Sept. 3, 1940. L. P. YOUNG 2,213,439

SOLDERING IRON STAND

Filed Dec. 12, 1938

Fig. 1.

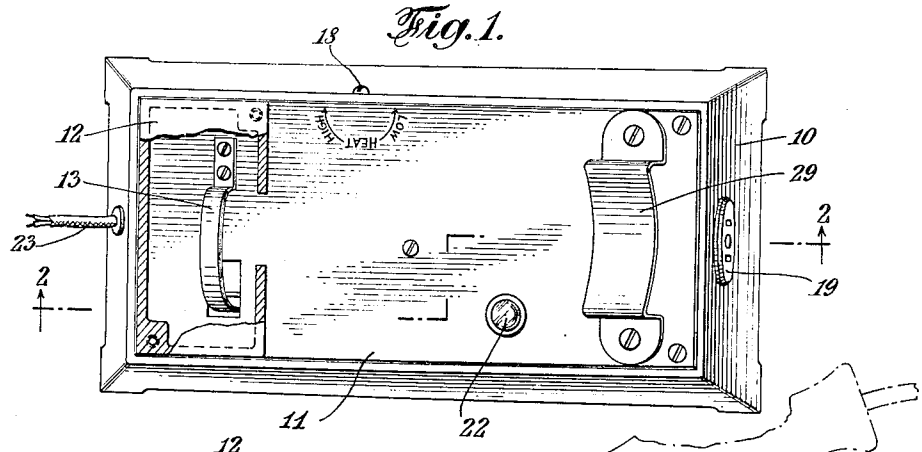


Fig. 2.

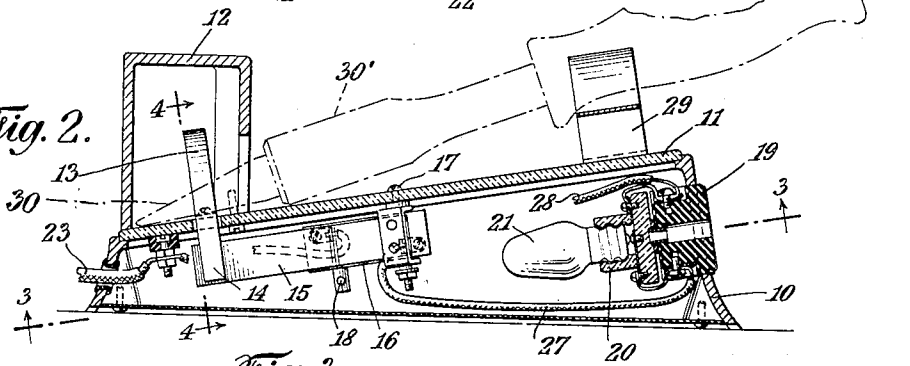


Fig. 3.

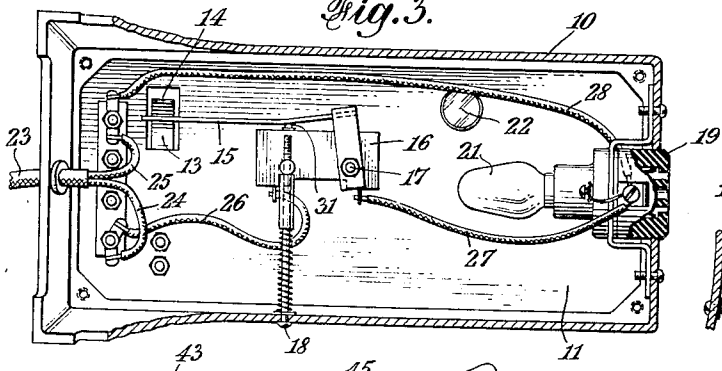
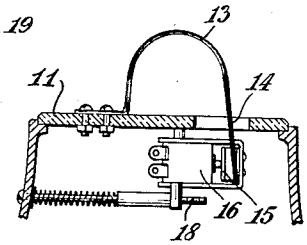


Fig. 4.



