United States Patent

Castiaux

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[45] Feb. 29, 1972

[54] PACKAGING DEVICE FOR SHEET MATERIALS

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[73] Assignee: Glaverbel, Watermael-Boitsfort, Belgium

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[52] U.S. Cl. ..... 206/62 R, 217/36 R

[51] Int. Cl. B65d 85/46

[58] Field of Search ..... 206/60, 60 A, 62, 65 B, 65 R, 206/46 FN, 46 FR, 46 H, 46 LM, 46 R; 214/10.5; 217/36, 43; 220/4 R, 4 E; 229/23 C

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Assistant Examiner—Steven E. Lipman
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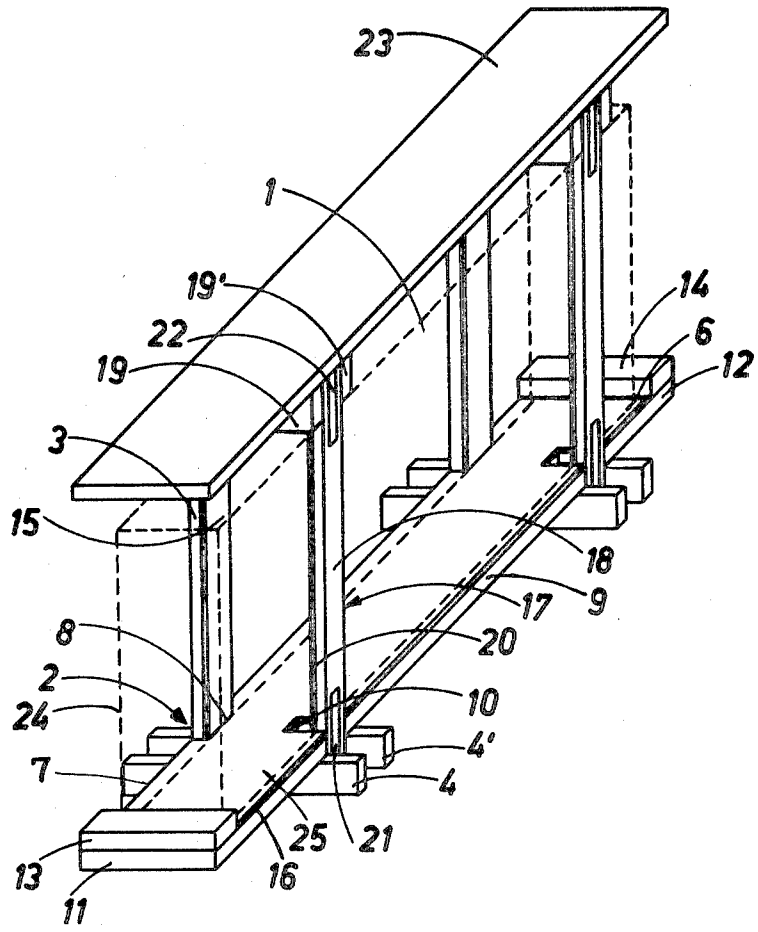
[57] ABSTRACT

A device is disclosed for packaging a stack or stacks of sheet articles such as sheets of glass. The device comprises a rectangular frame formed of two L-shaped sections and is positioned around a stack of sheet articles. A panel or floor member is disposed between one side of the frame and a face of the stack so that the edges of the sheet articles of the stack rest upon the floor member. On both ends of the floor member there are mounted stops which abut faces of the stack to prevent movement of the stack with respect to the frame. Protective panels may also be mounted on the frame to extend over at least a portion of a face of the stack to protect or to enclose the packaged sheets. The L-shaped sections of the frame may be assembled in various positions so as to vary the dimensions of the opening of the frame to accommodate stacks of various cross-sectional areas. The package may also comprise two or more frames with each frame made of a U-shaped section and a crosspiece to bridge the open ends of this section.

