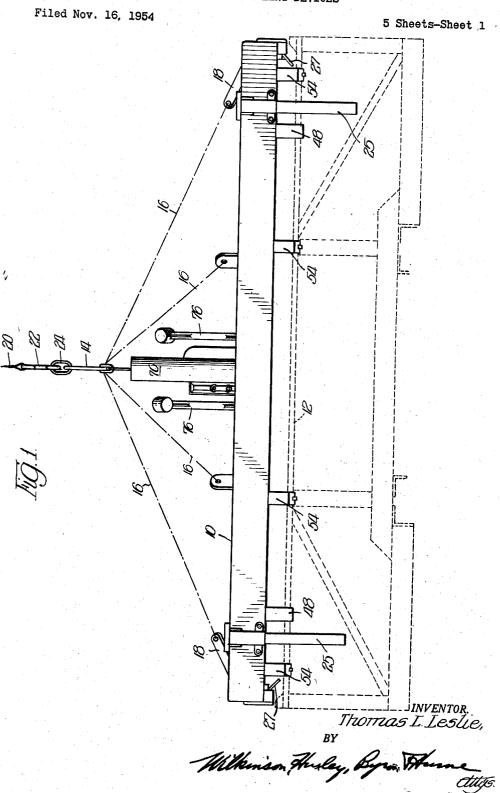
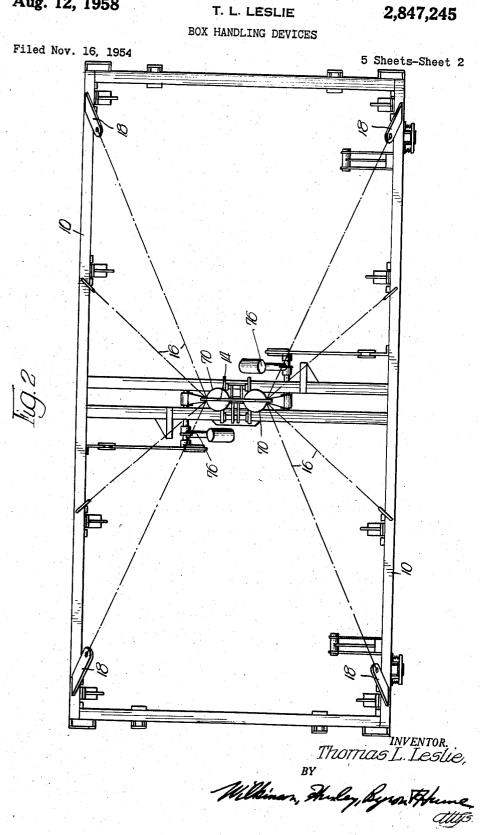
T. L. LESLIE

