

Jan. 16, 1940.

T. A. GRAVES

2,187,121

VENETIAN BLIND SLAT

Filed Feb. 23, 1938

2 Sheets-Sheet 1

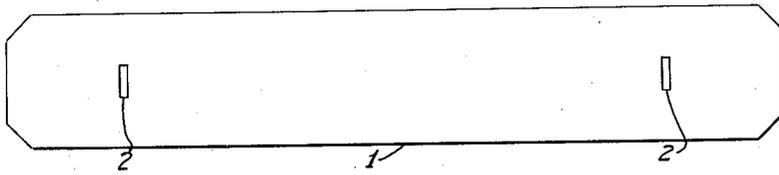


Fig. 1

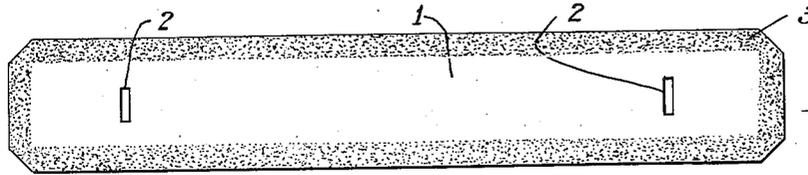


Fig. 2

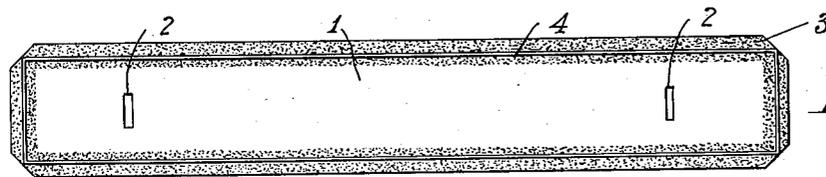


Fig. 3

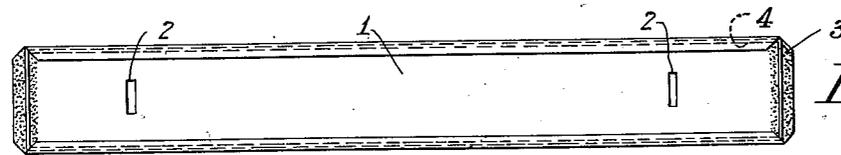


Fig. 4

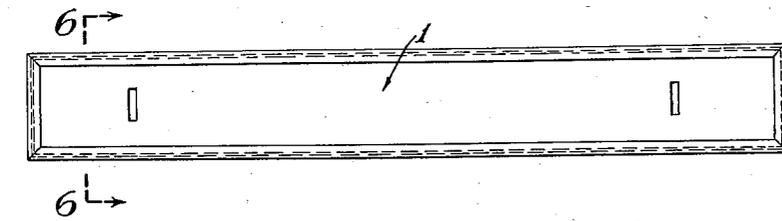


Fig. 5

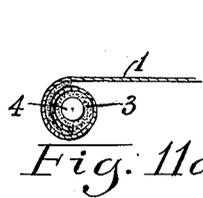


Fig. 11a

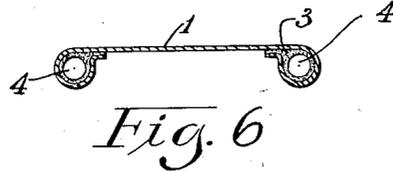


Fig. 6

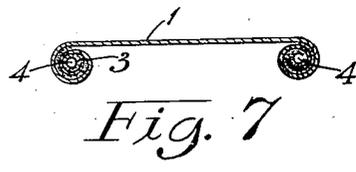
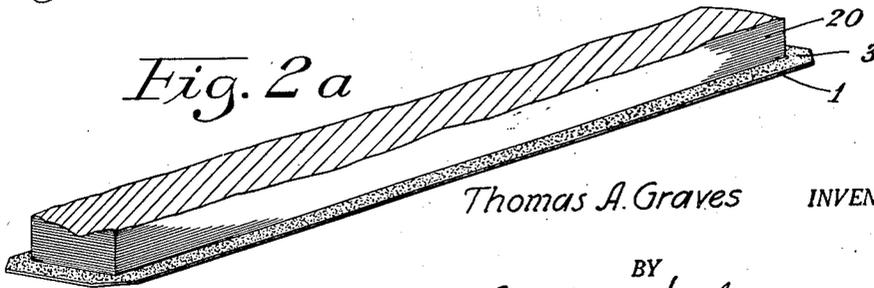


Fig. 7

Fig. 2a



Thomas A. Graves INVENTOR.

