United States Patent [19]

Spinello

[11] **3,755,903**

[45] **Sept. 4, 1973**

[54] **ANTI-MISTING ATTACHMENT FOR DENTAL MIRRORS**

[76] Inventor: **Ronald P. Spinello,** 372 Post Ave., Westbury, N.Y. 11590

[22] Filed: **May 8, 1972**

[21] Appl. No.: **251,452**

[52] **U.S. Cl.** **32/69**
[51] **Int. Cl.** **A61c 3/00**
[58] **Field of Search** 32/69

[56] **References Cited**

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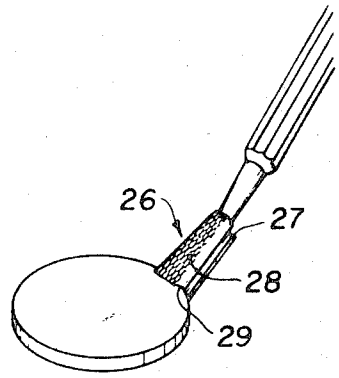
Primary Examiner—Robert Peshock
Attorney—James A. Eisenman et al.

[57] **ABSTRACT**

An anti-misting attachment for dental mirrors is disclosed for use particularly in conjunction with water-cooled dental drills, the spray from which generates water droplets which quickly blur mirrors to the point of uselessness. The surface mist is dispersed by a surfactant stored on an exposed carrier attached to the mirror in contact with the reflecting surface and released onto the mirror surface in minute quantities in the presence of ambient water spray which conveys the surfactant to the reflecting surface.

