Nov. 4, 1952 D. B. MacKENDRICK 2,617,011

ELECTRIC HEATING PAD

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Fig. 2.

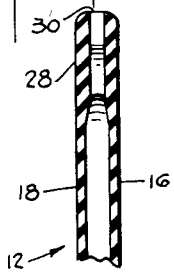


Fig. 3.

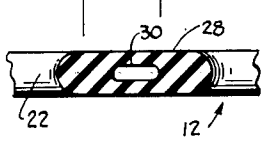
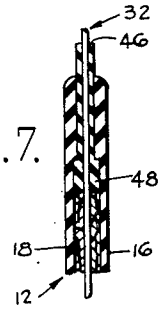


Fig. 7.



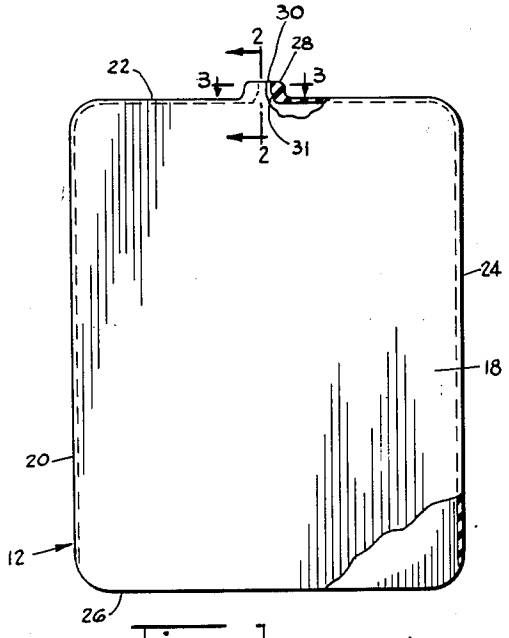
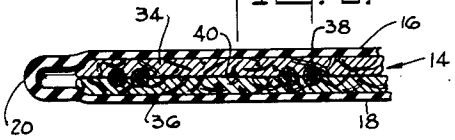


Fig. 1.

Fig. 6.



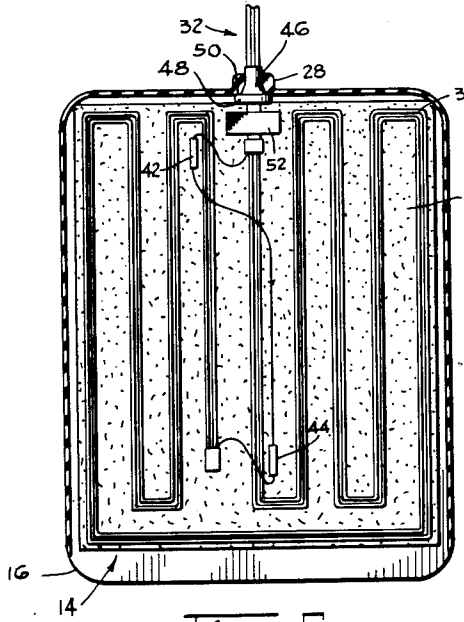
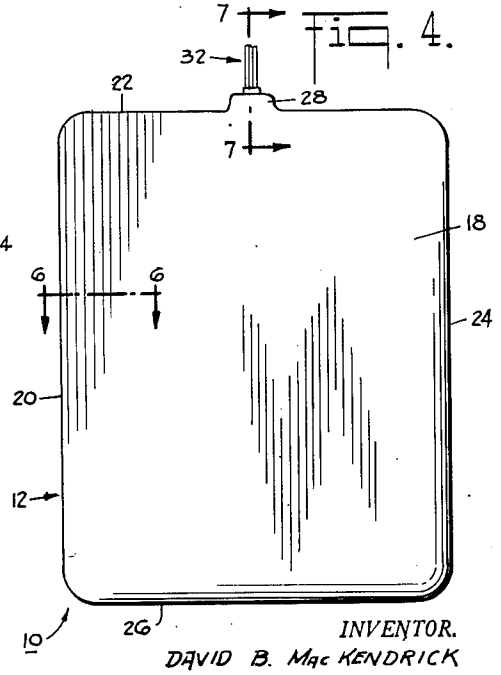


Fig. 5.

Fig. 4.



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ELECTRIC HEATING PAD

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2 Claims. (Cl. 219—46)

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This invention relates to electric heating pads and, more particularly, is concerned with electric heating pads of the type constituting a fabric-carried heating element contained in a hermetically sealed flat envelope of elastomeric material.

It is an object of my invention to provide a heating pad of the character described which can be produced more quickly and economically than present-day heating pads of the same general type.

It is another object of my invention to provide a heating pad of the character described which is so constructed that it lends itself to a simple hermetic sealing operation, e. g. to a simple vulcanization.

It is another object of my invention to provide a heating pad of the character described wherein the pad is not extensively vulcanized around the point of entrance for the power supply cord.

It is another object of my invention to provide a heating pad of the character described having a simple and efficient strain relief between the power supply cord and the elastomeric envelope.

