Jan. 12, 1954 A. G. COOK 2,666,189

ELECTRIC TERMINAL BLOCK ASSEMBLY

Filed July 30, 1951

Fig. 1

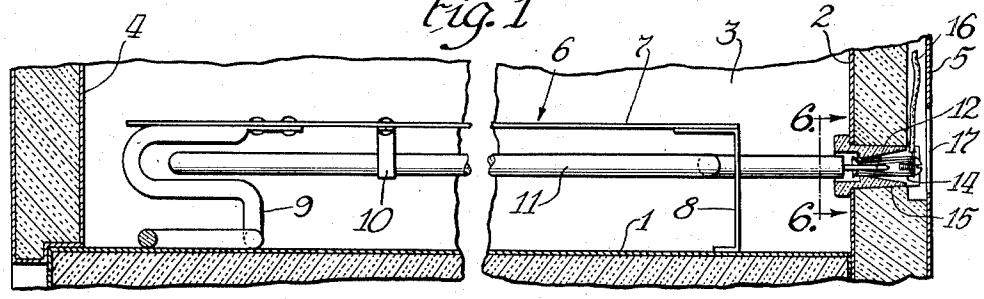


Fig. 2

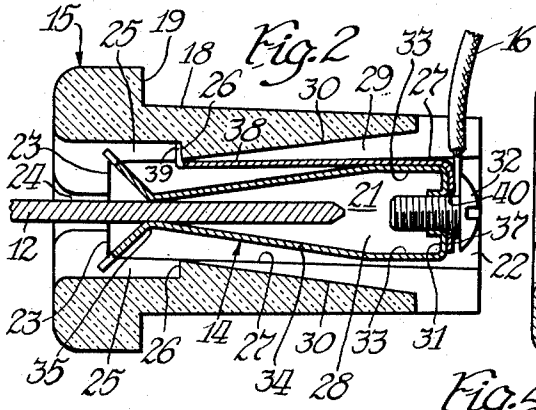


Fig. 3

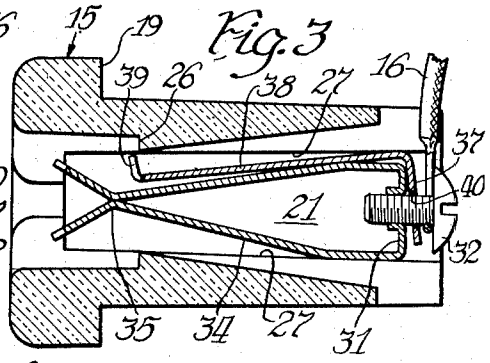


Fig. 4

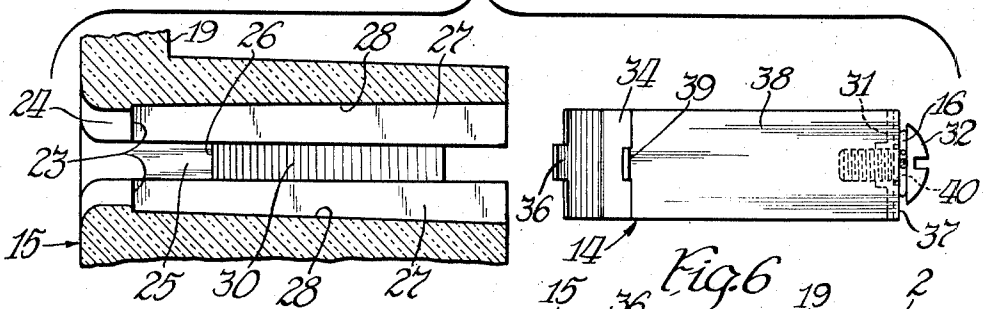


Fig. 5

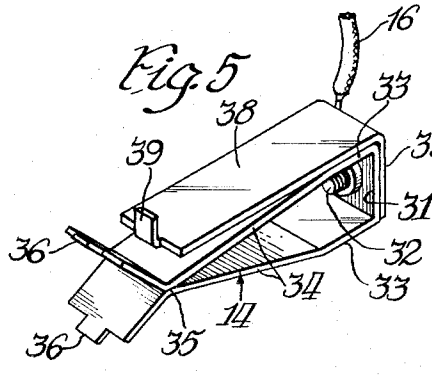
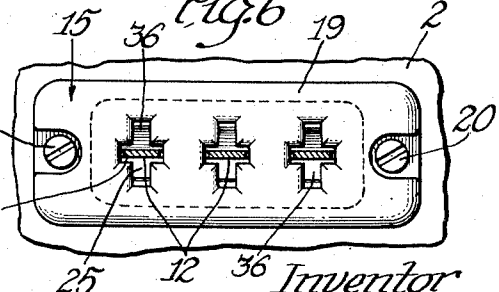


