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2,602,180

PNEUMATIC TOOL FOR CLEANING SWITCH BANKS

Filed Dec. 19, 1946

3 Sheets-Sheet 1

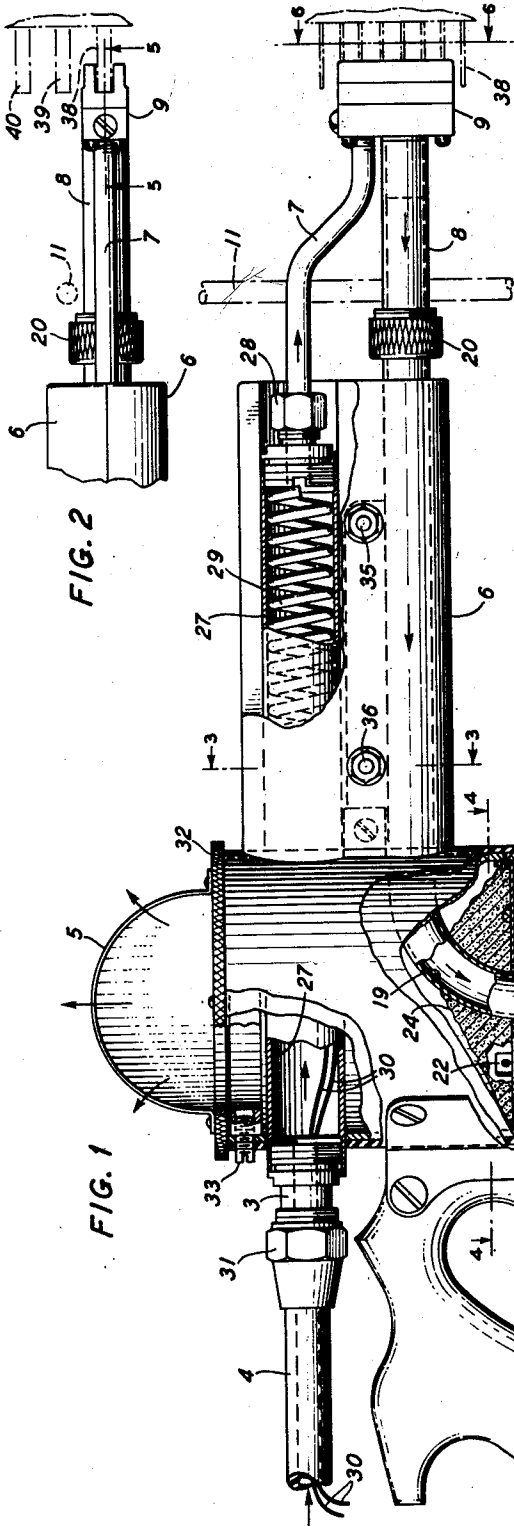
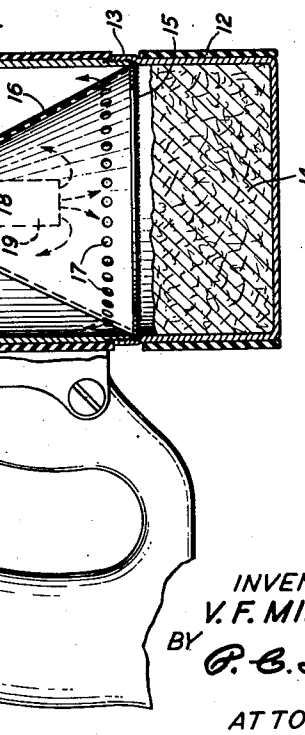
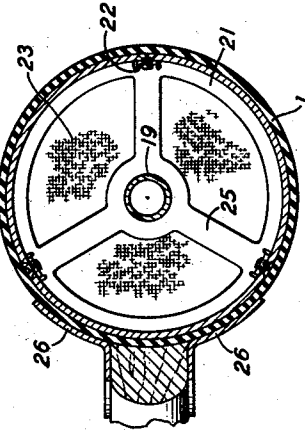


