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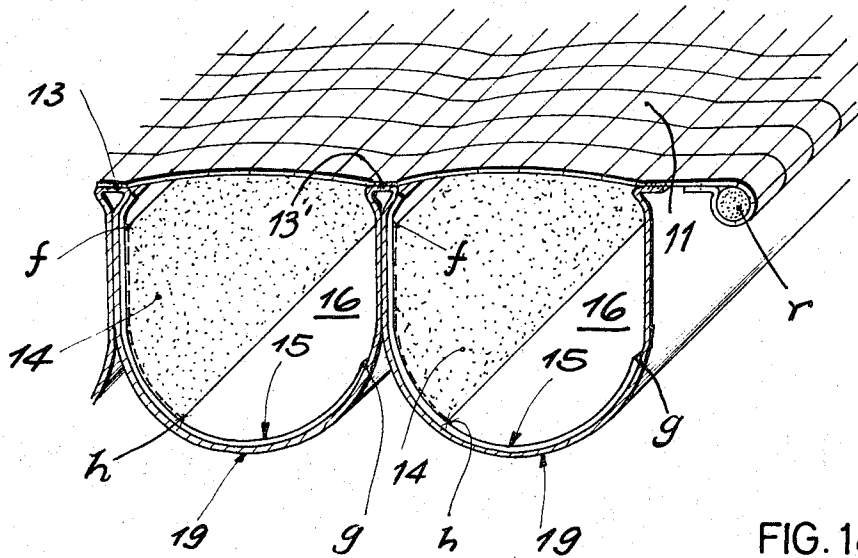
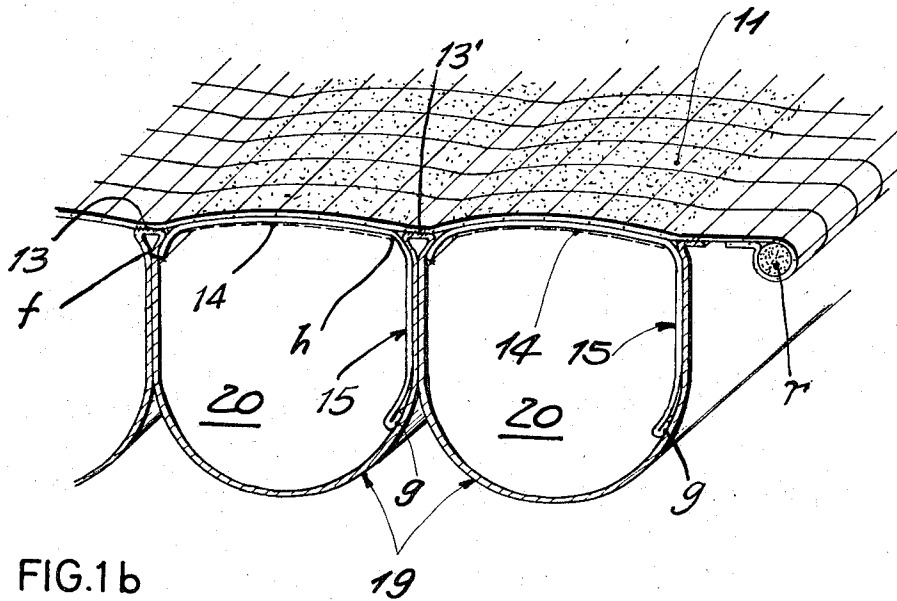
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3,375,321

