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[54] **DEVICE FOR SUPPORTING SHEET MATERIALS**

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[52] **U.S. Cl.** **211/50,** 211/134

[51] **Int. Cl.** **A47f 5/10,** A47f 7/00

[58] **Field of Search** ..... 211/134, 149, 49 R, 211/44, 28, 42, 45, 47, 50, 51, 85, 178

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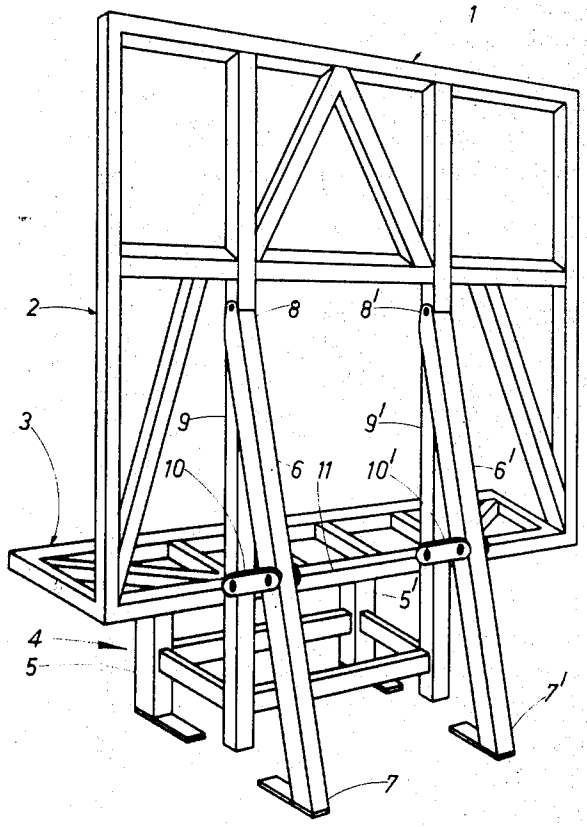
[57] **ABSTRACT**

A supporting device for a load of sheets comprises an L-shaped structure having a wall upstanding from the rear portion of a supporting surface and supported by front and rear leg means. The rear leg means comprises a rear leg member pivotally mounted on the device to pivot between a position in which the rear wall is vertical and another position in which the rear wall is inclined. A catch member is pivotally mounted on the device and locks the movable rear leg member in a position to incline the supporting device. When the device is in a vertical position the catch member is pivoted to an inoperative position and the movable rear leg member is pivoted back to its position wherein the supporting device is vertical.

