

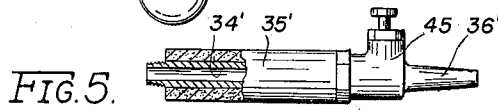
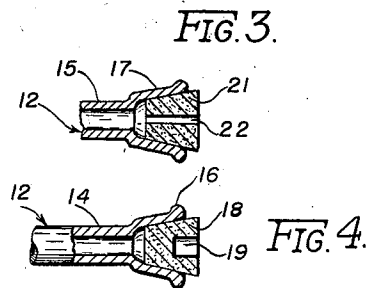
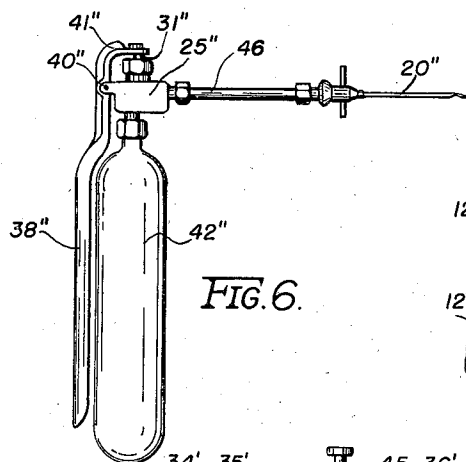
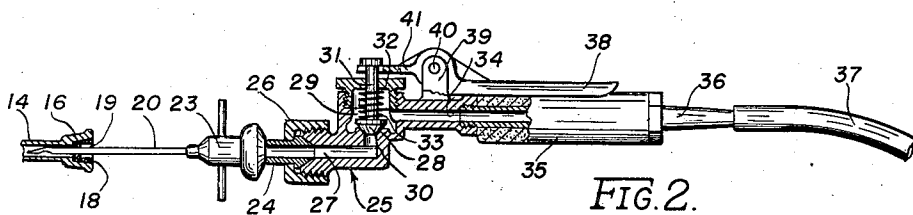
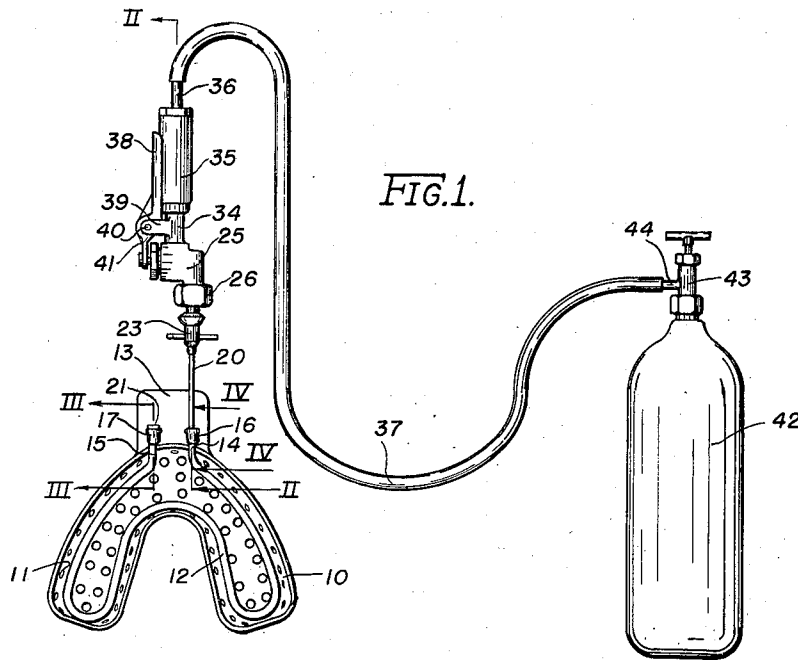
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METHOD AND APPARATUS FOR COOLING DENTAL IMPRESSIONS

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METHOD AND APPARATUS FOR COOLING
DENTAL IMPRESSIONS

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6 Claims. (Cl. 32—17)

This invention relates to a method of and apparatus for cooling dental impressions, although the teachings thereof may be employed with equal advantage for other purposes.

It contemplates more especially the provision of means for effectively and instantly cooling dental impressions by resort to a highly compressed refrigerant so as to convert normally solid impression material heated to a semi-plastic state into a self-sustaining and form-retaining mass without entailing any appreciable time.

