

Aug. 4, 1970

W. A. E. SCHOELZ

3,522,654

WAXING TOOL

Filed April 24, 1968

2 Sheets-Sheet 1

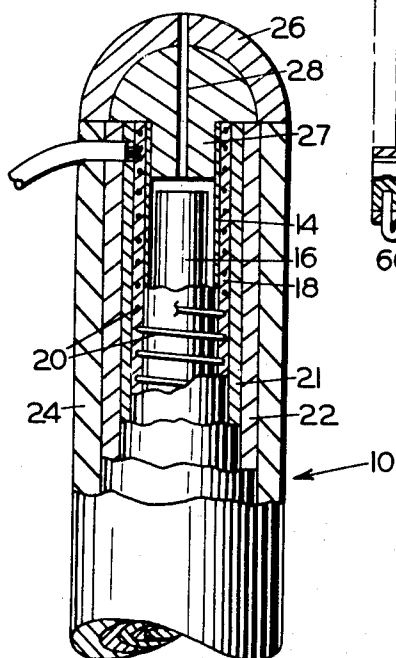


FIG. 1

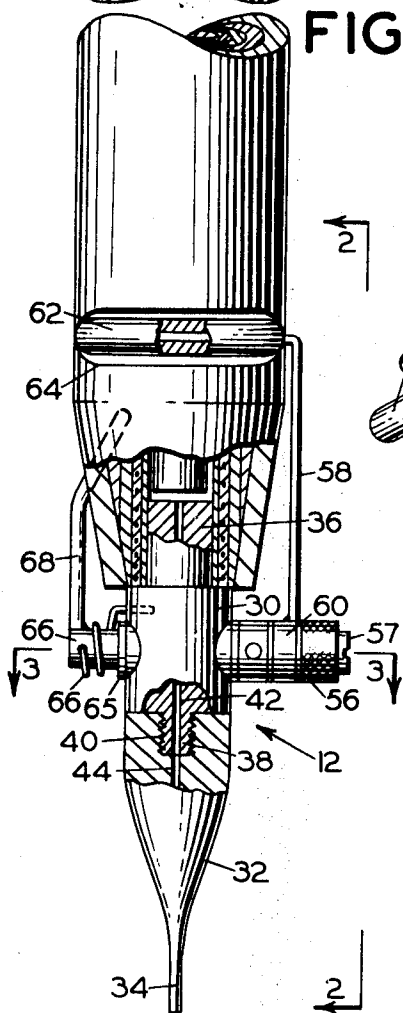


FIG. 2

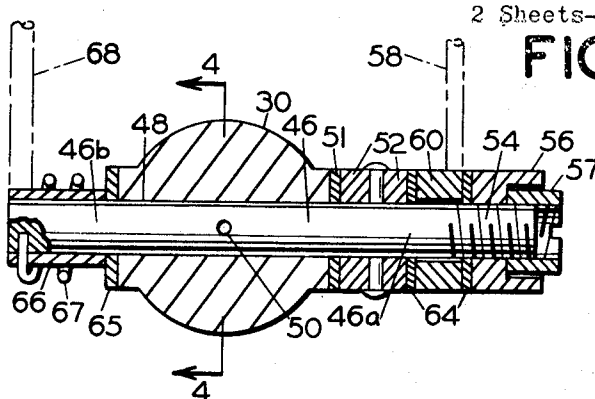


FIG. 3

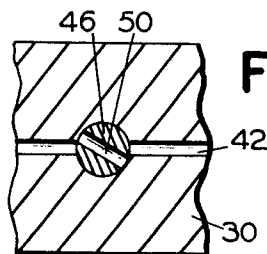


FIG. 4

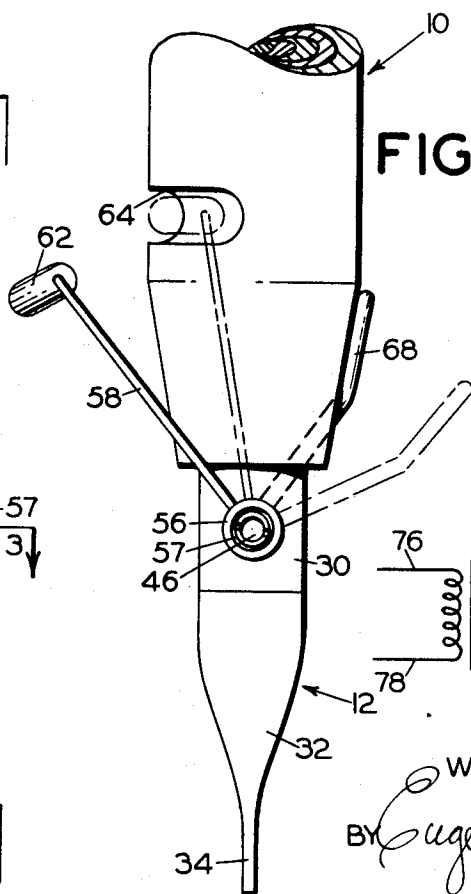


FIG. 5

INVENTOR.
WILLY A. E. SCHOELZ
BY *Eugen M. Eckelman*
ATTORNEY

Aug. 4, 1970

W. A. E. SCHOELZ

3,522,654

WAXING TOOL

Filed April 24, 1968

2 Sheets-Sheet 2

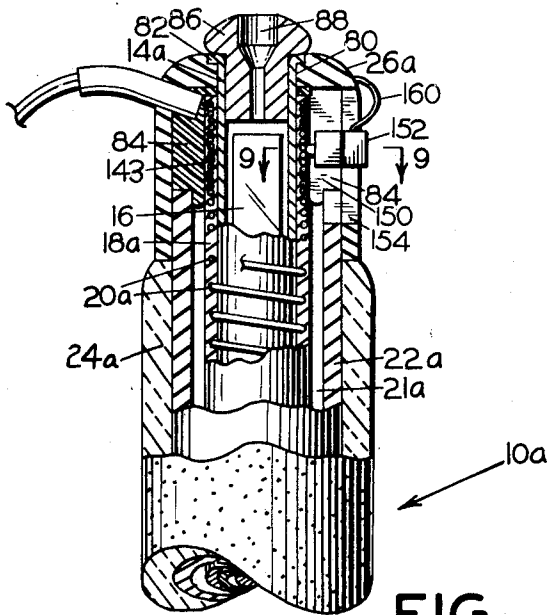


FIG. 6

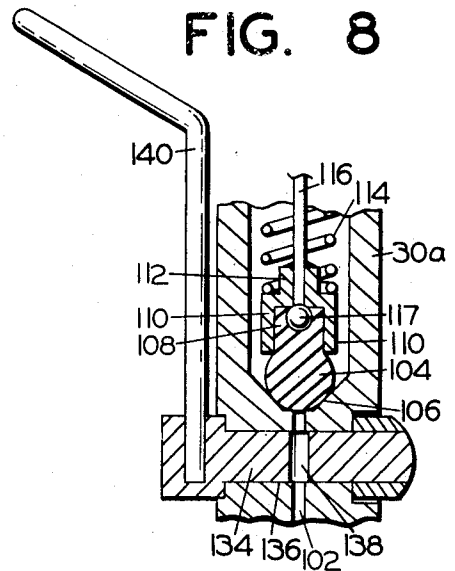


FIG. 8

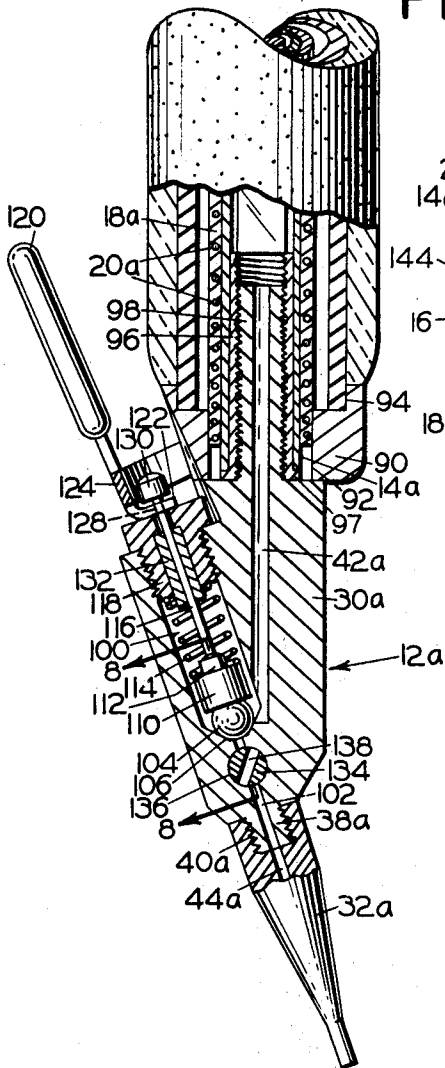


FIG. 9

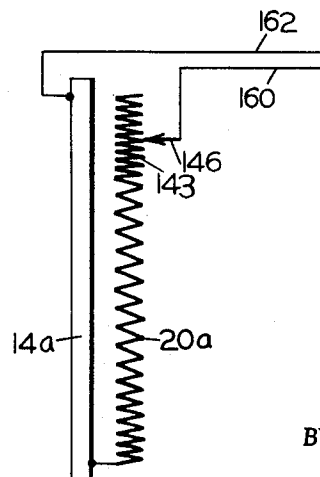


FIG. 10

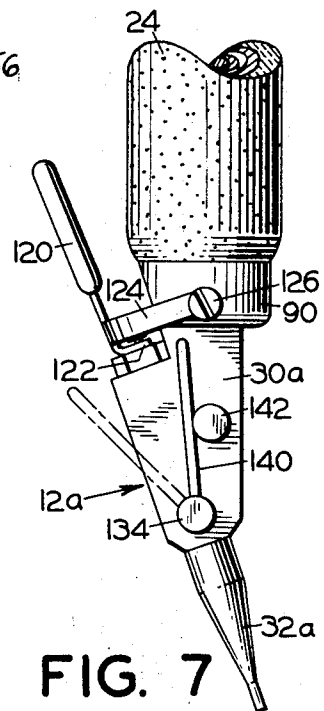


FIG. 7

INVENTOR.
WILLY A. E. SCHOELZ
BY *Eugene M. Eckelman*
ATTY.

1

3,522,654

WAXING TOOL

Willy A. E. Schoelz, 12716 SW. Edgecliff Road,
Portland, Oreg. 97219

Continuation-in-part of application Ser. No. 495,100,
Oct. 12, 1965. This application Apr. 24, 1968, Ser.
No. 730,971

Int. Cl. A61c 9/00

U.S. Cl. 32—70

8 Claims

ABSTRACT OF THE DISCLOSURE

