March 13, 1973 P. W. RUTTER 3,720,035

PACKAGES FOR SHEET MATERIAL

Filed June 26, 1970 2 Sheets-Sheet 1

FIG. 1

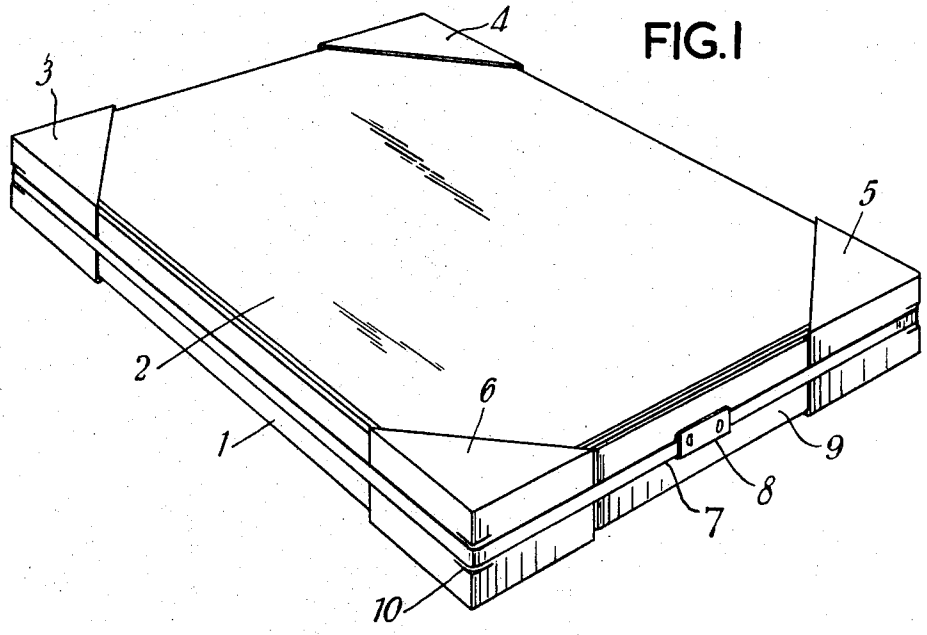
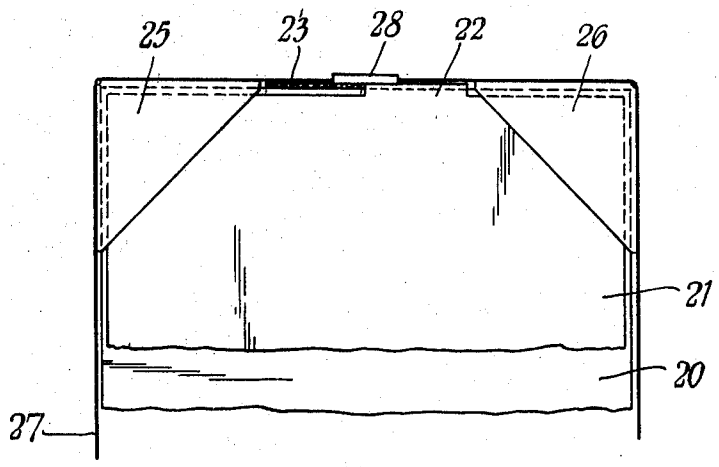


FIG. 2



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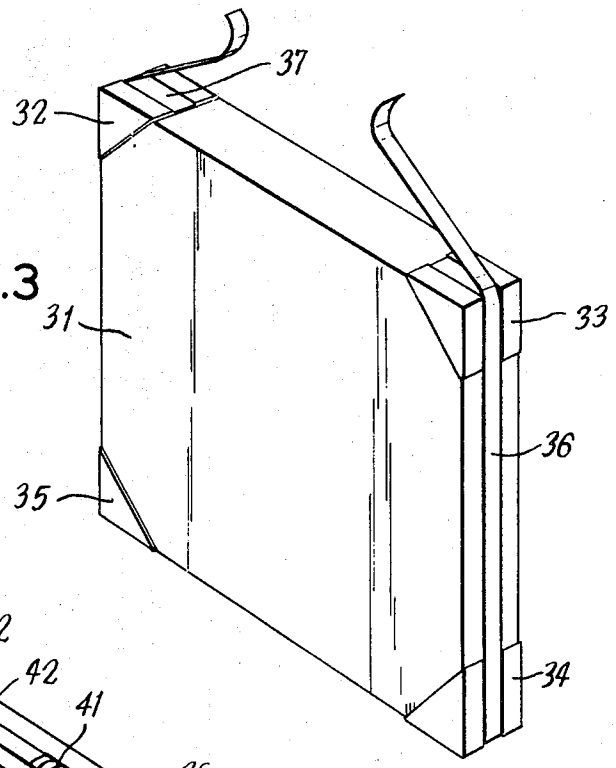
PACKAGES FOR SHEET MATERIAL

