Sept. 14, 1965 J. W. McCRACKEN 3,206,050

RIGID CRATING SYSTEM FOR SHEET MATERIAL AND THE LIKE

Filed Feb. 17, 1964

Fig. 1.

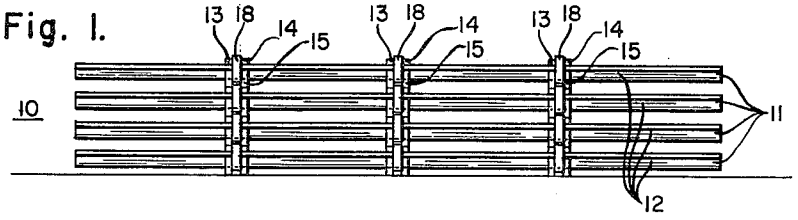


Fig. 2.

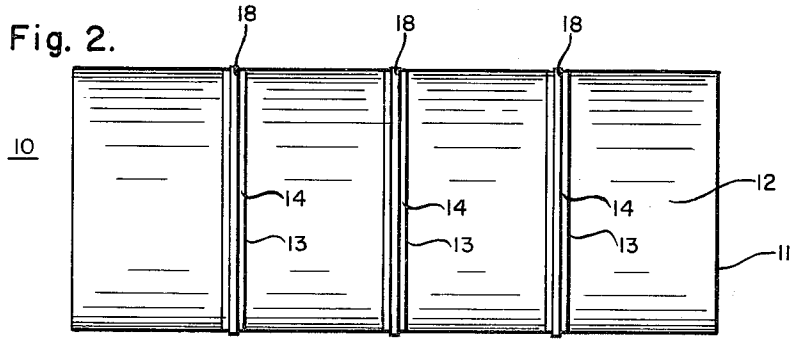


Fig. 3.

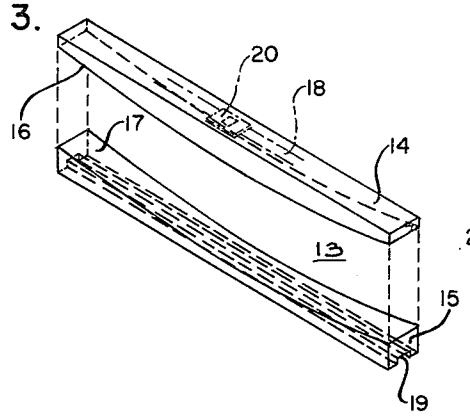


Fig. 4.

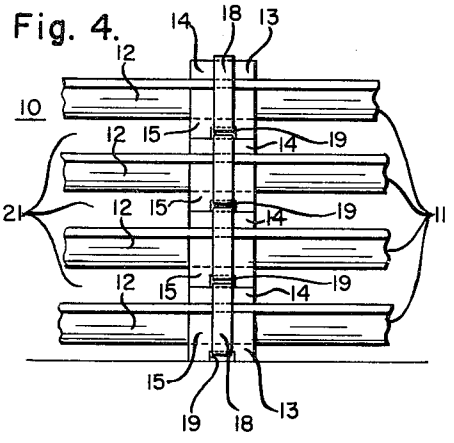
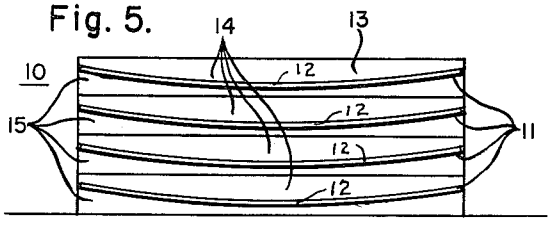


Fig. 5.



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RIGID CRATING SYSTEM FOR SHEET MATERIAL AND THE LIKE

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This invention relates to apparatus and method for rigidly crating bendable sheet material for shipping, handling and/or storage utilizing the rigidity of such sheet material in bowed form. More particularly, this invention pertains to elongated crating blocks of wood to bow and hold such sheet material and the like, such as large or long sheets of relatively thin gauge metal, wallboard, plastic and other products, in rigidly crated form which can be readily handled without deflection and/or deformation.

As an example of the field of use and utility of this invention, it may be mentioned that sizeable sheets of wallboard, plastic and metal present problems in connection with the shipment, handling and/or storage thereof, which usually is performed with such sheet material in piles or stacks, because of the drooping of the ends, or other bending or twisting of the sheet material when being handled. Consequently, it has been one practice at considerable expense to pile many sheets of such material on a relatively heavy, rigid pallet for strapping of the material to such pallet; another, to encase a single pile of sheets, such as thin-gauge, stainless-steel sheets of high and valuable surface finish, in a rigid wooden or metail case, e.g., see United States Patents Nos. 2,661,-838 and 2,901,102.

