Jan. 6, 1970 B. WEISSMAN 3,487,544

DENTAL VENTING DEVICE

Filed Feb. 16, 1968

FIG. 1

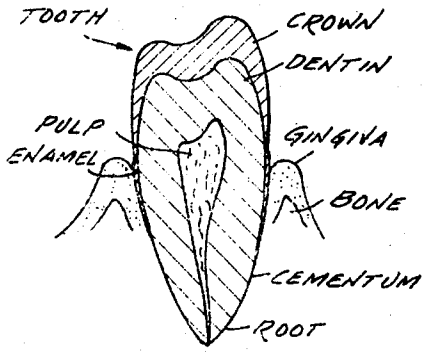


FIG. 2

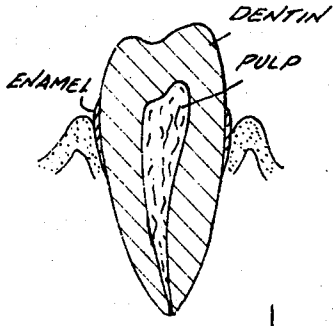
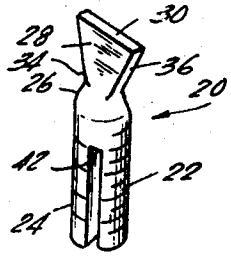


FIG. 3



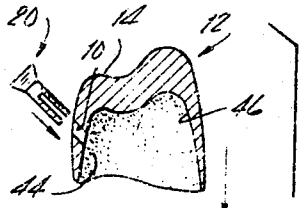
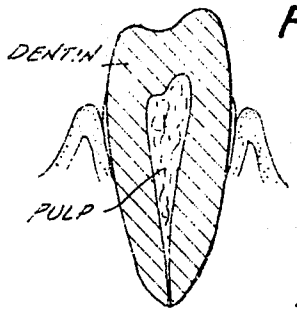


FIG. 4



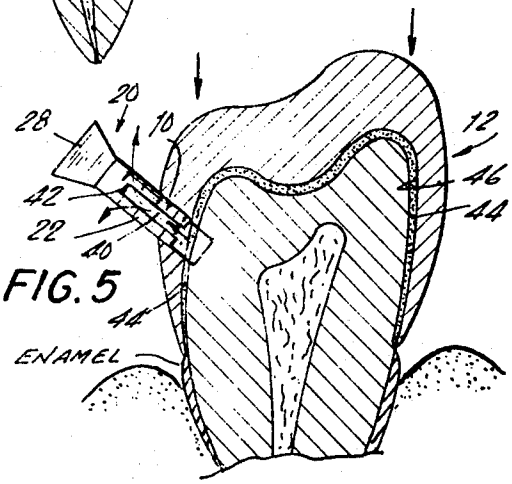
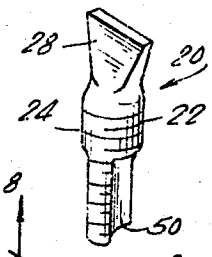


FIG. 5

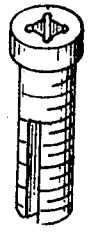
FIG. 7



8

8

FIG. 9



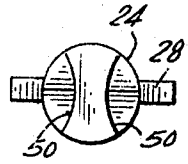
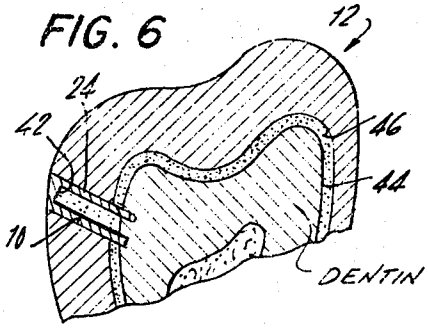


FIG. 8

FIG. 6



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DENTAL VENTING DEVICE

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ABSTRACT OF THE DISCLOSURE

This invention is concerned with providing means for venting crowns used in prosthetic restoration. Briefly, the invention comprises providing a threaded venting pin for engagement into an associatingly threaded aperture disposed at a desirable location in the crown. The threaded venting pin is suitably adapted with venting means such as a channel or grooves communicating to the exterior of the crown so that when the crown is seated onto the previously prepared tooth, cement filling the hollow cavity of the crown is caused to be displaced into the channel or groove until the excess thereof is spent providing for an air-tight fit when the venting means are subsequently sealed off.

