

Jan. 14, 1958

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2,819,759

FLAME BARRIER MATERIAL

Filed March 28, 1955

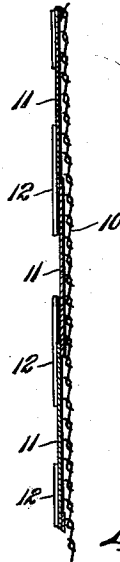
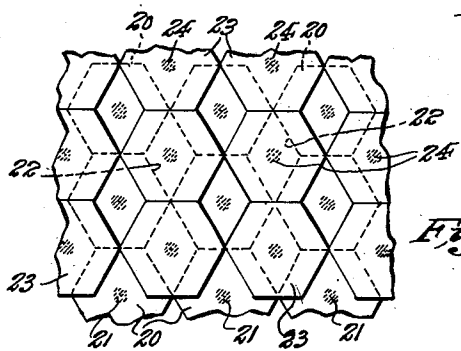
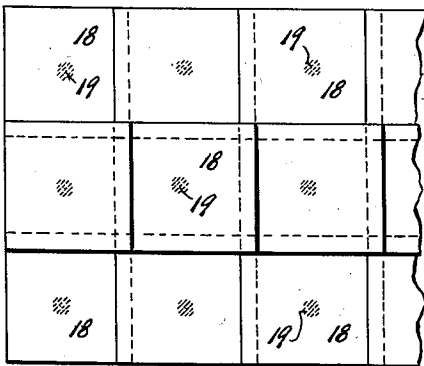
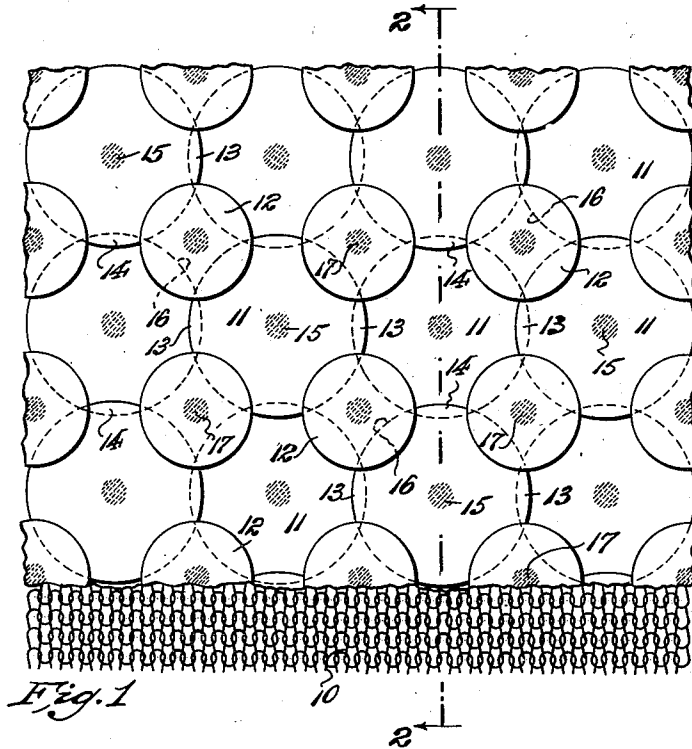


Fig. 2

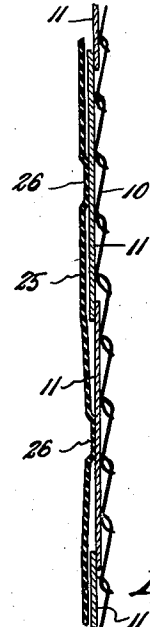


Fig. 5

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FLAME BARRIER MATERIAL

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Application March 28, 1955, Serial No. 497,349

2 Claims. (Cl. 160—330)

This invention relates to a novel composite construction of flexible, all metal sheet material which is adapted to serve as an impenetrable barrier against the spread of flames.

With respect to many structures involving fire hazard, a demand has arisen for a flexible, all metal sheet material which can be interposed between a zone of fire hazard and other zone or zones of the structure, whereby to provide a barrier against the spread of fire and flame from the former zone to the latter zone or zones.

Especially in the construction of various types of aircraft, it is highly desirable to provide a flexible, all metal sheet material which is suitable for service as a flame barrier adapted, for example, to be interposed between engine locations or other fire hazard locations and adjoining wing or fuselage or other spaces.

