Jan. 18, 1949. W. W. WORTHINGTON 2,459,207

MATERIAL HANDLING MECHANISM

Filed April 16, 1945 2 Sheets-Sheet 1

FIG. 1.

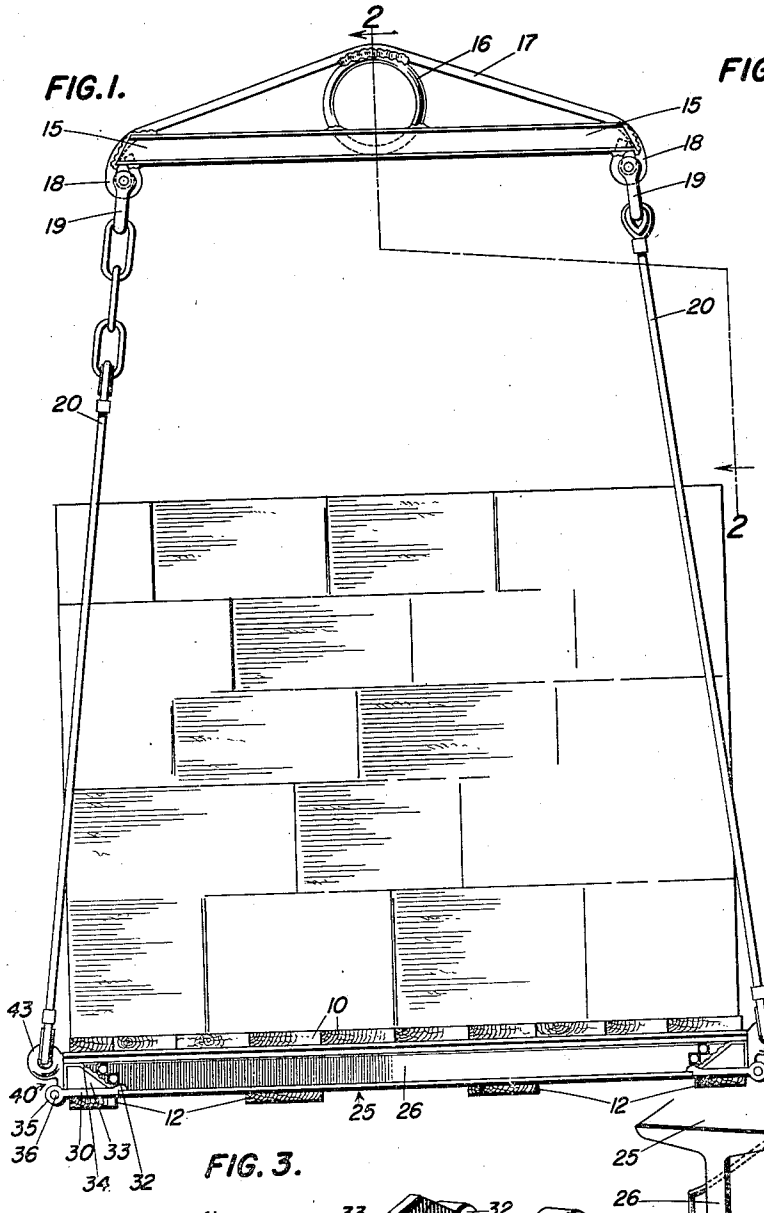


FIG. 2.

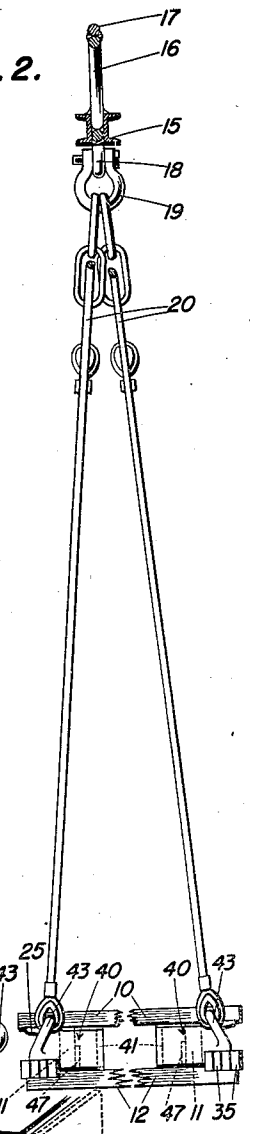


FIG. 3.