FIG. 2

FIG. 3



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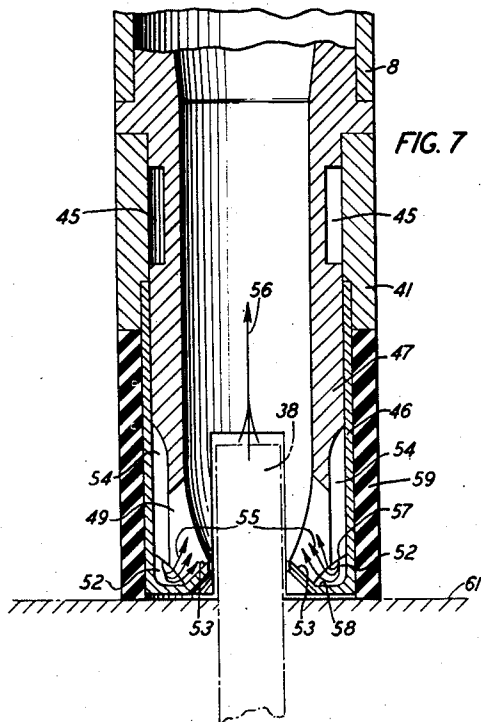
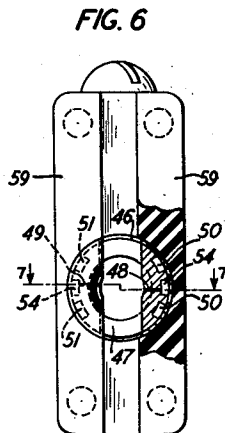
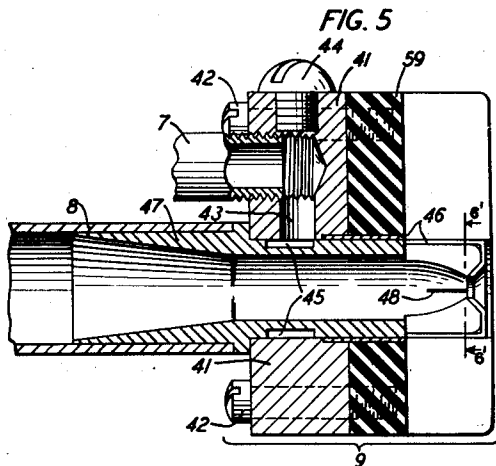
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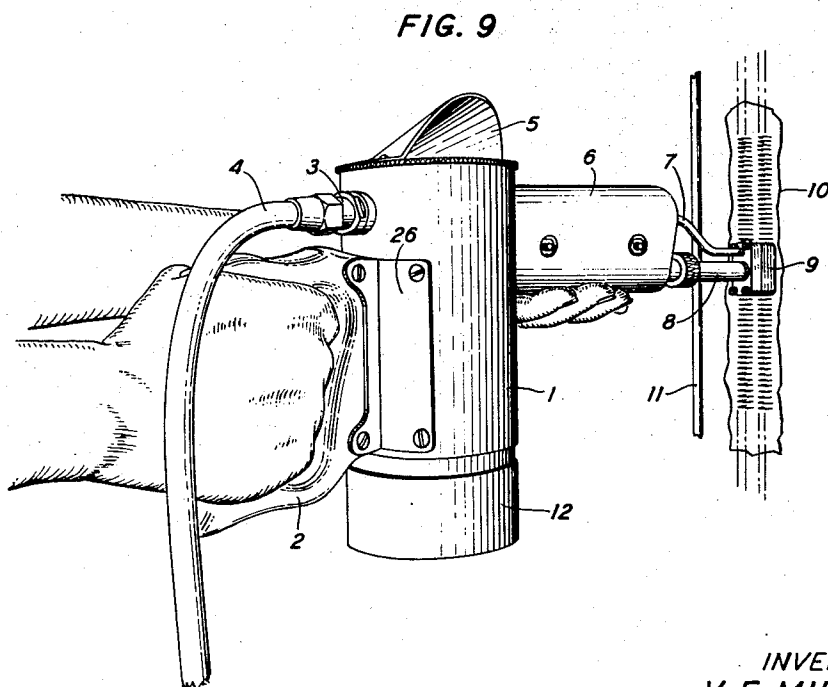
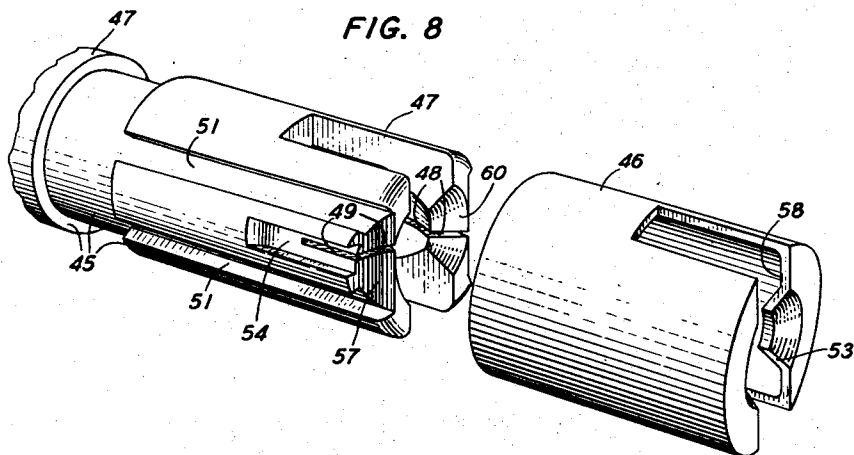
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PNEUMATIC TOOL FOR CLEANING SWITCH BANKS

