

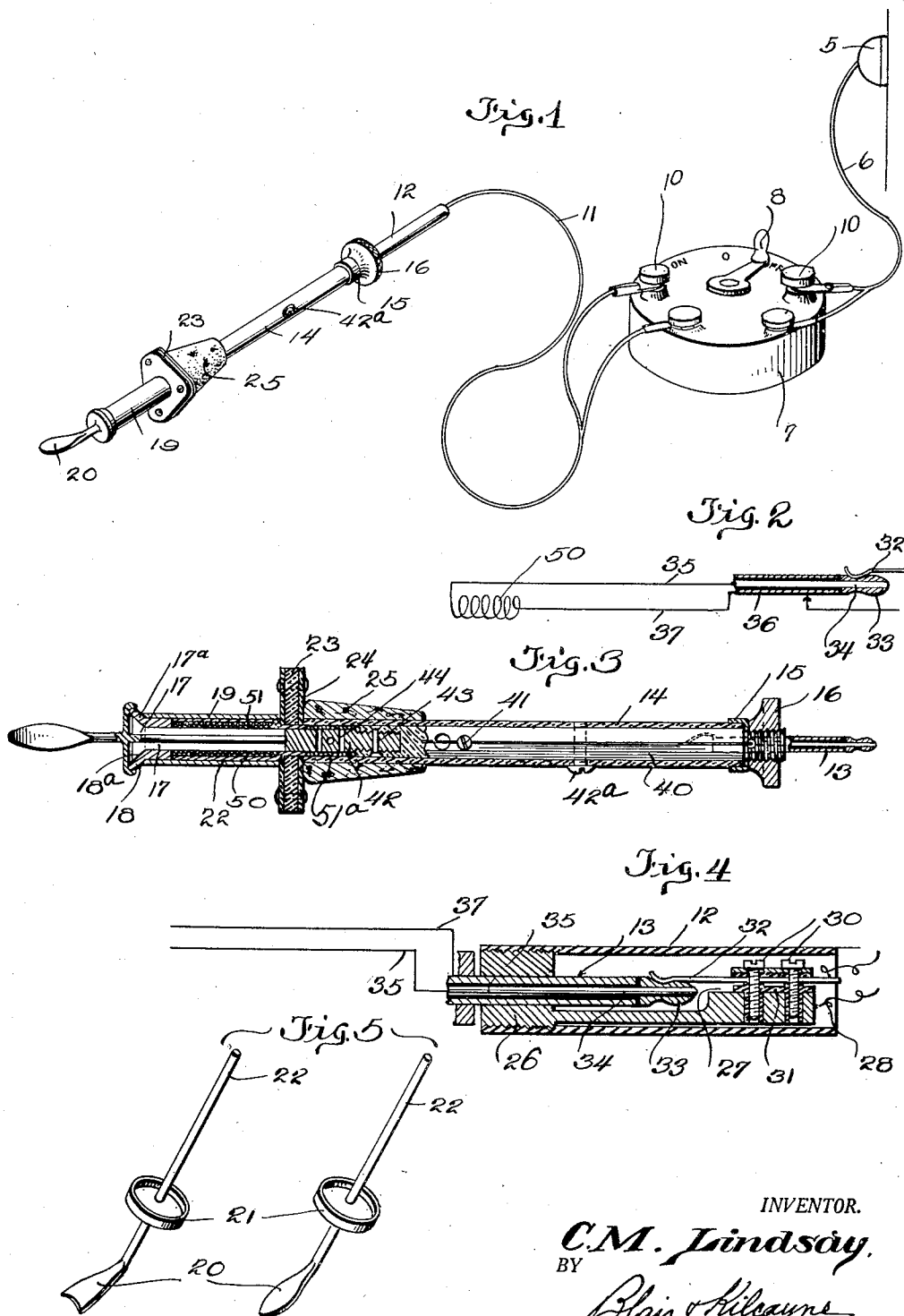
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ELECTROTHERMAL MODELING TOOL

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ELECTROTHERMAL MODELING TOOL

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This invention relates to electro-thermal modeling tools for modeling or shaping plastic materials such as wax, and like materials used in making dentures, costume mannequins, sculptured figures and the like, whose plasticity is dependent upon the application of heat or heated tools. While the invention will be hereinafter described as an electro-thermal dental spatula, it is, of course, to be understood that without material modification, the device will be found useful in other professions and for other lines of work.

