Feb. 3, 1953 H. A. KAUFMANN 2,627,311

SCREEN FRAME CONSTRUCTION INTENDED PRIMARILY FOR SHADE SCREENS

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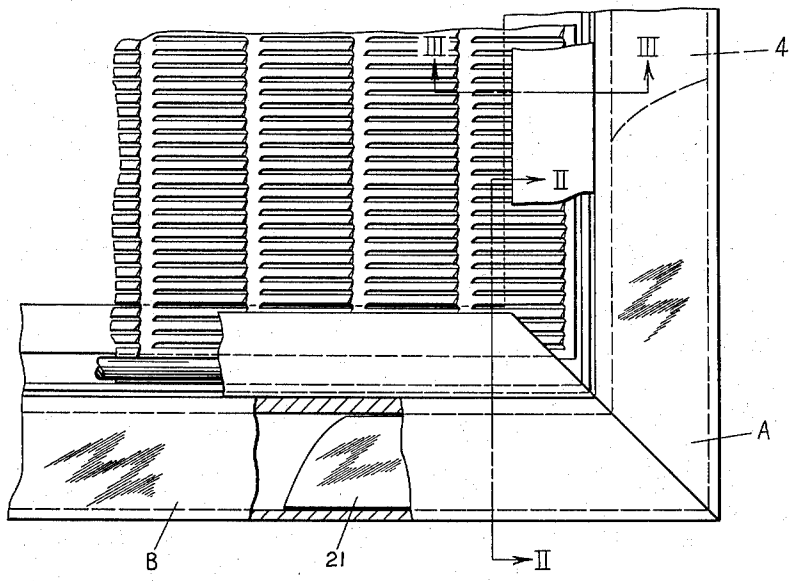


fig. 1

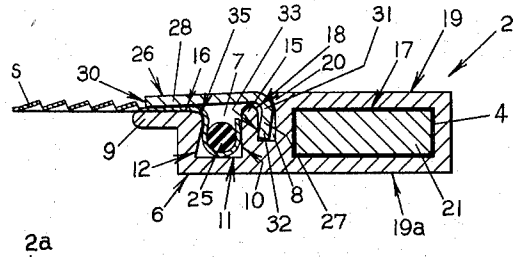


fig. 2

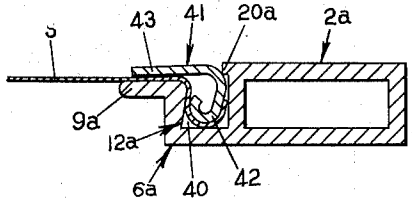


fig. 4

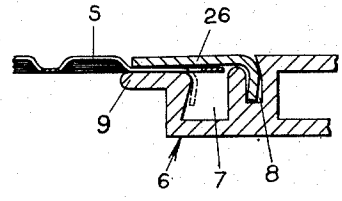


fig. 3

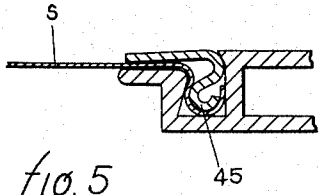


fig. 5

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SCREEN FRAME CONSTRUCTION INTENDED PRIMARILY FOR SHADE SCREENS

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12 Claims. (Cl. 160—395)

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This invention relates to metallic screen frame structures and particularly to a type thereof adapted to receive screening of the kinds, among others, illustrated in U. S. Patent No. 2,366,224, issued to Warp January 2, 1945, in U. S. Patent No. 2,194,222, issued to Ewing March 19, 1940, and in U. S. Patent No. 2,319,225 issued to Grebe and Ewing May 18, 1943.

In the utilization of screen structures of the type mentioned above, sometimes referred to in the trade as "sun screen," a serious problem has existed for a number of years in the provision of frame structures therefor. Inasmuch as the structure of such screen makes it more difficult to grip than conventional, woven screen cloth, the use of these types of screen structures has been seriously restricted by the lack of adequate and satisfactory framing means. Some wooden framing structures have been utilized with limited success, but, insofar as I am aware, it has not yet been possible to make use of the known advantageous properties of metal frames with the sun type screening.