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3 Sheets-Sheet 3



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PNEUMATIC TOOL FOR CLEANING
SWITCH BANKS

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3 Claims. (Cl. 15—339)

1

This invention relates to a machine for removing coatings of preservative and protective substances previously applied to electrical terminals and is more specifically related to a machine for removing such substances as petrolatum from terminals of panel telephone switching system terminal banks.

Heretofore it has been known that switching apparatus terminals included in telephone talking circuits impose undesirable noise into these circuits by virtue of the unstable contact resistance thereof caused largely by tarnish and dirt accumulations on the terminals. The prior art has met the problem by applying such substances as "Vaseline," commonly known as petrolatum, to the terminals in mixture with small amounts of other substances to control the flow and abrasive properties of the composite mixture. The application of this compound to the terminals prevents oxidizing agents from creating tarnish thereon and inhibits accumulation of globules or balls of dirt and link, etc. at the contacting area of same. Various methods of applying the compound have been used and various machines have been employed to perform the task.

Prior to the advent of the present invention, the methods of and machines for removal of said compound, after its useful life of perhaps one and one-half to two years, have been unsatisfactory for a number of reasons. Such machines are exemplified by combs and washing brushes whereby the compound has been combed or washed or brushed from the terminals. The use of such machines and methods have not efficiently removed all of the compound nor have they done so quickly and without attendant somewhat uncontrolled dirty conditions not to mention requirement of skill in so using them.

It is, therefore, the object of the present invention to provide a tool which will efficiently and effectively remove petrolatum or similar compounds from the bank terminals of switches with a minimum of deleterious effects and without requiring the services of a skilled operator.

To attain this object the present invention comprises a removing tool having a chamber for receiving the compound removed from the terminals, a special nozzle end adapted to engage the terminals, and means for employing heated air under pressure to force the compound from the terminals into the said chamber by virtue of the special construction of the said special end. The exhaust products are filtered and the used compound discarded. This tool removes all of the

2

compound on the terminals in a short time and does not require a skilled operator to operate same efficiently. The removed compound is confined to closed passageways and chambers in the tool from the instant it is swept from the terminals by the heated air. The only exhaust product which is expelled into the space ambient to the operator and switching equipment is air which has been decontaminated by having been filtered through activated carbon subsequent to having been used to force compound from the terminals.

In general a container is provided which houses absorbent material such as cotton or the like and activated carbon. The container is provided with a handle and means for attaching to said container an air hose and electrical wires. Also attached to said container are two passageways, such as pipes or similar devices, both of which are terminated in a common end head for the tool. This end head, or air directing structure as it will be referred to at various times herein, comprises a cylindrical body member of special constructions and a thimble or deflecting assembly over the end thereof, both housed in a suitable insulating guide member which generally may be considered as part of said end head structure. The guide member is adapted to engage a row of terminals from which it is desired to remove compound. The body member and thimble arrangement is supplied with air under pressure from the aforementioned air hose after said air has been heated by passing through or around an electrical heating element housed in one of the pipes or passageways. The air directing structure reverses the direction of the heated air and forces same across the terminals, the pressure of said air blast forcing the compound back into the container where the used compound is absorbed by the cotton and the contaminated air is filtered through activated carbon and exhausted into the ambient space.

