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G. A. MAXWELL

3,238,683

SUN SCREEN

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Fig. 1.

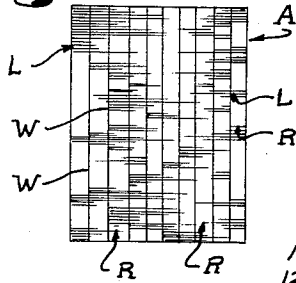


Fig. 2.

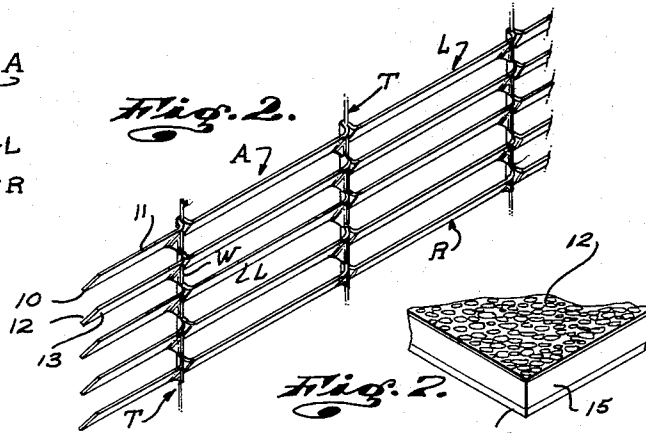


Fig. 3.

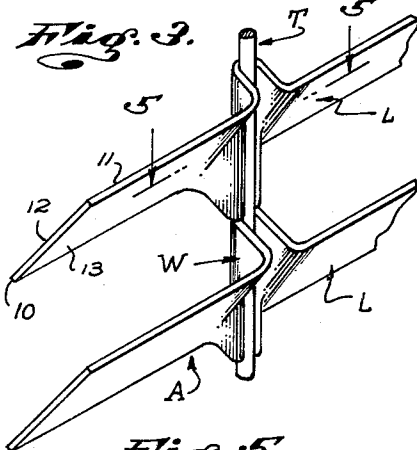


Fig. 4.

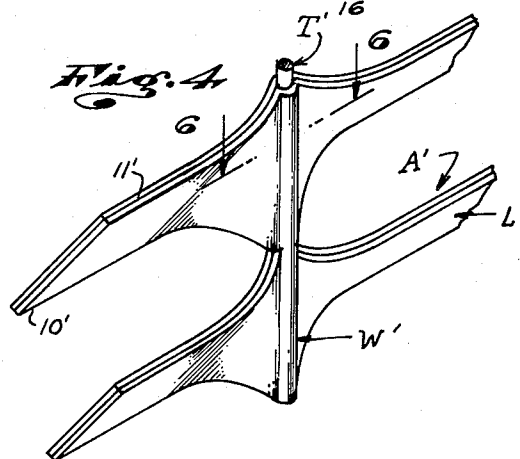


Fig. 5.

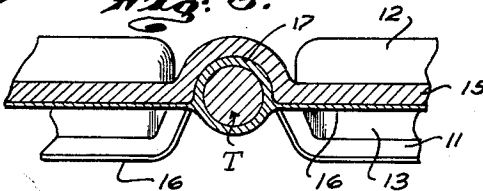


Fig. 6.

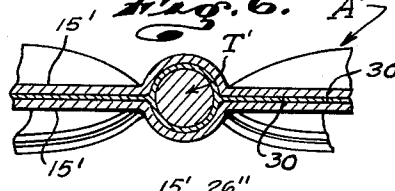


Fig. 8.

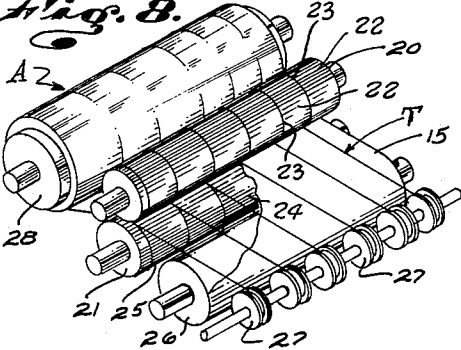
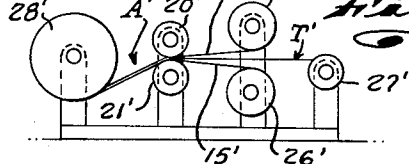


Fig. 9.



