EUROPEAN PATENT SPECIFICATION

Date of publication of patent specification: 27.07.94

Int. Cl.9: B29C 69/00, B31D 5/04, E06B 9/262

Application number: 90313245.4

Date of filing: 06.12.90

Method of manufacture of a pleated window shade.

Priority: 08.12.89 US 448040

Date of publication of application: 12.06.91 Bulletin 91/24

Publications of the grant of the patent: 27.07.94 Bulletin 94/30

Designated Contracting States: AT BE CH DE DK ES FR GB GR IT LI LU NL SE

References cited:
- WO-A-88/07345
- US-A- 1 935 519
- US-A- 4 676 855

Proprietor: HUNTER DOUGLAS INTERNATIONAL NV
Kaya Flambouyan 22
Willemstad, Curacao(AN)

Inventor: Colson, Wendell B.
3415 N. 95th Street
Boulder, Colorado 80301(US)

Representative: Allen, William Guy Fairfax et al
J.A. KEMP & CO.
14 South Square
Gray’s Inn
London WC1R 5LX (GB)

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid (Art. 99(1) European patent convention).
Description

This invention relates to a method of manufacture of pleated window shades, in particular a single-panel pleated window shade.

Several processes are known for manufacturing window shades of folded material. Two relevant basic varieties of these shades are a first, pleated type consisting of a single panel of corrugated material and a second more complex cellular type, where stacked folded strips form a series of collapsible cells. This latter type is known to have favorable thermal insulation properties, because of the static air mass which is trapped between the layers of material when the cells are in the expanded position. The single-panel type, on the other hand, is favored for its appearance in some cases, and is less expensive to manufacture.

There is considerable difference in the method of manufacture of the single-panel and cellular shades. The former has heretofore been made by repeatedly folding the material across its width, so that it becomes pleated. Among the difficulties with this approach is the need repeatedly to make narrow parallel folds transversely across a wide sheet of material of continuous length. Unless highly exacting conditions are maintained, the folding process can fall out of alignment. Also, substitution of materials is cumbersome because sheets of material and not strips are involved. Further, single-panel shades are relatively weak, structurally, as compared to cellular shades. Retention of pleat shape is a significant problem with most single-panel shades, and is particularly severe where non-woven or sheer fabrics are used. Another disadvantage is the necessity of using multiple sheets joined at seams where large shades are desired.

There are several methods for producing the cellular shades. For example, in U.S.-A. 4,685,986 two single-panel pleated lengths of material are joined together by adhesively bonding them together at opposing pleats. The adhesive bonding step limits the problem of pleat retention noted above with respect to pleated shades. Other methods depart from this by joining together series of longitudinally folded strips, rather than continuous sheets of pleated material, see for example US-A-4,450,027 and 4,676,855. In the former strips longitudinally folded into a U-shape are adhered on top of one another, whereas in the latter these strips are Z-shaped and are adhered in an interlocking position.

The strip joining method shown in the US-A-4,450,027 has a number of desirable attributes, while providing a highly desirable thermally insulative shade. First, the alignment problems inherent in folding large sheets of material transversely to make pleated shades are largely avoided. Second, substitution of materials is easier because strips and not sheets of material are involved. Third, structural strength is increased, which gives greater pleat retention and allows for more lightweight materials to be used. Fourth, larger shades can be made without the need for seams. Finally, the speed of production of such cellular shades is at least as fast as that of single-panel pleated shades made by usual methods.

According to the present invention there is provided a method of fabricating an expandable shade of a plurality of folded strips, one on top of the other, comprising the steps of:

stacking in layers a plurality of folded strips of material having a central portion and two lateral edge portions folded over the central portion to form an assembly of cells one on another;

applying an adhesive material to each layer to bond the central portion of each layer to the folded lateral edge portions of an adjacent layer, forming a unitary stack; and

cutting the stacked folded material longitudinally along the center of the cells to create two single-panel expandable structures.

Such a method of manufacture provides "pleated look" shades of greater strength, and in particular, greater resistance to flattening of the pleats, than hereto achieved by simply pleating a sheet of material. The method is useful with a wide range of materials including non-woven and sheer materials, is suitable for forming large shades without seams and is capable of giving rapid production speed and versatile material substitution.

