

Aug. 4, 1964

R. A. BEST  
PROTECTIVE COVER

3,143,154

Filed March 4, 1963

4 Sheets-Sheet 1

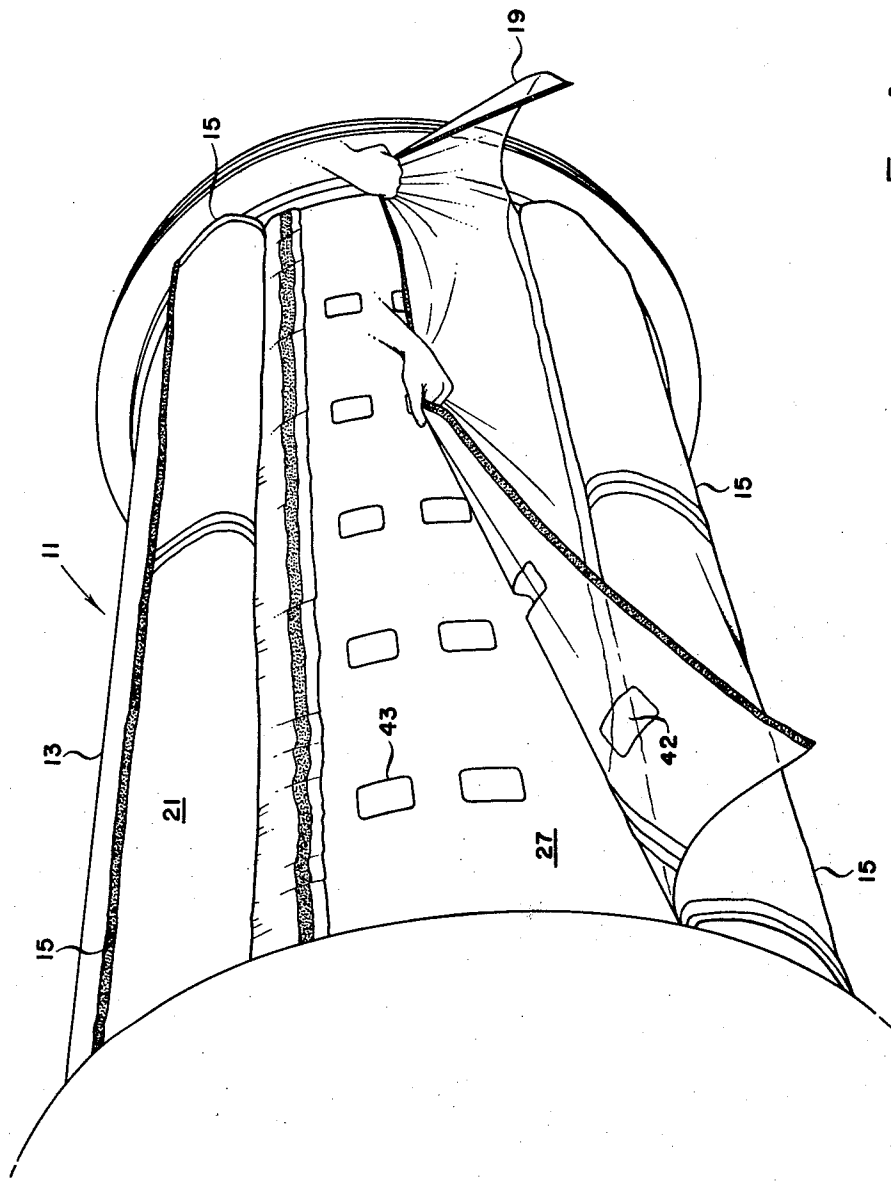


FIG. 1

