April 12, 1955 J. H. BLAIR 2,705,838

WATER COOLING ARRANGEMENT FOR DENTAL DRILL

Filed Sept. 11, 1953

Fig. 1.

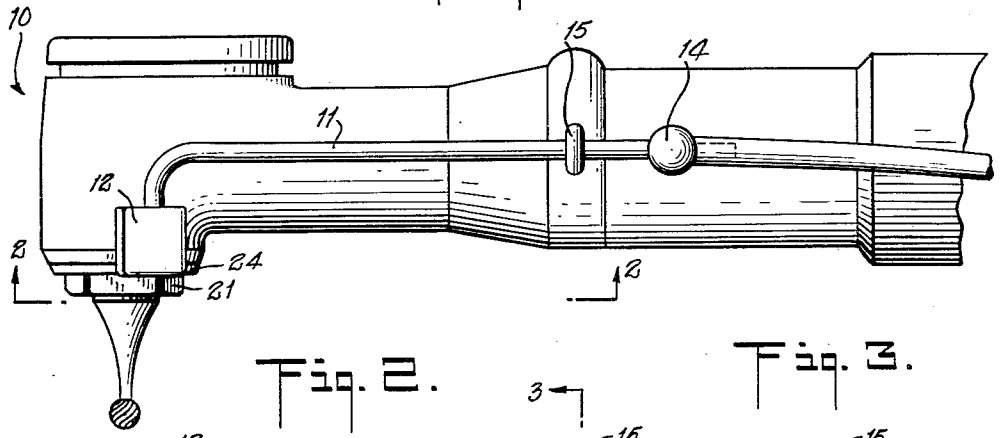


Fig. 2.

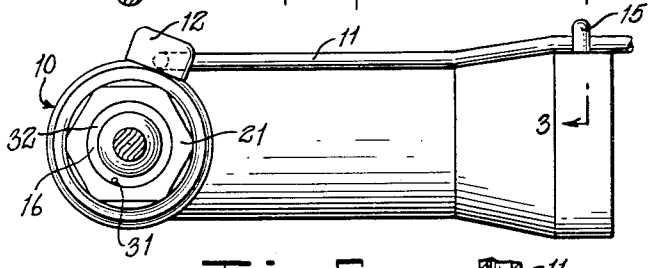


Fig. 3.

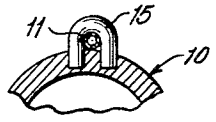


Fig. 4.

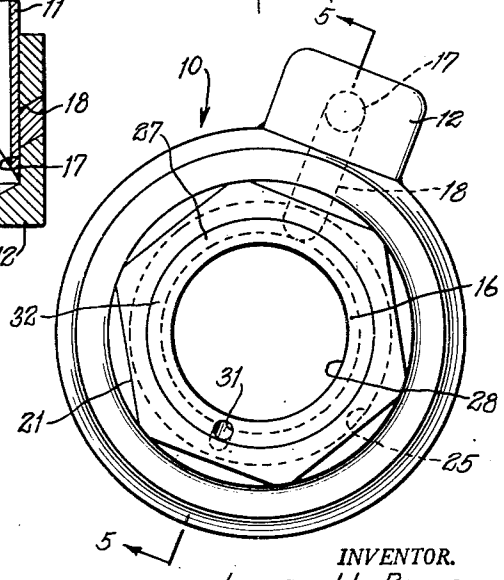
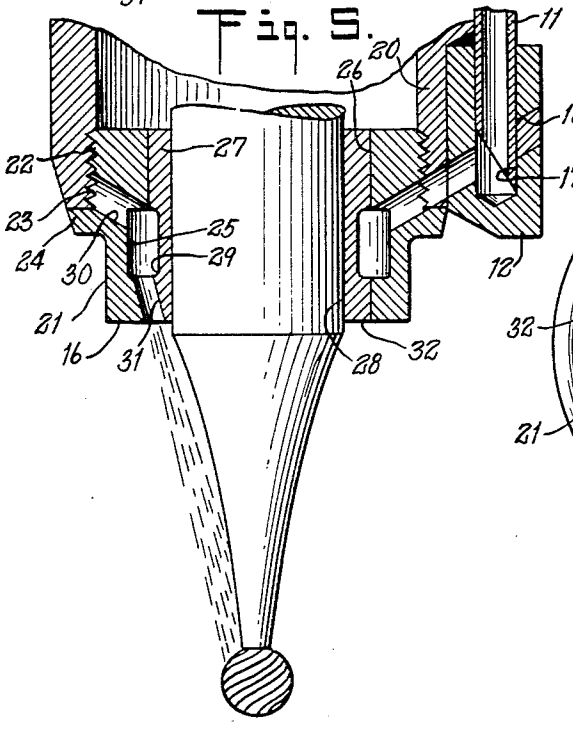


Fig. 5.