The tool includes a handle portion and a nozzle portion. The handle portion includes an innermost metallic tube which receives sticks of wax, and the nozzle portion has a passageway through which molten wax is discharged. A heating element in the handle portion melts the wax, and the handle portion has insulating means. The nozzle portion has an on-off valve therein as well as a volume control. Electric-control means vary the temperature of the tool.

CROSS REFERENCE TO RELATED APPLICATION

This application is a continuation-in-part of application Ser. No. 495,100, now abandoned, filed Oct. 12, 1965 for Waxing Tool.

BACKGROUND OF THE INVENTION

This invention relates to a new and novel waxing tool, and more particularly is concerned with such a tool capable of supplying molten wax for the construction of wax patterns.

One use of the present waxing tool is to make wax patterns for the construction of dental inlays, crowns, bridge-work, or the like. At present, wax patterns for such work are built up by repeatedly depositing small increments of wax on the patterns by means of a scribe-like tool. In the use of such scribe-like tool three steps are required to deposit such increment of wax on the pattern. The first step comprises heating the scribe-like tool over a burner; the second step comprises picking up a small amount of wax on the tip of the tool; and the third step comprises depositing the small increment of wax on the pattern. Such steps have to be repeated many times over in order to build up a wax pattern, and such repeated steps in the operation are very time consuming and cause early fatigue to the operator. Furthermore, in this method of pattern building there is no precise control over the temperature of the wax at the pattern.

SUMMARY OF THE INVENTION

According to the present invention there is provided a waxing tool of a construction capable of holding a supply of wax and of depositing a controlled amount of wax through a tip end thereof, and more particularly there is provided such a tool which in combination has a wax receiving portion, heating means arranged to melt the wax receiving portion, a nozzle portion for the discharge of melted wax, and control means for controlling the on-off as well as volume flow of wax through the nozzle, thus providing a tool which does not have to be taken away from the work for heating and receiving wax.