In order that the invention may more readily be understood, the following description is given, merely by way of example, reference being made to the accompanying drawings, in which:

Figure 1 is a perspective view of one embodiment of initial creasing apparatus of the present invention;

Figure 2 is an enlarged cross-sectional view of a folding roller of this apparatus as it shapes the shade material;

Figure 3 is a cross-sectional view of a folding track as it further shapes the shade material;

Figure 4 is a perspective view of one embodiment of the adhesive applicator;

Figure 5 is a perspective view of a modified adhesive applicator;

Figure 6 is a perspective view of a layered cellular shade being separated into two pleated shade portions according to the present invention;

Figure 7 is a perspective view of the single-panel shade material according to the present invention in its collapsed state;

Figure 8 is a perspective view of a single-panel shade material according to the present invention.
tion in its expanded state; and

Figures 9, 10, 11 and 12 are each a perspective view of four different embodiments of single panel shade product according to the invention.

As indicated above, single-panel "pleated-look" shades may be produced according to the invention by essentially the same methods disclosed in US-A-4,450,027, with the additional step of cutting the cellular shade obtained thereby into two essentially identical panels.

Figures 1 to 4 illustrate steps used in the basic method for manufacturing cellular shades. A continuous strip of shade material 10 is drawn through a series of steps which result in its edge portions 12 being folded over the central portion 13, so that they approach each other closely near the middle of the strip. As Figure 1 shows, a pair of spaced-apart creaser wheels 14 are pressed against the shade material 10 as it is drawn around a roller 16. The creaser wheels are mounted on an axle 17 which is itself mounted on a pivotal arm assembly 18, and are kept pressed against the shade material by a spring 19.

After creasing, the material 10 is drawn through rollers 20, 21 which are used to bond the edges 12 of the shade material inwardly, as shown in Figure 2. The edges 12 are then folded in, over the central portion 13 of the shade material 10, by being drawn through a folding die 22, as shown in Figure 3.

Once folded, adhesive material 30 is applied to the shade material, as shown in Figures 4 and 5, to bond layers of the shade material together. Generally, as the shade material 10 is drawn around a roller 32, adhesive material 30 is dispensed from an applicator 34 onto the shade material 10. Motor-driven belts 36 may be used to drive the roller 32 to assist in drawing the shade material 10. Preferably, the adhesive 30 is dispensed at a rate proportional to the speed at which the shade material 10 is drawn past, so that a like amount of adhesive 30 is applied regardless of the manufacturing rate.

Figures 4 and 5 show two preferred modes of adhesive application which result in two different embodiments of the invention shown in Figures 9 and 10, respectively. In the Figure 4 embodiment, two beads 30a of adhesive 30 are continuously dispensed one each onto edges 12 of the shade material 10. The strips of material 10 are then stacked as shown in US-A-4,450,027, so that the strips 10 are bonded to one another. According to the invention, these bonded strips are subsequently cut to create two single-panel shades 40 of the type shown in Figure 9.

In Figure 5, instead of the two beads of adhesive, two pairs of parallel beads 30b are applied. When the stacked strips are subsequently cut, two single-panel shades of the type shown in Figure 10 are created.

As noted above, after the application of adhesive material, the shade material 10 is stacked so that the folded edge portions 12 of one strip are adhesively bonded to the central portion 13 of the next strip. In US-A-4,450,027 the strip material is stacked by being wound upon a rotating elongated mandrel, the stacked strips thus curving around the ends of the mandrel. When the assembly is complete, the curved ends of the assembly are cut off, leaving two shade panels on either side of the mandrel.

The present invention adds the additional step of cutting the stacked material longitudinally down its central portion 13, between the folded side portions 12, preferably by a rotating circular knife 44, yielding two pleated panels 40, as shown in Figure 6. However, any basic cutting tool could be used, even a simple hand-held knife. These pleated panels are then used in the usual way to make finished shade products, e.g. by joining a top rail 50 and a bottom rail 52, as shown in Figures 7 and 8, in order to give the panel 40 structural rigidity. Conventional cords 60, pulleys 62, and related hardware, as shown schematically in Figures 9 and 10, may be added to provide a means for expanding and contracting the panel 40.

