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DENTAL GRINDING INSTRUMENT

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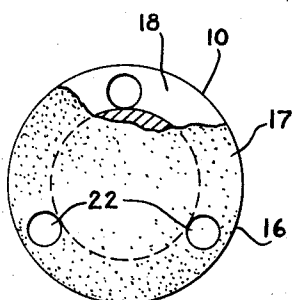


Fig. 4

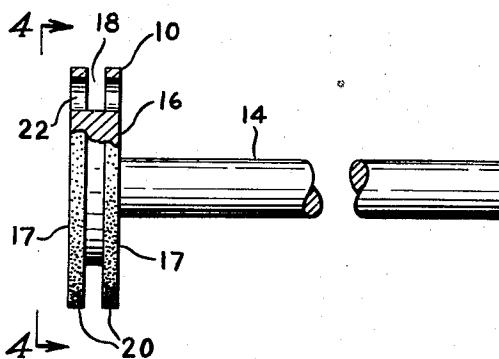


Fig. 3

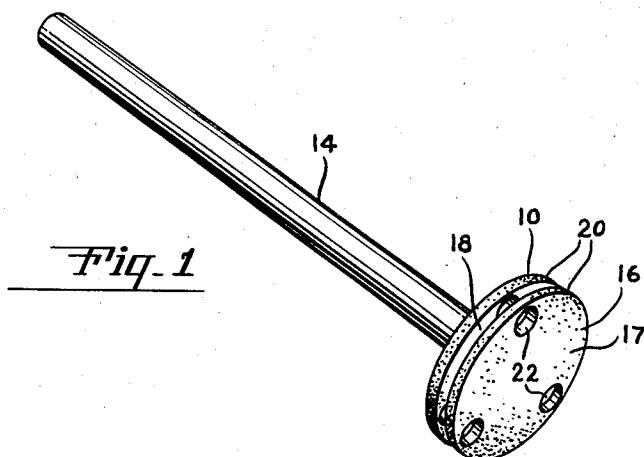


Fig. 1

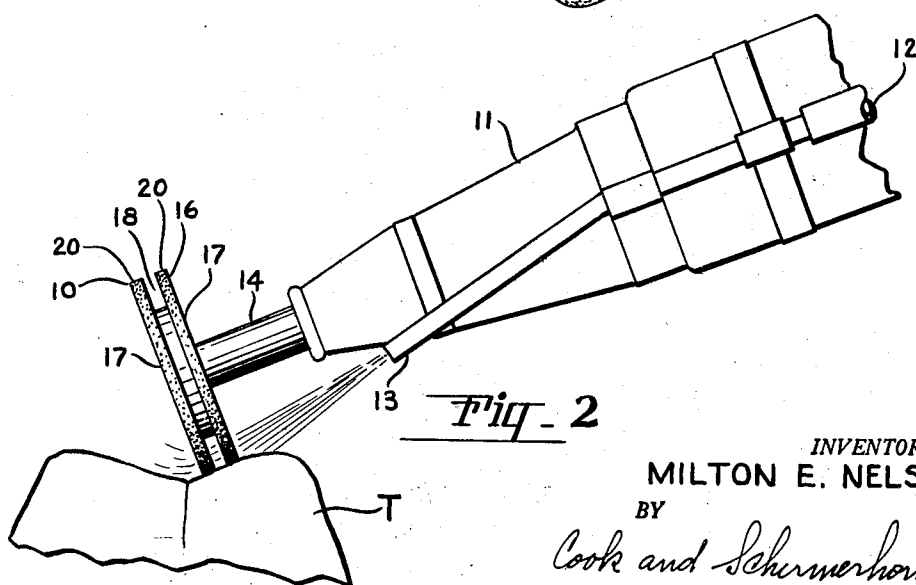


Fig. 2

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DENTAL GRINDING INSTRUMENT

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5 Claims. (Cl. 32—59)

This invention relates to improvements in dental grinding instruments, and, more specifically, is concerned with instruments operated by power driven handpieces for tooth grinding in a repairing operation.