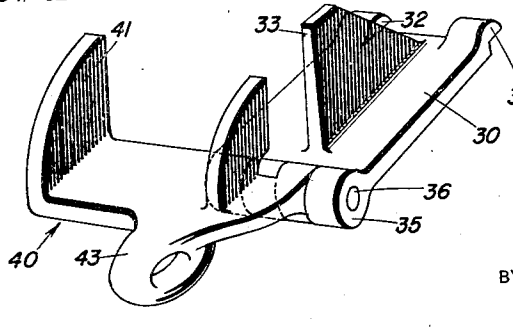
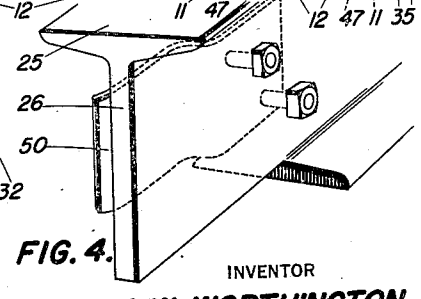


FIG. 4.



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Jan. 18, 1949. W. W. WORTHINGTON 2,459,207

MATERIAL HANDLING MECHANISM

Filed April 16, 1945 2 Sheets-Sheet 2

FIG. 5.

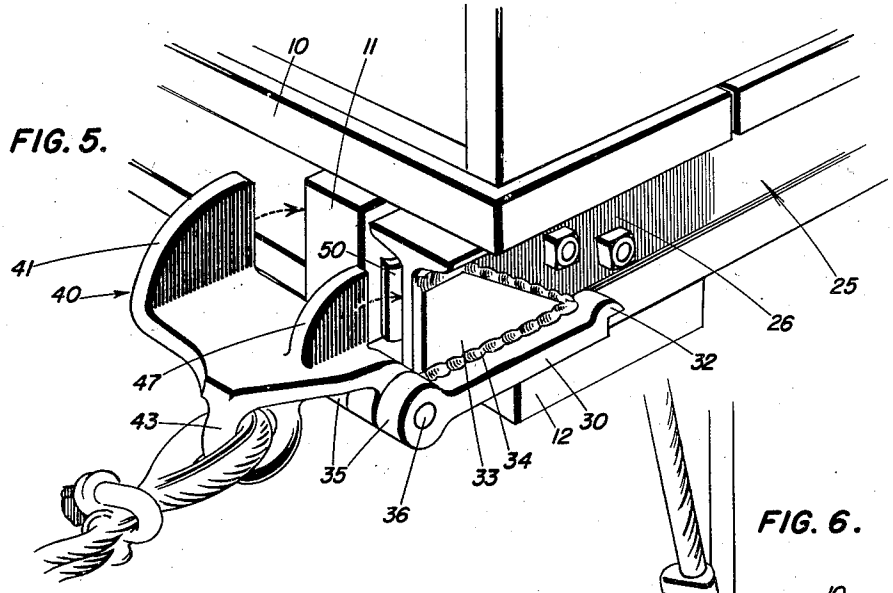


FIG. 6.