WALL STRUCTURE WITH MEANS FOR CONTROLLING THE
RADIATION TRANSMISSIVITY OF THE STRUCTURE

Filed July 16, 1965

2 Sheets-Sheet 1



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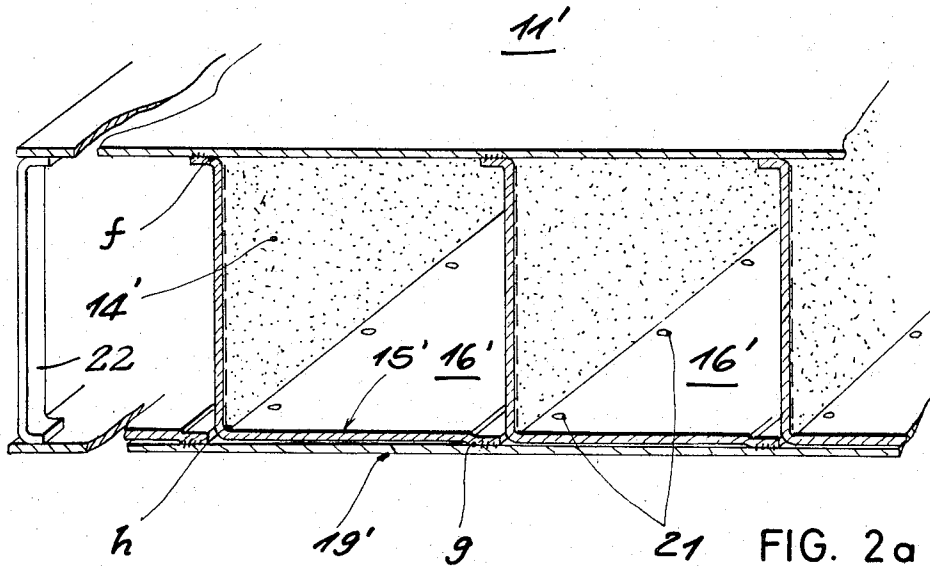
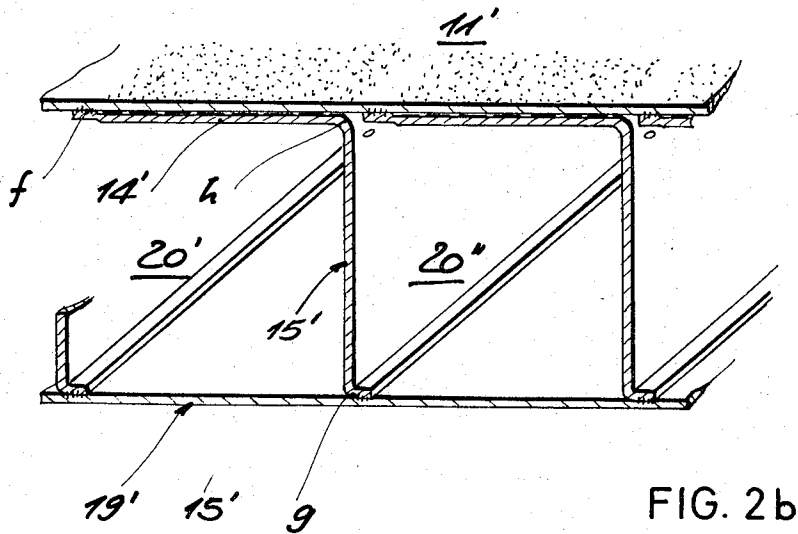
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WALL STRUCTURE WITH MEANS FOR CONTROLLING THE RADIATION TRANSMISSIVITY OF THE STRUCTURE

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14 Claims. (Cl. 174-35)

ABSTRACT OF THE DISCLOSURE

A wall structure in which a plurality of independent adjacent foil strips each having a portion of low radiation transmissivity integrally joined to a portion of high radiation transmissivity are fixed along edges thereof to a pair of outer layers in such a manner that when the spaces between one outer layer and said strips are filled with fluid, said portions of low radiation transmissivity will abut against the other outer layer to prevent penetration of radiation through the wall, while when the spaces between the strips and the other outer layer are filled with fluid, radiation will be substantially free to penetrate through the wall structure.

This invention relates to a wall structure with means for controlling the radiation transmissivity of the structure.

In my pending application Ser. No. 216,575 of Aug. 13, 1962, now Patent No. 3,249,682, a wall structure is described comprising a plurality of inflatable elements juxtaposed with one another, each of said elements having at least one portion of substantially radiation-impermeable material occupying a first position in the deflated state of the element and a second position generally perpendicular to said first position in the inflated state thereof, said portions forming an effective radiation barrier in one of said states of said elements while permitting radiation to pass more freely therebetween in the other of said states.

Furthermore my application Ser. No. 216,575, now Patent No. 3,249,682, describes a structure in which the support foil is coated with two flexible layers, an outer flexible layer and a center flexible layer located between the support foil and the outer flexible layer, said center flexible layer being subdivided into strips of low transmissivity for electro-magnetic radiation called "blinds" and strips of high transmissivity. This arrangement allows for blinding and unblinding by inflating or deflating one or the other part of the channel system formed by the two layers and the support foil. In the process the center layer bearing the blinds has to fold in a predetermined way in order to achieve the blinding effect. This folding may lead to disturbances if the folding symmetry is not accurate. If, however, the device has once been accurately used, the folding symmetry readjusts itself spontaneously; on the other hand it is difficult to correct the folding when the operation of the device is started if the folding does not run along the desired folding lines.