BY Frank C. Hellberg ATTORNEY

Jan. 16, 1940.

T. A. GRAVES

2,187,121

VENETIAN BLIND SLAT

Filed Feb. 23, 1938

2 Sheets-Sheet 2

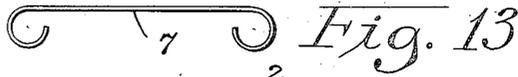


Fig. 8

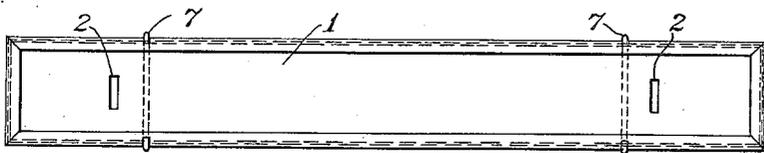


Fig. 10

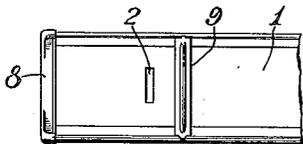


Fig. 12



Fig. 14

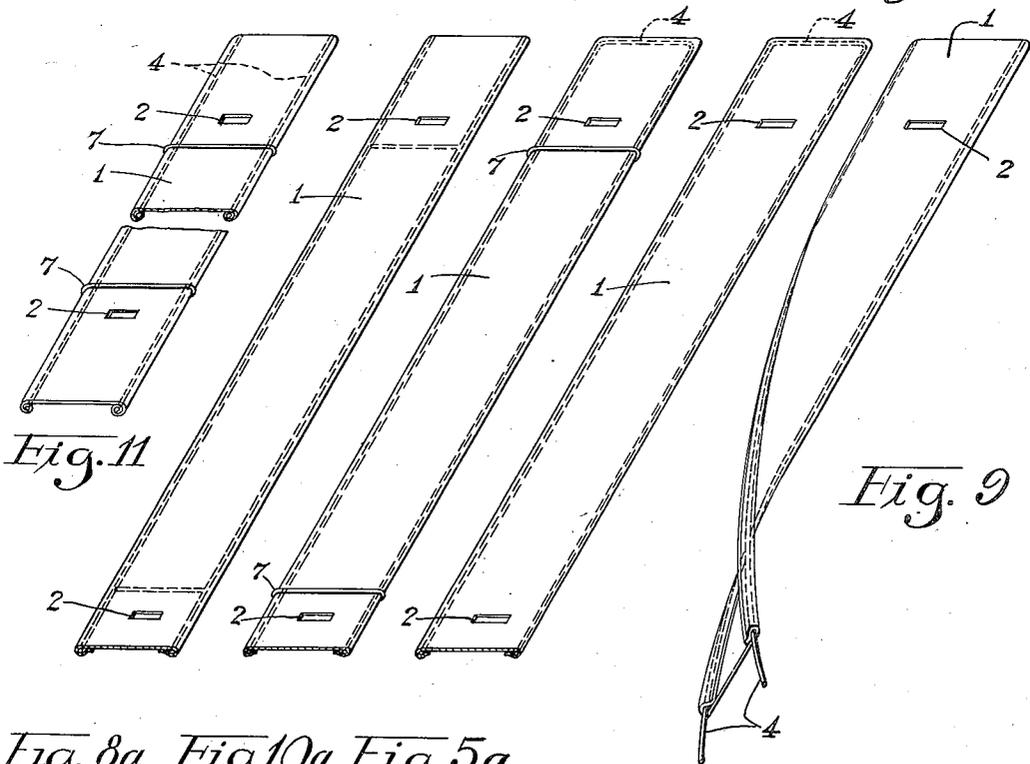


Fig. 8a Fig. 10a Fig. 5a

Thomas A. Graves INVENTOR.

