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PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Improvements in and relating to Slats for Blinds, Roller Shutters and the like

We, HUNTER DOUGLAS INTERNATIONAL (QUEBEC) LTD., a Corporation organized and existing under the laws of the Province of Quebec, of 9500, St. Lawrence Boulevard, Montreal, Province of Quebec, Canada, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to slat assemblies, and it has particular reference to those types of slat assemblies having a number of narrow metal slats joined side by side in parallel relationship, each slat having each longitudinal edge rolled for hooked engagement with an oppositely-rolled edge of the slat immediately adjacent on either side to form hinged connections. Such slat assemblies are widely used for awnings, screens, doors, blinds, roller blinds, roller shutters and the like.

Slat assemblies of these types have been found generally satisfactory in their various applications, but they have the obvious disadvantage that the slats tend to slide longitudinally relative to one another unless they are fastened together, and it has therefore become customary to punch or pinch together the rolled sections forming the joint between each pair of slats—preferably near to the end of the joint—though this will somewhat impair hinging action between the slats.

For this purpose, the generally-accepted method of joining the slats involves either sharply punching the adjacent rolled edges on the inner face of the assembly, such face being the one which is normally disposed inwards or downwards in use, such as by means of a machine or pinching the rolled edges by inserting one jaw of an instrument or mandrel into the open end of the joint and then pressing the other jaw into the rolled edges beyond the first jaw to express two tongues into the round-section space within the joint. However, this type of joining has the disadvantage that the tongues or depressed portions do not hold firmly against one another to prevent relative lateral and longitudinal movement of the slats. Thus, the assembly will not be firm and stable, and difficulty will be experienced in handling and installing the assembly, while any longitudinal strains will tend to separate the slats.

Another joint of the same general type comprises a locking pin adapted to be passed into an open end of the rolled edge joint and having circumferential groove adapted to be engaged by a tongue expressed inwardly from the inner rolled edge of the joint, an enlarged head of the pin being adapted to abut against the ends of the rolled edges of the joint when the pin is engaged therein with the tongue engaged with the groove. This type of joint is extremely efficient in all uses of the assembly, but the cost of the pins and the procedure involved in installing them is not inconsiderable.

The present invention has been devised to overcome the various disadvantages associated with present types of punched, rolled-edge joints, and it accordingly has for its principal object the provision of such improvements in slat joints as will ensure that the assembly will have a greater resistance to relative longitudinal sliding.

Other objects of the invention are to provide improvements of the aforementioned type which may be effected simply and inexpensively, and which will prove durable, efficient and trouble-free in use.

With the foregoing and other objects in view, the invention resides broadly in a slat assembly in which the oppositely rolled longitudinal edges of each two adjacent slats are engaged to define a central cylindrical space, each of the cylindrical spaces being provided with at least one plug of an artificial plastic material and means being provided which pre-

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vent said plugs from moving out of said cylindrical spaces and prevent the slats from sliding in the longitudinal direction relative to one another. Preferably, the plugs consist of a strip of round-section plastic material, such as polyvinyl chloride, having a diameter slightly less than the diameter of the cylindrical space within the joints.

The plugs may be retained on their places by the inner tongue of two tongues of the rolled ~~longitudinally~~ edges of two engaging adjacent slats, said tongues projecting into the cylindrical space, the plug being pressed between said inner tongue and the opposite periphery of the cylindrical space and acts to maintain the two tongues in radial contact.

The plugs of each two adjacent cylindrical spaces may also be mutually connected and the connecting portion of said plugs may be fixed to the ends of the slats. This may be done by means of one or more lips or strips. Said lips may pass or may be connected through openings or slots provided in the end portions of the slats lying opposite the connecting portions of the plugs. It is also possible to provide the ends of the slats with lips which embrace said connecting portions. According to another embodiment the ends of at least one of the oppositely-rolled longitudinal edges of each two adjacent slats may be provided with one or more lips which are bent cross-wise over the end openings of the cylindrical spaces.