In order that a clearer perception of the present invention may be had, it may be stated that heretofore attempts have been made to provide electrically heated modeling tools for dental work, but such efforts have been unsuccessful for many reasons, such for example as the inability to provide a device of this character which may be easily and conveniently handled, and which will maintain a desirable and useful temperature, and which will permit the ready interchange of tools for work of different character, while permitting the same to be conveniently operated without burning the operator's hand or overheating the work upon which it is employed. The result has been that even the largest dental laboratories still use the unnecessarily impractical method of heating the tip of a spatula in the flame of a Bunsen burner, then applying it to the wax, and reheating and again applying, which practice is exceedingly time consuming and laborious.

The present invention is therefore directed primarily to a small, compact and light tool which overcomes the disadvantages incident to known devices of this character, and which may be easily and conveniently maintained at desired temperatures whereby the working of the wax or other plastic material may be rapidly and expeditiously carried forward.

A further object is to provide a safe and foolproof device of the above character, which will be unlikely to burn out or cause injury or damage if the operator fails to turn off the current.

A further object is to provide a device of the above character with working tips of different shapes and sizes readily changed

and securely clamped or released without burning the operator's fingers.

A further object is to provide a means of connecting the improved modeling tool to the lighting service in such a manner that the flexible cord or wire will not twist or kink when turning the tool in use, such being accomplished by the provision of an improved swivel connection between the tool and conductor.

A further object is to provide a modeling tool with a means for controlling the temperature thereof, having a sufficient range of temperature to permit a rapid melting or flowing of the material when blocking out the work and a lower temperature for the fine finishing touches.

Other objects will be in part obvious from the annexed drawing and in part hereinafter indicated in connection therewith by the following analysis of this invention.

This invention accordingly consists in the features of construction, combination of parts and in the unique relation of the members and in the relative proportioning and disposition thereof, all as more completely outlined herein.

To enable others skilled in the art to fully comprehend the underlying features thereof they may embody the same by the numerous modifications in structure and relation contemplated by this invention, drawing depicting a preferred form of the invention has been annexed as a part of this disclosure, in which—

Fig. 1 is a perspective view of the complete apparatus connected and ready for use;

Fig. 2 is an enlarged detail view showing the wiring diagram;

Fig. 3 is an approximately full size longitudinal, sectional view of the complete device;

Fig. 4 is an enlarged detail sectional view of the connection between the electro-thermal tool and the flexible cord from a source of electrical supply, known as a "jack" type cord connector;

Fig. 5 illustrates in perspective two forms of interchangeable tools.

Referring now to the drawing in detail

and more particularly to Fig. 1, 5 indicates a plug adapted to be tapped into any electrical socket, which is connected by means of a twin conductor 6, one conductor of which is in series, with any standard form of rheostat 7. The rheostat is provided with a control handle 8 and terminals 10, to which flexible twin conductor tinsel wire 11 is connected to a "jack" type connector 12 shown in detail, Fig. 4. This "jack" type connector is of the swivel type as will be hereinafter explained and adapted to receive a plug 13 at the end of the working tool as shown in Fig. 3.

Referring to Fig. 3 in detail, it will be noted that the body portion of the spatula comprises an insulating barrel or casing 14, of material such as bakelite, and preferably not over three-eighths of an inch in outer diameter. A base or core 40, to be hereinafter described, extends thru the casing 14, and is threaded at its plug end. Disposed to abut the ends of the casing 14 and slidable axially on the base 40 is a cup washer 15, which is engaged by a knurled nut 16 running on the threaded portion of the base 40. The said base is axially bored at its other end to receive a block 42 threaded therein and locked against rotation by a pin 43. The said block terminates beyond the casing 14, and being of a smaller diameter than the base 40, there is formed a narrow annular chamber between the outer surface of the block and the inner diameter of the sleeve 14.