9 Claims, 11 Drawing Figures



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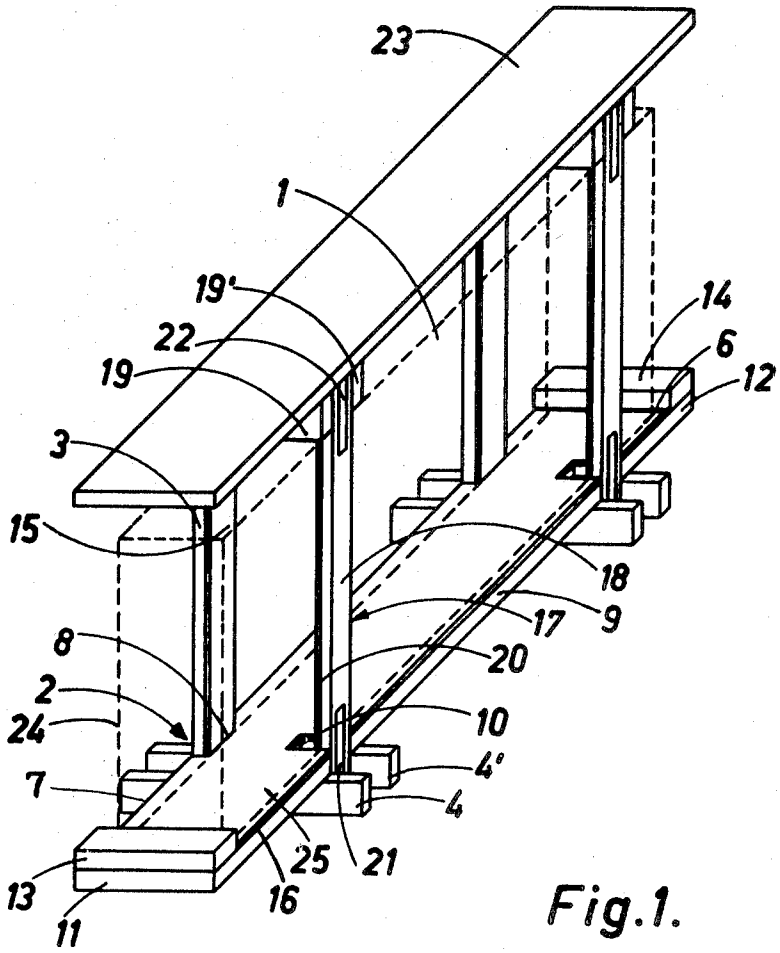

Fig. 1.

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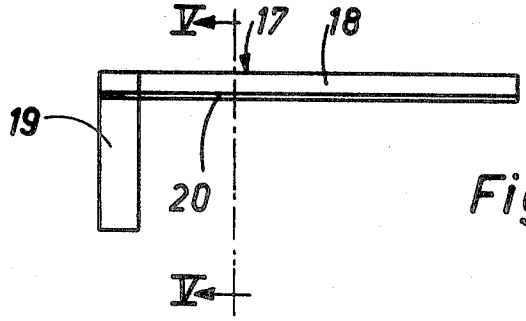
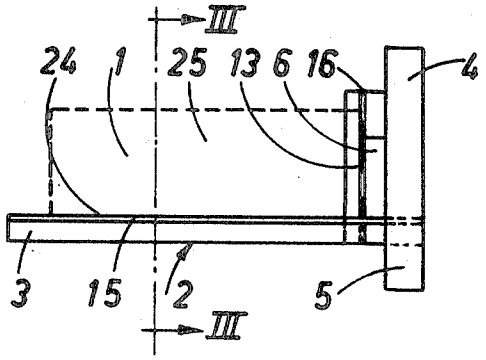


Fig.4.

Fig.2.



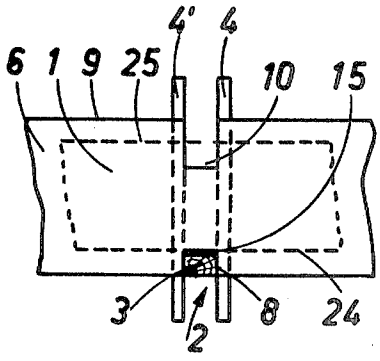


Fig.3.

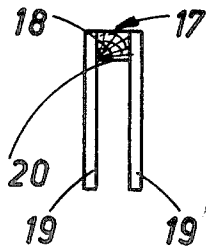


Fig.5.

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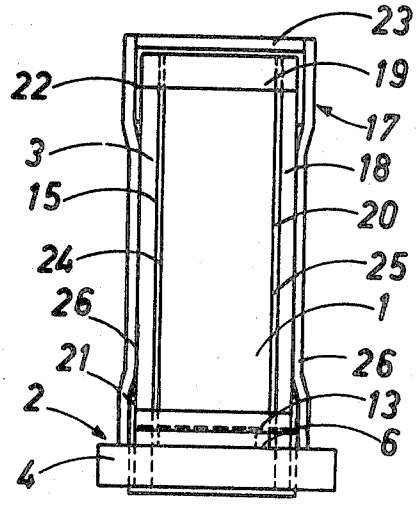

Fig. 6.

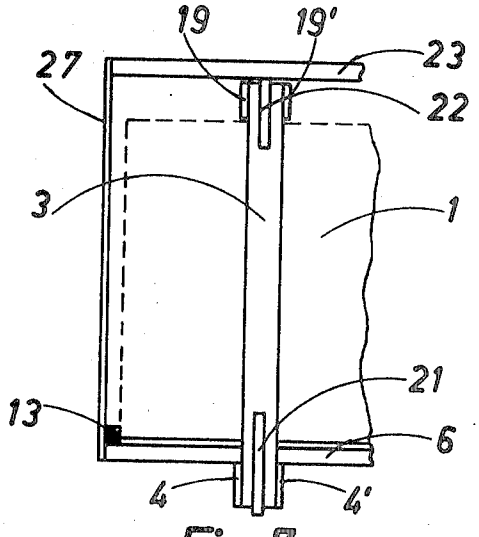

Fig. 7.