10 Claims, 4 Drawing Figures



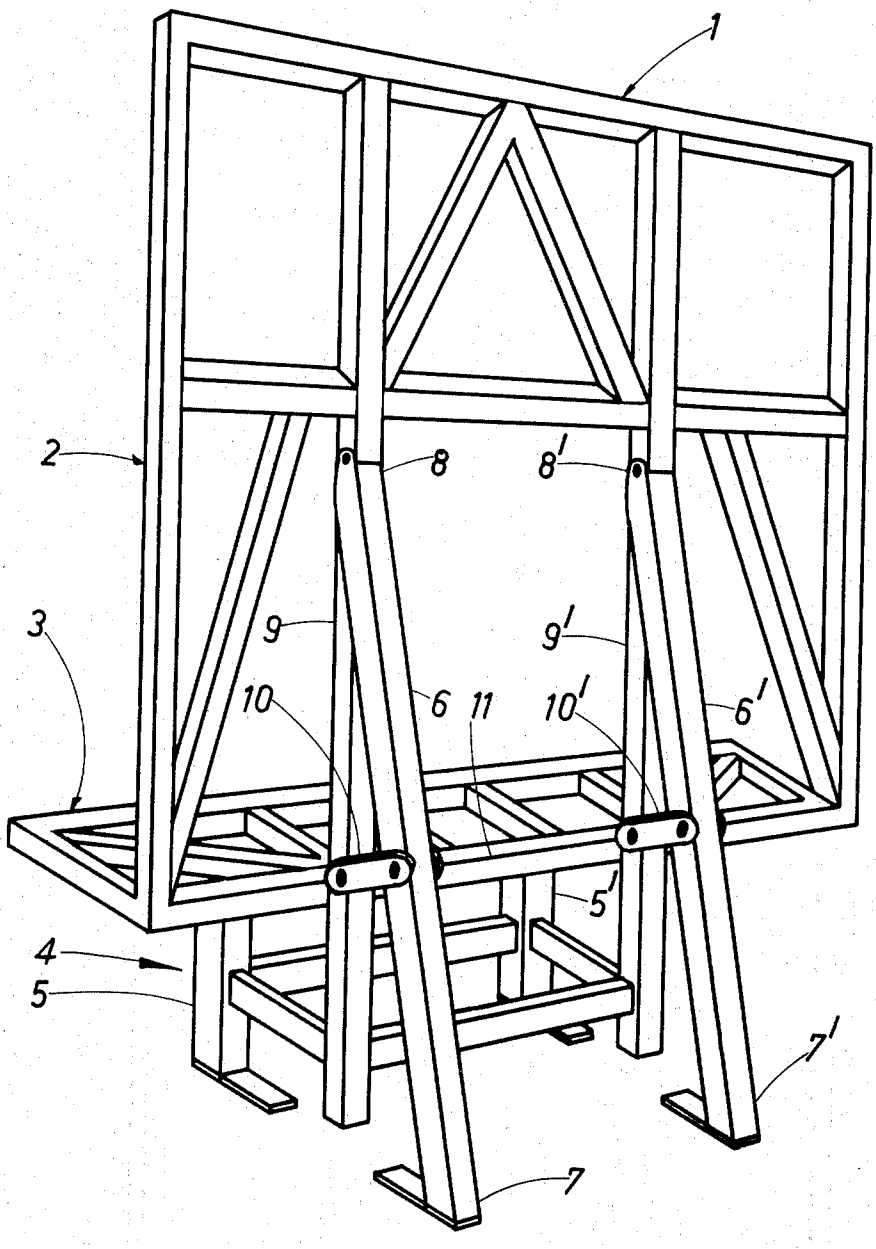


Fig.1.

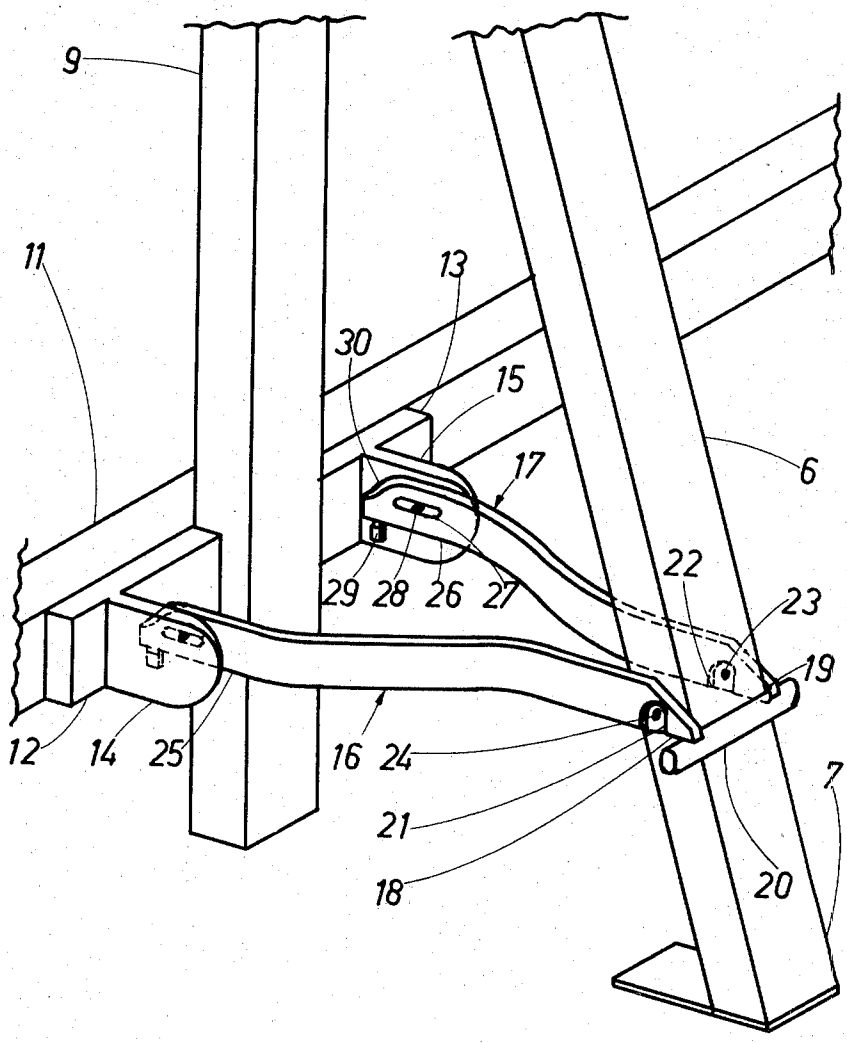


Fig.2.