2,847,245

BOX HANDLING DEVICES



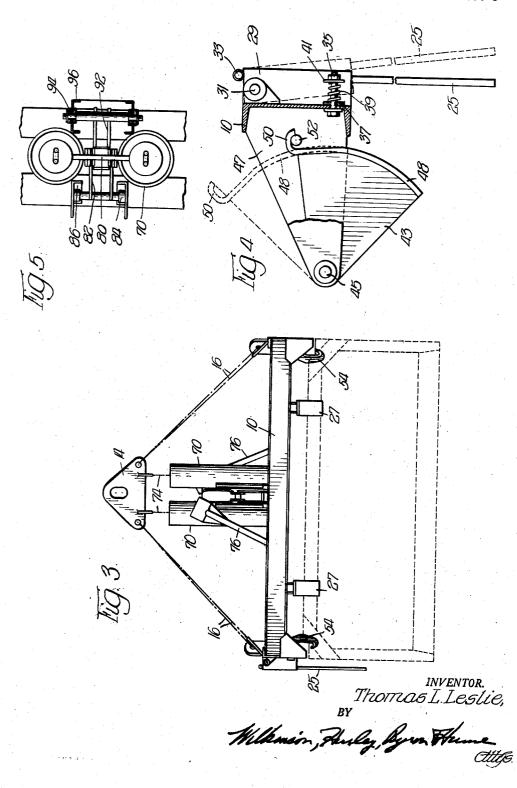


T. L. LESLIE BOX HANDLING DEVICES

2,847,245

Filed Nov. 16, 1954

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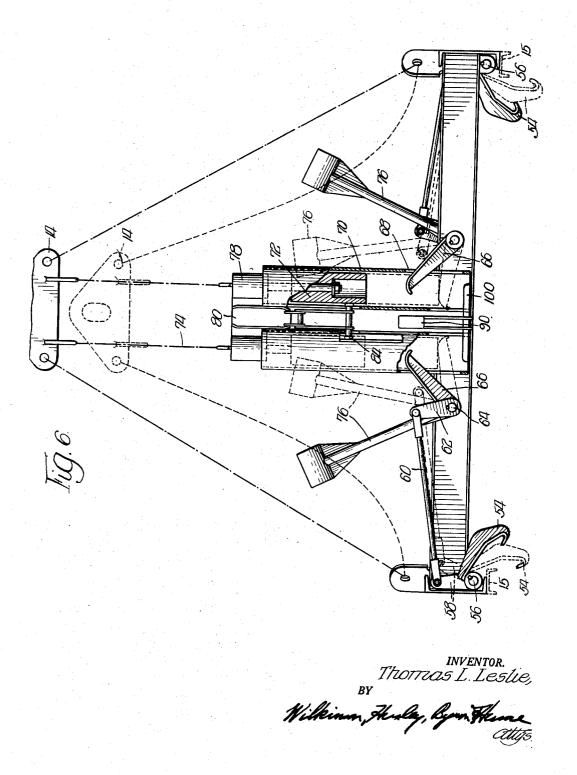


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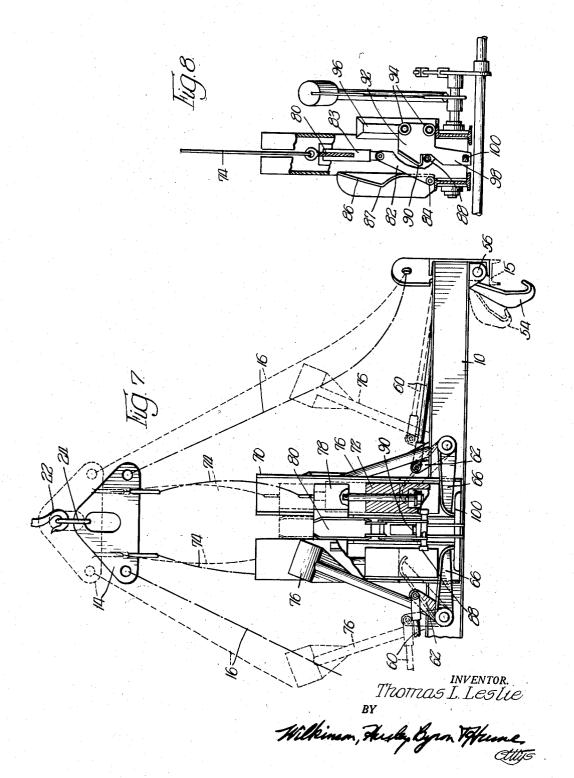


### T. L. LESLIE BOX HANDLING DEVICES

2,847,245

Filed Nov. 16, 1954

5 Sheets-Sheet 5



# United States Patent Office

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### 2,847,245

### **BOX HANDLING DEVICES**

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5 Claims. (Cl. 294-110)

This invention relates to a new and improved box 15 handling device and more particularly to a device adapted to automatically couple to a bulk fruit box for lifting such a box from cars or trucks or when loading such boxes onto ships, lighters or barges.