Another object is to provide in a waxing tool of the type described novel heat control means therefor to maintain the melted wax at optimum temperatures for working.

Another object is to provide in a waxing tool of the type described a novel discharge nozzle and novel control means conveniently operable for controlling the on-off and volume of flow through the nozzle.

2

Another object is to provide in a waxing tool of the type described a wax discharge nozzle as described and movable control means for the nozzle having limit means for controlling limit positions thereof.

Still another object is to provide a waxing tool of the type described which is simplified in construction and efficient in its operation.

Additional objects will become apparent from the following specification and claims, considered together with the accompanying drawings, wherein the numerals of reference indicate like parts.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a foreshortened elevational view, partly broken away, of a first form of the present waxing tool;

FIG. 2 is a fragmentary elevational view taken on the line 2—2 of FIG. 1;

FIG. 3 is an enlarged, sectional view taken on the line 3—3 of FIG. 1;

FIG. 4 is a fragmentary sectional view taken on the line 4—4 of FIG. 3;

FIG. 5 is a wiring diagram of a heating circuit for the tool;

FIG. 6 is a foreshortened elevational view, partly broken away, of a second form of the present waxing tool;

FIG. 7 is a fragmentary side elevational view, slightly reduced in size with relation to the other figures and showing a nozzle end of the tool;

FIG. 8 is a fragmentary sectional view taken on the line 8—8 of FIG. 6;

FIG. 9 is an enlarged, fragmentary sectional view taken on the line 9—9 of FIG. 6;

FIG. 10 is a wiring diagram of a heating circuit for the tool of FIG. 6.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring in particular to the drawings and first to FIGS. 1 through 5, which show a first form of the invention, the numeral 10 designates in general a handle portion of the present tool and the numeral 12 designates in general a nozzle portion. The handle portion comprises a plurality of interfitted tubular members or layers the innermost one of which is a barrel 14 constructed of a heat conducting material such as brass. The barrel 14 is open at both ends and is adapted to receive a supply of wax 16 in solid form. Wax for making dental patterns as hereinbefore described is furnished in stick or pencil-like form and the interior of barrel 14 is of a diameter to freely receive such a stick of wax. As stated, the ends of the barrel 14 are open and the stick of wax may be readily inserted through the rearward opening thereof.

Encircling the barrel 14 and embedded in a layer of electrically insulating material 18 is a heating element 20 capable of producing sufficient heat to melt the wax in the barrel. In a preferred construction, the electrical heating element 20 has more windings per inch adjacent the forward end of the barrel in order to insure a sufficient temperature of the nozzle portion for conveying wax therethrough even though the nozzle portion does not contain a portion of the heating element therein. It is to be understood, however, that the output of the heating element 20 is sufficient to melt the wax throughout the full length of the barrel in order that the wax will not adhere to walls of the barrel but will flow freely therefrom.

Disposed around the layer 18 is a heat insulating layer 21 such as asbestos, and disposed around this latter layer is a body portion 22 preferably also of heat insulating material. Body portion 22 is formed of a rigid material such as hard plastic, wood, or the like to impart structural strength to the handle portion 10. Body portion 22

is in turn confined in an outer layer 24 preferably formed of semi-resilient material which may have heat insulating qualities, such as cork, rubber, resilient plastic, or the like whereby to provide a comfortable, frictional, hand grip surface for the operator and further to provide heat confining means for the interior of the tool. The various members which make up the handle portion 10 may be suitably secured together by adhesive or by a pressed fit.

The rearward end of the tool is closed by a removable cap 26 having a forwardly extending projection 27 dimensioned to have a removable frictional fit in the open end of barrel 14. This cap has a central air inlet bore or passageway 28 communicating with the interior of barrel 14 to permit gravity flow of molten wax through the other end of the tool, as will be more apparent hereinafter.