It is another object of my invention to provide a heating pad of the character described wherein a uniform wall thickness is provided in the envelope along the zone of extensive hermetic sealing so that the sealing process is simplified and expedited and the finished bag has a more attractive appearance than heretofore.

It is another object of my invention to provide a heating pad of the character described which is inexpensive to manufacture, durable in use and efficient in operation.

It is another object of my invention to provide a heating pad of the character described whose construction is such that installation of the heating element in the envelope is simplified.

Other objects of my invention will in part be obvious and in part will be pointed out hereinafter.

My invention accordingly consists in the features of construction, combinations of elements and arrangements of parts which will be exemplified in the device hereinafter described and of which the scope of application will be indicated in the appended claims.

In the accompanying drawings in which is shown one of the various possible embodiments of my invention,

Fig. 1 is a plan view of an elastomeric envelope constituting part of a heating pad constructed in accordance with my invention, said envelope being broken away adjacent its two openings to

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show the internal construction thereof in these regions before insertion of a heating element;

Figs. 2 and 3 are enlarged sectional views taken substantially along the lines 2—2 and 3—3, respectively, of Fig. 1, the same being illustrative of the internal configuration of the elastomeric envelope adjacent the opening for the power supply cord;

Fig. 4 is a plan view of the finished heating pad;

Fig. 5 is a view similar to Fig. 4 but with one side of the envelope and one sheet of the heating element removed to illustrate the internal construction of the heating element; and

Figs. 6 and 7 are enlarged sectional views taken substantially along the lines 6—6 and 7—7, respectively, of Fig. 5.

Referring now in detail to the drawings, the reference numeral 10 denotes an electric heating pad constructed in accordance with my invention and including a flat envelope 12 in which there is disposed a fabric-carried heating element 14.

The envelope 12 comprises two juxtaposed flat coextensive panels 16, 18 which are integrally joined along three sets of their registered edges 20, 22, 24, the fourth set of edges 26 being unconnected (see Fig. 1) before insertion of the heating element. Said envelope is made from any one of the well-known elastomeric materials, for example, natural rubber or a synthetic elastomeric plastic, such as butadiene styrene copolymers, butadiene acrylonitrile copolymers, isobutylene-diolefin copolymers, polychloroprene, or organic polysulfide polymers.

The set of edges 22 opposite to the edges 26 is formed with a protruding neck 28 having an internal passageway 30 which runs from the tip of the neck to the inside of the envelope. The inner end of the passageway, i. e., the end terminating at the inside of the envelope, is the widest portion thereof (see Figs. 1 and 5). The passageway converges from this end toward the tip of the neck thereby forming a portion 31 of frusto-conical contour. Between the tip of the neck and said frusto-conical portion, the passageway is of uniform width. The height of the passageway (see Fig. 2) is small in comparison with its width and is substantially uniform except for a slight increase at its inner end. Due to this configuration, the walls 16, 18 of the envelope are of substantially uniform thickness throughout the length of the set of edges 22 and inclusive of the neck 28.

The envelope as thus far described is prefabri-

cated in accordance with any standard molding procedure, the opening at the edges 26 extending across the full width of the envelope.

The heating element 14 is conventional except as to its power supply cord 32. By way of example, said element may have a construction such as shown in my Patent No. 2,423,196 for Flexible Electric Heater and Apparatus and Method for Making the Same, issued July 1, 1947. Accordingly, said element includes a pair of sheets 34, 36 of felted cotton or woolen fibers which are juxtaposed and have sandwiched between them a coil 38 of resistance heating wire which is arranged in some suitable configuration. The coil is adhesively secured to the two sheets and the sheets are adhesively secured to one another by a heat resisting flexible cement 40, for example, latex or synthetic rubber dissolved in a volatile liquid vehicle. The usual thermostats 42, 44 are connected in a suitable circuit to maintain the pad at predetermined safe temperatures in accordance with well-known practice.

Electric energy is supplied to the heating coil through the power supply cord 32. Said cord can be of either the conventional two-, three- or more wire type, the latter being illustrated herein. The illustrated cord includes three stranded wire conductors, each enclosed in its own sheath of electrical insulating, e. g. elastomeric material, and the three sheaths being integrally connected, for instance by vulcanization, so as to provide a cord of oblong section.

At a point immediately adjacent a set of edges of the fabric sheets 34, 36, the supply cord is provided with a member 46 which is permanently connected thereto, preferably being so fashioned that it is in one piece with the combined sheaths for the various conductors. To this end said member desirably is fabricated from a material which is the same as or compatible with the material of the sheaths and is molded in place around the supply cord. The member is larger than the supply cord in at least one transverse dimension so that it cannot pass through an opening which will accommodate the supply cord.

In the preferred form of my invention, the member 46 includes a portion whose plan contour negatively matches the plan contour of the passageway 30. That is to say, said member has a part with parallel sides adjacent to a part of wedge shape. These parts are slightly thicker than the supply cord as indicated in Fig. 7. In addition, the member includes a collar 48 which is wider than the wedge shaped part and is joined to the wedge shaped part at a shoulder 50. The collar 48 is thicker than the wedge shaped part (see Fig. 7).