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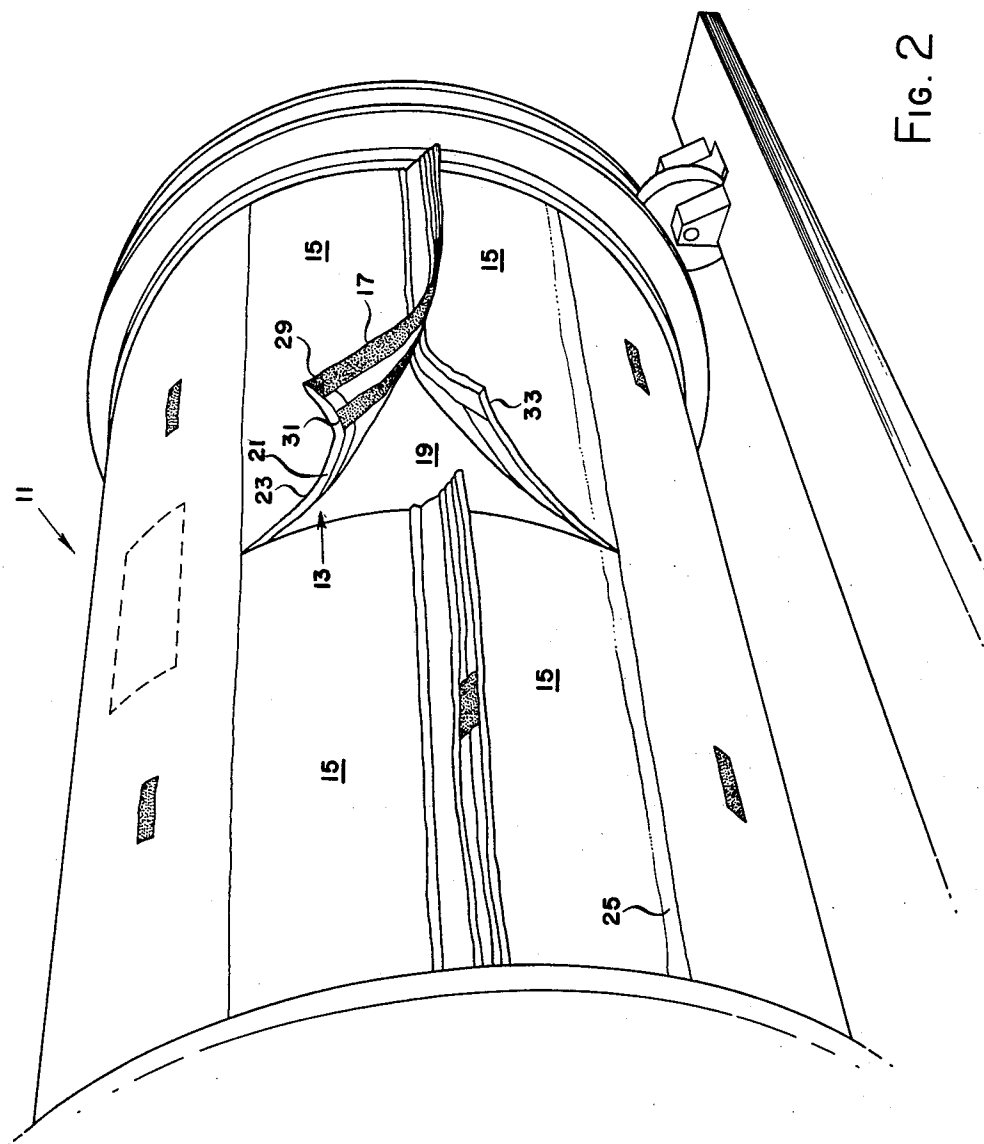
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4 Sheets-Sheet 2