Nozzle portion 12 comprises a base 30 and a tip 32, the latter having an elongated tapered end 34. Base 30 has a rearwardly extending projection 36 secured in the open front end of the barrel 14 such as by a press fit and furthermore has a forwardly extending threaded portion 38 threadedly engaged in an internally threaded bore 40 in the rearward end of the tip 32. It is intended that the base 30 have semi-permanent attachment to the handle portion, and with the threaded support of the tip 32 thereon, said tip may be readily installed and removed as desired. It is thus apparent that tips of different contour or construction may be supplied for use with the tool and suitable ones of the tips may be utilized as conditions warrant. Base 30 and tip 32 are formed of a heat conducting material such as brass in order that heat from the handle portion will heat said base and nozzle and maintain the wax in molten condition in the latter parts. In a preferred construction of the nozzle, the tip 32 as stated is thinned and elongated whereby the operator has good viewing of the work being done in that the work is not obstructed from view by bulky nozzle portions.

The base 30 is provided with a full length, central passageway or bore 42 and the nozzle 32 is similarly provided with a full length central passageway or bore 44 which is aligned with and communicates with the bore 42, whereby when the instrument is tipped up wax from the barrel 14 is arranged to flow by gravity through the nozzle.

Base 30 has on-off and volume control means associated with the passageway 42 to control the flow of wax to the nozzle. With reference to FIGS. 3 and 4, such control means comprises a valve in the form of a cross shaft 46 journaled in a cross bore 48 intersecting passageway 42. This shaft has a diametral passageway or bore 50 arranged in one rotative position of the shaft to allow flow of wax through the bore 42 or in another rotative position of the shaft to cut off the flow of wax therethrough. Thus, by selective rotative positioning of the cross shaft 46 it is apparent that a maximum flow of wax may be permitted to the nozzle or such flow may be entirely shut off. Furthermore, it is also apparent that if the shaft 46 is rotated to a position for partial communication of the passageway 50 with the passageway 42 a limited flow of wax to the nozzle is permitted.

Shaft 46 has opposite end portions 46a and 46b which project respectively beyond opposite sides of the base 30. Projecting end 46a carries a washer 51 next to the base and a collar 52 secured to such shaft end outwardly from the washer. Shaft end 46a has a threaded outer end 54 for receiving a nut 56 and a lock nut 57 therefor. Mounted on the shaft end 46a is a right angular control lever 58 one end of which terminates in an enlargement 60 suitably bored for rotatable support on this shaft end between the collar 52 and the hand nut 56. The other end of the lever 58 carries a finger grip member 62 in transverse relation to the tool and arranged to engage the outer surface of a forward portion of the handle when rotated in the direction of the handle.

Disposed on opposite sides of the enlargement 60 on the shaft end 46a is a pair of friction washers 64, and the arrangement is such that upon suitable tightening of the nut 56 a compressed set position of the enlargement 60 between the collar 52 and the nut is accomplished. The set position of the enlargement 60 between the friction washers may be such that while it positively rotates the shaft upon rotation of the lever 58 it can nevertheless be adjustably rotated on the shaft by holding the shaft stationary and forcing the lever to a new position without loosening the nuts 56 and 57. The lever 58 may be selectively set on the shaft such that when it is pivoted rearwardly into engagement with the handle portion of the tool, as shown in phantom lines in FIG. 2, the passageway 50 of the valve is in full registry with the passageway 42, or if desired the lever 58 may be suitably positioned on the shaft such that when pivoted into engagement with the handle as before the passageway 50 will be in only partial registry with the passageway 42. Thus, such lever 58 may be set according to the flow of wax desired. In order that the finger grip member 62 of the lever will be disposed in a comfortable gripping position when the lever is in engagement with the handle portion in a fully opened position, the handle portion has a transverse recess 64 for receiving such finger grip.

Shaft end 46b carries a washer 65 and an integrated collar 66. The shaft 46 is urged to a closed valve position, namely in a direction away from the handle by a spiral spring 67 wrapped around the collar 66 and having one of its ends anchored to the shaft and its other end anchored to the base 30. Integrated with the collar 66 is a setting finger 68 which extends rearwardly and is arranged in a closed position of the lever, FIG. 2, to engage the outer surface of the handle. This setting finger thus serves as a stop for the outward spring movement of the lever. Furthermore, this finger controls the extent of opening of the valve in that the lever 58 may be rotatably adjusted on the shaft end 46a to set the valve opening position desired when the lever is pressed down on the handle. As stated hereinbefore, such lever may merely be forced into a new adjusted position by holding the shaft in a stationary position while adjustment is being made. Such adjustment can be made to a greater flow position by forcing the lever away from the handle, with the shaft being anchored in a stationary position by abutment of the setting finger 68 against the handle. If the lever is to be adjusted to a lesser flow position, it is turned on the shaft 46 while holding the setting finger, and thus the shaft, in a fixed position. These adjustments are readily accomplished by the one hand which grips the waxing tool.