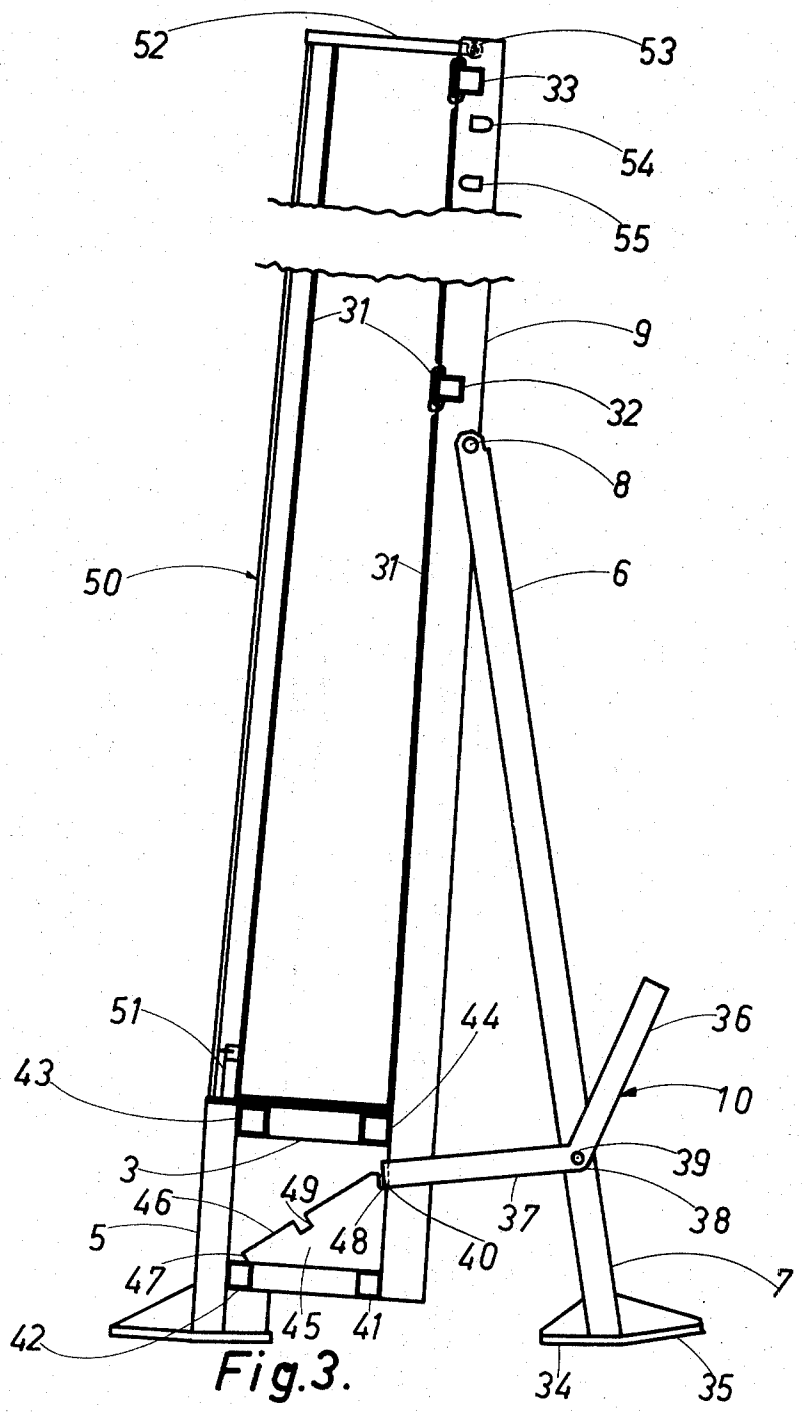

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Fig.3.

