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METHOD AND APPARATUS FOR LOADING METAL

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METHOD AND APPARATUS FOR LOADING METAL

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This invention relates to the shipping or transporting of metal sheets, such as sheet steel, in box cars or other conveyances. Heretofore it has been the conventional practice to pile the sheets in stacks at opposite ends of the car, the sheets in each stack being piled flatwise on the floor of the car and there after the several stacks being suitably braced. In order to facilitate the handling of the sheets and protect them against scratching, it has been the practice to oil the surfaces of the sheets before shipment from the rolling mills. The metal sheets were loaded and unloaded by hand, the workmen picking up each sheet separately and sliding it across the pile and over the corner thereof. This practice resulted in scratching a large proportion of the sheets so that they were either rejected as defective or required expensive refinishing operations to remove the scratches. This is particularly true in the automobile industry since sheet steel used for automobile bodies must be free from scratches in order to properly take the enamel and paint.

The fact that the sheets have been shipped with the surfaces oiled increased the tendency of the sheets to slide upon each other during shipment and break loose in the car. In actual practice it has been the custom to brace the piles of metal sheets by means of timbers or wooden blocks nailed to the floor of the car. This practice was a failure in keeping the stacks intact during transit since the sheets constantly shifted or broke loose as a result of shocks or collisions to which the cars are subjected, and frequently the sheets were driven into the end of the car masking it and causing great damage to the sheets as well as to the car.

When the sheets are stacked in the car with the sheets placed horizontally or flatwise, very serious problems are encountered in attempting to hold the stack of sheets intact as a unit against relative shifting movement of the sheets. The shocks or jolts to which the cars are subjected result in setting up a whipping action of the sheets or in other words the flat pile of metal sheets will bend transversely in the middle and then flatten out with a whip-like action. Where the stack of sheets is held together at the four vertical corners by metal angle posts or standards clamped against the corners, this movement of the sheets results in crimping the end edges of the sheets, rendering them defective. It is therefore not only difficult to clamp or tie the stack of sheets flatwise against relative movement, but also to prevent movement of the stack itself on the floor of the car when subjected to impacts and shocks.

In order to overcome the above disadvantages, I have conceived the idea of loading metal sheets on their edges in the car. Two packs of sheets, each preferably approximating ten tons where the load capacity of the car is forty tons, are placed at each end of the car, and each pack is placed on edge with the plane of the sheets vertical instead of horizontal or flat as heretofore. The bottom edges of the sheets are in engagement throughout their length preferably with wooden sills or cross members which may be nailed to the car floor, and the pack is tied or clamped together transversely adjacent opposite ends by members engaging opposite vertical faces of the pack. In this manner the pack or stack of sheets will rest on edge, each sheet assisting in supporting itself. It will also be seen that where the sheets are positioned vertically the entire weight of the sheets is carried on the wooden sills and the lower edge of each sheet will tend to cut into the wood and resist longitudinal sliding movement.

In the drawings I have illustrated members at the opposite ends of the pack at the bottom therefore for blocking the pack. Where it is desired to block the ends of the pack, it will be seen that due to the edgewise position of the pack the desirability of providing heavy corner angles at the four vertical corners of the stack as in the case where the sheets are piled flat is obviated. In practice however where the pack is held or braced together as a unit, the frictional engagement of the edges of the sheets with preferability soft wood surfaces will normally hold the sheets against relative movement so that the use of the members 31—33 is not necessary. It will be noted that the wood members 10 extend with the grain of the wood running transversely to the edges of the metal sheets, thereby increasing the frictional resistance of the sheets on the wood surfaces.

This method in which the metal sheets are supported on edge takes advantage of the tensile strength of the sheets in distributing the load on the car floor, and by which the sheets furnish their own non-skid means against longitudinal movement. The edge of each sheet after being cut has normally a fine saw tooth formation and with the stack resting edgewise on the wooden sills or members any longitudinal movements of the pack will cause the sheets to bite or dig deeper into the wood thus effectually holding the stack of sheets intact or in position. A fur-
ther important advantage resulting from this method resides in the fact that the sheets may be fed from the stack into the presses more rapidly than with previous methods, since all the remaining sheets of the stack, thereby resulting as heretofore in scratching many of the sheets. The stack may be delivered at the press with the sheets supported on edge; each sheet may be separated laterally from the pack, swung outwardly at an incline to the vertical to clear the vertical face of the pack and then the sheet may be lifted ahead and fed into the press without contacting with the other sheets of the pack.