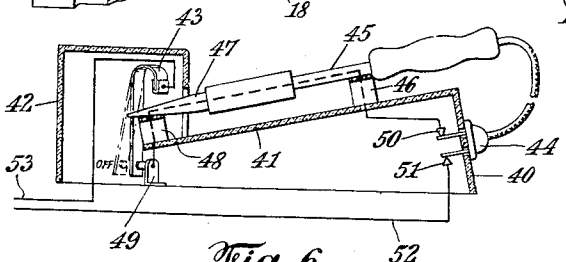
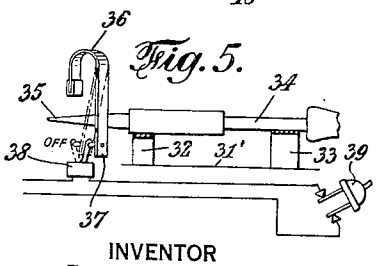


Fig. 6.

Fig. 5.



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Patented Sept. 3, 1940

2,213,439

UNITED STATES PATENT OFFICE

2,213,439

SOLDERING IRON STAND

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Application December 12, 1938, Serial No. 245,097

11 Claims. (Cl. 219—26)

This invention relates to stands for electric soldering irons in general, and particularly to stands for thermostatically controlling the current energizing an electric soldering iron by means of the heat emanating from the tip of such iron. Stands for electric soldering irons and control means for governing the electric current energizing them are known, but most of these devices are either too complicated and too cumbersome or require most exacting care in their construction and manufacture, or are so delicate and fragile that they become either impractical or too expensive from the commercial standpoint.

The primary object of the present invention is to provide a relatively simple, inexpensive, rugged and positively operative device of this kind which is adapted to be governed not by the heat of the heating element of an electric iron, but by the heat of that portion of an electric iron which is most detrimentally affected by an excess of heat, that is the soldering tip of the electric iron.

Another object of my invention is to so construct the thermostat control of my device, that a positive and quick action for the opening or closing of the circuit energizing the electric iron is assured.

Another important object of my invention is to provide a new combination between the tip of an iron and a thermostatic element, wherein the latter virtually surrounds the tip, so as to become readily influenced by the temperature of the latter, and wherein means are provided to concentrate the heat, emanating from the tip, about the thermostatic element, thus causing the latter to react quickly to the influence of the tip temperature.

The foregoing and a number of other objects and important advantages of my disclosure will become more fully apparent from the ensuing description, in conjunction with the accompanying drawing, which latter, also showing preferred embodiments of the present invention, are by no means intended to limit me to the actual showing and in which

Fig. 1 is a plan view, partially in section of my stand,

Fig. 2 is a vertical cross section through my stand taken on line 2—2 of Fig. 1.

Fig. 3 is a bottom view of my stand, partially in section, taken on line 3—3 of Fig. 2.

Fig. 4 is a fragmental cross section through my stand taken on line 4—4 of Fig. 2.

Fig. 5 is a diagrammatical illustration of my stand in a modified form, and

Fig. 6 is a diagrammatical vertical cross section of another embodiment of my stand.

Referring now specifically to Figs. 1, 2, 3, and 4, numeral 10 denotes a base, one end of which is higher than the other, and upon which base is mounted a dielectric platform 11 for the support of an electric soldering iron. At the lower end of the platform there is provided an apertured housing 12 for accommodating the tip of the soldering iron, and for concentrating its heat within a limited space. Within the housing there is secured a relatively thin, curved, or bowed thermostatic element 13, adapted to closely surround an inserted tip. The free end 14 of the element extends through a suitable opening in platform 11 downwards into the interior of base 10 and is adapted to actuate a lever 15 controlling a switch 16. The latter is pivotally mounted at 17 to platform 11, and its position may be adjusted by suitable means indicated at 18, whereby the distance between end 14 of the thermostatic element and lever 15 may be altered.

Secured at the high portion of the base is a dielectric plug receptacle 19 for the reception of a plug to which the conduits of an electric soldering iron are attached. Secured to the plug receptacle is an electric socket 20 of a light source 21. The latter is connected in parallel with the contact points of plug receptacle 19.

In the dielectric platform is mounted a light window 22 for permitting the peneration of light emanating from light source 21 when the electric iron is in operation.