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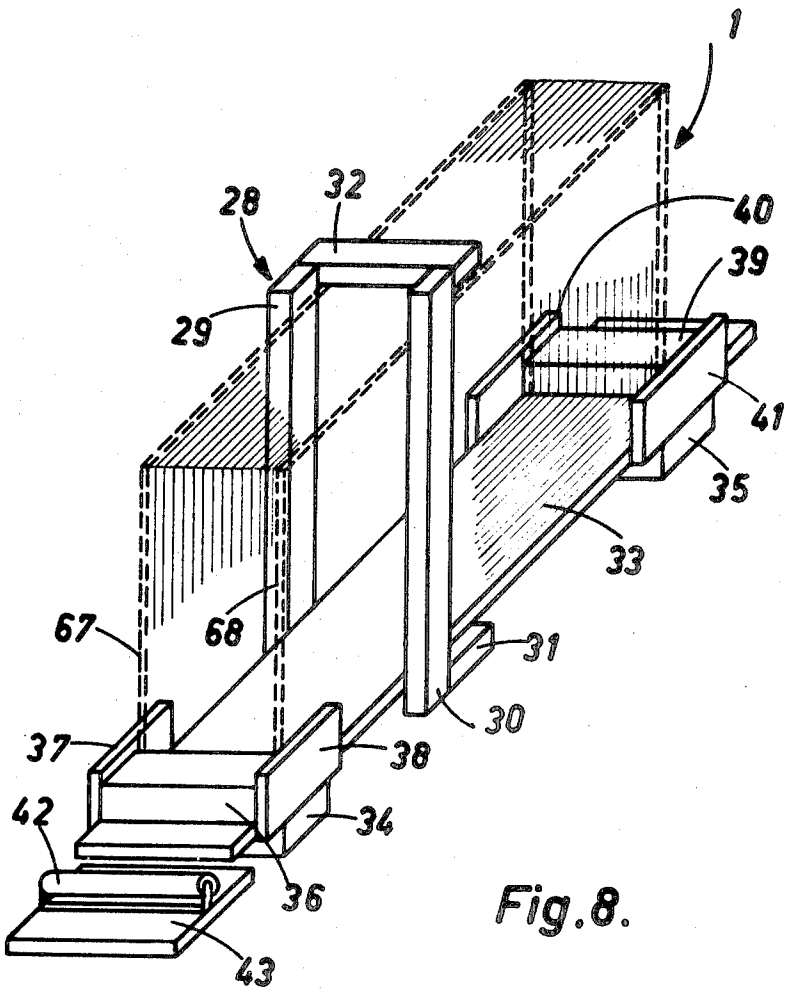

Fig. 8.

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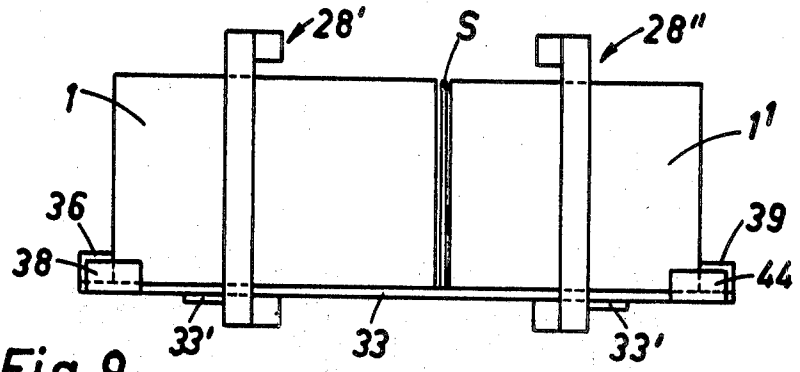

Fig. 9.

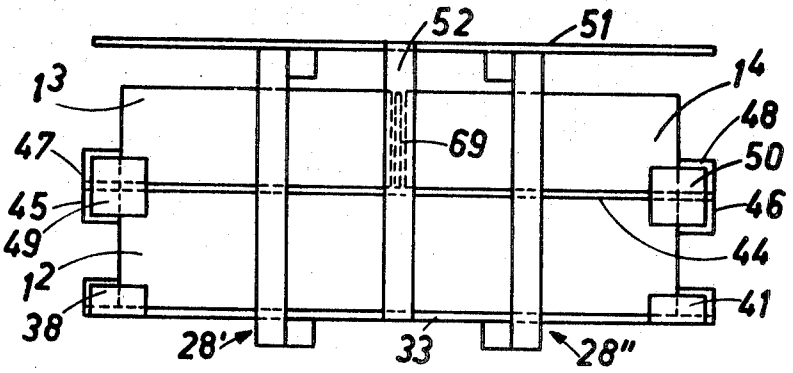

Fig. 10.