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4 Sheets-Sheet 3

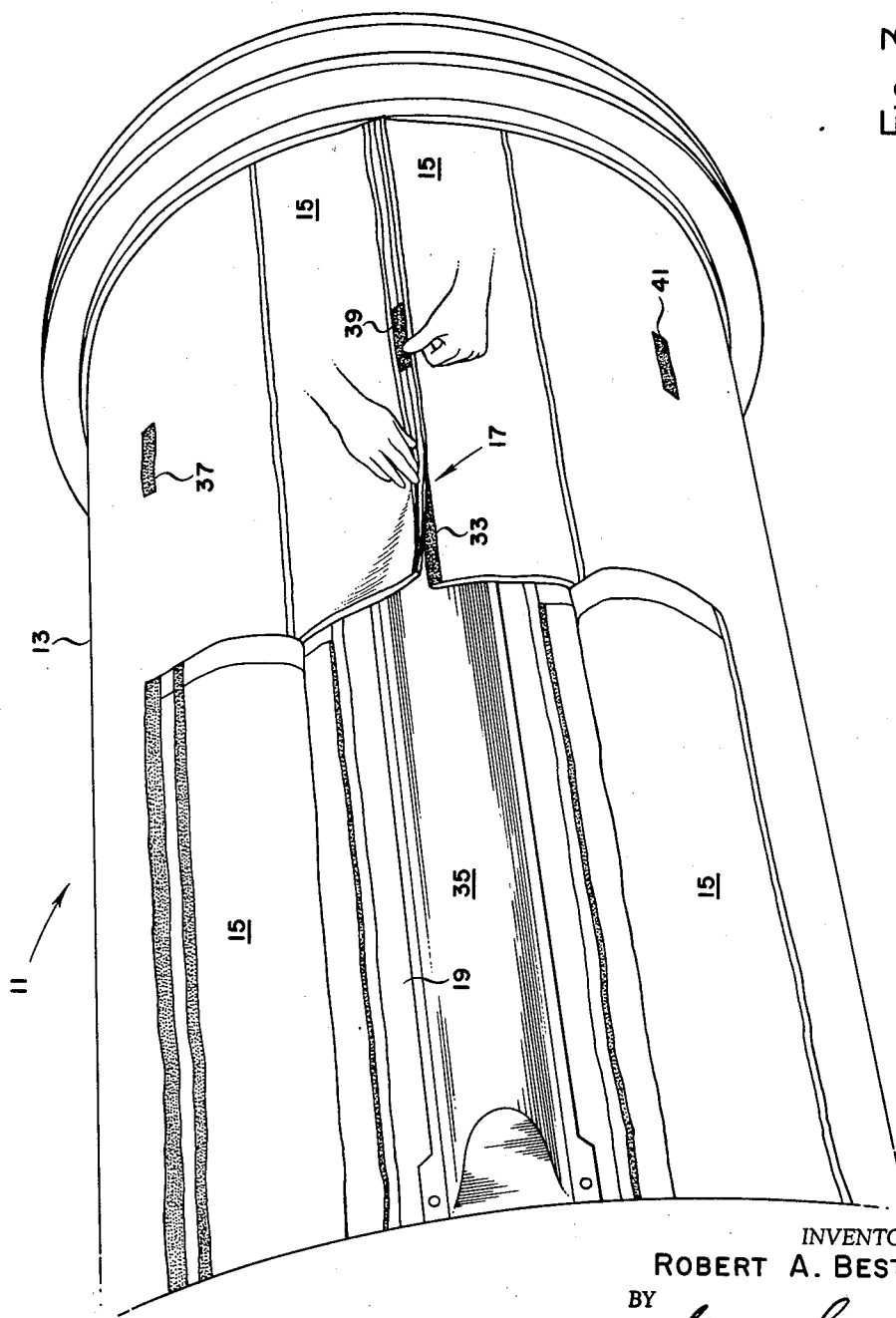


Fig. 3

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4 Sheets-Sheet 4

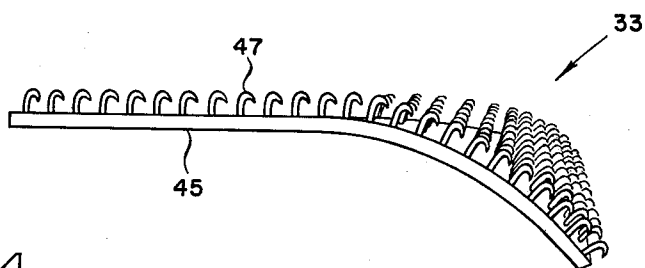


FIG. 4

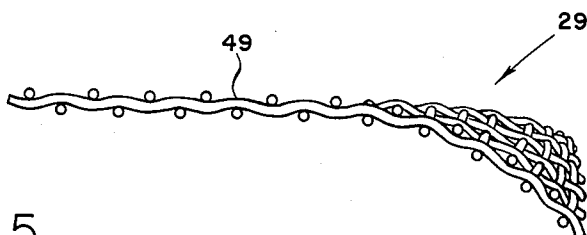


FIG. 5

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3,143,154

## PROTECTIVE COVER

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Filed Mar. 4, 1963, Ser. No. 262,521  
1 Claim. (Cl. 150—52)

The present invention relates to a protective cover and more particularly to an expandable protective cover which may be applied immediately after the surface to be protected has been generated and featuring a technique which provides accessibility for work and test during and after manufacturing operations.

In many manufacturing operations it is desirable to have both protection as well as ready access to a particular surface. In addition, it is frequently desirable to have the protecting device capable of expanding to permit changes in the product configuration. It is often advantageous to have ready access to the product for purpose of testing, inspection, repair and modification after final manufacture. Not only must the protecting device have these characteristics, but it must protect against mechanical damage as well as contamination from foreign materials such as fingerprints, oils and chemicals.

The present invention accomplishes the foregoing by providing a protective cover having a unique combination of cover materials, access openings and fastening techniques thereby providing an expandable, lightweight, flexible, low moisture vapor transmission, fire resistant, protective cover.

Accordingly, an object of the present invention is to provide a protective cover which makes it possible to have ready access to the surface being protected.