As noted above, in the Figure 9 embodiment, one bead of adhesive 30a is used to bond each strip to the next. Typically, holes 64 are drilled so that the lift cords 60 are visible from the side of the shade meant to face into a room, as shown. In the Figure 10 embodiment, holes 64 are drilled so that the lift cords 60 are typically disposed between the beads of adhesive 30b provided. In this embodiment, the lift cords 60 are not visible from the side of the shade meant to face into a room.

Two other embodiments representing variations on the manner of adhesive bonding are shown in Figures 11 and 12. Both of these use two beads of adhesive dispensed onto the strip material, as in the Figure 9 embodiment. In the Figure 11 embodiment, however, the holes 64 for the cords 60 are drilled behind the adhesive bonds 30c so that the lift cords 60 for expanding and contracting the shade 40 are not visible from the side of the shade meant to face into a room. According to the embodiment of Figure 12, the adhesive bonds 30d are relatively wide and the holes 64 for the cords 60 are drilled through the bonds. This also yields a product where the cords are not visible from the side of the shade meant to face into a room.

It should also be noted that the adhesive material used, while usually liquid adhesive, may be of other varieties such as double-sided contact tape.

Finally, while the preferred mode of the invention is to employ the processes disclosed in US-A-4,450,027, adding the cutting step according to the
invention, and including the steps of drilling the assembly for cords and the like at specific locations with respect to the glue bond locations as needed, the invention may be used generally to divide cellular shades produced by other methods to yield two single-panel pleated shades. These other methods include all those employing different ways of creating cellular arrays of folded strips of material which are stacked and bonded to form the shade.

Claims

1. A method of fabricating an expandable shade (40) of a plurality of folded strips, one on top of the other, comprising the steps of:
   stacking in layers a plurality of folded strips of material (10) having a central portion (13) and two lateral edge portions (12) folded over the central portion to form an assembly of cells one on another; and
   applying an adhesive material (30) to each layer to bond the central portion (13) of each layer to the folded lateral edge portions (12) of an adjacent layer, forming a unitary stack; characterised by the further step of
   cutting the stacked folded material longitudinally along the centre (at 44) of the cells to create two single-panel expandable structures (40).

2. A method according to claim 1, characterised in that the adhesive material (30) bonds the folded strip in one longitudinal line (30a, 30c, 30d) between each folded lateral edge portion (12) and the central portion (13) of the adjacent layer.

3. A method according to claim 2, characterised in that the adhesive material is applied in one longitudinal line along each lateral edge portion of the folded material.

4. A method according to claim 1, 2 or 3, characterised by the steps of:
   forming holes (64) through the stacked folded material:
   attaching a head rail (50) to a top folded strip and a bottom rail (52) to a bottom folded strip; and
   connecting at least one cord (60) to the bottom rail (52), extending through the holes (64) in the stacked folded material and into the head rail (50).

5. A method according to claim 4, characterised in that the holes (64) are formed through the stacked folded material between the adhesive (30c) and the location where the material is cut.

6. A method according to claim 4, characterised in that the holes (64) are formed through the stacked folded material, said holes extending essentially through the adhesive material (30d) joining the layers.

7. A method according to claim 4, characterised in that the holes (64) are formed through the stacked folded material between the adhesive (30c) and the location where the material is folded.

8. A method according to claim 1, characterised in that the adhesive material (30b) bonds the folded strip in two parallel longitudinal lines between each folded lateral edge portion (12) and the central portion (13) of the adjacent layer.

9. A method according to claim 8, characterised by the further steps of:
   forming holes (64) through the stacked folded material between the parallel longitudinal lines of adhesive material;
   attaching a head rail (50) to a top folded strip and a bottom rail (52) to a bottom folded strip; and
   connecting at least one cord to the bottom rail, extending through the holes in the stacked folded material and into the head rail.

10. A method according to any preceding claim, characterised in that the step of stacking the continuous strip of folded material in a plurality of adjacent layers is effected by wrapping the continuous strip over a rotating mandrel so that the continuous strip forms two or more straight sections connected by curved portions and by cutting away from the straight sections of the stacked folded material the curved portions of the stacked material.

