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Knowles et al.

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[54] **STAND FOR CHARGING AN ELECTRIC TOOL AND THE COMBINATION OF THIS STAND WITH SUCH A TOOL**

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[51] **Int. Cl.**[2] **H05B 1/00**; H01M 10/46

[58] **Field of Search** 219/221-242, 219/521, 247, 246, 256, 257, 258, 267, 268; 320/2; 248/117.1, 117.2; 339/58

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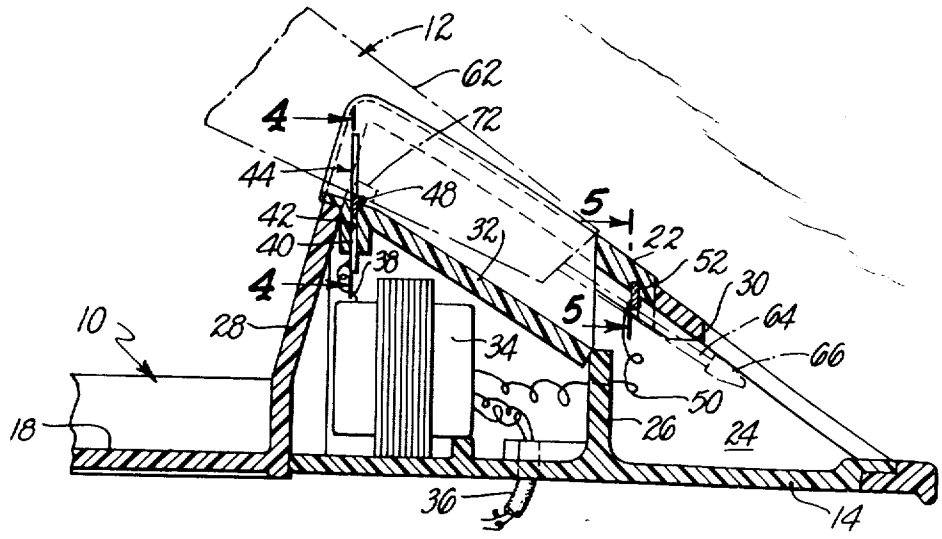
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[57] **ABSTRACT**

An electric tool such as a soldering iron can be constructed so as to be capable of being supported on a stand in such a position that an electric current is supplied to the tool. First and second contact elements are horizontally displaced from one another on the stand and are located so that an end of the tool can be inserted generally between them. First and second contact members are located on the tool in positions in which they can engage the contact elements. When the tool is in place upon the stand a portion of the tool projects from the side of the first contact element remote from the second contact element. This portion is sufficiently heavy so as to tend to pivot the tool about the first contact element in such a manner that the first contact element is in electrical communication with the first contact member and in such a manner that the second contact member is against and in electrical communication with the second contact element.

9 Claims, 5 Drawing Figures



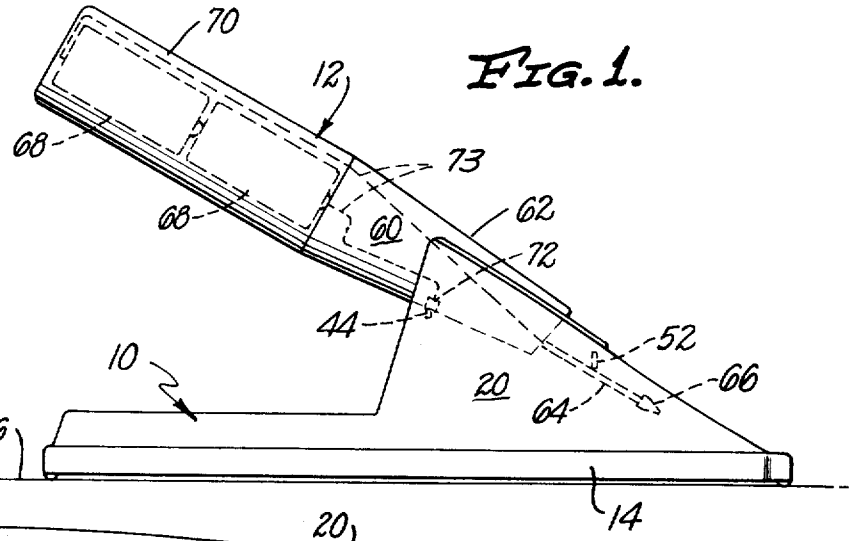


FIG. 1.