Another object of the present invention is to provide a protective cover which is capable of expanding to permit changes in the product configuration.

A further object of the present invention is to provide a cover which protects against mechanical damage as well as foreign materials.

Still another object of the present invention is to provide a protective cover which is lightweight, flexible, possesses low moisture vapor transmission, is fire resistant and protects against impact.

The specific nature of the invention, as well as other objects, uses and advantages thereof, will clearly appear from the following description and from the accompanying drawings in which:

FIGURE 1 is a perspective view of the protective cover illustrating its initial application to the surface to be protected.

FIGURE 2 is a perspective view of the protective cover illustrating the method by which it is closed for covering a minimum-sized object.

FIGURE 3 is a perspective view of the protective cover illustrating its expanding characteristic for accommodating increase in size of the protected object during manufacture.

FIGURE 4 is an enlarged perspective view of the belt employed in the fasteners of the present invention.

FIGURE 5 is an enlarged perspective view of the strip employed in the fasteners of the present invention.

To best illustrate the unique features of the present invention the protective cover and the sequential operation thereof is depicted in FIGURES 1 through 3. Protective cover 11 generally consists of protective material 13, opening panels 15, longitudinal fasteners 17 and transparent material 19. Protective cover 11 may be used to cover many different devices and configurations and is illustrated in FIGURES 1-3 as covering a cylindrical member, for example, a portion of a missile casing.