In the handling of fresh fruit as, for example, pine- 20 apple, it is the practice to load such fruit in bulk into large boxes. The gross weight of such a box including the fruit may be on the order of ten tons. These boxes are moved by power cranes and the previous practice has been to have a plurality of hooks or grab irons suspended 25 bers are designed to engage the upper faces of the ends from the crane. It is then necessary to provide several workmen to attach the hooks to the boxes at suitable points and to see that they remain properly attached as the box is lifted. It is also necessary to provide men to detach the hooks and to see that they do not engage 30 the box as the crane lifts the assembly after the box has been placed in the desired position. Besides these high labor costs, a further objection to this practice is that the heavy swinging hooks may damage the upper layer of fruit when the hooks are swung into or out of position.

According to the present invention, a frame is provided carrying properly spaced guide members and attaching hooks for connecting the frame to the top of a box. The frame is suspended from the crane cable and means are provided for moving the attaching hooks 40 from released to attached position and the reverse by suitable manipulation of the crane cable.

It is an object of the present invention to provide a new and improved box handling device.

It is a further object to provide a device of this char- 45 acter having guide means to correctly locate it relative to the upper portion of a box when lowered upon the box.

It is another object to provide such a construction which is provided with attaching hooks adapted to be 50 connected and disconnected from the box by manipulation of a crane cable supporting and moving the device.

It is also an object to provide a box lifting and handling device which is largely automatic in operation, requiring a minimum of labor for its operation.

It is an additional object to provide a box handling device which is adapted for commercial construction and for use in handling heavy boxes.

Other and further objects will appear as the description proceeds.

I have shown certain preferred embodiments of the invention in the accompanying drawings, in which-

Figure 1 is a side elevation of the device;

Figure 2 is a plan view of the device;

Figure 3 is an end elevation of the device;

Figure 4 is a fragmentary elevation, on an enlarged scale, of the guide construction;

Figure 5 is a fragmentary plan view, on an enlarged scale, of the actuating weights and associated parts;

Figure 6 is an enlarged cross section showing the parts in full lines in the released position;

Figure 7 is a partial view, similar to Figure 5, but showing the parts in full lines with the hooks engaged;

Figure 8 is a fragmentary elevation, partly broken 5 away, showing the release lift latch.

Referring first to Figure 1 of the drawings, the device comprises a support frame 10 which is formed of structural steel members and conforms substantially to the shape and size of the upper face of the cargo bin or box

10 12 which has been indicated in broken lines. The frame 10 is supported from a bridle plate 14 by means of a multiplicity of cables 16 which are connected by suitable fastening means to pad eyes 18 permanently and rigidly secured to the frame 10. It will be understood that the entire assembly may be moved by any standard type of crane which will raise or lower or move laterally a cable 20 connected to a crane hook 22. This hook 22 is shown as extending through a link 24 connected to the bridle plate 14.

One side of the frame 10 carries spring-loaded guideon bars 25, the construction of which is shown in detail in Figure 4. The ends of frame 10 carry rigid sloping guide members 27 having lower guide surfaces inclined downwardly and inwardly of the frame. These memof the cargo bin or box 12 to guide the frame 10 longitudinally of the bin as the frame is lowered thereon.

Referring next to Figure 4, the guide-on bars 25 slide vertically through a guide or housing 29 which is pivotally connected at 31 to the upper outer face of the frame The bars 25 are provided at their upper ends with stop bars 33 which limit the downward movement of the bars 25. The spring loading of the box 29 normally carries it in the position shown in full lines in 35 Figure 4, but permits it to swing to the broken line position of that figure when the bar 25 thrusts against the outer face of a side wall of the cargo bin 12. spring loading is accomplished by means of a bolt 35 This extending through the frame 10 and through an ear 37 on box 29. The compression spring 39 is located around the bolt 35 between the washer 41 and the ear 37.