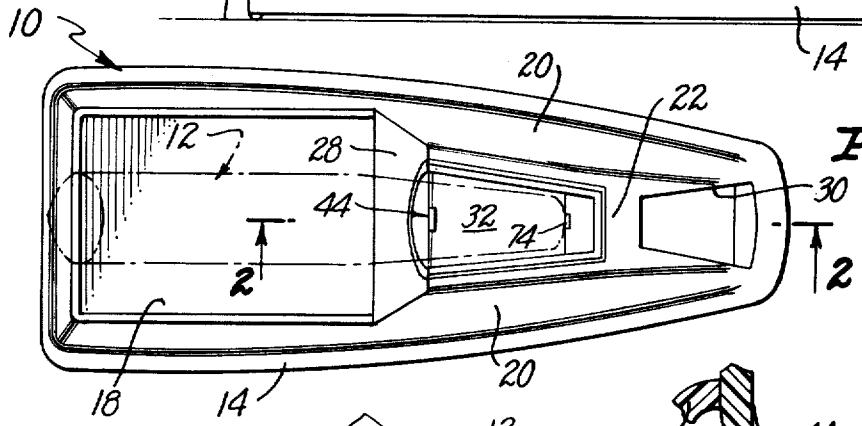


FIG. 2.

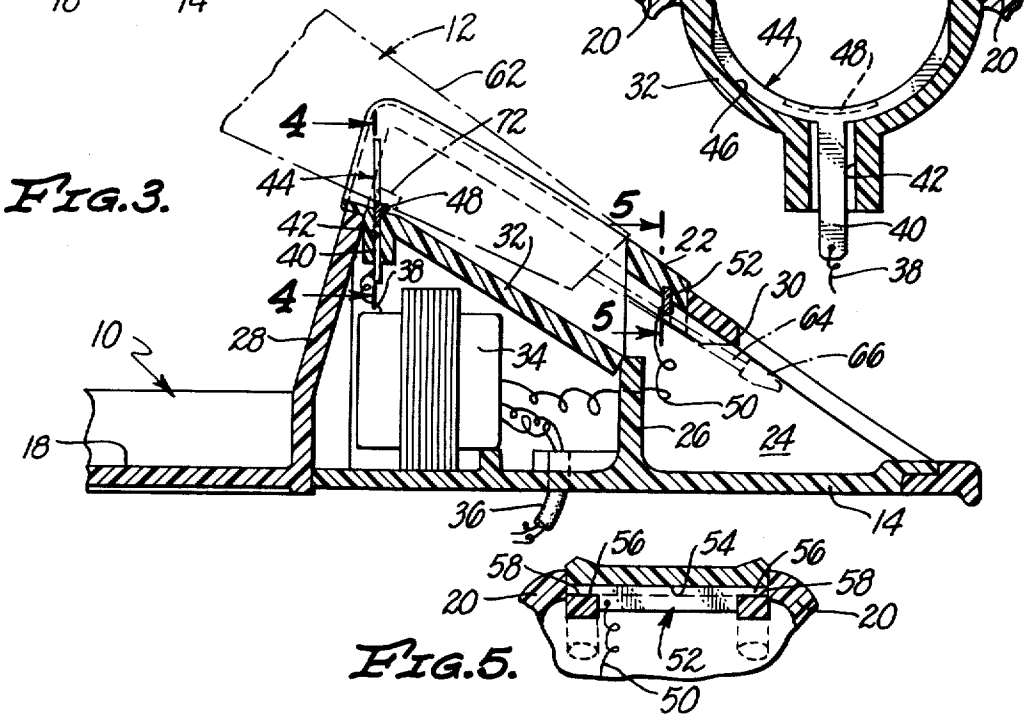


FIG. 3.

FIG. 4.

FIG. 5.

STAND FOR CHARGING AN ELECTRIC TOOL AND THE COMBINATION OF THIS STAND WITH SUCH A TOOL

BACKGROUND OF THE INVENTION

Frequently it is necessary or desirable to supply an electric tool with electricity as such a tool is supported by a stand or the like. Thus, for example, in the field of battery operated soldering irons and similar implements it is normally desired to supply an electric current to such a soldering iron or other implement to charge one or more batteries within such a soldering iron or other implement.

