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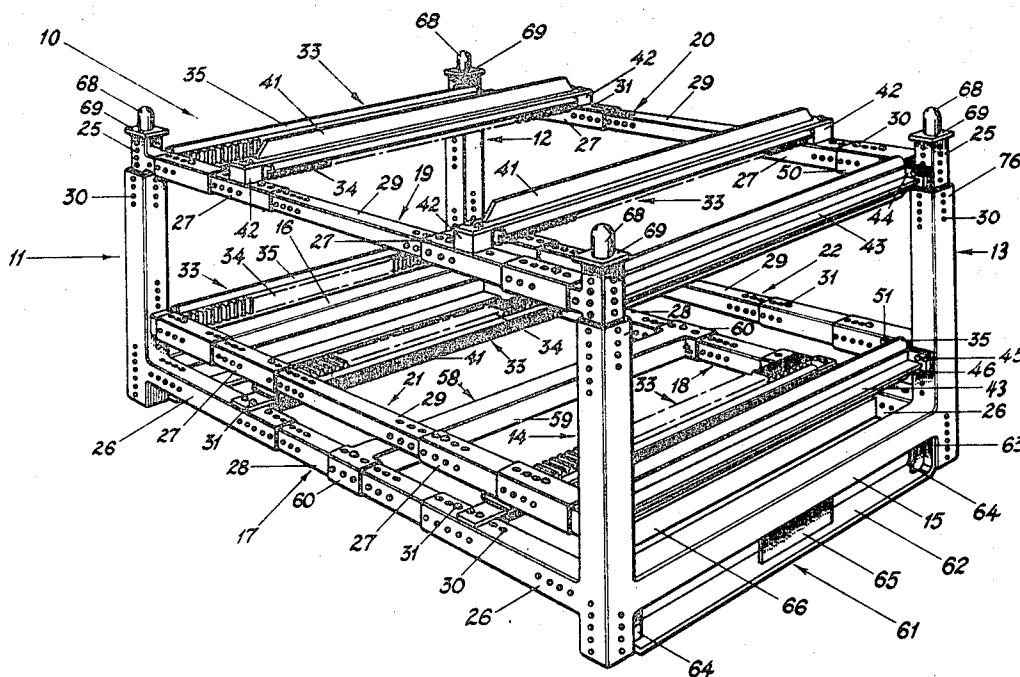
[54] **SHIPPING RACK**
9 Claims, 7 Drawing Figs.

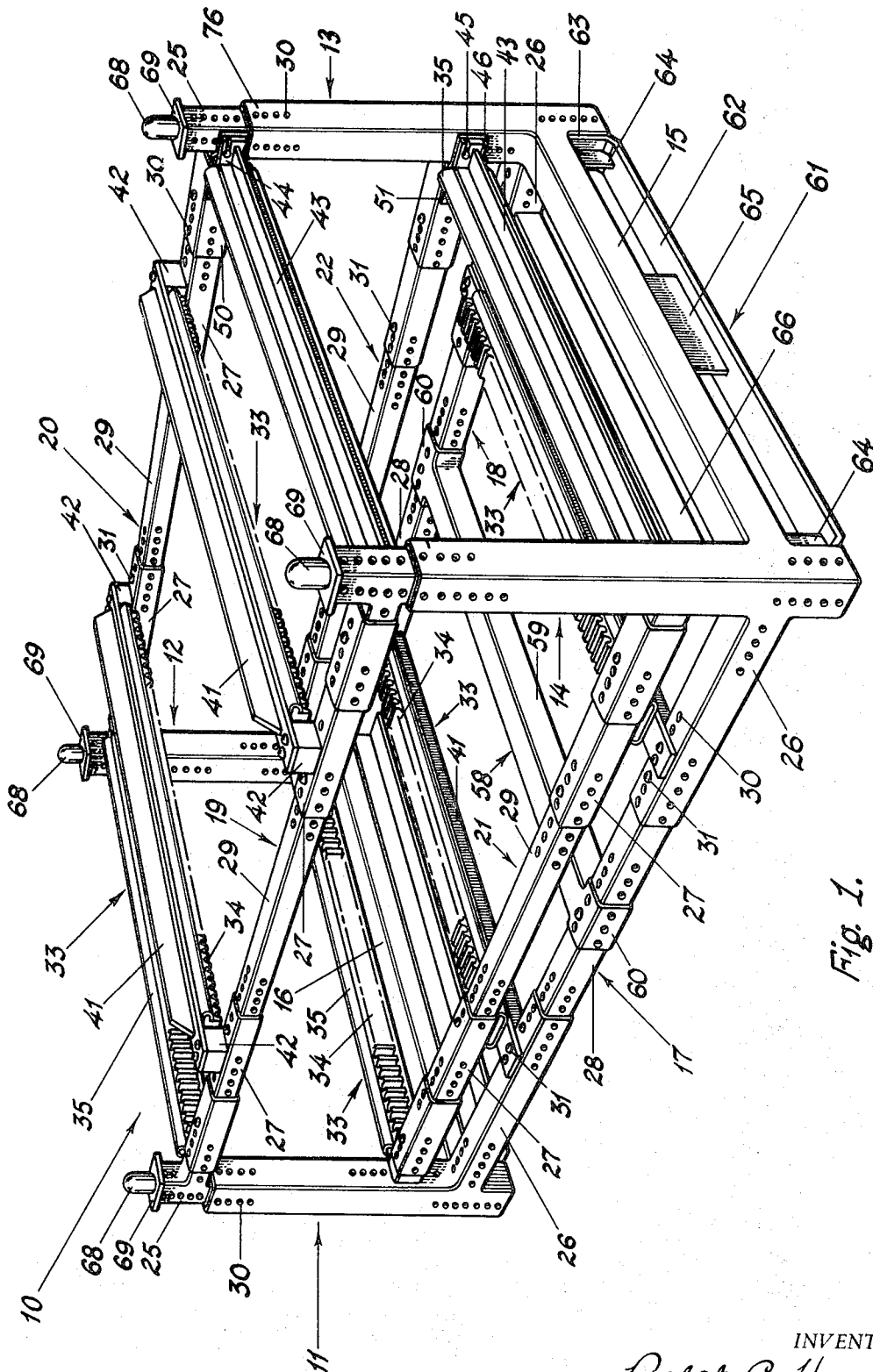
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ABSTRACT: A rack for shipping and storing multiple sheet glazing units. The rack can be adjusted both vertically and horizontally to accommodate various size units and includes resilient restraining members which grip the edges, leaving the critical corner areas free of restraint. The rack can be adapted to carry units either in a single row or in multiple rows.