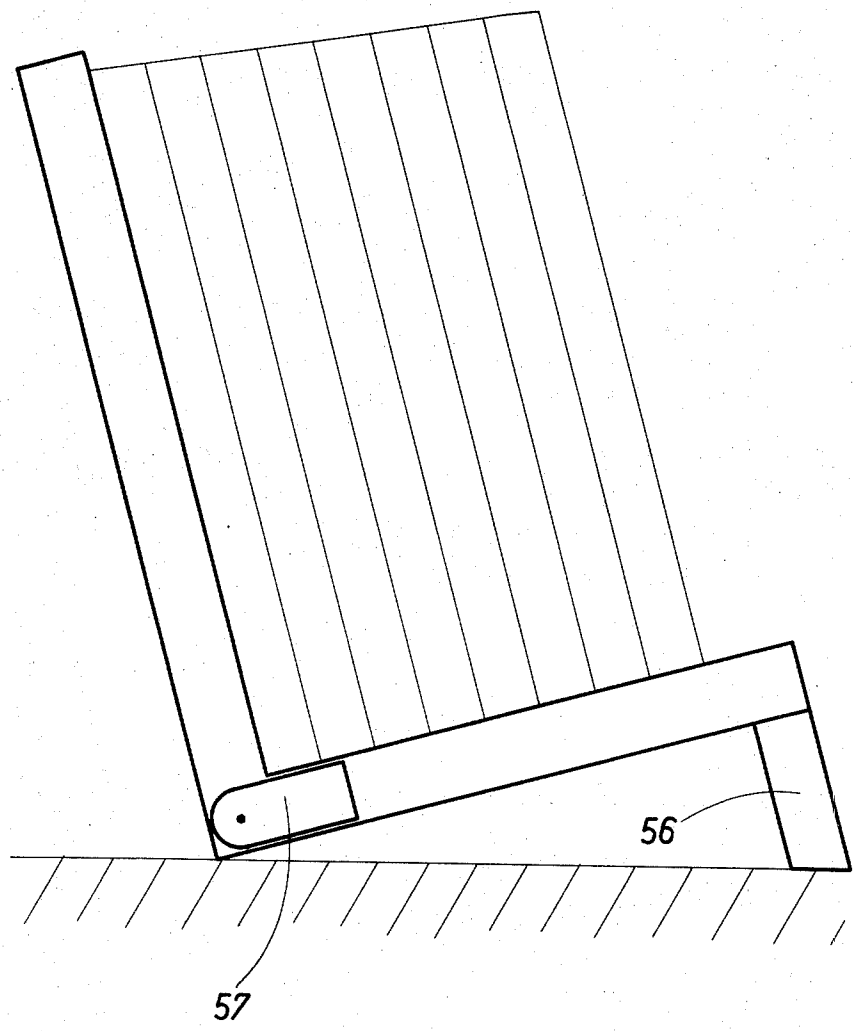

Fig. 4

DEVICE FOR SUPPORTING SHEET MATERIALS

The present invention relates to a device for supporting a load of sheets thereon, more particularly, to such a device wherein the sheets are positioned edgewise on a supporting surface and lean against an upright wall and the device is positionable in a vertical or rearwardly inclined position.

In the production of flat glass, various forms of load supporting devices have been used to hold the unit loads of glass sheets as they come from the production line. Similar or other forms of load supporting devices have been used for holding such loads of glass sheets in warehouses during storage or in vehicles during transportation. Such devices have also been provided with wheels to facilitate the movement of loads of sheets over relatively short distances, such as from the production plant to a shipping dock or a warehouse. Since such devices are generally provided with raised load supporting surfaces they can be lifted or carried with their loads in place by fork lift trucks or other handling apparatus so that it is not essential that the devices be always equipped with wheels.

These supporting devices are generally loaded by individually carrying each sheet over the front edge of the supporting surface and releasing the sheet so that its face leans against a wall extending upwardly from the rear portion of the load supporting surface. Each subsequently loaded sheet thus rests against the face of the previously loaded sheet. Unloading of this device is accomplished by the reverse sequence of the above operation. The loading and unloading operations thus require that the front of the supporting device be unobstructed by any load retaining wall or other structure. Basically, the supporting devices comprise a raised load supporting deck or surface and a rear wall upstanding from the rear portion of the supporting deck so that when the device is viewed from the end thereof the supporting surface and wall define a substantially L-shaped structure.