BACKGROUND OF THE INVENTION

Field of the invention

This invention relates to the field of prosthetic restoration generally. More particularly, the invention relates to dental venting devices for use in connection with crown work.

Description of the prior art

The major portion of a tooth comprises a bonelike substance called dentin, which is covered by enamel to form the crown and by cementum to form the root. The root of a tooth is attached to the alveolar bone by fibrous connective tissue called the periodontal membrane. Within the crown and the root of a tooth is a filament of soft tissue called the pulp. The nerves and blood vessels enter and leave the pulp through an opening at or near the root end.

When a tooth has become broken or chipped, quite often it is preferable not to extract the damaged tooth since it provides support for the teeth adjacent thereto. This is also the case if the tooth has become carious and unsightly and yet can be saved from extraction. What is done is to grind away a substantial portion of the crown and then provide an artificial crown which is cemented to the remaining exposed portion of the tooth.

The artificial crown is a matched replica of the original crown except that the interior thereof is provided with a hollow cavity. Into this cavity is placed a suitable dental cement and then this replacement crown is fitted over the remaining tooth. However, this technique has several disadvantages. Air is trapped between the tooth and the crown leaving spaces uncemented. Cement is caused to flow outside the edges of the crown and into the gums, and seating of the tooth is generally poor. It is apparent that the securement of crown to tooth can, under the aforementioned method, become a rather "hit and miss" affair.

SUMMARY OF THE INVENTION

It is, therefore, among one of the principal objectives of this invention to provide a means for accomplishing the securement of crowns to teeth that will result in accurate crown seating and ease of application.

In accordance with the present invention, means for venting crowns have now been discovered which comprise a threaded venting pin suitably adapted to be threaded into an associatingly threaded aperture located through the crown wall. The threaded venting pin is further suitably adapted with venting means so that when it is in place in the crown, and the crown is seated onto a previously prepared tooth, cement filling a hollow cavity in the interior of the crown is caused to be displaced upward through the said venting means, said venting means communicating to the exterior of the crown, until the excess of the cement is spent and the space between the crown and tooth is substantially air-free.

BRIEF DESCRIPTION OF THE DRAWING

The invention will be hereinafter more fully described with reference to the accompanying drawing, in which:

FIGURE 1 is a cross-sectional fragmentary view of a tooth before preparation for crowning;

FIGURE 2 is a view similar to FIG. 1 except that the tooth is now shown as prepared for crowning with the enamel or crown portion substantially removed;

FIGURE 3 is a perspective view of the venting device of the invention in one embodiment thereof;

FIGURE 4 is an exploded cross-sectional fragmentary view showing the detached relation of the prepared tooth, crown therefor and the venting device;

FIGURE 5 is a cross-sectional fragmentary view showing the parts of FIG. 4 in attached relationship;

FIGURE 6 is a cross-sectional fragmentary view showing the crown seated in place on the tooth with the top of the venting device sheared flushly away;

FIGURE 7 is a perspective view of another embodiment of the venting device; and

FIGURE 8 is a view taken along line **8—8** of FIG. 7 looking in the direction of the arrows located just below the numerals.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the figures of the drawing, for purposes of illustration FIG. 1 depicts a tooth before it has been prepared by grinding for the attachment thereto of an artificial crown. It can be seen that the major portion of the tooth, as labeled, comprises a bonelike substance called dentin, which is covered by enamel to form the crown and by cementum to form the root. Within the crown and the root of the tooth is a filament of soft-tissue called the pulp. The root of the tooth is attached to the surrounding bone by means of fibrous connective tissue (not shown). The gingiva (or gum) covers the bone inside the mouth.

