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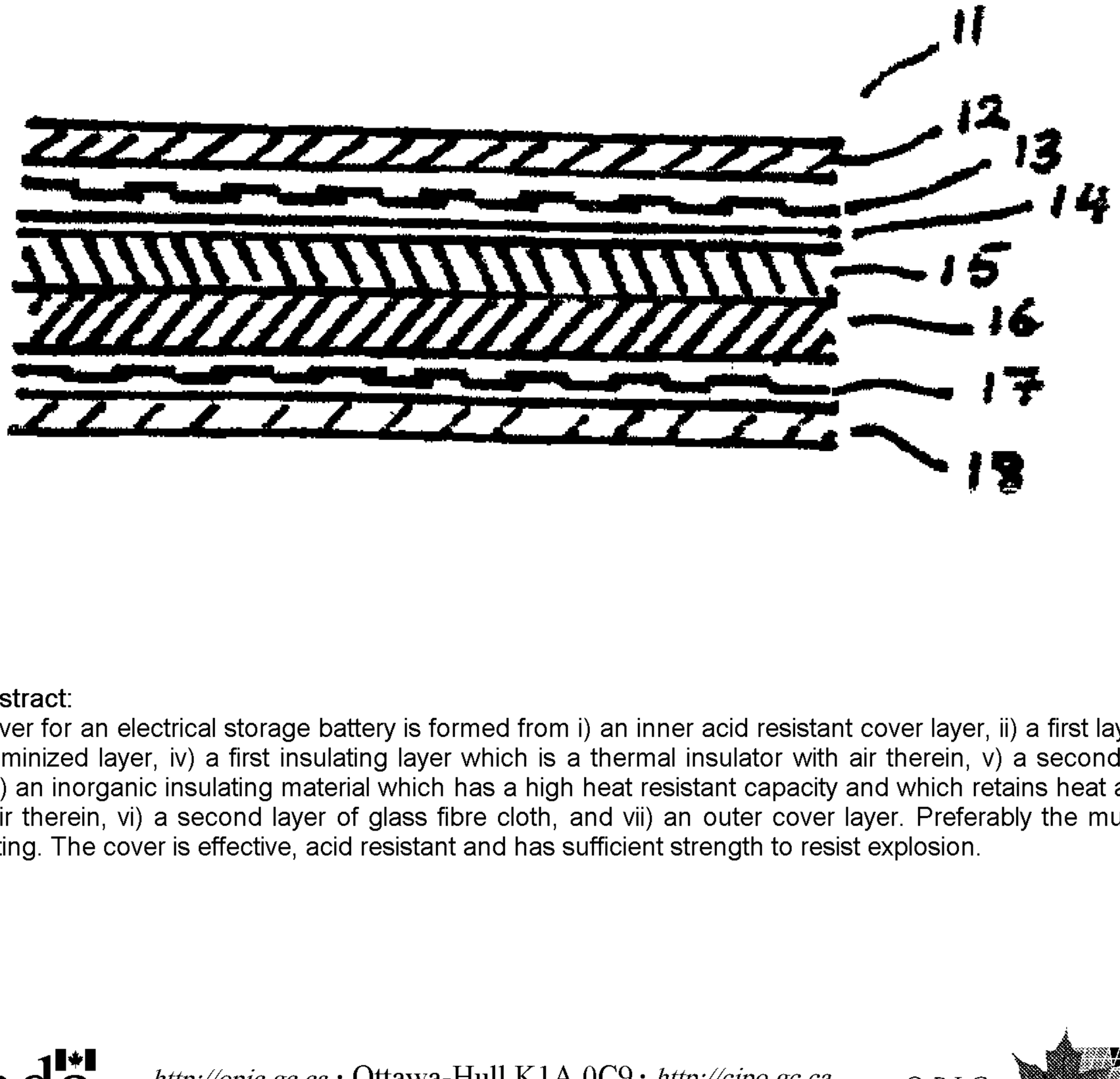


(57) Abrégé/Abstract:
A multi-layer cover for an electrical storage battery is formed from i) an inner acid resistant cover layer, ii) a first layer of glass fibre cloth, iii) an aluminized layer, iv) a first insulating layer which is a thermal insulator with air therein, v) a second insulating layer selected from a) an inorganic insulating material which has a high heat resistant capacity and which retains heat and b) a thermal insulator with air therein, vi) a second layer of glass fibre cloth, and vii) an outer cover layer. Preferably the multi-layer cover is secured by quilting. The cover is effective, acid resistant and has sufficient strength to resist explosion.