16 Claims, 16 Drawing Figures



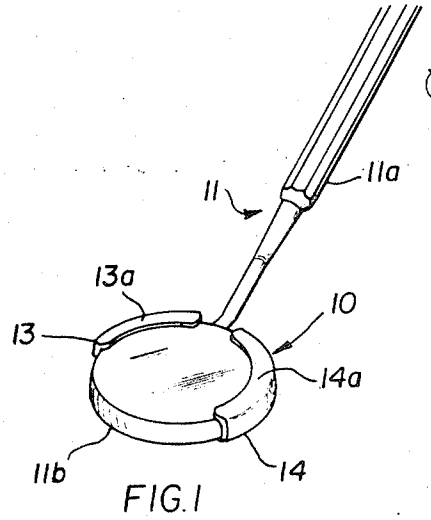


FIG. 1

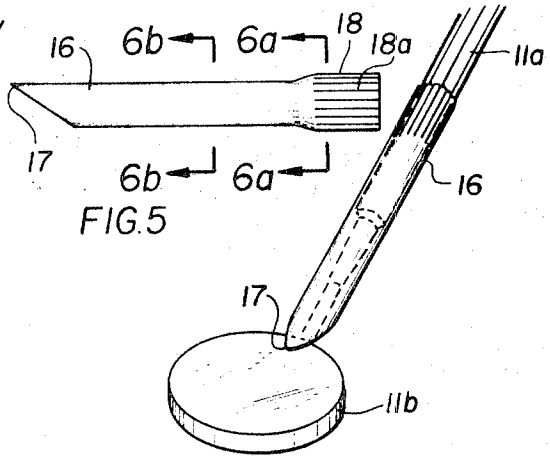


FIG. 5

FIG. 4

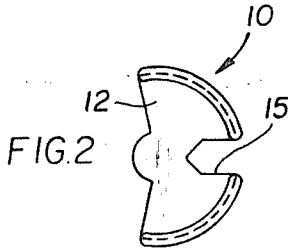


FIG. 2

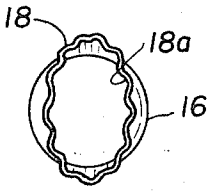


FIG. 6a

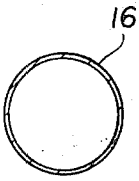


FIG. 6b

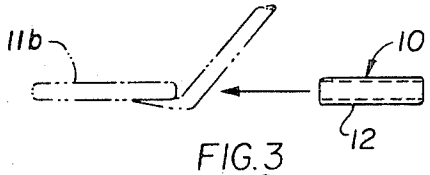


FIG. 3

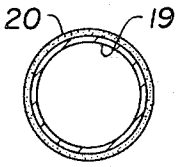


FIG. 7

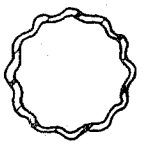


FIG. 8

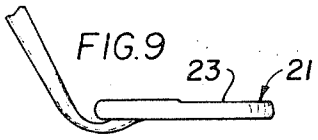


FIG. 9

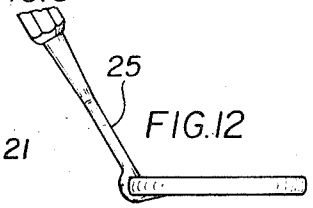


FIG. 12

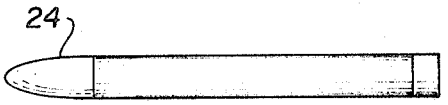


FIG. 14

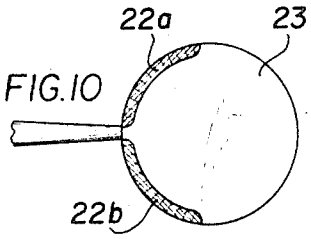


FIG. 10

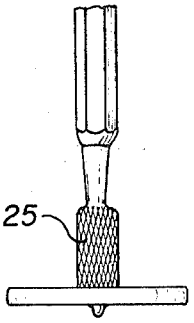


FIG. 13

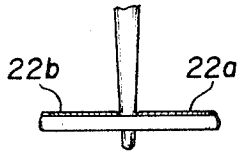


FIG. 11

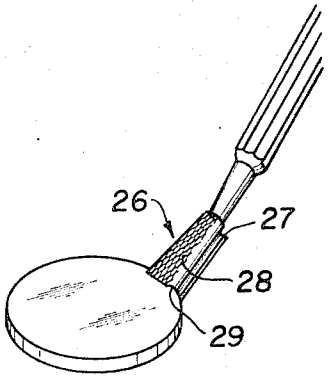


FIG. 15

ANTI-MISTING ATTACHMENT FOR DENTAL MIRRORS

BACKGROUND OF THE INVENTION

The invention relates to mist-dispelling and fog-preventing devices for dental mirrors.

In conventional dental practice, drilling the upper teeth using high-speed water-cooled drills results in the rapid accumulation of mist or droplets on the mirror which first distorts and then obliterates the image. To remedy this problem, the dentist periodically removes the mirror from the mouth of the patient to clean it as by dipping in a non-misting liquid, usually a germicidal detergent. Each cleaning yields a short period of mist-free operation until the residual detergent dissipates in the continuing spray of coolant water. The procedure is not only time-consuming but can result in degraded work due both to worsening mirror reflectivity while the dentist operates and the need of the dentist to reestablish critical instrument positions after each mirror-clearing interruption. Also, a detergent-dipped mirror can be distasteful in the patient's mouth. A lesser problem to dentists, and one more easily solved, involves fogging of cold mirrors by the patient's breath as a transient condition occurring at the outset of treatment.

Accordingly, it is an object of the present invention to provide a dental mirror assembly which de-mists itself automatically in the presence of moisture without requiring that it be removed from the mouth of the patient, and which, moreover, is not distaseful to the patient.

SUMMARY OF THE INVENTION

In accordance with the invention, there is provided an attachment for a dental mirror in the form of an exposed carrier in contact with the reflecting surface and which holds a water-soluble surfactant, minute quantities of which are picked up by the ambient water spray to be carried thereby to the miror surface.