The invention is based on the task to design the center flexible layer in a way that the inflation of one of the two parts of the channel systems alternatively on one or on the other side of the center flexible layer will effect the blinding and unblinding smoothly and without folding difficulties.

The figures show examples illustrating the invention.

FIG. 1a is a schematic view of a part of the wall. Two

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channels are shown perspectively and in cross section. This figure shows the center layer in unblind" position.

FIG. 1b shows the "blind" position of the center layer in a view similar to that of FIG. 1a.

FIG. 2a shows a wall embodying the invention with rigid outer layers similar to the view of FIGURE 1.

FIG. 2b shows the "blind" position of the wall depicted in FIG. 2a.

FIG. 1a is a cross section of the arrangement of the transmission-controllable wall or pneumatic blind. The outside cover or support foil 11 consists of an extremely thin transparent foil reinforced by a filament bearing tensile stress. Along the support foil a second, much thinner layer 19 is welded to the support foil 11 following the seams or strips 13, 13' in a way that channels 16 are formed, these channels being sized in a way that thermal convection in their interior space is just avoided. The blinds 14 containing foils or center layers 15 are located inside the channels and run from the seams *f* to the seams *g*.

Between the seams *f* and the line *h* these foils are metal coated; between the line *h* and the seams *g* they are completely transparent. In this the distance *f-h* corresponds approximately to the distance 13-13'. In the position shown in FIG. 1a vertical as well as extremely oblique sun rays (the latter by means of one reflexion) penetrate into the building limited by the wall.

FIG. 1b shows the same transmission-controllable wall. In the position shown in FIG. 1a the space between the support foil 11 and the center layer 15 is inflated by compressed air, so that the blinds 14 are in "open" position; in the position shown in FIG. 1b the space between the center layer 15 and the layer forming the channels 19 is inflated by compressed air. Compressed air has been drawn from the space filled with compressed air first, so that the center layer folds diagonally in the manner shown in FIG. 1b. This creates a channel 20 limited by the layer 19 and the center layer 15. In this position the bonded or metal coated part of the foil between *f* and *h* covers the support foil or covering completely, so that all radiation hitting this layer from the inside or the outside is reflected.

Between the two positions depicted in FIGS. 1a and 1b all interim positions are freely selectable, for the bonded area between *f* and *h* is much more rigid than the transparent area between *h* and *g*.

The walls are made in strips of a predetermined width. The borders of the strips bear beads *r* which can be inserted closely fitting in suitable corrugation profiles. In this way the wall can be mounted.

FIGS. 2a and 2b show an embodiment of the invention in which the flexible center layer 15' is located as shown between two rigid transparent plates 11' and 19'. The flexible center layer 15' in turn is subdivided into individual elements. One half of each of these elements is coated with a material 14 reflecting and/or absorbing the electromagnetic radiation. As the arrangement depicted in FIGS. 2a and 2b is with the exception of its rigidity equivalent to the arrangement shown in FIGS. 1a and 1b, the equivalent parts are indicated by the same numbers which differ only by a mark '.

The parts of the channel system 16' and 20' are formed by the strips 15' of the center layer each of which is firmly fixed to the upper rigid plate 11' and the lower plate 19'. The inflation of the space between the two rigid plates 11' and 19' can be effected alternatively on one of the two sides of the center layers 15' so that the extreme positions of the strips 15' are achieved as shown in FIGS. 2a and 2b, FIG. 2a showing the position of maximum transparency of the wall and FIG. 2b the maximum blinding effect. In the latter position in which the part of the channel system 20' is inflated the parts

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14 of the blind strips 15 coated with opaque foils fold along the transparent plate 11'.

It is possible to maintain predetermined intervals between the two plates 11' and 19' by means of straps or spacers 22, one of which is indicated in FIG. 2a. If the wall is constructed from individual elements shown in FIGS. 2a and 2b whose size allows for fixing the distance between the plates 11' and 19' by means of a frame, spacers are of course superfluous.