Forwardly of the block 42 and in abutting engagement therewith, extend the chuck jaws 17 with their usual spindle portions, each having at their forward end the inclined beveled surfaces 17a, which coact with the correspondingly coned surface 18a of an annular member or collet 18. A sleeve 19, preferably of aluminum, is disposed about the collet member 18 and engages, at one end, the outer incline surfaces 18a thereof. Disposed between the sleeves 14 and 19, there is provided an irregular or triangular guard formed of asbestos pad 23 protected on both sides by sheets of insulating material 24. The tools or tips generally illustrated in Fig. 5 each comprise a working tip 20, a collar portion 21 and a shank portion 22. They are preferably made of metal having the desired hardness and heat conductivity, and the shank portion 22 is engaged by the chuck jaw 17 and held tightly therein, as follows. As the nut 16 is turned on the base 40, it causes axial movement of the collar 15 which is imparted to the sleeve 14. The guard 23, 24, being substantially rigid, transmits this movement to the sleeve 19, which, by reason of its engagement with the inclined surface 18a of collet member 18, imparts a slight axial travel to the collet 18, which thru the wedging action of the inclined portion 17a causes the jaws 17 to be

securely clamped on the shank 22 of the tool.

Wound about the chuck spindle portions and preferably insulated therefrom is a plurality of turns of very fine resistance wire which forms a heating coil 50, the ends of which coil are connected with terminals as will be shortly explained. It may be assumed that when the current is turned on, this coil becomes heated to a medium degree of temperature, the desired degree of which may be controlled by the rheostat 7, the main point being that the temperature is not excessive, but is sufficient to heat the chuck and transmit such heat to the shank 22 of the tip, from which heat is conducted to the tip 20 thereby permitting the wax upon which the spatula is generally used to be molded and shaped as desired.

It will be noted that the heating coil 20 extends beyond the end of the casing 14 a relatively short distance, and in practice only about one inch or less, and at the end of this heated portion, the guard 23, 24 is disposed, and immediately adjacent the guard is provided a finger grip such as a tapered or cylindrical cork body 25. The triangular guard not only protects the fingers of the operator from radiated heat from the coil, but if the device is resting upon a table, the irregular configuration, that is, triangular or square, prevents the spatula from rolling should the table be slightly inclined. The cork grip 25 is preferable over other materials, inasmuch as it absorbs moisture and perspiration from the finger tips, provides a firm, non-slipping grip, and is more or less heat insulating. An insulating sheath 51 is preferably arranged between the sleeve 19 and the coil, extends thru the guard 23, 24, and terminates in the space formed between the sleeve 14 and the plug 42 in the form of an asbestos cord winding 51a. The plug 42 may be formed with breathing holes 44 disposed in normal relation as indicated.

Referring to Fig. 4, it will be noted that the "jack" type connector assembly consists of a metal base 26 cut away longitudinally on one side as indicated by the line 27. This base serves as one side of the line and is connected to wire 28. A spring contact arm 32 is mounted on, but electrically insulated as at 31 from the connector base 26 and held firmly in position by the screws 30. Part of one end of the base 26 is left cylindrical, threaded on the outside and slotted on the end so that a screw driver may be used to screw it into the insulating sleeve 12 which is threaded to receive it. Thus, when the plug end 13 of the spatula shown in Fig. 2 is inserted, the electrical circuit is complete. This plug end assembly 13 comprises an outer knob 33 having a central core 34 connected with one terminal 35, while connected with the other terminal 37 about this core and insulated therefrom is a sleeve 36 from the coil

50. When the plug is inserted in the "jack", the spring arm 32 engages behind the knob 33, thus completing the circuit thru one wire, while the other terminal or sleeve 36 connected with wire 37 is in engagement with the base 26 and the wire 28 which is one of the two wires within the flexible cord 11 shown in Fig. 1.

This swivel connection tends to prevent open circuits in the cord or wire caused by the metal conductors in the cord becoming "fatigued" from constant twisting and kinking. Most of the failures of socket appliances result from failure to provide means in the connections used in conventional designs to relieve the twisting or kinking strains on the conductor.