Therefore, this invention contemplates the provision of a metallic framing means which will be adapted for use with any kind of screening material, but which is particularly effective with the screening material of the general types illustrated by the above-named patents. With the framing means of this invention, these screening materials may be framed with a speed comparable to that of conventional, woven screening and at a comparable cost. Thus, the cost of framing these new screening materials is greatly reduced and their use thereby made much more practicable than it is at present.

Accordingly, a principal object of this invention is to provide a metallic framing structure which will receive and hold tightly against slippage or sagging various types of screening materials and particularly the types illustrated by the above-mentioned patents.

A further object of the invention is to provide a metallic framing structure, as aforesaid, which will also hold other types of screening material with equal tightness.

A further object of the invention is to provide a metallic framing structure, as aforesaid, whose cost will not greatly, if any, exceed the cost of present framing structures for conventional, woven screening materials.

A further object of the invention is to provide a metallic framing structure, as aforesaid which will prevent the slipping and escaping of the screen panel from its tightly held condition even

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if some degree of sag does develop in said panel.

A further object of the invention is to provide a metallic framing structure, as aforesaid, which will hold the screen panel firmly and tightly but will not cause such distortion of the louvres thereof as to materially injure its sun-shading effectiveness even in the region closely adjacent the side elements of the frame.

A further object of the invention is to provide a metallic framing structure, as aforesaid, in which the framing structure may be fabricated by the simple extrusion processes.

A further object of the invention is to provide a metallic framing structure, as aforesaid, which will present a neat and attractive appearance.

Other objects and purposes of the invention will become immediately apparent to persons acquainted with articles of this type upon reading of the following specification and the study of the accompanying drawings.

In the drawings:

Figure 1 represents a fragmentary, broken front elevation view of a corner of a screen and frame assembly as normally appearing from the inside of the building in which the assembly is installed.

Figure 2 represents a section taken on the line II—II of Figure 1 rotated 90° counterclockwise.

Figure 3 represents a section taken on the line III—III of Figure 1.

Figure 4 represents a section of a modified form of the invention as appearing in a view corresponding to that of Figure 2.

Figure 5 represents a fragmentary view of a further modification of the invention.

In the following description, the screening material has, for illustrative purposes, been taken as that shown in the Warp Patent No. 2,366,224, mentioned above, although it will be understood that the screening material of either of the other two above mentioned patents could as well be utilized. For convenience in reference, the term "inward" shall mean inward of the building with which the screen is being used, which is upward with respect to Figures 2 and 4, and "outward" shall mean the opposite direction. The term "centerward" shall mean toward the geometric center of the entire frame and screen assembly, and "peripheral" shall mean in the opposite direction. Each of these terms shall include also the derivatives of each word thus expressly mentioned.

In meeting the above-enumerated objects and purposes, I provide framing sections of any convenient, extrudable material, such as aluminum, which sections are sidewardly grooved for the re-

ception of one or more splines. Whether one spline, or more, be used, the splines perform several functions. In the usual case, there will be provided a conventional, round spline of rubber or vinyl, at the top and bottom of the screen frame which functions partly to give the screen the necessary stretching vertically when it is being first placed onto the frame and partly to hold the screen firmly in place with respect to the frame. A second, or cover spline, is then applied and so arranged that it is anchored at a point peripherally of the first named spline, extends across it to cover same and hide it from view, and engages the panel with a substantial pressure at a point centerwardly of the first named spline, and on an unbent part of the panel. A lip is provided on the centerward portion of the frame element to receive the pressure of the cover spline. This spline provides a strong holding force applied directly to the screen panel and applied along all four edges thereof which holds each of said four edges against displacement. Thus, a uniform appearance is provided all of the way around the screen and all of the parts are held sufficiently tightly to promote an attractive appearance.

In modified structures, also shown and described, the two above mentioned splines are combined into single elements which perform the same functions as the two splines above described, but the resulting structures are somewhat less easy to assemble.

