrick..... 32/49

*Primary Examiner*—Robert Peshock  
*Attorney, Agent, or Firm*—Werner W. Kleeman

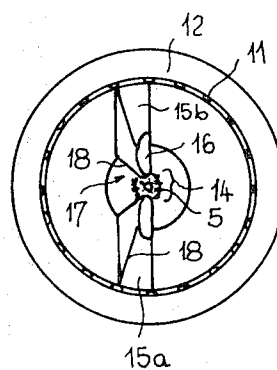
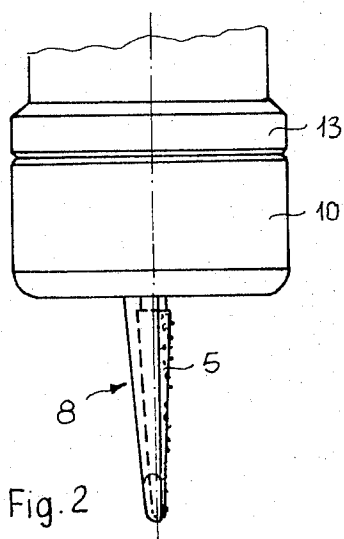
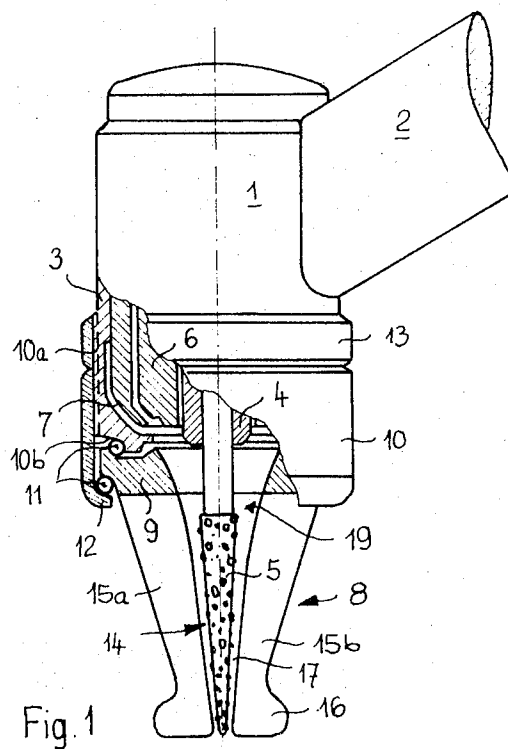
[57] **ABSTRACT**

A dental drill handle or handgrip comprising a drivable clamping mechanism for a rotating tool, the clamping mechanism being rotatably mounted in a housing. A protective shield partially surrounds the rotating tool at least along its effective or working portion while leaving free a region of engagement or attack. The protective shield is freely rotatable or pivotable about a portion of the periphery of the tool.

**14 Claims, 5 Drawing Figures**



SHEET 1 OF 2



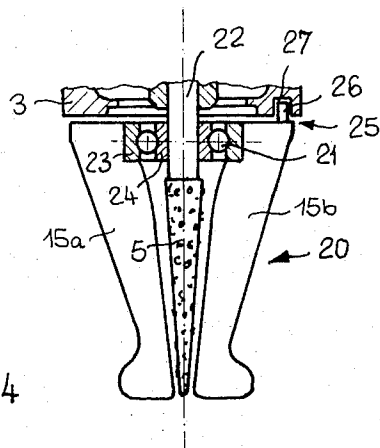


Fig. 4

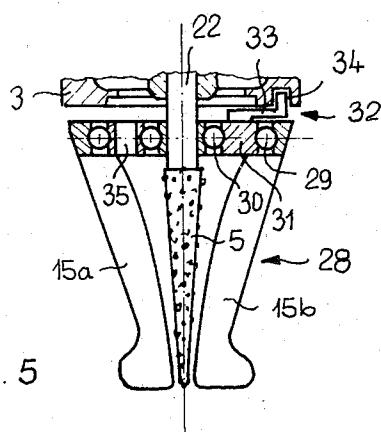


Fig. 5

**DENTAL DRILL HANDGRIP****BACKGROUND OF THE INVENTION**

The present invention relates to a new and improved construction of dental drill handgrip or handle with a drivable clamping mechanism or chuck for a rotating tool, the clamping mechanism being rotatably mounted within a housing.

In the art of dentistry, there previously have been employed for sub-gingiva treatment different drills and grinders of different grades of fineness. These dental implements cannot prevent damage or injury to the gingiva border and the ligamentum circulare. In dentistry, for the purpose of limiting such damage, there have been employed pointed, flame-shaped drills or grinders.