A special advantage of the assembly according to the present invention consists in that the plastic plugs prevent the troublesome rattling of the slats due to wind when in use.

The invention also embraces the method of forming such joints by the steps of inserting an extended length of plug material into the open end, punching the inner face of the joint to express two tongues inwards to engage the plug, and cutting the plug at or near to the end of the joint either before, after or simultaneously with the punching operation. Then again, the invention embraces all types of slat assemblies having joints of this type or formed in the manner described. Other features of the invention will become apparent from the following description.

In order that the invention may be more readily understood and put into practical effect, reference will now be made to the accompanying drawings, wherein:

Fig.1 is a perspective view of part of a known slat assembly, illustrating the rolling-up action of the assembly, the slats hinging about their joints;

Fig. 2 is a perspective view, illustrating the use of a plug in a slat joint;

Fig. 3 is a sectional end view along the line V—V of Fig. 4, but showing an inserted plug in a slat joint prior to punching;

Fig. 4 is a half sectional side elevation of part of a punched slat joint, the assembly being inverted so that the inner face is uppermost;

Fig. 5 is a sectional end view along the line V—V of Fig. 4 after punching;

Figs. 6—9 show another embodiment of the invention, in which two adjacent plugs are connected by a connecting part having two lips;

Fig. 10 shows an embodiment in which the connecting part of two adjacent plugs has one lip;

Fig. 11 shows an end portion of an embodiment of a slat having two lips for embracing the connecting part of two adjacent plugs;

Figs. 12—14 show an end portion of another embodiment of a slat having lips provided on one of its rolled longitudinal edges.

Referring firstly to the arrangements shown in the Figs. 1—5, the slat assembly 1 may suitably be of rectangular shape and is made up of a series of parallel narrow metal slats 2 of arcuate cross-section, each of which has its longitudinal edges oppositely rolled, each edge of a slat 2 being engaged hingedly with an oppositely-rolled edge of an adjacent slat to form a joint 3.

It will be seen that each slat 2 has one edge 4 (hereinafter termed the "inner" edge) simply rolled in the direction of curvature of the body of the slat, but the other edge 5 (hereinafter termed the "outer" edge) is oppositely rolled adjacent a longitudinal shoulder 6 of the slat, with the result that the top 7 of the outwardly-rolled edge 5 is disposed on or near to the arc of curvature of the main body of the slat, while the joints 3 protrude on that side of the assembly 1 on which the slats 2 have their centres of curvature. This is the "inner" side of the assembly 1, whereas the other or outer side of the assembly is that which is normally arranged to face upwards in an assembled awning. The joints 3 are punched on their inner faces, and so the assembly 1 would be disposed with its inner side upwards during the punching operation, the joints 3 then also facing upwards. For this reason, all the drawings with the exception of Fig. 1, show the joints in the inverted attitudes in which they can most conveniently be punched.

The degree of roll of each edge 4,5 is such that a full circle is not formed, the extremity at each edge being spaced by a short distance from the body of the slat. Thus, when the inner edge 4 is engaged within the outer edge 5, of another slat to form a joint, the two extremities are spaced from each other, and each constitutes a portion of the metal defining an inner cylindrical space 8 which is of generally round cross-section except for the protrusions therein of the free extremities. Actually, for preference, each rolled edge is in the shape of an Archimedean spiral, although uniformly arcuate shapes would operate relatively satisfactorily.

Figs. 4 and 5 show tongues 9 and 10 expressed into the cylindrical space 8 of the joint 3 from the inner rolled edge 4 and outer rolled edge 5 respectively, for the purpose of holding the ends of the slats 2 in alignment, and to prevent longitudinal sliding, the tongues being punched or otherwise expressed at a short distance from the ends of the slats.

The diameter of the space 8 within the rolled edges 4 and 5 is approximately one-eighth inch in this particular instance, and the invention is put into effect by taking a continuous piece of solid, round-section polyvinyl chloride or similar plastic material of a diameter of slightly less than one-eighth inch so that it may be passed fairly neatly into the space 8 to be disposed longitudinally in the joint 3.