Where the two splines are referred to, the term "holding spline" for the centerward spline and "cover spline" for the peripherally positioned spline, will be used for identification purposes only and with no implications of function intended by such terminology.

Turning now to the several figures, only two elements of a frame are shown in as much as all four elements are identical. In Figure 1 there are shown frame elements A and B which are cut, mitered and joined in the usual manner. Each thereof comprises a body section 2 which may be solid but which preferably has an opening 4 therein. Extending centerward from the body section 2 is the screen-receiving section 6, having therein on the inward side thereof the screen-receiving groove 7 and the auxiliary groove 8. A lip 9 extends further centerward from the inward edge of the centerward end of the screen-receiving section 6.

The peripheral wall 10 of the screen-receiving groove 7 is substantially perpendicular to the general plane of the screen panel and the bottom 11 of said groove is substantially parallel therewith. The centerward wall 12 is sloped from the bottom 11 toward the wall 10 at such an angle, here about 75 degrees, as to provide an undercut sufficient to hold the hereinafter mentioned screen spline securely in position within the groove 7. Thus, the wall 12 intersects the inward face 16 of the lip 9 at an acute angle along the snubbing edge 35.

The groove 8 is spaced peripherally from the groove 7 such a distance that the wall 15 between said grooves will have sufficient thickness to be of reasonable strength, but it may be placed a greater distance from said groove 7, if desirable for other reasons, without affecting the purposes of this invention. Said groove 8, whose walls are both parallel with the said wall 10 of the groove 7, is preferably of less depth than the groove 7 in order to improve the strength of the parts.

The inward face 16 of the lip 9 is preferably in substantially the same plane as, or outwardly of, the surface 17 of the body section 2, although this can vary quite substantially without departing from the purposes of this invention. It is desirable for a product of attractive appearance, although not essential insofar as this invention is concerned, so to locate the inward surface of said lip 9 that the entirety of the screen panel lies within the zone defined by parallel planes including the surfaces 19 and 19a of the framing elements. The extremity 18 of the wall 15 is preferably disposed in a plane parallel with and substantially intermediate the walls 17 and 19 of the body section 2. At the most centerward and inward corner of the body section 2, there is located an overhang or bead 20 which commences approximately at the last mentioned plane and extends centerwardly to narrow slightly the opening of the groove 8. In the example here selected for illustration, the overhang preferably extends centerwardly less than one fourth of the width of said groove 8. Its inward surface is preferably flush with the inward surface 19 of the body section 2 and its outer surface is disposed at an angle of about 60 degrees to the general plane of the screen panel, although the angle will vary widely as shown in Figure 4, according to the design choice without affecting the invention in its broader sense.

In forming a screen holding frame, pieces of framing are cut and mitered in the usual manner and assembled by the use of any convenient corner elements, such as the right angular corner element 21 which fits snugly into the opening 4 within the body section 2. However, other forms of corner elements may be freely used or the corners may be welded, without affecting the scope or effectiveness of this invention.

This will provide a strong and rigid frame and one which will support the screen material in a highly satisfactory manner.

In applying the screen material to the frame, the screen is cut to such size that its edge will preferably extend to a point near the mouth of the groove 7 and its end will be enabled to follow close to the walls and bottom of the groove 7 in the top and bottom sections of the frame. The spline 25 may be of any conventional material, such as a relatively soft metal or a relatively stiff rubber or vinyl, and is preferably of circular cross-section. The edges of the material may need some pre-flattening to enable them to be bent in the proper manner. Normally, screen material made according to said Patent No. 2,266,224 will need such pre-flattening and screen material made according to said Patent Number 2,194,222 will not need such flattening. With the upper and lower edges of the screen panel thus pre-flattened, if needed, and the frame on a table with its inner face upwardly, the screen panel S (Figure 2) is placed onto the frame and the upper and lower edges pressed at least partially into the groove 7 of the top and bottom frame elements. There is some advantage in similarly bending the side edges of the panel into said grooves 7 of the side elements, but this is not essential. The spline is then placed on top of the screen edges and pressed fully into the respective grooves 7, thus pushing the panel edges fully into the grooves 7, stretching the screen tightly and locking the edges snugly under the undercut provided by the centerward wall 12 of said grooves 7. This

may be done by conventional tools and in a conventional manner.