Other objects and advantages of this invention as well as various other objects and advantages of the invention will appear in the following description and in the appended claims, reference being had to the accompanying drawings wherein like reference characters designate corresponding parts in the several views.

Fig. 1 is a perspective view showing a form of apparatus for carrying out the present method. A view of the sheet as it leaves the stack is shown in Fig. 1, and Fig. 2 is a plan view of the bottom member of the lifting and clamping device for the pack of sheets.

Fig. 3 is a side view of the stacking bars broken away. A cross-sectional view of the construction shown in Fig. 3, parts being broken away for the sake of clearness.

Before explaining in detail the present invention, and the method or modes of operation embodied therein, it is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawings, since the invention is capable of other embodiments and of being practiced or carried out in various ways. Also it is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation, and it is not intended to limit the invention beyond the terms of the several claims hereto appended or the requirements of the prior art.

In the present instance I have illustrated one form of apparatus by means of which a pack of metal sheets, such as sheet steel, may be tied or clamped together and supported in position in a freight car for shipment but it will be understood that in carrying out the present method various types of apparatus may be utilized. A series of wooden sills or cross members 10 are first placed in position on the floor of the car and preferably secured thereto crosswise or transversely to the pack of sheets. The pack of metal sheets S is placed in position on the wooden members 10. Substantially the entire weight of the sheets will be carried by these members where the sheets are positioned on edge with the sheets in a vertical plane, as shown in Fig. 1.

In this manner it will be seen that the longitudinal edge S' of each sheet will engage the several wood sills 10. These sills are preferably arranged in spaced relation, and adjacent opposite ends of the pack a pair of the members 10 are spaced apart sufficiently to provide guide ways 11 for the bottom members A of the lifting and clamping devices. A pair of these devices are placed adjacent opposite ends of the pack and are preferably identical in construction so that a description of one suffices for both.

The bottom member A of each lifting and clamping device comprises in the present instance a pair of steel angles 12 and 13 which are arranged in inverted position with the horizontal flanges uppermost and extending toward each other, thus forming a channel member having a transverse channel or guideway B. The angles 12 and 13 are spaced apart at 14 to provide a guide way 11 for the bottom members A of the lifting and clamping bars 16 and 17. The angles 12 and 13 are rigidly secured together centrally thereof by means of a plate 15 which is riveted to the upper horizontal flanges thereof, as shown particularly in Fig. 1. The angles 12 and 13 may also be connected together at their opposite free ends by means of U-shaped members 35 which are preferably detachably secured in position by means of suitable bolts.

Each vertical clamping bar 16 and 17 is formed of metal, such as steel, so as to sustain the weight of the pack of sheets when lifted, each pack in practice preferably weighing approximately ten tons.

The lower end of each bar 16 and 17 extends freely through the guide way 14 between the angles 12 and 13, and rigidly secured to the opposite side of each bar is a plate 18 which slidingly fits into the guideway B. A hole is drilled through the lower end of each bar 16 and 17 and also through the plate 18, and a threaded rod or adjusting screw 19 extends freely through this hole and is provided at its outer end with a head 20. The threaded rod 19 extends inwardly through the channel B and its inner end is threaded into a hole tapped in a fixed steel block or nut 21 which is riveted to the angles 12 and 13 as shown in Fig. 2. From this construction, it will be seen that the vertical clamping bars 16 and 17 of each set may be independently adjusted toward and from each other by means of the pair of screw rods or adjusting screws 19, and by turning the heads 20 on the ends of these screw rods the lower ends of the bars 16 and 17 may be rigidly clamped against the opposite vertical faces of the pack S.

Each bar 16 and 17 adjacent its upper end is provided with a series of V-shaped notches 22 which are spaced apart in accordance with different needs. These notches are connected to the upper end of each bar 16 and 17, the notches may be provided in each of the vertical bars 16 and 17, or in a combination of the vertical bars 16 and 17, or in one of the vertical bars 16 and 17. In this manner it will be seen that the longitudinal edge S' of each sheet will engage the several wood sills 10. These sills are preferably arranged in spaced relation, and adjacent opposite ends of the pack a pair of the members 10 are spaced apart sufficiently to provide guide ways 11 for the bottom members A of the lifting and clamping devices. A pair of these devices are placed adjacent opposite ends of the pack and are preferably identical in construction so that a description of one suffices for both.