During the loading and unloading operation the sheets which may be on the device at any given time must be stably supported. Since it is undesirable to provide any form of retaining structure on the front portion of the supporting device it is generally provided that the upstanding wall is inclined rearwardly and the sheets are leaned against this inclined wall. Such a structure is relatively inefficient because the volume of storage space required for accommodating a storage device is disproportionate with respect to its load bearing capacity. When it is necessary to accommodate a large number of supporting devices loaded with sheets, the inefficiently used storage space increases directly in proportion to the number of devices being stored.

It is therefore the principal object of the present invention to provide a novel and improved device for supporting a load of sheets and requiring a minimum of storage area.

It is another object of the present invention to provide a supporting device for sheet material which enables sheets of glass and other material to be economically and efficiently stored, handled and transported.

It is a further object of the present invention to provide a device for supporting a load of sheets thereon in vertical position and upon which the sheets may be efficiently loaded or unloaded.

According to one aspect of the present invention, the device for supporting a load of sheets may comprise supporting surface means having front and rear leg means. Wall means are upstanding from the rear portion of the load supporting surface means so as to support a load of sheets placed edgewise on the supporting surface and leaning against the wall means. The rear leg means comprises movable rear leg means pivotally mounted on the supporting device to pivot between a position in which the wall means is substantially vertical and another position in which the wall means is inclined rearwardly from the bottom to the top thereof.

The supporting surface means and the wall means essentially define an L-shaped structure and a movable leg or legs may be pivotally mounted from a point on the wall means above the supporting surfaces. A catch member is pivotally mounted on the device and locks the movable rear leg in a position wherein the supporting device is inclined. The catch member can be pivoted to a vertical position in which it is inoperative to enable the movable rear leg to be pivoted to a position in which the supporting device is substantially vertical. A retaining member may be provided to pass over and in front of the load of sheets and be detachably connected to the upper portion of the wall means and/or to the front portion of the supporting surface means.

The movable rear leg may also be pivoted to the lower portion of the supporting device so that when the device is in the inclined position the rear portion of the device will be supported at the junction of the supporting surface and upstanding wall means.

The supporting device of the present invention is particularly advantageous since during loading the device can be positioned with its rear wall inclined and the loaded device can then be stored in a vertical position in which it occupies a considerably smaller space. The floor space occupied by a loaded device in a vertical position is up to 45% less than for other known storage devices. Accordingly, the given area of a storage room, a transport container or vehicle can hold a considerably greater number of loaded devices of the present invention than previously known sheet supporting devices. It is apparent that while the rear wall of the storage device should be inclined during loading and unloading operations it is not necessary that the wall be inclined when the device has been loaded and is being stored or transported. At these times when the supporting device is in a vertical position the load is retained in position by suitable retaining straps or bars.

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 perspective device according to the present invention and looking at the rear thereof;

FIG. 2 is a perspective view but in enlarged scale showing details of the construction of the catch member on the supporting device of FIG. 1;

FIG. 3 is a side elevational view of a modified supporting device; and

FIG. 4 is a side elevational view of a portion of still another modification of the load supporting device 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 modifica-

tions of the present invention will be described in detail.

In FIGS. 1 and 2 a sheet supporting device according to the present invention is indicated generally at 1 and comprises a rear wall 2 which is upstanding from the rear portion of a raised load supporting deck or surface 3. The rear wall 2 and supporting deck 3 form an L-shaped structure when viewed from a side elevation. The load supporting deck 2 and the rear wall 3 may take any suitable form as long as supporting surfaces appropriate to the functions are provided. The terms both "surface" and "wall" do not necessarily require a continuous planar supporting surface. Either one or both of these components may comprise a panel providing a continuous or substantially continuous surface or framework or a plurality of spaced members such as slats or bars. In the embodiment of the present invention the wall 2 and deck 3 are formed of bars which may have a rectangular, I- or channel section.

The supporting device 1 further comprises a base portion 4 having two fixed front legs 5,5' secured to the load supporting deck 2.

There are two rear legs, 6,6' whose upper ends are pivotally connected at 8,8' to rear uprights 9,9' which are elements of the rear wall 2. The legs 6,6' may comprise channel section members and in the drawings are shown in their rearward positions in which, together with the front legs 5,5', the load supporting device is supported with its rear wall 2 inclined rearwardly from bottom to the top thereof.

The rear legs 6,6' can be pivoted inwardly from the illustrated positions into vertical positions in which the fixed uprights 9,9' are accommodated within the channel section of movable legs 6,6'. In the inward or vertical positions of the rear legs their lower ends 7,7' are positioned under the uprights 9,9' and the legs 6,6' together with the fixed front legs 5,5' support the device in a substantially vertical position in which the rear wall 2 is vertical. The supporting device is therefore very stable in its inclined as well as in its vertical position regardless of the depth of the load supporting deck 3 as measured from its front to rear edges.

