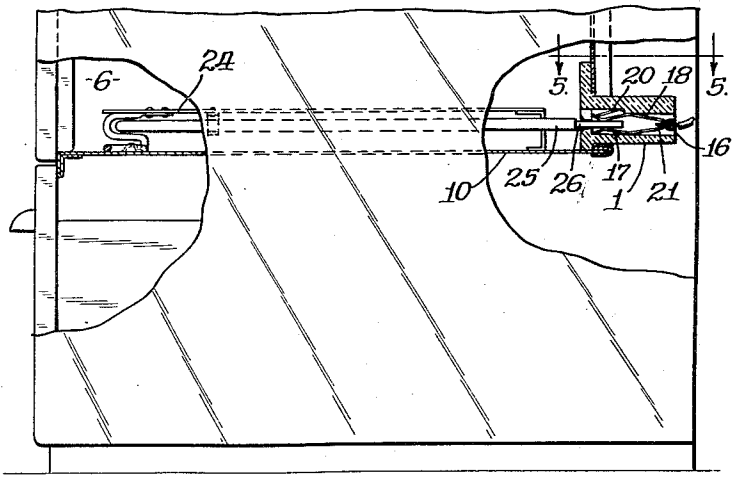
Oct. 5, 1954 R. J. SUTTON ET AL 2,691,147

TERMINAL BLOCK

Filed April 2, 1951 2 Sheets-Sheet 1

Fig. 1.



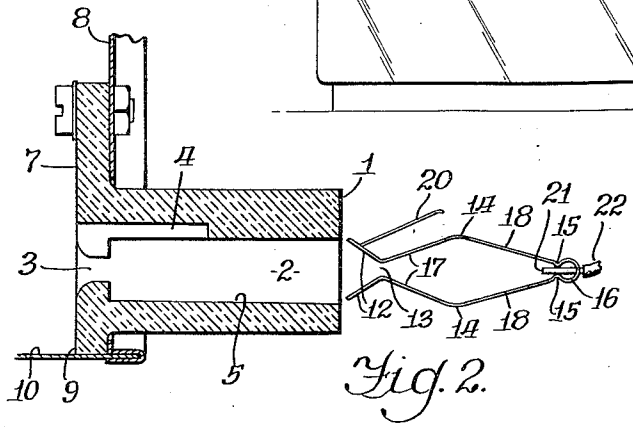


Fig. 2.

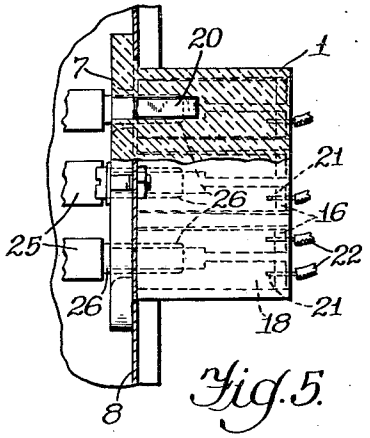


Fig. 5.

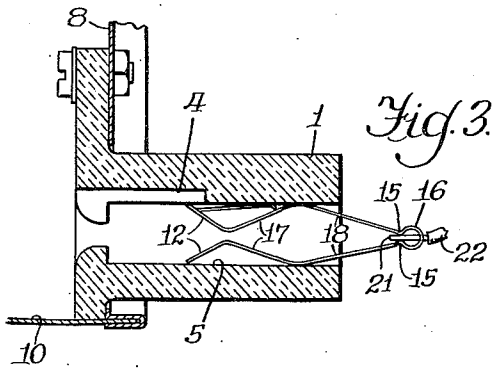


Fig. 3.

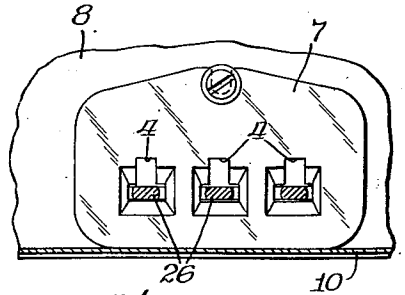


Fig. 6.