FIG. 2 shows the tooth after the crown portion has been ground away by suitable grinding means well known to the dental art leaving some enamel along the gum line. Thereafter a crown is prepared by conventional means also well known to the art. A threaded aperture **10** is provided through the wall of the crown **12** (FIGURE 4) at its occlusal surface **14**. Although, as shown, the occlusal surface **14** is illustrated, it is to be understood that any suitabe wall of a tooth may be utilized. For instance, if a front tooth is to be crowned then the lingual surface (i.e. facing the tongue) would be provided with the threaded aperture **14**. The threading of aperture **10** may be accomplished by preferably boring a pin hole after the crown is waxed, in the wax pattern on the die, selecting the most desirable area. The pattern is removed from the die and a threaded pin (nickel or silver) is inserted into the pin hole, allowing it to protrude from either side of the wax pattern and sealed from the outside securely into place. After the casting is cut off from the sprue, the pin is removed by suiable means, such as dissolving with nitric acid, leaving an internally threaded aperture in the casting.

Alternatively, the internally threaded aperture may be

made after the crown has been cast by conventional threading means, but this is less preferred.

A venting device **20** with externally threaded walls **22**, in associated threading relation with aperture **14** is provided for threading insertion into aperture **14**. The venting device **20** (FIG. 3) comprises a generally cylindrically shaped body **24** with the upper portion **26**, upper with respect to the outside surface of the crown **12**, being slightly inwardly tapered, and terminating after said tapered portion with a shank **28** integrally connected therewith. Said shank **28** has a base **30** substantially parallel to the base **32** of the cylindrical body **24**, but preferably wider than the diameter of the said cylinder. Integrally connected to base **32** are two inwardly converging sides **34** and **36** which merge into said tapered portion **26** of body **24**. In cross-section, said shank **28**, looking at FIGS. 4 and 5, resembles an inverted triangle, preferably equiangular, with the bottom portion being truncated. As mentioned, the body portion **24** is externally threaded as at **22**, which threading preferably terminates at the beginning of the tapered portion **26**. A channel **40** bisects the cylindrical body **24**. The length of the channel **40** is adapted to be slightly longer than the length of aperture **10**, so that when the venting device **20** is threaded into the aperture **14** by means of threaded walls **22** the crown **12** will be resultingly vented. The threading of walls **22** continues for several turns past the termination of channel **40** at its venting end **42** for a reason to be subsequently set forth. The venting device **20** is cast of preferably stainless steel and preferably gold plated, although any suitable metal may be utilized.

Describing now the operation of the device of the invention, reference may be had to FIGS. 3–6. The venting device **20** is threaded into aperture **10** so that the venting end **42** of the device remains exposed to the air. Thereafter a dental cement **44** conventionally known to the art is placed in the interior cavity **46** of the crown **12** substantially filling said cavity. Following this the crown **12** is immediately placed over the prepared tooth and the crown **12** is forced down onto the tooth in the direction of the arrow in FIG. 4, or upwards as the case may be. When the crown **12** is forced over the tooth, the cement **44**, substantially filling the interior cavity **46** thereof, is caused to be displaced upwardly through the channel **40** in the direction of the arrows as shown in FIG. 5, and exiting from the venting end **42** of the said channel **40**, until the excess amount of cement is spent. Thereafter the device **20** is threaded several more turns by means of shank **28** into the aperture **10** until the venting end **42** of the channel **40** is sealed off achieving an air-tight seal thereby. The device is threaded by means of a latching wrench or suitable drive mechanism. When the final turns have been made, as described, the protruding shank **28** is cut off with a cutting device such as a small rotary disc, then finished and polished smooth with the contour of the crown (FIG. 6). The venting end **42** is now below the exterior surface of the crown. Alternatively, instead of a shank, the venting device may be provided with an Allen type head, such as is found on an Allen screw, and this modified venting device may be secured to the tooth by means of an Allen wrench. The Allen head may be adapted to proceed into a smooth relation with the crown surface, or it may be adapted to be cut off as is shank **28** above. Still further, it is to be understood that aperture **10** may proceed partially into the dentin layer of the tooth so that an even more secure attachment of crown to tooth is achieved by the invention venting device.