By pivotally connecting the rear legs 6,6' to the rear wall at points spaced above the lower edge of the rear wall good stability of the supporting device in the inclined position is achieved.

The load supporting device may be provided with wheels mounted on the front and rear legs.

When the supporting device is in its inclined position as illustrated in FIG. 1, the load supporting deck 3 will be inclined downwardly from front to rear and sheets can be loaded edgewise onto the deck and leaned against the inclined rear wall 2 without risk of the sheets slipping off the deck. After the supporting device has been loaded, the rear legs 6,6' are pivoted inwardly to the vertical position to support the device in an upright position.

Proceeding next to FIG. 2 the locking arrangement 10 shown in FIG. 1 is illustrated in greater detail. This locking arrangement is for the purpose of locking the rear legs 6,6' in their rearward positions as shown in FIG. 1. Brackets 12,13 are attached to the rear horizontal bar 11 at the bottom of rear wall 2 on opposite sides of upright 9. The brackets 12,13 have rearwardly extending lugs 14,15. A catch loop or locking member comprises side members 16, 17 and a cross piece 20 having projecting end portions is attached to the outer ends 18, 19 of the side members. The catch loop is pivotally mounted on the lugs 14, 15 and is positioned over rear leg 6 as shown in FIG. 2. The ends 18, 19 of the side members 16, 17 are provided with downwardly opening notches 21, 22 for receiving studs or pins 23, 24 projecting from opposite sides of the rear leg 6.

The end portion 26 of side member 17 is provided with an elongated slot 27 which receives a pivot pin 28 projecting from the inner face of the lug 15. A stop 29 is also provided on that lug inner face. Similarly, the end portion 25 of the side member 16 is provided with a slot which similarly receives a pivot pin. Further, the inner face of lug 14 is provided with a stop similar to stop 29. This pivotal arrangement enables the catch loop to be pivoted upwardly from its illustrated operative position into a substantially vertical inoperative position and to be locked in this vertical position.

When the catch loop is in its illustrated position the stop 29 and the corresponding stop on lug 14 prevent any upward pivotal movement of the loop from pivot pin 28 and the corresponding pin on lug 14. The catch loop is thus held against inadvertent disengagement from the pins 23, 24 on rear leg 6. The leg 6 is thus positively locked in its rearward position in which the load supporting device is in its inclined loading/unloading position.

In order to tilt the load supporting device into its vertical position, the catch loops locking the rear legs 6,6' in their rearward positions are urged rearwardly by striking the projecting end portions of the cross pieces 20 so that the ends of the catch loops are moved clear of the stops 29. The ends of the loops are then pivoted upwardly sufficiently to disengage the notches 21, 22 from the pins 23, 24. The legs 6,6' are then swung inwardly against the upright members 9,9'. During this inward pivotal movement of the legs 6,6' the pins 23, 24 ride along the bottom edges of the side members 16, 17 of the catch loops so that these loops are automatically swung upwardly into vertical positions alongside the legs 6,6' and the uprights 9,9'. When the catch loops approach the vertical positions they drop by gravity a distance defined by the ends of slots 27 engaging the pivot pins 28. The inner ends of the side members are shaped to provide inclined portions such as shown at 30 on side member 17. As the catch loop descends vertically these inclined portions move downwardly behind the stops 29 on the lugs 14 and 15. The stops prevent the catch loops from pivoting downwardly unless the catch loops are first raised with respect to the pivot pins 28. The catch loops are thus conveniently accommodated on the supporting device when the rear legs are in their inward or vertical positions.

The load supporting device illustrated in FIG. 3 similarly comprises the load supporting deck 3 and a rear wall incorporating the vertical uprights 9 with rear legs 6 being pivotally connected with the rear uprights in the manner as previously described. Only a single rear leg 6 is illustrated in FIG. 3, it being understood that there is provided a second similar leg. Rear leg 6 also has a foot portion 7 and is pivotally connected at 8 to the vertical upright 9.

The load supporting deck 3 and the rear wall are constructed from metal members and a resilient lining material 31 is secured to both the load supporting deck and the rear wall, including the uprights 9 and horizontal bars 32, 33, in order to protect the glass sheets from contact with the metal members.