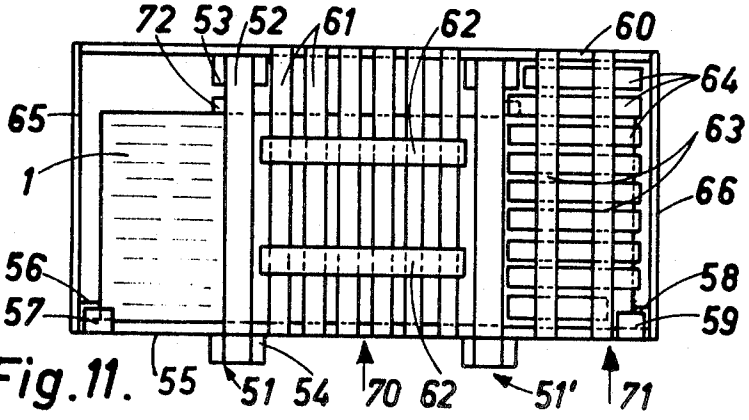

Fig. 11.

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PACKAGING DEVICE FOR SHEET MATERIALS

The present invention relates to the packaging of sheet articles, more particularly, to a packaging device for the storage and transportation of stacks of sheet articles.

The storage and shipping of sheets of glass poses a number of problems because of the inherent fragile nature of glass. In devising solutions to these problems particular consideration must be given to the costs involved. It is desirable to package sheets of glass so as to minimize the risk of breakage during shipment or storage while at the same time packaging should be economical with respect to both the cost of the packaging material and the cost of the labor necessary to carry out the packaging operation. Furthermore, the packages of glass should be such that they can be stacked upon each other during storage and shipment so as to most efficiently utilize space. While the relatively fragile nature of glass must always be carefully considered the above considerations also apply to the packaging of other sheet articles.

A large number of packaging devices involving a variety of different structures have been proposed in an attempt to obtain effective and reliable packaging of glass and other fragile sheet articles. Many of the proposed packaging devices are containers containing straw or other loose packaging material for cushioning the sheet articles placed within the containers. Such containers have the disadvantage of being too expensive for storing large quantities of glass in warehouses and the like and the packing of glass sheets in such containers is an operation involving considerable skill. In addition, the size of the container must conform to the size of the sheet articles being packed so that it becomes difficult to standardize the container sizes when there is a wide range of sizes in the sheet articles which are to be packed.

Another form of packaging device generally comprises clamping frames for clamping stacks of sheet articles. Such clamping frames are preferred over the above-mentioned containers since they are relatively inexpensive and can be easily and quickly applied to the stacks of sheet articles. However, such clamping frames have the disadvantages of not providing sufficient protection against damage to the fragile sheets during shipment unless special provisions are made for loading the packages in the transport vehicles or supplementary packaging is used.

It is therefore the principal objection of the present invention to provide a novel and improved packaging device for a stack or stacks of sheet articles.

It is another object of the present invention to provide a packaging device for sheets of glass which is inexpensive, and can be quickly and readily assembled by relatively unskilled labor.

It is a further object of the present invention to provide a packaging device for sheets of glass which comprises a minimum of components but adequately protects the sheets of glass during shipment and storage and permits such packages of glass sheets to be stacked so as to occupy a minimum of space.

A packaging device according to the present invention may comprise a frame assembled from two L-shaped sections so as to have a rectangular opening within which is positioned a stack of glass sheets. The L-shaped sections may be positioned with respect to each other so as to vary the dimensions of the rectangular frame opening so as to accommodate different sizes and shapes of stacks of glass sheets. A floor member or panel is attached to the frame so as to support edges of the sheets comprising the stack. Stop means are mounted on the floor panel to bear against the ends of the stack and to prevent movement of the stack with respect to the frame.

Protective panels may also be attached to the frame so as to cover at least portions of faces of the stack of glass sheets. These panels may comprise a number of parallel elongated elements extending in different directions.

The packaging device may also hold several stacks of glass sheets with the stacks being vertically positioned in edgewise relationship and a longitudinal panel inserted between the vertical stacks.

In an alternate form of frame construction a frame may comprise a U-shaped section and a straight bar to bridge the U-shaped section so as to form a rectangular frame in which one dimension is defined by the position at which the straight bar is connected across the parallel arms of the U-shaped section.

Other objects and advantages of the present invention will be apparent upon reference to the accompanying description when taken in conjunction with the following drawings, which are exemplary, wherein:

FIG. 1 is an overall respective view of the packaging device according to the present invention;

FIG. 2 is a plan view of a section of one of the frames in the device of FIG. 1;

FIG. 3 is a sectional view taken along the line III—III of FIG. 2;

FIG. 4 is a plan view of a section of the frame complementary to the section shown in FIG. 2;

FIG. 5 is a sectional view taken along the line V—V of FIG. 4;

FIG. 6 is an end elevational view of the packaging device shown in FIG. 1;

FIG. 7 is a front elevational view of an end of the packaging device of FIG. 1 but being provided with end panels;

FIG. 8 is an overall perspective view of another form of a packaging device according to the present invention; and

FIGS. 9 to 11 are front elevational views of three additional forms of packaging devices according to the present invention.