The pivoted guide-on shoe 43, also shown in Figure 4, is pivotally supported on a pin 45 carried by an arm 47 extending inwardly from the frame 10. This guideon shoe 43 is provided with an arcuate surface 48 adapted to engage the inner face of the side wall or top frame of the cargo bin to positively locate the device relative to the bin in the transverse direction. The guide-on shoe 43 has an upper outwardly extending lip 50 adapted to engage a stop pin 52 carried by arm 47 to limit downward swinging movement of member 43 about its pivot The shoe 43 normally is held extended below frame 10 by gravity.

The frame 10 is secured to the top of the bin 12 to 55 lift it by means of the lifting hooks 54. These hooks 54 are carried on each side of the frame 10 upon longitudinally extending shafts 56, as best shown in Figure 6. Each such shaft 56 is provided with a crank arm 58 keyed or otherwise rigidly connected to the shaft and rotatable therewith. The arms 58 are connected by links 60 to arms 62, which arms are keyed to rotate with intermediate shafts 64. Also keyed to the intermediate shafts 64 are operating levers 66.

These operating levers 66 extend through slots 68 in 65 the walls of the parallel tubular weight guide members 70. The weights 72 are adapted to slide vertically in the guides 70 and are connected to upper portions 78 which in turn are connected to the bridle plate 14 by cables 74. The weighted arms 76 are keyed to the inter-70 mediate shafts 64 and, as shown in Figure 6 in full lines, are swung outwardly past the vertical with the hooks 54 in the open or unlatched position. When swung inwardly

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and

toward the center of the frame to the broken line position, these weighted arms 76 cause the hooks 54 to move toward the operative or lifting position, as shown in broken lines in Figure 6. The arms 76 and hooks 54are shown in the lifting position in Figure 7.

The upper portions 78 of the weights 72 are connected by a yoke 80 from which latch members 82 are pivotally supported upon arms 83, as best shown in Figure 8. These latch members 82 are provided with cam rollers 10 84 which travel on the outside of the cam track 86. The members 82 are further provided with a roller 33 adapted to engage under the nose 90 of a follower 92. This follower 92 is provided with pairs of rollers 94 which guide the vertical movement of the follower 92 by roll-15 ing in the guide tracks 96. The lower leg 98 of follower 92 carries a transversely extending lifting arm 100. As shown in Figure 7, this arm 100 underlies the inner ends of the members 66.

It will be apparent from an examination of Figures 7 and 8 that with the cables 74 slacked away, the weights 20 72 will be at their lower position and consequently the transverse roller 88 will be under the lifting nose 90 of the follower 92. As the cables 74 are tightened, the weights 72 are lifted and the member 82 is raised. Rollers 84 travel on the outside of the cam guide 86 and 25 when the rollers reach the high point 87 of the cam guide 86, the transverse roller 88 is drawn outwardly from under the nose 90 and the follower 92 and transverse arm 100 return by gravity to the position in which they are shown in Figure 8.

In the use of the device it will be understood that it will be moved by a crane and lowered upon the top of the bin or box to be moved. If the device is not lowered accurately upon the box, the various guide means will assist in moving it to the proper position so that 35the lifting hooks may engage. If the device is off-center lengthwise of the box a moderate amount, the sloping guide members 27 will tend to center it in that direction. If the device is lowered inaccurately in the lateral direction to the extent that the spring-loaded guide-on bars 40 25 engage the top of the box, no damage will be done to the box or bars as these bars will be forced upwardly When the device is swung through the housings 29. laterally so as to bring the bars 25 against a lateral wall of the bin, the move in this direction will be yieldingly 45 stopped by the springs 39 which will tend to properly center the device on the box. When the box is properly centered relative to bars 25, the guide-on shoes 43 will drop down to the position shown in Figure 4 so that the upper edge of the box is held between bars 25 and shoes 50 43, thus properly centering the whole device in the lateral direction.

