

Jan. 18, 1949.

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2,459,573

DENTAL DRILL SPRAY

Filed Nov. 25, 1946

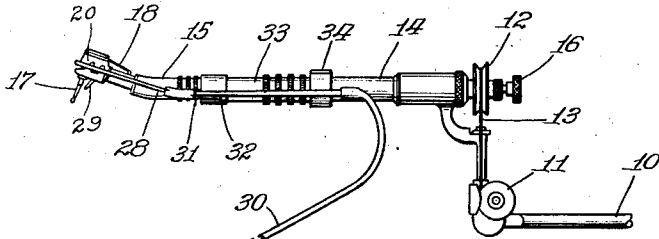


Fig. 1.

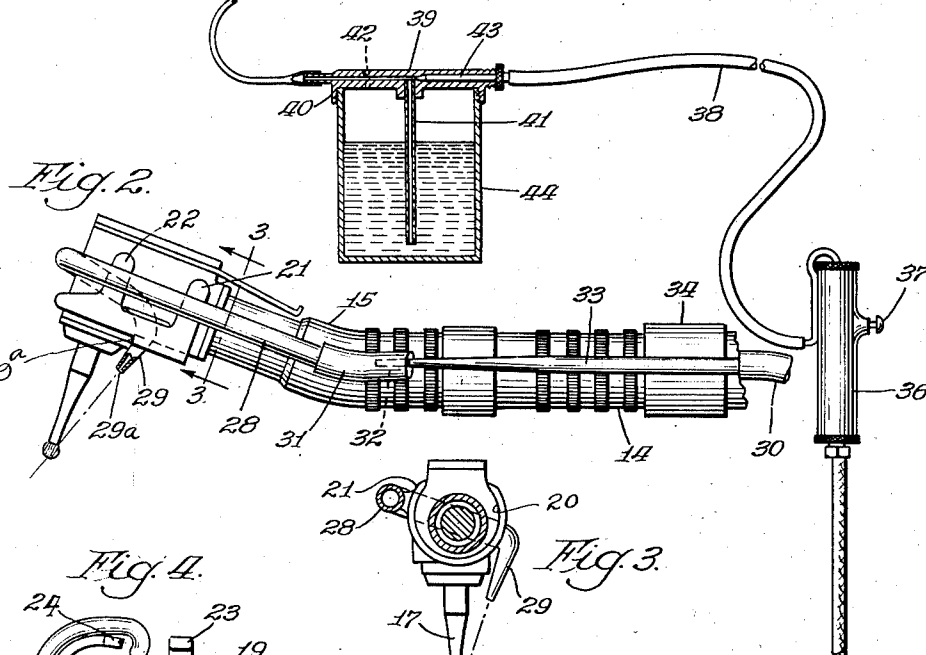


Fig. 2.

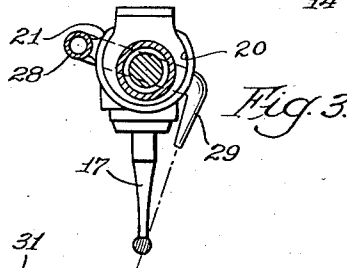


Fig. 3.

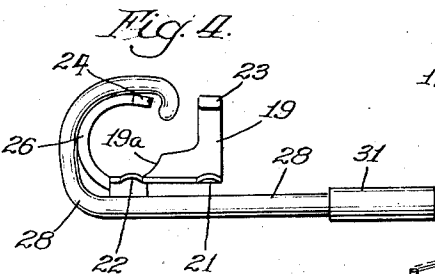


Fig. 4.

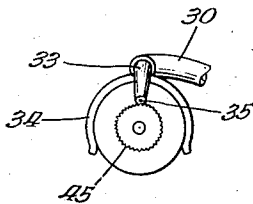


Fig. 5.

Fig. 6.

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UNITED STATES PATENT OFFICE

2,459,573

DENTAL DRILL SPRAY

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Application November 25, 1946; Serial No. 712,098

2. Claims. (Cl. 32—28)

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This invention relates to improvements in dental drill sprays of the general class which are adapted to be attached to the hand piece of a dental drilling apparatus.

A principal object of the invention is to provide an improved spray device of the above character which will function with maximum efficiency to dissipate the heat generated during the drilling operation and also flush the saliva and debris from the cavity or surface being treated, to the end that the patient is relieved from pain and discomfort due to the generation of heat during the drilling and grinding operations, and the dental work is speeded up both by the increased efficiency due to the cleaning effect of the spray on the drill and by avoiding the frequent pauses heretofore required to permit cooling of the tooth, the relaxing of the psychological tension of the patient caused by discomfort, and the elimination of frequent stopping for mouth rinse and removal of accumulated saliva.

Another object of the invention is to provide a simplified spray device, of the above general class, which can be readily and conveniently applied to the hand piece of a dental drilling apparatus at a location where it will not interfere with the drill locking means, whereby different drills or other cutting tools may readily be inserted and removed from the hand piece without disturbing the position of the spray device.