ABSTRACT OF THE DISCLOSURE

A multi-layer cover for an electrical storage battery is formed from i) an inner acid resistant cover layer, ii) a first layer of glass fibre cloth, iii) an aluminized layer, iv) a first insulating layer which is a thermal insulator with air therein, v) a second insulating layer selected from a) an inorganic insulating material which has a high heat resistant capacity and which retains heat and b) a thermal insulator with air therein, vi) a second layer of glass fibre cloth, and vii) an outer cover layer. Preferably the multi-layer cover is secured by quilting. The cover is effective, acid resistant and has sufficient strength to resist explosion.

Technical Field

The present invention relates to a removable thermal insulator for electrical storage batteries.

Background to the Invention

Battery blankets are known. For example, U.S. Patent 4 235 502 to Taylor discloses a flexible battery cover providing a hinged top overlying enclosed sides for securement about the battery. U.S. Patent 3 825 447 to Kraals discloses a battery cover for flexibly enclosing a battery together with openings for accommodating the battery electrical connections. U.S. Patent 4 738 906 to Sanders discloses a battery container with heating means and insulation. U.S. Patent 4 054 730 to Crifasi discloses an insulated battery cover made from glass fibre insulation sandwiched between aluminum plies. U.S. Patent 4 840 855 to Foti et al. discloses battery cover made from a durable insulating material such as quilted nylon fabric, with an insulating material within the quilted fabric.

The present invention is intended to provide another means for insulating a battery.

Summary of the Invention

Accordingly the present invention provides a multi-layer cover for an electrical storage battery, said cover having, in sequence, i) an inner acid resistant cover layer, ii) a first layer of glass fibre cloth, iii) an aluminized layer selected from aluminum foil and aluminized thermoplastic polymeric film, iv) a first insulating layer which is a thermal insulator with air therein, v) a second insulating layer selected from a) an inorganic insulating material which has a high heat resistant capacity and which retains heat and b) a thermal insulator with air therein, vi) a second layer of glass fibre cloth, and vii) an outer cover layer.

In one embodiment the multi-layer cover is held together by quilting.

In another embodiment the first insulating layer is

glass fibre insulation.

In yet another embodiment there is a separator layer between the first and second insulating layers.

In a further embodiment the second layer is selected from the group consisting of glass fibre insulation, mineral wool or stone wool.

In yet another embodiment there is a separator layer in a location selected from i) between the first and second insulation layers, ii) between the first layer of glass fibre cloth and the aluminized layer, iii) between the aluminized layer and the first insulation layer and iv) between the second insulation layer and the second layer of glass fibre cloth.

In another embodiment the outer cover is selected from a canvas cover, a fabric cover, a thermoplastic polymeric film cover and a rigid plastic cover. The fabric cover is preferably a high heat resistant cover.

In yet another embodiment the first and second insulation layers are glass fibre insulation and are separated by a separator layer.

In a further embodiment the separator layer is selected from a) a solar blanket and b) a sheet of thermoplastic polymer, e.g. polypropylene, polyester, nylon, an aluminized sheet of thermoplastic polymer or metal foil.

In yet another embodiment the cover has at least a top, two sides and two ends, and corners formed from adjacent sides and ends, said corners being joined by cooperating fasteners on the sides and ends.

Brief Description of the Drawings

Figure 1 shows a cross-section of a wall of a battery cover of the present invention.

Figure 2 shows a cross-section of a wall of a second battery cover of the present invention.

Figure 3 shows a battery with one embodiment of a cover of the present invention.

Figure 4 shows the battery cover of Figure 3, prior

to fitting over battery.

Figure 5 shows a battery with a another embodiment of a cover of the present invention.

Figure 6 shows a battery cover of Figure 5, prior to fitting over a battery.