In one preferred embodiment, the carrier takes the form of an expendable, detachable member, so mounted that it is in contact with an edge of the mirror surface and at least partially exposed above the surface. The carrier can be formed, for example, of a porous medium saturated with surfactant and its exposure is such that it gathers ambient spray from the tooth-drilling operation. When exposed to water from the spray, the surfactant leaches out of the carrier in small quantities, tasteless to the patient, but effective to break down surface tension of water droplets on the reflecting surface, and therefore will dispel the mist to prevent distortion of the reflected image. Thus, the ambient spray water forms the medium for picking up the surfactant and carrying it to the reflecting surface where it encounters the image-distorting droplets, also from the spray, and which are immediately dispersed. The carrier can take the form, for example, of a sleeve adapted to be slipped over the mirror handle. The carrier can also be non-expendable, forming either a permanent part of the mirror, or a re-usable, i.e. sterilizable, attachment therefor, with the surfactant being applied prior to use and after sterilization.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a view in perspective of the lower end of a dental mirror having a mist-dispelling and fog-preventing attachment thereon;

FIG. 2 is a top view of the attachment separated from the mirror;

FIG. 3 is a side view of the attachment and showing the mirror in phantom lines to indicate how the attachment is mounted;

FIG. 4 is a view in perspective of another modification of the invention shown mounted on a dental mirror;

FIG. 5 is a side view of the attachment on the dental mirror of FIG. 4 as it appears prior to mounting on the mirror handle;

FIGS. 6*a* and 6*b* are views in transverse section taken on the lines 6*a*—6*a* and 6*b*—6*b* respectively looking in the direction of the arrows of FIG. 5;

FIG. 7 is a view in transverse section in enlarged scale illustrating a wall construction for the attachment of FIGS. 4 and 5;

FIG. 8 is a view in transverse section illustrating another way of fabricating the walls of the attachment of FIGS. 4 and 5;

FIGS. 9, 10 and 11 are respectively side, top and end views of a dental mirror representing another modification of the invention;

FIGS. 12 and 13 are side and end views of a dental mirror embodying the present invention and illustrating still another modification;

FIG. 14 is a side view of a dispenser which can be used in conjunction with the embodiments of the invention illustrated by FIGS. 9–13; and

FIG. 15 is a view in perspective of another modification of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

In its broadest terms, the invention comprises devices which utilize the ambient or scattered spray water which emanates from water-cooled dental drills as a vehicle for carrying a water-soluble surfactant from an exposed portion of the dental mirror above the reflecting surface downward to the reflecting surface to dispel mists deposited by the spray. A surfactant is defined as a "surface-active agent", such as a wetting agent, which breaks down the surface tension of the water particles causing them to integrate into a thin water film which does not distort the image and which can flow from the mirror surface. The surfactant also augments the accumulation and flow of water from the spray to the mirror surface.

In accordance with the invention, the apparatus can take a number of forms including an expendable attachment entraining surfactant and adapted to be detachably mounted on the head or handle of the dental mirror, or it can take the form of a surface designed permanently into the mirror assembly as either part of the handle or the head and to which a surfactant, preferably in solid form, is applied each time the mirror is to be used. The surfactant supply should be sufficient in volume so that it will continuously dispel water mists on the mirror for an extended period of time, say, 60 minutes, without replacement or replenishment.

Referring to the drawings and first to FIGS. 1–3, the invention is illustrated in the form of a clip-on carrier attachment **10** for a dental mirror **11**, including a handle portion **11***a* and a reflecting head portion **11***b*. The attachment **10** is moded in an integrated assembly of plastic including a flat base portion **12** adapted to underlie the back surface of the mirror and a pair of C-

shaped arcuate flange portions 13 and 14 adapted to grip the sides of the mirror with a light spring force and including arcuate sections 13*a* and 14*a* respectively adapted to overlie for a very short distance the edge of the reflecting surface of the mirror. The attachment is adapted to be slipped onto the mirror by snapping it on from the rear edge generally in the same plane as the reflecting head of the mirror, with the lower end of the handle 11*a* (usually in the form of a thin stem) being received in a slot 15.

