DOOR ACTUATING MEANS FOR MATERIAL HANDLING BOX

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This invention relates generally to a material handling box and stand and more particularly to a door actuating means for a material handling box.

The material handling stand and box of the present invention is particularly useful in and around work areas and assembly lines. The device is employed for supplying numbers of a particular item to a workman. The combination box and stand allows efficient transport of the items to the work area and convenient access to the items at the work area.

Material handling boxes heretofore known in the art have inherent in their structures several disadvantages which reduce the efficiency and safety factors. For instance, when a solid and fixedly mounted bar is employed for engaging the door actuating member, undue stresses and wear are afforded the door and actuating member. When the box is being lowered onto the stand, a rear portion is engaged by the stand and allows the front portion to pivot therearound until coming to rest on a suitable stop means. Since the door actuating bar is fixedly mounted, frictional engagement results with the actuating member on the door. Such frictional engagement provides wear to the door member and undue stresses upon the door and consequently upon the grooves in which it slides.

Because of the engagement required between the bar and the door member, the member must be of substantial length to be able to engage the bar in either of its two extreme positions of engagement therewith. Therefore, when the box is being moved as by a fork lift, the door member is necessarily protruding outwardly in front of the box and presents a safety hazard. Furthermore, the larger the actuating member, the greater the possibility of accidental opening of the door. Damage is also more likely during inadvertent handling if the door member protrudes substantially from the door. In addition, stacking and storing of the boxes is more difficult with door members which protrude substantially from the door.

In an effort to overcome these and other problems presented by material handling boxes, the present invention employs a novel door actuating means and structures for supporting the box more efficiently. The preferred form of the invention provides a spring biased bar on a supporting stand for a material handling box that yields to the movement of the box while it is being positioned for gravity unloading.

It is, therefore, one primary object of this invention to provide a supporting stand having a yieldable bar for actuating the door of a material handling box.

Another object of this invention is to provide a material handling stand which reduces the heretofore required length of the door actuating member.

Still another object of this invention is to provide a material handling stand which employs a door actuating member of lighter weight than heretofore known.

Yet another object of the present invention is to provide a material handling stand and box which does not require the actuating member to protrude at substantial distances from the door.

A still another object of this invention is to provide a material handling stand and box which substantially reduces accidental openings of the door, damage to the door by inadvertent handling, and stacking and storing problems.

Still a further object of this invention is to provide a material handling stand and box which greatly increases safety over known devices.

These and other objects of the present invention will be more fully realized and understood from the following detailed description when taken in conjunction with the accompanying drawings wherein:

FIGURE 1 is a perspective view of the material handling stand with the material handling box supported thereon and the door in actuated and opened position;

FIGURE 2 is a fragmentary enlarged view of a portion of the spring biased bar;

FIGURE 3 is a sectional view taken along line III—III of FIGURE 2;

FIGURE 4 is a side elevational view showing the material handling box being placed on the stand with the door actuating member engaging the spring biased bar;

FIGURE 5 is a side elevational view similar to that of FIGURE 4 but showing the box in gravity unloading position with the door held open by the spring biased bar; and

FIGURE 6 is a fragmentary sectional view of a portion of the stand and box as shown in FIGURE 4.

Like reference numerals throughout the various views of the drawings are intended to designate the same or similar structures.

With reference to the drawings in detail and in particular to FIGURE 1, there is shown the preferred form of the present invention. A stand generally designated with the reference numeral 10 includes a discharge chute 12 and a frame 14 for receiving parts or sub-assemblies therein which are to be assembled or fabricated in a production line. The chute 12 forms a visualization portion for articles to be used on an assembly line and the chute 12 is provided with a pair of side walls 16 and 18 and a bottom wall 20. The frame 14 is provided with a pair of front legs 22 and a pair of back legs 24 for supporting the stand on a level support surface. The legs 24 extend upwardly a substantial height and include support members 26 at one end thereof.

A material handling box generally designated with the reference numeral 28 includes a pair of back supporting legs 30 and a pair of front supporting legs 32 thereon. The box 28 is disposed for placement on the stand 10 so that the forward edge of the legs 30 engage the members 26. The box 28 also includes a pair of side rails 34 for slidably supporting a door 36 therein. Although the door 36 is shown as a substantially flat metal sheet, structural rigidity may be obtained by forming offset flanges at the side edges thereby making the front surface of the door flush with the front edges of the side rails 34. A front wall 38 is provided with an opening 40 controlled by the door 36. A door actuating member 42 extends outwardly from the door 36 and functions as a handle for moving the door with respect to the opening 40.