The cover spline 26 is of resilient material, preferably spring metal, and is bent through such an angle at its peripheral portion 27 that, when said portion is inserted into the groove 8 and passed under the overhang 20, the centerward portion 28 will press with considerable force against the screen panel S lying against the lip 9. In one successful embodiment, the pressure exerted with a screen panel in place is 13 pounds per lineal inch of frame. The overhang 20 serves to assist in holding the cover spline in place as shown. Thus, the cover spline functions both to hold the screen in position, especially along the sides of the panel, and to conceal and cover the groove 7 and its contents.

This cover spline is so shaped that it cannot be pushed into the groove 8 excepting by the application of a substantial force, which may be applied in any conventional manner but is advantageously applied by a roller traveling from one end of a given frame element to the other. When in place within said groove, the centerward edge 30 of the cover spline contacts the screen panel with a major amount of force and the greater part of the force applied to the screen panel is applied through this edge, or through the zone immediately adjacent to the edge. The portion of maximum bend, indicated at 31, is seated against the overhang 20 and the opposite edge 32 bears against the centerward face 33 of the groove 8. Inasmuch as the distortion of the cover spline incident to its insertion into place does not exceed the elastic limit of its material, the resiliency thereof will be retained after insertion and a strong pressure will be exerted, thereby urging the screen panel against the lip 9 throughout the useful life of the entire screen assembly.

An important function of this cover spline, in cooperation with the holding spline 25, resides in its positioning of the screen panel snugly against the lip 9, regardless of the pressure actually exerted in so doing. If the panel were not so positioned, and it developed a substantial sag, it would, under inwardly directed pressure, be moved away from the lip 9. This would materially reduce the snubbing action, now secured against the edge 35, and the panel edges would be held against movement only by the frictional gripping of the holding spline 25. This snubbing effect may also be secured to an extremely helpful extent at the sides of the panel, without encountering the practical difficulties of trying to place round splining into position across the ends of the louvres, by merely bending said edges into the grooves 7 at the sides as indicated in broken lines in Figure 3. The cover spline will hold said panel snugly against the inward face of the lip 9 and thereby assist it to resist being drawn out of position entirely apart from any frictional gripping imposed by said cover spline. Thus, while in the preferred form of the invention the cover spline will, as aforesaid, exert a major pressure against the panel, at least a phase of the invention might be practiced if the cover splines at the sides exerted only sufficient pressure against the panel, to prevent movement therof inwardly from said lip.

In Figure 4 is illustrated a modification wherein the functions of grooves 7 and 8 are combined into a single groove and the functions of the splines 25 and 26 are combined into a single spline. This form is acceptable for certain uses

but presents assembly problems not present in the preferred form above illustrated.

The body section 2a is substantially the same as illustrated and described above. The screen receiving section 6a, however, is of less centerward extent. The lip 9a is similar to the lip 9. The single groove 40 is somewhat wider than either of the grooves 7 or 8, described above, but has the sloping wall 12a corresponding to the wall 12 above and the overhang 20a corresponding to the overhang 20 above. The spline 41 is of spring material, preferably metal, and functions both to press the edge of the screen panel S into the groove 40 and to press the portion of the panel adjacent to the edge against the lip 9a. The overhang 20a assists in both these functions. Care should be taken, however, that the curved portion 42 of the spline 41 be non-circular in cross-section in order to effect a resilient pressure by the gripping portion 43 onto the panel S. Otherwise, the portion 42 will merely rotate clockwise, as appearing in Figure 4, and no pressure will be effected by the portion 43 against the lip 9a.

Figure 5 shows a further modification wherein the curved portion 42 of Figure 4 is reversed as indicated at 45, so that there is no possibility of improper rotation and release of pressure thereby. While there is no precise rule determining the radius and arc through which the parts 42 and 45 should be bent the radius should be enough to prevent injury of the panel and the arc should be sufficient to secure a substantial pressure surface. By way of specific example, and example only, a radius equal to the usual round screen spline, such as 5/64 inch, and an arc of about 180 degrees will usually be satisfactory.