If the joint 3 is to be punched near to its end, only a short insertion of the plastic material beyond the intended punching position need be made, so that the space 8 will contain a neatly-fitting plug 11 (as shown in Fig. 4), and then a sharp peck with a suitable tapered punch 12 on the inner face of the joint 3 will cause two tongues 9 and 10 to be expressed from the inner and outer rolled edges 4 and 5 into the space 8 to engage and dent the plastic plug 11 and hold it normally against withdrawal. The plug 11 may be severed from the rest of the plastic material 13 either before punching, as indicated at Fig. 2, or alternatively, it may be severed simultaneously with or after the punching operation.

It will be appreciated that the plastic plug 11 serves two main purposes. Firstly, it acts as a mandrel during the punching operation and so makes for efficient punching at all times, and secondly, it acts to hold the two slats which are joined in the same relationship and firmness as when they are punched, while it allows sufficient hinging of the joint for the required purpose. Thus, the rolled edges may move circumferentially relative to one another to some extent, but they will be restrained against relative longitudinal sliding because the tongues will be held together radially, the assembly therefore being highly efficient for roll-up constructions. The tongues may be of such shape that they prevent relative longitudinal sliding in one direction only, similar tongues at the other end of the joint acting to prevent sliding in the other direction.

Plastic materials, such as reasonably hard polyvinyl chloride, are very suitable for the plugs 11, but any other material may be used provided it is not brittle and yet can be dented, and provided also it exhibits sufficient resiliency or resistance to further compression after punching to ensure that it will be gripped between the inner tongue and the opposite wall of the cylindrical space 8 and will act to maintain the two tongues in radial contact without the plug being so fluid as to collapse or exert no holding strength. For example, the plug could be made of rubber, fibrous material, soft wood, or even lead. The plug may also be of any desired, substantially constant cross-section, although round section is the most convenient and is highly efficient. Also, the plug may have any desired dimensions provided it can be gripped and held between the inner tongue and the opposite wall as previously mentioned. Then again, the plug need not be dented upon punching to the extent indicated in the drawings provided it is dented sufficiently for it to be retained in the joint.

The afore-mentioned method of putting the invention into effect, as described with reference to Fig. 2, relates only to the simplest type of operation on a single joint. It will be understood that various methods may be used, particularly in order to secure a maximum number of joints in a given time. Thus, the plastic plugs could be inserted in separate pre-cut pieces prior to the joints being punched successively or the plugs could be inserted in strip form and cut in situ before, after or during successive punching operations.

Figs. 6 and 7 show an embodiment of a slat assembly in which two adjacent plugs 11 are connected with one another by a connecting part 14 which is provided with two lips or wings 15 of thermoplastic material. The slats 1 are provided with a slotlike aperture 16 through which the lips or wings 15 may be sealed together. Instead of having one single aperture the slats may be provided at their ends with two or more apertures. As may be seen from Fig. 7, which shows a sectional view along the line VII—VII of Fig. 6 the connecting part 14 may be provided with a core 17 which consists of bendable metal. Said core may also be provided in the plugs 11. The plugs 11 with their connecting part 14 and the lips or wings 15 may be made of a strip of material as shown in the Figs. 8 and 9.

From said strip of material portions 18 which are hatched in Fig. 8 are cut away so that cylindrical parts 11 remain. Said parts are cut through whereafter plugs provided with a connecting part and lips or wings are obtained. In this way such connected plugs may be easily and cheaply manufactured by extruding the strip as shown in Figs. 8 and 9.

Fig. 10 shows a cross-section of plugs connected by a connecting portion 14 of the type shown in Figs. 6—9, but which has only one wing or lip 19. This wing or lip 19 is provided with a rib 20, which fits in a slot 16 of a slat 2. After insertion of the plugs into the cylindrical spaces of the slats 2 (as indicated in Fig. 6) and after insertion of the lip 19 into the slot 16 of the slat 2 the free end of said lip 19 is sealed to the connecting portion 14.