Hereinafter is set forth a detailed description of a preferred embodiment of the invention with the assistance of the drawings, of which:

Fig. 1 illustrates a cut-away elevation view of a preferred embodiment of my invention in operational position with a panel system terminal bank;

Fig. 2 shows a plan view of the forward or head end of the tool shown in Fig. 1;

Fig. 3 is a section taken along the line 3—3 of Fig. 1;

Fig. 4 is a section taken along the line 4—4 of Fig. 1;

3

Fig. 5 is a section taken along the line 5—5 of Fig. 2;

Fig. 6 is a view taken along the line 6—6 of Fig. 1 and shows a cut-away section along the line 6'—6' of Fig. 5;

Fig. 7 is a section taken along the line of 7—7 of Fig. 6;

Fig. 8 is an exploded perspective showing the construction of and operational relationship between the body member and thimble comprising part of the head end of the tool of Fig. 1; and

Fig. 9 illustrates the preferred manner of applying the invention to remove compound from a row of terminals on a line finder or selector terminal bank of a panel switching system.

Referring to Fig. 9 the removing tool is seen to comprise a container 1 having attached thereto a bottom section 12 by means of a threaded interconnection and a handle 2 by means of angle members 26. Near the top of container 1 is situated a connector 3 by means of which an air hose 4 may be attached to the container 1. An exhaust vent or deflector 5 is attached to the top of container 1. Situated at the side of container 1 is a wooden hand grip 6 which houses apparatus to be described later. Extending from the end of this hand grip 6 are pipes 7 and 8 extending to a head end 9 of the removing tool. It is seen in Fig. 9 that an operator is employing the removing tool to remove compound from a row of terminals on a terminal bank such as 10 of well-known type as found for instance in the panel telephone switching system. It is also seen that the tool is designed so as not to interfere with the brush rod 11, a well-known part of such a switch.

Referring in more detail to Fig. 1, the bottom section or can 12 is attached to the container 1 by means of screw threads 13. The can 12 is adapted to contain absorbent material 14 such as cotton or like material. Situated between the can 12 and the main container 1 is a coarse mesh screen 15. Directly above the screen 15 is a conical sieve-like member 16 having holes 17 and 18 therein as indicated. A pipe-like member 19 is seen to protrude into the container 1 through the top of the conical member 16. This pipe-like member 19 extends through the hand grip 6 and protrudes from the end thereof in order to have the pipe 8 from head 9 attached thereto by means of coupling 20. In the vicinity of the top of the conical section 16 is a fine mesh screen 23 held in position by means of a framework 21 which in turn is held to the container 1 by means of brackets 22. In this regard reference is made to Fig. 4 which is a sectionalized view taken along the line 4—4 of Fig. 1 and shows a plan view of the screen 23 held by means of framework 21, comprising radial arms 25, circumscribed about pipe 19 and held to the container 1 by means of brackets 22. The fine screen 23 is adapted to hold on the top thereof a suitable quantity of activated carbon 24.

Handle 2 is attached to the container 1 by means of angle members 26 as previously mentioned. In addition near the top of container 1 is a pipe fitting 3 which is adapted to receive fitting 31 on the end of an air hose 4 extending from a suitable source of pressurized air. A pipe-like member 27 extends from the pipe fitting 3 through the container 1 and through the hand grip 6 to the end of the hand grip 6 where the pipe 27 is attached to pipe 7 by means of fitting 28. Within the pipe member 27, and within the hand grip 6, is an electrical heating element

4

29. This heating element 29 is energized from a suitable source of electrical power by way of conductors 30, which for convenience may be located within the air hose 4 as shown.

On the top of container 1 is an exhaust deflector 5 conveniently attached to flanged ring 32 which in turn is adapted to be removably attached to the top of container 1 by means of set screw 33 or other detent arrangement or a cotter pin type of device. The effect of this arrangement is to provide that deflector 5 may be suitably positioned with reference to the operator of the machine such that the exhaust gases do not come forth at an unreasonable proximity to said operator. Reference is made to Fig. 9 wherein it is seen that for a right-handed operator the deflector 5 may be arranged as shown to deflect the exhaust gases away from the operator.

For a better understanding of the nature of the hand grip 6 and the location of the pipes 19 and 27 located therein, reference is made to Fig. 3. It is seen that hand grip 6 is constructed in two similar sections which are held together about the pipes 27 and 19 by means of bolts 35 and 36. It is also to be pointed out that the electrical heating element 29 located within pipe member 27 is arranged to provide a passageway 34 therethrough whereby the air under pressure from air hose 4 may freely pass to pipe 7 on end 9 of the tool. Likewise 37 designates the nature of the cross-section of pipe 19.