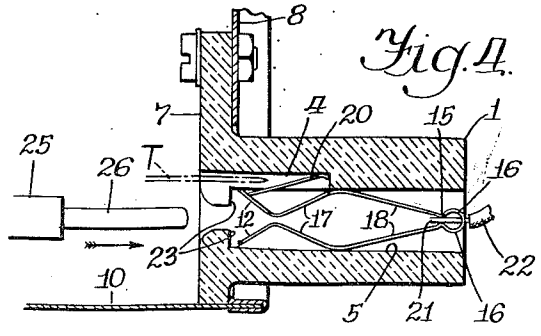


Fig. 4.

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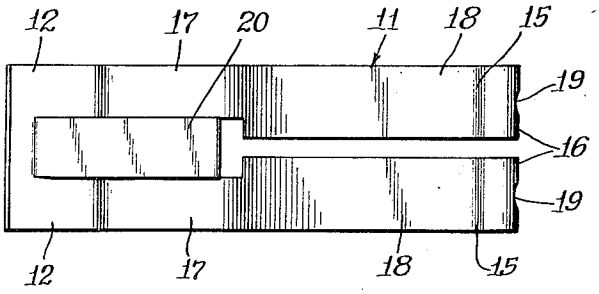


Fig. 7.

Fig. 9.

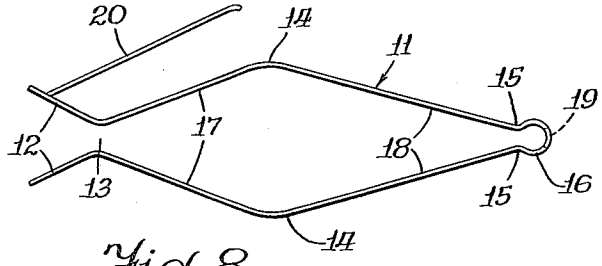
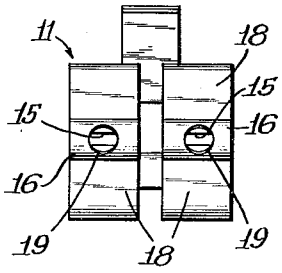


Fig. 8.



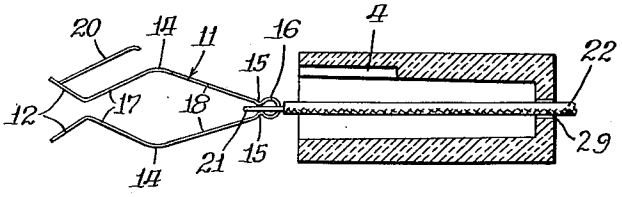


Fig. 10.

Fig. 12.

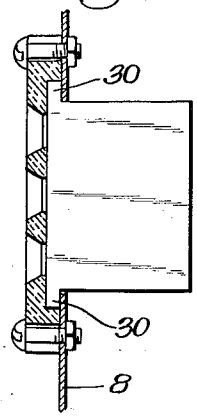
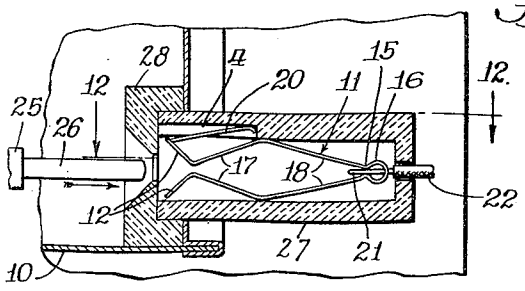


Fig. 11.



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TERMINAL BLOCK

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Application April 2, 1951, Serial No. 218,857

3 Claims. (Cl. 339—217)

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This invention relates to an improved terminal block for electric appliances.

In particular, our invention relates to an electrical connector block having unitary spring contact elements provided at one end with jaws which receive and clamp about the end of a conductor wire, and at the other end, with jaws arranged to make pressure contact with blade-type terminals of an electric accessory device. It is a feature of our invention that the connection with the conductor wire is actually improved by the insertion of the blade terminal of the accessory, and for this and other reasons hereinafter appearing, our invention is suitable for relatively high wattage service, as in electric range ovens and the like in which it is desired to have one or more of the heating units readily removable for cleaning or inspection.

It is an object of our invention to provide a terminal construction having a spring contact element adapted to make pressure contact with a blade-like terminal of an accessory electric device, and having an improved jaw configuration for connecting the contact element to a power conductor without requiring screws, brazed or soldered connections, or the like.

A further object of the invention is to provide a contact structure suitable to receive a blade-like terminal of an electrical accessory device for pressure contact therewith, and having jaw means making a pressure connection with an electrical power conductor, the respective pressure contacts being arranged so that the introduction of the blade-like terminal serves to increase the pressure connection with the power conductor.