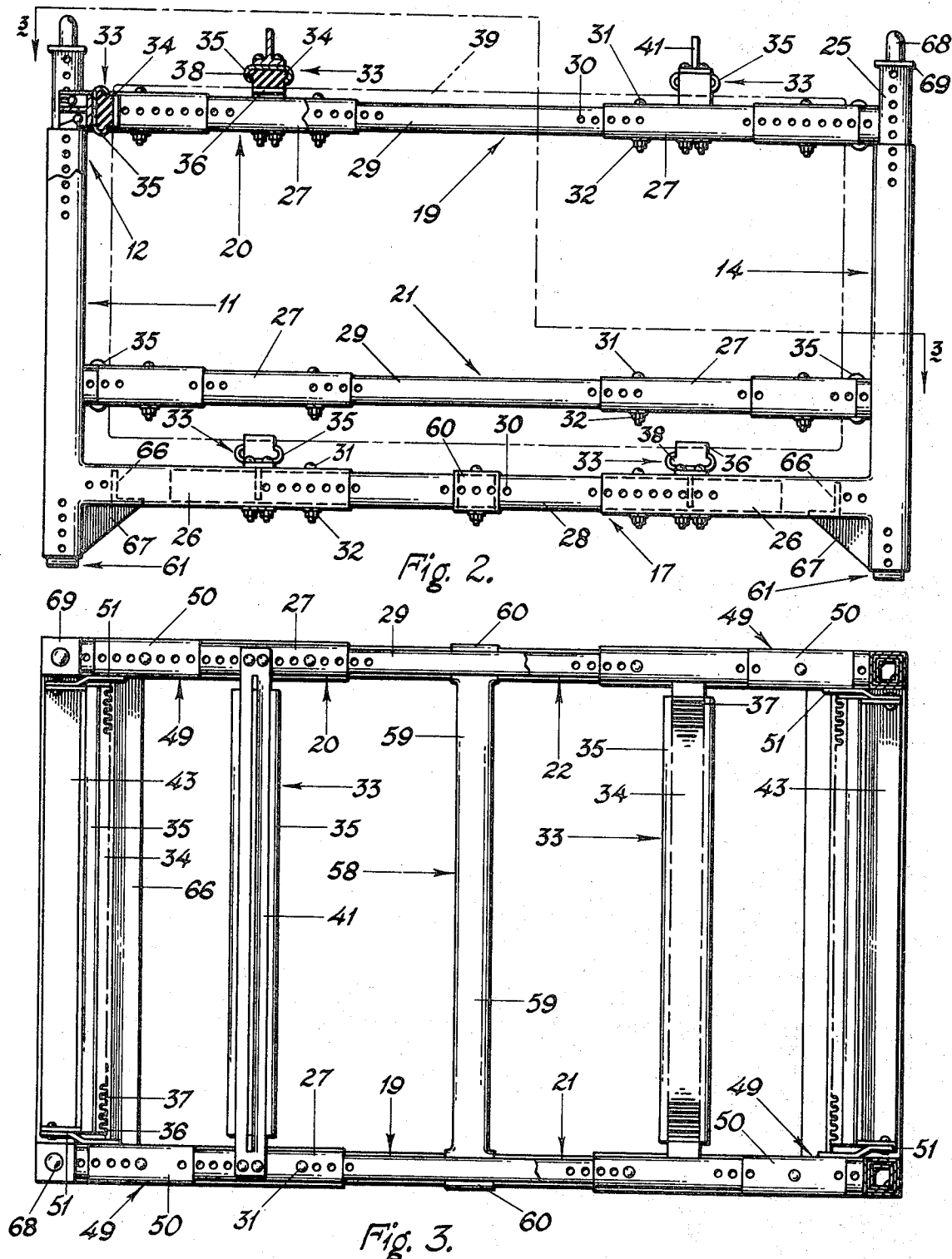


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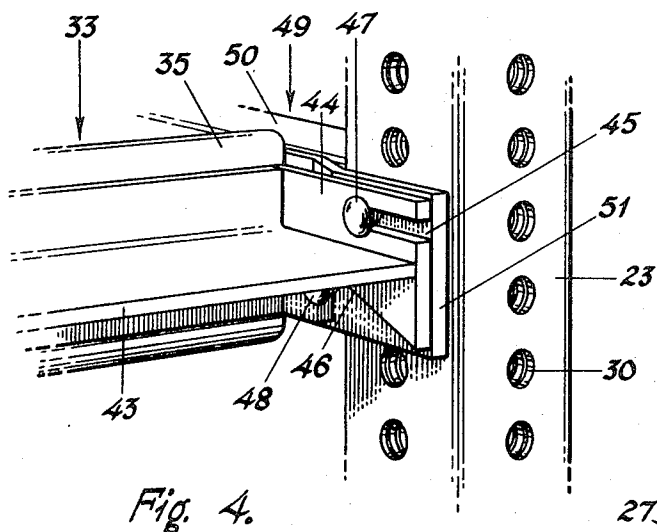


Fig. 4.

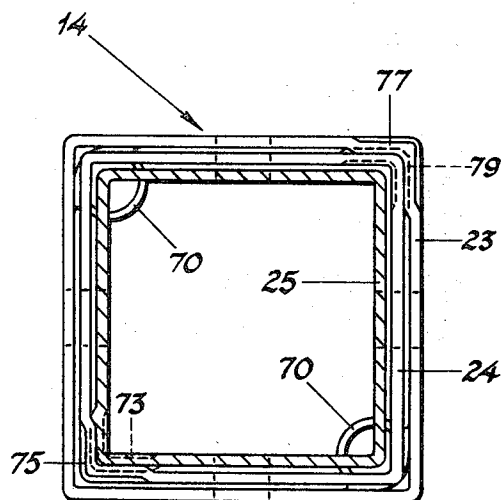


Fig. 7.