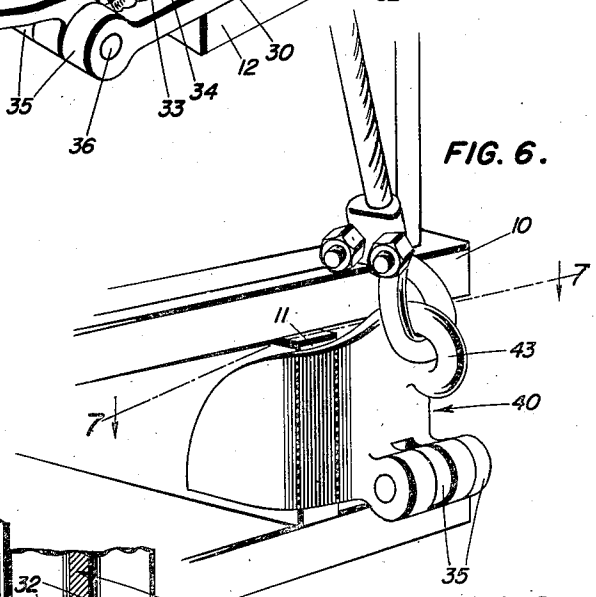


FIG. 7.

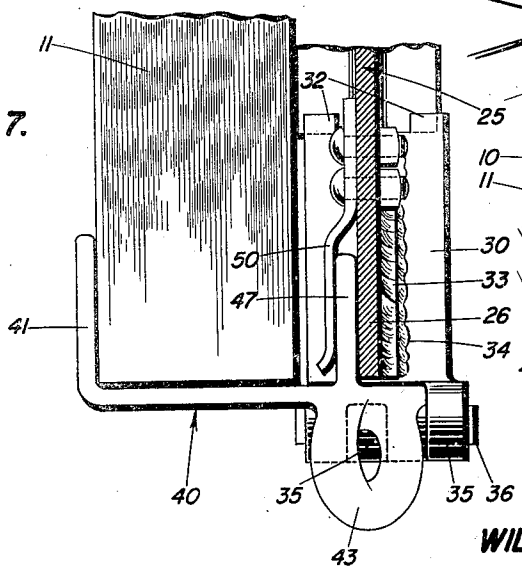
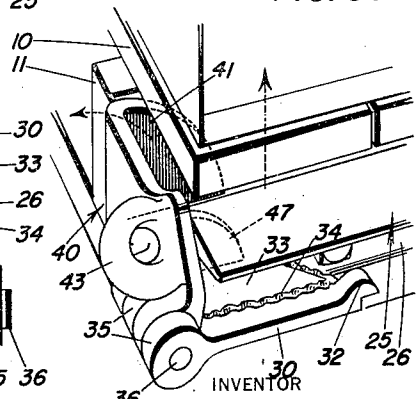


FIG. 8.



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Patented Jan. 18, 1949

2,459,207

UNITED STATES PATENT OFFICE

2,459,207

MATERIAL HANDLING MECHANISM

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Application April 16, 1945, Serial No. 588,520

8 Claims. (Cl. 294—67)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

1

This invention relates to materials handling apparatus, and particularly to sling-type suspensions for pallet-carried loads.

An important object of the invention is to provide improved grappling means for attaching supporting cables or lines to a loaded pallet, the grappling means being of great strength, adapted to contribute materially to the rigidity of the support afforded the pallet and its load, but quickly and easily detachable from the pallet when tension upon the suspension lines is relieved.

Another object is to provide such improved grappling means which is effectively locked to the pallet and cannot be removed therefrom so long as the pallet and grappling means are suspended, yet which is quickly manually releasable, without the use of tools, when the pallet and load are rested on a suitable support and tension upon the suspension lines is released.

Another object is to provide combined grappling and supporting means of the character indicated so constructed that attachment to the pallet and raising of the load are impossible until the grappling devices are firmly and properly locked to the pallet in a manner which makes their accidental dislodgment impossible.

Still another object is to incorporate in load handling apparatus of the indicated character simple manually releasable means preventing detachment of grappling and lifting elements from a pallet, even when tension upon the supporting lines is relieved, until such release is desired, and consciously effected by the operator.

