Aug. 21, 1956 H. C. CUNNINGHAM 2,760,173

ELECTRIC TERMINAL PROTECTION

Filed Feb. 9, 1953

Fig. 1

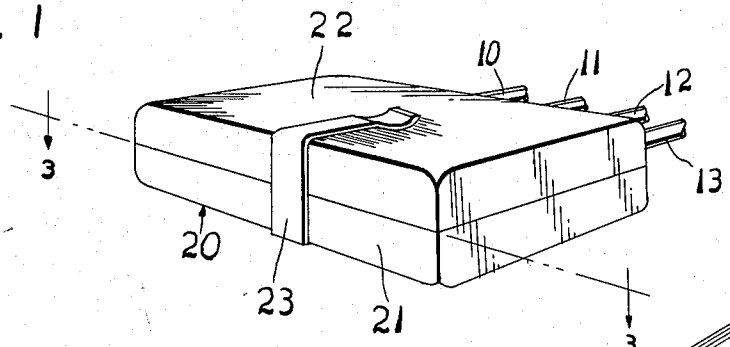


Fig. 2

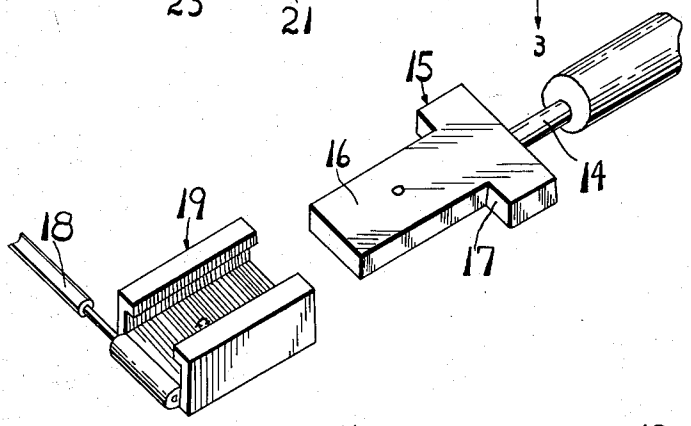
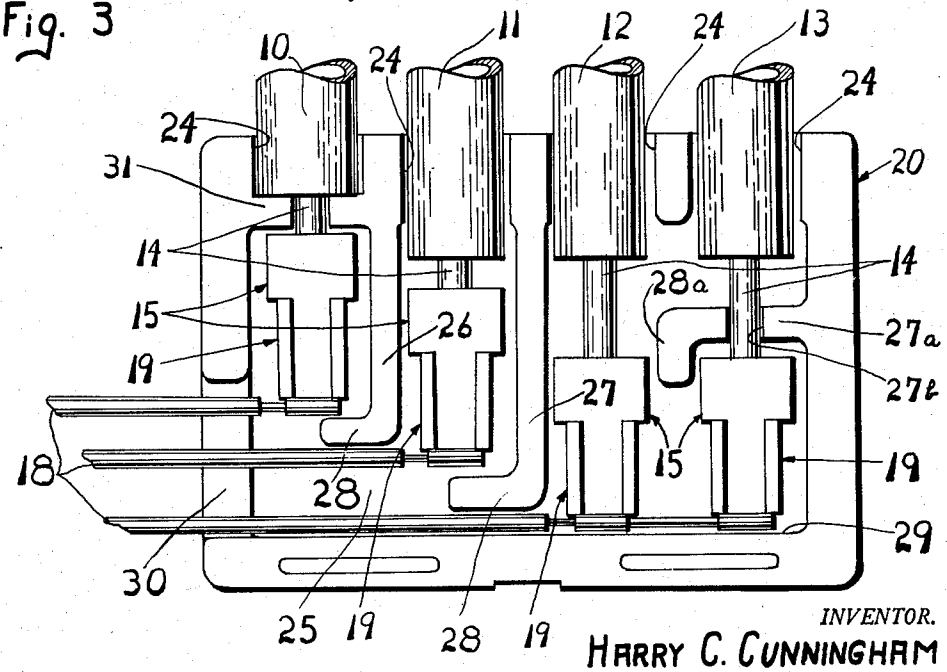


Fig. 3



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ELECTRIC TERMINAL PROTECTION

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4 Claims. (Cl. 339—76)

My invention relates to means for protecting an electric terminal, more particularly to means for protecting the terminal connections of range-type sheathed electric heating elements from contact with portions of the range or with each other, and the principal object of my invention is to provide new and improved means of the character described.