In the past a number of different support structures or stands have been developed for the purpose of supplying an electric tool with electricity as such a tool is supported in the stand. It is considered that a detailed understanding of the present invention does not require a detailed consideration and discussion of the various prior structures which have been utilized for this purpose. Generally speaking, such prior structures have normally used what may be referred to as "plug-in type" electrical connections. This expression "plug-in type" electrical connections is considered to designate a wide variety of different types of known electrical plugs and sockets.

While unquestionably plug-in type electrical connections are satisfactory in transferring current from a stand to an electrical tool such structures are considered to be unnecessarily complex and expensive even though they are, in many respects, quite simple. In the field of electrical implements, tools and appliances economic considerations are quite important and the avoidance of seemingly small, insignificant costs can be critical from a commercial standpoint. Further, plug-in type electrical connections can be considered as somewhat disadvantageous from a utilitarian standpoint because of the minor amount of manual manipulation required in the use of some connections. In the field of electrically operated tools, appliances and the like ease of use also tends to be quite critical in effecting the commercial acceptability of an item.

SUMMARY OF THE INVENTION

A broad objective of the present invention is to provide a new and improved support structures or stands for use in transferring an electric current to an electric tool positioned upon such a stand. A related generalized objective of the invention is to provide a new and improved combination of a stand and an electric tool in which current can be transferred through the stand to the tool. Both of these broad objectives of the invention are directed towards providing comparatively inexpensive stands and tools which may be effectively and easily utilized. The invention is also intended to supply stands and tools which may be employed over a long period with a minimum of maintenance.

The invention concerns a stand for supporting an electric tool and for supplying electricity to contact members on the tool in which the improvement comprises: first and second electrical contact elements located on the stand so that when the tool is supported on the stand a contact member on the lower part of the tool engages the first electrical contact element and so that a contact at the upper part of the tool engages the second contact and means for regulating the position of the tool on the stand so that the tool is supported on the stand so that the contact elements are so engaged and so that a portion of the tool projects outwardly away from the side of the first contact element remote from the second contact element, this portion being sufficiently heavy to hold the tool in engagement with the contact elements.

The invention also encompasses the combination of such a tool and such a stand with the tool being located on the stand so that the weight of the portion of the tool noted holds the contact members in engagement with the contact elements so that a current can be passed between the stand and the contact members. The precise constructions of the stand and of the tool are best determined in accordance with the specific nature of the tool involved. Thus, for example, it is considered that normally the stand and the tool will be constructed differently if the tool is a battery operated soldering iron to be used on a table top than if the tool is an item such as a battery operated cutting knife.

BRIEF DESCRIPTION OF THE DRAWING

Further details of the present invention are best more fully explained with reference to the accompanying drawing in which:

FIG. 1 is a side elevational view of a presently preferred embodiment or form of a stand of the invention used in combination with a presently preferred embodiment or form of a tool in accordance with this invention;

FIG. 2 is a top plan view of the stand shown in FIG. 1.

FIG. 3 is a partial cross-sectional view taken at line 2—2 of FIG. 2;

FIG. 4 is a partial cross-sectional view taken at line 4—4 of FIG. 3; and

FIG. 5 is a partial cross-sectional view taken at line 5—5 of FIG. 3.

The stand and the tool illustrated in the drawing are embodiments of structures utilizing the concepts or features of the invention summarized or defined in the appended claims. These concepts or features may be utilized in a variety of somewhat differently appearing and differently constructed stands and tools through the use or exercise of routine engineering skill on the basis of the disclosure embodied within this specification and in the drawing.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

In the drawing there is shown a stand **10** and a soldering iron **12** which are intended to be utilized in combination with one another as herein indicated. Except as indicated the internal structure of the soldering iron **12** is conventional. The stand **10** is constructed so as to include an electrically non-conductive base **14** which is adpated to be supported on an appropriate horizontal surface **16.** This base **14** includes a rearwardly extending recess which is adapted to hold a sponge or the like (not shown). The base **14** also includes upstanding, curved side walls **20** which are connected by a wall **22** so as to define an internal cavity **24.** Within the interior of this cavity **24** there is located an internal wall **26** which is spaced from the wall **22** as shown in FIG. **3** of the drawing.