Fig. 6



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ELECTRIC TERMINAL BLOCK ASSEMBLY

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5 Claims. (Cl. 339—213)

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This invention relates to an improved terminal block assembly.

Frequently, electric terminal blocks must be located in confined spaces in which it is difficult to manipulate the electrical leads and the usual terminal screws by which the leads are connected to the contact members. In electric range ovens, for example, there are provided one or more terminal blocks mounted on the rear oven wall. These terminal blocks have spring contacts receptive to blade-like terminals projecting from an oven heating unit, and permit the heating unit to be removed from the oven when the oven wall below the unit, or the unit itself, is to be cleaned, or the unit shifted to another elevation within the oven as is now the practice in some range constructions. The heating unit terminal blade and contact clips of the terminal block are sized for very tight engagement. It is necessary therefore to secure the contact clip against being pushed or pulled within the terminal housing as the oven unit is inserted or removed.

In the usual production line manufacturing operation it is advantageous to complete the assembly of the range body and casing and then make up the electrical connections. Because of the location of the oven terminal blocks, the cramped space and unhandy access, it has been rather difficult and time-consuming to attach the oven circuit conductors to terminal blocks in which the contact clips were fixedly secured within the housing. Constructions have been proposed by which the circuit conductors may be attached before the clip is inserted into the housing, but although electrically adequate, they have been subject to various servicing difficulties.

It is therefore a principal object of this invention to provide a terminal block in which the contact clips may be preassembled to the lead wires and inserted into the housing through a rear opening, said clips having means which hold securely against accidental displacement within the housing while being easily releasable to permit the clips to be withdrawn for servicing.

Other features and advantages of my invention will appear from the following detailed description of a presently preferred embodiment read in conjunction with the accompanying drawings, in which:

Fig. 1 is a fragmentary side elevation, partly in section, of an electric range oven having a terminal block embodying the present invention;

Fig. 2 is an enlarged side sectional elevation showing the terminal block with the contact clip in home position and a terminal blade inserted;

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Fig. 3 is a view similar to Fig. 2 but showing the manner in which the retainer disengages from the housing to permit the contact clip to be withdrawn from the housing;

Fig. 4 is a fragmentary plan view of the terminal block housing, in section, showing the contact clip ready for insertion into the housing;

Fig. 5 is a perspective of the assembled contact clip; and

Fig. 6 is a front elevation of the terminal block.

A portion of an electric range oven is shown in Fig. 1. As is well known, an oven comprises a five-sided casing suitably supported within the range frame structure. Usually relatively heavy insulation, such as rock wool or the like, surrounds the cavity, and the hinged door is similarly insulated. Specifically, Fig. 1 shows the floor 1 of the oven, rear wall 2, side wall 3, door 4, and a rear panel 5 which constitutes an element of the range frame. With respect to the latter, it is pointed out that present day manufacturing practice for electric ranges and the like utilizes a "wrap around" construction in which the rear panel 5 is integral with the side and front panels (not shown). An oven heating unit 6 includes a baffle plate 7 suitably supported above the oven floor by a rear leg 8 and a front support 9. Suspended beneath the baffle, as by a suitable number of straps 10, is a heating element 11, preferably of the well known sheathed coil type. The oven heating unit may be of the general type shown in Patents #2,498,583 and 2,536,613 which respectively issued to H. W. Schulze et al. and H. W. Schulze on February 21, 1950, and January 2, 1951, and are assigned to my present assignee.