In a preferred circuitry for the heating element 20 the latter is in circuit with a transformer 72 to reduce the voltage a selected amount, such as 12 volts, and voltage control means 74 such as a rheostat. The transformer is fed by lead-in wires 76 and 78 of the conventional 110-volt circuit and voltage to the heating element 20 may be controlled by means of the rheostat 74 from zero to the maximum of 12 volts. By means of the rheostat 74 the temperature of the tool may be set for optimum wax discharge conditions through the nozzle 32.

In the operation of the tool of FIG. 1, it is first heated to the proper temperature, by selected setting of the rheostat 74, to cause wax in the barrel 14 to be transformed into a liquid state. The operator then opens the valve 46 by operation of the lever 58 while at the same time holding the tool in an upright position to provide for gravity flow of the molten wax, through the nozzle. By selective operation and adjustment of the lever 58 and setting finger 68, wax is discharged to accomplish the desired waxing process.

The temperature control is important because pattern building is best accomplished under optimum wax flow conditions. For example, if the wax is too hot, it will merely flatten as it leaves the tip and if it is too cold it

5

cannot be properly shaped. However, if it is at a proper temperature, it still will be molten at the tip but will solidify almost immediately when it leaves said tip at this temperature the wax can be most conveniently worked, although for other purposes a higher or lower wax temperature at the tip may be desired. Such can readily be accomplished by adjustment of the rheostat 74.

Referring now to FIGS. 6-10, a second form of the tool is illustrated. Although the tool has somewhat different structure, it accomplishes the same purpose. In this embodiment there is a handle portion 10a and a nozzle portion 12a. The handle portion similarly includes a barrel 14a constructed of a heat conducting material such as brass and having both ends open and arranged to receive a supply of wax 16 in solid form. Encircling the barrel 14a and embedded in a layer of electrically insulating material 18a is a heating element 20a.

The embodiment of FIG. 6 utilizes an insulating air space 21a between the layer 18a and an outer body portion 22a of rigid heat insulating material. Disposed around the body portion 22a is an outer layer 24a of semi-resilient material of heat insulating qualities. The rearward end of the tool is closed by a cap 26a which is open at one end to receive body portion 22a as well as the barrel 14a and heating element 20a. In a preferred construction, cap 26a has an opening 80 in its closed wall and the barrel 14a projects therethrough and is turned or riveted over at 82 to provide a fixed connection of the cap on the handle portion. Furthermore, it is preferred that the body portion 22a project only a short distance into the cap in order to provide a space which is filled with epoxy 84 during assembly of the tool for the purpose of securely anchoring the end portion of the heating element in the cap as well as the inner end of the lead wire connected thereto.

An end plug 86 is adapted for removable frictional engagement in the barrel 14a to close off the end of the barrel. This plug, however, has a central aperture 88 to permit gravity flow of molten wax in the tool.

The forward or nozzle end of the handle portion supports a cap 90 which in turn supports a nozzle base 30a for tip 32a. Cap 90 has a bore 92 which receives a projecting end of the barrel 14a and a projecting end of insulated covered heating element 20a. Cap 90 also has a counterbore 94 for receiving a projecting end of the body portion 22a, the projecting end of the body portion being shortened with relation to the barrel 14a. Disposed in the open end of the barrel 14a at the nozzle end in a press fit is an internally threaded bushing 96 having an end flange 97 engaged with the end of barrel 14. Bushing 96 threadedly receives an externally threaded shank 98 on the base 30a. In its threaded engagement with the bushing 98, the base 30a bears tightly up against the end of cap 90 to hold the latter in a fixed position on the end of the handle portion.

A passageway or bore 42a extends longitudinally through the bushing 98 as well as forwardly of the base to a valve bore 100 which is angled in the base 30a at an acute angle relative to the passageway 42a. A second passageway 102 extends from the valve bore 100 forwardly through the front end of the base 30a and communicates with a passageway 44a in tip 32a. As in the first embodiment, base 30a has a threaded projection 38a threadedly engaged in an internally threaded bore 40a in the rearward end of the tip whereby various tips may be substituted one for another.