Patentansprüche

1. Verfahren zur Herstellung einer auseinanderziehbaren Jalousie (40) aus mehreren gefalteten, übereinander angeordneten Streifen, wobei mehrere gefaltete Materialstreifen (10), die jeweils ein Mittelteil (13) sowie zwei über dieses Mittelteil gefaltete seitliche Randteile (12) aufweisen, lagenweise so aufeinandergelegt werden, daß eine Anordnung übereinanderliegender Zellen entsteht, und auf jede dieser Lagen ein Klebstoff (30) aufgetragen wird, um das Mittelteil (13) jeder Lage mit den gefal-
ten seitlichen Randteilen (12) der angrenzen-
den Lage zu verkleben, wodurch sich ein zu-
sammenhängender Stapel ergibt, **dadurch gekennzeichnet**, daß das aufeinandergelegte 
und gefaltete Material in einem weiteren Schritt 
Längsrichtung entlang der Mittellinie (44) 
der Zeilen so durchschnittet wird, daß zwei 
einteilige auseinanderziehbare Flächengebiele 
entstehen.

2. Verfahren gemäß Anspruch 1, **dadurch ge-
kennzeichnet**, daß der Klebstoff (30) den ge-
faßten Streifen in einer in Längsrichtung verla-
ufen Linie (30a, 30c, 30d) zwischen je-
dem seitlichen Randteil (12) und dem Mittelteil 
(13) der nächstfolgenden Lage verbindet.

3. Verfahren gemäß Anspruch 2, **dadurch ge-
kennzeichnet**, daß der Klebstoff in einer in 
Längsrichtung verlaufenden Linie entlang je-
dem seitlichen Randteile des gefalteten 
Materials aufgetragen wird.

4. Verfahren gemäß einem der Ansprüche 1, 2 
or 3, **dadurch gekennzeichnet**, daß in das au-
feinandergelegte gefaltete Material Löcher 
(64) eingebracht werden, und daß eine Ober-
schiene (50) an einem oberen gefalteten Strei-
fen und eine Unterschiene (52) an einem unter-
en gefalteten Streifen angebracht werden, 
und daß mindestens eine Schnur (60) mit der 
Unterschiene (52) verbunden und durch die Lö-
cher (64) in dem aufeinandergelegten gefal-
teten Material bis in die Oberschiene (50) ge-
führt wird.

5. Verfahren gemäß Anspruch 4, **dadurch ge-
kennzeichnet**, daß die Löcher (64) in das au-
feinandergelegte gefaltete Material zwischen 
dem Klebstoff (30c) und der Stelle, an der das 
Material geschnitten wird, eingebracht werden.

6. Verfahren gemäß Anspruch 4, **dadurch ge-
kennzeichnet**, daß die Löcher (64) in das au-
feinandergelegte gefaltete Material so einge-
bracht werden, daß sie im wesentlichen durch 
den die einzelnen Lagen verbindenden Klebstoff 
(30d) verlaufen.

7. Verfahren gemäß Anspruch 4, **dadurch ge-
kennzeichnet**, daß die Löcher (64) in das au-
feinandergelegte gefaltete Material zwischen 
dem Klebstoff (30c) und der Faltstelle des Ma-
terials eingebracht werden.

8. Verfahren gemäß Anspruch 1, **dadurch ge-
kennzeichnet**, daß der Klebstoff (30b) den 
gefalteten Streifen in zwei parallelen, in Längs-
richtung verlaufenden Linien zwischen jedem 
umgelegten seitlichen Randteil (12) und dem 
Mittelteil (13) der nächstfolgenden Lage verbin-
det.

9. Verfahren gemäß Anspruch 8, **dadurch ge-
kennzeichnet**, daß zusätzlich in das aufeinan-
dergelegte gefaltete Material zwischen den pa-
rallelen in Längsrichtung verlaufenden Klebstoffli-
nien Löcher (64) eingebracht werden, und daß 
eine Oberschiene (50) an einem oberen gefal-
teten Streifen und eine Unterschiene (52) an 
einem unteren gefalteten Streifen angebracht 
werden, und daß mindestens eine Schnur mit 
der Unterschiene verbunden und durch die Lö-
cher in dem aufeinandergelegten gefalteten 
Material bis in die Oberschiene geführt wird.