INVENTOR.
Georges A. Maxwell

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3,238,683

SUN SCREEN

Georges A. Maxwell, Los Alamitos, Calif. (1208 Pershing Square Bldg., 448 S. Hill St., Los Angeles 13, Calif.)

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4 Claims. (Cl. 52-473)

This invention relates to an improved sun screen construction and the method of making the same.

Sun screens of the nature herein concerned with and as provided by the prior art are flat, vertically-disposed fabric, or fabric-like, sheets having a plurality of vertically-spaced, horizontally-disposed, flat louvers or slats, and a plurality of laterally spaced, vertically disposed tie members or portions fixed to and extending between the slats and serving to hold the slats in fixed position. The slats or louvers are canted, or inclined, so as to normally block and prevent the direct rays of the sun from passing through the screen, yet are such that they do not block passage of other light from altitudes below or lesser than sun, or establish an objectionable hindrance to one's vision through the screen.

The principal objectionable feature of such screens is the appearance of the verticals. In one form of sun screens now being produced, the verticals are established by a pair of wires engaged about the slats and twisted with each other, between adjacent slats, as by a suitable weaving operation. The principal objection to this form of screen resides in the fact that the pairs of twisted vertical wires set up stresses throughout the sheet which cause twisting and warping of the slats. Further, the pairs of wires establishing the verticals stretch, or become elongated, and further increase the stresses set up through the screen when tensioned. Still further, in such a construction, a suitable enamel or varnish must be applied to the screen to hold the verticals and horizontals in fixed position, and as such are monochrome; that is, they are of one color. Still further, such screens are extremely costly to manufacture and are very delicate and fragile.

Another form of sun screen in wide use is established by a single sheet of aluminum, which sheet has a plurality of laterally spaced, vertical rows of horizontal louvers established therein by a suitable punching operation. In order to gain the desired end, the sheet of aluminum must be of extremely thin gauge. In order to provide such a screen with sufficient strength to support the louvers and prevent vertical stretching and resulting distortion of the screen, the uninterrupted portions intermediate the rows of louvers, which portions are the equivalent of the verticals in the first-mentioned form of screen, must be extremely broad, and, as a result are unsightly and greatly reduce the effectiveness of such screens.

The last-mentioned form of screen, like the first, is very delicate and easily damaged, due to the soft, malleable nature of the material from which it is formed. Still further, this second form of screen is such that it cannot be painted or colored on one side without the paint running, or otherwise passing through the screen, thereby requiring that these screens, as the first-mentioned form of screen, be monochrome.

Each of the screens provided by the prior art, being formed of metal, absorb and conduct a great deal of heat energy from the sun which impinges upon them, thereby reducing their effectiveness as heat barriers and also creating many other adverse effects which materially affect and limit their use.

An object of the present invention is to provide a sun screen of the general character referred to, which is formed of plastic, thereby eliminating and/or reducing

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many of the disadvantages existing in similar screens formed of metal.

An object of this invention is to provide a plastic sun screen of the character referred to including, laterally spaced, vertical, suspension and/or tension wires, bonded to or in the plastic, thereby establishing a structure which is such that it can be advantageously tensioned vertically, and which is such that the verticals are of a minimum lateral extent and establish a minimum of visual obstruction.

Another object of this invention is to provide a plastic screen of the character referred to, made up of a pair of thin, plastic sheets welded or bonded together, and with the vertical wires arranged therebetween.

It is another object of this invention to provide a laminated plastic screen of the character referred to wherein the sheets are of the same or different colors, are transparent, translucent, opaque or aluminized, or any suitable combination thereof, whereby one of several heat and light controlling effects can be advantageously obtained.

A further object of this invention is to establish a sun screen of the character referred to made of a sheet or sheets of plastic film which is tough, durable, resilient and such that it will retain a set and will return to such set if shifted therefrom, thereby providing a screen which is not subject to being damaged and rendered ineffective when used under ordinary circumstances.

Another object of this invention is to provide a screen of the character referred to established of a sheet or sheets of non-thermowelding plastic material with milled coatings of thermowelding plastic material thereon.