The bottom member A of each lifting and clamping device comprises in the present instance a pair of steel angles 12 and 13 which are arranged in inverted position with the horizontal flanges uppermost and extending toward each other, thus forming a channel member having a transverse channel or guideway B. The angles 12 and 13 are spaced apart at 14 to provide a guide way 11 for the bottom members A of the lifting and clamping bars 16 and 17. The angles 12 and 13 are rigidly secured together centrally thereof by means of a plate 15 which is riveted to the upper horizontal flanges thereof, as shown particularly in Fig. 1. The angles 12 and 13 may also be connected together at their opposite free ends by means of U-shaped members 35 which are preferably detachably secured in position by means of suitable bolts.

Each vertical clamping bar 16 and 17 is formed of metal, such as steel, so as to sustain the weight of the pack of sheets when lifted, each pack in practice preferably weighing approximately ten tons.

The lower end of each bar 16 and 17 extends freely through the guide way 14 between the angles 12 and 13, and rigidly secured to the opposite side of each bar is a plate 18 which slidingly fits into the guideway B. A hole is drilled through the lower end of each bar 16 and 17 and also through the plate 18, and a threaded rod or adjusting screw 19 extends freely through this hole and is provided at its outer end with a head 20. The threaded rod 19 extends inwardly through the channel B and its inner end is threaded into a hole tapped in a fixed steel block or nut 21 which is riveted to the angles 12 and 13 as shown in Fig. 2. From this construction, it will be seen that the vertical clamping bars 16 and 17 of each set may be independently adjusted toward and from each other by means of the pair of screw rods or adjusting screws 19, and by turning the heads 20 on the ends of these screw rods the lower ends of the bars 16 and 17 may be rigidly clamped against the opposite vertical faces of the pack S.

Each bar 16 and 17 adjacent its upper end is provided with a series of V-shaped notches 22 which are spaced apart in accordance with different needs. These notches are connected to the upper end of each bar 16 and 17, the notches may be provided in each of the vertical bars 16 and 17, or in a combination of the vertical bars 16 and 17, or in one of the vertical bars 16 and 17. In this manner it will be seen that the longitudinal edge S' of each sheet will engage the several wood sills 10. These sills are preferably arranged in spaced relation, and adjacent opposite ends of the pack a pair of the members 10 are spaced apart sufficiently to provide guide ways 11 for the bottom members A of the lifting and clamping devices. A pair of these devices are placed adjacent opposite ends of the pack and are preferably identical in construction so that a description of one suffices for both.

The bottom member A of each lifting and clamping device comprises in the present instance a pair of steel angles 12 and 13 which are arranged in inverted position with the horizontal flanges uppermost and extending toward each other, thus forming a channel member having a transverse channel or guideway B. The angles 12 and 13 are spaced apart at 14 to provide a guide way 11 for the bottom members A of the lifting and clamping bars 16 and 17. The angles 12 and 13 are rigidly secured together centrally thereof by means of a plate 15 which is riveted to the upper horizontal flanges thereof, as shown particularly in Fig. 1. The angles 12 and 13 may also be connected together at their opposite free ends by means of U-shaped members 35 which are preferably detachably secured in position by means of suitable bolts.

Each vertical clamping bar 16 and 17 is formed of metal, such as steel, so as to sustain the weight of the pack of sheets when lifted, each pack in practice preferably weighing approximately ten tons.

The lower end of each bar 16 and 17 extends freely through the guide way 14 between the angles 12 and 13, and rigidly secured to the opposite side of each bar is a plate 18 which slidingly fits into the guideway B. A hole is drilled through the lower end of each bar 16 and 17 and also through the plate 18, and a threaded rod or adjusting screw 19 extends freely through this hole and is provided at its outer end with a head 20. The threaded rod 19 extends inwardly through the channel B and its inner end is threaded into a hole tapped in a fixed steel block or nut 21 which is riveted to the angles 12 and 13 as shown in Fig. 2. From this construction, it will be seen that the vertical clamping bars 16 and 17 of each set may be independently adjusted toward and from each other by means of the pair of screw rods or adjusting screws 19, and by turning the heads 20 on the ends of these screw rods the lower ends of the bars 16 and 17 may be rigidly clamped against the opposite vertical faces of the pack S.