One end of this cavity **24** is closed off by a wall **28** extending between the walls **20.** The front of this cavity **24** is open to the exterior of the stand **10** through an opening **30.** The walls **26** and **28** support and carry an

interior "cradle" type of wall **32** having substantially the shape of a frustrum of a cone. As hereinafter indicated this wall **32** serves as a support structure or means. This wall **32** extends between the walls **20** and closes off the space between the walls **26** and **28.** This space under the wall **32** may be conveniently utilized to hold a transformer **34** or the like used to supply a current to the soldering iron **12.** This transformer **34** is preferably mounted on the base **14** in a conventional manner and may be connected to conventional electric lines (not shown) through a conventional electric cord **36.**

In the structure shown one terminal (not shown) of the transformer **34** is connected by an electric wire **38** to an extending tab **40** which is positioned so as to extend through a slot **42** in the wall **32.** This tab **40** is formed integrally with an electrically conductive semicircular support and contact element **44** which rests in a groove **46** extending generally between the walls **20** in the wall **32.** This element **44** preferably includes a small bent over flange **48** in its center region which engages the wall **32** so as to aid in positioning the element **44** in the location as shown. In this location the element **44** extends a short distance above the wall **32.** In the stand **10** the other terminal (not shown) of the transformer **34** is connected by another electrical wire **50** to another contact element **52** positioned in a groove **54** located in the lower surface of the wall **22** so as to extend generally between the walls **20.** This element **52** is supported in the groove **54** by small extensions **56** on it fitting within cavities **58** as shown in FIG. **5** so that the contact element is exposed beneath the wall **22.**

The soldering iron **12** has a housing **60** terminating in a forwardly directed, tapered nose portion **62** which is shaped so as to fit within and be "cradled" within the wall **32.** This nose portion **62** carries an extending, electrically conductive tube **64** which in turn carries a conventional or known soldering tip **66.** During the use of the soldering iron **12** it is intended that this tip **66** be supplied with electric current in a known manner from batteries **68** which are principally or primarily located in the tail portion **70** of the housing **60.** When the soldering iron **12** is in a position as shown it can receive a current from the transformer **34** by virtue of a contact member **72** on the nose portion **62** of the housing **60** abutting against the contact element **44.** The circuit is completed by the tube **64** abutting against the contact element **52.** Wires **73** shown schematically in FIG. **1** may be used to connect the contact member **72** and the tube **64** to the batteries **68** in a known manner. Because of the function of the tube **64** in transferring current into the soldering iron **12** it may be referred to as another or second contact member.

Firm contact is normally maintained to transfer current because of the weight of the soldering iron **12** tending to press the contact member **72** down against the contact element **44.** The weight of the batteries **68** is primarily important in this regard; it also tends to pivot the soldering iron **12** about the contact element **44** so as to establish firm contact between the tube **64** and the contact element **52.**

From this it will be seen that several significant relationships are required for the stand **10** and the soldering iron **12** to be operative in transferring current. The contact elements **44** and **52** must be horizontally positioned or displaced with respect to one another. Preferably they are located vertically relative to one another as shown so that the exposed portion of the element **44** is above the exposed portion of the element **52** in such a manner that the soldering iron **12** is held at an angle to the horizontal which is less than 90° or non-vertical in character. An angle of from about 30° to about 60° is considered best since at such an angle it is convenient to manually engage the soldering iron **12** and to move it into an out of position on the stand **10.**

Further in order to obtain the desired results the soldering iron **12** is constructed so that as it is inserted into a charging position on the stand **10** the principal weight of the soldering iron **12** is on the side of the element **44** removed from the element **52.** This is necessary in order to attain the pivoting action indicated in the preceding discussion.

In the preferred manner of practicing the invention the walls **22** and **32** and the contact elements **44** and **52** are positioned as shown so that gravity will tend to move and hold the nose portion **62** of the soldering iron **12** against the wall **22,** limiting the amount to which the soldering iron **12** can be inserted in the stand **10** to a sufficient extent so that the weight relationship indicated in the preceding discussion will be obtained and so that the contact members and elements indicated will engage one another. Thus with the structure of the stand **10** described in the wall **22** in effect acts as a stop means or stop element. When the soldering iron **12** is in the position shown the tip **66** is generally adjacent to the opening **30** so that any residual heat within this tip **66** can be dissipated to the ambient air.