The wedge shaped and straight parts of the member 46, although of the same contour as the passageway 30, desirably have slightly larger dimensions so that, when disposed in the passageway, the walls of the passageway are slightly stretched. Since the collar 48 is immediately in back of the wedge shaped part, when this part is in the passageway 30, the collar abuts the inside of the envelope immediately adjacent said passageway.

The heating element is provided with a suitable strain relief, for example a strip of adhesive 52, for holding the power supply cord in place. Said strip is taped across the supply cord and to the inner face of one of the fabric sheets 34, 36.

To assemble the pad, the power supply cord 32 is slipped into the envelope 12, introduced into the inner end of the passageway 30 and threaded therethrough, the mouth of said passageway being so dimensioned as to freely pass the cord. The cord is pulled through the passageway and at the same time the heating element is introduced into the envelope.

It will be observed that the heating unit can be slipped into the envelope in its normally flat condition, needing neither to be folded nor rolled up, since the opening in the envelope 12 at the unconnected set of edges 26 extends across the full width of the envelope and therefore is of sufficient size thus to accommodate the heating element which is slightly narrower than the envelope (see Fig. 5).

As the leading edge of the heating element (the edge adjacent the member 46) approaches the inner surface of the edge 22 of the envelope from which the neck protrudes, the member 46 enters the passageway 30 stretching the same slightly as it does so. When the wedge shaped part of said member reaches the narrow part of the passageway, further movement is prevented by the suddenly increased resistance of the neck to further stretching. Moreover, at the same time the collar 48 abuts the inner surface of the envelope on both sides of the passageway 30 thus further preventing outward movement of the supply cord. With the member thus positioned, the leading edge of the heating element is disposed in the immediate vicinity of the edge 22 of the envelope and the opposite edge of the heating element is within the envelope. If desired, prior to seating the strain-relief member 46 in the passageway 30, a suitable adhesive, e. g., rubber cement can be introduced into said passageway to make certain that when the wedge is in place the passageway will be hermetically sealed.

Finally, the envelope has its unconnected set of edges 26 permanently secured to one another. This may be achieved either by cementing with a suitable cement, e. g., rubber cement, or by forming an autogenous joint, e. g., by vulcanization. It will be observed that when this set of edges is joined by vulcanizing, the latter may be practiced very rapidly and simply, inasmuch as the envelope along these edges is of uniform thickness and meets in face-to-face relationship For example, if said edges are vulcanized at a temperature of approximately 350° F., the process will be complete in two to three minutes. Sealing, by vulcanizing, a set of such edges is far more rapid than vulcanization of a set of edges having a cord disposed therebetween since in the latter case the presence of the cord over only a fraction of the area to be vulcanized makes it necessary to use material which is variable in thickness if the finished product is to have a plane exterior.

If desired, the envelope may be vulcanized at the neck 28. This vulcanization, likewise, can be practiced rapidly because the cord extends across the entire width of the area to be vulcanized.

From the foregoing it will be appreciated that insertion of the heating element in the envelope can be carried out rapidly and easily due to the presence both of a small opening for accommodation of the power supply cord and a large opening into which the heating element can be inserted unimpededly. Moreover, the described construction of the envelope enables subsequent

vulcanization to be speedily and effectively achieved.

After the pad has been assembled, the member 46 functions as a strain relief, the wedge shaped part cooperating with the wedge shaped part of the passageway and the collar 48 cooperating with the inside of the envelope on both sides of the passageway.

It thus will be seen that I have provided a device which achieves all the objects of my invention and is well adapted to meet the conditions of practical use.

As various possible embodiments might be made of the above invention, and as various changes might be made in the embodiments above set forth, it is to be understood that all matter herein described, or shown in the accompanying drawings, is to be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. An electric heating pad comprising a flat elastomeric envelope and a flat heating element within said envelope, said heating element including a power supply cord, said envelope having a passageway through which the cord extends, said passageway having a wedge shaped part of which a wider end faces the inside of the envelope, a member permanently secured to said cord adjacent said heating element, said member including a wedge shaped part protruding transversely from the cord and of larger transverse dimensions than the wedge shaped part of the passageway, the configuration of the wedge shaped part of the member matching that of the wedge shaped part of the passageway, said member also including a collar between the wedge shaped part and the heating element, said collar being wider than said part and abutting the inner surface of the envelope adjacent said passageway whereby said member serves as a strain relief between the cord and the envelope, and means securing said member to the walls of said passageway.

2. For use in an electric heating pad having a flat elastomeric envelope and a flat heating element within said envelope and which envelope has a passageway including a wedge shaped part of which the wider end faces the inside of the envelope: a power supply cord for supplying electric energy to the heating element, a member permanently secured to said cord adjacent the heating element, said member including a wedge shaped part protruding transversely from the cord and of larger transverse dimensions than the wedge shaped part of the passageway, the configuration of the wedge shaped part of the member matching that of the wedge shaped part of the passageway, said member also including a collar at the wide end of the wedge shaped part, said collar being wider than said part and abutting the inner surface of the envelope adjacent said passageway whereby said member serves as a strain relief between the cord and the envelope.

DAVID B. MacKENDRICK.

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