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Description

The present invention relates to an apparatus and method of mechanically assembling the slats of a venetian blind.

Venetian blinds consist of at least two ladders, either ladder cords or ladder tapes, each having laterally spaced side members and cross rungs defining openings to receive slats. The assembling can be done manually or by machine and in the latter case, the ladders are intermittently fed lengthwise of the side members and are guided so that two adjacent rungs of each ladder and the portions of the longitudinal side members at the location of the adjacent rungs are held apart, thereby to define a predetermined shape to the associated opening. Slat material is fed along a defined path through the opening.

Conventionally the thus assembled slats are individually lifted and stacked and retained by pawls in holder guides and, either during this lifting or after, lift cords are passed down through preformed openings in the slats and attached to a bottom rail. In one embodiment of apparatus for assembling venetian blinds, a guide, in the form of a flap, is provided for each ladder and this flap rocks about a lower generally horizontal pivot from a position on one side of a plane passing vertically through the lift cord apertures in the slats and the other side of this plane, this being caused by the slat material giving to the flap an adequate angular momentum, as the ladders are tautened during raising of a slat, to pass through the vertical position. In this way the ladder cord rungs are alternately positioned first on one side and then on the other side of the lift cord.

US-A-4073044 discloses an apparatus for mechanically assembling the slat of venetian blind with at least two ladders said apparatus comprising means for guiding and feeding a length of slat forming material along a defined slat feed path; means for positioning said at least two ladders at different locations longitudinally of said feed path, said ladders each comprising side members and cross rungs, suitably held and spaced to define aligned openings for receiving the slats; means for lifting the individually assembled slats in a direction transverse to said slat feed path to an upper position over a distance effective to position a next cross rung of each ladder directly below said slat feed path; movable ladder guides for accurately positioning each ladder, said ladder guides being movable between a first position and a second position to cause a cross rung to be spaced on one side or the other of the central plane associated with a movable ladder guide.

While this may be satisfactory when one is dealing with relatively heavy duty blinds, for exam-

ple ones having slats with a width of 25mm or so, it is not entirely satisfactory with smaller blinds having a width of, say, 16mm and can give rise to too much friction during the raising and lowering of the blind by lifting and lowering the lift cords.

The present invention is characterised by control means to control the movement of said movable ladder guide at any desired time between said first position and said second position and vice versa.

The invention also provides a method of mechanically assembling the slats of a venetian blind having a stack of individual slats with vertically aligned openings for the passage of a lifting member with at least two ladders, each comprising two longitudinal side members connected by cross rungs for supporting said slats in the vicinity of said vertically aligned openings, said method comprising the steps of guiding and feeding a length of slat forming strip material along a defined slat feed path; positioning and holding each of said at least two ladders at a different location, longitudinally of said slat feed path, each with its two longitudinal sides of said slat feed path, so as to define at least two aligned slat receiving openings, between a cross rung directly below and a cross rung directly above said feed path; lifting the individually assembled slat in a direction transverse to said slat feed path to an upper stacking position over a distance effective to position a next successive cross rung of each ladder directly below said slat feed path and retaining the assembled slat in an upper stacking position; providing two alternative positions for each cross rung directly below said slat feed path to be on one or other side of the aligned lift cord openings of the assembled slats, longitudinally of said slat feed path; intermittently altering the position of said cross rungs directly below said slat feed path at any desired time after the first three steps have been repeated a number of times.

With the method and apparatus of the present invention it is possible readily to control the number of cross rungs which are on one side or the other of the lift cord and preferably the arrangement is such that while, in certain instances, one may have only one cross rung on one side and then one cross rung on the other, as is conventional, one can have the facility for having as many as twenty cross rungs on one side and then an equal or different number on the other side.

This greatly reduces the friction problem mentioned above.

In the particularly convenient construction, the movable ladder guides are each in the form of a flap pivotal about an axis associated with its lower edge and the control means comprising an electro-mechanical control such as an electromagnet or a fluid pressure operated ram, e.g. a pneumatic ram.

Preferably the control means provide a facility for changing the time at which the movable ladder guides are moved between the first position and the second position and vice versa.