INVENTOR.
JAMES H. BLAIR
BY Howard V. Joandron
ATTORNEY

United States Patent Office 2,705,838 Patented Apr. 12, 1955

2,705,838

WATER COOLING ARRANGEMENT FOR DENTAL DRILL

James H. Blair, New York, N. Y., assignor to Chayes Dental Instrument Company, New York, N. Y.

Application September 11, 1953, Serial No. 379,712

4 Claims. (Cl. 32—28)

This invention relates to a water cooling arrangement for a dental drill and more particularly a water cooled bushing and drill spray for a hand piece of a dental drill.

In the past, water cooling spray attachments have been provided for dental drills, that is, they are provided as an auxiliary attachment to be clipped onto the side of the drill and provide a jet of water directed to the end of the bit where the drilling operation occurs to provide a cooling effect on the cutting bit. In the past the dental drills have been operated at comparatively low R. P. M. speeds and at the usual R. P. M. speeds the only heat created was directly at the edge or end of the cutting bit. Due to the development of dental hand pieces that are driven at exceptionally high R. P. M. speeds (13,000 to 20,000 R. P. M.), the problem of cooling with a fluid (water) circulation has changed, not only increasing the amount of heat developed by the cutting or grinding bit, but because of the exceptionally small end of the dental hand piece, there is a tendency to develop heat between the bushing and the drive shaft or chuck at the end bearing of the hand piece.

It is an object of this invention to provide a dental hand piece with a water cooling arrangement at the end of the hand piece to prevent the hand piece from overheating.

Another object of this invention is to provide a dental hand piece with a water cooling arrangement at the end and a spray from the end of the hand piece to assist in cooling the cutting bit.

A still further object of this invention is to provide a dental hand piece with a water cooling arrangement at the end of the hand piece and a spray from the end of the hand piece to assist in cooling the cutting bit in which the water cooling arrangement in addition increases the temperature of the water that impinges with the cutting bit and tooth.

Other objects of this invention shall be apparent by reference to the accompanying detailed description and the drawings in which:

Fig. 1 illustrates a side elevational view of an angle end for a dental hand piece,

Fig. 2 is a plan view taken on line 2—2 of Fig. 1,

Fig. 3 is a detail view taken on line 3—3 of Fig. 2,

Fig. 4 is an enlarged plan view of the check face of the angle and illustrated in Fig. 1, and

Fig. 5 is a cross sectional view taken on line 5—5 of Fig. 4.

Referring to Figs. 1 and 2 there is illustrated the end portion of a dental hand piece. In this particular instance the end portion is an angle element **10**, that is, this particular end piece retains the drilling bit at an angle to the drive shaft that descends through the hand piece to the angle element **10**. The mechanical drive and construction of element **10** is not of importance to this invention. Rather, this invention is only concerned with the water tube **11** that is affixed to the side of the hand piece. Tube **11** at one end thereof is permanently mounted into a head piece **12**. At the opposite end tube **11** is mounted in a ball type joint **14**. The opposite end of the ball joint **14** is in turn connected to a tube or hose (not shown). The tube leading to the ball joint **14** is connected to a water supply (not shown). In order that the tube **11** may be retained in a tight fitting relation with angle element **10**, a U clamp **15** (Figs. 2 and 3) is fitted into the angle element surrounding the tube **11**.