BY Frank C. Hilberg ATTORNEY

UNITED STATES PATENT OFFICE

2,187,121

VENETIAN BLIND SLAT

Thomas A. Graves, Newburgh, N. Y., assignor to
E. I. du Pont de Nemours & Company, Wil-
mington, Del., a corporation of Delaware

Application February 23, 1938, Serial No. 191,911

6 Claims. (Cl. 156—17)

This invention relates to Venetian blinds and more particularly to translucent or semi-transparent Venetian blind slats which are made from flexible sheet material without stitching.

There are two distinct types of window shades commonly used at the present time one of which is the ordinary window shade which is prepared from coated fabrics and mounted on a spring roller, and the other of which is the Venetian blind type which consists of a plurality of individual horizontal slats uniformly spaced and suspended on vertical strips which may be raised or lowered by suitable elevator cords. The former of these two types has been in use to a considerable extent due to its lower cost, but has the disadvantage that during the daytime it shuts out all direct light although recently translucent shade cloth has been made available commercially.

Heretofore, Venetian blind slats have been made of wood or metal and while they add considerable charm and distinction to a room, they do not have the property of transmitting diffused light when the slats are adjusted to the closed position.

It has been proposed therefore to use coated fabrics in the construction of slats for blinds of this type and the usual method of doing this is to stitch the fabric in a manner such that a longitudinal pocket is produced and a metal frame is inserted into the pocket and then the closing flap either stitched or otherwise suitably closed. The slats prepared in such a manner are easily twisted out of shape, and it is this disadvantage which the present invention overcomes since slats which have become twisted lose the beauty of their symmetrical lines and then have a very unsightly appearance.

It is an object of the present invention to produce a Venetian blind slat which has no stitching and which may be made of flexible translucent material having sufficient rigidity to maintain a flat condition in use.

Another object is the provision of a non-stitched cloth Venetian blind slat with a substantially plain surface on one side.

Other objects will be apparent as the description of the invention proceeds.

The foregoing objects are accomplished by preparing a Venetian blind slat which comprises a flexible translucent or semi-transparent fabric supported by metal reinforcing elements, the edges of the fabric being bonded to the metal by means of an adhesive in such a manner that

the metal may be considered as being embedded in a mass of the adhesive.

In the drawings, the successive figures show the method of preparing a slat in accordance with this invention. Figure 1 is a plan view of a flexible sheet material which forms the body of a slat and which has been cut to the desired shape. Figure 2—A is a plan view showing a blanking out element centered on the sheet on which adhesive has been applied to the portion not blanked out. Figure 2 is a plan view of the fabric after the blanking out element has been removed. Figure 3 is a plan view showing the steel frame in place. Figure 4 is a plan view showing the longitudinal edges of the sheet material folded over the steel frame. Figure 5 is a plan view showing all of the edges folded over the steel frame. Figure 5—A is a top plan view with an end in section. Figure 6 is a section along the line 6—6 of Figure 5. Figures 7 and 11—A are imaginary sections along the line 6—6 where a modification has been used in winding the fabric around the metal frame $1\frac{3}{4}$ times and $1\frac{1}{2}$ times, respectively. Figures 13 and 14 are transverse reinforcing elements. Figures 8 and 10 are plan views of the opposite sides of a slat showing the reinforcing elements in place other than at the ends. Figure 9 is a plan view of a slat which has been distorted. Figure 10 has reinforcing elements also at the end.

Figure 8—A represents a plan view of a slat in which the reenforcements running transversely are welded to those running longitudinally. Figure 10—A likewise is a plan view of a slat in which clips, shown in detail in Figure 13, are used. Figure 11 is a plan view similar to Figure 10—A but is broken to show a section and also shows the end reenforcements eliminated. Figure 12 is a portion of a plan view of a slat showing the combination of the clip shown in Figure 14 and an end reenforcement which is clamped in place rather than being integral with the longitudinal reinforcing members.

A slat prepared according to the prior art will remain in this position, while a slat prepared according to the present invention will return to the position shown in Figure 5—A, upon the removal of the distorting force. Figure 10—A is a plan view of the opposite side of the slat from that shown in Figure 10 with one end in section. Figure 14 is a detail plan view of a portion of a modification in which the slat is like Figure 11 with a crimped reinforcing element at the end.