Having the above in view, it is an object of this invention to provide a flexible, all metal sheet structure suitable for use as a flame barrier; said sheet structure being of minimum weight; the same being sufficiently flexible to be easily bent without creasing or wrinkling, when curved installation thereof is required; and which will withstand vibration without risk of cracking or opening up of holes or crevices therethrough.

This invention has for a further object to provide a composite construction of flexible, all metal sheet material comprising a carrier or backing member formed by a knitted metallic fabric to which is applied a multiplicity of lapped metallic foil elements which are spot welded thereto so as to form an imperforate sheet metal facing; the attaching spot welds being so located as to leave the lapping marginal portions of adjoining foil elements free for relative movement, whereby flexibility of the sheet structure as a whole is assured.

The above and other objects will be understood from a reading of the following detail description of my invention in connection with the accompanying drawings, in which:

Fig. 1 is a fragmentary face view, with parts broken away, showing one embodiment of the composite construction of flexible, all metal flame barrier material according to this invention; and Fig. 2 is a longitudinal sectional view therethrough, taken on line 2—2 in Fig. 1.

Fig. 3 is a fragmentary face view of a modified form of the flexible, all metal flame barrier material; and Fig. 4 is a fragmentary face view of another modified form thereof.

Fig. 5 is a fragmentary longitudinal sectional view, similar to that of Fig. 2, but drawn on larger scale, and showing the foil face of the flame barrier material coated with a film of rubber or like substance, whereby to render the material impervious to passage of gas therethrough, in addition to its flame barrier function.

Referring to the drawings, wherein the characters of reference denote corresponding parts, the reference character 10 indicates a knitted metallic fabric which serves as the carrier or backing member of the composite flame barrier material of this invention. This carrier or

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backing member 10 is knitted from a suitable metallic wire, such as stainless steel, nickel steel, chrome nickel alloy or the like, of selected gauge, and is knitted to provide a fabric of selected knit loop or mesh size. The knitted carrier or backing member is furnished in selected width up to four or more feet wide, and of any desired length.

Superposed upon a face of the knitted fabric carrier or backing member 10 are a multiplicity of thin and flexible metallic foil elements, which are so relatively arranged as to cover the entire surface of said carrier or backing member without leaving any through openings therebetween. Said foil elements are produced from a high melting point metal or metallic alloy. For example, said foil elements can be satisfactorily produced from sheet stock of stainless steel, chrome-nickel alloy or the like, preferably ranging from two to five thousandths of an inch in thickness. Said metallic foil elements may be of selected peripheral shape, which, when said foil elements are assembled in covering relation to a face of the carrier or backing member 10, permits the same to be so relatively arranged and lapped as to eliminate any through openings therebetween.

A preferred form and arrangement of the metallic foil elements is shown in Figs. 1 and 2. In this preferred form and arrangement thereof, the foil elements comprise a series of relatively large circular foil elements 11 (e. g. approximating two inches in diameter), and a series of smaller circular foil elements 12 (e. g. approximating one and five-eighths inches in diameter). To apply these circular foil elements in covering relation to a face of the carrier or backing member 10, the larger circular foil elements 11 are superposed on said carrier or backing member in horizontal and vertical row arrangement, and in such manner that the lateral marginal portions 13 of adjoining elements, which form the horizontal rows thereof, overlap one another, and so that the top and bottom marginal portions 14 of adjoining elements, which form the vertical rows thereof, also overlap one another. As thus relatively arranged, said large circular foil elements 11 are secured to the carrier or backing member 10 by substantially central spot welds 15, which anchor the same in place, but in such manner as to leave the major portions of the areas thereof free to flex, and their lapping marginal portions free for relative movements during flexure of the assembly. When thus applied to the carrier or backing member 10, openings 16 will be left between the adjoining large foil elements 11. To close these openings 16, the smaller circular foil elements 12 are applied in overlying and lapping relation to the large circular foil elements 11, so as to cover said openings, whereupon said smaller foil elements are then directly secured to the carrier or backing member 10 by substantially central spot welds 17, thereby also leaving the major portions of the areas thereof free to flex, and their lapping marginal portions are also free for movement relative to the underlying large foil elements 11 during flexure of the assembly. Since the carrier or backing member 10 of knitted wire mesh is highly flexible and capable of stretching movement in direction of either its length or width, and since the facing of lapped foil elements of the composite barrier material constituting the assembly is also substantially flexible, the resultant sheet structure is, as a whole, sufficiently flexible and stretchable to permit the same to be easily bent, without creasing, wrinkling or opening through holes or gaps therein, when curved installation thereof is required.