In the past, the terminal connections of range-type sheathed electric heating units have been secured to a terminal block by means of screws. However, these terminal blocks are troublesome to install and they do not offer complete protection to the terminals since they are usually open at the bottom to facilitate assembly.

My invention completely protects the terminals of a sheathed electric heating element and it may be installed much more quickly and economically than those of the prior art. These and other advantages will become apparent from a study of the following description and from the drawing appended hereto.

In the drawing accompanying this specification and forming a part of this application there is shown, for purpose of illustration, an embodiment which my invention may assume, and in this drawing:

Figure 1 is a perspective view of my invention secured in position to a fragmentarily shown, sheathed electric range-type heating element of conventional design,

Figure 2 is an enlarged perspective view of a detail, and

Figure 3 is an enlarged view generally corresponding to the line 3—3 of Figure 1.

As shown in the drawing, my invention is presently adapted for use with a sheathed range-type electric heating element having four terminal portions to which connections must be made. However, it will be apparent that my invention may be adapted for use with heating elements other than of range-type and with elements having any number of terminal connections.

As is well known in the art, the common range-type sheathed electric heating element generally comprises a pair of convoluted, sheathed heating elements secured together to form a generally plane support for the container to be heated. The convoluted portions of the heating elements are usually supported by a spider that in turn is supported by the range, and the elements are usually secured to the spider to form a unitary structure. The ends **10**, **11**, **12** and **13** of the heating elements are generally disposed together in side-by-side relation as shown, to facilitate making the necessary electrical connections.

In the present embodiment and as illustrated in Figures 2 and 3, a terminal pin **14** extends axially from each of the ends **10**, **11**, **12** and **13** of the sheathed heating elements. Each terminal pin **14** is adapted to be secured to the conventional resistance wire contained within the sheath and a terminal lug **15** is adapted to be electrically and mechanically secured to each terminal pin **14**, as shown, by any suitable means.

Each terminal lug **15** is narrowed at **16** to provide a shoulder **17** for a purpose to be shown. Insulated electric power leads **18** are adapted to be connected to the terminal lugs **15**, and as illustrated in Figure 2, each lead **18** is electrically connected to a channel-like clip or connector **19**. In the present embodiment one of the leads **18** has two clips **19** secured thereto since this lead is common to both elements.

As will be apparent, each clip **19** is adapted to be slid over a respective terminal lug **15** until it engages the shoulder **17**, the clip **19** being so constructed and proportioned that frictional interengagement between the clip and the lug is sufficient to insure good electrical contact therebetween.

My invention provides means for protecting the above described electrical connections and to this end I provide a dielectric body **28** which completely covers the said electrical connections. In the present embodiment, the body **20** comprises two complementarily formed pieces **21** and **22** held together by means of a spring clip **23**.

In the present embodiment each piece **21**, **22** forms one-half of the body **20**, each being similar to the other with the exception that the pieces are of opposite hand. Each piece is formed with semi-circular recesses **24**, the recesses in the pieces combining to form openings for receiving the spaced-apart terminal portions **10**, **11**, **12** and **13** of the heating elements. The body portion to each piece is further recessed to provide a hollow interior **25** for the body **20**, this hollow interior receiving the terminal pins **14**, terminal lugs **15**, clips **19** and leads **18**.

As illustrated, the end **10** of the heating element does not project as far into the interior of the body **20** as do the ends **11**, **12** and **13**, and the terminal pins **14** of the ends **12** and **13** are longer than those of ends **10** and **11**. This arrangement staggers the position of the lugs **15** within the body **20** for a purpose to appear.

Walls **26** and **27**, formed in part in each of the body pieces **21**, **22**, divide the chamber **25** and these walls effectively separate the electrical connections and eliminate the possibility of shorts therebetween. Each wall **26**, **27** is provided with a transversely disposed foot **28**, and these feet **28** and a wall **29** which defines the hollow interior **25** of the body **20**, prevent disengagement of respective clips **19** from the lugs **15**. An elongated aperture **30** leads from an outer edge of the body **20** to the interior thereof, this aperture **30** being adapted to pass the electric leads **18**.

Means are provided to restrict axial movement of the body **20** with respect to the ends of the heating elements and such means presently comprises a wall **31** that is disposed between the end **10** of the heating element and its respective terminal lug **15**. The wall **31** is defined by wall portions carried by the respective body pieces **21**, **22**, each wall portion being recessed and together providing an aperture to pass the terminal pin **14**. It will be clear that once the two pieces **21**, **22** of the body **20** are secured in position, movement of the body **20** in an axial direction will be restricted by interengagement of the wall **31** with either the end **10** of the heating element or the lug **15** carried by the end **10**.