The head end 9 of the tool which rigidly houses pipes 7 and 8 is adapted as shown in Fig. 2 to engage a row of terminals such as 38 and is also adapted so as not to interfere with brush rod 11. It is seen that when the head 9 engages the row of terminals 38, pipes 7 and 8 have sufficient clearance with reference to brush rod 11 so as not to interfere therewith. It is common practice in this type of telephone system, namely, the panel type, that the rows of terminals such as 38, 39 and 40 are arranged either as tip, sleeve and ring, respectively, or ring, sleeve and tip, respectively, and that in the use of such a preservative compound as we are interested with here, the sleeve terminals 39 are not required to be so covered. Because of this it is not necessary, of course, to remove material from the row of terminals 39 which incidentally would be impossible because of the position of the brush rod 11. The remaining description is directed in detail to the structural features of the head end 9 and reference is made to one or more of Figs. 5 to 8, inclusive.

With reference to Fig. 5 in particular, the pipe 8 is seen to be attached to a body member 47 by means of "sweat soldering" or other suitable means. This body member 47 is shown in perspective in Fig. 8 and continuous reference is suggested to this perspective for a clear visualization of the structural features about to be described. Pipe 7, which is previously described as the inlet pipe for the pressurized air, is screw fitted into a metallic member 41 and has a suitable opening in the end thereof by means of which the air may escape into passageway 43 of the metallic member 41. A suitable machine screw 44 is adapted to engage the opening 43 by means of a tapped hole in the top thereof whereby cleaning of this opening 43 is facilitated when necessary. Secured by means of screws 42 to metal member 41 on either side of the head 9 is an insulator piece 59. A slot or groove is provided in the end of this insulated piece 59 for accommo-

dating a row of terminals such as 38 as is evident from Figs. 2 and 6. Surrounding the middle section of the body member 47 is a circumferential groove 45 adjacent to the opening 43. Connecting with this groove 45 on either side of the body 47 are slots 50 and 51, as shown in Figs. 6 and 8. A thimble 46 is provided over the end of the body member 47 as shown in Fig. 8 and has a suitable slot therein, as does the body member 47 and the insulator 59, for accommodating a row of terminals. Located between slots 51, for instance, on the left side of the body member of Fig. 6, is another slot 54 which does not connect to the circumferential groove 45 but does open upon the end of the body which is covered by the thimble 46. This slot 54 has a narrow slit or slot 49 in it to connect said slot 54 with the inner bore of the body 47. On the end of the body 47 is a beveled surface 57 which, in cooperation with the thereto abutting ends 58 of the thimble, comprises a transverse passageway whereby air under pressure in slots 51 must be changed in direction at the open end of slot 54 and consequently be forced through the narrow slit or slot 49, and likewise 48 on the other side of the body, to the inner bore of the body in the direction of the arrows 55 of Fig. 7.

With reference to Fig. 7 the passageway designated as 52 is the one previously referred to as being formed between the beveled edge 57 of the body member 47 and the thereto abutting end 58 of the thimble. It is also to be noticed that the ears 53 of the thimble are tightly fitted against the inner beveled surfaces 56 of the body to provide a backward slanting surface against which the air under pressure may be guided in the direction of the arrows 55. The terminal 38 in Fig. 7 is shown in a representative position which, as will be appreciated, will permit the stream of air illustrated by arrows 55 to sweep across the surface of the terminal 38 forcing the compound from these surfaces back into the exhaust pipe-like member 8 in the direction of the arrow 56. It is noticed in Fig. 6 that the narrow slits or slots 48 and 49 in respective sides of the body 47 are not opposite each other. They are displaced vertically so that the respective stream of air will not interfere with each other.

Returning now to Fig. 1, it will be recalled that reference was made to an electrical heating element 29 through which the air was required to pass in its travel to the head 9. It is necessary to preheat this air in order to make the compound become fluid for ease of removal by the stream of air. This compound assumes a consistency similar to that of "Vaseline" at room temperature and requires application of heat before it will become fluid.