It is another object of the invention to provide an electric terminal block which is simple to manufacture and install.

It is a further object of our invention to provide an electrical terminal block having an improved contact element arranged to be removably connected to a lead wire without the use of screw-threaded devices, and adapted after such connection to be self-securing within an insulating housing into which the terminal elements of other electrical devices may be inserted for connection to an electric circuit.

Other features and advantages of our invention will be apparent from the following description of presently preferred embodiments thereof, read in connection with the accompanying drawings in which Fig. 1 is a fragmentary side elevation of an electric range oven showing the lower oven unit connected to the power circuit by a terminal block embodying our invention; Fig. 2 is a side elevational section of the terminal housing, with the contact member having been threaded over the power lead prior to insertion into the rear of the housing; Fig. 3 is similar to Fig. 2 but showing the contact member partially inserted;

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Fig. 4 shows the contact member in home position ready to receive the terminal of the oven unit; Fig. 5 is a plan view of the body block with an upper portion partially broken away to disclose the contact arrangement, said figure being taken in section through the oven wall on lines 5—5 of Fig. 1; Fig. 6 is a front elevation of Fig. 5, the oven unit terminal blades being in section; Figs. 7, 8, and 9 are respectively a top plan view, a side elevation, and a rear elevation of the contact element; Figs. 10 and 11 illustrate the application of the contact element to a second form of terminal block, the terminal housing being in section; and Fig. 12 is a plan view of the last-named terminal block with the cover element thereof being in section.

Referring first to Figs. 2 and 5, one form of terminal block embodying our invention comprises a housing 1 of ceramic or other insulation material having a plurality of body cavities or passages 2 communicating with a mouth 3 of size and shape for the easy reception of a terminal of an electric accessory, as later described. An upper wall groove 4 extends rearwardly from the mouth of the housing; this groove is of less width than the mouth and cavity as is apparent from a comparison of Figs. 5 and 6. Each groove 4 is symmetrical with respect to the side walls of its particular cavity. Preferably, the lower wall 5 of each cavity slopes downwardly toward the rear, and therefore the open rear end of the cavity is slightly larger in area and dimension than the cavity portion immediately to the rear of the mouth.

We have illustrated our invention as applied to the oven of an electric range; and as shown in Fig. 1, such use may entail mounting of the housing substantially at the intersection of the rear wall and floor of the oven 6, usually intermediate the side walls thereof. Accordingly, we shape the forward portion of the housing for convenient securement by providing a relatively high upper front wall portion 7, which may be bolted or otherwise suitably affixed to the rear oven wall 8, and a lower lip 9 which fits snugly against said rear wall and the floor 10. Obviously, the shape of the housing will be dictated by the designed use of the terminal block, and the illustrated shape is by way of illustration only.

The number of body cavities likewise will conform to such end use. An oven wall connector block usually requires a three-cavity device to receive the three terminal blades of a typical oven heating element, as later described. Each of the cavities contains a spring contact member 11 of the pressure contact type. In Figs. 7, 8, and 9 such a contact is shown in enlarged size. The contacts are one-piece structures blanked out of spring metal stock which is then suitably bent back on itself to form the illustrated "hair pin"

shape. When employed in an electric range oven circuit, the contacts must be capable of satisfactorily handling relatively high wattages and should also be corrosion resistant. We prefer to utilize hard rolled steel of about .020 inch thickness; the tensile strength should be of the order of 90,000 p. s. i., and the grain of the metal should extend in lengthwise direction. It is preferable to plate the contact element to increase its electrical conductivity and resistance to corrosion; we prefer to silver plate them. A satisfactory alternate material is .020 inch thick spring temper nickel, which has excellent corrosion resistance and conductivity. Less severe performance requirements may indicate the use of lighter gauge materials or materials such as spring brass, or bronze.