The device will be lowered upon the bin with the lifting hooks and their operating parts in the position shown in full lines in Figure 6. The hooks 54 are then 55 in their released position. In order to move the hooks 54 to latched position, the crane operator lowers away the cable and the bridle plate 14 is lowered to the broken line position of Figure 6. This lowers the weights 72 and they engage the operating levers 66 to swing them 60 downwardly to the broken line position of Figure 6. This swings the weighted arms 76 past center so that the weighted arms continue the downward movement of the operating levers 66 and these levers are moved away from weights 72. This final movement swings the hooks 54 to the full line position in which they are shown in 65Figure 7. The weights 72, however, during this hook-on operation, will not be lowered to the position in which they are shown in Figure 7, but will be held at a level approximating that in which they are shown in broken 70 lines in Figure 6.

The hooks 54 now engaging under the upper flanges 15 of the side walls of box 12 will enable the crane operator to raise the entire handling assembly as well as the loaded bin and to move it to any other desired location within the range of crane operation.

5

When it is desired to release the device from the box, the crane operator again lowers away on the cable, this time, however, lowering the weights 72 until they come to rest on the operating levers 66, as shown in Figure 7. He then hauls away on the cable, lifting the device from the box, and during this movement the hooks are automatically released. This release is accomplished by the fact that the latch members 82 are lowered to the position shown in Figure 8 so that the roller 88 engages under the nose 90 of the follower 92. As the operator lifts the cables, the latch members 82 are raised and the roller 88 also serves to raise the follower 92. The transversely extending lifting arm 100 is lifted with the follower 92 and this arm lifts operating levers 66 which serve to swing the weighted arms 76 past the vertical position. The parts are so related that shortly after the arm 76 passes the vertical, the cam rise 87 swings the latch members 82 to the left and roller 88 is drawn out from under the nose 90 of the follower 92. The follower 92 and the arm 100 then drop down by gravity to their normal position in which they are shown in Figure 7. As the weighted arms 76 pass the vertical, their weight causes their movement to continue until they are returned to the full line position of Figure 6. At this time the hooks 54 are in the fully released position and a continued lift on the cables moves the device vertically from the bin.

The device now has all its parts in position for initiating a next operation. It will be apparent that no manual labor is required in securing the device to the bin or in releasing it from the bin. The only care required by the crane operator, once he has located the device over the box, is that he lowers his cable and thus lowers the weight 72 only an amount sufficient to swing the weighted arms 76 past the vertical and cause the latching operation. During this latching-on operation, the operator does not lower the weights sufficiently for roller 88 to engage under nose 90 to carry out the releasing Should this excessive lowering accidentally operation. take place, it is only necessary to first haul away on the lifting cable a short distance and then follow up by again lowering the weights a proper amount. The position of the weighted arms 76 is visible to the operator and he can be guided in his operation by watching the movement of these arms.

While I have shown one preferred form of my device, it is to be understood that this is illustrative only as it is capable of variation to meet different conditions and requirements. I therefore contemplate such modifications as come within the spirit and scope of the appended claims.

I claim:

1. In a box handling device for use with boxes having a substantially open upper face and flanges extending laterally from the upper edges of said box walls, a frame adapted to substantially register with the upper edges of the box walls, a plurality of hooks hingedly mounted on said frame and extending to hook under the flanges on said box when in engaged position, means for moving said hooks from engaged to disengaged position and vice versa, said means comprising a system of levers mounted on said frame and connected to said hooks, means for suspending said frame for movement relative to the boxes, weights connected to said frame-suspending means for movement thereby, lifting means, and means for connecting said lifting means and weights when said weights are in a lowered position and for disconnecting said lifting means and weights when said weights are in an intermediate raised position, portions of said lever system extending for contact with and movement by said weights to move said hooks into engaged position when said weights are moved downwardly a predetermined extent and portions of said lever system extending for contact with and movement by said lifting means to dis-75 engage said hooks when said lifting means and weights are