In the drawings:

Fig. 1 is a side elevational view of a loaded pallet of the type used in the handling of stackable articles in warehouses, wharves and the like, the pallet and load being shown suspended by improved grappling and supporting means constructed in accordance with the present invention;

Fig. 2 is a side elevational view, centrally broken away, taken at right angles to Fig. 1 and looking in the direction of the line and arrows of 2—2 of Fig. 1;

Fig. 3 is a perspective view of the locking means forming one of the connecting elements by which attachment to the pallet is effected, the locking means being shown separated from the coacting I-beam supporting element to which it is attached in the completed assembly;

Fig. 4 is a perspective view of one end of the I-beam support element, separate from the locking means of Fig. 3 and showing the manner in which the I-beam construction is modified to permit attachment of the portion shown in Fig. 3;

2

Fig. 5 is a perspective view of one end of the completed assembly, showing the same in operative position beneath a loaded pallet but with the locking means in unlocked position;

Fig. 6 is a perspective view similar to Fig. 5, looking approximately at right angles to the direction of view of Fig. 5 and with the parts shown in locked position;

Fig. 7 is a horizontal sectional plan view taken substantially as indicated by the arrows 7—7 of Fig. 6, and

Fig. 8 is a perspective view similar to Fig. 5 but showing the effect of closing the gate before an attempt is made to position the assembly in the pallet.

Referring now to the drawings:

Reference character 10 designates the floor of a wooden pallet, shown as of conventional construction, although it will be recognized that its precise design is subject to modification, the floor being supported and reinforced by transverse stringers or braces 11 secured to the underside thereof in spaced parallel relation. Additional cross bracing is provided by transverse bottom boards 12 which also provide a base upon which the pallet rests, the boards 12 extending at right angles to and being secured to the stringers 11. As shown in Fig. 5, the ends of the floor boards 10 extend beyond the braces 11, and the bottom boards 12 may also extend beyond the braces to a similar extent, as shown, although this is not material.

In order to enable suspension of the pallet and its load from above as by a derrick or the like (not shown) I provide improved sling means including a skeletonized strongback (Figs. 1 and 2) formed of a pair of transverse channel elements 15 arranged back to back but spaced from one another, the mid portions of the channels being secured to the heavy suspension ring 16, while welded to and between the ends of the channels is a bar 17 which extends downwardly thereto from a higher central area which is welded or otherwise firmly secured to the top of the ring 16. The ends of the bracing rod 17 may be looped below the ends of the channels, as indicated at 18, to provide hoisting eyes. To each of the eyes a clevis 19 may be attached for attachment to the sling lines 20. Two sling lines may be attached to each clevis, as shown, to provide for support of the pallet at its four corners.

Between each opposite pair of sling lines, extending parallel to the strongback, is a supporting I-beam 25 which is adapted to extend beneath

the overhanging ends of floor boards 10, in the manner indicated in Fig. 5, to provide support for the pallet when the latter is to be hoisted. As also shown in that view, the I-beam lies closely adjacent to the outermost cross bracing member 11 when the device is in use, and the length of the beam is substantially the same as that of the brace. The lower web of the I-beam is cut away for a distance of several inches, as shown in Fig. 4, for attachment of the base plate 30 of the grappling and locking device, the dimensions of the base plate substantially corresponding to the cut away portion of the bottom web. Attachment of the base plate to the I-beam is effected by a pair of overhanging lugs 32, one of which is adapted to overlie each flange of the bottom web of the I-beam, and by an integral vertical web 33 upstanding from the base plate and offset from the center thereof to an extent corresponding to the thickness of the vertical web 26 of the I-beam. Flange 33 thus lies against the vertical web of the I-beam when the parts are assembled, as shown in Fig. 5, and these parts may be welded together, as also indicated in that figure at 34. The outer end of the base plate 30 extends beyond the web 26 and is provided with horizontal eye portions 35 adapted to support the hinge pintle 36 by which the hinged locking element or gate 40 is pivotally attached to the base plate for swinging movement about a transverse axis lying substantially in the plane of the bottom web of the I-beam. The gate is substantially flat, as shown, and swingable from a horizontal position in which it lies substantially parallel to the bottom web of the I-beam to a vertical position in which it extends perpendicular to and across the end of such beam. When swung to the vertical position, and interlocking flange 41 carried by the inner end of the plate is adapted to lie behind the adjacent brace 11 of a pallet in the manner shown in Figs. 1, 2, 6 and 7. Symmetrically opposite locking assemblies are carried by the ends of the beam 25 and when the flanges 41 thereof are engaged behind opposite ends of the braces, the bars are effectively locked to the pallet, preventing dislodgment of the beam from its supporting position beneath the ends of the floor boards, while when the locking plates are swung outwardly and downwardly to the position shown in Fig. 5, the beam and its associated parts may readily be freed from the pallet.