The foot portion 7 of rear leg 6 is provided with an angled base portion having bottom contact surfaces 34 and 35 which are in different planes the angles of which with respect to the longitudinal axis of the leg 6 are such that when the leg 6 is in its rear position surface 34 will be horizontal, whereas when the leg 6 is in its inward vertical position the surface 35 will be horizontal.

The locking arrangement for leg 6 in this modification comprises a catch member 10 essentially in the shape of a crank and having angular arms 36, 37 extending from an elbow portion 38. When viewed in plan, the catch member is essentially in the form of a rectangular elongated loop through which the pivotable rear leg 6 passes. The catch member is pivoted at elbow portion 38 to the rear leg by a pivot pin 39. The arm 37 extends around the upright 9 so that end portion 40 of the arm 37 is disposed in a rectangular space located below the load supporting deck 3 and bounded at the four corners thereof by transverse tubular bars 41, 42, 43 and 44. Within this rectangular space and in the vertical plane of upright 9 there is fixedly mounted a triangular plate 45 having an inclined edge 46 in which are provided locking recesses 47, 48, 49 to receive the end portion 40 of the arm 37. The arm 37 is engaged in recess 48 when the rear leg 6 is in its rearward position as illustrated in FIG. 3 in which the load supporting device is inclined to the vertical for a loading or unloading operation. The arm 37 is positioned in recess 47 when the leg 6 is in its inward vertical position in which the load supporting device is vertically positioned. The leg 6 can also be retained in an intermediate position by positioning end portion 40 of the arm 37 in the notch 49. The angled catch member 10 can be readily manipulated by its rearwardly projecting arm 36. A similar locking system may be provided for the other rear leg of this device.

The supporting device of FIG. 3 is provided with a load retaining member which permits a load of sheets to be readily and securely retained on the supporting device. In the absence of such a retaining member the load can be secured by tying with a cable or rope. However, retaining by tying is not as satisfactory as by the use of a load retaining means to be presently described.

The supporting device of FIG. 3 is provided with a load retaining member comprising a vertical front retaining bar 50 having at its bottom a latch pin 51 which is received in a socket in the top of the fixed front leg 4 and is then pivoted to lock the pin in engagement with the front leg. The top of retaining bar 50 is connected to the rear upright 9 by a metal plate 52 one end of which has a hole which receives the upper end of bar 50 and whose other end is connected to the upright 9 by a bolt 53. The retaining member comprising vertical bar 50 and top bar 52 thus bears against the front and top of the load of sheets respectively and retains the load on the supporting device when the device is in its vertical position. A similar retaining member may be provided at the other end of the device in the vicinity of the other fixed front leg 5'.

The rear upright 9 has two oppositely directed half rings 54 and 55 at its upper end portion which can be engaged by a lifting sling for stabilizing the load supporting device while it is being lifted, such as by a crane.

The load retaining member in FIG. 3 has been disclosed as contacting both the front and top of a load of sheets but, if desired, such a load retaining member may engage either the front or the top of the load. The load retaining members are preferably detachable so that they can be disconnected from the supporting device when not in use. The same load retaining member can be used on other load supporting devices of similar structure.

As a further modification one or more load retaining members may be permanently connected to the supporting device but are movable into an inoperative position in which the movement of sheets onto or from the device is unhindered. Such a load retaining member may comprise an arm which is pivotally mounted to the top of the rear wall of the device and has a stop portion which is positioned in front of the top edge of the outermost sheet of the load when the arm is pivoted into its operative position across the top of the load of sheets. Suitable clamping means are provided for locking the arm in its operative position. One or more load retaining arms may be pivotally connected to the load supporting deck 3 of the supporting device and suitable means may be provided for clamping such arm in an operative position in which the arm will contact the outer face of the outermost sheet of the load.

A load retainer may also comprise a resiliently extensible strip with the ends of the strip being detachably connected to suitable fastener elements at the top portion of the rear wall and front portion of the supporting deck. In this manner the resilient strip can be quickly connected under tension to retain securely the load of sheets on the supporting device.

While several forms of retaining structures may be employed as discussed above, the load retaining member 50, 52 as shown in FIG. 3 is preferable since it has considerable strength and may be quickly connected or disconnected from the supporting device. Preferably, the bar-to-bar and/or the bar-to-device connections are of the pin-and-hold type with there being a series of holes at different positions so that the effective lengths of the retaining bars can be selected in accordance with the overall dimensions of the load of sheets. The retaining bars, such as 50 and 52, are preferably lined with resilient material along their inner surfaces so as to prevent any damage to the edges of the sheets in the load.