A more specific object of the invention includes, for use with a right-angle drill, a spray device in the form of a resilient clip adapted to be removably applied to the under surface of the drill receiving chuck or head and comprises a portion for partially or wholly encircling the hub surrounding the drill receiving opening of the chuck or head so as to prevent movement of the clip lengthwise of said chuck and is provided with resilient portions which cooperate with laterally bulged side surfaces of the drill receiving chuck to firmly clamp the spray clip thereto.

Another specific object is to provide an improved spray clip with a spray nozzle which is so formed that it may be adjusted by the dentist to compensate for variations in the size or shape of the cutting tool being used so that the spray may be accurately directed into the cavity or onto the surface being treated and thereby flush the saliva and debris therefrom, whereby the dentist will have a clear view of the progress of the work and whereby the debris is flushed from the cutting surface of the drill in a manner to increase its efficiency and to reduce the time required for drilling operations.

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A further object is to provide a removable spray device in which the nozzle portion thereof is relatively long and is positioned at a location to force the saliva and the debris from the drilling and grinding operations toward the back of the oral cavity and away from the mouth opening, whereby the patient is relieved from the discomforts incident to the flow of saliva and spray liquid from his mouth and thereby reduces the number of mouth-rinsing operations during the drilling of a tooth.

According to the present invention the spray is in the form of an atomized liquid and air and is under the control of the patient; in that the patient is required to operate an air valve for delivering air under pressure to a liquid atomizer. This participation by the patient in the operation performed on his tooth has a beneficial psychological effect on the patient in that he realizes that he has control of the operation of the spray and can thereby eliminate the discomfort due to the generation of heat.

The spray may be composed of water or any suitable antiseptic and air. The jet or spray, being in the form of an atomized liquid and air under pressure, is delivered onto the tooth with sufficient force to remove the saliva and the particles cut from the tooth being treated and thereby gives the dentist a clear view of the progress of the work.

The spray device is so formed that it does not materially increase the size of the drilling and grinding apparatus and can be readily removed for sterilizing treatment and may be readily connected and disconnected from the atomizer tube when it is necessary or desirable to change the drill receiving chuck in the hand piece.

The invention is illustrated in certain preferred embodiments in the accompanying drawing wherein:

Fig. 1 is a view in elevation of the hand piece of a dental drilling apparatus together with an apparatus including a spray device and a patient controlled atomizer for delivering a spray of atomized liquid to the cutting surface of the drill.

Fig. 2 is an enlarged view of the drill receiving chuck which forms a part of the hand piece shown in Fig. 1 and illustrating my improved spray device applied thereto.

Fig. 3 is a sectional view taken on line 3—3 of Fig. 2, looking in the direction indicated by the arrows.

Fig. 4 is a top view of the spray device removed from the chuck of the drilling apparatus.

Fig. 5 is a fragmentary side view in elevation of

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a different form of hand piece attachment and illustrating a modified form of spray device, and

Fig. 6 is a sectional view taken on line 6—6 of Fig. 5 and looking in the direction indicated by the arrows.

The dental engine for operating the drill device herein shown may be of any desired construction. In the drawing the reference numeral 10 indicates a flexible arm, of said dental engine, provided with the usual pulleys 11 and 12 for guiding a belt 13. The hand piece includes a portion 14 fixed to the flexible shaft structure and a removable end piece 15. The end piece 15 is secured to the portion 14 in the usual manner by tightening a handscrew 16. The removable end portion 15 of the structures shown in Figs. 1, 2, and 3 is of a form whereby the drilling tool 17 is fitted into a drill receiving chuck so as to extend at right angles to the removable end portion of the drilling apparatus. The drilling tool 17 is secured in its applied position in the chuck by means of a locking lever 18. This lever is usually positioned so that the operating end of the lever overlies the top surface of the removably end portion 15.

The spray device of the present invention shown in Figs. 1 to 4 inclusive of the drawing is adapted for use in connection with a right angle drill device. It includes a body 19 curved, as shown in Fig. 3, to fit the curved lower surface of the drill receiving chuck 20 of the removable portion 15. The body portion of the clip abuts at 19^a against a hub portion of the drill receiving chuck and is formed with a plurality of resilient tangs 21, 22, 23 and 24 which are adapted to fit over the laterally bulged side surfaces of the said chuck 20. The lower portion of the chuck 20 is preferably slightly larger than the upper portion so as to form laterally bulged side surfaces which incline inwardly toward the top of the chuck. The ends of the tangs, therefore, fit over the said bulge and engage the inclined portions of the side of the chuck so as to resiliently lock the spray device on the head. A forward tang 26 is formed to encircle the hub portion 27 which extends around the drill receiving opening of the chuck 20 so as to prevent any substantial movement of the spray device lengthwise of the hand piece.