The oven unit is intended for easy removal from the oven, and its heating element is provided with rigid blade-like terminals 12, usually three in number to provide a ground connection. These terminal blades releasably engage contact clips 14 in a terminal block 15 much the same as any appliance plug cooperates with the usual contact clips of a convenience outlet. Because of the high wattage of the usual oven unit and the tendency of the unit to "walk" or "work" during heating and cooling periods, the terminal blades and the contact clips are sized and arranged for very tight engagement. The contact clip is therefore subjected to strong pushing or pulling effort when the heating unit is inserted and removed.

In the usual electric range the controls (not shown) are located remote from the various heating units. The oven control, for example, may

be placed on a front ledge portion of the range or on an upstanding back panel or backsplasher (not shown). From the control switch the necessary conductors 16 are run within the space between the rear oven wall and the rear frame wall 5. Although an access opening 17 is provided in wall 5 so that the wiring may be completed, the available space is nevertheless inadequate for an efficient operation. I have therefore provided a terminal block having contact clips which may be preassembled to the conductors and easily inserted and secured within the terminal block housing after the range structure has been completed.

The terminal block housing may advantageously comprise a ceramic body 18 having a front flange 19 which backs up against the front face of the oven wall 2 for securement thereto by screws 20 or equivalent passing into said wall. As best shown by comparison of Figs. 2 and 4, the body has rather long, rectangular, contact-receiving cavities 21 individual to the respective contact clips 14. Each cavity has a large rear opening 22 providing for the insertion of the contact clip from the rear, as later described. The "home" position of a contact clip is established by front walls 23 which are actually the rear walls of a cruciform passage having a horizontally arranged slot-like opening 24 through which the blade 12 may be inserted, and upper and lower grooves 25, each of which terminates in an abrupt wall 26. Cavities 21 are characterized by upper and lower pairs of walls 27 which reach inwardly from the respective side walls 28 toward a centrally disposed narrow groove 29, the base 30 of which slopes toward the front of the housing to a point at the same level as that of the walls 27. The base wall 30 of each groove terminates abruptly at the vertical wall 26. The upper and lower grooves 25 and 29 are in alignment and are preferably of the same width; at least, groove 25 should not be narrower than groove 29. The groove 25 forms a pocket for the reception of a detent finger, as later explained.

It will be observed that the various walls defining the grooves and body cavities are symmetrical. This is merely to facilitate installation of the terminal block by making it unnecessary to distinguish between top and bottom sides thereof.

The contact clip 14 is itself of relatively conventional pattern, being formed from a single piece of suitable spring metal stock, such as strip steel suitably heat treated and silver plated. The rear wall 31 is tapped to receive a terminal screw 32. Forwardly of said rear wall are short shoulder portions 33 from which extend the contact elements 34 which converge to a normally closed throat 35 and then diverge to provide a mouth for the reception of a terminal blade 12. It will be noted that the extremities of the contact elements have a forwardly projecting tongue 36 which fits within the respective upper and lower grooves 25, and thus keep the mouth of the contact clip centered with respect to the entrance slot 24.

It is readily apparent from Figs. 2 and 4 that the clip 14 will be supported within the cavity 21 by the upper and lower pairs of walls 27, and that the front walls 23 prevent the contact clip from being drawn forwardly out of the terminal block. However, means must be provided to secure the clip from being driven rearwardly out of the open end of the terminal block so that the blade 12 may be inserted. Accordingly, I employ a rigid, but flexible, retainer which is of angle form having a short rear wall 37, a relatively long, flexible arm 38, and a finger 39 extending upwardly from the end of said arm 38. Rear wall 37 has an aperture 40 to permit the passage of the terminal screw 32. The arm 38 and rear wall 37 are preferably in rectangular relationship. When the retainer is placed over the contact clip and the screw tightened, rear wall 37 will be clamped against wall 31 and the arm 38 will lie on the adjacent shoulder 33. In such position the spacing between the upper edge of finger 39 and the plane of the bottom shoulder 33 is greater than the maximum spacing between the upper and lower walls 27, and hence as the assembled contact clip is installed the sloping wall 30 will engage the finger 39 and flex the arm 38 downwardly.