Fig. 11 shows in a perspective view a part of a slat 2 the end of which is provided with

two curved lips 21 which, after insertion of the plugs into the cylindrical spaces of the adjacent slats of a slat assembly, may be bent over a connecting part of said plugs. As said lips 21 embrace this connecting part, said connecting part does not need to have wings.

In the embodiment according to the Figs. 12—14 the rolled longitudinal edge 22 of the slats 2 is provided with two small lips 23,24, which after insertion of a plug 11 are bent in such a way that they close the end opening of the cylindrical space defined by a pair of oppositely-rolled longitudinal edges of engaged adjacent slats 2. If both ends of said rolled longitudinal edge 22 are provided with such lips 23, 24, the slats 2 cannot slide longitudinally relative to one another.

It will of course be understood that the invention embraces all variations which will be readily apparent and are deemed to reside within the scope and ambit of our invention, as defined by the appended claims.

WHAT WE CLAIM IS:—

1. A slat assembly having a number of narrow, thin metal slats joined side by side in parallel relationship each slat having each longitudinal edge rolled for hooked engagement with an oppositely-rolled longitudinal edge of the slat immediately adjacent on either side to form hinged connections for said slats each hinged connection defining a cylindrical space of substantially round cross-section, each of the cylindrical spaces being provided with at least one plug of artificial plastic material and means being provided which prevent said plugs from moving out of said cylindrical spaces and also prevent the slats from sliding in the longitudinal direction relative to one another.

2. A slat assembly according to claim 1, wherein the plug consists of dentable, non-brittle, preferably elastic material.

3. A slat assembly according to claim 1 or 2, wherein the diameter of the plugs is slightly less than the diameter of the cylindrical space between the rolled edges of the hinged connections.

4. A slat assembly according to any one of the preceding claims, wherein the plug material is polyvinyl chloride or equivalent plastic material.

5. A slat assembly according to any one of the preceding claims wherein each of the plugs is retained on its place by the inner tongue of two tongues of the rolled longitudinal edges of two engaging adjacent slats, said tongues projecting into the cylindrical space, the plug being pressed between said inner tongue and the opposite periphery of the cylindrical space and acting to maintain the two tongues in radial contact.

6. A slat assembly according to any one of the claims 1—4, wherein the plugs of each two adjacent cylindrical spaces are mutually connected, the connecting portion of said plugs being fixed to the ends of the slat.

7. A slat assembly according to claim 6, wherein the connecting portion of the plugs is connected by means of at least one lip to the end of the slat opposite the connecting portion.

8. A slat assembly according to claim 6 or 7, wherein the end portion of the slats opposite the connecting portion of each two plugs at least one aperture is provided for the material of this connecting portion.

9. A slat assembly according to claim 6 or 7, wherein the ends of the slats opposite the connecting portion of each two plugs is provided with at least one lip, embracing said connecting portion.

10. A slat assembly according to any one of the claims 1—4, wherein the ends of at least one of the oppositely-rolled longitudinal edges of each two adjacent slats are provided with at least one lip, which is bent cross-wise over the end opening of the cylindrical space.

11. A slat assembly according to any one of the preceding claims, wherein the plugs are provided with a bendable, metal core.

12. A method of forming a joint between an adjacent pair of slats, according to any one of the claims 1—4, one of which has a rolled longitudinal edge engaged with an oppositely rolled longitudinal edge of the other to define a cylindrical space of the substantially round cross-section, said method comprising the steps of inserting longitudinally into the space an extended length of material of substantially constant cross-section and of non-brittle but dentable material, said material being adapted when dented to exhibit resiliency or resistance to further compression; punching or otherwise expressing into the space from the inner (normally-underneath) face of the joint of a pair of tongues of the rolled edges so that the inner tongue engages and dents the said material and so that the material will be gripped between the said inner tongue and the opposite periphery of the cylindrical space and will act to maintain the two tongues in radial contact; and cutting the material transversely either before, after or during the punching operation at or near to the end of the joint, so that the portion of material within the joint and engaged by the inner tongue constitutes a plug.