Detailed Description of Preferred Embodiments

As indicated hereinabove, the battery cover is a multi-layer cover. As will be seen from Figure 1, the multi-layer cover 11 has an inner cover layer 12, a first glass fibre cloth layer 13, an aluminized layer 14, insulation layers 15 and 16, a second glass fibre cloth layer 17 and an outer cover layer 18.

The cover of Figure 2 is similar to that of Figure 1 except that there is an intermediate separator layer 19 sandwiched between insulation layers 15 and 16.

The inner cover layer 12 is preferably made from a fabric coated with an acid resistant material, e.g. polyethylene, vinyl polymer, rubber.

First and second glass fibre cloth layers 13 and 17 may be of any suitable weave construction and weight. A simple weave, having a weight of from 4 to 9 oz, preferably about 6 oz, has been found to be suitable and is easily available. Because of the strength of the glass fibre cloth, such cloth tends to prevent rupture of the cover in the event of an explosion adjacent the battery, inside the cover.

The first insulating layer 15 is an insulating layer with a substantial volume of air, which provides the insulating medium. A particulary suitable material for this layer is made with glass fibre insulation. Preferably the glass fibre insulation has a thickness of from 4 millimetres to 20 millimetres, especially from 5 to 15 millimetres. The aluminized layer 14 may be aluminum foil or aluminized film, e.g. aluminized polyester film, which is preferably adhered to first insulating layer 15.

The second insulating layer 16 may either be an

insulating layer with a substantial volume of air or a layer which retains heat and has a high heat resistant capacity. Glass fibre insulation is a preferred insulating layer with a substantial volume of air. One such insulation is sold under the trade mark FIBERGLAS. Suitable materials with high heat resistant capacity are inorganic materials such as mineral wool or stone wool. One such second layer is available in Canada under the trade mark ROXUL. Suitable thicknesses for the second insulating layer 16 is from 4 to 20 millimetres, especially from 6 to 15 millimetres. When the second insulating layer is a high heat resistant capacity material, it is intended to slowly heat while the battery is in use and yet is slow to lose heat, e.g. when power is not being drawn. As the battery is most often placed in an engine compartment, where it is warm, the high heat resistant capacity material will be heated in the engine compartment. When the engine is shut off and the engine compartment becomes cold, second insulating layer 16 will give off heat slowly, by radiation. Some of the heat will be radiated into the first insulating layer 15, thus tending to slow the rate of temperature drop of the battery. As will be apparent this is of particular importance in cold climates for vehicular batteries such as in cars and trucks.

The outer cover 18 is preferably a flexible material such as canvas, thermoplastic polymeric film, or fabric. The flexibility is useful in making the cover fit snugly around the battery. Preferably the outer cover is fire retardant or flameproof.

The outer cover may be made of rigid plastic, for example polypropylene, for covers that are not intended to be removed frequently.

As indicated, there may be a separator layer 19. Preferably it is between first and second insulating layers 15 and 16, as shown in Figure 2. One such

separator layer is a solar blanket. Other such layers are a thermoplastic polymeric film, e.g. polyester film, aluminized films and metal foil, e.g. aluminum foil. The separator layer tends to keep heat from being drawn from the battery to the outside.

The layers are preferably held together by quilting. The multi-layer cover may be made by cutting the various layers in a shape necessary to make the cover, e.g. as shown in Figures 4 and 6. It is preferred that the glass fibre insulation layers have an R-rating from R-12 to R-30 prior to being quilted. Such insulation may be from 20 millimetres to 10 centimetres thick before quilting. After quilting the glass fibre insulation is generally compressed to a thickness from 4 to 20 millimetres. This allows the cover to be compact and yet provide the necessary insulating value. The battery cover is preferably made in a cruciform shape such as shown in Figures 4 and 6. The side walls or end walls have securement devices to hold the cover in place when placed around the battery. The securement devices may be loop and hook fasteners, e.g. available under the trade mark Velcro, or by other fasteners such as snap press fasteners. The fasteners may be of metal or a non-corroding material such as polypropylene, polyethylene or nylon.

As will be seen in Figure 3, the battery 21 comprises a case (not shown) which contains the necessary chemicals, anodes and cathodes. Battery 21 has two posts 23, one positive and one negative for connection to electrical devices, e.g a starter and distributor (not shown), by electrical wires 24. Battery 21 is blanketed with cover 25 which has apertures 26 to permit posts 23 to be connected with wires 24. Side panel 27 and end panel 28 are secured by flaps 29 with fasteners attached.