The present invention is intended primarily to provide a dental instrument which is adapted to smoothly and rapidly grind a tooth to reduce the tooth for crown or bridge work, or to provide said tooth with an opening for a filling or inlay. It is not possible to smoothly and rapidly grind a tooth with existing wheels and yet maintain the comfort of the patient because said wheels do not have adequate means of cooling or effective means of removing debris which has been ground from the tooth. With existing wheels, considerable heat is generated immediately upon the application of a grinding wheel to the hard tooth surface, and, in order to maintain the comfort of the patient, the grinding operation must be carried on slowly and with little hand pressure. In addition, the grinding surfaces of existing wheels will rapidly fill with debris to become clogged and merely create a burnishing effect with excessive heating rather than an efficient penetrating action.

Thin grinding wheels do not generate an excessive amount of heat if properly handled and operate satisfactorily to penetrate a tooth surface. However, in the use of such thin wheels, a relatively large grinding operation is objectionably time consuming. Other wheels which are sufficiently wide to satisfactorily make an opening or reduction have the inherent disadvantages pointed out above comprising overheating and clogging.

A principal object of the invention is to provide a dental grinding instrument which has means effective to rapidly accomplish a tooth grinding operation without generating heat uncomfortable to the patient and without clogging.

More specifically, objects of the invention are to provide a dental grinding instrument having a grinding wheel with thin cutting edges capable of reducing a tooth or making an opening therein in a minimum of time and to provide said instrument with fluid passageway means operative to receive fluid to effectively maintain a cool temperature and flush out debris.

These objects are achieved by a grinding instrument operated by a dental handpiece or holder and associated with a pressurized stream of fluid ejected from the handpiece or from a source independent of the handpiece. The present instrument comprises a shank with an integral grinding wheel on one end. This wheel is grooved around its rim to form thin grinding edges and has port means intersecting the groove which are in the path of the pressurized stream. Fluid from the pressurized stream is forced through the ports and groove to accomplish a cooling and non-clogging action. The construction of the instrument will be better understood and additional objects and advantages will become apparent from the following description taken in connection with the accompanying drawings which illustrate a preferred form of the invention. It is to be understood, however, that

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the invention may take other forms, and that all such modifications and variations within the scope of the appended claims which will occur to persons skilled in the art are included in the invention.

In the drawings:

Figure 1 is a perspective view of the present instrument;

Figure 2 is an elevational view of the instrument mounted in a dental handpiece and showing a pressurized stream of fluid from the handpiece being projected toward the grinding wheel;

Figure 3 is a side elevational view, partly broken away, of the present instrument, showing the port and groove means of the grinding wheel; and

Figure 4 is an end elevational view of the grinding wheel, taken on the line 4—4 of Figure 3.

The present instrument or drill bit is designated generally by the numeral 10, and, as shown in Figure 2, it is adapted to be mounted in the chuck of a dental handpiece or holder 11 of well known construction. The handpiece 11 is connected with suitable power driving means for rotating the chuck at a high speed and may also be provided with a fluid inlet conduit 12 having a nozzle 13 for spraying a fluid, which may comprise air or water, or a combination of both, in a forward direction for impingement against the grinding instrument. The nozzle is inclined at a slight angle to the axis of the chuck for directing the fluid spray against one side of the grinding wheel near its periphery.

The instrument 10 comprises essentially a shank portion 14 and a grinding wheel 16, the abrasive portion of which preferably comprises well known material such as diamond particles embedded in a metal base. Wheel 16 has oppositely disposed faces 17 and the rim or periphery thereof is provided with a groove 18 forming a pair of thin lands or cutting edges 20 on each side thereof. Disposed in parallel relation to the axis of the wheel 16 are a plurality of ports or passages 22 which intersect the peripheral groove 18. The wheel 16 is illustrated with three ports 22, but it is to be understood that more or less of these ports may be utilized.