In a preferred way of carried out the method of the invention, the first and the second of said at least two ladders are held on opposite sides of the aligned lift cord openings associated with a given slat, so that the first and second of said at least two ladders are in mirror-image relation to one another.

In order that the present 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 side elevation of one embodiment of assembly apparatus according to the invention;

Figure 2 is an enlarged front view of one of the slat assembling stations; and

Figure 3 is a side elevation of the station of Figure 1.

Referring to the drawings there is illustrated therein a machine frame 10 carrying a reel 12 of slat material 14 which is fed via an accumulator 16 by feed rolls 18 to a cutting and punching station 20. Feed-on rolls 22 feed the cut material to first and second slat assembly stations 24. These are of a conventional design and details of them need not be described. The construction so far described, indeed, is more fully described in United States Patent 4073044.

Referring now to Figure 2 one of the stations 24 is indicated in greater detail. Slat material 14 is illustrated being fed past two vertically extending stacking guides 26 each provided with retaining pawls at 28. The slat material 14 is fed through openings 30 (Figure 3) in the ladders which include side members 32 and cross rungs 34. In order to spread the ladders to define a suitable opening for the slat material to be fed therethrough a ladder guide 36 is provided with conventional divergent guide plates 38 mounted on a pivotal flap which is pivotal about a lower edge axis 40.

Mounted below the flap is a solenoid 42 the armature 44 of which is connected to a side lever 46 on the flap. Operation of the solenoid 42 will raise the armature 44 and move the flap, which is shown inclined about 30° to the vertical and to the left in Figure 2, to a similar position but to the right.

A lift finger 48 is used to raise the slat material which has been laced through the ladder and raise it along the guides 26 to be retained in an upper position by the pawls 28.

Each of the slats is provided with an aperture which is aligned with a vertical lift cord needle 50 which is movable along a vertical plane 52 passing through the apertures (not shown) in the slats 14.

In a conventional apparatus, which does not

employ the solenoid or similar device 42, the cross rungs are alternately positioned one on one side of the vertical plane 52 including the apertures in the slats 14, and then the next on the other side of this plane. With a construction of the present invention, on the other hand, it is possible to leave a number of cross rungs on one side of this plane 52 and a number on the other. In Figure 2 there are illustrated three cross rungs 34 to the left and three cross rungs 34 to the right of this plane.

It is contemplated that one can have anything between one and twenty cross rungs to one side of the plane and then to the other side.

An electric control circuit (not shown) can be connected to the solenoid 42 to provide any pattern desired of this cross rung arrangement.

Instead of having the solenoid 42 one may have pneumatic or other forms of mechanical arrangement to move the flap from one side to the other in a controlled manner.

Claims

1. Apparatus for mechanically assembling the slats of a venetian blind with at least two ladders said apparatus comprising:-

a) means (18,22) for guiding and feeding a length of slat forming material (14) along a defined slat feed path;

b) means for positioning said at least two ladders at different locations longitudinally of said feed path, said ladders each comprising side members (32) and cross rungs (34) suitably held and spaced to define aligned openings (30) for receiving the slats; c) means for lifting the individually assembled slats in a direction transverse to said slat feed path to an upper position (28) of a distance effective to position a next cross rung of each ladder directly below said slat feed path; and

d) movable ladder guides (36,38) for accurately positioning each ladder, said ladder guides being movable between a first position and a second position to cause a cross rung to be spaced on one side or the other of the central plane associated with a movable ladder guide

characterised in that control means (42,44,46) are provided to control the movement of said movable ladder guide at any desired time between said first position and said second position and vice versa.

2. Apparatus according to claim 1, characterised in that said at least two movable ladder guides (36,38) are each in the form of a flap pivotal about an axis associated with its lower edge.