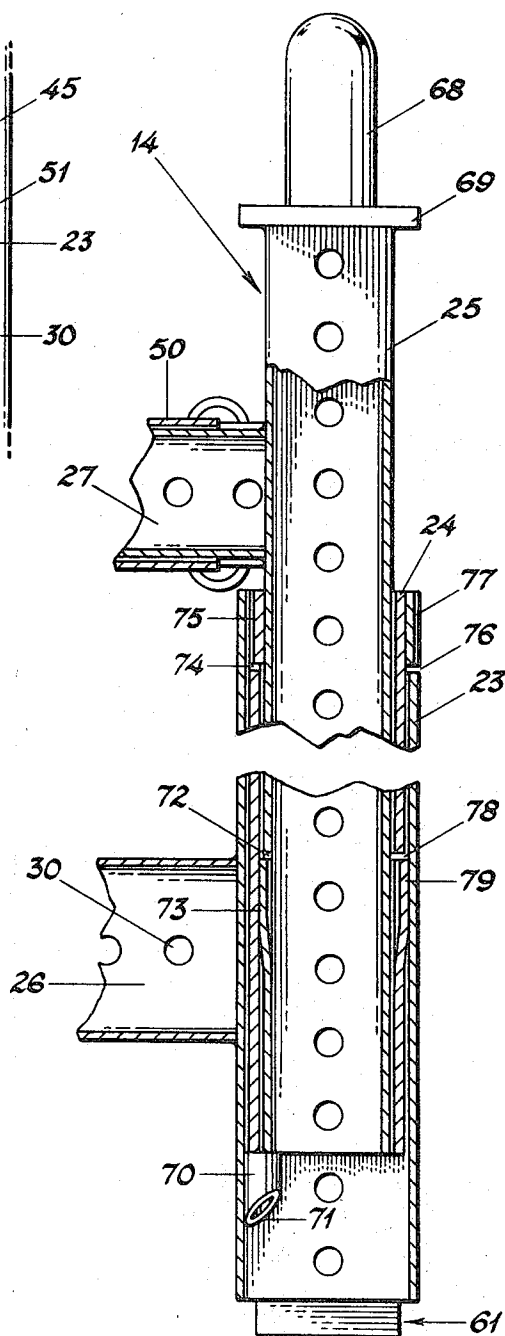


Fig. 5.

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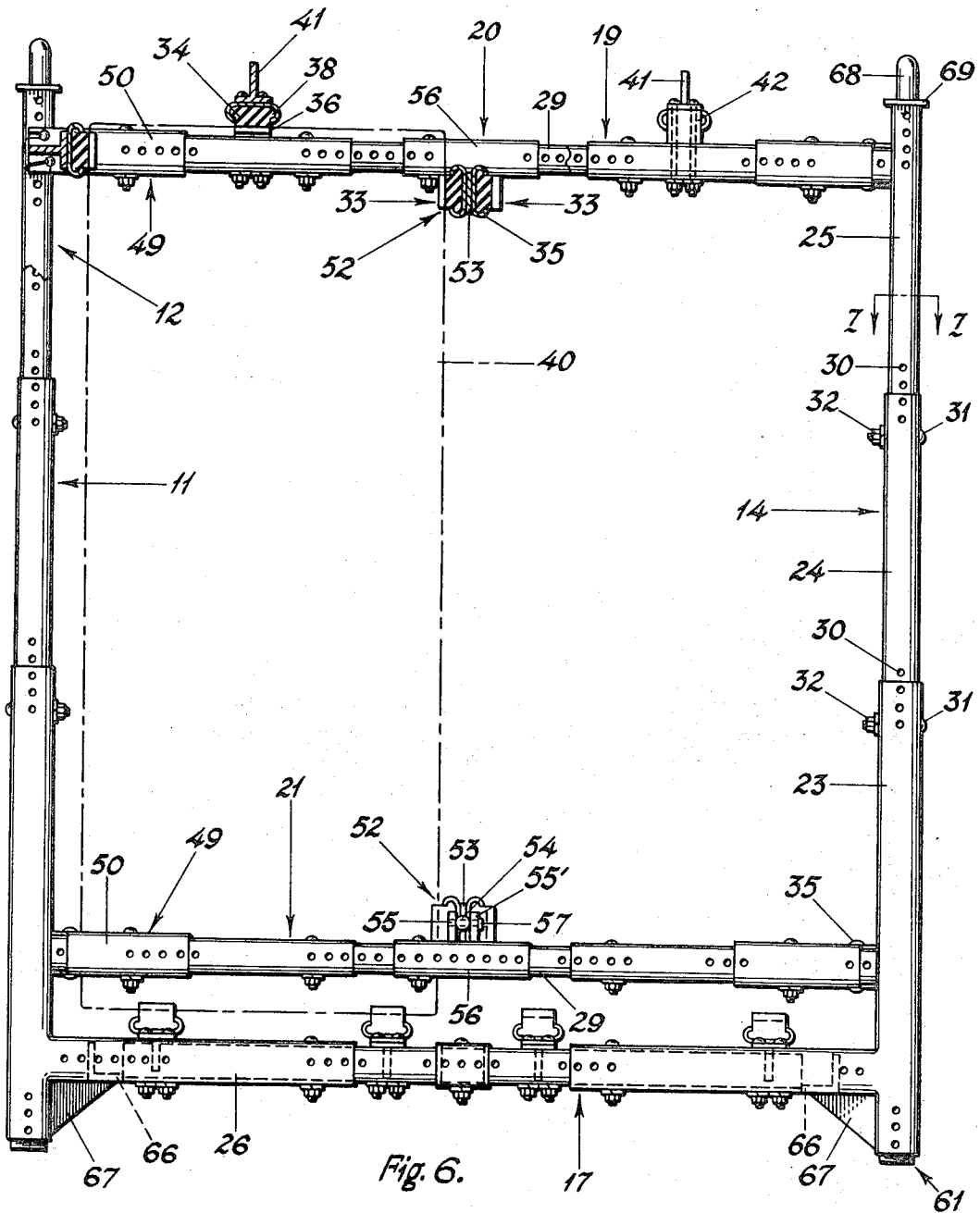


Fig. 6.

