May 27, 1941. E. G. STACK 2,243,400

WAXER

Filed Feb. 16, 1939

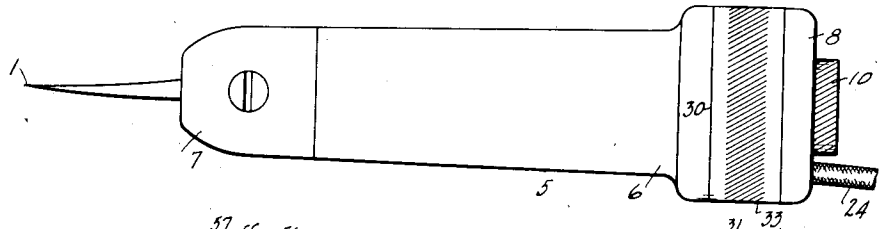


Fig. 1.

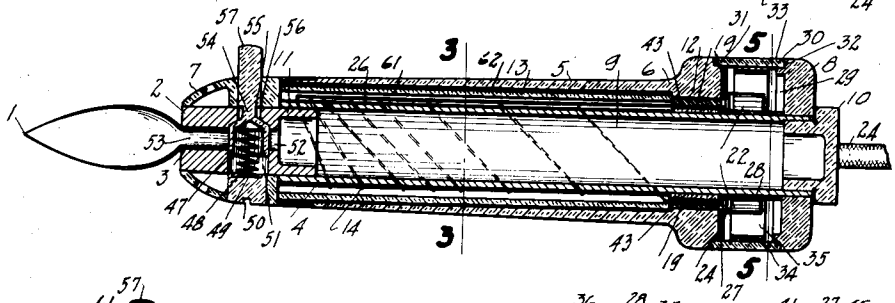


Fig. 2.

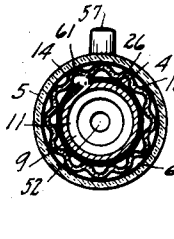


Fig. 3.

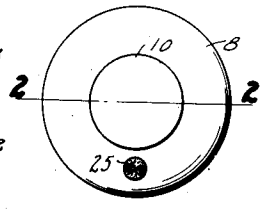


Fig. 4.

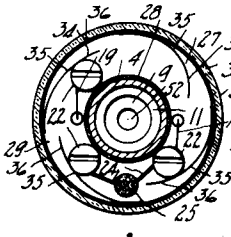


Fig. 5.

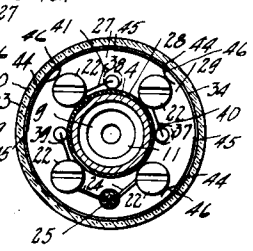


Fig. 6.

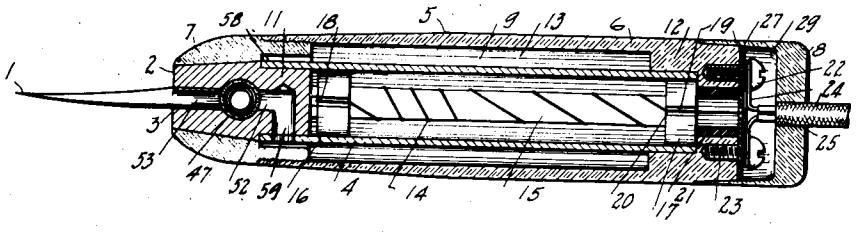


Fig. 7.

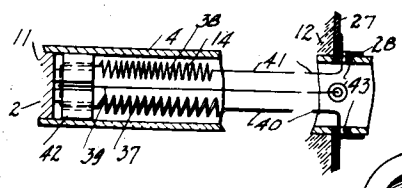


Fig. 8.

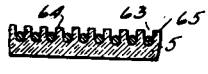


Fig. 9.

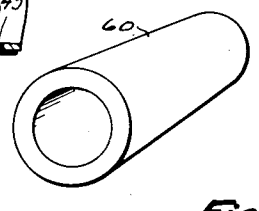


Fig. 10.

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Patented May 27, 1941 2,243,400

UNITED STATES PATENT OFFICE

2,243,400

WAXER

Emmet G. Stack, Marshfield, Oreg.

Application February 16, 1939, Serial No. 256,648

6 Claims. (Cl. 219—21)

My invention relates to waxers particularly adapted for use by the dental technician and has for its principal objective the facilitation of his work. This objective will be enlarged upon as I proceed with the description of my waxer as the dental technician might use it.