Figure 4 shows one configuration for the battery cover. It comprises a top panel 30 and two side panels

27 and two end panels 28. Depending on the type of battery, apertures 26 may be in the top panel as shown in Figure 4, or may be in one of the side panels. The apertures are preferably circular. The side or end panels 27 and 28 may have flaps 29 upon which at least one fastener, e.g. 37, 28 is secured. After installation on a battery (not shown) the side and end panels may be joined together with fasteners 37 and 38. Fasteners 37 and 38 may be clip and loop, snap press fasteners, hook and loop (e.g. Velcro® fasteners).

In Figure 5, it will be seen that the battery wires 40 exit from the battery cover 41 between end panel 42 and flaps 43. Battery cover 41 has a top panel 44 and side panels 45. Figure 6 shows a configuration for battery cover 41. It comprises a top panel 44, two side panels 45, two end panels 42 and bottom 46. The side or end panels 42 and 45 and bottom may have flaps 43 upon which at least one part of fasteners 48 are secured. After installation on a battery (not shown)the side and end panels may be joined together with fasteners 48. Fasteners 48 may be clip and loop, snap press fasteners, hook and loop (e.g. Velcro® fasteners).

The present invention provides a cover which assists in increasing battery life from less exposure to ambient temperature fluctuations, sustaining better cold cranking temperatures. In one experiment, a battery cover was made with an acid resistant fabric inner cover and a fire retardant fabric outer cover. Between the inner and outer covers was a glass fibre cloth envelope with insulating material inside. The insulating material was one layer of glass fibre insulation backed with aluminized film and another layer of glass fibre insulation. The battery cover was quilted. The battery cover was used in the engine compartment of an automobile over a one week period when ambient temperatures were below -10°C. From 4-8 hours after the

automobile had been left without the motor running the temperature inside the cover was from 5 to 10°C higher than in the engine compartment.

CLAIMS:

1. A multi-layer cover for an electrical storage battery, said cover having in sequence, i) an inner acid resistant cover layer, ii) a first layer of glass fibre cloth, iii) an aluminized layer selected from aluminum foil and aluminized thermoplastic polymeric film, iv) a first insulating layer which is a thermal insulation with air therein, v) a second insulating layer selected from a) an inorganic insulating material which has a high heat resistant capacity and which retains heat and b) a thermal insulator with air therein, vi) a second layer of glass fibre cloth, and vii) an outer cover layer.

2. A cover according Claim 1 wherein the first insulating layer is glass fibre insulation.

3. A cover according to Claim 1 wherein the second insulating layer is selected from the group consisting of glass fibre insulation, mineral wool, and stone wool.

4. A cover according to Claim 2 wherein the second insulating layer is selected from the group consisting of glass fibre insulation, mineral wool and stone wool.

5. A cover according to Claim 4 wherein there is a separator layer between the first and second insulating layers.

6. A cover according to Claim 5 wherein the first and second insulating layers are glass fibre insulation.

7. A cover according to Claim 5 wherein the separator layer is selected from a) a solar blanket and b) a sheet of thermoplastic polymer.

8. A cover according to Claim 2 wherein the multi-layer cover is held together by quilting.

9. A cover according to Claim 3 wherein the multi-layer cover is held together by quilting.

10. A cover according to Claim 5 wherein the multi-layer cover is held together by quilting.

11. A cover according to Claim 8 wherein the cover has at least a top, two sides and two ends, and corners formed from adjacent sides and ends, said corners being joined by cooperating fasteners on the sides and ends.

12. A cover according to Claim 9 wherein the cover has at least a top, two sides and two ends, and corners formed from adjacent sides and ends, said corners being joined by cooperating fasteners on the sides and ends.

13. A cover according to Claim 10 wherein the cover has at least a top, two sides and two ends, and corners formed from adjacent sides and ends, said corners being joined by cooperating fasteners on the sides and ends.