Proceeding next to the drawings wherein like reference symbols indicate the same parts throughout the various views a specific embodiment and several modifications of the present invention will be described in detail.

As may be seen in FIG. 1 a stack 1 of sheet articles which are secured within the packaging device of the present invention is indicated in dash lines. The stack is illustrated as being a rectangular parallelepiped but it is to be understood the stack may include sheets of various dimensions.

The packaging device comprises two substantially rectangular frames with each frame having two L-shaped sections 2, as shown in detail in FIGS. 2 and 3, and 17, as shown in detail in FIGS. 4 and 5. Each frame has a rectangular opening with at least one dimensions being greater than the corresponding dimension of the stack 1.

Each L-shaped section 2 has a main arm 3 which may be formed from a long wooden member having a rectangular cross section and a secondary arm formed from two flat wooden members 4 and 4' each having a rectangular cross section. The flat members 4 and 4' are attached on opposite sides of one end of the main arm 3 so that their ends extend outwardly of the main arm as may be seen in FIG. 1.

A wooden floor panel 6 having a rectangular cross section is secured to the inner edges of the flat members 4 and 4'. The floor panel 6 has longitudinal edges 7 and 9 and opposed recesses 8 and 10 are formed in the respective edges 7 and 9. The recesses have sufficient width to closely accommodate the main frame arms 3.

At the ends 11 and 12 of the floor panel member 6 there are positioned rectangular wooden plates or blocks 13 and 14 respectively to provides stops for the opposing ends of the stack 1. Where the sheets are all of the same length and this length corresponds with the space between the stops 13 and 14, every sheet will be held securely against sliding movement with respect to the frame and to the other sheets of the stack. Such sliding movement of individual sheets may occur during transportation of the sheets by road or by rail unless the sheets are clamped together under a very high pressure. For certain types of sheet articles such high clamping pressure is undesirable. Even when the sheets of a stack are of unequal lengths the stops will prevent displacement of any sheet from the frame or frames. One stop may be used for limiting movement of the sheets in one direction. The inner surfaces of the frame components 3 may be covered with strips 15 of synthetic plastic material such as "Isorel" covers the top surface of the floor

member 6. The length of the frame components 3 is at least equal to or greater than the with of the widest sheets in the stack 1. The length of the members 4 and 4' is greater than the width of the floor member 6. The lateral distance between the bottoms of the recesses 8 and 10 is equal to or less than the thickness of the stack 1.

Each L-shaped frame section 17 is provided with a main arm 18 formed of a long wooden member having a rectangular cross section and a secondary arm formed of two straight wooden members 19 and 19' each having a rectangular cross section. The members 19 and 19' are attached to opposite sides of one end of the long member 18. The member 18 has the same dimensions as the long members 3 of the L-shaped frame sections 2. The members 19 and 19' are the same as the members 4 and 4' of the frame sections 2 except they are shorter as may be seen in FIG. 1. The length of the members 19 and 19' is equal to or slightly less than the width of the floor member 6. A strip of synthetic plastic material 20 such as polystyrene covers the inner face of the long member 18.

As may be seen in FIG. 1, each pair of L-shaped frame sections 2 and 17 are connected in mutually inverted relationship by means of steel bands 21 and 22 extending along the bottom and top respectively of the frame. The end portions of the steel bands are bent at right angles to the central portions of the bands and are attached such as by nails to the outer faces of the long members 3 and 18.

The two frames of the packaging device surrounding the stack 1 are also connected together by a top panel 23 having a rectangular cross section and the same dimensions as floor panel 6.

It will be apparent that the components of each frame may be connected together by suitable fastening means in different relative positions to form rectangular frame openings of different sizes. Stacks of sheet articles having different depths as measured normally to the sheet articles can thus be secured in the frames without the necessity of pads or other cushion material between the frames and the stack. However, such pads or cushions may be employed and pressure plates may be adjustably mounted on the frames so that clamping pressure may be exerted through the plates against the stack.

By forming the members 4 and 4' so as to extend outwardly beyond their connection points to the long arms 3 and 18 will improve the stability of the package when positioned on the floor with the extended frame side at the bottom.

The sides of each frame may be formed by bars obtained from lengths of material of uniform cross section so as to facilitate the mass production of such frames in a range of sizes. The wooden components of the frames may be assembled merely by nailing.

In packaging a stack of sheet articles with the packaging device of the present invention the floor panel member 6 is secured to the horizontal arms 4 and 4' of frame sections 2 with the vertical arms 3 of these sections being positioned in the recesses 8. The sections 2 are slightly tilted and the sheets to be packaged are placed edgewise on the floor panel 6 in side by side relationship against the long members 3. The exposed face of the outermost sheet is indicated at 24 and contacts the synthetic plastic strips 15 on the inner faces of the member 3. The bottom edges of the sheets rest on the synthetic plastic covering 16 on the floor panel 6.