**SUMMARY OF THE INVENTION**

It is a primary object of the present invention to provide a new and improved dental drill handgrip of the previously mentioned character which is constructed in such a manner that there can be effectively prevented damage to the ligamentum circulare and the border or marginal portion of the gingiva.

Now in order to realize this object as well as others which will become more readily apparent as the description proceeds, the invention contemplates the provision of a protective shield which partially surrounds the rotating tool at least along its effective or operable portion while maintaining free an engagement region, and wherein such protective shield is freely pivotable about a portion of the periphery of the tool.

By virtue of the provision of the protective shield or protective plate, there is covered that part of the rotating tool which would come into contact with the ligamentum circulare or gingiva. Only the attack or engagement portion of the tool needed for treatment of the teeth remains exposed. In this way there can be practically completely prevented damage to the ligamentum circulare and gingiva. By virtue of the feature that the protective shield is freely pivotable at least about a portion of the periphery of the tool, the dental drill handgrip can be operated quite easily owing to the fact that during movement along the tooth the protective shield automatically accommodates itself to the curvature of the tooth. With the novel construction of dental drill handgrip of this development, there is considerably improved and shortened the prior cumbersome and tedious work at the neck of the tooth. Apart from the previously considered bleeding of the ligamentum circulare, it is necessary to work very slowly and carefully with the standard drills and grinders in order to prevent penetration of the tip of the tool into the ligamentum circulare. On the other hand, with the drill handgrip of the invention, it is not only possible for the dentist to carry out the work free of bleeding of the patient, something which already beneficially contributes to improving the visual access of the dentist to the area to be treated and speeding up the work itself, but furthermore the protective shield also facilitates introduction into the gingiva pocket, and there is automatically prevented too deep penetration since the protective shield rests upon the base of the gingiva pocket and therefore prevents undue penetration of the tool.

Although the protective shield already provides its advantageous action when it exposes the tip of the tool,

it is furthermore of particular advantage if the protective shield protrudes somewhat past the free end of the tool. The engagement region of the tool which is left exposed by the protective shield should be as small as possible, so that it is preferred if the protective shield covers more than one-half of the periphery of the tool.

A particularly advantageous constructional manifestation of the invention is realized if the protective shield possesses diametrically situated protruding side portions with respect to the axis of the tool, which then facilitate guiding of the protective shield in the gingiva pocket. The height of the side portions can decrease from the housing of the dental drill handgrip to the region of the free end of the tool in order to favor handling of the tool. It is particularly advantageous if there are provided at the free end of the protective shield rounded gliding or sliding shoes which diametrically protrude with regard to the axis of the tool. These sliding shoes contribute to the lateral guiding and spacing of the marginal portion of the gingiva and, furthermore, serve to provide a positive seating of the protective shield at the base of the physiological gingiva pocket.

The protective shield can be constructed in such a way that, apart from the engagement region, it is completely closed at the portion surrounding the periphery of the tool. However, in order to facilitate observation of the tool, the throughpassage of the cooling agent delivered as a general rule to the dental drill handgrip and to improve upon the withdrawal of the material removed by the tool, it is of advantage to provide the protective shield with a slot which at least extends over a portion of the length of the protective shield at its side which, with respect to the tool axis, is located diametrically with regard to the engagement or attack region. The outer edges of the slot are then arranged such that the plane defined thereby is located at a spacing from the periphery of the tool. It is also of advantage to provide a receiving compartment at the protective shield for the tool, which receiving compartment widens in the direction of the housing. By virtue of these measures, there can be improved in particular the infeed of the cooling agent.

The arrangement of the protective shield can be carried out in a particularly advantageous manner in that such protective shield is provided at the side of the housing with a flange which protrudes radially with regard to the tool axis, by means of which the protective shield can be rotatably and detachably retained at the housing through the agency of a suitable connection element, for instance a screw cap or coupling nut. This constructional embodiment retains the tool free of attached components and also allows for good infeed of cooling agent to the tool. It is however also possible to rotatably mount the protective shield at the shank or shaft of the tool and to secure such to the housing against entrainment during rotation of the tool.

The protective shield can be designed for the most different types of tools, such as drills and grinders, which are suitable for sub-gingiva tooth treatment.