Another object of my invention is to provide a structure of the character referred to wherein the vertical wires are jacketed with a thermowelding plastic and are welded on or between the sheet or sheets of coated plastic.

Still another object of my invention is to provide a screen of the character referred to wherein the sheet or sheets of plastic are transparent and the thermowelding plastic coating or coatings are stained a suitable color.

A further object of the present invention is to provide novel methods for producing the screens of the character referred to which are fast, dependable and economical.

The various objects and features of my invention will be fully understood from the following detailed description of typical preferred forms and applications of my invention, throughout which description reference is made to the accompanying drawings, in which:

FIG. 1 is an elevational view of a sheet of screen as provided by the present invention;

FIG. 2 is an enlarged perspective view of a portion of the structure shown in FIG. 1;

FIG. 3 is a perspective view of a portion of one form of screen that I provide;

FIG. 4 is a perspective view of a portion of another form of screen that I provide;

FIG. 5 is a sectional view taken as indicated by line 5-5 on FIG. 3;

FIG. 6 is a sectional view taken as indicated by line 6-6 on FIG. 4;

FIG. 7 is an enlarged, perspective view of a portion of a sheet of material from which my new screen is established;

FIG. 8 is a diagrammatic perspective view illustrating the method and apparatus employed in making the form of screen shown in FIG. 3 of the drawings; and

FIG. 9 is a diagrammatic view showing the method and apparatus employed in making the form of screen shown in FIG. 4 of the drawings.

The sun screen construction A that I provide involves an elongate sheet of uniform, predetermined lateral extent and of indefinite longitudinal extent.

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The screen A includes a plurality of laterally spaced rows R of straight horizontal louvers L, a plurality of laterally spaced, vertically disposed, longitudinal webs W between the adjacent rows of louvers L, and an elongate tension wire T extending longitudinally of and bonded to or in each web W.

The several louvers L of each row of louvers are canted or pitched at like predetermined angles and each has a lower forward edge 10, an upper rear edge 11, a forwardly and upwardly disposed front surface 12 and a rearwardly and downwardly disposed rear surface 13.

The louvers L and webs W are established of one or more sheets of plastic film and are from five to ten mills in thickness.

In practice the plastic material must be a tough, stable material which is not subject to cold flowing, stretching or warping when subjected to moderate temperature variations and forces, and which is such that it can be advantageously formed and set into a desired configuration by the application of heat and/or pressure.

Further, it is important that the material from which my screen is made be not brittle, but sufficiently resilient that should the louvers L be bent or flattened from their set disposition, they will readily return to said position without permanent damage to the construction. Still further, it is important that the material be sufficiently flexible and resilient that the screen can be rolled longitudinally, as for the purpose of storing and shipping, without damage to the louvers and/or webs.

A plastic film having the above characteristics and from which applicant's screen can be advantageously established is produced by Du Pont Chemical Corporation and is marketed under the trade name Mylar. Mylar is available in any desired mill thickness, in any color, transparent, translucent, or opaque, and can advantageously be aluminized. While Mylar is such that it cannot be welded together by heat or pressure, it is common practice to coat it, on one or both surfaces, with a suitable compatible plastic material, such as polyethylene, which has good heat or thermowelding characteristics. In this manner, a plastic film having the several advantages of Mylar and the desirable thermowelding characteristics of polyethylene is obtained.

The polyethylene coating referred to above is extremely thin and is applied to the Mylar by a suitable milling operation.

Accordingly, a feature of the present invention is to establish a novel screen construction of Mylar film having a milled polyethylene coating on one or both surfaces thereof.

While Mylar film, and more particularly polyethylene coated Mylar film is specifically referred to, applicant does not wish to be limited to this particular material, since it is recognized that certain other existing plastic materials, such as nylon, might be established with the characteristics required in applicant's construction, or a new material having such characteristics may be developed which would, itself, be thermowelding.

In the form of the invention illustrated in FIGS. 3, 5 and 8 of the drawings, the screen A is established of a single sheet of plastic 15. The sheet 15 is preferably Mylar, and is provided with a milled coating 16 of polyethylene. The wire T is provided with a polyethylene jacket 17 to facilitate welding the wire into fixed position on or with the sheet.