3. Apparatus according to claims 1 or 2, characterised in that said control means comprises an electro-mechanical control means.
4. Apparatus according to claim 3, characterised in that said control means includes an electro-magnet (42). 5
5. Apparatus according to any one of claims 1, 2 and 3, characterised in that said control means includes a fluid pressure operated ram. 10
6. Apparatus according to any preceding claim, characterised in that said control means provides a facility for changing the time at which the movable ladder guides are moved between the first position and the second position and vice versa. 15
7. A method of mechanically assembling the slats of a venetian blind having a stack of individual slats with vertically aligned openings for the passage of a lifting member with at least two ladders, each comprising two longitudinal side members connected by cross rungs for supporting said slats in the vicinity of said vertically aligned openings, said method comprising the steps of 20
 - a) guiding and feeding a length of slat forming strip material along a defined slat feed path; 25
 - b) positioning and holding each of said at least two ladders at a different location, longitudinally of said slat feed path, each with its two longitudinal side members laterally spaced and positioned at opposite sides of said slat feed path, so as to define at least two aligned slat receiving openings, between a cross rung directly below and a cross rung directly above said feed path; 30
 - c) lifting the individually assembled slat in a direction transverse to said slat feed path to an upper stacking position over a distance effective to position a next successive cross rung of each ladder directly below said slat feed path and retaining the assembled slat in an upper stacking position; 35
 - d) providing two alternative positions for each cross rung directly below said slat feed path to be on one or the other side of the aligned lift cord openings of the assembled slats, longitudinally of said slat feed path; and 40
 characterised by intermittently altering the position of said cross rungs directly below said slat feed path at any desired time after steps a) through c) have been repeated a number of times. 45 50 55

8. A method according to claim 7, characterised in that it is possible to change the time at which the position of said cross rungs directly below said slat feed path are intermittently altered between the two alternative positions.
9. A method according to claims 8 or 9, characterised in that a first and a second of said at least two ladders are held on opposite sides of the aligned lift cord openings associated with a given slat, so that said first and second of said at least two ladders are in mirror image relation to one another.
10. A method according to claims 8, 9 or 10, characterised in that the rate of change over is adjustable between being changed once every slat and once every 20 slats.

Revendications

1. Dispositif pour assembler mécaniquement les lames d'un store vénitien avec au moins deux échelles, le dispositif comprenant :
 - a) un moyen (18, 22) pour guider et délivrer une longueur de matériau formant les lames (14) suivant un trajet d'avancée de lames défini ;
 - b) un moyen pour positionner les au moins deux échelles à des emplacements différents, longitudinalement au trajet d'avancée, les échelles comprenant chacune des éléments latéraux (32) et des barreaux transversaux (34) maintenus et espacés de manière appropriée pour définir des ouvertures alignées (30) pour recevoir les lames ;
 - c) un moyen pour soulever les lames individuellement assemblées dans une direction transversale au trajet d'avancée des lames à une position supérieure (28) d'une distance effective pour positionner un barreau transversal suivant de chaque échelle directement au-dessous dudit trajet d'avancée de lames, et
 - d) des guides d'échelle mobiles (36, 38) pour positionner précisément chaque échelle, les guides d'échelle étant déplaçables entre une première position et une seconde position pour amener un barreau transversal à être espacé sur un côté ou l'autre du plan central associé à un guide d'échelle mobile caractérisé en ce que des moyens de commande (42, 44, 46) sont prévus pour commander le déplacement du guide d'échelle mobile à tout moment souhaité entre la première position et la seconde position et vice versa.