**BRIEF DESCRIPTION OF THE DRAWINGS**

The invention will be better understood and objects other than those set forth above, will become apparent when consideration is given to the following detailed description thereof. Such description makes reference to the annexed drawings wherein:

FIG. 1 illustrates in side and partially sectional view the head of a dental drill handgrip or handle with the mounted drill and protective shield;

FIG. 2 illustrates the head of the dental drill handgrip of FIG. 1 in a view displaced 90° with regard to the showing of FIG. 1;

FIG. 3 illustrates the head of the dental drill handgrip of FIG. 1 viewed in the direction of the tool;

FIG. 4 illustrates the head of the dental drill handgrip in sectional view and side view, showing the tool and the protective shield arranged thereat; and

FIG. 5 illustrates the head of the dental drill handgrip of FIG. 4 in a further modified form and in an illustration analogous to the showing of FIG. 4.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Describing now the drawings, the head 1 of a dental drill handgrip or handle 2, as depicted in FIG. 1 will be understood to embody a housing 3 in which there is arranged a clamping mechanism or chuck 4 for a suitable rotating tool 5 having an effective working portion. The clamping mechanism 4 is driven by a turbine 6 as is known in this art. The delivery of a suitable flushing agent for the tool 5 occurs by means of channel 7.

A protective shield or plate 8 is provided at the side of the housing with a flange 9 which protrudes radially with regard to the lengthwise axis of the tool 5. This protective shield 8 can be connected by means of the flange 9 through the agency of a connection element 10, constructed for instance in the form of a coupling nut or screw cap, with the housing 3. When this connection is established, the flange 9 bears via axial ball bearings 11 both at the housing 3 as well as also at an inwardly turned collar 12 of the screw cap or coupling nut 10. For fixing the position of the screw cap 10 threaded on to the housing 3, there is provided an impact ring 13 which is likewise screwed on to the housing 3 and secured by means of any suitable securing means which has not been particularly further illustrated.

In the exemplary embodiment under consideration, the protective shield or plate 8 extends over the entire free length of the tool and surrounds such while maintaining free or exposed a tool engagement or attack portion or region 14 of the effective working portion of the tool. The protective shield 8 which is freely pivotable about the axis of the tool 5 owing to the provision of the ball bearings 11, contains two side portions 15a and 15d which are located diametrically with regard to the lengthwise axis of the tool. The height of the side portions decreases from the housing 3 or flange 9 up to the free ends of the protective shield 8. At these free ends there are arranged in diametrically opposed relationship with regard to the tool axis, protruding dull or blunt e.g. rounded sliding or gliding shoes 16. The protective shield 8 is provided at its rear face, that is, with regard to the tool rotational axis, diametrically of the engagement region 14, with a slot 17 defining a free zone and extending at least over a portion of the length of the protective shield 8. In this regard, the protective shield is constructed such that a plane defined by the outer edges 18 of the slot 17 is located at a spacing from the periphery of the tool 5. Consequently, there is insured that during use of the dental drill handgrip, the tissue will also be approximately maintained at a spacing from the tool which corresponds to the spacing

of the aforementioned reference plane from the periphery of the tool. A receiving compartment 19, provided at the protective shield, and serving for the accommodation of the tool 5 widens in the direction of the housing 3 in funnel-shaped fashion, as shown, and specifically in a much more pronounced manner than such is actually required by the shape of the tool.

With the benefit of the foregoing discussion of the dental drill handgrip, its operation will now be considered: the dental drill handgrip is of conventional design and serves for use with conventional dental tools. In addition to the standard construction, the dental drill handgrip of this development is further provided, according to the showing of FIGS. 1-3, with an external threading 10a for the screw cap 10 and a running surface 10b for the ball bearing 11. Furthermore, the dental drill handgrip carries a fixedly mounted and adjusted impact or stop ring 13.

If the dentist intends to carry out treatment at the gingiva region, then he initially mounts in conventional fashion at the dental drill handgrip the tool which is necessary for such work. Thereafter, he threadably connects by means of the screw cap 10 the protective shield 8 at the head 1 of the dental drill handgrip.

Introduction of the tool into the gingiva pocket takes place in a completely normal way, whereby the protective shield, for instance, is aligned at the tooth such that the engagement or attack region 14 of the protective shield 8 extends towards the tooth. Then the tool together with the protective shield is introduced into the gingiva pocket. In so doing, no particular care need be paid to the depth of insertion, since the protective shield will automatically rest by means of the sliding shoes 16 at the floor or bottom of the gingiva pocket, therefore effectively prevents injury or damage due to penetration of the tool into the gingiva or into the ligamentum circulare. Due to the provision of the slot at the rear face of the protective shield, it is possible to observe the work of the tool, e.g. drill, particularly since the protective shield permits a mode of treatment which does not lead to bleeding. During lateral guiding of the tool, with the protective shield, such automatically accommodates itself to the momentary direction of the gingiva pocket due to the rotatable mounting at the housing. In order to carry out the treatment at a location externally of the gingiva, it is only necessary to remove the protective shield by removing the screw cap. The dental drill handgrip is then ready for performing normal treatment work.