The advantages achieved by using the novel venting device are manifold: (a) the cement and trapped air are allowed to escape through the venting channel permitting the casting to seat fully; (b) accurate marginal seating is achieved between crown and tooth; (c) there is no elevation of the crown caused by cement and air trapping, and (d) there is no occlusal interference after permanent seating with the cement.

While as described the device **20** was placed in the crown before the start of the crowning operation, it is to be understood that the venting device can also be placed immediately after the crown has been seated. The venting device may also serve as a set screw for additional retention against the dentin. After the casting is seated, a drill is used through the aperture **10** to provide an indent in the dentin, more cement is forced into the aperture and thereafter the venting device is threaded back into the aperture, acting as before, and finally securing itself in the indent in the dentin. Thus the solid understructure is fully engaged creating a set lock that opposes unseating forces.

In FIGS. 7 and 8 there is shown a still further embodiment of the invention. The device **20** has threaded walls **22** as before and has a shank **28**; however, cylindrically shaped body **24** is provided with parallel oppositely disposed grooves **50** and **52** cut into its vertical threaded walls **22**. As shown in FIG. 7, the grooves are seen to be cut at substantially right angles to the vertical, however it is clear that the grooves can also be V-shaped as well. Said grooves **50** and **52** are placed in the same relation as channel **40** in said device, and function in the same manner as channel **40**. Of course while a pair of grooves are preferred, a single groove would also be satisfactory, especially a V-shaped groove.

While the venting device is shown as preferably having a tapered upper portion **26**, to facilitate in the removal of the shank **28**, it is to be understood that this is not essential and the body portion **24** may be cylindrically shaped for its entire length until it merges with said shank **28**. It is also to be understood that the threading on the body of the threaded wall **22** need not extend the entire vertical length of body **24** but need only extend beyond the terminus point of channel **40** or grooves **50** and **52** for several turns or more. It is further to be understood the inventive device and method work easily as well where the tooth is ground almost to the gum line and an anchor peg is inserted into the stump over which the crown is cemented.

Having thus described the invention with regard to specific embodiments thereof, it is understood that various changes may be made by those skilled in the art without departing from the spirit and scope thereof.

I claim:

1. In combination a dental crown and venting device therefor comprising an at least partially threaded body integrally connected at one end thereof with a smooth shank portion, said partially threaded body adapted to be engaged with associatingly threaded opening means disposed in a wall of said crown, said crown being provided with an interior hollow cavity for containing cementing means therefor, said threaded body being further provided with venting means so that when said threaded body is threadingly engaged in said opening means and said crown is seated onto a tooth prepared therefor, cement means substantially occupying said interior cavity of said crown are caused to be displaced into and through said venting means, said venting means communicating to the exterior of said crown, until the excess portion of said cementing means is spent.

2. A combination according to claim **1**, wherein after said excess portion of said cementing means is spent, said venting means are sealed off.