Each bar 16 and 17 adjacent its upper end is provided with a series of V-shaped notches 22 which are spaced apart in accordance with different needs. These notches are connected to the upper end of each bar 16 and 17.

It will be seen from the foregoing that the bars 16 and 17 of each set may be drawn together at the upper and lower ends thereof so as to squeeze the pack transversely adjacent each end thereof. The bottom member A of each set not only is provided for adjusting the lower end of the members 16 and 17 but also to assist in lifting the stack of sheets as a unit off the floor of the car. For accomplishing this purpose the upper end of each member 15 and 17 is preferably enlarged and provided with an eye 28 and 29 respectively, whereby the lifting hooking device for operating mechanism may be connected. An apparatus by means of which the stack may be bodily lifted from the car floor on to a truck or platform or may be lifted from the...
a truck and deposited on a car floor is shown in my copending application, Serial No. 133,374, filed September 3, 1926. Such a lifting mechanism is provided with four hoisting drums having depending hoisting cables provided with sheaves 50 to which are connected the four hooks 30, no strain therefore is transmitted to the upper ends of the four bars 16 and 17 and the hoisting mechanism operated to lift the stack of sheets, it will be seen that the weight of the sheets is transmitted from the angle bars 12 and 13 to the several bars 16 and 17 by means of the plates 18 and 19 and the adjusting screws 19.

The pack of sheets S may be blocked or braced on the floor of the car at opposite ends thereof in the following manner. A wooden sill or beam 31 is placed flatwise against each lower end of the pack, the sill 31 being supported on its edge. This member 31 is clamped against the end of the stack by means of a transverse metal angle bar 32 which is nailed to the floor of the car. The angle bar 32 is braced by means of a pair of longitudinal bars 33 and 34 which abut against the vertical flange 32a of the bar 32, and are nailed to the floor of the car. The present method of placing the sheets in a car on their edges facilitates the bracing of the pack at opposite longitudinal ends 31, since by blocking or bracing the pack at the bottom thereof by means of the members 31—34 the upper ends of the pack will also be braced or held in position. By interposing the wooden sills or members 31 between the angle braces 32 and the ends of the pack, it will be seen that the pack will be cushioned by the softer wood material.

Any longitudinal movements of the pack as a result of collisions or shocks will be resisted by the longitudinal edges S' of the sheets cutting into the pack at the angle bars 32. Any tendency of the pack to rock as a result of severe shocks to the freight car will be resisted by the wooden members 31 since it will be seen that the tendency of one end of the pack to lift will be prevented by the vertical end edges of the sheets cutting into the wooden sills or blocks 31.

In practice I prefer to place the packs of sheet metal with the sheets running lengthwise of the cars. This not only facilitates the use of the stack lifter described in my above mentioned application in lifting the pack from the car floor where the packs are transported in closed or box cars, but also takes advantage of the frictional engagement of the sheets with the wood surfaces in resisting shocks or jolts longitudinally of the car. These shocks to which the cars are subjected are greatest in the direction of the length of the car, and hence I have found as a result of tests that better utilization of the invention is obtained by positioning the packs lengthwise rather than crosswise of the car.

Furthermore, where the sheets were packed flatwise on the car floor the rocking or vibratory movement of the car floor during travel due to unevenness of the road bed and shocks, resulted in a wearing or flexing action of the sheets, causing relative movement of the surfaces of the sheets back and forth upon one another. This set up a constant abrasive or scouring action causing scratches in the finished surfaces.

By shipping the sheet metal on edge however this wearing action is prevented, the sheets find their own level, abrasive particles gravitate out from between the sheets, and each sheet may be supported independently of the others. Furthermore, if desired a larger number of packs may be placed at the ends of the car. Later where wide sheets are being shipped, than where the packs are placed flatwise on the floor. It will also be seen from the foregoing that the thickness of the bottom sills 10 is greater than the depth of the cross member A, so that the entire weight of the pack is carried by the wooden members 10 and the edges of the sheets do not rest upon the metal of the angle bars 12 and 13 which would tend to crimp the edges of the sheets.