It is believed that the utilization of the stand **10** with the soldering iron **12** will be obvious from the preceding description. When the soldering iron **12** is to be removed from the stand **10** it is pivoted upwardly a slight amount so that the tip **66** will clear the element **52** as the soldering iron **12** is withdrawn from the stand **10.** When it is so withdrawn the electrical circuit used to supply current to the soldering iron **12** is automatically broken by the removal of the soldering iron **12.** This circuit is automatically reestablished by reinserting the soldering iron **12** in the stand **10** and releasing it so that automatically connection is established between the element **44** and the member **72** and the element **52** and the tube **64.** It will be realized that it is quite desirable to construct a stand **10** and a soldering iron **12** as illustrated for use in combination with one another. This should not be taken as indicating, however, that the invention is only applicable to a stand for used in connection with a soldering iron or that the tool for use in connection with the invention must be a soldering iron. The broad concepts of the invention can be applied wherever there is need for transferring electric current between a base and a tool or implement which is removably mounted on such a base or stand.

We claim:

1. In a stand for supporting an electric tool having a contact member on the upper part thereof and a contact member on the lower part thereof, said tool including electrical utilization means connected to said contact members, and for supplying electricity to contact members on said tool the improvement which comprises:

first and second spaced electrical contact elements located on said stand, said contact elements being spaced apart, said first contact element facing upwardly, said second contact element facing downwardly, so that when said tool is supported on said stand said contact member on the lower part of said tool engages said first electrical contact ele-

ment and so that said contact member on the upper part of said tool engages said contact element, and

cradle means on said stand for regulating the position of said tool on said stand and so positioned with respect to said contact elements that said tool can only be supported on said stand with said contact elements so engaged with said contact members so that a portion of said tool projects outwardly of said cradle means, away from the side of said first contact element remote from said second contact element, said portion being sufficiently heavy and said contact members being so positioned relative to the center of gravity of said tool so that the contact members of said tool are held in engagement with said contact elements by the force of gravity, and

means for connecting said contact elements on said stand to an external source of power.

2. A stand for used in supporting and electric tool having a pair of spaced contacts for supplying electricity to said tool which comprises:

a base means for use in supporting said stand,

a support structure on said base means, said support structure being capable of positioning said tool in only one position so that a portion of said tool projects from and is horizontally displaced from said support structure, said support structure being shaped so that said tool may be inserted into and removed from said support structure, said tool extending outwardly from a side of said support structure when it is so inserted,

first and second contact elements located on said support structure so as to be displaced horizontally from one another, said support structure and contact elements being so constructed and arranged that, when said tool is inserted into said stand between said contact elements, said contact elements engage diametrically opposed surfaces of said tool and said tool is positioned by said support structure with said contacts engaged with said contact elements and the weight of said portion of said tool projecting from said support structure brings a first contact of said tool into electrical contact with said first contact element and pivots said tool about said first contact element to bring the other tool contact into electrical contact with said contact element.

means for connecting said contact elements on said stand to a source of power.

3. A stand as claimed in claim **2** wherein:

said support means includes a stop means for limiting the extent to which said tool may be inserted into said stand, said stop means insuring alignment of said contact members on said tool with said contact elements on said stand and preventing said tool from being inserted into said stand to such an extent that said portion of said tool does not project from said support structure.

4. The combination of an electric tool and a stand holding said tool in which the improvement comprises:

cradle means on said stand for regulating the position of said tool on said stand,

first and second electrical contact elements located on said strand, adjacent to said cradle means, said contact elements being spaced horizontally from one another,

first and second electrical contact members located on said tool so as to be spaced from one another an amount corresponding to the spacing between said first and said second contact element, said first contact member being located so as to be exposed on one surface of said tool and said contact member being located so as to be exposed on another, opposed surface of said tool,

said tool being capable of being inserted in said cradle means between said contact elements,

said tool when so inserted being located so that said first contact member is above and against said first contact element and so that said second contact member is below and against said second contact element and so that a portion of said tool extends outwardly away from the side of said first contact element remote from said second contact element, said portion being sufficiently heavy and said contact members being so positioned relative to the center of gravity of said tool that said contact members are held in engagement with said contact elements by the force of gravity and means for connecting said contact elements on said stand to an external source of power.