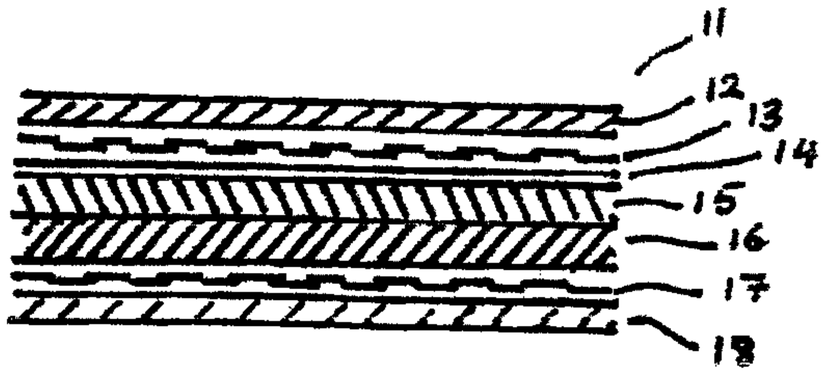


FIG 1

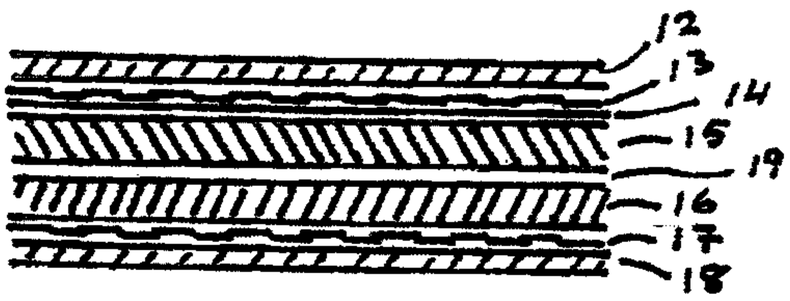
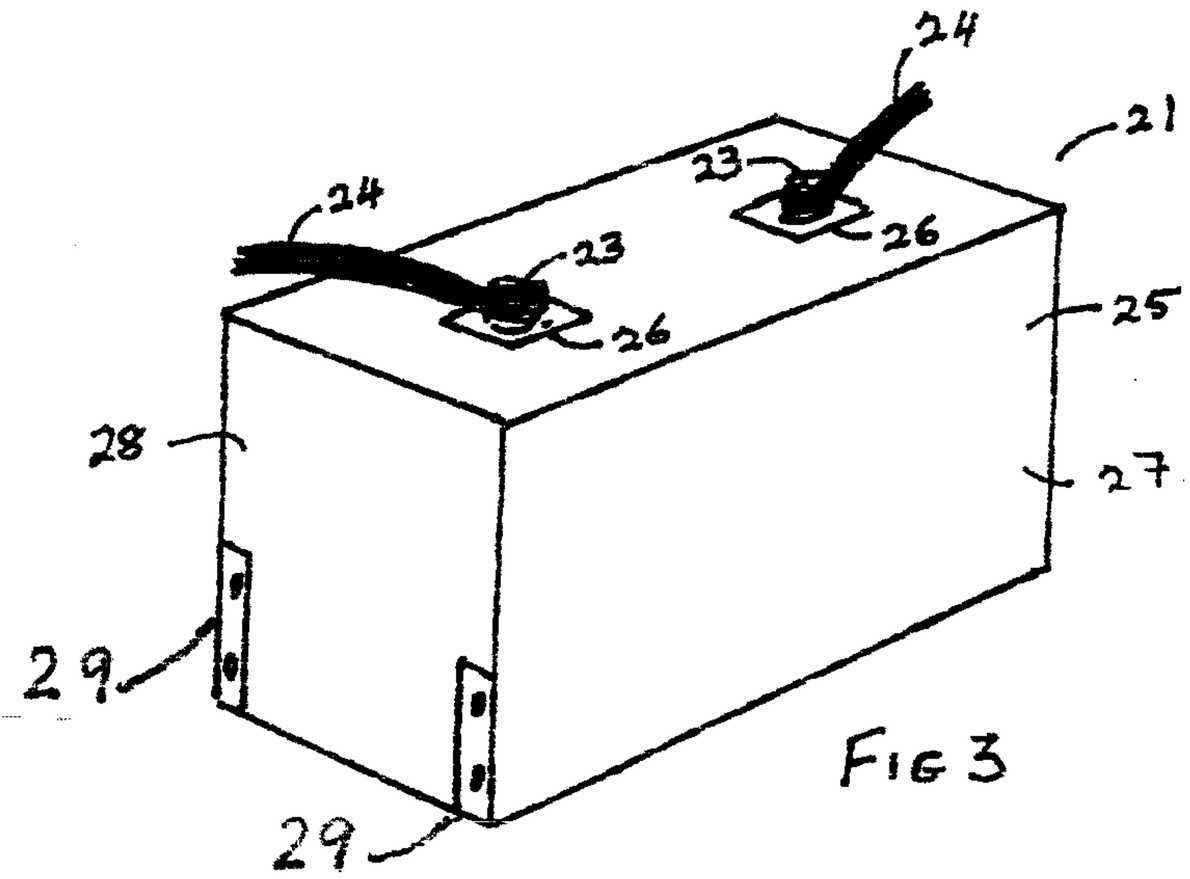