FIG. 4 illustrates a further embodiment of dental drill handgrip with a protective shield 20 which, in this case however, is not secured to the housing 3 of the dental drill handgrip, rather by a bearing means 21 at the shank or shaft 22 of the tool 5. The side portions 15a and 15d of the protective shield are secured to the outer bearing ring or race 23 of the bearing 21 designed as a radial ball bearing. The inner bearing ring or race 24 is secured against rotation with the shank 22 of the tool 5. This can be realized, for instance, by a force fit, a shrinkage fit, a wedge or key connection and so forth. In order to prevent entrainment of the protective shield during operation of the tool owing to the bearing friction, there is provided a holdback or retaining member 25. In the embodiment under discussion, the holdback member 25 comprises a pin 26 which engages in a circular arc-shaped groove or slot 27 at the housing 3 of the head of the dental drill handgrip. Due to the provi-

sion of the circular arc-shaped groove, there is provided a certain pivotal range of the protective shield in the peripheral direction of the tool. The ends of the circular arc-shaped groove 27 however prevent that the protective shield will be continuously entrained by the rotating tool.

With this exemplary embodiment of the invention, the protective shield is preferably always coupled with the shank of the tool, so that for using the tool with the protective shield there is only necessary one assembly manipulation, and specifically the insertion of the tool with the protective shield into the head of the dental drill handgrip, in contrast to the previously discussed exemplary embodiment where the tool and the protective shield must each be separately mounted. Working with this protective shield occurs in the same manner as when working with the protective shield of the embodiment of FIG. 1-3. Care need only be taken to insure that the protective shield is always entrained by the bearing friction and bears against one end of the groove. During introduction of the tool with the protective shield into the gingiva pocket, the dentist need only however erect the protective shield at the tooth, so that it arrives at the correct position at a point contacting the impact or stop of the groove. In contrast to the above prior discussed embodiment, the dentist cannot carry out a continuous treatment of the tooth through an angle of 360° with this embodiment of equipment, rather from time to time he must reposition the protective shield, depending upon the size of the circular arc length of the groove.

FIG. 5 illustrates an exemplary embodiment of dental drill handgrip with a protective shield 28, analogous to the showing of FIG. 4, which however is not connected by means of a bearing with the tool shank 22 as was the case with the embodiment of FIG. 4, rather is connected with the shank or shaft by means of two radial superimposed bearings 29 and 30 between which there is arranged an intermediate ring 31. The intermediate ring 31 can form the inner race or ring of the outer ball bearing 29 as well as at the same time the outer race or ring of the inner ball bearing 30. The intermediate ring 31 is secured against rotation via a holdback or retaining member 32 with the housing 3 of the head of the dental drill handgrip. To this end, there is secured an arm 33 at the intermediate ring 31, the arm 33 engaging with a bore 34 or equivalent of the housing 3 and preventing rotation of the intermediate ring 31. Owing to this construction, there is prevented entrainment of the intermediate ring brought about by friction and therefore also of the protective shield 28. Moreover, the protective shield 28 can rotate just as freely about the axis of the tool 5, e.g. drill, as the protective shield arrangement according to the embodiment of FIGS. 1-3. In order to facilitate the throughpassage of the cooling agent, it is advantageous if the intermediate ring possesses a rim of throughpassage openings 35 extending in the direction of the tool.

The mode of operation of this dental drill handgrip is analogous to the exemplary embodiments previously discussed above.

In contrast to the illustrated exemplary constructional manifestations, there are further possible a series of additional designs. Thus, for instance, the connection element depicted in FIGS. 1-3 need not be a screw cap, can for instance be connected in bayonet-type fashion with the housing. It is also possible to employ

connection elements which form a purely clamping connection with the housing. Moreover, instead of using the axial ball bearing means depicted in FIG. 1, it would also be possible to employ a sliding bearing. The same also is true for the radial ball bearing arrangement depicted in FIG. 4 and 5.