A hoisting eye 43 is carried by the gate 40 at its outer or free end, the lower end of one of the sling lines being attached to each such eye, as shown. The distance between the outer or free edges of gates carried by the opposite ends of same supporting beam somewhat exceeds the maximum width of the pallet in the direction in which the beam extends when in use, as shown in Fig. 8, and the flanges 41 are tapered from maximum width near the bottom to a minimum width at their outer or upper edges, being shown as curved in Fig. 8. Inward swinging movement of gate beyond the vertical is prevented by engagement of the gate with the I-beam.

A friction holding or detent flange 47 is carried by the gate and extends perpendicularly therefrom in position to lie beside the central web 26 of the I-beam when the gate is swung to the vertical position. The edge of flange 47 may be grooved substantially concentrically about axis pintle 36 so that the flange may swing freely to and from its position beside the web 26. A friction gripping device in the form of a leaf spring engages the outer side of the flange 47 when the gate 40 is in the vertical position, thereby preventing the gate from falling down into the horizontal position until it is manually pulled free. The spring means may comprise a flat spring plate 50 bolted or otherwise secured to the web 26 and so contoured as to admit the flange 47 but exerting a predetermined desired friction thereupon.

The flange 41 is spaced inwardly from the I-beam sufficiently so that when the hinge plates are in the vertical position the I-beam cannot be moved into position under the ends of the pallet floor boards. Thus if an attempt is inadvertently made to position the beams beneath the pallet edges with the gates in the vertical position, effective use of the sling system is prevented, without danger of any lifting or tipping of the pallet or its load. This is assured by reason of the fact that when hoisting effort is exerted upon the sling lines the outer and lower corners of the outermost floor boards ride over the inclined surfaces of the flanges 41, camming the gates outwardly, while the I-beam, being held off to a distance such that it is free of the ends of the boards will be harmlessly lifted beside the pallet and its load. On the other hand, if the beams are properly positioned beneath the overhanging ends of the floor and against the braces 11, the first hoisting effort exerted upon the eyes 43 will swing the gates upwardly and inwardly, moving the flanges 41 into position behind the ends of the braces 11 and so effectively locking the beams to the pallet.

While it will be apparent that the preferred embodiment of my invention herein disclosed is well calculated adequately to fulfill the object primarily stated, it will be apparent that the invention is susceptible to variation, modification and change within the spirit and scope of the subjoined claims.

The invention herein described may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

I claim:

1. A handling device for a load-supporting platform having a transverse reinforcing member; comprising a supporting member adapted for positioning adjacent said transverse member, and a pair of gate latching members adapted for latching engagement with said re-enforcing member, one of said latching members being pivotally mounted on each end of said supporting member, a friction gripping device secured to said supporting member adjacent each end, said latching members being pivotally movable from a disengaged position with respect to said transverse member to a latching position wherein they are each engaged by a respective one of said friction gripping devices to lock said supporting member to said transverse member.

2. A handling device for a load-supporting platform having a floor and strengthening means spaced inwardly from an edge thereof; comprising a supporting bar adapted to extend transversely beneath the floor and adjacent to the strengthening means; and combined lifting and grappling means including a tension element attached to each end of the supporting bar, a locking element attached to each tension element and engageable with one side of the strengthening means when the bar is closely adjacent the other side of the strengthening means, said locking element being offset sufficiently from the bar to prevent such engagement with the strengthen-

ing means when the bar is spaced more than a predetermined distance from the strengthening means.