Additionally, movement of the end of the body **20** adjacent element end **13** is limited in one direction by engagement of the clip **19** carried by element end **13** with the wall **29**, and in the other direction by engagement of the lug **15** carried by element end **13** with a wall **27***a*. As will be understood, the wall **27***a* is in part provided by each of the pieces **21**, **22** and each wall portion is recessed at **27***b* to pass the terminal pin **14** that extends from this element end. A foot portion **28***a* is provided by each wall portion **27***a* and this foot serves to maintain the spacing between element ends **12**, **13**.

Although the pieces **21**, **22** of the body **20** have been shown and described as being similar but of the opposite hand, it is to be understood that if desired only one of

the pieces could be formed as described while the other piece could simply be a flat closure plate. It is also to be understood that means other than the spring clip 23 may be employed to hold the two pieces of the body 20 together.

In view of the foregoing it will be apparent to those skilled in the art that I have accomplished at least the principal object of my invention and it will also be apparent to those skilled in the art that the embodiment herein described may be variously changed and modified, without departing from the spirit of the invention, and that the invention is capable of uses and has advantages not herein specifically described, hence it will be appreciated that the herein disclosed embodiment is illustrative only, and that my invention is not limited thereto.

I claim:

1. In combination with a sheathed electric heating element having a current-carrying terminal pin extending axially from the end of said sheath, a slip-on electrical connector adapted to be electrically connected to said terminal pin by shifting it axially thereof in a direction toward said sheath, and means for protecting the exposed current-carrying portion of said heating element, comprising a dielectric body having an internal cavity for receiving the end of said sheath, said terminal pin and the connector secured thereto, said body being formed of separable portions which together substantially completely encase the current-carrying terminal portion of said heating element, interengageable means in part provided by said heating element and in part provided by said body to restrict movement of said body in either direction axially of said heating element, abutment means provided by said body adjacent said electrical connector to prevent axial movement of the latter in a direction away from said sheath and consequent disengagement thereof from said terminal pin, and means for holding said portions of said body together.

2. In combination with a sheathed electric heating element having a current-carrying terminal pin extending axially from the end of said sheath, said terminal pin having a terminal lug secured thereto in spaced relation with respect to the end of said sheath, and means for protecting the exposed current-carrying portion of said heating element, comprising a dielectric body having an internal cavity for receiving the end of said sheath, said terminal pin and said terminal lug, said body being formed of separable portions which together substantially completely encase the current-carrying portion of said heating element and said body having a portion disposed between the end of said sheath and an adjacent portion of said terminal lug to restrict movement of said body axially of said heating element, and means for holding said portions of said body together.

3. In combination with a sheathed electric heating element formed with its ends disposed in side-by-side relation and having a current-carrying terminal pin extending

axially from each end of said sheath, a terminal lug secured to each terminal pin in spaced relation to a respective end of said sheath, a slip-on electrical connector for each of said terminal lugs, each connector being engageable with its respective terminal lug by shifting it axially of said terminal pin, and means for protecting the exposed current-carrying terminal portion of said heating element, comprising a dielectric body having spaced-apart internal cavities for receiving respective ends of said sheath, said terminal pins and the parts secured thereto, said body being formed of separable portions which together substantially completely encase the current-carrying terminal portion of said heating element, interengageable means in part provided by said heating element and in part provided by said body to restrict movement of said body axially of said heating element, abutment means provided by said body adjacent said electrical connectors to prevent disengagement of said connectors from respective terminal lugs, and means for holding said portions of said body together.

4. In combination with a sheathed electric heating element formed with its ends disposed in side-by-side relation and having a current-carrying terminal pin extending axially from each end of said sheath, a terminal lug secured to each terminal pin in spaced relation to a respective end of said sheath, a slip-on electrical connector for each of said terminal lugs, each connector being engageable with its respective terminal lug by shifting it axially of said terminal pin, and means for protecting the exposed current-carrying terminal portion of said heating element, comprising a dielectric body having spaced-apart internal cavities for receiving respective ends of said sheath, said terminal pins and the parts secured thereto, said body being formed of separable portions which together substantially completely encase the current-carrying terminal portion of said heating element and said body having a portion disposed between one of the ends of said sheath and an adjacent portion of a respective terminal lug to restrict movement of said body axially of said heating element, abutment means provided by said body adjacent said electrical connectors to prevent disengagement of said connectors from respective terminal lugs, and means for holding said portions of said body together.

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