While there is shown and described present preferred embodiments of the invention, it is to be distinctly understood that the invention is not limited thereto, but may be otherwise variously embodied and practiced within the scope of the following claims. Accordingly,

What is claimed is:

1. A dental drill handgrip for a rotatable dental tool comprising a housing, a drivable clamping mechanism for the rotating tool having an effective working portion and rotatably mounted in the housing, a protective shield partially surrounding the rotating tool at least along its effective working portion while leaving free an engagement region, means for mounting the protective shield so as to be freely pivotable at least over a portion of the periphery of the tool, said protective shield being provided at the side of the housing with a flange which protrudes radially with respect to the lengthwise axis of the tool, connecting element means cooperating with the flange for rotatably and detachably securing the protective shield with the housing, said connecting element means being provided with a collar member, and said flange of the protective shield being supported by means of axial ball bearings against the housing as well as against the collar member of the connecting element means.

2. A dental drill handgrip for a rotatable dental tool comprising a housing, a drivable clamping mechanism for the rotating tool having an effective working portion and rotatably mounted in the housing, a protective shield partially surrounding the rotating tool at least along its effective working portion while leaving free an engagement region, and means for mounting the protective shield so as to be freely pivotable at least over a portion of the periphery of the tool, said protective shield being provided with means for rotatably mounting a shank of the tool and means for securing the protective shield at the housing against entrainment during rotation of the tool, said securing means comprising holdback means arranged between the housing and the protective shield, and two stop means for limiting the range of movement of the holdback means in the peripheral direction of the tool.

3. A dental drill handgrip for a rotatable dental tool comprising a housing, a drivable clamping mechanism for the rotating tool having an effective working portion and rotatably mounted in the housing, a protective shield partially surrounding the rotating tool at least along its effective working portion while leaving free an engagement region, and means for mounting the protective shield so as to be freely pivotable at least over a portion of the periphery of the tool, said protective shield being provided with means for rotatably mounting a shank of the tool and means for securing the protective shield at the housing against entrainment during rotation of the tool, and wherein said rotatably mounting means comprises an intermediate ring member at which the protective shield is rotatably mounted, said intermediate ring member being rotatably secured to the shank of the tool, and holdback means for non-movably retaining the intermediate ring member relative to the housing.

4. The dental drill handgrip as defined in claim 3, wherein the intermediate ring member possesses throughpassage openings substantially extending in the direction of the tool.

5. A dental drill handgrip for a rotatable dental tool having a lengthwise extending axis of rotation and including an effective working portion, comprising a housing, a drivable clamping mechanism for the rotatable tool and rotatably mounted in said housing, a protective shield partially surrounding the rotatable tool and leaving exposed an engagement region of the effective working portion of the tool, means mounting the protective shield to be independent of the rotational movement of the tool, said protective shield embodying two interconnected side portions which are located approximately at diametrically opposed locations with respect to the axis of rotation of the tool, said diametrically opposed side portions including means forming with respect to the engagement region of the tool a rearwardly located free zone, said side portions each having a lower end which is blunt so that the protective shield does not injure a support location against which it bears during use of the dental drill handgrip.

6. The dental drill handgrip as defined in claim 5, wherein both of said side portions of the protective shield have a substantially flat construction and possess surfaces which are located adjacent the engagement region of the tool, said surfaces being substantially in alignment with one another.

7. The dental drill handgrip as defined in claim 5, wherein said side portions include outer edges bounding said rearwardly located free zone, said outer edges being disposed in an imaginary plane which is spaced

from the periphery of the tool.

8. The dental drill handgrip as defined in claim 5, wherein said blunt lower end of each side portion comprises a respective protruding rounded sliding shoe, said shoes being disposed at diametrically opposed locations with respect to the lengthwise axis of the tool.

9. The dental drill handgrip as defined in claim 8, wherein the cross-section of each side portion decreases in the direction of the lower end thereof.

10. The dental drill handgrip as defined in claim 5, wherein the spacing of the protective shield from the tool is increased in the direction of the clamping mechanism.

11. The dental drill handgrip as defined in claim 5, wherein the tool has a free end which when the tool is not in use at most extends up to the region of the lower end of the protective shield.

12. The dental drill handgrip as defined in claim 5, wherein said mounting means serves to mount the protective shield so as to be freely pivotable about the entire periphery of the tool.

13. The dental drill handgrip as defined in claim 5, wherein the protective shield possesses a flange which protrudes radially with respect to the axis of rotation of the tool, and a screw cap for rotatably and detachably securing the protective shield via the flange at the housing.

14. The dental drill handgrip as defined in claim 13, wherein the screw cap includes a flange, and axial ball bearing means for securing the flange of the protective shield both against the housing as well as against the flange of the screw cap.

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