The screen A is fabricated by passing the sheet 15 and the wires T between a pair of heated calendar rollers 20 and 21. The roller 20 is a female roller having a plurality of laterally-spaced annular rows of axially extending recesses 22 shaped to the form of the forward halves of the louvers and annular grooves 23 between the rows of recesses adapted to receive and guide the jacketed wires T and shaped to the form of the web W. The roller 21 is a male roller, having a plurality of laterally-spaced annular rows of axially extending projections 24 and

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annular ribs 25 shaped to the form of the rear side of the screen and adapted to cooperate with the recesses and grooves in the female roller 20 to form the sheet 15 and weld the wires T thereto.

The sheet 15 is fed between the rollers 20 and 21 from a supply roll 26 spaced forwardly of the rollers 20 and 21. The wires T are fed onto the sheet 15 and between the rollers 20 and 21 from spools 27 of wire rotatably supported forward of the rolls 26. The finished screen A issuing from the rollers 20 and 21 is engaged about a roller 28 spaced rearwardly of the rollers 20 and 21.

In practice, it is preferred that the sheet 15 be an opaque black sheet and that the front surface 12 thereof be iluminized, that is, provided with a deposit of highly reflective aluminum. With such a construction, the front surface 12, which opposes the direct rays of the sun, reflects and bounces back the greater portion of the solar light and heat energy impinging upon it, particularly the ultraviolet rays which otherwise act upon the plastic and cause rapid deterioration thereof. Further, by establishing the sheet of opaque black plastic the portion of the ultraviolet rays which might filter through the aluminized surface and which bounce into direct engagement with the plastic, will not pass through the plastic and thereby will not cause deterioration thereof.

In another form of the invention, the plastic is clear or transparent, can be stained any desired color, and, as above, the front surface 12 is provided with a very light or sparse aluminized coating, which coating is such that it will effectively reflect a desired portion of the solar rays impinging upon the screen and will allow the remainder to pass through the screen. With this set-up, the effect is to reduce, soften, and color the direct solar light passing through the screen, as desired.

Yet another form of the invention is to establish the screen of a sheet of tinted, transparent or translucent plastic, without the aluminized coating. In the case of each of the two last-mentioned forms or variations of the invention, the screen can be advantageously used in any one of a number of situations where a pane of glass is arranged between the screen and the sun since ordinary glass is an effective filter of the ultraviolet rays which would otherwise have damaging effects on the clear plastic.

FIG. 7 of the drawings is an enlarged view of a portion of the sheet 15 of plastic, showing the milled polyethylene coating 16 on one surface thereof and indicating the aluminized coating, at 20, on the other surface thereof.

In the form of the invention shown in FIGS. 4, 6 and 9 of the drawings, the screen A' is established of two sheets of plastic 15' suitably welded or bonded together with the wires T' engaged therebetween.

The screen A' is established in substantially the same manner as the screen A. The apparatus employed includes a pair of forming rollers 20' and 21', a lower supply roll 26' of plastic film, wire supply spools 27', and a receiving roller 28' about which the finished product is wound. The foregoing elements or means are arranged and operated in the same manner as the apparatus employed in establishing the screen A. In addition, the apparatus for establishing the screen A' is provided with a second, upper supply roll 26'' above the roll 26' and above the wires T' leading or advancing between the rolls 20' and 21'.

With the above relationship of parts, it will be apparent that the two sheets 15' are fed uniformly between the rollers 20' and 21' and that the wires T' are fed into engagement therebetween.

In the form of the invention now under consideration, if Mylar plastic is used, the opposing surfaces 30 of the sheet must be provided with milled coatings of polyethylene.

If desired, instead of providing polyethylene coatings on the two sheets 15', a suitable cement or bonding plastic in liquid form can be applied to the upwardly-disposed surface of the lowermost sheet 15', as by a suitable cement

roller or spray gun type of apparatus, which cement will set and cure when subjected to the heat and/or pressure of the rollers 20' and 21', thereby bonding the sheets together with the wires T' therebetween.

The wires T', being engaged between the sheets 15', need not be jacketed as in the case of the wires T.

In this second form of the invention, if a suitable thermobonding plastic is used, the need of polyethylene coatings, cements, or the like, is eliminated, since the two sheets 15' could be bonded together to establish an integral mass about the wires T' and in the desired configuration.