In the operation of the device the wheel is driven at high speed, and fluid which is ejected from the nozzle 13 impinges against the lower portion of the inner face 17 of the grinding wheel and around the area of a tooth T being ground by the wheel, as shown in Figure 2. Some of this fluid flows through the ports 22 to be forcefully discharged from the opposite face 17 as well as from the groove 18 in the edge. Fluid which does not enter the ports 22 flushes and cools the tooth area on that particular side of the wheel. The force of the fluid flowing through the ports 22 and groove 18 causes the debris which has been removed by the grinding wheel to be washed away immediately to prevent clogging of the cutting edges, and thereby the grinding edges are kept clean and a continuous grinding action is produced, together with a cooling action. Undesirable effects, such as burnishing and overheating, cannot exist because groove 18 constitutes a debris channel which is kept open and clear at all times by the flushing action of the fluid stream. The debris is not confined against the tooth as it is by a broad wheel surface.

The present grinding wheel will make a tooth reduction or an opening in a tooth surface in a minimum of time without causing discomfort to the patient. A rapid penetration is accomplished by the thin cutting edges, and, in the grinding operation, the operator oscillates the handpiece slightly back and forth in an axial direction so as to grind off the portion between the cutting edges 20 and additional portions adjacent the faces of the tool, the range of oscillation depending upon the width of opening or the extent of the reduction to be made. For this purpose the whole surface of the wheel is preferably

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covered with projecting diamond particles, including not only the edges 20 but also both exterior faces 17 and both interior faces of groove 18. The present wheel can thereby create a smooth grinding operation without generating the heat which is generated by broad, flat surface wheels normally in use.

The ports 22 may be disposed at a different radial distance from the center of the grinding wheel as long as they communicate with the groove 18, it being understood that the groove 18 may have a greater or lesser depth than that shown without departing from the principles of the invention. Fluid projected from the nozzle 13 is under sufficient pressure to keep the paths through the wheel free of debris. This assures that the groove 18 will not become clogged and that the flushing and cooling liquid or air will flow through without interruption. The instrument can thereby be maintained in constant contact with the tooth portion being prepared without debris accumulating, resulting in a faster repairing operation than is possible by existing instruments. With a constant flow of cooling fluid over all the grinding surfaces, discomfort of the patient is held to a minimum.

The flushing and cooling advantages of the present instrument exist in both the initial, or surface grinding, of the tooth and the deeper penetrations. When grinding at the surface or in a shallow penetration the fluid from the spray flows from the ports 22 into the groove 18 and out the groove adjacent the bottom thereof. As the instrument penetrates the tooth to greater depth, some of the fluid in the groove 18 flows upwardly to discharge from the groove at the tooth surface. Other fluid will be carried outwardly by centrifugal force and be discharged out of the portion of the groove above or outside the tooth surface. The continuous groove thus permits the pressurized fluid to flow through the grinding wheel to accomplish the desired functions for eliminating burnishing or overheating even in deep penetrations.

Although the fluid ejecting means comprising the nozzle 13 and its inlet conduit 12 are illustrated as comprising a part of the handpiece 11, this structure may not be

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associated with said handpiece but rather may be utilized apart therefrom and be manipulated by an assistant to direct fluid against the instrument 10. In such case, if the instrument 10 in its grinding operation becomes turned edgewise to the line of fluid travel, effective flushing and cooling actions are nevertheless achieved by fluid flowing radially into the instrument and out the ports opening through the faces 17.

Having now described my invention and in what manner the same may be used, what I claim as new and desire to protect by Letters Patent is:

1. A dental grinding wheel for use with an axially directed stream of fluid, said grinding wheel having a pair of spaced peripheral flanges defining a peripheral groove therebetween, said flanges having axial openings therein for flushing debris out of said groove in an axial direction.

2. A dental grinding wheel having a pair of spaced peripheral flanges defining a peripheral groove therebetween, said flanges having axially aligned openings there-through.

3. A dental grinding wheel comprising a solid imperforate hub portion having spaced peripheral flanges defining side walls of a peripheral groove therebetween, the periphery of said imperforate hub portion between said flanges forming the bottom of said groove, said flanges having openings therethrough.

4. A dental grinding wheel having a peripheral groove, said wheel having openings into said groove from its opposite faces, all parts of said openings being spaced from the wheel axis a distance at least equal to the radius of the bottom of said groove.

5. A dental grinding wheel having a peripheral groove and axial flush openings in opposite side walls of said groove.

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