2. Dispositif selon la revendication 1, caractérisé en ce qu'au moins deux guides d'échelle mobiles (36, 38) sont chacun sous la forme d'un volet pivotant autour d'un axe associé à son bord inférieur. 5
3. Dispositif selon la revendication 1 ou 2, caractérisé en ce que le moyen de commande comprend un moyen de commande électromécanique. 10
4. Dispositif selon la revendication 3, caractérisé en ce que le moyen de commande comporte un électro-aimant (42). 15
5. Dispositif selon l'une quelconque des revendications 1, 2 et 3, caractérisé en ce que le moyen de commande comporte un piston commandé par pression d'un fluide. 20
6. dispositif selon l'une quelconque des revendications précédentes, caractérisé en ce que le moyen de commande procure la possibilité de changer le moment auquel les guides d'échelle mobiles sont déplacés entre la première position et la seconde position et vice versa. 25
7. Procédé pour assembler mécaniquement les lame d'un store vénitien ayant un empilage de lames individuelles avec des ouvertures verticalement alignées pour le passage d'un élément de montée avec au moins deux échelles, chacune comprenant deux éléments latéraux longitudinaux reliés par des barreaux transversaux pour supporter les lames au voisinage des ouvertures verticalement alignées, le procédé comprenant les étapes consistant à : 30
 - a) guider et délivrer une longueur de matériau de bande formant les lames suivant un trajet d'avancée de lames défini ;
 - b) positionner et maintenir au moins chacune des deux échelles à un emplacement différent, longitudinalement audit trajet d'avancée de lames, chacune avec ses deux éléments latéraux longitudinaux latéralement espacés et positionnés aux côtés opposés du trajet d'avancée de lames, de façon à définir au moins deux ouvertures de réception de lames alignées, entre un barreau transversal directement au-dessous et un barreau transversal directement au-dessus dudit trajet d'avancée ; 35
 - c) soulever la lame individuellement assemblée dans une direction transversale audit trajet d'avancée de lames à une position d'empilage supérieure sur une distance effective pour positionner un barreau transversal suivant de chaque échelle directement 40

au-dessous du trajet d'avancée de lames et maintenir la lame assemblée dans une position d'empilage supérieure ;

d) prévoir deux positions alternées pour chaque barreau transversal directement en-dessous du trajet d'avancée de lames pour être sur un ou sur l'autre côté des ouvertures des cordons de montée alignés des lames assemblées, longitudinalement au trajet d'avancée des lames, et

caractérisé en ce qu'on modifie de manière intermittente la position des barreaux transversaux directement au-dessous du trajet d'avancée des lames à tout moment souhaité après que les étapes a) à c) aient été répétées un certain nombre de fois.

8. Procédé selon la revendication 7, caractérisé en ce qu'il est possible de changer le moment auquel la position des barreaux transversaux directement au-dessous du trajet d'avancée de lames sont modifiés de manière intermittente entre les deux positions alternées.

9. Procédé selon la revendication 8 ou 9, caractérisé en ce qu'une première et une seconde d'au moins les deux échelles sont maintenues sur les côtés opposés des ouvertures de cordon de montée alignées associées à une lame donnée, de sorte que la première et la seconde d'au moins les deux échelles sont en relation symétrique l'une par rapport à l'autre.

10. Procédé selon la revendication 8, 9 ou 10, caractérisé en ce que le taux de commutation est réglable pour être changé entre une fois pour chaque lame et une fois toutes les vingt lames.

Patentansprüche

1. Vorrichtung zum mechanischen Zusammenbauen der Lamellen in einer Jalousie mit mindestens zwei Leitern mit

a) Einrichtungen (18, 22) zum Führen und Vorbewegen einer Länge aus Lamellenformmaterial (14) entlang einer definierten Lamellenvorschubbahn;

b) Einrichtungen zum Positionieren der mindestens zwei Leitern an unterschiedlichen Stellen in Längsrichtung der Vorschubbahn, wobei die Leitern jeweils Seitenelemente (32) und Quersprossen (32) umfassen, die in geeigneter Weise gehalten werden und beabstandet sind, so daß ausgerichtete Öffnungen (30) zur Aufnahme der Lamellen gebildet werden;