In this form of the invention, the two sheets 15' can be of different colors, opaque or translucent, and one can be provided with an aluminized surface coating, as circumstances require, to give the desired end result and/or effect.

In practice, and as shown in FIG. 3 of the drawings, the louvers L can be formed with ends that are substantially at right angles to their major planes, so that a gradual reduction of the space between adjacent louvers does not occur at each end of the said spaces, and so that the lateral extent of the web W, and its resulting obstruction to light and vision, is maintained at a minimum.

In FIG. 4 of the drawings, the louvers L' are canted or pitched from the plane of the screen by a twisting of the end portions of the louvers, adjacent the webs W'. This results in a convergence between adjacent top and bottom edges 11' and 10' of adjacent louvers, at the ends thereof and a resulting restriction of both light and vision.

The configurations shown in FIGS. 3 and 4 indicate two extremes in louver configuration. The form of louver shown in FIG. 4 can be easily and conveniently established of any plastic film, while the form of louver shown in FIG. 3 of the drawings can only be established of a plastic film which will readily stretch and flow a required amount when subjected to the heat and/or pressures of the forming rollers without adverse effects.

Having described only typical preferred forms and applications of apparatus and typical manners of carrying out the method of my invention, I do not wish to be limited to the specific details herein set forth, but wish to reserve to myself any variations and modifications that may appear to those skilled in the art and fall within the scope of the following claims.

Having described my invention, I claim:

1. A flat, planar, vertically disposed sun screen of the character referred to having front and rear surfaces and including, a plurality of laterally spaced vertical rows of flat, horizontally extending louvers of flexible and stretchable plastic material, an elongate, vertically extending, rearwardly opening semi-circular web of flexible and stretchable plastic material formed integral with and extending between the ends of adjacent louvers and between adjacent rows of louvers and, an elongate round, flexible and substantially non-stretchable tension wire seated and bonded in each web to extend longitudinally thereof, said webs establishing uniform, uninterrupted seated engagement about the forward half of the wires throughout their longitudinal extent.

2. A flat, planar, vertically disposed, fabricated sun screen of the character referred to having front and rear surfaces and including, a plurality of laterally spaced vertical rows of flat horizontally extending louvers of flexible and stretchable plastic, an elongate vertically

extending rearwardly opening semi-circular web of flexible and stretchable plastic formed integral with and extending between the ends of adjacent louvers and between rows of louvers and an elongate, round, flexible and substantially non-stretchable tension wire seated and bonded in and extending longitudinally of each web, said louvers having forwardly and upwardly disposed front surfaces and rearwardly and downwardly disposed rear surfaces and arranged with their central longitudinal axes normal to and intersecting the central axes of the wires, said webs establishing uniform uninterrupted seated engagement about the forward 180° of said wires, throughout their longitudinal extent.

3. A flat, planar, vertically disposed, fabricated sun screen of the character referred to having front and rear surfaces and including, a plurality of laterally spaced vertical rows of flat, horizontally extending and forwardly and downwardly inclined louvers, elongate, vertically extending tubular webs formed integrally with and extending between the ends of adjacent louvers and between adjacent rows of louvers, the central longitudinal axes of the webs being normal to and intersecting the central longitudinal axes of the louvers, an elongate, flexible and substantially non-stretchable tension wire engaged in and extending longitudinally through each web, said louvers and webs being established of flat front and rear films of flexible and stretchable plastic material bonded to each other and with said wires to establish an integral structure.

4. A flat, planar, vertically disposed sun screen of the character referred to having front and rear surfaces and including, a plurality of laterally spaced vertical rows of flat, horizontally extending, forwardly and downwardly inclined louvers, elongate, vertically extending webs formed integrally with and extending between the ends of adjacent louvers and between adjacent rows of louvers, said louvers and webs being integrally formed of flexible and stretchable plastic film material, elongate, rounded, flexible and substantially non-stretchable tension wires bonded to and extending longitudinally of the webs, said webs being formed about and establishing uninterrupted seated engagement about at least 180° of the tension wires throughout their longitudinal extent, said louvers being arranged with their central longitudinal axes normal to and intersecting the central longitudinal axes of the wires.

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HARRISON R. MOSELEY, *Primary Examiner.*

JOSEPH D. BEIN, *Examiner.*