FIG 2



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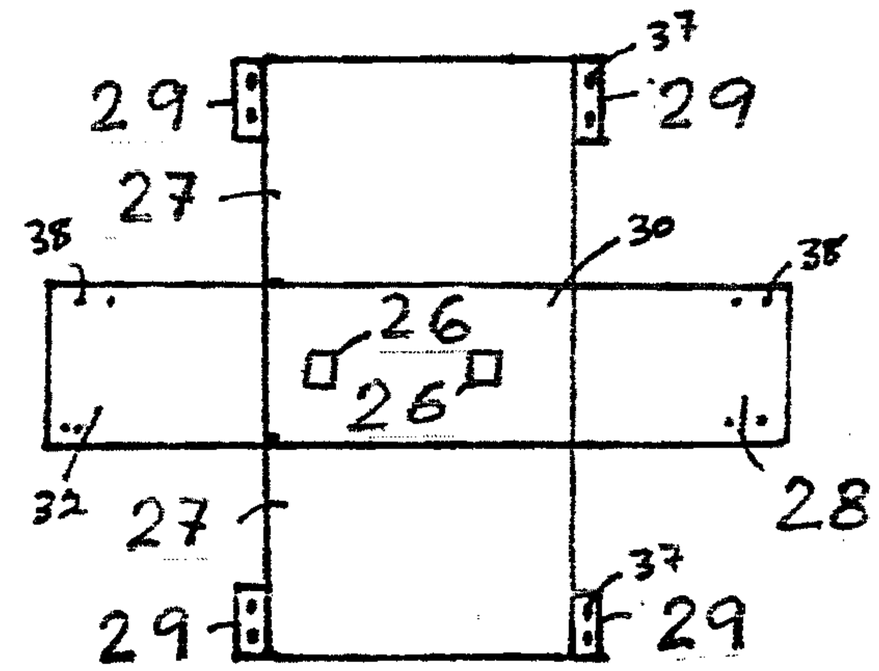