3. In combination a dental crown and venting device therefor comprising an at least partially threaded body adapted to be engaged with associatingly threaded opening means disposed in a wall of said crown, said crown being provided with an interior hollow cavity for containing cementing means therefor, said threaded body being further provided with venting means so that when said threaded body is threadingly engaged in said opening means and said crown is seated onto a tooth prepared therefor, cement means substantially occupying said in-

terior cavity of said crown are caused to be displaced into and through said venting means, said venting means communicating to the exterior of said crown, until the excess portion of said cementing means is spent and wherein said threaded body comprises a substantially cylindrically shaped body inwardly tapered at one end thereof, and having integrally connected therewith at said tapered end a shank portion, said cylindrically shaped body being threaded at least partially along its vertical length, said venting means provided on said threaded body comprising a channel member bisecting said cylindrical body for at least a vertical portion thereof, the length of said channel being slightly longer than the depth of said threaded opening means comprising a threaded aperture, the threading on said cylindrical body extending beyond the terminus point of said channel.

4. A combination according to claim 3, wherein after said displaced portion of said cement means is spent said venting means are sealed off by threaded said body further into said threaded aperture until said channel member is below the external surface of said wall of said crown.

5. In combination a dental crown and venting device therefor comprising an at least partially threaded body adapted to be engaged with associatingly threaded opening means disposed in a wall of said crown, said crown being provided with an interior hollow cavity for containing cementing means therefor, said threaded body being further provided with venting means so that when said threaded body is threadingly engaged in said opening means and said crown is seated onto a tooth prepared therefor, cement means substantially occupying said interior cavity of said crown are caused to be displaced into and through said venting means, said venting means communicating to the exterior of said crown, until the excess portion of said cementing means is spent and wherein said threaded body comprises a substantially cylindrically shaped body having integrally connected therewith at one end thereof a shank portion, said cylindrically shaped body being threaded at least a portion of its vertical length, said venting means provided on said threaded body comprising a pair of oppositely disposed grooves located along the vertical length of said cylindrical body and terminating below the terminus point of said threading.

6. A venting device for a dental crown adapted to receive said device comprising a substantially cylindrically shaped body inwardly tapered at one end thereof, and having a shank portion integrally connected therewith at said tapered end, said cylindrical shaped body being threaded at least partially along its vertical wall, said cylindrical body being provided with venting means comprising a channel member bisecting said cylindrical body for at least a vertical portion thereof, the threading on said cylindrical body extending beyond the terminus point of said channel, said device being receivable in associatingly threaded opening means provided in a wall of said dental crown.

7. A venting device according to claim 6, wherein said venting means comprise a pair of oppositely disposed grooves located at least partially along the vertical length of said cylindrical body and terminating below the terminus point of said threading.

8. A device according to claim 6, wherein said threading terminates at the beginning of said tapered end.

9. A device according to claim 6, wherein said venting device is formed of stainless steel.

10. A device according to claim 7, wherein said venting device is formed of stainless steel.

11. A combination according to claim 3, wherein said threading of said cylindrical body extends substantially up to the beginning of said tapered end.

12. A method for venting and sealing a dental crown which comprises providing a threaded body adapted to be secured to associatingly threaded opening means disposed in a wall of said crown, said threaded body being provided with venting means, said crown being provided with an internal hollow cavity for containing cementing means therefor, so that when said threaded body is threadingly engaged in said opening means and said crown is seated onto a tooth prepared therefor, cementing means substantially occupying said internal cavity of said crown will be caused to be displaced into and through said venting means, said venting means communicating to the exterior of said crown, until the excess portion of said cementing means is spent, and thereafter sealing off said venting means.

13. A method according to claim 12, wherein said threaded body is threadingly engaged in said opening means after said crown is seated on said tooth.

14. A method according to claim 13, wherein said threaded body is further threadingly engaged into a wall of said tooth provided with an indent therefor.

15. A venting device according to claim 6, wherein said venting means comprises a V-shaped groove extending along the vertical dimension of said cylindrical body and terminating below the terminus point of said threading.

16. A venting device according to claim 5, wherein said shank is shaped substantially as a truncated triangle with the base of said triangle being wider than the diameter of said cylindrical body, and the truncated portion thereof merging integrally with said body.

17. A venting device according to claim 1, wherein said threaded body is provided with an Allen-type head.

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ROBERT PESHOCK, Primary Examiner