Filed June 26, 1970 2 Sheets-Sheet 2

FIG.3



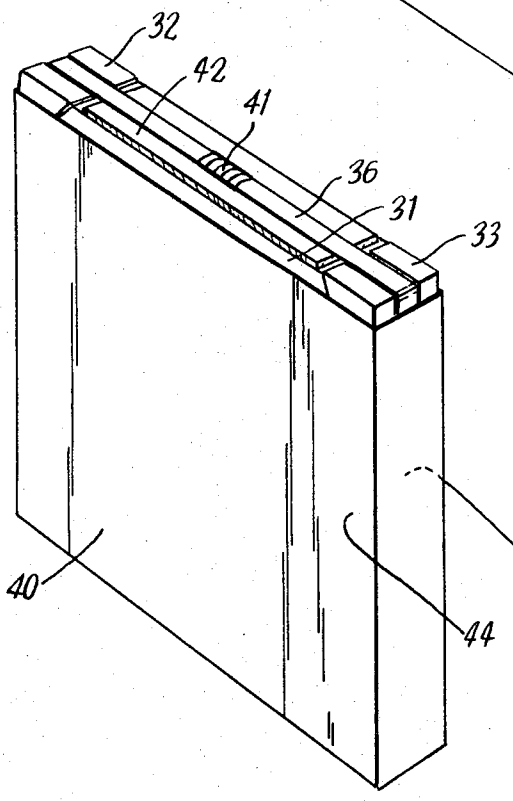


FIG.4

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3,720,035

PACKAGES FOR SHEET MATERIAL

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Continuation-in-part of application Ser. No. 775,289, Nov. 11, 1968. This application June 26, 1970, Ser. No. 50,099
Claims priority, application Great Britain, June 26, 1969, 32,424/69
Int. Cl. B65b *13/02, 25/14*
U.S. Cl. 53—3 7 Claims

ABSTRACT OF THE DISCLOSURE

This application describes a method of packing a stack of flexible sheet material which comprises the steps of positioning four corner pieces made of a relatively strong material so as to embrace each of the four corners of stack to form a substantially tight fit thereon, placing a length of strapping material so that it passes around each of the positioned corner pieces, applying tension to the length of strapping material so causing the corner pieces to pull into close contact with the stack of flexible sheet material and then joining the length of strapping material to form a tension band around the pack, there being applied to the stack two sheets of rigid material on the opposite faces of the stack, as a step preceding the application of tension to the strapping material, said sheets of rigid material serving to disable the stack from flexing.

This invention relates to a method of packaging a stack of flexible sheet material and is a continuation-in-part of my application No. 775,289 filed on Nov. 11, 1968 entitled "Packages for Sheet Material."

It is difficult to pack stacks of flexible sheet material to ensure that during transportation of the stack there is no movement of the sheets relative to each other caused either by bending or lateral movement. Such relative movement can often cause scratching or marking of the surfaces of the flexible sheet material if any particulate material such as dust is entrapped between the sheets of the stack. Such surface scratching or marking gives rise to particular troubles when the flexible sheet material is a light-sensitive film as any marking of the light-sensitive emulsion, which is on the surface of the sheet, alters its sensitometeric properties in such a way that, depending on the conditions, either a sensitised or desensitised spot is produced, resulting in either a black or a white spot on development of the material. As it is almost impossible to exclude dust completely from the atmosphere when packing sheet materials it is, thus, very important to lessen the effect to entrapped dust particles by preventing the relative movement of the sheets in a stack. A relative movement of as little as one hundredth of an inch can cause each entrapped dust particle to produce a very noticeable black or white spot on the developed material.

Therefore according to the present invention there is provided a method of packing a stack of flexible sheet material which comprises the steps of positioning four corner pieces made of a relatively strong material so as to embrace each of the four corners of the stack to form a substantially tight fit thereon, placing a length of strapping material so that it passes around each of the positioned corner pieces, applying a tension to the length of strapping material so causing the corner pieces to pull into close contact with the stack of flexible short material and then joining the length of strapping material to form a tension band around the pack, there being applied to the stack two sheets of rigid materials on the opposite faces of the stack as a step preceding the application of tension to the strapping material said sheets of rigid material serving to disable the stack from flexing.

