Nov. 18, 1958 D. KNOLL 2,861,168

ELECTRIC HEATER PANEL CONTACT STRUCTURE

Filed May 14, 1957

Fig. 1.

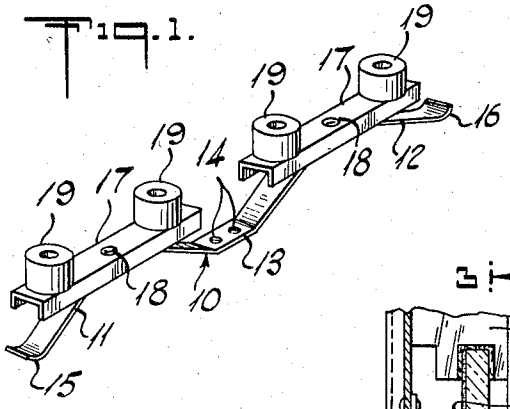


Fig. 3.

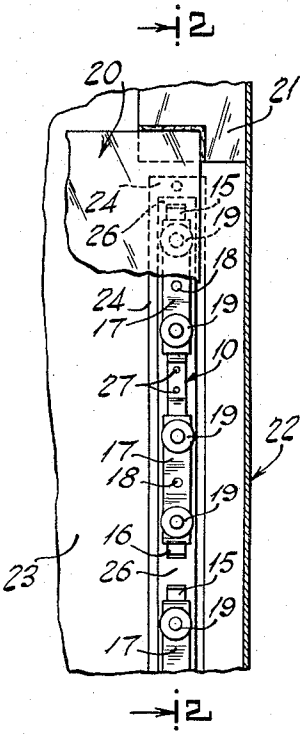
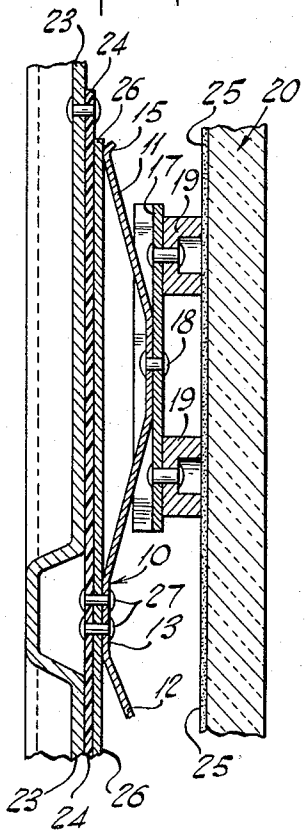


Fig. 4.



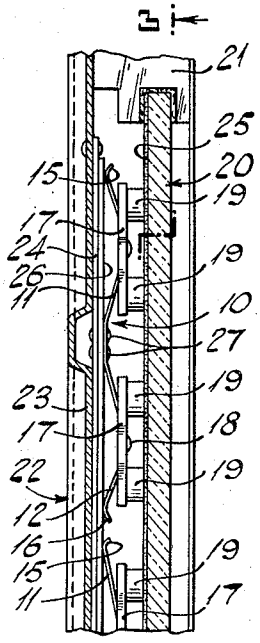


Fig. 2.

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ELECTRIC HEATER PANEL CONTACT STRUCTURE

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6 Claims. (Cl. 219—34)

This invention relates to electric heaters and more specifically to a novel and improved contactor particularly useful for electric glass panel heaters.

In the manufacture of electric heaters wherein pressure contact is made with the heating element to supply electric energy thereto, it is difficult to maintain a low contact resistance in cases where limited space is available. This is particularly the case with high wattage glass panel heaters which have presented difficult and costly design and construction problems in order to secure reasonable heater life.

This invention overcomes the foregoing difficulty in the manufacture of panel type heaters utilizing pressure type contacts and affords an improved contact structure characterized by its effectiveness, low cost, compactness and dependability.

Another object of the invention is the provision of a novel and improved electrical pressure-type contact assembly that may be simply and easily manufactured and at the same time provide a contact assembly wherein the pressure of the contacts on the panel will be substantially uniform.

Still another object of the invention resides in the provision of a novel and improved electrical contact assembly for electric heaters.

The above and other objects and advantages of the invention will become more apparent from the following description and accompanying drawings forming part of this application.

In the drawings:

Fig. 1 is a perspective view of a contact assembly in accordance with the invention;

Fig. 2 is a cross sectional view of an electric panel heater embodying the invention and is taken along the line 2—2 of Fig. 3;

Fig. 3 is a fragmentary view of a panel heater in partial section and is taken along the line 3—3 of Fig. 2; and

Fig. 4 is an enlarged cross sectional view of the contact structure of Figs. 1 and 2 showing its cooperation with a glass heating panel.