In application, the bared end of conductor 16 is looped about the shank of screw 32, the retainer placed with its wall 37 adjacent the rear wall 31 of the contact clip, and the screw made up tight. This preassembly may be made by unskilled workmen. A range assembler takes the preassembly (usually he receives them in suitable groups of three in which the conductors are tied or taped together) and runs or fishes the wires within the space at the rear of the range and exposes the contact clip portions at the opening 17. Another assembler along the production line then grasps the contact clips and inserts them into the respective cavities 21. To facilitate this operation, the terminal block housing and contact clip are sized and arranged so that finger 39 will enter the slot 29 while there is still a substantial portion of the terminal clip outside of the rear plate 5. Then the operator pushes the contact clip forwardly to its home position in the terminal housing. The arm 38 flexes downwardly and as the finger 39 passes the wall 26, which coincides with the attainment of home position, the arm snaps upwardly to the Fig. 2 position. The contact clip then is secure against being driven rearwardly by the pressure of the terminal blade as it is being inserted. As the blade 12 enters the throat, the tendency of the shoulders 33 to separate is resisted by the spring-like arm 38, with the result that the jaw pressure on the terminal blade is somewhat increased and the electrical contact pressure between the terminal blade and contact clip is improved.

A substantial advantage of my construction lies in the ease with which the contact clip may be removed. No probes or special tools to depress the arm 39 are required. It is only necessary to unscrew terminal screw 32 until its head has been backed away sufficiently for the retainer to fall of its own weight until the finger 39 has dropped below wall 26 as shown in Fig. 3. Then the mechanic or repairman may pull the entire contact clip assembly out of the housing. It will be apparent that the center of gravity of the retainer is to the left of the contact clip shoulder portion (as viewed in Fig. 3) and that it will ordinarily rotate into release position. If it should stick or bind, a light touch with the screw driver blade will free it. It will also be apparent that the lift of the rear wall 37 necessary to remove the finger 39 from the pocket 25 is small. Therefore, opening 40 need be only slightly larger than the diameter of the shank or screw 32 to permit such movement and the danger of the bared end of conductor 16 jamming within opening 40 is eliminated.

While there has been described what is at

present considered to be the preferred embodiment 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.

I claim:

1. Electric terminal means comprising in combination, a housing having wall means defining an elongated cavity open at the front and at the rear, a contact clip adapted to be manually inserted into said cavity, said contact clip having elongated contact elements reaching forwardly within said cavity and terminating in a throat facing said front opening, a retainer having a resilient arm member adapted to extend along one of said contact elements in overlying relation therewith, one end of said arm member having a finger extending angularly therefrom, terminal screw means for removably securing the opposite end of said arm member to said contact clip, wall means within said cavity establishing a home position for said contact clip therein, means for placing the resilient arm member of said retainer under stress as the contact clip and thereto affixed retainer are inserted into said cavity, wall means defining a pocket adapted to receive said finger by reaction of said arm member as said finger passes said wall means substantially coincident with the attainment of home position by said contact clip, said finger and said wall means thereafter cooperating to hold the clip against withdrawal from said cavity, and means effective upon loosening of said terminal screw means to permit said retainer arm member to rotate relative to said contact clip to remove said finger from said pocket.

2. Electric terminal means comprising in combination, a housing having wall means defining an elongated cavity open at the front and at the rear, a contact clip adapted to be manually inserted into said cavity, said contact clip having elongated contact elements reaching forwardly into said cavity and terminating in a throat facing said front cavity opening, means engageable with the forward ends of said contact elements to establish a home position of said contact clip within said cavity, and a retainer releasably secured to said contact clip, said retainer having a resilient arm member extending along one of said contact elements in spaced relation therewith, said arm member having a finger extending angularly therefrom, wall means within said cavity engaging said finger to flex said arm member downwardly as said contact clip is inserted into said housing, said wall means terminating in other wall means establishing a pocket which said finger may enter by reaction of said flexed arm member as said contact clip attains home position, said last-named wall means and said finger thereupon cooperating to secure said contact clip against withdrawal from said housing; the securement means for said retainer comprising a terminal screw passing freely through said retainer and entering said contact clip to fix said retainer securely thereto for operation of the arm member into said contact clip securing position upon being tightened, and releasing said retainer for free rotation of its arm member out of such position upon said retainer being loosened from said contact clip.