In FIG. 4 there is shown further modification of a load supporting device according to the present invention. This supporting device comprises a pair of front legs 56 and a pair of rear legs 57 with only one leg of each pair being visible in the drawing. The rear legs 57 are pivotally mounted at their upper ends to the angle of the L-shaped supporting structure so that they can be pivoted into the illustrated position in which the supporting device will stand on its front legs and the bottom edge of the rear wall. In this position, the device is an inclined position which is suitable for the loading and unloading of the device. When loading has been completed, the rear of the supporting device may be raised, such as by a fork lift truck, sufficiently to permit the rear legs 57 to be pivoted downwardly to their vertical operative position and secured by suitable locking means not shown but know in the art.

Instead of two rear legs as illustrated in FIG. 4, only a single rear leg may be provided. However, to insure good stability of the loaded device the single rear leg should have an appreciable horizontal dimension parallel with the length of the supporting device. The single leg may be in the form of a rectangular frame or in the

shape of an inverted T with the cross piece comprising the base which engages the ground.

The subject device of FIG. 4 does not depend for stability in the inclined position on any positive locking or location of the rear legs. The inclined position stability merely requires that the load supporting deck have sufficient depth measured from front to rear.

Suitable locking means may be provided for positively locking the rear leg or legs **57** in different positions corresponding to different inclinations of the supporting device. The supporting device can then be suitably inclined with respect to different loads and the position in which the rear leg is locked can compensate for any unevenness of the floor or other conditions of use. As a result, excellent stability is achieved for the supporting device when it is loaded or unloaded and in an inclined position.

It is understood that this invention is susceptible to modification in order to adapt it to different usages and conditions and, accordingly, it is desired to comprehend such modifications within the invention as may fall within the scope of the appended claims.

What is claimed is:

1. A device for supporting a load of sheets edgewise comprising a load supporting surface means having front and rear leg means for resting on a base surface, wall means upstanding at right angles from the rear portion of said load supporting surface means, said wall means and said load supporting surface means defining an integral L-shaped load supporting structure having a rigid connection between said load supporting surface means and said wall means, said structure being adapted to support a load of sheets placed edgewise on said supporting surface means and leaning against said wall means, said rear leg means comprising a plurality of movable rear leg members pivotally mounted to said wall means to pivot between a position in which the wall means of the L-shaped load supporting structure is positioned substantially vertical with respect to the base surface and another position in which said wall means is inclined rearwardly, and means for locking each of said movable leg members comprising a catch loop means which is pivotable secured to said load supporting structure with said loop means slidably engaging about said leg member, and stop means for retaining said catch loop means in place.

2. A device as claimed in claim **1** wherein said movable rear leg means supports the supporting device at the rear thereof when the device is in the inclined position.

3. A device as claimed in claim **1** wherein said movable rear leg means is pivotally mounted on said wall means above the lower edge thereof.

4. A device as claimed in claim **1** and comprising means for positively retaining said movable rear leg means in a position in which the supporting device is substantially vertical.

5. A device as claimed in claim **4** wherein said retaining means comprises a catch member pivotally mounted on said device to pivot from a position engageable with said movable rear leg means when the latter is positioned to support the device in an inclined position and to a vertical position when the movable rear leg means is in a position where the wall means is vertical.

6. A device as claimed in claim **5** wherein said catch member has a slot pivotally receiving a pin on said supporting device, and means on said device for locking said catch member against inadvertent upward or downward pivotal movement about said pin.

7. A device as claimed in claim **4** wherein said retaining means comprises a catch member having an elbow portion and arms angularly extending from said elbow portion, said elbow portion being pivotally mounted on said movable rear leg means, there being a plurality of locking recesses on said supporting device, one arm of said catch member being engageable in said recesses to retain said movable rear leg means in selected positions.

8. A device as claimed in claim **1** and comprising a load retaining member positionable against a load of sheets positioned on said supporting surface means and against said wall means, and means on said device for positively securing said load retaining member in position thereon.

9. A device as claimed in claim **8** wherein said securing means are mounted on the top portion of said wall means or the front portion of said supporting surface means.

10. A device as claimed in claim **8** wherein said load retaining member is detachable from the supporting device.

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