The complementary frame sections 17 are then positioned with the long members 18 inserted between the horizontal arms 4 and 4' of the frame sections 2 and into the recesses 10 of the floor panel 6. The long arms 3 of the sections 2 being inserted between the straight top members 19 and 19' of the frame sections 17. The frame sections 17 are held in position by the steel bands 21 and 22 with the plastic strips 20 on the inner faces of the members 18 being in close contact against the opposite face 25 of the stack 1. To complete the packaging operation, the top panel 23 is then fastened to the top sides of the frames.

In order to lift the packaged stack of sheets for storage or shipping slings are passed under the floor member 6 near the frames. When the slings are tightened, they become positioned in the angles between the frame members 4 and the floor panel 6.

In order to remove the stack 1 from the package, the top panel 23 is removed and the steel bands 21 and 22 unfastened from the long members 18. The L-shaped frame sections 17 are then removed and the sheets are then accessible. The entire package may be first tilted slightly rearwardly in order to prevent the sheets from falling forwardly from the frame sections 2.

If only a few sheets are to be removed from the package stack 1, the top panel 23 is removed, the steel bands 21 and 22 are unfastened from the long members 18 and one of stops 13 and 14 is removed from the floor panel 6. The frame sections 17 are then moved in a direction away from the frame sections 2 in the recesses 10 so as to relieve the clamping pressure on the stack 1. The required individual sheets can then be slid from the stack. The frame sections 17 can then be reassembled into their original positions to exert a clamping pressure on the thinner stack formed by the remaining sheets.

Individual sheets may be removed from the stack without disassembling the frames or removing the top panel 23 merely by removing the padding strips 15 and 20 so as to decrease the clamping pressure exerted against the stack.

It is generally preferable to stack the sheets and to remove them while the frame sections such as sections 2 are positioned with their longer arms 3 horizontal as shown in FIG. 2. The sheets are laid flat on the sides 3 so as to avoid any risk of the sheets falling over.

The packaging device as described above embodies a simple construction which at the same time provides high degree of security and protection to the packaged sheets. However, it may be desirable to enclose completely the sheets or to cover one or more sides of the stack with protective panels which might be secured to the frames.

Proceeding next to FIG. 6 there is shown a modification of the packaging device as described above wherein panel 26 are provided to protect the side faces 24 and 25 of the stack 1. The panels 26 have a length equal to that of the floor and top panels 6 and 23 and a width equal to the height of the package above the bottom members 4 and 4' of the frames. The side panels 26 are secured to the outer faces of the long members 3 and 18 of the frames and to the edges of the floor and top panels 6 and 23 by nails, screws, clips or other suitable fastening means. The panels 26 may be made from a number of assembled wooden planks or of a lighter but sufficiently rigid sheet materials such as "Unalit" or "Linex."

The packaging device illustrated in FIG. 7 is similar to that illustrated in FIG. 1 and described above but is provided with end panels 27. The height of the end panels is equal to the height of the package above the bottom members 4 and 4' of the frames and their width is equal to the width of the floor and top panels 6 and 23. The end panels are secured to the ends of the floor and top panels by nails, screws, clips or other suitable fastening elements.

It is pointed out that the protective panels of FIGS. 6 and 7 and in subsequent FIGS. to be described do not function to hold the sheets together in a stack but are solely protective. While all sides of the packaged stack may be covered with such protective panels to form a complete container the sheets will still be held together by the frames and prevented from movement with respect to the frames by the stop members. Since the packaging of the sheet articles is not dependent upon the panels the number and arrangement of the panels is open to a wide range of choice in view of particular circumstances. To facilitate the mounting of protective panels onto a packaged stack of sheets the frames should be constructed with flat outer surfaces.

A protecting panel as described above which protects at least a portion of a face of a stack held in the frames may be used for connecting to the frames a stop for preventing displacement of the frames along the packages sheets in a given direction.

Proceeding next to FIG. 8 there is illustrated another form of packaging device according to the present invention. The packaging device comprises a single wooden frame 28 composed of uprights 29 and 30 nailed to bottom and top transverse member 31 and 32. A floor panel 33 extends through the frame and supports the edges of the sheets of the stack 1. The floor panel is nailed to the transverse member 31 of the frame. Transverse supporting blocks 34 and 35 are nailed to the underside of the floor panel 31 near its ends so that the package may be stable when positioned on the floor as illustrated in FIG. 8. End stops 36 and 39 are nailed to the upper surface of the floor panel 31 to prevent relative longitudinal displacement of the stack 1 with respect to the floor panel 33 and the frame 28. The connection of the stop 36 to the floor panel 33 is strengthened by end plates 37 and 38 which are nailed to the ends of the stop 36 and to the longitudinal edges of the floor panel. These end plates extend over the bottom corner portions of the outer sheets of the stack 1 to provide additional protection for these portions. Similar end plates 40 and 41 are mounted at the other end of the floor panel 33 in association with the stop 39.