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SHIPPING RACK

The present invention relates broadly to the transporting of sheet materials and more particularly to an improved rack for shipping and storing multiple sheet glazing units.

It has heretofore been the practice to pack such glazing units in disposable wooden boxes for shipment. However, where the units are transported in large volume directly to fabricators such as producers of framed window units, such disposable packaging is generally costly and time consuming to build as well as to dispose of, as contrasted with reusable containers which can be repeatedly shipped back and forth between the producer of the glazing unit and the fabricator. Moreover, wooden containers and disposable separating materials do not offer adequate protection from breakage and surface damage in view of the fact that each glazing unit is completely finished when shipped, and substantial damage to any portion of the unit results in loss of the entire unit. In this connection, it has been found that the corners of the units are particularly susceptible to damage and must be given particular attention when disposable packaging is utilized.

Therefore, the primary object of this invention is to provide a reusable shipping rack which is adapted to safely carry a relatively large number of multiple sheet glazing units during the transportation and/or storage thereof.

Another object is to provide such a rack which will resiliently support the units in spaced face-to-face relation, leaving the corners unrestrained, without the use of additional separating or packing materials.

Another object is to provide a rack which is adjustable so as to accommodate units of different sizes in one or more rows as required with a minimum of wasted space, and which can be easily converted from carrying units of one size to those of a different size.

Another object is to provide a rack which includes means for rigidly stacking another similar rack upon the first.

Other objects and advantages of the invention will become more apparent during the course of the following description when taken in connection with the accompanying drawings.

In the drawings wherein like numerals are employed to designate like parts throughout the same:

FIG. 1 is a perspective view of a shipping rack constructed in accordance with the present invention;

FIG. 2 is a front elevational view of a shipping rack, with parts broken away;

FIG. 3 is a plan view, partially in section, taken substantially along line 3-3 of FIG. 2;

FIG. 4 is a fragmentary enlarged perspective view of mounting means for the unit restraining members of the invention;

FIG. 5 is an enlarged fragmentary vertical sectional view of one corner post of the shipping rack;

FIG. 6 is a front elevational view, partially in section, depicting a shipping rack modified to carry a double row of vertically disposed units; and

FIG. 7 is a partial sectional view taken along line 7-7 of FIG. 6.

Briefly stated, the shipping rack of this invention, while having utility in the shipping of glazing units generally, is particularly adapted for repeated use in the transportation of multiple sheet glazing units. A high level of protection is provided by means of a rigid metal frame and by the use of resilient restraining elements which define distinct channels separating adjacent units from one another while leaving their corners free of restraint. The members which comprise the frame of the rack are adjustable vertically and horizontally in order that the rack might accommodate various size units and eliminate the need for racks of a number of different sizes, thereby providing a saving in required storage space as well as a long-term saving in construction costs.

Referring now to the drawings and particularly to FIG. 1, there is illustrated a shipping rack constructed in accordance

with the invention and designated in its entirety by the numeral 10. Generally, the rack 10 comprises an open frame in the form of a rectangular parallelepiped and includes vertical corner posts 11, 12, 13 and 14, rigid horizontal end rails 15 and 16, a lower pair of adjustable horizontal front and rear longitudinal rails 17 and 18 extending between and connecting the end rails 15 and 16, an upper pair of adjustable horizontal rails 19 and 20 slightly smaller in cross section than the lower rails 17 and 18, and a pair of intermediate front and rear rails 21 and 22, all rigidly secured to the corner posts.

In the illustrated embodiments, each of the longitudinal rails and corner posts is constructed of a plurality of sections of square tubing which are of varying sizes so that they can be nested, or telescoped, together. Thus, each of the corner posts 11 to 14 is made up of three telescoping sections 23, 24 and 25, in decreasing order of size, as best shown in FIGS. 5 and 7; and each of the longitudinal rails 17-22 is made up of outer end sections rigidly attached to their respective corner posts and floating inner sections bridging the end sections. Preferably, the lower rails 17 and 18, being part of the main structure, are somewhat heavier than the upper and intermediate longitudinal rails and have outer or end sections 26 of the same cross section as the largest section 23 of the corner posts, while the intermediate and upper rails have outer sections 27 of the same cross section as the smallest section 25 of the corner posts. The floating center section 28 of the lower rail is somewhat smaller than the outer section 26 and is telescoped within the opposed outer sections, and the center sections 29 of the upper and intermediate rails are correspondingly smaller than and telescoped within the outer sections 27.

