Sept. 5, 1939. R. J. SUTTON 2,172,181

CONNECTOR STRUCTURE

Filed Dec. 24, 1937

Fig. 1.

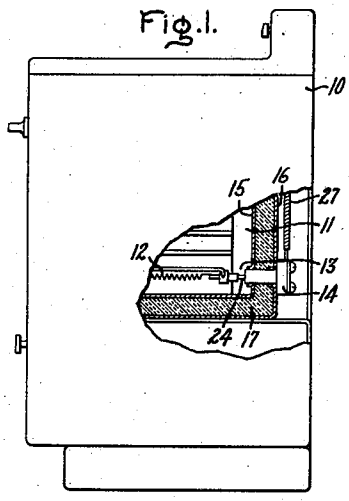


Fig. 2.

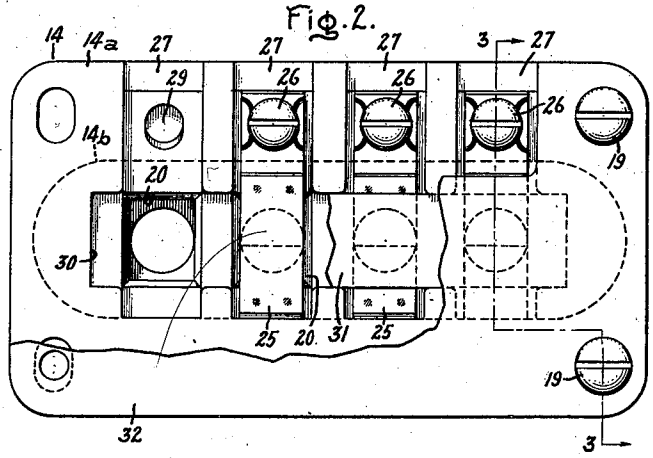


Fig. 3.

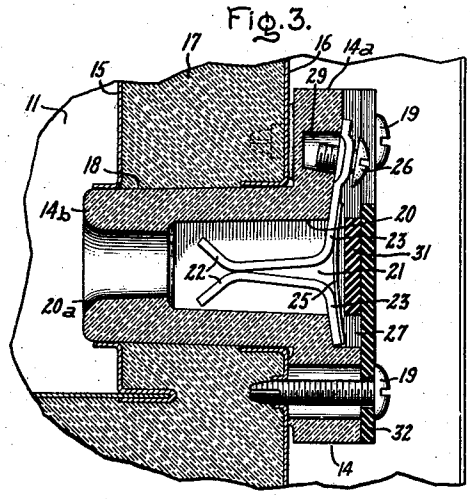


Fig. 4.

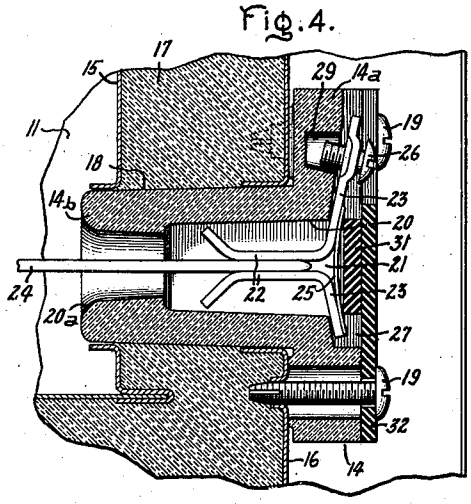
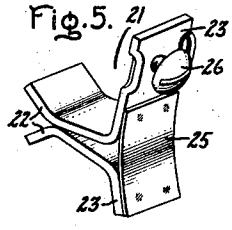


Fig. 5.



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UNITED STATES PATENT OFFICE

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CONNECTOR STRUCTURE

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10 Claims. (Cl. 173—363)

This invention relates to connector structures of the type provided with contact clips, that have opposed jaws to receive between them a bayonet-like terminal, such as are used in electric ovens and other heating devices, and it has for its object the provision of an improved connector structure of this character.

Electric ovens and like heating devices are oftentimes provided with a heating unit that is removable. In such cases the heating unit is provided with bayonet-type terminals which when the unit is applied to the oven, or other heating device, are received in contact clips that have jaws arranged in pairs between which the terminals are received.

This invention contemplates an improved connector structure having a contact clip that is simple, sturdy and inexpensive in its construction; in which the jaws are strong, relatively massive and substantially inflexible; and in which the jaws are yieldingly related to each other by a spring in such a way that they engage the terminal with a relatively great contact pressure, but offer little resistance to the insertion and removal of the terminal. In addition, it is contemplated that the spring will be located in the coldest part of the assembly, and will carry but a small part of the current.

In accordance with this invention, the jaws of each contact clip are provided with base members, each of which is arranged at an angle to its jaw so that the base members are directed away from each other. It is contemplated that the base members shall be arranged at a relatively large angle to each other, such as 180° or somewhat less. Rigidly secured to the base sections is a sheet-like spring member which is so arranged that it biases the two jaws toward each other. Cooperating with this spring member are means for varying its effect when the bayonet-like terminal is inserted in the jaws so as to reduce the pressure of the spring on the jaws, and thereby reduce the resistance of the jaws to the insertion of the terminal.