In all the figures, f represents the coated fab-

ric, 2 indicates openings through which the elevator cords may pass. The adhesive is indicated as 3, and the metal reinforcing member as 4. The transverse reinforcing members are shown as 7 and 9. In the latter, two of the ears 5 are pressed over the rod 4 and one ear 10 is pressed under the rod. Figure 14 is a detailed view of member 9.

According to the present invention, the slats are made by cutting a suitably shaped piece of fabric which may be coated or uncoated in the general shape as shown in Figure 1. In the preferred embodiment, the fabric is coated with pyroxylin. This may be done by coating it with a doctor knife. A suitable fabric has been found to be one having a thread count of 68 x 72 and weighing 3.1 ozs. per square yard. This material is then coated with a composition having the following formula:

	Percent by weight
Cellulose nitrate	15.1
Dibutyl phthalate	12.5
Bone black	0.7
25 Leaded zinc oxide	22.5
Chrome yellow	0.9
Chrome orange	0.9
Ethyl acetate	19.0
Ethyl alcohol	28.4

30 Four coats of this composition are applied which produces a light brown translucent window shade material.

In one embodiment of the invention, this fabric is die-cut to the shape shown in Figure 1 so that when the edges are folded over they will be butted at the corners as shown in Figure 5. The openings 2 are also cut in the fabric to permit the raising and lowering of the blind by means of elevator cords. After the material has been cut, a blanking out member 20, as shown in Figure 2—A is placed on the sheet and adhesive is applied by brushing, spraying, or any other suitable method to the exposed area as shown at 3. The adhesive may be of any type depending on the fabric or paper of which the slat is constructed. With fabrics coated with pyroxylin it has been found that a cellulose nitrate cement having approximately the following formula is particularly satisfactory:

	Percent
Cellulose nitrate	12.35
Ethyl alcohol	43.82
Ethyl acetate	43.83
	100.00

After the adhesive has been applied and before it dries, a metal rectangular frame 4 is placed on the adhesive as shown in Figure 3. The metal frame may be constructed of rigid or hollow steel. It has been found that No. 13 gauge spring steel is particularly satisfactory although variations in this reinforcing member will be obvious to those skilled in the art. The longitudinal edges of the fabric are then folded over as shown in Figure 4, after which the end portions are folded so that the metal frame is completely enveloped as shown in Figure 5. If desired, the adhesive may be allowed to dry and then activated immediately before the metal is put in place. It is also possible to use thermoplastic adhesives in which case they are folded and then activated by applying heat and pressure.

The above described embodiment of the invention is primarily a hand operation and is given

to illustrate the principle of the invention more clearly. It does not lend itself, however, to large scale production and in the commercial manufacture of slats prepared according to the present invention, a slightly modified embodiment of the invention is used. This embodiment is a two-step operation. The first of these steps is the preparation of the pyroxylin coated fabric and the slicing of it into strips approximately 2 x $\frac{1}{8}$ inches wide. The coated fabric is then rolled up into large rolls. Either before or simultaneously with the rolling up of the fabric, an adhesive is applied to the edges which may be thermoplastic in nature or one which dries to a non-tacky condition and which is activated with solvent in the second step of the operation. If a thermoplastic cement is used, heat and pressure are applied instead of the solvent to activate the cement.

The second step of the operation involves passing the strip of fabric and the longitudinal metal reinforcing rods into an automatic machine which holds the rods a fixed distance apart, turns the edges of the fabric over the rod, and either applies solvent or heat to activate the cement depending on whether or not it is thermoplastic. Before the semi-finished slat leaves the machine, it is cut into suitable lengths depending on the width of the window on which the finished blind is to be used. When the slat is made on such an automatic machine, it has been found that an end reinforcing member shown as 8 in Figure 12 simplifies the operation. It has also been found that a clip such as that shown in Figure 14 may easily be attached to the slat. It is to be understood that the machine attaches the end reinforcing member as well as the transverse reinforcing element. The holes for the elevator cords may be stamped out of the fabric before or while it passes through the machine.