The plug 13 and connectors 35, 37 herein shown are primarily the wiring elements and are assembled on the base 40 of insulating material and held in place by means of set screws 41. After the wiring portion is assembled, a set screw 42a passes thru the sleeve 14 into the base 40, thus maintaining these parts in operative relation. It is obvious that a base having the wires molded thereon may be substituted. Likewise, the base 40 and sleeve 14 may be formed hexagonal or of other irregular configuration to prevent turning therebetween.

As herein shown, the rheostat is provided as a separate element independent of the dental spatula. This is primarily because the extra weight by mounting the rheostat directly on the spatula would soon tire the wrist and fingers of the operator, thus diminishing the effectiveness of his work, and for this reason it is preferably to mount the same separately and contact it with the spatula by a very light flexible cord having a swivel connection as shown. Sufficient electrical resistance is inherent to the self-contained winding permitting it to withstand full line voltage, in the event of the rheostat becoming short-circuited.

From the above, it will be seen that the present invention comprehends a simple and practical device of the above character particularly adapted for dental use. The device is of about the size and weight of the average fountain pen or less, and may be used indefinitely without tiring the operator. When its use is started, the current is preferably turned on full thru the rheostat 7, and as soon as the desired temperature is reached, the current is reduced in order to maintain the temperature of the tool 20 at just the right degree so as to permit efficient operation upon the wax, yet without danger of causing puddling of the wax. The cork grip 25 enables the operator to conveniently move the spatula in any direction and without danger of the tool slipping from his fingers due to perspiration, for example. The guard 23, however, will protect the fingers to a

large extent from heat radiations. The swivel connection 13 permits the electro-thermal dental spatula to be turned and revolved in any direction without kinking the cord 11. The collar 21 prevents the melted plastic from running into the chuck and heating coil.

From the above, it will be seen that the present invention provides a simple and practical device which may be inexpensively manufactured, assembled and used, the amount of current required being almost negligible, 0.11 ampere maximum. Inasmuch as the tool is continuously maintained at the desired temperature, a great deal of time is saved as well as effort and labor on the part of the operator, for he may work continuously on the wax without the endless operation of passing the spatula back and forth from the wax to the Bunsen burner as heretofore.

Without further analysis the foregoing will so fully reveal the gist of this invention that others can by applying current knowledge readily adapt it for various applications without omitting certain features that, from the standpoint of the prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention, and therefore such adaptations should and are intended to be comprehended within the meaning and range of equivalency of the following claims.

I claim:

1. An electro-thermal modeling tool comprising a barrel of insulating material, a working tip, electrically operated tip holding means disposed near one end of the barrel for heating the tip and actuable to hold the same in working relation, means disposed adjacent the other end of the barrel for actuating the holding means, and a plug extending beyond said last-named end of the barrel providing a swivel connection with a source of current.

2. An electro-thermal modeling tool comprising a barrel portion of insulating material, a chuck at the end of said portion, a coil surrounding said chuck, means for releasing the chuck, and a releasable tip having a shank adapted to be engaged by the chuck and heated by said coil.

3. An electro-thermal modeling tool comprising a barrel portion of insulating material, a chuck at the end of said portion, a coil surrounding said chuck, means near the opposite end of the barrel portion for releasing the chuck, and a releasable tip having a shank adapted to be engaged by the chuck and heated by said coil.

4. An electro-thermal modeling tool comprising a barrel portion of insulating material, a chuck at the end of said portion, a coil surrounding said chuck, means near the opposite end of the barrel portion for releas-

ing the chuck, a releasable tip having a shank adapted to be engaged by the chuck and heated by said coil, and a plug adjacent said chuck release and providing a swivel connection with a source of current.

5 5. In a tool of the character described, the combination of a body portion, a working point having a tip and a shank, a chuck disposed at one end of said body portion and
10 having spindle and jaw portions, an electrically operated heating coil wound on the spindle portion, and a member threadedly engaged with the other end of the body portion for opening and closing the chuck jaws.

15 6. An electro-thermal modeling tool comprising a body portion having a hollowed recess at one end containing movable chuck jaws, an electrical heating coil surrounding said chuck jaws, a member for opening and
20 closing the chuck jaws, a plug adapted to provide a swivel connection with any suitable source of current, and a tip having a shank adapted to be engaged by said chuck jaws.