Fig. 1 is a side view of a waxer; Fig. 2 is a section on 2—2 of Fig. 4; Fig. 3 is a section on 3—3 of Fig. 2; Fig. 4 is a view of Fig. 1; Fig. 5 is a section on 5—5 of Fig. 2, showing a thermostatically controlled waxer; Fig. 6 is a similar section but showing a 3-way switch controlled waxer; Fig. 7 is a longitudinal section on the vertical median line thru a front-fill waxer; Fig. 8 is a partial section showing an element arrangement for a 3-way switch control; Fig. 9 is an enlarged section of casing showing the method of heat dissipation; and Fig. 10 is a perspective of a wax slug.

Thruout the drawing and the specification similar numerals refer to similar parts.

My invention may be used in any of the arts in which wax or other build-up material is employed in carrying on, or its use may be extended in the same art as, for instance, in cold packing rubber or other compounds in dental cases.

In the dental art the dentist takes an impression of the mouth of the person for whom he is to make a denture. From the impression he pours up a cast of plaster of Paris or other substances used for the same purpose. Upon this cast he sets up the teeth holding them in position by means of wax. With this same wax he builds up the form the denture will assume in the material of which the permanent denture will be made. Many dentists and nearly all technicians prefer to shape this preliminary form as closely as possible to the finished case since wax is a much easier material to shape up. This shaping-up is done with a tool known in the parlance as a spatula. This tool is shaped in many ways to better adapt it to its varied uses and to suit the whims of the user. In illustrating my invention I have shown the most common type, or spoon spatula. The wax usually employed comes in small thin sheets from which a small portion is cut off with the spatula, melted over a gas flame, and then deposited upon the cast and spread as desired with the heated spatula. Some dentists melt a quantity of wax in a receptacle from which they draw. Others speed up by using a plurality of spatulas keeping some heating while they are using one. There is a lot of lost time and motion in the best of the present day methods, and again, the wax or the spatula is generally too hot or too cold. I seek to cut down this wasted time and effort and to provide wax and spatula uniformly heated to the degree desired.

I find that the waxes now used handle best at a temperature around 170 degrees Fahr., and I find that the spatula is sometimes most efficient when heated to around 200 degrees Fahr., as when shaping up, again, when cold-packing, a spatula heated to around 140 degrees Fahr., facilitates the operation. Since the spatula is very thin it remains heated for only a very limited period of time. To extend this period indefinitely is another step toward my principal objective.

The spatulas now used comprise an elongated handle portion having a material-manipulating portion formed on one or both ends thereof. Another step toward my principal objective is to provide material-manipulating portions with short shanks adapted to be detachably mounted in a common handle or case, and which may be used heated or unheated as desired.

My invention may be considerably varied in its form and arrangement of parts without departing from the basic idea, and therefore I do not limit it to the designs shown but extend it to all that comes fairly within the scope of the appended claims.

All the spatulas used are relatively simple in form and all may be formed with the short shank provided for the spatula illustrated. This spatula 1 may be formed integral with the head 2 or preferably formed with a short shank 3 push-fitted in said head whereby other spatulas having similar shanks may be interchangeable with it. The head 2 may also be formed integral with the heat-conducting element or tube 4 or be push-fitted thereto for ready removal therefrom as when used with a front-filled waxer, shown in Fig. 7. The spatula, the spatula-carrying head, and the tube, are preferably made of a good conductor of heat such as copper. The handle portion 5 of the spatula-manipulating casing 6 terminates in a head cap 7 and a rear cap 8, both of which, in the illustrations, are shown separably secured to said handle portion. In Figs. 2 and 7, the head 2 is a pressed taper fit in the head cap 7 which is threaded on the handle portion 5 in Fig. 7, and push-fitted to the same in Fig. 2, the threaded attachment being preferable where the head assembly is frequently removed as for filling the reservoir 9 with wax. In Fig. 2, the wax reservoir 9 is within the tube 4, while in Fig. 7, it

is positioned between the tube 4 and the casing handle portion 5, hence surrounds said tube. In Fig. 2, the wax reservoir 9 is filled from the rear by removing the filler plug 10 which is threadedly secured to the tube 4. In all instances, I have shown the employment of a length of standard commercial copper tubing for the tube 4. The spatula-manipulating casing 6 is shaped to be comfortable to the hand and is formed of a non-conducting heat-insulating material which is not affected by the heat necessary in the waxer or by action of the wax which will be used with it. In other words, the casing is formed to lay between the thumb and forefinger and against the end of the middle finger of the user and to be gripped by said fingers.