In order to retain the telescoped sections at a desired extension, at least two opposite walls of each square section are perforated by a plurality of centrally arranged, spaced holes 30. Retention is provided by bolts 31 which are inserted in aligned holes 30 of two or more sections and then secured by means of nuts 32 (See FIGS. 2 and 6). While the holes 30 may be drilled or punched where required during construction of the rack, it is preferable to employ tubing which has already been perforated. Such tubing is well known and readily available commercially with the holes in either two opposed sides or in all four sides. For the purposes of the present invention, either type is suitable.

To retain the glazing units within the rack, there is provided a plurality of restraining members 33 mounted between the pairs of lower and upper longitudinal rails 17-18 and 19-20, respectively, and the intermediate longitudinal rails 21 and 22, to receive and support the edges of the units. Each restraining member comprises a grooved pad 34 carried by a pad-retaining channel 35. The pads 34 can be a hard rubber or other resilient material, such as 70-durometer molded vinyl, which is sufficiently rigid to support the glazing units. Each pad 34 comprises a centrally disposed raised section 36 into which a plurality of transverse grooves 37 are cut or molded to receive the edges of the units, and protruding lugs or ears 38, on either side of the center section, which are retained by the channel 35.

The channel 35 is preferably of sheet metal and is formed from a single sheet of flat stock (e.g., 13Ga.) by bending the longitudinal edges over upon themselves to form opposed U-shaped channels which receive the lugs 38 of the pad 34. The pad can be retained in the channel by any convenient means such as by pointed set screws (not shown) threaded through the channel and bearing against the pad, by providing a tight fit between the lugs and the channel, or by crimping the channel.

There are several means provided for mounting the restraining members 33 depending upon the particular edge of the unit to be received and upon the manner in which the rack is used (i.e., whether it is used to carry a single row of horizontally disposed units 39 as shown in FIG. 2, or a double row of vertically disposed units 40 as shown in FIG. 6).

Thus, the restraining members 33 for the top and bottom edges of the units are mounted between the top and bottom longitudinal rails 17—18 and 19—20 by means of bars 41 of T-shaped cross section to which the restraining members are bolted or otherwise fastened, and which are then bolted to the rails through aligned pairs of holes 30. On the top rails, spacers 42 are interposed between the T-shaped bar and the restrainer in order to permit the restraining members for the side edges to be mounted on the upper rails while avoiding contact with the corners of the units. Vertical adjustment of the restraining members is provided by the telescoping corner posts 11—14 in combination with selection of the correct thickness of the spacers 42, and horizontal adjustment is made by selecting the proper pair of holes 30 through which to bolt the bar 41.

The restraining members 33 which contact the side edges of the units when a single, horizontally disposed row of units is carried on the rack, as shown in FIG. 2, or the outermost side edges when a double row of vertically disposed units is carried as shown in FIG. 6, are mounted so that they can be easily removed and replaced as required for loading and unloading the racks. To this end, the restrainer 33 is mounted on a T-shaped bar 43 (FIG. 4) similar to the bar 41 to which the top and bottom restrainers are mounted. The T-shaped bars 43 are coextensive with the restraining member 33, and end plates 44 are welded or otherwise fastened to either end thereof. Upper and lower slots 45 and 46, respectively, formed in each end plate are adapted to fit over upper and lower pins 47 and 48 protruding from a mounting sleeve assembly 49 which slips over the upper and intermediate longitudinal rails 19—22.

The mounting sleeve assembly 49 comprises a perforated, square, tubular sleeve 50 which is slightly larger than and slips over the end sections 27 of the upper and intermediate longitudinal rails, and a plate 51, affixed to one wall of the sleeve, by which the pins 47 and 48 are carried.

The sleeve assembly is mounted on the rack by sliding it over the rail with the plate 51 toward the inside of the rack. The protruding portion of the plate 51 is offset slightly so that when the sleeve assembly is slid over the end section of the rail and approaches the corner post, the plate will clear the post (See FIG. 3 and 4). The pins 47 and 48 are secured in the plate 51 with their heads protruding a sufficient distance to allow clearance for the slotted end plate 44. The pins are slightly out of vertical alignment, with the lower pin 48 closer to the sleeve 50. The top slot 45 in the mounting plate 44 extends inwardly from and perpendicular to the free end of the plate a sufficient distance to allow it to become aligned with the top pin 47, while the bottom slot 46 is cut at such an angle to the end that, in effect, a portion of the lower edge of the plate is cut away.