Referring to Figs. 4 and 5 it is apparent that the head

piece **12** is brazed to the side of the angle element **10** adjacent to the bit mounting face **16** and tube **11** is shown mounted in a bore **17** of the head piece **12**. The bit mounting face of angle element **10** is comprised of a threadably secured nut **21**, that is, the upper portion of nut **21** is provided with an external thread **22** that mates with and is threaded to an internal thread **23** of the angle element **10**. Nut **21** is also provided with an abutting shoulder **24** which will abut against the end of wall **20** of the angle element **10**. Nut **21** is also provided with a recessed portion **25**. Nut **21** is also provided with a central bore **26**. A stainless steel bushing **27** is mounted in bore **26**. Bushing **27** is fitted into bore **26** to float or rotate freely therein. Bushing **27** is provided with an internal bore **28** through which the tool bit is in turn mounted to an internal chuck in angle element **10** (not shown). Bushing **27** is also provided with a recessed portion **29** that is in alignment with the recess **25** of nut **21**. Thus the recess **25** of nut **21** and the recess **29** of bushing **27** forms a peripheral chamber through which water is circulated to cool bushing **26**. A cross bore **18** is drilled through tube **11**, the head piece **12** and penetrates the wall **20** of the angle element **10** and also penetrates nut **21** passing into the recessed portion **25**. This drilled bore must in turn be plugged on its outer extremity, that is, in the wall of element **12**. The construction of nut **21** may be varied instead of depending upon the single bore **18** penetrating to the recessed portion **25**, nut **21** may be provided with a peripheral groove **30** which connects recess **25** with the outer periphery of the threaded portion **22** as illustrated in Fig. 5. With this construction, nut **21** may be removed and reinserted and the peripheral groove **30** may be easily aligned with bore **18**. Thus it is apparent with the construction illustrated in Fig. 5 that water entering through tube **11** will pass through bore **18** into the fluid chamber surrounding bushing **27** thus providing a water cooled jacket for bushing **27**. In addition to the water cooled jacket, one or more bores **31** may be drilled into outer face **32** of the element but in each instance the bore **31** will be drilled on a particular angle and will be drilled to enter into the water chamber formed by recesses **25** and **29**. This bore **31** thus provides a fluid passage so that the water that is pumped into the fluid chamber about bushing **27**, being under pressure, this water will be jetted through bore **31** and thus ejected in a fine stream on the particular angle of bore **31** and thus aimed to impinge upon the cutting edge of a bit mounted in the hand piece (not shown). It is apparent with this construction that tube **11** may be connected to an ordinary water supply where there is sufficient pressure or tube **11** may be connected to an auxiliary pump (not shown) and the pump in turn connected in turn to a fluid supply (not shown). In either case, the water supplied may be too cool for spraying directly to the cutting bit and at the same time impinging upon the tooth of a patient. But in the embodiment illustrated, although the water may be cool or cold when supplied through tube **11**, by the time it has circulated in the fluid chamber surrounding the bushing **27**, it will be considerably warmed because of the heat developed by the high R. P. M. drive through bushing **27**. Thus the water that is sprayed to impinge upon the bit and the tooth will be of a desired temperature and cannot cause discomfort to the patient. Although there is illustrated a single bore **31** to produce a single jet stream, it is within the scope of this invention to provide a plurality of bores **31**. Although tube **11** has been illustrated as mounted externally of the dental hand piece and the angle element **10**, it is conceivable that tube **11** may be mounted internally to accomplish the same result. Although bushing **27** has been illustrated with a floating or loose fit in this embodiment of the invention, it is likewise within the concept of this invention to provide a tight fitting bushing and still obtain the same general effect as described in this embodiment.

Various changes may be made regarding the size of the water cooling cavity or the general location of the water cooling cavity and various changes may be made to the size of jet bore, its shape or its manner of varying the jet spray without departing from the spirit of

this invention and this invention shall be limited only by the appended claims.

What is claimed is:

1. The combination with the hand piece of a dental drill, a removable tool bearing end and bushing, said bearing end and bushing provided with a water jacket surrounding the central circular periphery of the bushing, a water tube affixed to the exterior of the dental hand piece, said water tube connected to said water jacket to carry water to be circulated through said water jacket.

2. The combination with the hand piece of a dental drill, a removable tool bearing end and bushing, said bearing end and bushing provided with a water jacket surrounding the central circular periphery of the bushing, said end piece provided with a jet aperture that extends into said water jacket, a water tube affixed to the exterior of the dental hand piece, said water tube connected to said water jacket to carry water to be circulated through said water jacket and be expelled through said jet aperture.

3. In a device according to claim 2 in which there are a plurality of jet apertures that extend into said water jacket.

4. The combination with the hand piece of a dental drill, a removable tool bearing end and bushing, said bearing end and bushing provided with a water jacket surrounding the central circular periphery of the bushing, said tool bearing end provided with a jet aperture that is connected to said water jacket, a water tube passing through the dental hand piece, said water tube connected to said water jacket to carry water to be circulated through said water jacket and be expelled through said jet aperture.

References Cited in the file of this patent

UNITED STATES PATENTS

2,442,033 Brantly et al. ---------- May 25, 1948