3. Electric terminal means comprising in combination, a housing having wall means defining an elongated cavity open at the front and at the rear, a contact clip adapted to be manually inserted into said cavity through the rear opening thereof, said contact clip having elongated contact elements reaching forwardly within said cavity, a retainer having a resilient arm member adapted to extend along one of said contact elements in overlying relation therewith, one end of said arm member having a finger extending angularly therefrom, terminal screw means for removably securing the opposite end of said arm member to said contact clip, wall means within said cavity establishing a home position for said contact clip therein, wall means including a wall sloping toward the forward end of said housing defining a groove along which said finger may travel, said sloping wall means engaging said finger and flexing said arm member to place the same under stress as the contact clip and thereto affixed retainer are inserted into said cavity, wall means at the forward end of said sloping wall defining a pocket adapted to receive said finger by reaction of said arm member as said finger passes said last-named wall means substantially coincident with the attainment of home position by said contact clip, said finger and said wall means thereafter cooperating to hold the clip against withdrawal from said cavity, and means effective upon loosening of said terminal screw means to permit said retainer arm member to rotate relative to said contact clip to remove said finger from said pocket.

4. Electric terminal means comprising in combination a contact clip having a rear wall portion and upper and lower contact elements extending forwardly therefrom, a retainer including a short rear wall member adapted to overlie said contact clip rear wall portion and a relatively long, springable, arm member extending angularly therefrom in overlying relationship with one of said contact elements, the free end of said springable arm member having an upstanding finger, means on said contact clip for pivotally supporting said retainer thereon, a terminal screw passing freely through a relatively large opening in said retainer rear wall member and entering said contact clip rear wall to secure said retainer to said contact clip with the retainer rear wall held against rotation relative to the contact clip, a housing having a cavity to receive the assembled contact clip and retainer for manual insertion from the rear, said housing having an opening at the front permitting introduction of a terminal thereinto for engagement with said contact clip, means within said housing establishing a home position of said contact clip therein, wall means in said housing engaging said retainer arm member as the contact clip is inserted into said cavity to deflect said retainer arm member and place the same under stress, and wall means in said housing defining a pocket to be entered by said retainer arm member finger as said contact clip attains home position, said finger and said last-named wall means thereafter cooperating to prevent rearward displacement of said contact clip; the normal clearance between the wall of the opening in said retainer rear wall member and the shank of said terminal screw being such that when said screw is loosened the retainer may under its own weight rotate sufficiently to remove said finger from said pocket to free the contact clip for withdrawal from said housing.

5. Electric terminal means comprising in combination, a contact clip having a rear wall portion and an upper contact element extending forwardly and downwardly therefrom, a retainer in-

cluding a short rear wall member adapted to overlie said contact clip rear wall portion and a relatively long, springable, arm member for extension in overlying spaced relationship with said upper contact member, the free end of said springable arm member having an upstanding finger, shoulder means on said upper contact element establishing a pivot point for said retainer arm member, the center of gravity of said retainer being intermediate said shoulder means and said finger, a terminal screw passing freely through a relatively large opening in said retainer wall member and entering said contact clip rear wall to secure said retainer to said contact clip with the retainer rear wall held against rotation relative to the contact clip, a housing having a cavity to receive the assembled contact clip and retainer for manual insertion from the rear, said housing having an opening at the front permitting introduction of a terminal thereinto for engagement with said contact clip, means within said housing establishing a home position of said contact clip therein, wall means in said housing above said retainer and engaging said finger as the contact clip is inserted into said cavity to deflect said retainer arm member toward said upper contact member and place the retainer arm member under stress, and wall

means in said housing at the end of said finger-engaging wall means and defining a pocket to be entered by said retainer finger as said contact clip attains home position, said pocket permitting said retainer arm member to react upwardly, said finger and said last-named wall means thereafter cooperating to prevent rearward displacement of said contact clip; the normal clearance between the wall of the opening in said retainer rear wall member and the shank of said terminal screen being such that when said screw is loosened the retainer may under its own weight rotate sufficiently to remove said finger from said pocket to free the contact clip for withdrawal from said housing.

ARNOLD G. COOK.

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