The manner in which the adhesive welds or bonds the coated fabric to the metal frame is not to be confused with the use of an adhesive as a substitute for stitching confined to the limited area ordinarily stitched together. In the present invention, the metal is embedded in a mass of adhesive which firmly bonds the metal to the coating on the fabric which in turn extends into its interstices, thereby forming an extremely rigid and integral unit.

The slat made as indicated above may be used in the ladder tape so that the substantially plane surface of the slat is up when it is adjusted to a horizontal position. It is very important that the fabric be securely bonded throughout to the metal frame since this results in great resistance to the torque of a distorting force. In the case of prior art slats, if the metal frame is enclosed in a pocket or hem formed by a row of stitching, they may be distorted very easily since the metal is allowed to twist within the pocket and when the distorting force is removed such slats do not return to their original shape. Slats made according to the present invention do not have this drawback and readily return to a flat condition when the distorting force is removed.

In order to demonstrate the resistance of the slats of the present invention to the torque of a distorting force, they may be compared to those prepared by stitching by laying both on a table top and applying a vertical lifting force at one corner of each slat with the remaining longitudinal edge in contact with the table top. It will be found that the prior art stitched slat will be twisted out of shape until it is forced back again, whereas material made according to the

present invention will return to its original position quickly.

5 It is usually preferred to use a pyroxylin coated fabric in making slats; however, paper such as fifty pound Alpha paper which is used in the production of paper window shades, may be used. This material is also coated with pyroxylin in a manner similar to that indicated above for cloth. It is also possible to use uncoated paper which 10 may be colored in any desired design.

Where the translucent property of the slats is not desired, opaque materials may be used to form the covering material for the metal framework. The location of the transverse portion of the metal framework is immaterial and it may be at the ends as shown in Figure 5, or located as shown in Figures 8 and 8—A near the elevator cord openings. A transverse reinforcing element may also be applied to the outside of the flexible sheet material as shown in Figures 10 and 10—A, and this may be in addition to or in lieu of the transverse member at the end as shown in Figure 3.

In the case of the slats shown in Figures 10 and 10—A, the longitudinal reinforcing members are two rods embedded in the adhesive and fastened by clipping a curved portion of two transverse elements around the longitudinal edge of the slat. These transverse elements 7 may or may not be embedded in adhesive, although it is preferred to have them embedded, especially where they take the form as shown in Figure 8.

The advantages of slats prepared according to the present invention are that they always present a neat appearance and may be readily cleaned. Any surface within reasonable limits may be obtained by varying the composition applied, and surfaces having a dull finish or a high gloss are readily obtainable, depending on the requirements for which the slat is to be used. The main advantage of slats according to the present invention is that they lie in substantially a plane surface on the top side.

It is apparent that many widely different embodiments of this invention may be made without departing from the spirit and scope thereof; and, therefore, it is not intended to be limited except as indicated in the appended claims.

I claim:

1. A Venetian blind slat comprising a flexible fabric having a metal reinforcing member about its periphery embedded in a mass of adhesive.
2. Product of claim 1 in which the adhesive 10 is a cellulose derivative cement.
3. Product of claim 1 in which the fabric is coated with a nitrocellulose composition.
4. A Venetian blind slat comprising a flexible pyroxylin coated fabric having a metal reinforcing member passing around its periphery, the said fabric being securely bonded to the metal by means of a substantial mass of cellulose derivative composition.
5. Process of preparing Venetian blind slats which comprises cutting out a blank from a cellulose derivative coated composition in the form of an octagon in which two of the parallel sides are many times the length of the sides perpendicular thereto, coating the outer edge of the said blank with a cellulose derivative cement, placing a rectangular reinforcing member on the cement, folding over the outer edges whereby the reinforcing member is embedded in a matrix of the cement.
6. The process of preparing Venetian blind 30 slats which comprises preparing a long strip of pyroxylin coated fabric, coating the edges of the said strip with a cement, placing two parallel longitudinal reinforcing members on the strip of fabric in contact with the cement, turning the 35 edges of the strip over the longitudinal member, activating the cement, applying pressure to join the folded portion with the main portion of the fabric, cutting off suitable lengths of the material so prepared, and crimping transverse rein- 40 forcing members over the ends of the slat.

THOMAS A. GRAVES.