c) Einrichtungen zum Anheben der einzelnen

- montierten Lamellen in einer Richtung quer zur Lamellenvorschubbahn bis in eine obere Position (28) über eine wirksame Strecke, um eine nächste Quersprosse einer jeden Leiter direkt unter der Lamellenvorschubbahn anzuordnen; und 5
- d) beweglichen Leiterführungen (36, 38) zum genauen Positionieren einer jeden Leiter, die zwischen einer ersten Position und einer zweiten Position bewegbar sind, damit eine Quersprosse mit Abstand auf einer Seite oder der anderen Seite einer beweglichen Leiterführung zugeordneten Mittelebene angeordnet wird, 10
- dadurch gekennzeichnet, daß 15
- Steuereinrichtungen (42, 44, 46) vorgesehen sind, um die Bewegung der beweglichen Leiterführung zu jeder beliebigen Zeit zwischen der ersten Position und der zweiten Position und umgekehrt zu steuern. 20
2. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß die mindestens zwei beweglichen Leiterführungen (36, 38) jeweils die Form einer Klappe besitzen, die um eine ihrem unteren Rand zugeordnete Achse schwenkbar ist. 25
3. Vorrichtung nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß die Steuereinrichtungen eine elektromechanische Steuereinrichtung umfassen. 30
4. Vorrichtung nach Anspruch 3, dadurch gekennzeichnet, daß die Steuereinrichtung einen Elektromagneten (42) aufweist. 35
5. Vorrichtung nach einem der Ansprüche 1, 2 und 3, dadurch gekennzeichnet, daß die Steuereinrichtungen einen strömungsmitteldruckbetätigten Kolben umfassen. 40
6. Vorrichtung nach einem der vorangehenden Ansprüche, dadurch gekennzeichnet, daß die Steuereinrichtungen eine Möglichkeit zum Ändern der Zeit, zu der die beweglichen Leiterführungen zwischen der ersten Position und der zweiten Position und umgekehrt bewegt werden, vorsehen. 45
7. Verfahren zum mechanischen Zusammenbauen der Lamellen einer Jalousie, die einen Stapel von einzelnen Lamellen mit vertikal ausgerichteten Öffnungen für den Durchgang eines Hubelementes besitzt, mit mindestens zwei Leitern, die jeweils zwei Längsseitelemente aufweisen, welche über Quersprossen zur Lagerung der Lamellen in der Nachbarschaft der vertikal ausgerichteten Öffnungen verbunden 50

sind, mit den folgenden Schritten:

- a) Führen und Vorbewegen einer Länge aus Lamellenformstreifenmaterial entlang einer definierten Lamellenvorschubbahn; 5
- b) Positionieren und Halten von jeder der mindestens zwei Leitern an einer unterschiedlichen Stelle in Längsrichtung der Lamellenvorschubbahn, wobei bei jeder die beiden Längsseitelemente mit seitlichem Abstand an gegenüberliegenden Seiten der Lamellenvorschubbahn angeordnet sind, um mindestens zwei ausgerichtete Lamellenaufnahmeöffnungen zwischen einer Quersprosse unmittelbar unterhalb der Vorschubbahn und einer Quersprosse direkt über derselben auszubilden; 10
- c) Anheben der einzeln montierten Lamelle in einer Richtung quer zu der Lamellenvorschubbahn bis in eine obere Stapelposition über eine wirksame Strecke, um eine nächstfolgende Quersprosse einer jeden Leiter direkt unter der Lamellenvorschubbahn anzuordnen und die montierte Lamelle in einer oberen Stapelposition zu halten; 15
- d) Vorsehen von zwei Alternativpositionen für jede Quersprosse direkt unter der Lamellenvorschubbahn auf der einen oder der anderen Seite der ausgerichteten Hub-schnuröffnungen der montierten Lamellen in Längsrichtung der Lamellenvorschubbahn; 20
- dadurch gekennzeichnet, daß die Position der Quersprossen direkt unter der Lamellenvorschubbahn zu jeder beliebigen Zeit, nachdem die Schritte a) bis c) eine Anzahl von Malen wiederholt worden sind, intermittierend geändert wird. 25
8. Verfahren nach Anspruch 7, dadurch gekennzeichnet, daß es möglich ist, die Zeit, zu der die Position der Quersprossen direkt unter der Lamellenvorschubbahn intermittierend zwischen den beiden Alternativpositionen geändert wird, zu verändern. 30
9. Verfahren nach Anspruch 8 oder 9, dadurch gekennzeichnet, daß eine erste und eine zweite der mindestens zwei Leitern auf gegenüberliegenden Seiten der ausgerichteten Hub-schnuröffnungen, die einer bestimmten Lamelle zugeordnet sind, gehalten werden, so daß die erste und zweite der mindestens zwei Leitern spiegelbildlich zueinander angeordnet sind. 35
10. Verfahren nach Anspruch 8, 9 oder 10, dadurch gekennzeichnet, daß die Zahl der Änderungen zwischen einer Änderung pro Lamelle und einer Änderung pro 20 Lamellen einstell- 40

bar ist.