A metal conduit 28 is secured to the removable clip, preferably to the tang 22, but is free of the other tangs so as not to interfere with the flexibility thereof and the resilient clamping engagement thereof on the bulged side faces of the drill chuck. By securing the conduit 28 to the tang 22, the other end of the conduit may be formed into a spiral extending around the end of the drill chuck 20 so that the discharge end or nozzle 29 of the conduit 28 can be adjusted by application of fingertip pressure thereto after the clip is applied to the head. In this way the nozzle 29 may be positioned to accurately direct the spray or jet of atomized liquid onto the cutting surface 30 of the drill without removing the spray device from its applied position. The conduit portion 28 of the said spray nozzle preferably extends a substantial distance along the portion 15 of the hand piece. If desired a fluid delivery hose 30 may be connected directly to the metal conduit 28, in which event the length of the conduit 28 is sufficient to prevent the hose 30 from entering the mouth of the patient and thereby simplifies the matter of sterilizing the instruments. However, for the purpose of convenience in connecting and disconnecting the

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spray conduit 28 to a source of spray fluid, the receiving end of conduit 28 is provided with a rubber sleeve 31 adapted to receive the delivery end 32 of a second nozzle device 33. The last mentioned nozzle is secured to a resilient clip 34 which embraces the hand piece 14 and is slidable lengthwise thereof, so that the end 32 may be inserted into and removed from the rubber sleeve 31. The second nozzle is formed with a small discharge opening 35 which is substantially the same as the opening 29^a of the nozzle 27. Consequently the second nozzle can be utilized to deliver an atomized spray against a tooth being treated when the dental cutting tool extrudes lengthwise of the hand piece as shown in Fig. 5 of the drawing. The delivery end of the nozzle 33 is, therefore, bent at an angle as shown in Fig. 5 to direct the atomized spray in the desired direction.

The atomized liquid spray is controlled by the patient. For this purpose, air under pressure is delivered to a valve casing 36 adapted to be held in the hand of the patient. By depressing the plunger 37 the valve will open to direct a jet of air through the conduit 38. The said conduit is connected to an atomizer 39 of the inspirating type formed in the closure cap 40 of a liquid container. A jet of air is directed across the upper end of inspirating tube 41 which extends downwardly into the liquid body within the container. An air vent 42 maintains atmospheric pressure within the vessel above the liquid body. The inspirating action of the air from the air nozzle 43 withdraws a portion of liquid therefrom and delivers it through the flexible hose 30 to the spray device. The liquid as drawn from the vessel 44 is atomized at the upper end of tube 41. A portion of the liquid is probably carried in suspension through the hose 30 to the spray device, but I have found that the size of the opening at the discharge end of the spray device is important for insuring a spray of finely atomized liquid and air. The discharge ends 29^a and 35 of both sprays, when used individually or conjointly are formed with openings of small diameter so as to insure the desired atomization of the liquid.

The fact that the patient has control of the delivery of the atomized jet of liquid makes it possible for him to increase or diminish the flow of liquid as may be required, to dissipate the heat generated during the drilling operation. However, the dentist can interrupt the flow of the atomized spray whenever he finds it is desirable by simply pressing the flexible tube 30 against the hand piece so as to restrict or stop the flow from the spray.

Referring again to the modified embodiment shown in Figs. 5 and 6: The removable head portion of this embodiment is designated 15^a and is formed to receive a cutting or grinding tool in its outer end, the shank of the tool extending longitudinally of the head 15^a instead of at right angles as shown in the previously described embodiment. In this modified embodiment of invention the spray nozzle 33 is used alone to deliver an atomized spray of liquid and air onto a tooth being treated. This clip member 34 carries the nozzle 33 and may be rotated about the cylindrical head portion 15^a so as to change its position relative to the hand piece and thereby properly direct the atomized spray from nozzle 33 onto the surface being treated when the dentist is working on an upper or lower tooth. The portion 14 of this embodiment and the spray nozzle

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33 and clip 34 are the same as the corresponding elements shown in Figs. 1 and 2 of previously described embodiment.

I claim:

1. In combination with the hand piece of a dental drilling apparatus, the end portion of which includes a tool retaining chuck formed with outwardly bulging side walls and having a circular boss on the under side which surrounds a drill receiving opening, of a spray device for removable attachment to the hand piece including a resilient clip having a portion arranged concentric with and engaging said boss to prevent movement of the clip lengthwise of the hand piece, and resilient tangs engaging over the said outwardly bulged side walls.

2. In combination with the hand piece of a dental drilling apparatus, the end portion of which includes a tool retaining chuck formed with outwardly bulging side walls and having a circular boss on the under side which surrounds a drill receiving opening, of a spray device for removable attachment to the hand piece including a resilient clip having a portion arranged concentric with and engaging said boss to prevent movement of the clip lengthwise of the hand

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piece, resilient tangs engaging over said outwardly bulging side walls, and a fluid discharge duct secured to the clip and extending in a spiral around the end of the hand piece and terminating at a location beneath the hand piece so as to direct the discharged spray against the tooth being treated and in a direction toward the back of the oral cavity so as to prevent discharge of liquid from the mouth of a patient whose tooth is being treated.

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