To place the restraining member 33 in position, it is first tilted upward so that only the upper slot 45 receives the upper pin 47. It is then moved toward the pins and at the same time tilted to a level position so that the lower pin 48 engages the slot 46. Because of the oblique relative disposition of the slots 45 and 46 and the offset placement of the pins 47 and 48, once the plates 44 are positioned over the pins, the end restraining members 33 will tend to remain in place since a definite force inward toward the center of the rack and a simultaneous upward tilt is required to remove them.

There is no independent vertical adjustment of the side restraining members 33; however, horizontal adjustment is accomplished by sliding the sleeves 50 over the end sections 27 until the desired position is obtained and then securing the sleeves by means of bolts received in aligned holes 30. To provide more accurate adjustment, the spacing of the holes 30 in the sleeves 50 is different from the spacing of the holes 30 in the end sections 27, so that there is a greater variety of aligned hole combinations than would be possible if there were equal spacing in both elements. For example, the holes 30 in the sections 27 are generally spaced 1 inch apart, while the holes in the sleeve 50 are spaced seven-eighths inch apart.

When the rack is adapted to carry vertically disposed units 40 as illustrated in FIG. 6, additional restraining members 33 are required to retain the innermost side edges of the units. These are mounted back to back to form a separator bar assembly 52 comprising the restrainers 33, and a flat separator plate 53 to which the restrainers are mounted and which terminates in cylindrical rods 54 butt-welded to each end thereof. The rods 54 are then received between spaced, parallel retaining lugs 55 and 55' fastened to and upstanding from square tubular sleeves 56 which fit over the center sections 29 of the upper and intermediate longitudinal rails 19—22. The rods 54 and the lugs 55, 55' are drilled to receive a retaining pin 57 which secures the separator to the sleeves. Horizontal adjustment is accomplished by sliding the sleeve along the center section and bolting through aligned holes 30. The spacing of the holes 30 in sleeve 56 can also be different from that in the center section 29 to provide a wider range of adjustment.

When large units are to be carried by the rack, it may be necessary to brace the lower rails 17 and 18 in order to maintain the rigidity of the rack. Preferably this is accomplished by means of a brace 58 which fits between the center section 28 of the lower bars, and consists of a long box section 59 having short box sections 60 welded or otherwise fastened perpendicular to either end thereof. The end sections 60 slip over the center sections 28 and are fastened by means of bolts.

To adapt the rack 10 for stacking and handling, runners 61 extending between the corner posts 11—12 and 13—14 are provided for supporting the rack upon the floor, with the lower ends of the corner posts spaced slightly above the support surface. Each runner 61 is formed with a substantially flat center portion 62 and upwardly directed end portions 63 secured to the respective end rail 15 or 16 as well as to the corner posts. Vertically disposed reinforcing plates 64 and 65 are secured between the runners 61 and the end rails with sufficient space left between them to provide openings for the fork of a conventional lift truck. Further bracing is provided by angle braces 66 rigidly fastened between the end sections 26 of the lower rails 17 and 18 and by webs 67 fastened between the center reinforcing plate 65 and the horizontal leg of the angle brace 66 (See FIG. 2 and 6).

To allow the racks 10 to be stacked upon one another, there is provided in the top of the inner or smallest section 25 of each corner post a stacking peg 68 adapted to be received in the bottom of the outer or largest section 23 of another, similarly constructed rack. Each peg 68 has a wide base portion 69 which provides support for the outer section 23 stacked upon it.

In order to prevent the intermediate or center and inner sections 24 and 25 of the corner posts from sliding out the bottom of the outer section 23, stops 70 are affixed to two opposite corners near the bottom of the outer section 23 of each post. These stops may comprise short sections of rod or tubing of sufficient diameter to provide a resting surface for the inner-sections as illustrated in FIGS. 5 and 7. In order that there will be sufficient clearance for the top of a stacking peg, the bottom of the rod can be cut at an angle as shown at 71 in FIG. 5.

To ensure that the telescoping sections of the corner posts will not disengage as they are being extended, for example in changing the rack from the configuration of FIG. 2 to that of FIG. 6, means are provided to prevent the center section 24 from extending beyond a preselected point on the outer section 23 and to prevent the inner section 25 from similarly extending beyond a certain point on the center section. As illustrated in FIG. 5, a saw cut 72 is made in one corner of the inner section 25 near the bottom of the section and an area of the corner just below the cut is driven outward as shown at 73 (FIG. 7). A similar cut 74 is made in the corresponding corner of the center section 24 near the top; however, in this case the area immediately above the cut is driven inward as shown at 75. As a result, when the inner section 25 is moved upward within the intermediate or center section 24 the outwardly driven area 73 of the inner section will contact the inwardly

driven area 75 of the intermediate section as the former nears full extension. A similar arrangement is made between the intermediate section 24 and the outer section 23 by means of a saw cut 76 and driven-in portion 77 in the outer section 23 and a saw cut 78 and driven-out portion 79 in the intermediate section 24. Approximately 4 inches is allowed between the bottom of the inner and intermediate sections and the lower saw cuts 72 and 78 in order to provide stability when the sections are fully extended.