13. A method of forming a joint between an adjacent pair of slats according to claim 12, wherein the plug material is of round cross-section and of slightly less diameter than the diameter of the space between rolled edges of the joint.

14. A method of forming a joint between an adjacent pair of slats, according to claim 12 or 13, wherein the plug material is polyvinyl chloride or equivalent plastic material.

15. A slat assembly having a plurality of slats each adjacent pair of which is connected

two curved lips 21 which, after insertion of the plugs into the cylindrical spaces of the adjacent slats of a slat assembly, may be bent over a connecting part of said plugs. As said lips 21 embrace this connecting part, said connecting part does not need to have wings.

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2. A slat assembly according to claim 1, wherein the plug consists of dentable, non-brittle, preferably elastic material.

3. A slat assembly according to claim 1 or 2, wherein the diameter of the plugs is slightly less than the diameter of the cylindrical space between the rolled edges of the hinged connections.

4. A slat assembly according to any one of the preceding claims, wherein the plug material is polyvinyl chloride or equivalent plastic material.

5. A slat assembly according to any one of the preceding claims wherein each of the plugs is retained on its place by the inner tongue of two tongues of the rolled longitudinal edges of two engaging adjacent slats, said tongues projecting into the cylindrical space, the plug being pressed between said inner tongue and the opposite periphery of the cylindrical space and acting to maintain the two tongues in radial contact.

6. A slat assembly according to any one of the claims 1—4, wherein the plugs of each two adjacent cylindrical spaces are mutually connected, the connecting portion of said plugs being fixed to the ends of the slat.

7. A slat assembly according to claim 6, wherein the connecting portion of the plugs is connected by means of at least one lip to the end of the slat opposite the connecting portion.

8. A slat assembly according to claim 6 or 7, wherein the end portion of the slats opposite the connecting portion of each two plugs at least one aperture is provided for the material of this connecting portion.

9. A slat assembly according to claim 6 or 7, wherein the ends of the slats opposite the connecting portion of each two plugs is provided with at least one lip, embracing said connecting portion.

10. A slat assembly according to any one of the claims 1—4, wherein the ends of at least one of the oppositely-rolled longitudinal edges of each two adjacent slats are provided with at least one lip, which is bent cross-wise over the end opening of the cylindrical space.

11. A slat assembly according to any one of the preceding claims, wherein the plugs are provided with a bendable, metal core.

12. A method of forming a joint between an adjacent pair of slats, according to any one of the claims 1—4, one of which has a rolled longitudinal edge engaged with an oppositely rolled longitudinal edge of the other to define a cylindrical space of the substantially round cross-section, said method comprising the steps of inserting longitudinally into the space an extended length of material of substantially constant cross-section and of non-brittle but dentable material, said material being adapted when dented to exhibit resiliency or resistance to further compression; punching or otherwise expressing into the space from the inner (normally-underneath) face of the joint of a pair of tongues of the rolled edges so that the inner tongue engages and dents the said material and so that the material will be gripped between the said inner tongue and the opposite periphery of the cylindrical space and will act to maintain the two tongues in radial contact; and cutting the material transversely either before, after or during the punching operation at or near to the end of the joint, so that the portion of material within the joint and engaged by the inner tongue constitutes a plug.

13. A method of forming a joint between an adjacent pair of slats according to claim 12, wherein the plug material is of round cross-section and of slightly less diameter than the diameter of the space between rolled edges of the joint.

14. A method of forming a joint between an adjacent pair of slats, according to claim 12 or 13, wherein the plug material is polyvinyl chloride or equivalent plastic material.

15. A slat assembly having a plurality of slats each adjacent pair of which is connected

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by the method of forming a hinged slat connection as claimed in any one of the claims 12—14.

16. A slat assembly, substantially as hereinbefore described and illustrated with reference to the Figures 1—5 of the accompanying drawings.

17. A slat assembly, substantially as hereinbefore described and illustrated with reference to the Figures 6—14 of the accompanying drawings.

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