The inflation of the two parts of the channel system 16' and 20' can be effected in the same way as in the arrangement shown in FIGS. 1a and 1b. Alternatively small perforations 21 can be provided in the flexible blind strip 15'. In this case the folding of the blinds is effected by applying compressed air alternatively from the right and from the left of the arrangement shown in FIGS. 2a and 2b. The perforations 21 have the effect of small jets effecting a pressure jump from one chamber to the next one which, in turn, allows for the folding of the pneumatic blinds.

The two rigid plates 11' and 19' can be made from a rigid transparent material such as plastics, Plexiglas or glass. The borders of the foil strips 15' can be glued to the plates or fixed to the plates by welding or by another known method.

I claim:

1. Wall structure comprising two outer layers and a plurality of independent strips of flexible foil arranged spaced from each other between said pair of outer layers one part of each of these strips being made from a material of low radiation transmissivity and the other part of each of the strips being made from a material of high radiation transmissivity, one edge of each of these strips being fixed to an outer layer and the other edge of each of the strips being also fixed to an outer layer spaced from the location of said one fixed edge and in a way that in a position where the spaces between these foil strips and the one outer layer are filled with gas or fluid the penetration of radiation through the channels is partly or completely avoided, and that in a second position where the spaces between these foil strips and the other outer layer are filled with gas or fluid the radiation is substantially free to penetrate.

2. Wall structure as defined in claim 1, wherein the two outer layers are flexible and form a system of a multitude of long channels located close to one another.

3. Wall structure as defined in claim 1, wherein the two outer layers are rigid plates made from a material permitting free penetration of the radiation.

4. Wall structure as defined in claim 3, wherein the plates are kept in a predetermined distance by spacers.

5. Wall structure as defined in claim 3, wherein the foil strips contain jet perforations for the passage of compressed air in a way that these jet perforations allow to maintain a pressure drop between the two sides of each of the strips, and wherein provision is made for devices reversing the direction of air flow through these jet perforations.

6. Device for varying the electromagnetic radiation transmissivity of a wall having a support layer to which a second layer forming a multitude of channels together with the support layer is fixed along parallel seams spaced a predetermined distance from each other, and a flexible center layer which is located in each of the channels between the support layer and the layer forming the re-

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spective channel and which subdivides the channels in two inflatable channel divisions, and part of which is made to act as a blind absorbing and/or reflecting radiation, and which is characterised in that each center layer is fixed at one edge thereof at the connecting place of the support layer and the layer forming the corresponding channel, and that only one portion of each center layer of a width corresponding to said predetermined distance acts as a blind, and that the second edge of each center layer is fixed to the layer forming the channel along a line which is diametrically opposite the fixed one edge of the center layer.

7. Device as defined in claim 6, wherein the support layer is reinforced by a filament bearing tensile stress.

8. Device as defined in claim 6, wherein the wall is made from strips having beads.

9. A wall structure comprising, in combination, a pair of outer layers and a center layer formed by a plurality of adjacent but separate strips of flexible foil, each of said strips having a first portion of preselected widths made from material of low radiation transmissivity and a second portion of high radiation transmissivity integral with said first portion, the free edge of said first portion of each strip being fixed to an outer layer at a distance from the free edge of said first portion of the strip adjacent thereto substantially equal to said preselected width of said first portion, and the free edge of the other portion of said strip being also fixed to an outer layer so that when the spaces between said strips and one of said outer layers is fixed along parallel lines transverse each strip will abut against the other outer layer and thus substantially prevent penetration of radiation through the wall structure, while when the spaces between said strips and the other outer layer are filled with fluid, radiation will be substantially free to penetrate through said wall structure.

10. A wall structure as defined in claim 9, wherein said two outer layers are flexible and wherein one of said outer layers is fixed along parallel lines transversely spaced at a distance substantially equal to said preselected width from each other to the other layer to form a plurality of elongated channels therewith, said flexible foil strips being respectively located in said channels and said edges of said strips being connected to said one outer layer.

11. A wall structure as defined in claim 10, wherein said other outer layer is reinforced by filaments.

12. A wall structure as defined in claim 9, wherein said two outer layers are formed by two rigid plates made from material permitting free penetration of radiation.

13. A wall structure as defined in claim 12, wherein said one edge of each wall strip is connected to one of said two plates and the other edge is connected to the other of said plates transversely spaced from said one edge.

14. A wall structure as defined in claim 13, wherein said plates extend substantially parallel to each other.

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