The upper and lower wall portions of the contact element are of almost identical shape, arranged so that each wall portion contributes substantially equally to the ultimate performance. The wall portions **12** converge toward a throat **13** which when the contact element is relaxed is quite constricted; to the right of the throat, as viewed in Fig. 8, the walls diverge to the upper and lower peaks **14** which represent the maximum body width. Then the walls converge at a lesser angle to form the upper and lower jaws **15**, beyond which the closed end **16** is preferably substantially circular. The end **16** resiliently, although rather stiffly, maintains the spacing of jaws **15** less than the diameter or thickness of the wire or terminal with which they make pressure contact. It will be noted that the length of wall portion **17** is less than that of wall portions **18**; when these dimensions are in the proportion of ⅝ inch to ¾ inch the rear portion of the contact element is less rigid than the forward portion, facilitating the insertion of the contact into the body block and causing the rear portion to bow slightly toward the central horizontal plane of the element when the accessory terminal is inserted into the throat. It will be noted that the wall portions **12** and **17** converge at a rather sharp apex. Opening **19** through the closed end **16** admits the terminal or wire between the jaws **15**. A tongue **20** is lanced out from the front of the upper wall portion **17**, for reasons later appearing.

The basic construction above described is readily adapted to receive more than one terminal at the closed end. We have illustrated a two-terminal type, in which the upper and lower wall portions are split from approximately the peaks **14** to the closed end **16**, thus providing two sets of substantially independently operating jaws **15**. Two parallel splits would provide a three-jaw construction. Obviously, an opening **19** must be provided for each jaw pair. Because of the individual jaw action, a single terminal may be applied to a multiple jaw device, as indicated in Fig. 5. In the relaxed position of Fig. 8 the spacing between the upper and lower points **14** is appreciably greater than the maximum spacing between the upper and lower walls of the body cavities; and although not a critical relationship, the relaxed spacing between the free ends of the contact element is such that when the element is in home position within the body cavity, the throat is practically closed, as indicated in Fig. 4.

Electrical connection between a contact element and the bared end **21** of a conductor wire **22** is made by threading said end through the opening **19** and between the jaws **15** before the contact element is inserted into the body block.

The opening **19** is preferably substantially oversize with respect to the conductor end **21**, and as has been previously mentioned, the separation of jaws **15**, even when the contact element is relaxed, is preferably sufficient to grip the conductor end without interposing appreciable resistance to the insertion of the conductor. Then, with the contact element and the conductor as shown in Fig. 2, the operator squeezes the element intermediate its ends so that the mouth portion will enter the rear of the body cavity, and then pushes the contact element forwardly within the cavity until it is stopped by the walls **23**. At the intermediate stage represented by Fig. 3 the contact element has elongated slightly and pressure of the body cavity walls on the points **14** reduces the spacing between the points and drives the jaws **15** closer together so that they firmly grip the conductor end **21**. At this stage of insertion the tongue **20** has been sprung downwardly; as the contact reaches the home position of Fig. 4, the tongue reacts upwardly so that its free end is adjacent the end wall of the slot **4**.

A conventional electric range-oven unit may include a frame structure **24**, secured to which is a heating element **25** having rigid blade-like terminals **26**. In electric ranges there may be a ground terminal in addition to the terminals at the respective ends of the heater element, and the three terminals are of standardized size and shape and are arranged in alignment. See, for example, the Schulze et al. Patent 2,536,613, granted January 2, 1951, entitled "Oven Heating Unit." The oven unit is arranged for removal for cleaning or inspection, and it is obvious that the terminal block above disclosed provides for the easy connection and separation of the terminals from the electric circuit. When a terminal blade **26** is inserted into the contact element, it of course separates the throat walls; the contact wall portions **17** are quite stiff, and oppose the separation. The blade **26** is thus gripped with a firm pressure contact along a relatively narrow line defined by the throat apices. The terminal blade drives the contact element rearwardly until the end of tongue **20** engages the end of groove **4**. As the relatively stiff walls **17** separate they pivot about the points **14**, and the more flexible walls **18** bow inwardly to a slight amount. This action is believed to exert forces on the jaws **15** which cause them to increase the pressure on the conductor. We have found that it is much more difficult to pull the conductor **22** away from the contact element **11** when a terminal blade **26** is in position than when it is not. This establishes, we believe, that our terminal construction improves the contact efficiency under actual operating conditions.

The contact element may be removed from the body block without difficulty. A tool having a stiff blade T narrower than the groove **4**, may be inserted into the groove to press the tongue **20** downwardly out of said groove whereupon the contact element may be drawn out the rear of the cavity by pulling on conductor **22**. The downward curve at the end of the tongue facilitates the displacement of the tongue.