Panel type electric heaters and particularly those employing glass panels often utilize a panel having a conductive coating on one surface and silver contacting strips parallel to and spaced from at least two opposing edges for feeding electric current to the panel. It is desirable in heaters of this character to maintain the thickness of the heater assembly at a minimum and in high wattage heaters using long narrow panels it is especially important to distribute the current as uniformly as possible along each strip to avoid damage by the introduction of excessive current at one or more points. With this invention a relatively large number of contact points can be provided within a relatively short span with substantially uniform pressure applied between each contact and the cooperating silver conducting strip.

Referring now to the drawings illustrating one embodiment of the invention, the contact assembly **10** includes

a member **11** formed of resilient material having two bowed sections **12** and **12'**. The central portion **13** of the assembly is substantially flat and in the illustrated embodiment has a pair of openings **14** for attachment of the strip to a supporting member. The outer ends **15** and **16** of the bowed sections **12** and **12'** are preferably curved as illustrated so that they will slide freely on the surface of the contact supporting structure.

Each of the bowed members **12** and **12'** carries an elongated strip of conducting material **17** that is generally U-shaped in section and is secured to the crest of the associated bow by a single rivet **18** or other suitable fastening means. Each member **17** has an internal width that will accommodate its cooperating bow and thereby maintain the channel members in alignment one with the other. Each channel member further includes a pair of carbon button contacts **19** that may be riveted or otherwise suitably fastened to the outer ends thereof and preferably at equal distances from the central rivet **18**.

Figs. 3 and 4 show the cooperation of contact assembly of Fig. 1 with a glass heating panel and for simplicity only a fragmentary portion of a glass panel heater has been illustrated. In this heater the conductive glass panel is generally denoted by the numeral **20** and is supported by four corner insulating blocks **21** carried by an appropriate protective frame **22**. Within the frame **22** there is provided in the instant embodiment of the invention a reflecting member **23** which usually is slightly larger in area than the glass panel **20**. This frame carries a pair of spaced parallel strips of insulating material **24** in alignment with the silver conducting strips **25** carried by the glass panel **20**. Overlying each insulating strip **24** is a strip of conducting material **26** which supports the contact assembly **10** and in addition feeds electrical energy thereto. The strip **26** is secured in position by a pair of rivets **27** which pass through the openings **14** of the contact assembly **10** and through the strips **26** and **24**.

The depth of the bows **11** and **12** previously described is coordinated with the distance between the reflector **23** and the glass panel **20** so that when the panel **20** is in place over the contact assembly **10** the bows will be depressed sufficiently to provide the desired pressure between the contactors **19** and the silver strip **25**. Inasmuch as each bow carries a pair of contactors on channels **17** the channels can tilt relative to the bows so that each bow will apply substantially uniform pressure to its pair of contacts. Inasmuch as the bows are all formed in a similar manner all of the contactors will be pressed against the silver strip **25** with substantially the same pressure. It will be observed that when the bows are depressed in the assembly of the heater as illustrated the curved end portions **15** and **16** of the bows will slide relative to the conductive strip **26** so that energy will be fed to the contact assembly through at least three points.

In the construction of electric heaters of the type above described one or more contact assemblies **10** are generally used in end to end relationship on a single conductive strip **26** in order to provide an electrical contact along one edge of a conducting plate and a similar contact arrangement is used along the opposite edge of the plate. Current is then fed to each of the contact strips **26** in order to energize the heater.

While only one embodiment of the invention has been illustrated and described it is apparent that modifications, alterations and changes may be made without departing from the true scope and spirit thereof.

What is claimed is:

1. In an electric panel type heater having a conductive panel and electrical connector strips adjacent at least two edges of said panel, pressure connectors for applying energy to said panel and uniformly bearing against said

strips, each connector comprising at least one bowed member of resilient electrically-conductive material, said member having means for attachment to a supporting member with the free end of the bow in slidable contact with said member, an elongated member of conductive material carried at the crest of said bow and at least two electrical contacts carried in spaced relationship by the last said member.

2. Apparatus according to claim 1 wherein the last said member is channel shaped and the contacts are carried near the ends of said channel.

3. Apparatus according to claim 2 wherein said contacts are carbon buttons having substantially large contacting surfaces.

4. A contactor for panel type electric heaters comprising a member of electrically conductive resilient material formed in the shape of a bow, an elongated member of electrically conductive material carried at the crest of said bow and at least two electric contacts carried by said elongated member.

5. A contactor for panel type electric heaters comprising a double-bowed member of electrically conductive resilient material and an elongated member of electrically conductive material carried at the crest of each bow and at least two electric contacts carried by each of said elongated members.

6. In an electric panel type heater having a conductive panel and electrical connector strips adjoining at least two edges of said panel, pressure connectors for applying energy to said panel and uniformly bearing against said strips, each connector comprising a double-bowed member of resilient electrically conductive material, means centrally of said member for attachment to a support with the free ends of the bows in slidable contact with said support, an elongated channel shaped member of conductive material carried at the crest of each bow with the legs of each channel member engaging its associated bow to maintain the channel members in alignment one with the other and at least two carbon button contacts carried in spaced relationship by each of said channel members.

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