5 connected and said weights are moved upwardly a pre-

determined extent. 2. In a box handling device for use with boxes having a substantially open upper face and flanges extending laterally from the upper edges of said box walls, a frame 5 adapted to substantially register with the upper edges of the box walls, a plurality of hooks hingedly mounted on said frame and extending to hook under the flanges on said box when in engaged position, means for moving said hooks from engaged to disengaged position and 10 of the frame, spring means urging the housings against vice versa, said means comprising a system of levers mounted on said frame and connected to said hooks, means for suspending said frame for movement relative to the boxes, weights connected to said frame-suspending means for movement thereby, lifting means, means for connecting said lifting means and weights when said weights are in a lowered position and for disconnecting said lifting means and weights when said weights are in an intermediate raised position, portions of said lever system extending for contact with and movement by said 20 weights to move said hooks into engaged position when said weights are moved downwardly a predetermined extent, and portions of said lever system extending for contact with and movement by said lifting means to disengage said hooks when said lifting means and weights are connected and said weights are moved upwardly a predetermined extent, said lever system further including weighted arms movable past the vertical position so as to bias the hooks to engaged position when on one side of the vertical and to bias the hooks to disengaged 30 position when on the opposite side of the vertical.

3. In a box handling device for use with boxes having a substantially open upper face and flanges extending inwardly of the upper edges of the box walls, a frame adapted to substantially register with the upper edges of the box walls, a plurality of hooks spaced about said frame hingedly mounted thereon, said hooks extending below the frame and being adapted to hook under the box flanges when in engaging position, means for moving the hooks from engaged to disengaged position and the reverse, guide members extending downwardly from the frame to guide the frame into substantial registration with the upper face of the box when the frame is lowered upon the box, said guide members comprising bars slidably supported in housings pivotally connected to the outer faces of the frame, and spring means urging the housings against the frame, the guide members normally extended to their lowermost position by gravity and movable upwardly relative to the frame upon engaging a 50 fixed surface.

4. In a box handling device for use with boxes having a substantially open upper face and flanges extending inwardly of the upper edges of the box walls, a frame adapted to substantially register with the upper edges of the box walls, a plurality of hooks spaced about said 55 frame hingedly mounted thereon, said hooks extending

below the frame and being adapted to hook under the box flanges when in engaging position, means for moving the hooks from engaged to disengaged position and the reverse, guide members extending downwardly from the frame to guide the frame into substantial registration with the upper face of the box when the frame is lowered upon the box, said guide members comprising downwardly extending bars slidably supported in housings pivotally connected to the outer faces of the outer face the frame, the guide members being normally extended to their lowermost position by gravity and movable upwardly relative to the frame upon engaging a fixed surface, and swinging guide shoes supported by the frame 15 on pivots located inside the frame, the guide shoes normally being held by gravity in position below the frame and being swingable upwardly by engagement with a fixed surface.

5. In a box handling device for use with boxes having a substantially open upper face and flanges extending laterally from the upper edges of said box walls, a frame adapted to substantially register with the upper edges of the box walls, a plurality of hooks hingedly mounted

on said frame and extending to hook under the flanges on said box when in engaged position, means for moving 25said hooks from engaged to disengaged position and vice versa, said means comprising a system of levers mounted on said frame and connected to said hooks, means for suspending said frame for movement relative to the boxes, weights connected to said frame-suspending means for movement thereby, lifting means having a cam follower means, and latch means connected to said weights having a cam means, said cam means and said cam follower means connecting said lifting means and said 35 weights when said weights are in a lowered position and for disconnecting said lifting means and said weights when said weights are in an intermediate raised position, portions of said lever system extending for contact with and movement by said weights to move said hooks into 40 engaged position when said weights are moved downwardly a predetermined extent and portions of said lever system extending for contact with and movement by said lifting means to disengage said hooks when said lifting means and said weights are connected and said weights 45 are moved upwardly a predetermined extent.

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