Therefore according to one form of the present invention there is provided a method of packing a stack of flexible sheet material which comprises placing a sheet of stiff material, which is slightly smaller than the sheets of the stack, on the top and bottom faces of the stack, positioning four corner pieces made of a relatively strong material so as to embrace each of the four corners of the stack of flexible sheet material together with the super- and underposed sheets of stiff material to form a comparatively tight fit thereon, placing a length of strapping material around the thus formed pack so that it passes around each of the positioned corner pieces, applying a tension to the length of strapping material so causing the corner pieces to pull into close contact with the stack of flexible sheet material, and then joining the length of strapping material to form a tension band around the pack.

When the length of strapping material is under tension it acts to urge the corner pieces towards each other and thus presses against the stack of sheet material from all four corners, disabling the individual sheets from moving relatively to each other. The stack of sheet material can not buckle or bend due to the presence of the sheets of stiff material on each face of the stack.

By sheet of stiff material is meant material which can not easily bend, for example wood, plastics material or thick cardboard.

By corner pieces of relatively strong material is meant a material which will withstand a constant tension without distortion, for example metals such as copper, steel or aluminum, wood or plastics material such as high impact strength polystyrene, polypropylene may be used.

The corner pieces are so shaped that each of them fits over and embraces a corner of the stack of sheet material plus the stiffeners. They may be of any size as long as all four can be fitted on to the stack but preferably, because it is envisaged that these pieces will be non-returnable and thus must be cheap to produce, they embrace only the corner of the stack. The thickness of the combined stack of sheet material plus stiffeners must be such that the corner pieces fit tightly over each corner.

According to a further form of the present invention there is provided a method of packing a stack of sheet material which comprises positioning four corner pieces made of a relatively strong material so as to embrace each of the four corners of the stack of sheet material to form a comparatively tight fit thereon, placing a length of strapping material around the thus formed pack so that it passes around each of the positioned corner pieces, placing the pack into a rigid box or box-like structure, the dimensions of which are so chosen that the pack fits tightly in the box or box-like structure, applying a tension to the length of strapping material so causing the corner pieces to pull into close contact with the stack of sheet material, and then joining the length of strapping material to form a tension band around the pack.

As in the first mentioned embodiment of the present

invention when the length of strapping material is under tension it acts to urge the corner pieces towards each other and thus presses against the stack of sheet material from all four corners, disabling the individual sheets from moving relatively to each other. The stack of sheet material can not buckle due to the presence of the rigid box-like structure around the pack.

By "box-like structure" is meant a structure like a box into which the stack can be inserted so that the top and bottom faces of the stack are completely covered by the structure. Preferably a box is used but a box-like structure, for example a rigid cardboard sleeve can be used, the cardboard sleeve containing the stack then being placed in an outer box for transportation.

By rigid material is meant material which can not easily bend, for example wood, plastics material or thick cardboard.

In this embodiment of the invention the corner pieces each fit over a corner of the stack of flexible sheet material the thickness of which must be such that the corner pieces fit tightly thereon.

It is preferred that each corner piece of use in both the embodiments of the present invention has means for locating centrally the band of strapping material to reduce the buckling effect, for example a central channel.

In some cases it is preferred, and in the case of light-sensitive materials essential, that the stack of flexible sheet material is placed initially in a light tight folder such as a polyethylene bag. The stiffeners, when used, can also be placed in the bag but preferably are placed above and below the bag containing the stack of sheet material.

The strapping material is, for example, metal or a plastics material such as polypropylene, nylon or rayon/fibre glass. The tension may be applied to the strapping material and the material joined to form a band by apparatus in general use in the packaging trade. It is preferred that the strapping material is of plastics material because it is easy to join such material by metal clips or the like, or in the case of some plastics material, by heat welding. Also plastics material can be severed more easily than metal bands.

It is preferred to provide a stiff material insert behind the band where it has been joined. This insert preferably extends behind the band from corner piece to corner piece.

This insert protects the stack of sheet material during the actual band joining process and it also prevents the enlarged join in the band from rubbing against the stack.

The accompanying drawings will serve to illustrate the present invention

FIG. 1 is a perspective view of a stack of flexible sheet material packed by the first method of the present invention.

FIG. 2 is a partial cross-sectional plan view of the method of packing a particular shaped sheet by means of the first method of the present invention.

FIG. 3 is a perspective view of a stack of flexible sheet material before insertion into a containing box and illustrates an alternative embodiment of the present invention.

FIG. 4 is a perspective view of a stack of sheet material inserted into a containing box and illustrates also an alternative embodiment of the present invention.

In FIG. 1 a stack of flexible sheet material **1** has superimposed on it a sheet of stiff cardboard **2**. This sheet **2** has slightly smaller dimensions than the stack of flexible sheet material **1**. (A similar sheet of stiff cardboard is present under the stack of sheet material.) Positioned at each corner of the stack and embracing the stack and cardboard sheets are four corner pieces **3**, **4**, **5** and **6** made of polypropylene. Placed around the pack is a band of strapping material **7** made of polypropylene which is joined at **8** by a metal clip. The polypropylene band is under a tension and acts to pull the four corner pieces together, thus preventing the sheets of material from moving relative to each other when the pack is moved. The stiff insert **9** prevents the clip **8** touching the film stack **1**.