The attachment can be formed of a plastic such as an acrylic which is polymerized in the presence of a surfactant, thereby entraining minute quantities of the surfactant throughout the plastic. Examples of how the plastic can be made are set forth below. Water from the coolant spray commonly used in conjunction with tooth drilling, normally falls upon the mirror in the form of droplets which distort the image or in some cases obliterate it entirely. The water engaging the upper flanges 13*a* and 14*a* of the attachment 10 releases minute quantities of surfactant in a water solution which instantaneously dispels the mist. The surfactant is released in such minute quantities that it is not perceptible to the patient. In addition, it leaches out onto the reflecting surface continuously for an extended period of as long as 60 minutes, which more than exceeds the average treatment period. When the treatment is completed, the attachment, being expendable, can be thrown away. In most cases, its nature is such that it is not conducive to sterilization because such processes normally remove the entrained detergent. The body 12 of the clip-on carrier attachment 10 can also be formed of a non-porous material, and the flanges 13*a* and 14*a* can have applied thereto a carrier, such as a porous overlay entraining a surfactant or a surfactant coating can be added directly to the carrier in the form of a solid surfactant which will solubilize slowly in the presence of water.

Referring to FIGS. 4–6, a modification of the invention is shown in the form of an expendable sleeve attachment 16 adapted to be slipped over the handle 11*a* of the mirror to cause its contoured tip 17 to engage the mirror surface. The sleeve can be formed, for example, as an extruded plastic composition which is polymerized in the presence of a surfactant and examples of which are set forth below. The resulting porous structure entraining a myriad of small interconnected masses of detergent will meter out small quantities of surfactant in the presence of the ambient coolant spray.

In order to better grip the handle 11*a* of the dental mirror while still affording clearance for easy mounting and removal, the sleeve can be formed in an elliptical configuration to afford spring resilience. Referring to FIGS. 5, 6*a* and 6*b*, the flattened elliptical configuration, identified by the numeral 18, is formed only at the upper end of the sleeve so that it may be more easily slid over the handle. It is positioned and arranged to grip the fat portion of the handle which is normally spaced at least an inch from the mirror head. In addition to its oval configuration, the section 18 can include longitudinal serrations 18*a* in the form of embossed ribs, preferably on both the inner and outer surfaces, thus imparting additional resilience to the gripping portion 18 and also providing resistance against turning along its longitudinal axis while mounted on the mirror. The serrations 18*a* grip the longitudinal fluting or edges on the handle of the mirror. The resilient out-of-round gripping section 18 can be formed by compressing the sleeve 16 between warm dies.

As mentioned above, the tubular attachment 16 can be formed by an extrusion process or it can be formed by tubular winding. The latter is particularly useful in fabricating the structure shown by FIG. 7, in which there is an inner wall 19 formed of a durable material, such as plastic (not entraining a surfactant) and an outer layer 20 of porous material, such as paper, which is saturated with a surfactant, such as a polyoxyethelene cetyl ether, having a melting temperature of approximately 38° C. The porous layer is preferably bonded to the plastic inner layer by a water-resistant adhesive and the surfactant is applied thereafter at an elevated temperature converting it to a liquid. The resulting tubes are cut to length and shape, including end-compressing to form the gripping end 18. The plastic inner layer is preferably formed of heat-softenable plastic which more readily achieves the out-of-round, and serrated character under the action of the warmed dies.

Referring to FIG. 8, there is illustrated a cross-sectional configuration for the tubular attachment which is particularly useful in the event an extrusion process is used. In this case, the walls are formed in an undulating configuration defining valleys and troughs so the attachment can expand radially under the inherent resilience of the plastic to fit over the handle of the mirror and to grip it against movement on the handle when in use. The valleys and troughs on the outside of the attachment also define water courses for the drainage of accumulated spray water down to the mirror surface. In draining toward the mirror surface, the water picks up surfactant entrained in or carried by the extruded plastic.