Protective material 13 is made of ethafoam 21 (expanded polyethylene having a closed cellular structure)

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and cloth tape 23. The primary purpose of ethafoam 21 is to provide a material which protects against impact, scratching and gouging. The primary purposes of cloth tape 23, which is preferably waterproofed, pressure-sensitive, cloth-backed and laminated to a polyethylene film, is to provide (1) a technique for interconnecting the widths of ethafoam 21, (2) a material having a low moisture vapor transmission and (3) a tough skin to resist any abrasive action. The bottom surface of the cloth backing has a thin coating of pressure sensitive adhesive applied thereto and the upper surface has applied thereto a polyethylene film. This polyethylene film provides the necessary low moisture vapor transmission characteristic. In the manufacturing process of protective material 13 the strips of ethafoam 21 are interconnected, for example, by twelve-inch widths of tape 23. The tape overlap 25 provides a rigid interconnection between adjacent strips of tape. The combined ethafoam 21 and tape 23, forming protective material 13, provide a material which can be stitched, is lightweight, flexible, resists mechanical and contamination damage and is fire resistant.

Opening panels 15 are employed to provide access to the cylindrical device 27 during and after final assembly. Panels 15 are longitudinally made in two sections for ease of operation and to expose the least possible surface. In addition, panels 15 are circumferentially made in two sections for ease of operation and minimum exposure. As best depicted in FIGURES 2 and 3, opening panels 15 are provided with fasteners 17 consisting of spaced apart parallel strips 29 and 31 made of fibrous material and belt 33 consisting of small plastic hooks.

In FIGURES 4 and 5 are respectively illustrated strips 29 and 31 and belt 33 of fasteners 17. Belt 33 consists of backing material 45 and a plurality of plastic hooks 47. Strips 29 and 31 consist of fibrous material 49 of sufficiently loose weave that when the hooks of belt 33 are pressed into contact therewith the hooks will be inserted through the openings formed by the loose weave. The belt and strip will then remain held together until a separation force sufficient to bend the ends of hooks 47 is applied thereto.

The purpose of the parallel strips of material 29 and 31 is to permit expanding of cylindrical device 27 during the manufacturing operation. FIGURE 2 demonstrates the use of strip 31 being attached to belt 33 whereas FIGURE 3 demonstrates the use of strip 29 being attached to belt 33. It will be particularly noted that strip 31 is employed when cylindrical device 27 is at a minimum diameter, for example, prior to exterior surface assembly operations, and strip 29 is employed after cover element 35 has been attached during the assembly process.

Each of panels 15 may be folded back upon itself and attached to protective cover 11 as best depicted in FIGURE 1. These panels are held in place by pressing belt 33 against strip 41 and belt 37 against strip 41.

Another important feature of the present invention is the utilization of transparent material 19. The primary purpose of this material, which may be polyethylene film, is to prevent contamination of the surface of cylindrical device 27 adjacent the opening formed when panels 15 are folded back. Material 19 is made transparent so that visual inspection is possible. It should be noted that openings 42 are provided in material 19 to receive elements 43 and to which may be attached electrical conductors (not shown) and cover 35. Transparent material 19 is held in place by means of fasteners which are made and function in the same manner as the fasteners described hereinabove.

It will be particularly appreciated that protective material 13 is capable of being cut and modified to provide access to the protected surface which was previously inaccessible. For example, a rectangular section could be

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cut from the upper surface of protective material 13 of FIGURE 2, as illustrated by the dotted line, and a strip of felt, similar to that illustrated in FIGURE 5, attached to the periphery of the cut-out opening. This opening could then be recovered by a section of protective material of slightly larger size and having a plastic hook belt, similar to that illustrated in FIGURE 4, attached to the periphery thereof.

It is to be understood in connection with this invention that the embodiments shown are only exemplary, and that various modifications can be made in construction and arrangement within the scope of the invention as defined in the appended claim.

What is claimed is:

A protective cover consisting of a sheet of flexible protective material including at least one pair of opening panels, each opening panel having means for attaching the same to the exterior surface of said sheet of flexible protective material one edge of one panel hav-

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ing a strip of material, said panel having a second strip of material spaced from and parallel to said first mentioned strip of material, one edge of the other panel having a belt for being connected to either said first or second strips of material, means for attaching to the interior surface of said protective material a sheet of transparent material adjacent the opening produced when said panels are folded back.

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