In the instant invention, such flexible sheet material, whether a single sheet or a pile of sheets, may be rigidly crated for shipping, storage and/or other handling by bowing the material out of its flat, normal plane and holding it bowed by means of rectilinear blocks, preferably extending transversely of such sheet material and the like, inasmuch as the problem solved hereby usually arises particularly in connection with such sheet material having a much greater length than width. Each such rectilinear block preferably comprises two crosspieces, the bottom surface of the upper crosspiece being convex downwardly and the top surface of the lower crosspiece being concave upwardly so that the two crosspieces when in vertical registry, whether with or without sheet material inbetween, virtually interfit. When sheet material is between such crosspieces, and they are steel strapped around the ends thereof, the sheet material is held with the same bowing curvature as that of the crosspieces in each block, such bowing being sufficiently shallow to avoid any deformation or permanent set in such sheet material. A plurality of such blocks in parallel arrangement spaced from each other will hold such sheet material rigidly so that it may be stacked, loaded, unloaded, stored, shipped and otherwise moved without drooping, bending, or twisting At least two such blocks will be used in smaller crates; more in larger, or longer, ones. Moreover, the material may be readily piled up in stacks of crates when rigidly crated in accordance with this invention and handled by conventional material handling equipment including fork-lift trucks in bundles of one or more crates without difficulty or interference. Still further, the cost of crating in a system of this invention is very much lower than prior practices and requires no skilled personnel. Crating blocks of this invention may be prepared by routine mill work from standard lumber, or such blocks may be made of lumber with a polystyrene core, or of metal.

Other objects, features and advantages of this invention will be apparent from the following description and

the accampanying drawings, which are illustrative of one embodiment only, in which

FIGURE 1 is a view in side elevation of a stack of four bundles of sheet material, each bundle comprising one or a pile of flexible sheets of the material, as desired, relatively rigidly held by one embodiment of the crating system of this invention;

FIGURE 2 is a plan view of the stacks shown in FIGURE 1 looking down on the uppermost bundle in that stack;

FIGURE 3 is an isometric view of one crating block used in the above crating embodiment with the upper and lower crosspieces comprising that block in vertically separated position;

FIGURE 4 is a detail side elevational view, somewhat enlarged, showing a portion of the stack in FIGURE 1 to show superposed crating blocks in one of the groups thereof in that embodiment; and

FIGURE 5 is an end view of the bundles in stacked arrangement shown in FIGURE 1.

Referring to the drawings, a stack **10** is shown comprising four crates, or bundles, **11** of flexible sheet material **12**. For the purpose of this description, such sheet material may be assumed to be one or a pile of superposed sheets relatively long when compared to the width thereof and capable of being bowed, in this case such bow being transverse and concave upwardly in the relatively natural form the sheet or pile of sheets would assume if they were supported from beneath along their side edges only. Such sheets in each pile in each crate **11** may be separated by paper or other covering to protect the surface finish thereof, if desired, and, further, the whole pile may be wrapped in such a protective covering before the crating thereof by means of being clamped between a pair of upper and lower crosspieces in each of the crating blocks **13** used therewith.

Each crating block **13** comprises an upper member **14** and a lower member **15**, such members in the illustrated embodiment being crosspieces because they extend across the sheet material **12** and hold it in bowed condition when the crate **11** is assembled. The top, bottom, sides and ends of each block **13** preferably are planar as shown although they may have other forms, the whole block preferably being rectilinear as to the outer surfaces thereof. However, the bottom surface **16** of upper crosspiece **14** is a curved cylinder section so as to be convex downwardly while the top surface **17** of lower crosspiece **15** is a curved cylindrical section so as to be concave upwardly. Preferably, each crosspiece, when of wood, is made in one piece, but it may be made of more than one.

The curvature of surfaces **16** and **17** is complementary so that they fit one another and define the bow to be taken by the sheet material **12** when the blocks **13** are tightly applied thereto by encircling steel straps **18**. Such curvature, which is also the curvature of the transverse bow of material **12** in each crate **11**, is relatively shallow, sufficient to hold the sheet material **12** rigid without drooping or being subject to bending or twisting in any direction, yet insufficient to permanently deform the sheet material out of its normal flatness in which it conventionally is when put to use, and, insufficient to form any permanent deformation or set in the sheet material irrespective of how long such sheet material may stand bowed in crate **11**.