10. Verfahren gemäß einem der vorstehenden An-
sprüche, **dadurch gekennzeichnet**, daß das 
Aufeinanderlegen des fortlaufenden Streifens 
gefalteten Materials in mehreren Lagen da-
urch erfolgt, daß der fortlaufende Streifen so 
um einen rotierenden Dorn gewickelt wird, daß 
er zweimal gerade, durch gekrümme Teilstücke 
verbundene Strecken bildet, und diese ge-
kürmten Teilstücke des aufeinandergelegten 
Materials dann von den geraden Strecken des 
aufeinandergelegten gefalteten Materials abge-
schnitten werden.

**Revendications**

1. Procédé de fabrication d'un store dépliable 
(40) à partir d'une pluralité de bandes pliées, 
en empilement, comprenant les étapes consis-
tant à :

empiler en couches une pluralité de ban-
des pliées de matériau (10) présentant une 
parti centrale (13) et deux parties de bord 
latérales (12) repliées au-dessus de la partie 
centrale pour former un ensemble de cellules 
disposées en empilement, et 
appliquer un matériau adhésif (30) sur cha-
cune des couches en vue de coller la parti 
centrale (13) de couche sur les parties de bord 
latérales pliées (12) d'une couche adjacente en 
formant ainsi un empilage solidaire, caractérisé 
par l'étape supplémentaire consistant à 
couper le matériau plié empilé selon le 
sens longitudinal, en longeant le centre (en 44) 
des cellules afin de créer deux structures dé-
pliables à panneau unique (40).

2. Procédé selon la revendication 1, caractérisé 
en ce que le matériau adhésif (30) a pour effet 
de coller la bande pliée selon une ligne longi-
tudinale (30a, 30c, 30d) entre chacune des
parties de bord latérales pliées (12) et la partie centrale (13) de la couche adjacente.

3. Procédé selon la revendication 2, caractérisé en ce que le matériau adhésif est appliqué selon une ligne longitudinale le long de chaque partie de bord latérale du matériau plié.

4. Procédé selon la revendication 1, 2 ou 3, caractérisé par les étapes consistant à :
   formant des trous (64) au travers du matériau plié empli,
   fixer un rail supérieur (50) à une bande pliée située au sommet et un rail inférieur (52)
   à une bande pliée située tout en bas, et
   fixer au moins un cordon (80) au rail inférieur (52), s'étendant au travers des trous (64)
   dans le matériau plié empli et dans le rail de sommet (50).

5. Procédé selon la revendication 4, caractérisé en ce que les trous (64) sont formés à travers la couche adjacente, l'emplacement où le matériau est coupé.

6. Procédé selon la revendication 4, caractérisé en ce que les trous (64) sont formés au travers du matériau plié empli, lesdits trous s'étendant principalement au travers du matériau plié empli (30d) réunissant les couches.

7. Procédé selon la revendication 4, caractérisé en ce que les trous (64) sont formés au travers du matériau plié empli entre l'adhésif (30c) et l'emplacement où le matériau est coupé.

8. Procédé selon la revendication 1, caractérisé en ce que le matériau adhésif (30b) a pour effet de coller la bande pliée selon deux lignes parallèles longitudinales entre chacune des parties de bord latérales pliées (12) et la partie centrale (13) de la couche adjacente.

9. Procédé selon la revendication 8, caractérisé par les étapes supplémentaires consistant à :
   formant des trous (64) au travers du matériau plié empli entre les lignes parallèles longituni-
   nales du matériau adhésif,
   fixer un rail supérieur (50) à une bande pliée située au sommet et un rail inférieur (52)
   à une bande pliée située tout en bas, et
   fixer au moins un cordon au rail inférieur,
   cordon s'étendant au travers des trous dans le matériau plié empli et dans le rail supérieur.

10. Procédé selon l'une quelconque des revendications précédentes, caractérisé en ce que l'étape consistant à empiler la bande de maté-
Fig. 2.

Fig. 3.