The band **7** is located centrally around the pack by a locating channel **10**, one of which is present on each corner piece.

FIG. 2 is a partial cross-sectional plan view of a stack of sheet material which has been packed by the method of the present invention. The pack shown in this figure is particularly useful when the stack of flexible sheet material is to be inserted into an end opening box because corners and card stiffeners can be removed without taking the stack from the box. Thus individual sheets can be removed from the stack while it is still in the box.

In FIG. 2 the top sheet **20** of a stack of films is shown. In front of the top film there is an insert of stiff cardboard **21**. This insert has an integral tab **22** that is folded over the end of a stack of film so that it then lies side by side with folded over tab **23** of the back insert of stiff cardboard. The two tabs **23** and **22** thus fill the gap between the two corner pieces **25** and **26**.

Holding the pack together is a tension band of polypropylene **27** which has been joined by a metal clip **28**. The two tabs **23** and **22** act together to prevent the metal clip touching the film.

Such a pack may be fitted into an end opening box (not shown).

When the end opening box is opened the band **27** is cut and pulled away and the corner pieces **25** and **26** removed. The tabs **23** and **22** may then be grasped and the cardboard pieces **21** and **23** removed. The individual sheets of film may then be removed from the stack.

In FIG. 3 the stack of flexible sheet material **31** is embraced at each corner by a corner piece **32**, **33**, **34** and **35**, each of which are made of polypropylene. Around the stack is a band of strapping material **36**, also made of polypropylene and the ends of which are shown unjoined. The band **36** is located centrally around the pack by a locating channel **37**, one of which is present on each corner piece.

In FIG. 4 the end of the stack of flexible sheet material **31** is shown partially protruding from the end of the specially shaped box **40**. The ends of the band **37** have been drawn tight and joined by a metal clip **41**. Underneath the metal clip **41** is shown a stiff insert **42**. This insert prevents the metal clip **41** from rubbing against the stack of sheet material.

After the stack of flexible sheet material **31** as shown in FIG. 3 has been placed in the rigid box **40** the ends of the band **36** are drawn together very tightly and clipped in this position. The stack **31** cannot buckle due to the top and bottom **44** and **45** of the rigid box **40**.

I claim as my invention:

1. A method of packing a stack composed of a plurality of flexible sheets which comprises stacking said flexible sheets to form a stack having two opposed face surfaces and two pairs of opposed side surfaces which define the thickness of the stack, one side surface of each pair being adjacent to both side surfaces of the other pair, the face surfaces and side surfaces of the stack forming edges which terminate in four corners where the two face surfaces are joined by two adjacent side surfaces, positioning four corner pieces made of a strong material so as to embrace each of the four corners of the stack of flexible sheets over the full thickness of the stack and thus encircling a portion of each face surface and the adjacent side surfaces which make up each said corner to form a snug fit thereon, placing a length of strapping material around the side surfaces of the thus formed pack so that the strapping material passes around each of the positioned corner pieces, placing the pack into a rigid box or box-like structure, the dimensions of which are so chosen that the pack fits

snugly in the box or box-like structure, thereafter applying a tension to the length of strapping material so causing the corner pieces to pull into close contact with the stack of flexible sheets, and then joining the length of strapping material to form a tension band around the pack.

2. A method according to claim 1 wherein the strapping material is polypropylene.

3. A method according to claim 2 wherein the length of polypropylene is joined by heat welding.

4. A method according to claim 1 wherein each corner piece comprises means for locating centrally the length of strapping material.

5. A method according to claim 4 wherein the means for locating centrally the length of strapping material is a channel.

6. A method according to claim 1 wherein the stack of sheets is enclosed in a light-tight folder.

7. A method according to claim 6 wherein the stack of flexible sheets is a stack of light-sensitive material.

References Cited

UNITED STATES PATENTS

2,445,152	7/1948	Poole	53—198 R
3,253,379	5/1966	Foradora	53—3
3,524,542	8/1970	Chylstun	206—65 B
2,106,276	1/1938	Heineman	53—3 X
3,203,726	8/1965	Smith	206—65 B
2,026,282	12/1935	Leguillon	53—3 X
3,442,735	5/1969	Stensaker	53—3 X
3,291,364	12/1966	Fischer	206—60 A X
3,123,209	3/1964	Burket et al.	206—62 R
3,618,755	11/1971	Kean et al.	53—30 X

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U.S. Cl. X.R.

53—26, 27; 206—65 B