It will be understood that other surfactants can be carried in the porous layer 20, such as a liquefied sulfonate detergent or a wetting agent.

In order to form a plastic entraining surfactant for either molding into the configuration of the clip-on attachment identified by the numeral 10 or of an extruded tubular member of the type identified by the numeral 16, the following compositions can be used:

EXAMPLE 1

Solid particles of powdered anionic detergent are blended with powdered polyethelene or polystyrene in a 60 percent plastic: 40 percent detergent ratio (by volume). The mixture is then heat molded to the desired shape, such as the butterfly wing design of FIG. 2 or extruded as shown in FIG. 8. The surface particles of powdered detergent are dissolved in the presence of water spray, and the resulting detergent solution acts as the defogging or de-misting agent.

EXAMPLE 2

A liquid concentrate of anionic detergent is blended with methyl methacrylate liquid monomer in a ratio of 60 percent monomer: 40 percent detergent (by volume). Anionic detergent can take the form of sulfonate detergents prepared from sulfuric acid and petroleum products, such as sodium dodecylbenzenesulfonate having a general formula of RSO_3Na, where R refers to a lipophilic or organic group containing about 18 carbon atoms. This solution is blended with methylmethacrylate polymer in powdered form in a 50:50 ratio (by volume), and cold cured in a mold to the desired shape or extruded. The detergent is entrapped within the

crystalline lattice of the cured plastic, and released in the presence of a water spray.

Referring to FIGS. 9–14, there are illustrated modifications of the invention wherein the dental mirror itself is formed with permanent exposed surfaces to which a surfactant can be applied when the mirror is to be used. In the embodiment of FIGS. 9–11, the head 21 of the mirror includes a pair of raised arcuate shoulders 22*a* and 22*b* on the sides of the mirror projecting slightly above the plane of the mirror surface 23. The raised arcuate surfaces 22*a* and 22*b* are downwardly inclined toward the mirror surface and are formed with an embossed pattern of indentations. Prior to use of the mirror, a surfactant is applied to the surfaces 22*a* and 22*b* using, for example, the dispenser stick 24 of FIG. 14, which is a stick formed of polyoxyethelene cetyl ether having a melting point above ambient room temperature, say, in the vicinity of 38° C. This material constitutes a detergent surfactant and has a firm waxy characteristic.

Referring to FIGS. 12 and 13, there is illustrated a modification of the invention in which an exposed surface 25 is formed as part of the handle of the mirror in the form of a flattened inclined plane terminating at the mirror surface and having its surface embossed to define indentations for holding applications of the surfactant material which can be applied, for example, by the stick 24 of FIG. 14. Spray water impinging on the surface 25 will pick up small amounts of the water-soluble surfactant and carry it to the mirror to dispel mist.

Features of the embodiments of FIGS. 4 and 12 are combined in the embodiment of FIG. 15, in which a non-expendable carrier 26 formed of metal is attached by means of mounting clamps 27 to the handle of the mirror. The carrier clip 26 includes an exposed face 28 scored or embossed to hold a water-soluble surfactant. The lower end of the clip 26 is contoured at 29 to rest against the periphery of the head of the mirror with the embossed surface overlying and contacting the mirror. The carrier 26 can be either detachably or permanently attached to the mirror and is preferably formed of a durable material to withstand repeated sterilization. In use, the dentist rubs a surfactant in solid form, such as that shown in FIG. 14, onto the surface 28. Any residual surfactant which is not dissipated during the course of the treatment will be removed by sterilization process.