FIG 4

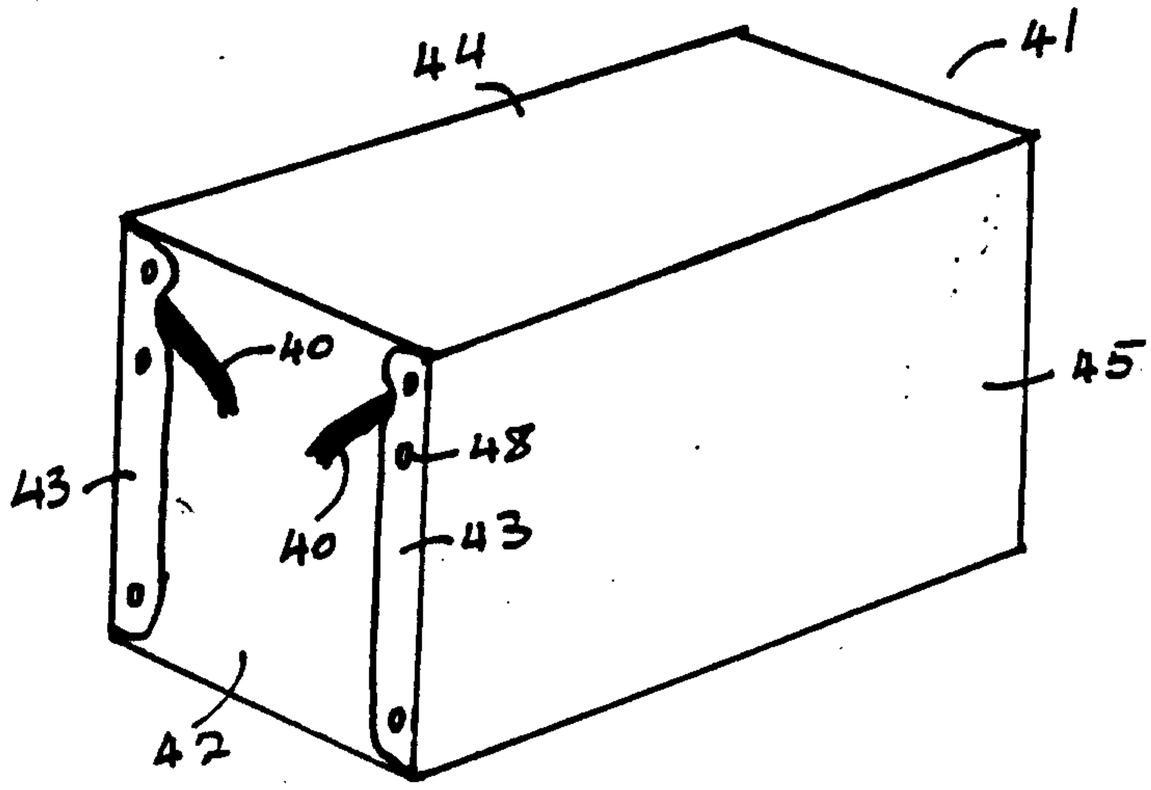


FIG 5

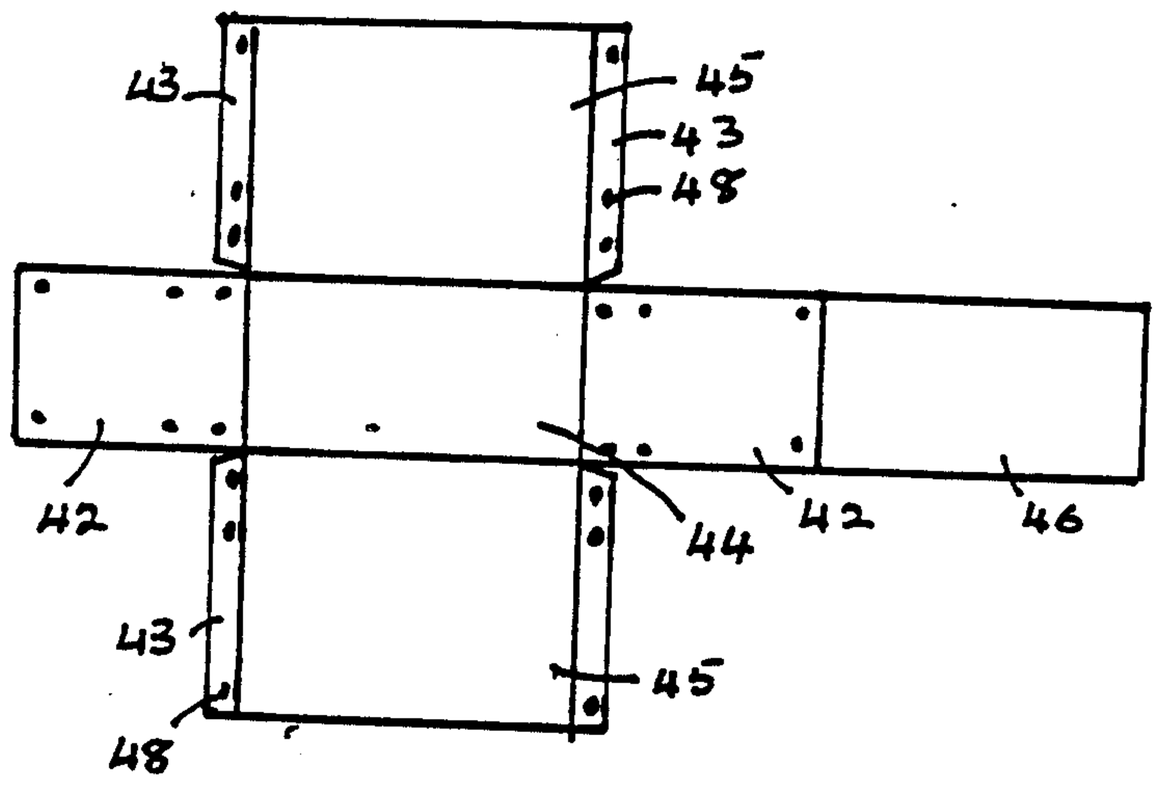