Accordingly, two specific forms of a screen frame structure which will meet the objects and purposes above set forth have been set forth hereinabove. Further variations will at once occur to persons acquainted with this type of equipment and such variations will be within the scope of the hereinafter appended claims excepting as said claims limit otherwise by their express language.

I claim:

1. In screen construction, the combination: cut and mitered frame elements assembled together to form a screen frame, each element being provided with a pair of parallel grooves along one side thereof and having a portion of each of said elements disposed centerwardly of the centerward groove thereof; a screen panel affixed to said frame and held thereto at opposite ends thereof; spline elements in the centerward one of said grooves at each of opposite ends of said frame holding the opposite ends of said screen panel against the respectively centerward walls of said centerward grooves; other spline elements in the outer one of said grooves in each of said frame elements extending across said centerward groove of each frame element and pressing said panel against said portion of said frame element disposed centerwardly of said centerward groove thereof; whereby said panel is held tightly and none-releasably at opposite ends of said frame and is held snugly but movably at the sides of said frame.

2. In an elongated frame element for a screen frame, the combination of: a body portion having centerward and peripheral edges and inward and outward sides, said body having a lengthwise recess in its inward side near to and parallel with the centerward edge thereof, said recess having an outer wall and a centerward wall and

said centerward wall extending toward and terminating at a point spaced from said inward side; a flat lip extending centerwardly from said centerward edge, said lip being spaced outwardly from said inward side and substantially parallel therewith; a lengthwise bead secured to and extending centerwardly from said outer wall adjacent to the inward edge thereof, said bead being spaced from a plane defined by the adjacent surface of said centerward wall; an elongated, resilient angle member having one leg thereof resistably extendable into said recess with the other leg extendable centerwardly and engageable with said lip, said other leg being resiliently distorted against said lip by engagement of the free end of said one leg with said centerward wall and engagement between said bead and the apex of said angle member, said angle member being completely disposed between planes defined by said inward and outward sides.

3. In screen frame construction for holding a screen panel, including a frame member of extruded material and being of generally rectangular cross-section, said frame having an inward edge adjacent said panel, an outward edge remote therefrom, and a first side and a second side lying substantially parallel to the plane of said screen panel, the combination comprising: means defining a first groove in the first side of said frame member; means extending from the inward edge of said frame member and providing a bearing surface intermediate the first and second sides of said frame member and generally parallel to the plane of said screen panel; means defining a second groove in said first side parallel to said first groove and spaced outwardly therefrom, the side of said second groove adjacent said first groove terminating substantially in the plane of said bearing surface and the opposite side of said second groove at its edge adjacent the first side of said frame member being displaced toward said first groove in the portion thereof extending beyond the first named side of said second groove; a substantially L-shaped member having one leg thereof contacting the inward surface of the second groove and contacting same only at the innermost extremity of said leg and said leg contacting also the outer surface of said second groove and contacting same only at the outermost extremity of said leg and having its other leg substantially parallel with said first surface with one surface of said other leg being substantially flush with the first side of the frame member and having its opposite surface substantially parallel with and engaging the said bearing surface.

4. In screen frame construction for supporting a panel, the combination comprising: a substantially rectangular body part having an inward edge, an outward edge and first and second sides; a substantially Z-shaped portion extending from said inward edge of said body part and comprising first, second and third bars, a first bar thereof being connected at one end to said inward edge and adjacent said second side, and having its first and third bars substantially parallel with each other and substantially parallel with said sides of said body part, the bar of said Z which is most remote from said body part defining by its surface opposite that to which its second bar is attached a bearing surface substantially parallel to the first side of said body part and spaced therefrom toward said second side of said body part; a barrier extending from the first bar of said Z member substantially parallel with the adjacent edge of said body part and spaced therefrom; an L-shaped spline having first and second legs positioned substantially at right angles with respect to each other, said first leg located between said barrier and the opposed edge of said body part, contacting said barrier only at the extremity of said leg and contacting the said edge of said body part only at the portion of said leg adjacent the apex of said L and at a point on said edge adjacent said first side, and the second leg of said spline extending across said bearing surface on the third bar of said Z and being substantially parallel thereto.