Briefly describing the manner in which the rack is used, for example in transporting horizontally disposed units as best illustrated in FIGS. 1 and 2, the restraining members 33 for the top and bottom edges of the units are first positioned vertically by adjusting the extension of the corner posts so that the unit will be able to slide freely within the grooves 37 and still be retained thereby. The units can then be inserted into the rack from either end and the side retaining members 33 snapped into place by placing the plates 44 over the pins 47 and 48 as described above. Final horizontal adjustment can be accomplished by sliding the sleeves 50 over the sections 27, and then locking them in place by bolting through the holes 30. When all the restraining members are in place, the units are held securely but resiliently and the corners, which are susceptible to damage upon impact, are free from restraint.

It is to be understood that the forms of the invention herewith shown and described are to be taken as preferred embodiments only of the same, and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of the invention.

I claim:

1. In a shipping rack for glazing units, comprising an open frame generally in the form of a rectangular parallelepiped including pairs of front and rear upstanding corner posts, upper, intermediate and lower longitudinal rails extending between said pair of front corner posts and between said pair of rear corner posts, an end rail extending between each of the corresponding front and rear corner posts, first restraining members extending between and carried by said front and rear lower longitudinal rails for receiving the lower edges of said glazing units, a second restraining member extending between and carried by said front and rear upper longitudinal rails for engaging the upper edges of said glazing units, and third restraining members extending between and carried by said front and rear intermediate longitudinal rails for engaging the side edges of said glazing units; the improvement comprising means for attaching the restraining members engaging the side edges of said units, including a tubular sleeve surrounding said intermediate longitudinal rails adjacent said corner posts, a first mounting plate attached to said sleeve on the inward facing side thereof, a second mounting plate attached to the end of said restraining member perpendicular thereto, and means

formed on said plates for attaching them together in face-to-face relation.

2. A shipping rack for glazing units as claimed in claim 1, in which said corner posts are extensible, and including means retaining said extensible posts in any of a plurality of extended positions whereby said rack can accommodate glazing units of different vertical dimensions.

3. A shipping rack for glazing units as claimed in claim 1, in which said upper, intermediate and lower longitudinal rails are extensible, and including means retaining said extensible longitudinal rails in any of a plurality of extended positions, whereby said rack can accommodate glazing units of different horizontal dimensions.

4. A shipping rack for glazing units as claimed in claim 1, in which said corner posts are extensible and include at least two telescoping tubular sections, said lower longitudinal rails being connected to the lower of said telescoping sections and said upper longitudinal rails being connected to the upper of said telescoping sections, and means retaining said extensible corner posts in any of a plurality of extended positions, whereby said rack can accommodate glazing units of different dimensions.

5. A shipping rack for glazing units as claimed in claim 1, in which said longitudinal rails are extensible and include tubular end sections affixed to the respective corner posts, a center floating section telescopically received by said end sections, and means retaining said extensible longitudinal rails in any of a plurality of extended positions, whereby said rack can accommodate glazing units of different horizontal dimensions.

6. A shipping rack for glazing units as claimed in claim 1, in which each of said restraining members comprises a rigid base, a grooved, resilient pad fastened to said base, and means to releasably attach said rigid base to said longitudinal rails.

7. A shipping rack for glazing units as claimed in claim 1, in which said means attaching said plates together comprises a pair of pins extending from said first plate and engageable with complementary slots formed in said second plate.

8. A shipping rack as claimed in claim 7, in which said pins are spaced apart vertically with the upper pin offset toward the outside of the rack, and said slots are formed oblique to one another, said relative placement of said slots and pins being such to require pivotal movement of said second plate relative to the first to enable said slots to engage said pins.

9. A shipping rack for glazing units as claimed in claim 1, in which said tubular sleeve has a plurality of holes formed therethrough and aligned along the axis of the sleeve, said holes being adapted for alignment with similar holes formed in the rail which said sleeve surrounds for the passage of a securing pin therethrough, the relative spacing of said holes in said sleeve being different from the relative spacing of the holes in said rail.

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