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Fig. 1.

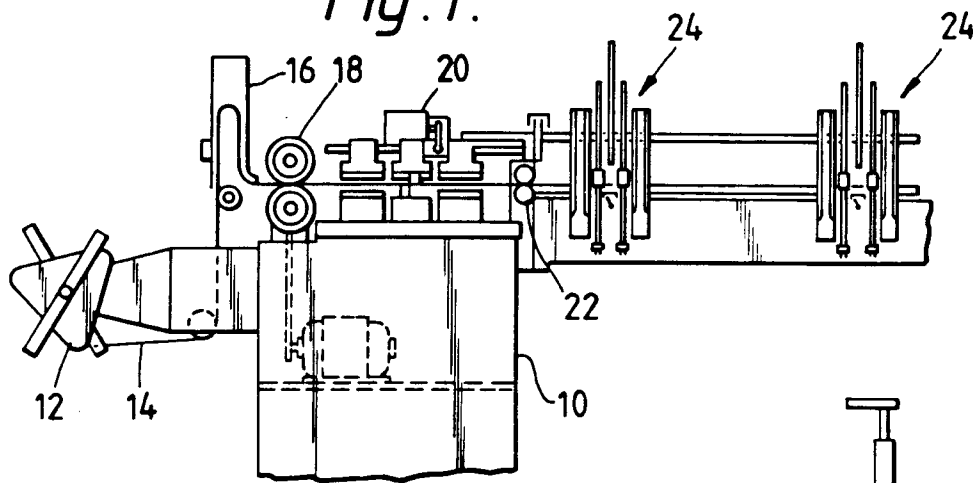


Fig. 2.

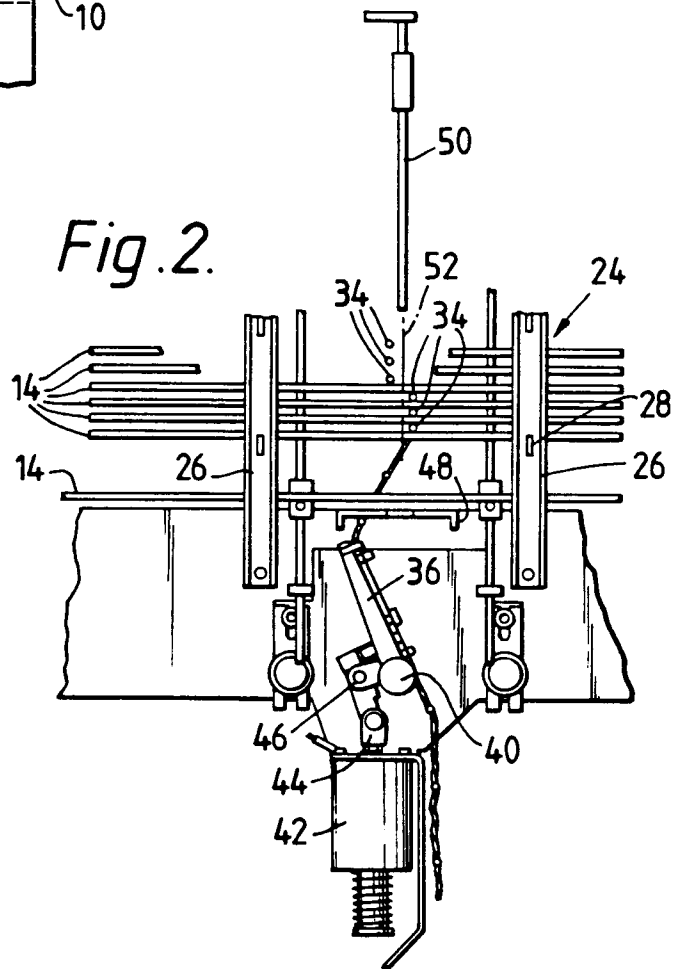


Fig. 3.