What I claim is:

1. The new art of transporting sheet metal on the floor of the freight car, consisting in arranging the metal sheets in a pack, sustaining the pack for transit in substantially upright position and causing the edges of the metal sheets to be in frictional engagement with a relatively softer surface than the sheets.

2. The hereinafter method of loading 100 sheet metal on the floor of a freight car for shipment, consisting in arranging the sheets in a pack with the planes of the sheets extending transversely to the plane of the car, and with the edges of the sheets frictionally engaged 135 to resist relative movement of the sheets, and maintaining the pack together as a unit.

3. The hereinafter method of loading sheet metal for shipment on a freight car consisting in positioning a pack of metal sheets 110 with the sheets resting on their edges against wood surfaces frictionally engaging the edges of the sheets.

4. The new art of transporting sheet metal on the floor of a freight car, consisting in arranging 115 the metal sheets in a pack, sustaining the pack for transit in substantially upright position, and causing the bottom edges of the metal sheets to be in frictional engagement with a relatively softer supporting surface than the sheets.

5. In an apparatus of the class described for packing sheet metal on the floor of a freight car for shipment with the sheets resting on their edges, the combination of means frictionally engaging the edges of the sheets to resist relative movement thereof, and means for maintaining the sheets together in a unit.

6. The hereinafter method of loading sheet metal consisting in stacking the metal sheets together on their edges in packs or stacks 130 and supporting the packs or stacks on edge in the car by means of wood members arranged in position beneath the sheets to sustain the entire weight thereof and to resist by frictional engagement with the edges of the sheets movement thereof during transit.

7. The hereinafter method of loading sheet metal consisting in positioning the sheets forming a pack or bundle with the sheets in upright position, and providing wood supports beneath the pack in direct engagement with the edges of the sheets.

8. The hereinafter method of loading sheet metal consisting in positioning the sheets forming a pack or bundle with the sheets in upright position, supporting the sheets on wood members in direct engagement with the edges of the sheets, and bracing the pack at opposite ends to resist displacement thereof in the car.

9. In an apparatus for packing sheet metal in
a pack or packs on the floor of a freight car for transportation with the sheets of the pack resting on their edges, the combination of means having a relatively softer surface than the sheets engaging the edges of the sheets, and means engaging the pack for supporting the sheets in position to rest on their edges.

10. The herein described method of transporting a pack metal sheet consisting in transporting on a freight car floor a pack of sheets with the sheets resting on edge upon members interposed between the pack and the car floor, and resisting relative movement of the pack members during transportation in the car by the frictional engagement of the edges of the sheets with said members.

11. The herein described method of loading metal sheets in a freight car, consisting in making up a pack of metal sheets and placing the pack on wooden members arranged on the floor of the car with the sheets supported on edge by said members.

12. The herein described method of informing metal sheets in a freight car for transportation, consisting in clamping together a pack of metal sheets and supporting the sheets on surfaces of relatively softer material in contact with the bottom edges of the sheets, the engagement between said material and the edges of the sheets being such as to resist by friction movement of the sheets during transit.

13. The herein described method of loading metal sheets in a freight car for transportation, consisting in supporting a pack of metal sheets on their edges with the sheets in each pack in upright position, and bracing the end of the pack in the car by placing a brace member having a wood surface engaging the bottom end edges of the stack only.

14. The herein described method of loading metal sheets in a freight car for transportation, consisting in supporting in the car a pack of metal sheets on their edges with the sheets of each stack in upright position, placing a transverse angle iron brace member across the lower end of the stacks with a wooden sill interposed between the angle iron and the stack in engagement with the bottom end edges of the sheets.

15. An apparatus for bracing a pack of metal sheets on their edges in a freight car, comprising a member extending transversely beneath the lower edges of the sheets, a pair of clamping members engaged opposite vertical sides of the pack, means carried by said first member and said clamping members for adjusting the latter toward and from the pack, and means for adjusting the upper ends of the clamping members toward and from each other.

16. An apparatus for bracing a pack of metal sheets on their edges in a freight car, comprising a member extending transversely beneath the lower edges of the sheets, a pair of clamping bars engaging opposite vertical sides of the pack, means carried by said first member and bars for adjusting the latter toward and from the pack, means for adjusting the upper ends of the bars toward and from each other, and wood members extending beneath the pack for supporting the same on edge independently of said first member.