In Figs. 2 and 7, the front end of the tube 4 is supported by the portion 11 of the head 2, which extends into said tube, and the rear end is supported by the casing portion 12 into or thru which the said tube extends, the same being snugly held therein. The casing handle portion 5 is formed with the annular chamber 13 forward of the portion 12 to constitute the wax reservoir 9, as shown in Fig. 7, or for the reception of the heating element 14, as shown in Fig. 2, these heating elements 14 being positioned within the tube 4 in Figs. 7 and 8. The heating element 14 shown in Fig. 7, is wrapped as a double strand about an elongated refractory bar 15 supported within the tube 4 by the spaced apart cylindrical heads 16 and 17. The loop 18 of the double strand element 14 is held by the head 16 notched to receive it, and the ends 19 of said strand are retained by the notches 20 in the head 17 and pass thru an insulating bushing 21 positioned in the casing portion 12 and then under the heads 22 of the terminal screws 23 threaded into said casing portion 12. Under the same screw heads are also clamped the feed wires 24 which enter the waxer thru the axially positioned aperture 25 in the rear cap 8.

In Fig. 2, the heating element 14 is wrapped as a single strand about the tube 4 being insulated therefrom by a thin asbestos sheet 26. The ends 19 of the element may also be led to and clamped, as I have previously described, under the heads 22 of the two terminal screws 23 with the two feed wires 24, or they may be connected as shown in Fig. 5. In this latter figure, and in Figs. 1, 2, and 4, the feed wires 24 enter the waxer thru the aperture 25 which, in this instance, is positioned in the rear cap 8 to avoid the filler plug 10 so that it may be removed from the axially positioned tube 4 which, in this instance, serves as the wax reservoir 9. The tube 4, in the above figures, extends thru the rear cap 8 and serves as a support for it, the cap being a tight push fit thereon. In Fig. 5, three terminal screws 23 are positioned in the casing portion 12. Under one of the terminal screw heads 22 is clamped one of the element ends 19. Under another terminal screw head is clamped one of the feed wires 24, and under the third screw head is clamped the other element end 19 and the other feed wire 24. Between the above wires and the casing portion 12 is an insulating disk 27 thru which the terminal screws pass as well as the ends 19 of the heating element 14. A cylindrical insulator 28 placed over the tube 4 in the terminal chamber 29 insulates the wires from said tube. The terminal chamber 29 is formed between the casing portion 12 and the rear cap 8 which is spaced from said casing portion by the tubular contactor carrier 30 which is rotatable upon the shoulder 31 formed on the casing portion 12 and upon the shoulder 32 formed on the rear cap 8. This carrier 30 is centrally knurled about its periphery 33, as shown in Fig. 1, so that it may provide a non-slip gripping surface. The periphery 33 of the carrier 30 aligns with the peripheral surface of the handle portion 5 and the rear cap 8 and is made of the same material. Within the tubular carrier 30 is press-fitted a metal cylindrical ring 34 on the inside of which at the quarter points are secured at one of their ends, four bi-metal thermal strip contactors 35, arcuate in form with their free end 36 extending into the terminal chamber 29 sufficiently to contact the heads 22 of the terminal screws 23 which, in this arrangement, are formed as elongated cylinders in order to provide a greater contact area. The curvature given each bi-metal thermal strip or contactor 35 is proportionate to the time it is necessary for that contactor to remain in communication with a terminal screw head in order to develop the pre-determined heat in the spatula. In other words, the curvature given one contactor 35 may cause it to break contact when the temperature at the spatula reaches 140 degrees, while another may be calibrated to break at 170 degrees, and a third at 200 degrees. The above arrangement also permits the breaking of the current supply intermediate the contact points. The bi-metal contactors may be made of such combinations of metal as Invar steel and brass, the brass being the contacting metal.