The exhaust products are forced through the pipe 8 and into the pipe 19 and impinge upon the coarse screen 15 above the can 12 in the bottom of container 1. The heavier constituents of these exhaust products, being mostly globules of compound, will be forced through the coarse screen 15 and will be absorbed by the absorbent material 14. The gaseous constituents of the exhaust products will be deflected as indicated by the arrows within the conical member 16 and will escape through holes 17 or 18 or both to be filtered through the activated carbon 24 suspended on the fine mesh screen 23. The activated carbon, as is well known, has the ability to remove certain obnoxious gases and as a result the exhaust gases which are excluded by the deflector 5 will not be

injurious to operators or other personnel in the vicinity.

The utility of this tool is represented by several features which may now be readily appreciated, a few of which are summarized as follows. By virtue of the air under pressure being deflected by the air directing end structure across the surfaces of the terminals and by virtue of its being preheated, practically all of the compound on the terminals, and as a matter of fact on all other parts of the terminal bank in the close vicinity thereto, is removed into the container which then separates gaseous and solid exhaust particles, confines the solid particles and filters the gaseous components whereby none of the gas products injurious to personnel or equipment are allowed to go free. In addition it is pointed out that to operate this machine requires no particular skill upon the part of the operator in that it is necessary for the operator merely to engage the tool with a row of terminals and allow the tool to drop by its own weight and thereby accomplish its job. The operator is merely required to guide the tool such that it will not bend or otherwise disfigure the row of terminals.

Any suitable supply of pressurized air and electricity, as previously indicated were necessary, may be adapted for use with this device. It is to be pointed out in connection with the heating element that it is advisable to combine electrical switching of the heating element with the pressure of the air and passage thereof through the tube 27 in order that excessive heat will not be generated unless a suitable quantity of air is passing through the heating element to thereby relieve same of too much heat, which as will be appreciated may injure various components of this machine. With reference to Figs. 6 and 7 it will be noticed that the insulator member 59 is suitably dimensioned in the slot or groove in the end thereof and in its projection beyond the end of the body 47 such that only insulating material may come in contact with terminals or terminal banks. This feature is provided in order that one may operate this device whether or not the terminals are energized by electric power.

Many modifications may be made to the structure or to the application of the principles disclosed in the structure without departing from the spirit of my invention and I therefore append claims which alone define the scope of my invention.

What is claimed is:

1. A tool for removing petrolatum compound from the terminals of a panel switch bank comprising a head having a grooved portion of electrically insulating material, an inlet pipe connected to said head for conducting air under pressure to said head, an exhaust pipe, and a bifurcated air directing structure in said head connected to said exhaust pipe, the inwardly facing sidewalls of said bifurcated structure being fitted into and aligned with the sidewalls of said groove such that all of the said walls define a channel which is adapted to embrace a row of said terminals, such structure having narrow slots in the sidewalls thereof connected by passageways to the said inlet pipe and having baffle surfaces for directing within the said structure streams of pressurized air through said slots and across said terminal surfaces over which said head is moved and into said exhaust pipe after said streams of air have traversed the said surfaces of said terminals to thereby remove said

7

compound from said terminals into said exhaust pipe.

2. A tool for removing petrolatum compound from the terminals of a panel switch bank comprising a head having a grooved portion of electrically insulating material, an inlet pipe connected to said head for conducting air under pressure to said head, an exhaust pipe, and a bifurcated air directing structure in said head connected to said exhaust pipe, said structure comprising a bifurcated cylindrical body member having the inwardly facing sidewalls thereof fitted into and aligned with the sidewalls of said groove such that all of the said walls define a channel which is adapted to embrace a row of said terminals, said body member having a central bore connected with said exhaust pipe and having first passageways extending from a connection with said inlet pipe to the bifurcation end of each divided portion of said member and having further passageways extending from the bifurcation end of each portion of said body member and communicating through narrow slots with the inner bore of said member and having a bifurcated thimble snugly surrounding said body member, said thimble having a baffle on each bifurcation end portion thereof for reversing the direction of the air streams entering through said first passageways and diverting them within said structure through said further

8

passageways and said slots and across the surfaces of said terminals into said outlet pipe.

3. A tool for removing petrolatum compound from the terminals of a panel switch bank as set forth in claim 2, wherein the inlet pipe contains a heating element for heating said pressurized air to enable same to render the compound fluid to facilitate the removal thereof from said terminals and wherein the exhaust pipe is terminated in filtering means to remove solid waste products from the exhaust air and to remove obnoxious gaseous waste products from said exhaust air prior to the expulsion of said air from said tool.

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