In the embodiment of Figs. 10, 12, the contact member **11** is identical with that previously described. The housing, however, is in two pieces, having a body portion **27** and a cover or cap **28**. The body portion has a rear opening **29** to receive the conductor **22**; and the upper and lower walls of the body cavity diverge toward the open end. The upper wall has a groove **4**

for the purpose previously described. In using this embodiment, body block 27 is placed within the oven and the respective conductors brought into the appropriate body cavities by threading through the openings 29 at the rear thereof. The conductor end 22 is threaded through the rear housing opening and between the jaws 15. Thus assembled, the contact element is placed within the body cavity and the body block moved rearwardly against the oven wall 8 until stopped by the engagement of the ears 30 therewith. Cover 28 has a recess within which the front wall of the body block seats, as shown in Figs. 11 and 12. Upon bolting the cover 28 to the oven wall, the terminal block installation is complete. It will be obvious that because the contact element is entirely confined within the body cavity, it may be possible to eliminate the tongue 20. This, however, would require relatively close tolerance of body cavity length, and in view of the shrinkage factor of ceramic materials, such tolerance control may be impracticable. We prefer, therefore, to maintain the relationship of the tongue 20 with the body groove 4 so that the body cavity may be made with less critical attention to its length.

It has previously been noted that it may be necessary to attach more than one conductor to a contact element according to the requirements of the electrical circuit. By dividing the rear portion of the element to provide the individual jaw pairs, we can readily make such plural connections without danger that one slightly oversized wire might detract from the jaw contact pressure at the companion wire. Each jaw pair is free to adjust itself to its own wire diameter within reasonable limits and thus maintain a high contact efficiency.

While there has been decribed what is at present considered to be the preferred embodiments of the invention, it will be understood that various modifications may be made therein, and it is intended to cover in the appended claims all such modifications as fall within the true spirit and scope of the invention.

We claim:

1. A terminal block for interconnecting a first terminal to one or more wire-like second terminals, comprising, in combination, a body having insulating wall means defining a cavity having opposite end openings, one of which admits said first terminal into said cavity and the other admits said one or more second terminals thereinto, and a contact member adapted for insertion into said cavity through one of said openings, said member being of spring metal formed into substantially hairpin shape with an open mouth having jaw members to receive said first terminal in pressure contact therewith and arcuate wall portions between said mouth and the opposite end of said contact member, said arcuate portions being in opposed relationship and respectively tangential to opposed wall surfaces of said cavity, the upper and lower arcuate portions being slit from said opposite end to said tangential portions to provide upper and lower pairs of elements having individual closed-end portions; and jaw means formed in each of said upper and lower pairs of elements for pressure engagement with the respective second terminals, said closed-end portions having openings to admit said terminals thereto and resiliently establishing the pairs of jaws associated therewith in mutually spaced relation slightly less than the diameter of the terminal to be used therewith; said contact member, when removed from said body cavity, having a relaxed shape in which the maximum spacing between said opposed arcuate portions is substantially greater than the spacing between the opposed walls of said cavity.

2. A terminal block as in claim 1, in which the arcuate length from the first-named jaw members to the said point of tangency is less than the length from said point to the second-named jaw members.

3. A terminal construction for electrically interconnecting first and second electric terminals disposed in end-to-end relationship in a substantially common plane, including a block of insulation material having wall means defining an elongated cavity open at each end, and a contact member removably secured within said cavity, said member comprising a single strip of stiffly flexible metal formed to provide spaced legs of substantially equal length extending in super-imposed relationship from a closed end portion; said legs immediately adjacent said end portion being configurated to provide relatively short sharp jaw members maintained by said end portion in spaced relation slightly less than the thickness of the terminal to be engaged thereby, said closed end portion being apertured to permit the introduction of said terminal; said legs each then diverging substantially symmetrically to a peak remote from said jaw members to place between said peaks and said jaw members a relatively long length of flexible material; said legs then converging substantially symmetrically to form a second set of opposed jaw members for engagement of said second terminal in pressure contact therewith and then diverging to provide an open entrance mouth for the admission of said second terminal; the length between said first and second jaw members being substantially greater than the combined lengths of said first and second terminals inwardly of the jaw members when said terminals are in normal home position within said contact member; said contact member when removed from said body cavity having a relaxed shape in which the spacing between said peaks is substantially greater than the spacing between said opposed body cavity walls, whereby after positioning a terminal between said first jaws and inserting the contact member into said cavity, the legs of said contact member between said first jaws and said peaks will be flexed to increase the pressure of said jaws against said terminal.

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