The valve assembly in the bore 100 comprises a ball valve 104 arranged for engagement with a tapered seat 106 to cover the inner end of passageway 102. Preferably, the valve 104 is integrated with a rectangular base portion 108, FIG. 8, which is secured within a rigid holder 110 having a rearwardly extending projection 112. One end of a compression spring 114 bears against the holder 110, the projection 112 holding the said one end of the spring on the holder. Valve 104 is arranged to be lifted from its seat 106 by the outward pulling force

6

of a strap or cable 116 connected to the holder 110 by suitable means, such as by a ball catch 117. Strap 116 passes through an end plug 118 threadedly engaged in an outer threaded end of bore 100. Strap 116 is operated by a finger lever 120 having an inturned end 122 and having pivoted support on the cap 90 by means of a U-shaped arm 124, best seen in FIG. 7, the ends of which are pivotally attached on opposite sides of said cap. Pivoted attachment of the arm 124 is accomplished by pins 126.

Inturned portion 122 of the finger lever 120 has an aperture 128 for receiving strap 116. Strap 116 has an integral enlargement 130 for engagement behind the inturned portion 122, whereby when finger lever 120 is pivoted from its position shown in FIGS. 6 and 7 to a position lying flat against the handle portion 10a the valve 104 is pulled off its seat and molten wax flows through passageway 102 and through the tip. When the finger lever 120 is released, the spring 114 returns the valve and the other parts to a closed position. In a preferred construction, strap 116 passes through a sealing bushing 132 in the plug 118 to prevent molten wax from escaping through the valve operating parts.

The valve mechanism just described comprises the on-off or flow control. Further provided in the present embodiment, as in FIG. 1, is a volume flow control. Such volume flow control comprises a cross shaft 134, FIGS. 6 and 8, journaled in a cross bore 136 intersecting passageway 102. Shaft 134 has a diametral passageway or bore 138 arranged in one rotative position of the shaft 134 to allow full flow of wax through the bore 102 and in other rotative positions of the shaft to control selectively such flow of wax. By selective rotative positioning of the cross shaft 134, wax flow may be provided in on, off or partial flow. Cross shaft 134 has an exterior hand lever 140, FIG. 8, which is parallel with base 30a and has engagement with a stop pin 142, FIG. 7. The parts are arranged such that when the lever 140 is engaged against the stop pin 142 the passageway 138 is out of communication with the passageway 102 for closing off the flow of wax, and upon moving the handle away from the pin the passageway 138 is brought into registry with the passageway 102 a selected amount. The passageway 138 has a larger diameter than passageway 102 which serves to provide maximum adjustment of volume control with minimum rotative movement of the shaft 134.

In the embodiment of FIG. 6, the tip 32a extends coaxially with the valve bore 100 and thus the tip extends at an angle relative to the general axis of the tool. Such angular disposition of the tip provides easy use. In addition, the angular placement of the finger lever 120 provides for efficient operation thereof by a finger of the hand which holds the tool. It is merely necessary to squeeze inwardly on the finger lever 120 when the flow of wax is desired and to release the lever when the wax is to be cut off, the shaft 134 first being set, by means of hand lever 140, to achieve the desired volume of wax flow when the finger lever 120 is operated.

The embodiment of FIG. 6 may employ temperature control means for the heating element 20a the same as in FIG. 1 but to provide a built-in control the heating element has a plurality of closely disposed windings 143 at the rearward end, FIG. 6, which serve as a resistance similar to that of a rheostat. A longitudinal groove 144 is cut through the insulated covering 18a, FIG. 9, to bare the closely disposed windings 143, and the exposed portion of the windings are engageable by a contact finger 146 supported in a slide 148 movable longitudinally of the pen in a slot 150 in the epoxy filling 84. Slide 148 has a projection 152 extending through a slot 154 in the cap 26a, the projection 152 serving as a finger engaging tab whereby the operator can readily adjust the slide along the rheostat windings 143.