The heating element 14 in Fig. 8, comprises a plurality of members as a helical coil 37 having less resistance than a second helical coil 38, both of which are connected to a common leg 39. The ends 40 and 41, respectively, of the coils 37 and 38 are clamped beneath the heads 22 of two of the terminal screws 23 shown in Fig. 6. The common leg 39, together with one of the feed wires 24 is clamped beneath a third terminal screw head, while the second feed wire 24 is clamped beneath the fourth terminal screw head. The junction of the coils and the common leg is supported adjacent the head 2 by the cylindrical refractory disk 42 notched to receive them and positioned within the tube 4, while the ends 40 and 41, and the leg 39, are passed thru like individual insulating bushings 43 in the tube 4 (Fig. 8) or in the casing portion 12 (Fig. 6) when coils are in chamber 13. In lieu of the four bi-metal contactors used with the arrangement shown in Fig. 5, only three of the contactors 44 are employed, and these are made of a single metal having resilient properties. They are also made arcuate in form and are secured to the ring 34 at one of their ends 45 and at the ring's quarter points. The free end is formed with a convex contacting portion 46 to better adapt it to ride over the heads 22 of the terminal screws 23. The above arrangement permits either or both of the coils 37 and 38 to be put into or out of operation by manually revolving the tubular contactor carrier 30. The coils 37 and 38 are calibrated to supply three different ranges of temperature at the spatula. Without further illustration, it may be pointed out that the coils and the common leg may be adapted for placement within the chamber 13 instead of within the tube 4. Attention is called to the arrangement of the heating elements illustrated. As shown, the elements are formed to deliver the greatest amount of heat adjacent the spatula-carrying head 2. These elements

are preferably made of nichrome wire of substantial diameter in order to assure long life and to assure against breakage by jars. I feel that it is better to cut down the voltage rather than to cut down the wire to a size where it becomes fragile.

It is found convenient and practical to make the tube **4** and the chamber **13**, when they constitute the wax reservoir **9**, large enough to hold sufficient wax to wax up two cases or, about one cubic inch.

The flow of wax from its reservoir **9** is controlled by the valve **47** which is adapted to be opened manually by the user of the waxer and to be closed by the compression spring **48** confined by the recessed valve body **49** and the top-recessed screw **50** which forms the bottom closure for the valve chamber **51** after the valve has been positioned within the head **2**. The valve body **49** is of greater diameter than the wax passages **52** and **53**, the latter being formed in the spatula shank **3**. Beyond these passages the valve body **49** is turned down to form a neck **54** which is of less diameter than said passages. In turning down the body **49** to form the neck **54**, a convex seat **55** is formed for cooperation with the concave termination **56** of the valve chamber **51** to effect the upper closure of said chamber. Beyond the neck **54** a somewhat larger valve stem **57** is formed to normally project beyond the head cap **7** whereby it may be engaged by the forefinger of the user of the waxer and depressed to bring all or part of the neck **54** into alignment with the passages **52** and **53** to permit wax to flow from its reservoir **9** to the spatula **1**. When the tube **4** constitutes the reservoir **9**, the axial passage **52** communicates directly with said reservoir, or the inside of the tube **4**. When the chamber **13** constitutes the reservoir **9**, an annular recess **58** is formed in the head cap **7** and in communication with said chamber **13**. The passage **59** preferably connects the bottom of the annular recess **58** with the passage **52** as shown in Fig. 7.

In the illustrations I have shown only one form of the spatula **1** and that formed with a passage **53** comprising a cylindrical bore. It may be pointed out without further illustration, that the shank **3** of the spatula may be formed with an open top, or in other words, be grooved to form the passage **53**. It may also be pointed out that during part of the waxing-up operation no wax is flowed but only a heated spatula used, hence, it is also apparent that all forms of spatulas need not be formed with hollow or grooved shanks.

As previously stated, the wax used in the dental art comes in thin flat sheets containing about one cubic inch of material. These sheets, may of course be cut up or rolled up for insertion in either type of reservoir illustrated. However, I believe it much the best to provide the wax in a solid slug for insertion in the reservoir. When the chamber **13** constitutes the reservoir the slug **60** may be perforated to straddle the tube **4**. See Fig. 10.

Considerable heat is given off by the heating elements **14** (electrical in this instance) some of which is dissipated in melting the wax and in heating the spatula. Some, of course, is absorbed by the casing **6** which, in order to keep it comfortably cool, is insulated. In Fig. 3, the heating element **14** is positioned between the thin asbestos sheet **26** and the heavier corrugated asbestos sheet **61**. Between this corrugated sheet and the casing wall enclosing the chamber **13** is positioned a thin sheet **62** of metal foil having a polished heat-ray-reflecting-surface. Where the chamber **13** constitutes the reservoir the casing may be insulated by providing a continuous groove **63** in the peripheral face **64** of the casing **6** and wrapping a fine copper wire in said groove, the wire **65** being positioned slightly below the peripheral face out of contact with the waxer user's hands. See the greatly enlarged section in Fig. 9.