Through the lower end of the base enters cable 23, conveying through conduits 24 and 25 electric energy for supplying current to the electric iron. From lead 24 current passes through conduit 26, over switch 16 and conduit 27 to one potential of plug receptacle 19 and light source 21. Lead 25 is connected through conduit 28 to the other potential of the receptacle and of the light source, as may be clearly seen from Fig. 3. At the high end of base 10 there is secured to platform 11 a support 29, which serves to accommodate the handle end of the iron, while the tip 30 of the iron, indicated in broken lines in Fig. 2, passes through a suitable opening into housing 12, so that thermostatic element 13 completely or partially surrounds the iron tip.

Operation

When the plug of the iron cable is inserted in plug receptacle 19, and current is supplied through cable 23 to the stand, switch 16 normally is closed and current flows to heating ele-

ment 30' of the iron. It is to be noted that the heating element 30' is located entirely outside of housing 12, which latter only accommodates tip 30 of the iron; consequently, only the heat of the iron tip, and not the temperature of the heating element, influences thermostatic element 13.

When the tip of the iron reaches a predetermined degree of heat, thermostatic element 13, shielded within casing 12, is caused to move towards, and finally operatively engages and actuates lever 15 of switch 16, which lever then depresses a button 31, which throws the switch, thereby causing the opening of the circuit.

While electric current passes into the heating element of the iron, light source 21 will illuminate window 22, providing visible indication that the iron is being heated. The moment switch 16 is operated to a circuit breaking position, the light source will also become de-energized, indicating that current is cut off from the iron. When the tip of the iron has cooled off to a predetermined degree, thermostatic element 13 will move towards its normal position, at which it will release lever 15. At that moment button 31 will revert to its normal position, thereby actuating the switch to a circuit closing position for again supplying electric energy to the iron.

The operation of the switch may be adjusted to the desired temperature ranges required for heating and de-energizing the iron, by simply adjusting the distance between end 14 of the heating element and lever 15 for actuating the switch. This may be readily accomplished in bodily moving switch 16 about its pivot 17, by means of spring-equipped adjusting screw 18, in operative engagement with a swivel nut of the switch. When turning the screw 18 in one direction, lever 15 will move towards end 14 of the thermostatic element, while when turning it in opposite direction, the distance between the lever and the thermostatic element will be increased. Thus the switch may be readily adjusted to operate at a desired maximum heat of the tip, at which the switch will break the circuit, and to a desired minimum heat of the tip, at which the switch will operate to close the circuit.

Modifications

Another construction of my device is illustrated in Fig. 5 in diagrammatical form, wherein a platform 31' is indicated, provided with supports 32 and 33 for accommodating iron 34, the tip 35 of which is disposed within the loop formation of thermostatic element 36. The lower, free end 37 of this element engages the actuating lever of a switch 38, which controls the current passing into the plug 39, from which conduits lead to iron 34. In this drawing the light source is omitted for the sake of simplicity.

Still another modified form is illustrated diagrammatically in Fig. 6. Here I again provide a base 40 with a dielectric platform 41, and a dielectric tip housing 42, within which is mounted a thermostatic element 43, which in this case forms a conductive part of the circuit. In base 40 there is again mounted a plug receptacle adapted to accommodate plug 44 of the electric iron, which latter rests with its conductive portion 45 upon a support 46, whereas its tip 47, which is also conductive, reposes upon support 48. The latter is electrically connected with stationary contact point 49, while support 46 is connected with one potential of plug 44, as indicated at 50. To the other potential of the plug connects at 51 a conduit 52, leading to an electric source of energy. The other lead 53 connects with thermostatic element 43, at the free end of which latter is provided a contact, opposite contact 49. In this construction the conductive part of the electric iron forms also a portion of the circuit. Thus when the iron and the tip are resting upon their respective supports, and when thermostatic element 43 is in its normal, full-line position, electric current supplied through leads 52 and 53 will energize the heating element of the iron. The moment the temperature within housing 42 reaches a certain predetermined degree, thermostatic element 43 will swing outwards to its broken line position, whereby its contact will separate from stationary contact 49, thus interrupting the current supplied to the iron. When the temperature of the tip is sufficiently reduced, while the iron rests upon its supports, or when the iron is removed from its supports, thermostatic element 43 will reverge to its normal, circuit closing position.