For a more complete understanding of this invention, reference should be had to the accompanying drawing in which Fig. 1 is a side elevation of an electric range provided with an oven having terminal structure embodying this invention; Fig. 2 is an enlarged plan view of terminal structure arranged in accordance with this invention and used in the electric range of Fig. 1, parts being broken away so as to illustrate certain details of construction; Fig. 3 is an enlarged fragmentary sectional view of a part of the electric range of Fig. 1 illustrating the terminal structure in section through the line 3—3 of Fig. 2 and looking in the direction of the arrows; Fig. 4 is a view similar to Fig. 3 but illustrating a terminal inserted in the contact clip; and Fig. 5 is a perspective view illustrating contact clip jaws assembled with their biasing spring all in accordance with this invention.

Referring to the drawing, this invention has been shown as applied to an electric range 10 having an oven 11. In the oven 11 is provided a removable heating element 12 which is provided with a contact structure 13 arranged in accordance with this invention. The contact structure 13 comprises a terminal block or housing 14 formed of any suitable electrically insulating material such as porcelain. The housing has a rectangular base 14*a*, and a relatively smaller portion 14*b* projecting from the base and having an elongated oval shape.

As shown, the oven will preferably be formed with inner and outer linings 15 and 16 between which a suitable layer 17 of thermal insulating material will be placed. The terminal block is arranged so that its portion 14*b* is inserted through an aperture 18 formed in the oven wall that comprises the two linings 15 and 16 and the insulating layer 17, as clearly shown in Figs. 1, 3 and 4. The base 14*a* is secured to the oven by means of screws 19 directed through apertures provided for them in the four corners of the base.

The insulator is provided with a plurality of parallel spaced chambers 20. Received in each of these chambers 20 is a clip structure 21 comprising a pair of opposed jaws 22 formed of a strong relatively inflexible material, such as cold rolled strip steel. The jaws 22 are provided with base sections 23 arranged at an angle to the jaw sections as clearly shown. Preferably, the base sections will be arranged at an angle of substantially 90° to the jaw sections 22. In the preferred form, however, the angle will be somewhat larger than 90°, such as 102°, so that two base sections 23 form an angle less than 180°, as shown in Figs. 3 and 4. It is to be understood, however, that this angle may be somewhat less than 90°. The jaw sections 22 at their ends opposite the base sections are flared outwardly, as shown, to facilitate the insertion of a bayonet-like terminal member 24 carried by the heating unit 12. Each chamber 20 has an opening 20*a* presented to the heating chamber 11 and through which the terminal is inserted.

The base sections 23 are rigidly secured to-

gether by means of a sheet-like spring 25, which as shown, has a width substantially equal to the width of the base section 23 and has a length such that a material area of each end section of the spring covers a like area of the base section 23. The end sections of the spring are rigidly secured to the base sections in any suitable manner, as by spot-welding. The spring preferably is of a highly flexible, strong, heat resisting material, such as a suitable alloy spring steel. One of the base sections 23 is relatively elongated as shown and this section receives a binding screw 26 to which the electrical supply connections 27 (Fig. 1) are attached.

A convenient way of assembling the spring 25 with the jaws 22 so that the spring is placed under proper tension to bias the jaws together is to place between the jaws a spacer member having about the same thickness as the terminal 24. Then preferably the spring 25 of initially flat sheet-like form is bowed substantially to its position shown in Fig. 4 and is secured to the base section 23 in the manner previously described, that is, by welding. Then when the spacer member is removed, the spring will retain its bowed position, as shown in Fig. 3, due to the fact that it has been rigidly secured to the angularly arranged end sections 23.

The base sections 23 are received in recesses 27 arranged cross-wise of the base 14a of the housing, as shown. Within the upper recesses, as viewed in Figs. 3 and 4, are deeper recesses 29 which provide room for the binding screws 26.

Intersecting the recesses 27 is an elongated longitudinal recess 30 in which is placed an elongated flat member 31 formed of a suitable electrically insulating material, such as fiber. As shown, this member 31 is positioned opposite the springs 25 of the clip members. This member 31 acts as a bearing for the clips when the terminals 24 are inserted. That is, this member is so related to the spring that its side edges form knife-edge or line contact across spring 25 at a section between, but away from, the two welded ends. These edges act as fulcrums for the bases 23 of the jaws members about which the bases rotate as the jaws 22 are being separated. When pressure or a force is applied to the terminal to move it into the jaws 22 these fulcrum knife edges react against the spring 25 causing it to deflect upwardly, thus reducing the pressure on the jaws. However, once the terminals have been applied, the downward force or pressure on the jaws is relieved and the entire spring strength is then available to bias the jaws together; in other words, the jaws are biased together by a relatively large force which insures a good electrical contact between the jaws and the terminal 24.