In packaging a number of sheet articles in the packaging device of FIG. 8, the side members 29 and 30 and the bottom transverse member 31 of the frame 28 are first assembled. The floor panel 33 together with its supporting blocks 34 and 35 is next attached in position on top of the transverse member 31. The individual sheets are then assembled in the resulting U-shaped frame section. When all of the sheets have been positioned within the U-shaped frame, the top transverse member 32 is then secured in position as shown in the drawing.

Additional protection to the stack may be obtained by inserting protective panels 67 and 68 between the side frame members 29 and 30 and the stack. These protective panels have the same dimensions as the packaged sheet articles and may be made of compressed fibrous materials.

The stops 36 and 39 may be mounted either on the floor panel 33 before positioning the sheets on the floor panel or one or both stops can be mounted in place after the stack of sheets has been assembled.

In an alternate packaging operation the sheets are assembled flat on a horizontally disposed side member 29 of an L-shaped frame section formed by the side member 29 and the bottom transverse member 31. Subsequently, the other frame members 30 and 32 are then connected to form the frame 28.

When it is desired to remove one or more sheets from the stack, it is only necessary to remove an end stop 36 or 39 and then slide the desired sheets outwardly from the frame. One or more supporting rollers 42 rotatably mounted on a base 43 may be provided to support these sheets as they are slid from the stack.

It can be seen that the stop members 36 and 39 extend along the angle formed by the edges of the sheets in stack 1 and a protecting panel contacting adjoining edges of the sheets. In a modification of FIG. 3 the protecting panel comprises the floor panel 33 and the stop members 36 and 39 contact the vertical edges of the sheets when the package is positioned as shown in FIG. 8. The addition of the protective plates 37 and 38 together with the stop member 36 adds significant protection to the adjacent corner portions of the outermost sheets of the stack. The cost of adding these protective plates is only negligible but the presence of the plates provides a considerable degree of protection when so desired.

In FIGS. 9 and 10 there are illustrated further modifications of the packaging device of the present invention with the device being of a construction similar to that shown in FIG. 8. In FIG. 9 there are two stacks 1 and 1′ of sheet articles supported on the floor panel 33 with the stacks being held by the frames 28′ and 28″ respectively. A spacer sheet S which may be resilient is sandwiched between the adjacent end faces of the two stacks. Reinforcing pieces 33′ are attached to the undersurface of floor panel 33 to provide additional support for the slings used in lifting the package.

In FIG. 10, there is shown a package in which there are assembled three stacks of sheets designated as 1^2, 1^3 and 1^4. Stack 1^2 comprises sheets whose length is slightly less than the floor panel 33 and stacks 1^3 and 1^4 are composed of shorter sheets which are assembled in alignment over the stack 1^2. A longitudinally extending horizontal panel 44 is interposed between the bottom stack 1^2 and the two upper stacks 1^3 and 1^4. The intermediate panel 44 is provided with stops 45 and 46 on its undersurface with the stops extending across the end edges of the sheets of stack 1^2 at the upper portions of these sheets. The intermediate panel 44 also carries end stops 47 and 48 on the upper surface thereof to extend across the outer end edges of sheets of the upper stacks 1^3 and 1^4. The stops 45 through 48 prevent relative longitudinal displacement between the intermediate panel 44 and the three stacks of sheet articles.

The intermediate panel 44 may also be nailed to the upright side members of the frames 28′ and 28″. The connections between the stops 45–48 and the intermediate panel 44 may be strengthened by the protective side plates 49 and 50 with there being another pair of such protective plates on the opposite side of the package. These protective plates are nailed to the ends of the stops and to the longitudinal edges of the intermediate panel and extend over the adjacent corner portions of the outermost sheets of the stacks to provide additional protection to these sheets.

A top panel 51 is nailed to the top members of the frames 28′ and 28″ to protect the top edges of the sheets of the upper stacks 1^3 and 1^4. On each side of the package there is a board 52 nailed to the side edges of floor panel 33 and the top panel 51 at such a position to cover the inner end portions of the outermost sheets of the upper stacks. One or more of such pair of boards 52 can also be used in a package containing only one stack or containing two vertically positioned stacks. A packing sheet 69 may be interposed between the two upper stacks.