It is to be observed that the embodiments shown in Figs. 1 to 4, inclusive, provide for current passing to the iron, while it either rests upon the stand or while the iron is being used; the modified form shown in Fig. 6, however, is intended to provide for energizing the heating element of the iron only when the iron is on the stand.

One of the important features of my invention resides in the fact that the current supplied to the iron is controlled not by the entire heated body of the iron, or by the heat emanating from its heating element, but merely by the heat radiated from the tip of the iron, since the tip forms that portion of an electric soldering iron which is most adversely affected by an excess of heat, in that it oxidizes and pits when overheated. It is the purpose of this invention to prevent the abnormal deterioration of the tip due to overheating. For this reason I have arranged to control the current by the heat emanating from the iron tip. A further advantageous point of my device consists in the arrangement of the thermostatic element in respect to the tip; it virtually surrounds and is practically directly affected by the heat of the tip.

For the purpose of providing for a relatively quick, if not an instantaneous operation of the thermostatic element, it is required to shape and dimension the bi-metal in accordance with the size of the tip. By the same token it may be desirable to change the relation or position of the bi-metallic element in respect to the tip. This is particularly true in the case of large tips, which become very hot and retain heat longer than small tips. For large tips I therefore prefer to use a relatively short loop of thermostatic metal, arranged to one side of the tip. It reacts quickly to temperature changes of the tip and works very satisfactorily. It is to be stated here that it is immaterial whether the bi-metallic element flexes inwardly or outwardly, for which reason the position of the bi-metallic element operating the switch may be readily arranged to suit different conditions.

Another important factor in the construction of my device resides in the employment, in conjunction with my quick-acting thermostatic element of an equally quick-acting switch of the spring type, which will at the slightest pressure or release, break or make contact.

Although in Figs. 2 and 3 a spring-type switch is illustrated, whereas in Fig. 5 a toggle switch

is shown, it is quite obvious that for larger capacities, mercury or other type switches may be readily substituted for the switches shown. This would be particularly advantageous where direct current is employed which has a tendency of damaging the contact points of ordinary switches.

Summarizing, from the foregoing description it will become clear that the tip of an electric soldering iron is the most important part requiring careful attention. Since the tip is most adversely affected by an excess of heat, it is very essential to control the temperature of the tip directly, which I am accomplishing in my device. In the event the control of the tip temperature should become influenced or directly governed by the heat radiating from the heating element or the body of a soldering iron, there would occur a considerable lag in temperature changes, due, for example, to the higher heat of the element, to the retention of the heat by the iron body, and a number of other factors which would impair an accurate and relatively quick operation of the heat controls, and therefore cause injury to the tip through overheating.

It is well established that the temperature of the tip is of paramount importance in the soldering operation of an iron. The temperature of the tip may be either too low or too high for soldering, or it may be just correct. Too high a temperature invariably results in oxidation of the tip, producing untinned surfaces and making it impossible to solder; too low a temperature will not melt the solder. It is therefore essential that the temperature of the tip remains below the oxidation temperature and sufficiently high to melt the solder.

The above reasons clearly point to the correctness of my assumption that the control of the current supplying the soldering iron element must be governed by the radiation of the heat emanating from the tip itself. In so doing, I eliminate lags in the functions of such control, due to slow temperature changes, slow heat transfer, or other adverse conditions, such as the difference between the temperature of the tip and the temperature of the heating element; my device actually controls the heat of the tip by the temperature thereof, which I consider the only correct heat control for that part of the iron, the ultimate purpose of which is to be always in prime condition for its intended work of soldering.

While I have shown specific construction of my device, it is to be understood that variations and improvements may be incorporated therein, and I, therefore, reserve for myself the right to make changes and improvements as may be deemed necessary, all within the scope of the annexed claims.

I claim:

1. In a stand for electric soldering irons, means for accommodating the tip of such iron, exclusive of its heating element, a thermostatic element arranged in such near proximity to the tip accommodating means as to be directly influenced by the temperature of the tip only, a normally closed, adjustable electric switch operable by said thermostatic element, the latter being constructed and arranged to cause the operation of the switch to open the electric circuit, supplying current to the soldering iron, when the tip has reached a desired degree of heat, and to release said switch to its normal, circuit-closing position when the degree of heat of the tip has dropped to a certain minimum.