Dental impressions have heretofore been cooled by resort to cold water, but this expedient is not entirely satisfactory due to the fact that appreciable time is required in permitting the impression to cool and the results are not always dependable or satisfactory. Then, too, the water available to a dentist is not always sufficiently cold to produce the desired cooling effect. At least, the interior body of the impression material is not thoroughly cooled to render such completely self-sustaining and form-retaining in the preservation of the exact impression during the removal of the impression material from the mouth.

One object of the present invention is to provide a new and novel method for cooling dental impressions and the like.

Another object is to provide a simple and improved apparatus for cooling impression material that has been heated to a semi-plastic state.

Still another object is to provide a novel method and simple and improved apparatus for effectively and thoroughly cooling impression material to render such self-sustaining and form-retaining without entailing any appreciable time interval.

A further object is to provide improved and simplified means for subjecting impression material to a refrigerant for the purpose of conducting heat therefrom.

A still further object is to provide a tray with an expansion tube for the purpose of receiving a highly compressed refrigerant to instantly cool impression material confined in the tray.

Still a further object is to provide a novel single-hand control valve for injecting and controlling a highly compressed refrigerant supply to an expansion tube having an impression material tray associated therewith.

Other objects and advantages will appear from the following description of an illustrative embodiment of the present invention.

In the drawing:

Figure 1 is a diagrammatic view of a dental impression tray having a refrigerant supply mechanism operatively connected therewith, the re-

frigerant supply mechanism being shown in substantially reduced size to permit of a complete illustration.

Figure 2 is a fragmentary sectional view taken substantially along line II—II of Figure 1.

Figure 3 is a sectional view taken substantially along line III—III of Figure 1 with the stopper orifice shown in enlarged proportion.

Figure 4 is a sectional view taken substantially along line IV—IV of Figure 1 with the stopper shown in enlarged proportion.

Figure 5 is a fragmentary sectional view in elevation of a valve control chamber similar to that shown in Figure 2 with an additional valve thereon for controlling the amount of liquid gas entering.

Figure 6 is a plan view of a modified form of refrigerant supply shown in Figure 1 wherein the refrigerant supply tank is incorporated as part of the valve handle.

The structure selected for illustration comprises a dental impression tray of any standard or approved construction and sized to meet the requirements of commercial practice. The dental impression tray 10 is preferably of a highly thermal conductive material and provided with apertures 11 therethrough so as to assist in the dissipation of heat and to lighten the burden of the tray 10 when applied to the teeth or in the mouth or wherever an impression is desired. The tray 10 is preferably provided in the concave surface thereof with the expansion tube 12 bent to conform with the general contour of the tray 10 and to cover as much of the surface thereof as possible in order to effect the cooling thereof with rapidity and effectiveness.

As shown, the tray 10 is provided with an extension 13 along a longitudinal median line thereof to facilitate the handling of the tray 10. In the present embodiment, the extremities 14 and 15 of the expansion tube 12 terminate in the region of the tray extension 13, the extremities 14 and 15 being provided with suitable enlarged orifices 16 and 17, respectively, to enable the introduction and discharge of a refrigerant in a manner which will appear more fully hereinafter. The refrigerant nozzle 16 consists of an enlarged flared tubular member formed integral or otherwise attached to the entrant extremity of the expansion tube 12 to receive a stopper 18 for sealed reception therein, the stopper 18 being preferably of rubber or other resilient composition material. As shown, the stopper 18 has a slight concavity 19 axially therein to receive a pointed extremity of a hypodermic needle 20 that pierces the material of

the stopper 18 to enable communication with the interior of the expansion tube 12.

The discharge orifice 17 of the expansion tube 12 is similarly formed integral or otherwise attached thereto to receive a rubber stopper 21 in sealed engagement with the interior thereof, the stopper 21 being preferably of rubber or other resilient material and preferably has a central bore 22 therethrough to regulate the discharge of the expanded refrigerant therefrom. The size of the stopper bore 22 may be varied within the requirements of commercial practice in order to produce the desired refrigerating effect by injecting a highly compressed refrigerant such as Freon (F 12). Any other suitable refrigerant can be substituted within the dictates of commercial practice, and good results can be procured by merely spraying the refrigerant directly over the surface of the tray 10 rather than resort to the expansion tube 12.