Preferably, each lower crosspiece **15** is provided with an upwardly recessed channel **19** extending out through the ends of crosspiece **15**, the width of that channel being such as to accommodate the width of the steel band from which the straps **18** are formed and having a height at least equal to the thickness of two of such bands in-

clusive of any band clip therefor that may be in the channel. Such channels **19** provide crate stacking advantages illustrated in more detail in FIGURE 4. Each encircling steel strap **18** passing around the ends of each block **13** will be held in tightened condition under a predetermined tensile strain by any usual form of clip **20** utilized therefor as illustrated in chain outline in FIGURE 3. The selected tightness of such steel strapping bands **18** preferably is such that each crate **11** will remain rigid without any of the sheets in a pile being subject to sliding with respect to one another, or with respect to any of the blocks **13**, and, without the parallel spaced blocks **13** in the illustrated embodiment being subject to movement relative to sheet material **12**, or one another. The length of the crosspieces **14** and **15** is such, preferably, as to protect the side edges of said material **12** against being damaged by the straps **18** where they pass around the ends of the blocks **13**, or otherwise. Moreover, when crates **11** are stacked upon one another as illustrated in FIGURES 1, 4 and 5, a higher stack of such bundles **11** may be made because there is no drooping anywhere when being handled by materials handling equipment such as a fork lift truck. Preferably in such stacking, corresponding blocks **13** in each crate are superposed as shown in FIGURE 4 and the reach of strap **18** along the top of an immediately lower block **13** fits in channel **19** of the immediately superjacent block **13**, improving support and the stability of the stack against being toppled or shifted.

In handling each crate **11**, when being stacked, or when stacked as shown, there is sufficient entry space **21** between the bottom of the sheet material in an upper crate **11** and the top of the sheet material **12** in an immediately lower crate **11**, or the ground, for the forks of a fork lift truck, for example, to pass thereinto a sufficient distance to lift off the upper crate, or to deposit it in a reverse operation, no special equipment being required.

In the assembling and movement of crates **11** of this invention, it is preferred that the bow in the sheet material **12** be concave upwardly and that such bow be transverse of the length of the material where that length is greater than the width thereof. When a crate **11** of this invention is opened by the cutting of the straps **18** so that the sheet material **12** can be removed therefrom and used, the blocks **13** may be nested together as will be clearly apparent from FIGURE 3 and groups of them placed together and strapped to form a cubical pallet for shipment back to the crating source, usually the place where the sheet material is manufactured.

It is thus evident that by a system of this invention, rigid crating of flexible sheet material and the like may be provided utilizing such sheet material itself in the formation of a rigid crate at relatively low cost and with materially increased convenience and other advantages. Other embodiments of this invention may be provided and changes made in details of the illustrated embodiment without departure from the spirit of this invention, or the scope of the appended claims.

What is claimed is:

1. In a method of rigidly crating a pile of elongated flexible sheet material and the like, the steps comprising, in combination, piling said sheet material in vertical registry, bowing said sheet material about the longer median axis thereof to be concave upwardly to each side of said axis, cradling substantially the entire width of the bottom of said bowed pile in axially spaced lower members extending transversely to said axis in supporting relation to the bottom of said pile, said lower members having a top surface with an upwardly concave single curvature which supports the bowed bottom of said pile, pressing substantially the entire width of the top of said bowed pile with axially spaced upper members extending transversely to said axis, said upper members having a bottom surface with a downwardly convex single curvature which supports the bowed top of said pile conforms, said curvatures substantially corresponding and being incapable of permanently setting said bow in said sheet material, positioning lower and upper members respectively in vertically registered axially spaced sets, and strapping said sets of members around their ends transverse to said axis thereby to rigidly hold together said pile of sheet material and the like.

2. In a method of rigidly crating flexible sheet material and the like, the steps comprising, in combination, bowing said sheet material about a median axis thereof, cradling the bottom of said bowed pile in axially spaced lower members extending transversely to said axis in supporting relation to the bottom of said pile, said lower members having a top surface with a bowing curvature to which said bottom of said pile conforms, pressing the top of said pile with axially spaced upper members extending transversely to said axis, said upper members having a bottom surface with a bowing curvature to which the top of said pile conforms, said curvatures substantially corresponding and being incapable of permanently fixing said bow in said sheet material, positioning lower and upper members respectively in vertically registered axially spaced sets, and clamping said members together in each set thereby to rigidly hold together said pile of sheet material and the like.

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