2. In a stand for electric soldering irons, an inclined platform, substantially fully enclosed means at the lower end thereof for accommodating the tip of the iron only, exclusive of the heating element, means at the higher end of the stand for supporting the handle-end of the iron, a thermostatic element arranged within said enclosed tip accommodating means and exposed to the temperature of the tip, and a switch, controlling the current energizing the iron, actuated by said element.

3. In a stand for electric soldering irons, as set forth in claim 2, said tip accommodating and said handle-end supporting means being electro-conductive, an electric soldering iron electrically connecting both of said means, thereby closing a circuit supplying electric energy to the iron.

4. In a stand for electric soldering irons, a base, an inclined, dielectric platform upon the base, a completely closed housing having but one opening for accommodating the tip of an iron only, at the lower end of the platform, a support for the handle-end of the iron at the higher end of the platform, a looped thermostatic element within the housing adapted to surround the tip of the iron, an electric switch, controlled by said element, and arranged beneath said platform within the base, for normally closing the electric circuit energizing the iron, a plug receptacle at the side of and a light source within the base, said light source adapted to become energized when the plug of an electric iron is inserted into said receptacle, and a light indicator for making visible the energized light source.

5. In a stand for electric soldering irons, as set forth in claim 4, said element being adapted to operate said switch to a circuit breaking position, when the tip of the iron reaches a desired maximum of heat, and to release the switch when the heat of the tip drops to a desired minimum, and means extending through the side of the base for adjusting the operation of the switch by said element, at desired temperatures of the tip.

6. In a heat control stand for electric soldering irons, separate tip and handle-end supports for an iron, a curved thermostatic element surrounding the tip support and controlling the flow of electric energy supplying the iron, said element being directly influenced by the temperature of only the tip of the iron.

7. In an electric iron stand for controlling the electric current for energizing the iron, a platform for supporting an iron, a housing for receiving the tip of the iron, exclusive of the heating element, a thermostatic element in said housing and adapted to surround the tip and to be influenced by the temperature thereof when the tip is placed in the housing, a light source, switch means for closing and opening an electric circuit energizing the iron, said light source and said switch means being disposed beneath the platform and within the stand and controlled by said thermostatic element.

8. In an electric iron stand for controlling the electric current for energizing the iron, as set forth in claim 7, light transmitting means and a plug receptacle provided with the stand, and means for adjusting said switch means.

9. In an electric iron stand for controlling the electric circuit for energizing the iron, the combination with substantially fully enclosed means for accommodating the iron's tip only, exclusive of its heating element, of a thermostatic element so disposed in respect to said tip accommodating

means that it will surround the inserted tip of an iron, whereby the thermostatic element becomes directly influenced by the tip's temperature, an electric switch remote from said tip and from said thermostatic element, the latter being adapted to operate said switch, said switch normally closing the electric circuit and being adapted to be opened by said element when the latter becomes subjected to heat emanating from said tip.

10. In a stand for electric soldering irons, a base, a dielectric platform thereon, a housing for the tip of the iron, a thermostatic element in said housing adapted to surround the tip when inserted into the housing, an adjustable circuit controlling switch and a light source within the base, a plug receptacle mounted with the base, light transmitting means in said platform, said thermostatic element adapted to actuate said switch, an electric soldering iron reposing upon said platform with the tip in the housing, the electric conduits of the iron being associated with said plug receptacle, leads from an electric source of energy, one of the leads being connected with the plug receptacle and the light source over the switch, said switch normally closing the electric circuit for energizing the iron and said light source, said thermostatic element, being exposed to the heat from the tip, adapted to actuate the switch to a circuit opening position, when heated by the tip to a predetermined temperature.

11. In a stand for electric soldering irons, as set forth in claim 10, conductive tip supporting means in the housing, a conductive support for the conductive part of the iron, the other lead to the plug receptacle and the light source being connected with said tip supporting means and said conductive support in such a way that the conductive body portion of the iron resting on the stand forms a part of the electric circuit.

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