Contact finger 146 is slidably mounted in a bore 156 in the slide 148 and is urged toward constant engagement

7

with the windings 142 by a spring 158. The closely disposed windings 143 are in series with the heating element and merely comprise an extension thereof. Such extension comprises a rheostat for controlling the temperature of the tool. The circuit for the heating element and rheostat is shown in FIG. 10 wherein one input line 160 is connected to the contact finger 146 and the other input line 162 is connected to one end of the center tube or barrel 14a, the latter member being formed of an electrically conducting metal. The opposite end of the barrel 14a is connected to the front end of the heating element 20a and such barrel thus forms the connecting circuit between the heating element and one input line.

The structure just described provides a simplified arrangement of wax pen and temperature control means therefor. The rheostat is contained directly in the instrument and a separate control box is not necessary. To increase the temperature of the heating element, the operator merely moves the slide 148 forward, and to decrease the temperature of the heating element the slide is moved in the opposite direction. As stated hereinbefore the temperature control of the instrument is important in order to deposit wax at optimum temperatures.

In a preferred arrangement, the windings are closer together at the forward end of the tool than in the middle in order to keep the nozzle end heated. As mentioned before in connection with FIG. 1, windings adjacent the rearward end of the tool may also be closer together than at the middle whereby to insure that the wax at such rearward end is maintained in a molten state.

It is to be understood that the forms of my invention herein shown and described are to be taken as preferred examples of the same and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of my invention.

Having thus described my invention, I claim:

1. A waxing tool comprising:
 - (a) a handle portion,
 - (b) a hollow wax holding portion in said handle portion,
 - (c) heating means on said wax holding portion for melting wax contained in said wax holding portion,
 - (d) a nozzle on said handle portion having a discharge passageway communicating with the interior of said wax holding portion,
 - (e) flow control means on said nozzle having a lever projecting to an area adjacent to the outer surface of said handle portion for operation by the gripping hand of the operator,
 - (f) said flow control means including a valve movable by said lever for controlling the flow of wax through said discharge passageway,
 - (g) said lever being movable between a first position comprising a shut-off position for said valve for stopping wax flow through said discharge passageway and a second position comprising an on position for said valve to allow wax to flow through said discharge passageway,
 - (h) said flow control means also including volume control means having adjustable set positions arranged in selected set positions thereof to control the volume of flow of wax through said discharge passageway when said lever is moved to its second position.

8

2. The waxing tool of claim 1 wherein said lever extends generally along the handle in spaced relation and the direction of movement of said lever to its on position is toward the handle.

3. The waxing tool of claim 2 including means biasing said lever to its shut-off position in spaced relation from said handle.

4. The waxing tool of claim 2 including

- (a) means biasing said lever to its shut-off position in spaced relation from said handle,
- (b) and stop means arranged to provide a stop position of said lever against the action of said biasing means at the first position of said lever.

5. The waxing tool of claim 1 wherein

- (a) said nozzle has a valve bore extending angularly with relation to the general axis of said handle portion,
- (b) said valve being operative in said bore,
- (c) and including a tip discharge end on said nozzle disposed substantially in axial alignment with said lever bore.

6. The waxing tool of claim 1 including means on the outer surface of said handle portion defining a recess for receiving a portion of said lever in one of its first and second positions.

7. The waxing tool of claim 1 wherein:

- (a) said wax holding portion comprises an inner barrel for holding wax,
- (b) said heating element heating said inner barrel,
- (c) an outer handle portion encircling said heating element,
- (d) said handle portion being of enlarged diameter for providing an insulating air space between said heating element and said handle portion.

8. The waxing tool of claim 1 wherein

- (a) said heating means comprises a plurality of electric resistance wire wrapping around said wax holding portion,
- (b) said heating means including a plurality of closely spaced ones of said wire wrappings adjacent one end of said wax holding portion to form a rheostat-like winding in series with said heating means,
- (c) and including an electric circuit,
- (d) and contact means in said circuit adjustably movable along said closely spaced wrappings to vary the effective length of said heating means for controlling the temperature of the latter.

References Cited

UNITED STATES PATENTS

1,189,735	7/1916	Quintin	32—70
1,619,817	3/1927	Gibson.	
2,243,400	5/1941	Stack	32—70
2,979,234	4/1961	Kamborian	222—146
3,123,070	3/1964	Kath.	
3,204,828	9/1965	Paulsen	222—146

ROBERT PESHOCK, Primary Examiner

U.S. Cl. X.R.

219—230; 222—146