3. A handling device for a pallet having a stringer beneath a floor and spaced inwardly from an edge thereof; comprising a lifting beam adapted to be disposed closely adjacent one side of the stringer, a detent spring attached to the beam near each end thereof; a detachable member at each end of the lifting beam; said detachable member including a base plate releasably fitted to the lifting beam and a grappling gate hinged substantially horizontally to the base plate for limited movement; said grappling gate including a locking flange offset sufficiently from the lifting beam to provide for engaging the opposite side of the stringer, a detent flange for frictionally engaging the detent spring and a coupling means for attaching a hoisting agency; whereby upon applying a hoisting force to the coupling means, the locking flanges engage the stringer only when the lifting beam is closely adjacent the stringer as the grappling gates swing inward to a closed position and are held against accidental dislodgement by the detent flanges and springs.

4. A handling device for a pallet having a stringer beneath a floor and spaced inwardly from an edge thereof; comprising a lifting beam adapted to be disposed closely adjacent to one side of the stringer, a detent spring attached to the beam near each end thereof; a grappling gate hinged substantially horizontally to each end of the lifting beam for limited movement; said grappling gate including a locking flange offset sufficiently from the lifting beam to provide for engaging the opposite side of the stringer, a detent flange adapted for frictional engagement with the detent spring, and a coupling means for attaching a hoisting agency; whereby upon applying a hoisting force to the coupling means, the locking flanges engage the stringer only when the lifting beam is closely adjacent the stringer as the grappling gates swing inward to a closed position and are held against accidental dislodgement by the detent flanges and springs.

5. A handling device for a load-supporting platform having a floor and transverse bar-like re-enforcing member spaced inwardly from an edge thereof, said device comprising a supporting beam adapted to extend transversely beneath a part of said floor adjacent, parallel and substantially coextensive with the said re-enforcing means, and a pair of latching members, one such latching member being pivotally secured to each end of said beam so that each latching member may be movable into a position of engagement with a lateral and end surface of the said re-enforcing member when said supporting beam is positioned adjacent thereto, whereby said supporting beam will be latched beneath the said floor of the load-supporting platform.

6. A handling device for a load-supporting platform having a floor and bar-like strengthening member spaced inwardly from an edge thereof, said device comprising a supporting beam adapted to extend transversely beneath a part of said floor adjacent, parallel and substantially coextensive with respect to said strengthening member, a pair of combined lifting and gate-latching devices having portions adapted to engage the end and lateral surface of said strengthening member, one each of said devices being pivoted to the said beam at each end thereof, a hoisting sling, means for securing said sling to said lifting and gate latching devices, whereby each of said latching devices may be moved into a position of engagement with a lateral and a respective end surface of said bar-like strengthening member upon the application of a hoisting effort to said sling thereby clamping said beam beneath said floor.

7. A handling device for a load-supporting platform having a floor and strengthening means spaced inwardly from an edge thereof; comprising a supporting bar adapted to extend transversely beneath the floor adjacent, parallel and substantially coextensive with the strengthening means; and combined lifting and grappling means including a coupling element hinged substantially horizontally to each end of the supporting bar, a locking element adapted to grip said strengthening means secured to each coupling element, said locking elements being offset sufficiently from said supporting bar to prevent positioning the supporting bar beneath the floor with the locking elements in the inward position, and means for attaching a hoisting agency to each coupling element; whereby the coupling elements swing upward carrying the locking elements inward into engagement with the strengthening means upon exertion of hoisting effort.

8. A handling device for a load-supporting platform having a floor and strengthening means spaced inwardly from an edge thereof; comprising a supporting bar adapted to extend transversely beneath the floor adjacent, parallel and substantially coextensive with the strengthening means; and combined lifting and grappling means including a coupling element hinged substantially horizontally to each end of the supporting bar, a locking element adapted to grip said strengthening means secured to each coupling element, means for attaching a hoisting agency to each coupling element whereby the coupling elements swing upward carrying the locking elements inward into engagement with the strengthening means upon exertion of hoisting effort, and releasable means for holding the locking elements in the engaged position.

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