25 7. An electro-thermal modeling tool comprising a body portion having a hollowed recess at one end containing movable chuck jaws, an electrical heating coil surrounding said chuck jaws, a member threadedly engaged with the base portion at the opposite
30 end for opening and closing the chuck jaws, a plug adjacent said operating means adapted to provide a swivel connection with any suitable source of electrical current, and a tip having a shank adapted to be engaged by
35 said chuck jaws.

8. An electro-thermal modeling tool comprising a body portion having a hollowed recess at one end containing movable chuck jaws, an electrical heating coil surrounding
40 said chuck jaws, a member for opening and closing the chuck jaws, a plug adapted to provide a swivel connection with any suitable source of current, a tip having a shank adapted to be engaged by said chuck jaws, an insulating housing enclosing said parts between
45 the tip and plug, a finger grip surrounding said housing, and a heat insulating guard adjacent the finger grip.

9. In a modeling tool of the character described, the combination of a body portion including a barrel of insulating material and a sleeve at one end thereof, a working point having a tip and a shank, a chuck operatively arranged in the sleeve and comprising spindle
50 and jaw portions and a collet member, the said sleeve being operative, upon slight axial movement, to engage the collet member whereby to actuate the chuck jaws into gripping or non-gripping relation relative to said
55 shank, an electrically operated heating coil wound on said chuck spindle, and means to impart a slight axial movement to the sleeve, whereby to actuate the chuck jaws.

10. In a modeling tool of the character described, the combination of a body portion

including a barrel of insulating material and a sleeve at one end thereof, a working point having a tip and a shank, a chuck operatively arranged in the sleeve and comprising spindle and jaw portions and a collet member, the said sleeve being operative, upon slight axial movement, to engage the collet member whereby to actuate the chuck jaws into gripping or non-gripping relation relative to said shank, an electrically operated heating coil wound on said chuck spindle, and means inclusive of said barrel to impart a slight axial movement to the sleeve, whereby to actuate the chuck jaws.

11. In a modeling tool of the character described, the combination of a body portion including a barrel of insulating material and a sleeve at one end thereof, a working point having a tip and a shank, a chuck operatively arranged in the sleeve and comprising spindle and jaw portions and a collet member, the said sleeve being operative, upon slight axial movement, to engage the collet member whereby to actuate the chuck jaws into gripping or non-gripping relation relative to said shank, an electrically operated heating coil wound on said chuck spindle, and a member threadedly engaged with said body portion near the other end of the barrel operative to impart a slight axial movement to the sleeve, whereby to actuate the chuck jaws.

12. In a modeling tool of the character described, the combination of a body portion comprising an insulating holding barrel and a sleeve disposed in axial alignment therewith, a working point having a shank, means operatively disposed in the sleeve to hold the point in working relation, a heating coil arranged in the sleeve and surrounding the shank for heating the holding means and the working point, and a heat protective guard disposed between the barrel and sleeve, whereby to protect the fingers of the operator from heat engendered by said coil.

13. In a modeling tool of the character described, the combination of a body portion comprising an insulating holding barrel and a sleeve disposed in axial alignment therewith, a working point having a shank, means operatively disposed in the sleeve to hold the point in working relation, a heating coil arranged in the sleeve and surrounding the shank for heating the holding means and the working point, a heat protective guard disposed between the sleeve and barrel, and a finger grip disposed adjacent said guard and about said barrel, said guard and grip being operative to protect the fingers of the operator from heat engendered by said coil.

14. In a modeling tool of the character described, a body portion comprising a holding barrel and a sleeve disposed in axial alignment therewith, an electrically heated chuck operatively mounted in said sleeve, a working point having a shank adapted to be gripped

by said chuck, said chuck being releasable upon slight axial movement of the sleeve whereby to release the shank, and means remote from said sleeve actuable to impart a slight axial movement thereto.

Signed at Washington, District of Columbia, this third day of July, 1929.

CHARLES MACHENRY LINDSAY.

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