While the invention has been described having reference to preferred embodiments thereof, it will be understood that it can take various other forms and arrangements within the scope of the overall disclosure as herein set forth, and should not therefore be regarded as limited except as defined by the following claims:

I claim:

1. A dental mirror assembly comprising a head portion having an image-reflecting surface and a supporting stem, an exposed carrier surface carried by the assembly at least partially disposed above the plane of the image-reflecting surface and defining a downwardly inclined water course to the reflecting surface to accumulate ambient coolant spray water from a proximate water-cooled dental drill to condense the water to be drained onto the reflecting surface, and an expendable, concentrated water-soluble surfactant on said carrier surface, whereby the water from the coolant spray falling on the carrier surface constitutes the medium for dissolving the surfactant and for transmitting an aqueous surfactant solution from the carrier to the reflecting surface for continuously dispelling depositions of image-distorting water particles of the spray from the reflecting surface.

2. A dental mirror assembly, comprising a head portion having an image-reflecting surface and a supporting stem, an exposed carrier surface spray by the assembly at least partially disposed above the plane of the image-reflecting surface and defining a downwardly inclined water course to the reflecting surface to accumulate ambient coolant spray water from a proximate water-cooled dental drill to condense the water to be drained onto the reflecting surface, and means forming an array of cavities in the carrier surface for holding a concentrated expendable surfactant adapted to contact the condensing water spray on the carrier surface to form an aqueous surfactant solution to be drained onto the image-reflecting surface for continuously dispelling depositions of image-distorting water particles of the spary from the reflecting surface.

3. Apparatus as set forth in claim 2, said cavities comprising channels inclined toward the reflecting surface.

4. A dental mirror as set forth in claim 1, said carrier surface comprising an integral portion of said supporting stem.

5. Apparatus as set forth in claim 1, said carrier surface including at least one arcuate member at the periphery of the reflecting surface.

6. An attachment for a dental mirror comprising a carrier member including an exposed carrier surface, and means to attach the carrier member to a dental mirror with at least one portion of the surface disposed above the mirror to accumulate ambient coolant water spray from a dental drill and to direct the accumulated water to the mirror, said surface being adapted to support an expendable water-soluble surfactant.

7. An attachment for a dental mirror as set forth in claim 6, said carrier member including a porous medium to carry the surfactant.

8. An attachment for a dental mirror as set forth in claim 6, said carrier member including detachable means to mount the carrier member on the dental mirror.

9. Apparatus as set forth in claim 8, said carrier member being formed of porous plastic entraining a water-soluble surfactant.

10. Apparatus as set forth in claim 9, said plastic being polymerized in the presence of and in admixture with the surfactant.

11. An attachment for a dental mirror as set forth in claim 8, said dental mirror having a reflecting head and a supporting handle, said carrier member comprising a detachable tubular member adapted to surround the lower end of the handle of the mirror and to be held thereby in close proximity to the edge of the reflecting surface.

12. Apparatus as set forth in claim 11, said tubular member being at least partially out of round to afford a resilient gripping action on the handle.

13. Apparatus as set forth in claim 11, said tubular member being formed with a pointed tip to engage the reflecting surface.

14. Apparatus as set forth in claim 11, said tubular member being deformed inwardly along its length to define at least one longitudinal channel to afford radial

resilience and to define a water course to the reflecting surface.

15. An attachment for a dental mirror as set forth in claim **11**, said tubular member comprising multiple layers, the inner layer being formed of water-resistant material and the outer layer being formed of a porous medium entraining the surfactant.

16. An attachment for a dental mirror as set forth in claim **15**, said layers being formed of helically wound materials, the outer layer being impregnated with a water-soluble surfactant.

* * * * *

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,755,903 Dated Sept. 4, 1973

Inventor(s) Ronald P. Spinello

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 2, line 66, "moded" should be changed to --molded--

Claim 2, line 3, after "surface", change "spray" to --carried--.

Signed and sealed this 19th day of February 1974.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

FORM PO-1050 (10-69)

USCOMM-DC 60376-P69
* U.S. GOVERNMENT PRINTING OFFICE : 1969 O—366-334