Although the above described specific form of the flame barrier material is considered to be preferable, it will be obvious that the same may be made up with foil elements of other than the described circular shapes. Illustrative of this, a modified form of the sheet

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structure is shown in Fig. 3, wherein the foil elements 18 are of rectangular peripheral shape, and are so relatively arranged, in their covering relation to a knitted metallic mesh carrier or backing member, that the marginal portions thereof lap one another in both their horizontal row and vertical row disposition. Each foil element 18 is secured to the carrier or backing member by substantially central spot welds 19, so that the major portions of their areas are free to flex, and the lapping marginal portions of adjoining elements are also free for limited relative sliding movements during flexure and stretch of the assembly.

Another modified form of the sheet structure is shown in Fig. 4, wherein the foil elements are of hexagonal or other similar peripheral shape. In this modified arrangement, the foil elements comprise an inner series of foil elements 20 disposed edge to edge in horizontal and vertical rows which are superposed upon a face of the carrier or backing member, and secured to the latter by substantially central spot welds 21. Such disposition of the inner series of foil elements 20 leaves through openings 22 intermediate adjoining elements. To cover said openings 22, an outer series of foil elements 23 are superposed upon said inner series thereof in edge to edge relation, and so staggered relative to said latter series as to cover the openings 22. The foil elements 23 of said outer series thereof are each directly secured to the underlying carrier or backing member by substantially central spot welds 24. In this arrangement marginal portions of the outer series of foil elements 23 lap marginal portions of the inner series of foil elements 20. As in the previously described arrangements of foil elements, the major portions of both the foil elements 20 and foil elements 23 are free to flex, and the lapping marginal portions of adjoining elements are free for relative sliding movements during flexure of the assembly.

It is sometimes desirable to additionally modify the flame barrier material as to render it also impenetrable by gas. An arrangement providing the additional gas barrier function is shown in Fig. 5, and comprises covering the exposed face of the foil element assembly with a thin film or coating 25 of rubber or like substance. This film or coating 25 is adhered, however, only to central portions of the underlying foil elements by cemented spots or areas 26, thus avoiding sealing adjoining foil elements together with such binding effect as might interfere with desired relative movement of lapped marginal portions thereof, or impair free flexibility of said foil elements.

From the above, it will now be apparent that the instant invention provides a novel composite, flexible and all metal sheet structure, which is of light weight and free from through openings, and therefore capable of providing an effective barrier to passage of flame there-through. It will also be understood that such flame barrier material can also be modified by a facing or coating of rubber or like substance, whereby to adapt the same to additionally function as a gas barrier.

Having now described my invention, I claim:

1. A composite flexible and stretchable metallic sheet

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structure for the purposes set forth comprising a backing member formed by a knitted metallic wire fabric of selected length and width, an assemblage of metallic foil elements superposed upon said backing member in covering relation thereto and comprising an inner layer of foil elements disposed in vertical and horizontal alignment and a superposed outer layer of foil elements also disposed in vertical and horizontal alignment and in such overlying staggered relation to the elements of said inner layer as to close through openings therebetween, spot welds adapted to attach substantially central portions of respective foil elements of both the inner and outer layer thereof directly to said backing member, whereby the unattached portions of the assembled elements are free to flex and overlapping portions of adjoining elements of the assemblage thereof are capable of relative sliding movement in both vertical and horizontal directions when the backing member is subjected to stretch, and a continuous thin coating of resilient gas impervious substance overlying the external face of the assemblage of foil elements, only areas of said coating which are contiguous to substantially central portions of underlying foil elements being adhered thereto.

2. A composite flexible and stretchable metallic sheet structure for the purposes set forth comprising a backing member formed by a knitted metallic wire fabric of selected length and width, an assemblage of metallic foil elements superposed upon said backing member in covering relation thereto and comprising a series of relatively large circular foil elements disposed in horizontal and vertical rows, lateral marginal portions of adjoining elements of horizontal rows thereof lapping one another, top and bottom marginal portions of adjoining elements of vertical rows thereof also lapping one another, a series of smaller circular foil elements overlying said larger circular elements so as to close through openings between the latter, spot welds adapted to attach substantially central portions of respective large and small circular elements to said backing member, whereby the unattached portions of the assembled elements are free to flex and overlapping portions of adjoining elements of the assemblage thereof are capable of relative sliding movement in both vertical and horizontal directions when the backing member is subjected to stretch, and a continuous thin coating of resilient gas impervious substance overlying the external face of the assemblage of foil elements, only areas of said coating which are contiguous to substantially central portions of at least the large circular foil elements being adhered thereto.

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