5. The combination claimed in claim **4** including:

step means for limiting the extent to which said tool may be inserted between said contact members, said stop means insuring that when said tool in inserted between said contact elements that said contact members on said tool are positioned so as to engage said contact elements, said stop means also insuring that when said tool is so inserted that said portion of said tool will extend from the side of said first contact element remote from said second contact element.

6. The combination of an electric tool and a stand, said stand having a support structure for holding said tool, said tool being capable of being partially inserted into and being capable of being removed from said support structure, in which the improvement comprises:

said support structure including cradle means capable of holding said tool in only one position so that said tool extends outwardly from said support structure at an angle so that at least a portion of said tool projects from and is horizontally displaced from said support structure,

a first upwardly directed and a second downwardly directed electrical contact element located on said stand so as to be horizontally displaced from one another in positions in which they are engaged by said tool when said tool is inserted between said contact elements and said tool when said tool is held by said cradle means,

a first downwardly directed and a second upwardly directed electrical contact member located on said tool so as to be in engagement with a respective one of said contact elements on said stand when said tool is inserted between said contact elements and is held by said support structure,

said contact elements and members being located on said stand and on said tool, respectively, so that when said tool is held by said support structure the weight of the portion of said tool projecting from said support strucutre holds said first upwardly directed contact element and said first downwardly directed contact member against one another so as to establish electrical contact between said first contact member and said first contact element and the weight of the portion of said tool projecting from said support structure causes a force tending

to pivot said tool about said first downwardly directed contact member to bring said second upwardly directed contact member against said second downwardly directed contact element to establish electrical contact between said second contact member and said second contact element, and means for connecting said contact elements on said stand to an external source of power.

7. In the combination of an electric soldering iron having a housing, batteries located in said housing for use in operating said soldering iron, a tubular conductor extending from one end of said housing, first and second contact members located on said housing so as to be exposed to the exterior of said housing, said contact members being electrically connected to said batteries, and a soldering tip formed on the extremity of said tubular conductor remote from said housing, said batteries being remote from said tubular conductor, said soldering tip being capable of being heated by a current from said batteries, and a stand, said stand having a support structure for holding said soldering iron, said soldering iron being capable of being partially inserted into and being capable of being removed from said support structure,

said support structure being capable of holding said soldering iron so that said soldering iron extends outwardly from said support structure at an angle so that at least a portion of said soldering iron projects from and is horizontally displaced from said support structure,

said support structure comprises a cradle adapted to contain the end of said housing from which said tubular conductor extends and a wall serving as a stop means located above and at the end of said cradle,

a first upwardly directed and a second downwardly directed contact element located on said stand so as to be horizontally displaced from one another in positions in which they are engaged by said soldering iron when said soldering iron is inserted between said contact elements and is held by said support structure,

said first contact member comprising an electrical conductor located on the bottom of said housing, said second contact member being said tubular conductor,

said first contact element on such support structure being located in the bottom of said cradle and on the extremity of said cradle remote from said stop means and being exposed to the interior of said cradle,

said second contact element on said support structure being located on the undersurface of said wall serving as said stop means and being exposed to the interior of said cradle so that when said soldering iron is inserted into said stand said tubular conductor extends past said stop means so as to be engaged by said contact element,

said contact elements and members being located on said stand and on said soldering iron, respectively, so that when said soldering iron is held by said support structure the weight of the portion of said soldering iron projecting from said support structure holds said first contact element and said first contact member against one another so as to establish electrical contact between said first contact member and said first contact element and the weight of the portion of said soldering iron projecting from said support structure causes a force tending to pivot said soldering iron about said first contact member to bring said second contact member against said second contact element to establish electrical contact between said second contact member and said second element, and means for connecting said contact elements to a source of power.

8. The combination claimed in claim 7 wherein:

said support structure and said contact elements are formed so as to hold said soldering iron so that said soldering iron extends upwardly and outwardly from said support structure at an angle of from about 30° to about 60°.

9. The combination claimed in claim 7 wherein:

said stand includes a ventilated opening which is located adjacent to said tip when said soldering iron is inserted in said stand.

* * * * *