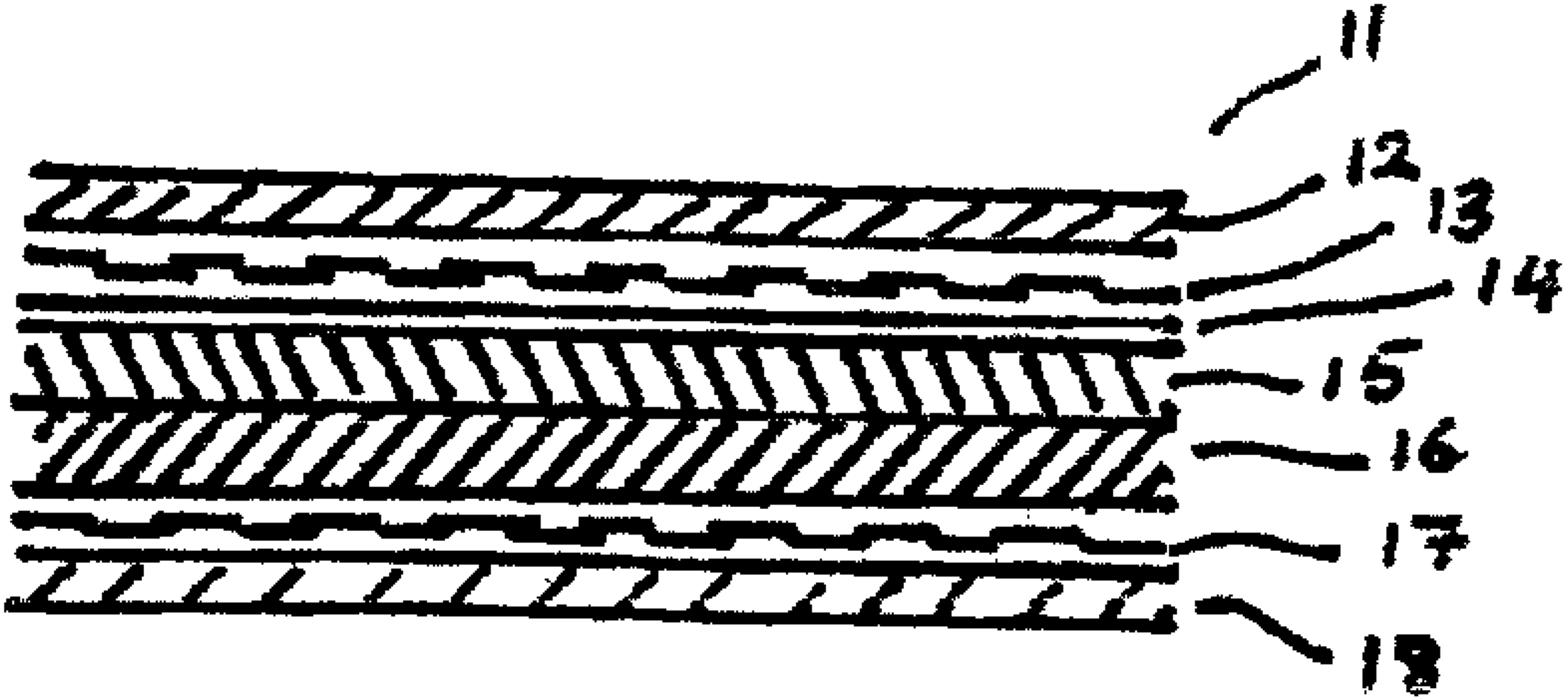


FIG 6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