5. In screen construction, the combination: cut and mitered frame elements arranged together to form a screen frame; one pair of opposite frame elements being provided with a pair of parallel longitudinal grooves along one face side of each thereof and said elements each having a platform portion disposed centerwardly of the centerward groove of each thereof, and the other pair of oppositely disposed frame elements being each provided with at least one longitudinal groove along one face side of each thereof and said latter elements each having a platform portion disposed centerwardly of said groove; a screen panel affixed to said frame and firmly held to said first named elements thereof; spline elements in the centerward one of said grooves of each of said first named elements holding the opposite ends of said screen panel against the respectively centerward walls of said centerward grooves; angular spline elements in the outer one of said grooves in each of said first named pair of screen elements and angular spline elements in said grooves of the second named pair of said frame elements, said angular spline elements extending across the centerward groove of the respective frame elements and pressing said panel against said platform portions of each of said frame elements; whereby said panel is held tightly and non-releasably at opposite ends of said frame and is held snugly but movably at the sides of said frame.

6. In screen frame construction for supporting a panel, the combination comprising: a substantially rectangular body part having an inward edge, an outward edge and first and second sides; a substantially Z-shaped portion extending from said inward edge of said body part and comprising first, second and third bars, said first bar thereof being connected at one end to said inward edge and adjacent said second side, and having its first and third bars substantially parallel with each other and substantially parallel with said sides of said body part, the bar of said Z which is most remote from said body part defining by its surface opposite that to which its second bar is attached a bearing surface substantially parallel to the first side of said body part and spaced therefrom toward said second side of said body part; a barrier extending from the first bar of said Z member and spaced from the adjacent edge of said body part; an L-shaped spline having first and second legs positioned substantially at slightly less than a right angle with respect to each other, said first leg located between said barrier and the opposed edge of said body part, contacting said barrier only at the extremity of said leg and contacting the said edge of said body part only at the portion of said leg adjacent the apex of said L and at a point on said edge adjacent said first side, and the second leg of said spline extending across said bearing sur-

face on the third bar of said Z and being substantially parallel thereto.

7. The device defined in claim 4 wherein said bearing surface is spaced from said first side toward said second side a distance substantially equal to the thickness of the second leg of said spline plus the thickness of the screen.

8. A device as defined in claim 4 having a bead on the inward edge of said body part adjacent the first side thereof and extending therefrom in the same direction as said Z-shaped member.

9. In an elongated frame element for a screen frame, the combination of: a body portion having centerward and peripheral edges and inward and outward sides, said body having a lengthwise recess in its inward side near to and parallel with the centerward edge thereof, said recess having an outer wall and a centerward wall and said centerward wall extending toward and terminating at a point spaced from said inward side, a lip being positioned intermediate said inward and said outward side and being substantially parallel therewith; a lengthwise bead secured to and extending centerwardly from said outer wall adjacent to the inward edge thereof, said bead being spaced from a plane defined by the adjacent surface of said centerward wall; an elongated, resilient angle member having one leg thereof resistably extendable into said recess with the other leg extendable centerwardly and engageable with said lip, said other leg being resiliently distorted against said lip by engagement of the free end of said one leg with said centerward wall and engagement between said bead and the apex of said angle member, said angle member being completely disposed between planes defined by said inward and outward sides.

10. The device defined in claim 2 wherein said bearing surface is spaced from said inward side a distance substantially equal to the thickness of said other leg plus the thickness of the screen.

11. The device defined in claim 2 including also a curved portion on the free end of said one leg for pressing a portion of said screen against the inward wall in said groove and against the base of said groove but said one leg being free from contact with the outer wall of said groove excepting against the bead thereof.

12. The device defined in claim 2 including also a curved portion on the free end of said one leg for pressing a portion of said screen adjacent the inward wall into said groove and against the bottom of said groove.

HARRY A. KAUFMANN.

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