17. An apparatus for loading a pack of sheet metal with the sheets supported on edge, comprising a bottom member extending transversely beneath the lower edges of the pack, a pair of bars connected to the opposite ends of said member and positioned at opposite vertical faces of the pack, each of said bars at the upper end thereof having means for connecting thereto a hoisting mechanism, and means for adjusting said bars relatively to the pack.

18. An apparatus of the class described, comprising wood slips adapted to be placed upon the floor of the car for supporting a pack of metal sheets with the sheets positioned on edge, means for clamping said sheets together and comprising a device encircling the pack of sheets, said device having means for connecting thereto a hoisting mechanism and said wood slips being constructed to support the weight of the metal sheets substantially free of said device.

19. An apparatus for loading sheet metal in a car comprising wood slips adapted to be placed upon the car floor for supporting a pack of metal sheets on edge, means adjacent opposite ends of said pack for clamping the sheets together, each of said means comprising a device encircling the pack and provided with adjusting means for clamping the sheets together at opposite vertical faces thereof, said devices having means for connecting a hoisting mechanism adjacent the four corners of the pack, and said slips having a thickness to sustain the weight of the sheets free of said device.

20. An apparatus for loading sheet metal in a car comprising wood slips adapted to be placed upon the car floor for supporting a pack of metal sheets on edge, means adjacent opposite ends of said pack for clamping the sheets together, each of said means comprising a device encircling the pack and provided with adjusting means for clamping the sheets together at opposite vertical faces thereof, said devices having means for connecting a hoisting mechanism adjacent the four corners of the pack, and said slips having a thickness to sustain the weight of the sheets free of said device.

21. An apparatus for loading metal sheets in a freight car for transportation, comprising a pair of devices positioned adjacent opposite ends of the pack of sheets for clamping the sheets together with the sheets resting on their edges, each of said devices comprising an adjustable frame having a portion extending transversely beneath the sheets and also having upright portions embracing the opposite vertical faces of the pack and provided with means for connecting thereto a hoisting mechanism, and wood members extending beneath the pack for carrying the weight thereof with the bottom edges of the pack in contact therewith.

22. An apparatus for packing metal sheets on edge in a freight car, comprising supporting members extending beneath the pack of sheets and having wood surfaces engaging the lower edges of the sheets, a pair of upright members positioned at opposite upright faces of the pack, means for adjusting the lower ends of said members toward and from each other relatively to the sheets, means for adjusting the upper ends of said members toward and from each other, and means carried by said members for connecting thereto hooks carried by a hoisting mechanism.

23. An apparatus of the class described, the combination of a pair of devices adjustable for squeezing a pack of metal sheets adjacent opposite ends with the sheets resting on their edges, and means carried by said devices for attaching a hoisting mechanism to permit the entire pack to be lifted or lowered through the medium of said devices.

24. An apparatus of the class described,
the combination of a pair of devices adjustable for squeezing a pack of metal sheets adjacent opposite ends with the sheets resting on their edges, and means having a surface of softer material than the sheets contacting with the bottom edges of the sheets to sustain the weight thereof and provide an anti-shifting medium.

25. In an apparatus of the class described, the combination of means for pressing together in a horizontal direction a pack of metal sheets positioned on edge with the sheets of the pack in vertical planes, and means for supporting the sheets on edge and having a surface of softer material than the sheets contacting with the bottom edges of the sheets to provide therewith an anti-shifting means.

26. In an apparatus for packing metal sheets in a pack on the floor of a freight car for transportation with the sheets resting on their edges comprising members extending at opposite upright sides of the pack for sustaining the pack of sheets, means for connecting said members together beneath the pack, and means having a surface of relatively softer material for frictionally engaging the lower edges of the sheets and effective to protect said edges against substantial damage from said means.

27. An apparatus for packing metal sheets in a pack on the floor of a freight car for shipment with the sheets arranged on their edges, comprising the combination of metal devices for binding the pack together into a unit, and members extending beneath the pack in frictional engagement with the edges thereof and having spaces through which said metal devices extend, thereby permitting the members to sustain the weight of the pack.

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