The modified package shown in FIG. 11 is similar to that shown in FIG. 1 and retains a stack of sheets 1 within two vertical frames 51 and 51′ each composed of vertical side members 52 and top and bottom transverse members 53 and 54. Each of the members 53 and 54 comprises two components located on opposite sides of vertical members 52 with the components 52, 53 and 54 being nailed together in this relationship. A floor panel 55 extends through the frames and is nailed to the top edges of the bottom members 54 of the frames. At one end of the floor panel 55 is an end stop 56 having lateral protecting plates 57 and at the other end there is a similar end stop 58 with protective plates 59. A top panel 60 is nailed to the top members 54 of the frames and completely covers the top of the stack 1. A transverse piece 72 is attached to the inner edges of the vertical frame members 52 in a position so as to contact the upper edge of the stack and thus prevent the packaged sheets from tilting in the frames in the event that the sheets are suddenly thrust against a stop 56 or 58 such as may occur from a sudden braking of a vehicle carrying the packaged sheets.

The package of FIG. 11 is further provided with protective panels to strengthen the packaged assembly and to provide addition protection to the sheets. One such protective panel is indicated at 70 and comprises a lattice structure of vertical boards 61 nd cross pieces 62. The vertical boards 61 are fastened to the side edges of the floor panel 55 and the top panel 60. That portion of the stack 1 projecting outwardly from the frame 51′ is protected at its sides by side walls or panels 71 similarly formed of a plurality of vertically spaced horizontal strips 64 secured in spaced relationship to vertical boards 63 which are also connected to the floor panel 55 and top panel 60. The protecting panels 70 and 71 are substantially in the plane of the vertical side members 52 of the frames 51 and 51′. This other end portion of the stack 1 can also be protected by a similar or different arrangement of boards or panels. The ends of stack 1 are protected by end panels 65 and 66 which are secured to the end edges of the floor panel 55 and the top panel 60.

It is preferable for different portions of one face of a stack to be protected by elongated panels extending in different directions as illustrated in FIG. 11 since such a structure imparts greater strength to the packaging device.

It is pointed out that the frames of FIG. 1 and FIG. 11 comprise complementary frame sections whose adjacent sides may be made up respectively of an even and odd number of pieces so that the piece or pieces of one side may fit between the pieces of the other side at the corresponding corner of the frame. The L-shaped frame section as employed in the present invention can be formed from three rectangular bars with two bars being parallel and forming one arm of the L while the third bar has an end connected between the two parallel members to form the other arm of the L. In this manner two identical L-shaped sections are formed which may be easily connected together in inverted relationship with the single bar or each section fitting between the double bars of the other section.

This it can be seen that the present invention has disclosed a packaging device for sheet articles, such as sheets of glass, wherein a number of sheets are assembled in face-to-face relationship to form a stack and the stack is held within one or more substantially rectangular frames. A protective panel which is attached within the frames supports one edge of the stack and at the same time has stop members at its ends so as to prevent any longitudinal displacement of the stack with respect to the frames or floor panel. Such a package of sheet articles may be completely enclosed by protective panels so as to form a container but it is emphasized that these panels merely enclose the sheets and are not structural elements of the packaging device.

The packaging device of the subject invention is simple in structure, may be readily assembled at a minimum of cost in both materials and labor but properly protects sheets of glass and other fragile articles both during shipment and storage.

It will be understood that this invention is subject to modification in order to adapt it to different uses and conditions.

What is claimed is:

1. A packaging device for a stack of sheet articles comprising a frame including at least two L-shaped sections, each section comprising first and second arms, the first arms having slot means therein, the second arms of each L-shaped section being received in its respective slot means and being secured therein, said L-shaped sections being oppositely disposed around a stack of sheet articles such that the sheets are pressed against each other, the second arm of at least one of said L-shaped sections being received in the slot means of the opposed L-shaped section and being slideable therein for varying the relative dimensions of said frame, stop means engaging opposed faces of said stack and limiting movement of the sheet articles outwardly for said frame, and panel means supporting another face of said stack and interconnecting said stop means and the first arm of at least one of said L-shaped sections.

2. A packaging device as claimed in claim 1 wherein said L-shaped sections define a rectangular opening, said sections being connectable to vary the two dimensions of the rectangular frame opening.

3. A packaging device as claimed in claim 1 wherein the first arm of at least one said L-shaped sections extends beyond its connection with the adjoining L-shaped section to protrude outwardly of said frame.

4. A packaging device as claimed in claim 1 wherein said panel means interconnecting said stop means and said frame is a protecting panel on said packaging device extending over at least a portion of a face of the stack of sheet articles within the packaging device.

5. A packaging device as claimed in claim 4 wherein said panel is between the frame and the stack of sheet articles within the packaging device.

6. A packaging device as claimed in claim 5 wherein said panel has recesses in the edges thereof receiving a portion of at least one of said L-shaped sections which are perpendicular to said panel.

7. A packaging device as claimed in claim 1 and comprising a panel connected between said stop means and said L-shaped sections and extending over a portion of a face of the stack of sheet articles and protecting same, said stop means contacting the edges of the sheets which comprises the protected face.

8. A packaging device as claimed in claim 2 wherein said rectangular opening has one dimension greater than the corresponding dimension of the stack positioned within the frame.

9. A packaging device as claimed in claim 1 wherein said articles are sheets of glass.

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