Also, it will be observed that the spring members 25 are located at a point relatively removed from the mouths of the jaws that receive the terminals, and so, are flexed but very slightly while the jaws 22 are moved a relatively great distance apart by the bayonet-like members 24. This effects a considerable degree of flexibility for a small movement of the spring member.

The bearing member 31 is secured within its recess 30 by means of a cover member 32 also formed of a suitable electrically insulating material such as fiber and secured by means of the screws 19.

The high flexibility that is effected by the relatively small flexing of the spring 25 as the jaws are separated permits the use of relatively heavy and inflexible jaws which is of a distinct advantage in that jaws of this character reduce relatively high temperature conditions at the surfaces in contact.

The removal of the springs 25 from the jaws and locating them in the base places the springs in substantially the coldest part of the contact clip structure, and furthermore, places the springs in that part of the clip structure where but very little current is carried. The proportion of the current carried by the springs 25 is further reduced by forming the springs of a high resistance material, and by giving them a relatively small cross section.

While I have shown a particular embodiment of my invention, it will be understood, of course, that I do not wish to be limited thereto since many modifications may be made, and I, therefore, contemplate by the appended claims to cover any such modifications as fall within the true spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A connector structure comprising a pair of relatively massive substantially inflexible jaws arranged opposite each other to receive a terminal between them, the jaws being flared outwardly at one end to facilitate the insertion of the terminal, and a resilient member rigidly secured to the jaws at the other end so as to bias said flared ends together and to yieldingly resist their separation by the terminal.

2. A connector structure comprising a contact clip for a bayonet-type terminal comprising a pair of opposed jaws formed of a relatively massive and inflexible metal and arranged to receive said terminal between them, and having bases directed away from each other, and a relatively thin, mechanically strong spring having its ends rigidly secured to the bases of said jaws to unite the jaws mechanically and to yieldingly hold them together.

3. A connector structure comprising a contact clip for a bayonet-type terminal comprising a pair of relatively rigid opposed jaw portions arranged to receive said terminal between them, bases on said jaw portions directed away from each other, a single sheet-like resilient member having its end sections covering substantial areas of said bases on the sides opposite said jaw portions, and means rigidly securing said end sections to said sides.

4. A connector structure comprising a contact clip having a pair of opposed relatively rigid jaws arranged to receive a bayonet-type terminal between them, each jaw having a base section arranged at an angle somewhat greater than 90° to the jaw so that the two base sections form an angle of somewhat less than 180° with each other, and a sheet-like resilient member having its end sections secured to said bases to bow the resilient member and cause it to resiliently force said jaws toward each other.

5. A connector structure comprising a contact clip having a pair of opposed relatively massive and substantially inflexible jaws arranged to receive a bayonet-type terminal between them, each jaw having a base section arranged at an angle somewhat greater than 90° to the jaw so that the two base sections form an angle of somewhat less than 180° with each other, and an initially flat spring having its end sections secured to said bases to bow the spring and cause it to resiliently force said jaws toward each other.

6. A connector structure comprising a con-

tact clip for a bayonet-type terminal comprising a pair of opposed jaws arranged to receive said terminal between them, and having bases directed away from each other, a spring having its ends rigidly secured to the bases of said jaws to unite the jaws mechanically and yieldingly hold them together, and means responsive to the force applied by said terminal on said jaws as it is being inserted reducing the pressure effect of said spring on each of said jaw members as the terminal is inserted, and restoring said pressure effect of said spring after said terminal has been inserted.

7. A connector structure comprising a contact clip for a bayonet-type terminal comprising a pair of relatively rigid opposed jaw portions arranged to receive said terminal between them, and having bases directed away from each other, a single sheet-like resilient member having its end sections covering substantial areas of said bases on the sides opposite said jaw portions, means rigidly securing said end sections to said sides, and a flat bearing member on the side of said spring opposite said bases having its edges adjacent to and bearing on the sections of said resilient member between the secured end sections.

8. A connector structure comprising an insulating support having a chamber, a contact clip in said chamber having opposed jaws arranged to receive between them a bayonet-type terminal, the jaws having base sections arranged at a substantial angle to each other, a spring having its ends secured to said bases to bias the jaws together, and an insulating bearing member having a pair of spaced edges adapted to have line contact with the sections of said spring between its secured ends.

9. A connector structure comprising an insulating support having a chamber, a contact clip in said chamber having opposed jaws to receive between them a bayonet-type terminal, the jaws having base sections arranged at a substantial angle to each other, a sheet-like spring having its ends secured to said bases to bias the jaws together, a flat insulating member opposite said spring with its edges adapted to have line contact with sections of said spring between its secured ends, and said insulating support having a recessed section to receive and position said flat insulating member.

10. A connector structure comprising a contact clip for a bayonet-type terminal comprising a pair of opposed jaws arranged to receive the terminal between them, base sections on said jaws, a spring having its ends rigidly secured to said base sections to unite the jaws mechanically and yieldingly hold them together, and means reducing the pressure effect of said spring on said jaw members only as the terminal is being inserted between said jaws to reduce the resistance of the jaws to the insertion of the terminal.

ROBERT J. SUTTON.