In an electrically heated waxer the amount of wax, its melting point, the kind and amount of material in the heated parts, the degree or degrees to which they or the wax is to be heated, and the voltage of the current employed for operation, determine the diameter and length of a wire in the heating element or elements, when the wire material resistance is known. The size of the heating element is easily found by any competent electrical engineer.

From what has been said, it is evident: that spatulas of any form may be adapted for use with my waxer and be interchangeable; that they may be heated to pre-determined temperatures; that the heat control may be outside the waxer or be incorporated therein and be manually or thermostatically operated; that the heating element may be varied in form and be positioned within or without the tube **4**; that the wax reservoir may be positioned within or without the tube **4**, that the reservoir may be filled from the front or from the rear.

Having described a preferred form of my waxer, shown in Figs. 2 and 3, and modifications thereof, so that anyone skilled in the art may apply the principles involved, I wish to append the following claims.

I claim:

1. A waxer having a heating element, a casing enclosing said element of a relatively low heat-conducting material, a groove in the outer peripheral surface of the casing, and a relatively high heat-conducting material positioned in said groove so that the outer peripheral surface of said material is below the outer peripheral surface of said casing whereby heat conducted to said high heat-conducting material may be radiated to the atmosphere without said material coming into contact with the hands of one handling the casing.

2. In a waxer, the combination of: a spatula; an elongated tubular casing for its manipulation; a heat-conducting element disposed within the casing; a wax reservoir within the element; a chamber between said element and the casing; a heating element, within the last named chamber, adapted to melt wax within the reservoir and to heat the spatula; feed terminals; a support for said terminals; a rear end cap supported on the heat-conducting element in spaced apart relation to the terminal support; a manually revolvable tubular contactor-carrier between the terminal support and the end cap; and contactors, secured to the carrier, adapted to be brought into communication with the terminals.

3. In a waxer, the combination of: a spatula; an elongated tubular casing for its manipulation formed to lie between the thumb and forefinger and against the end of the middle finger of the user and to be gripped by said fingers; a heat-conducting element disposed within the casing; a wax reservoir within said element; a chamber between said element and the casing; a heating

element, within said last named chamber, adapted to melt wax within the reservoir and to heat the spatula; a passage to convey melted wax from the reservoir to the spatula; a self-closing valve, angularly disposed to said passage to control the flow of wax therethru, having operating portions extending from the casing for operable engagement of said forefinger; feed terminals; a support for said terminals; a rear end cap in spaced apart relation to the terminal support; a manually revolvable contactor-carrier between the terminal support and the end cap; and contactors, secured to the carrier, adapted to be brought into communication with the terminals.

4. In a waxer, the combination of: a spatula; an elongated tubular casing for its manipulation formed to lie between the thumb and forefinger and against the end of the middle finger of the user and to be gripped by said fingers; a heat-conducting element within the casing, adapted to receive the spatula, having a chamber therein; an annular chamber between said element and the casing; a wax reservoir in one of said chambers; a heating element in the other chamber, having a plurality of members of different resistance, adapted to melt wax within the reservoir and to heat the spatula; a passage to convey the melted wax from the reservoir to the spatula; a self-closing valve, angularly disposed to said passage to control the flow of wax therethru, having operating portions extending from the casing for operable engagement of said forefinger; feed terminals to which the resistance members are connected; a support for said terminals; a rear end cap in spaced apart relation to the terminal support; a manually revolvable contactor-carrier between the terminal support and the end cap; and contactors, secured to the carrier, adapted to be brought into communication with selected terminals.

5. A waxer as specified in claim 4 in which the contactors are formed of a bi-metal.

6. In a waxer, the combination of: a spatula; an elongated tubular casing for its manipulation formed to lie between the thumb and forefinger and against the end of the middle finger of the user and to be gripped by said fingers; a heat-conducting element within the casing, adapted to receive the spatula, having a chamber therein; an annular chamber between said element and the casing; a wax reservoir in one of said chambers; a heating element in the other chamber, having a plurality of members of different resistance, adapted to melt wax within the reservoir and to heat the spatula; a passage to convey the melted wax from the reservoir to the spatula; a self-closing valve, angularly disposed to said passage to control the flow of wax therethru, having operating portions extending from the casing for operable engagement of said forefinger; feed terminals to which the resistance members are connected; a support for said terminals; a rear end cap in spaced apart relation to the terminal support; a manually revolvable contactor-carrier between the terminal support and the end cap; bi-metal contactors, secured to the carrier, adapted to be brought into communication with selected terminals, said contactors being formed to remain in communication with the terminals a sufficient length of time to develop a pre-determined heat in the spatula.

EMMET G. STACK.