The tray 10 is filled with impression material in the customary manner and then placed in the mouth to procure the desired impression as is now the practice. To provide for a correct and perfect impression, the normally solid impression material must be slightly heated so as to convert such into a semi-plastic state to conform with the shape of the gum section of the mouth to be fitted. After the impression has been made, the highly compressed refrigerant such as Freon (F 12) is introduced into the expansion tube 12 so as to absorb the heat from the tray and the impression material to effect the immediate cooling thereof. By so doing, the impression material is soon converted to its normally solid self-sustaining and form-retaining state within two minutes or less to preserve the impression for its intended purpose.

In order to enable the dentist or practitioner to introduce the highly compressed refrigerant without requiring an assistant, the hypodermic needle 20 has its hub 23 in sealed engagement with the discharge nozzle 24 seated to a valve body 25 by means of a threaded union or coupling 26 (Figure 2). The valve body 25 is provided with a port 27 that communicates with the nozzle 24 and the interior of the needle 20. The port 27 communicates with a valve seat 28 within the tubular interior 29 of the valve body 25. A conical valve 30 confronts the valve seat 28, and has its shank 31 reciprocally mounted in a threaded closure 32, the closure 32 being in threaded engagement with the valve 25 and serves as a guide for the valve shank 31 that projects exteriorly therethrough.

To maintain the valve normally closed against its seat 28, a coil spring 33 envelops the valve shank 31 between its valve head 30 and the interior surface of the valve body closure 32 serving as guide for the reciprocally mounted valve shank 31. The valve body 25 terminates in a tubular extension 34 that has a handle 35 of insulation material detachably or otherwise associated therewith, the handle 35 having a tubular interior for communication with the interior of the valve body 25. As shown, the handle member 35 terminates in a conical tubular extension 36 for enabling the connection of a flexible tube 37 thereto.

In order to manipulate the valve 30, a lever 38 is fitted to the valve body extension 34 having a furcated boss 39 provided thereon for that purpose. In order to pivotally sustain the handle lever 38, a pin 40 projects through the furcated boss 39 and engages the lever 38 that has an arm

41 extending in the path of the valve shank 31 to effect an operative connection therebetween. It will be noted that the handle 35 may be grasped in one hand and the lever 38 manipulated with the fingers of the same hand to open the valve 30 against the urge of the spring 33 in order to introduce the highly compressed refrigerant in the expansion tube 12. To this end, the flexible tube 37 is operatively connected to a refrigerant supply tank 42 that has an adjustable valve 43 of standard construction provided thereon. The tank valve 43 is provided with a discharge port 44 engaging the flexible tube 37 so as to complete the supply line to the valve body 25 to control the discharge of the refrigerant through the needle 20 in the manner described supra. Then, too, the highly compressed liquid gas can be sprayed directly on the tissues to freeze the skin and mucous membranes for surgical purposes. At the present time, only low pressure liquid gases such as ethyl chloride have been used in surgery. Highly compressed liquid gases sprayed in the manner described herein would be more efficient owing to their lower evaporating temperatures.

In the modified embodiment shown in Figure 5, the handle member 35' is provided with an enlarged tubular interior 34' that communicates with a hand valve 45 to admit the highly compressed liquid gases to the interior chamber 34' of the handle 35'. A tubular extension 36' projects from the valve 45 for connection to the flexible hose 37 shown in Figures 1 and 2 leading from the supply tank 42 as illustrated in Figure 1. The tubular handle 35' serves as a temporary storage compartment for a sufficient amount of liquid gas to solidify the impressions or measured for any other purposes for which it is used. The tubular handle 35' is provided at its discharge end with the valve body 25 (Figure 2) so that after the charge of compressed liquid gas is enclosed in the handle compartment 34', the handle valve 45' is closed and the finger manipulated valve handle 38 (Figure 2) is compressed to afford the discharge of the highly compressed liquid gas from the handle chamber 34'. This construction affords the conservative use of the refrigerant for any particular purpose and the size of the handle 35' with its tubular interior compartment can be varied within any particular requirements depending upon the amount of liquid gas required and the purpose for which it is intended.

Should it be desired, the refrigerant supply tank 42' may be connected directly to a valve body 25'' (Figure 6) that has a rigid discharge tube 46 operatively connected therewith to receive a hypodermic needle 20'' in communicating relation therewith. The valve body 25'' is provided with the valve control lever 38'' that is pivoted thereto as at 40'' so that its arm 41'' will be operatively connected to the spring impelled valve stem 31''. By so doing, the flexible tube 37 (Figure 1) is dispensed with and a much more compact and portable refrigerant supply unit is provided. It is only necessary to inject the hypodermic needle 20'' into the rubber stopper 18 (Figure 4) so as to introduce the highly compressed refrigerant to the expansion tube 12 fixed to the impression tray 10 (Figure 1) unless it is desired to spray the refrigerant over the surface of the tray 10.

With the arrangement of parts above described, it will be apparent that a very effective and improved method and apparatus for cooling

dental impressions has been provided and such may be applied to other analogous uses depending upon the dictates of commercial practice. Various changes may be made in the embodiment of the invention herein specifically described without departing from or sacrificing any of the advantages or features of the invention, and nothing herein shall be construed as a limitation of the invention, its concept or structural embodiment as to the whole or any part thereof except as defined in the appended claims.

I claim:—

1. An impression material device comprising a preformed tray of highly thermal conductive material, a refrigerant expansion tube applied to the surface of said tray, entrant control means at one end of said tube to tightly receive the discharge end of a refrigerant supply needle, a refrigerant discharge needle engaging said expansion tube entrant control means to communicate with the interior of said expansion tube, means for supplying a refrigerant through said needle, and a valve for controlling the supply of a highly compressed refrigerant to said expansion tube.

2. In a cooling mechanism, the combination with a highly compressed refrigerant supply line, of a handle member in said supply line, a valve in said handle member, spring means for normally urging said valve to its closed position, a lever connected to said handle member to open said valve against the urge of said spring means with the finger of the hand grasping said handle member, a tubular needle connected at the discharge end of said handle member in front of said valve, a cooling tray, an expansion tube fixed to the surface of said cooling tray, and means in the entrant orifice of said expansion tube to receive said needle in sealed communication with the interior of said expansion tube.

3. In a cooling mechanism, the combination with a highly compressed refrigerant supply line, of a tubular handle member in said supply line, a valve associated with the discharge end of said handle member, a lever connected to said handle member to operate said valve with the finger of the hand grasping said handle member, another valve associated with the intake end of said tubular handle member to retain a predetermined supply of a refrigerant therein, and a tubular

needle connected at the discharge end of said handle member in front of said valve.

4. In a cooling mechanism, the combination with a highly compressed refrigerant supply line, of a tubular handle member in said supply line, a valve associated with the discharge end of said handle member, spring means for normally urging said valve to its closed position, a lever connected to said handle member to operate said valve with the finger of the hand grasping said handle member, another valve associated with the intake end of said tubular handle member to retain a predetermined supply of a refrigerant therein, and a tubular needle connected to the discharge end of said handle member in front of said valve.

5. In a cooling mechanism, the combination with a highly compressed refrigerant supply line, of a tubular handle member in said supply line, a valve associated with the discharge end of said handle member, spring means for normally urging said valve to its closed position, a lever connected to said handle member to open said valve against the urge of said spring means with the finger of the hand grasping said handle member, another valve associated with the intake end of said tubular handle member to retain a predetermined supply of a refrigerant therein, a tubular needle connected at the discharge end of said handle member in front of said valve, a cooling tray, an expansion tube fixed to the surface of said cooling tray, and means in the entrant orifice of said expansion tube to receive said needle in sealed communication with the interior of said expansion tube.

6. An impression material device comprising a preformed tray of highly thermal conductive material, a refrigerant expansion tube applied to the surface of said tray, a solid rubber entrant stopper at one end of said tube to tightly receive the discharge end of a refrigerant supply needle, a refrigerant discharge needle engaging said expansion tube rubber entrant stopper to communicate with the interior of said expansion tube, means for supplying a refrigerant through said needle, and a valve for controlling the supply of a highly compressed refrigerant to said expansion tube.

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