Mounted on each side wall 16 of the frame 14 is a cylinder barrel 44 for receiving a plunger or piston 46 therein. A bar 48 consisting of an angle iron extends between the plungers and is disposed for engaging the door actuating member 42. As more clearly illustrated in FIGURE 3, the barrel 44 includes a spring 50 therein for biasing each plunger 46 outwardly of the barrel 44. Therefore, the bar 48 is spring-biased to respond to the horizontal component of movement of the door actuating member 42 which occurs during the arcuate movement of the front portion of box 28. Such structure, therefore, eliminates frictional engagement with member 42 and consequently reduces the stresses on the door 36 and the side rails 34.
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The barrel 44 also includes a longitudinal slot 52 therein for receiving a set screw 54 which is fastened to the plunger 46. The set screw 54 maintains the plunger 46 in aligned position with respect to barrel 44. Also, the set screw 54 is adapted for bottoming one end of the spring 50 against the plunger 46. A bracing member 56 extends between the barrel 44 on each side wall to provide support therebetween.

The plunger 46 is a generally tubular article and has its end portion terminating in an angular inclination as at 57 so that the angle of inclination complements the angle of inclination of the bottom wall 20 to the horizontal as shown at A (FIGURE 6). The angle iron bar 48 has two legs 48a and 48b and one of the legs 48a is engaged against the inclined end 57 of each plunger 46, thereby positioning the leg 48a vertically in the operative position of the bar 48 with a forward intercepting lip 48c positioned uppermost to engage the door actuating member 42 at a depending front flange 42a.

The box 28 is disposed for placement on the stand 10 by a fork lift vehicle or other suitable means (not shown). The box 28 is lowered onto the stand 10 until the legs 30 engage the support members 26 and the door actuating member 42, at its flange 42a, engages the spring biased bar 48 at its intercepting lip 48c. As the box 28 is further lowered, it tends to rotate about a pivotal point provided by the engagement of the legs 30 and the support members 26. Since the front portion of the box 28 moves in an arcuate path, the actuating member 42 will have a relative horizontal linear movement tending to force bar 48 against the bias thereon. As the box 28 is allowed to pivot in a downwardly direction, the bar 48 engages the actuating member 42 to move the door 36 upwardly relative to the opening 40. When the box 28 is lowered to its final position, the legs 32 engage the support member 48 and the opening 40 registers with the container 12 for dispensing items therein. The relative position of each of the elements in the various positions of the box 28, with respect to the stand 10, are shown in FIGURES 4, 5, and 6.

When the box 28 is finally positioned on the stand 10, it can be seen that its entire weight is supported by the frame on the support members 26 and 58. Therefore, none of the weight of the box 28 is supported by the chute 12. The only elements supported by the bar 48 are the door 36 and the door actuating member 42.

The principles of the invention explained in connection with the specific embodiment thereon will suggest many other applications and modifications of the same. It is, accordingly, desired that, in construing the breadth of the appended claims they shall not be limited to specific detail shown and described in connection with the exemplification thereof.

Although various minor structural modifications might be suggested by those versed in the art, it should be understood that it is desired to embody within the scope of the patent warranted hereon all such modifications as reasonably and properly come within the scope of the contribution thereof to the art.

The embodiments of the invention in which an exclusive property or privilege are claimed are defined as follows:
1. In combination, material handling apparatus comprising:
   a stand,
   a material handling box for mounting on said stand in an inclined, unloading position and having an opening in a front wall thereof for the gravitational discharging of articles contained in said box, said box including a door slidably supported thereon to selectively open and close said opening,
   acting means on said stand including biasing means urging said actuating means in a direction intersecting said front wall and toward said door in a generally transverse direction when said box is lowered into said inclined position,
   and means on said door for engaging said actuating means to simultaneously move said door away from said opening and to move said actuating means in an opposite direction against the bias of said biasing means as said box is lowered into said inclined position.

2. The combination of claim 1 further including, a closure actuating member on said door and said actuating means including a bar carried on said stand for engaging said closure actuating member.

3. The combination of claim 2 in which, said actuating means includes a pair of cylinders on opposite sides of said stand, a coiled biasing spring in each cylinder having one end bottomed in said cylinder, and a plunger in each cylinder operatively engaging the other end of each corresponding spring, said bar extending between and carried by said plungers.

4. The combination of claim 3 in which, said bar comprises an angle iron, and each said plunger comprises a cylindrical tube having its end disposed at an angle, one leg of said angle iron engaging said tube ends to position the other leg of the angle iron with its free edge forming a vertically disposed intersecting lip to engage said door actuating member.

5. Material handling apparatus comprising, a container for the material having a wall in which a discharge opening is formed, a door, means carrying said door on said wall for sliding movement between a fully closed position and a fully open position, relative to said opening, a stand including a higher rear portion and a lower front portion on which the container may be selectively positioned with one portion of the container engaged against the higher rear portion for pivotal action while the said wall in which said discharge opening is formed moves downwardly in an arcuate path, and interengaging actuating means between said stand and said door including spring biased plungers pre-loaded axially in a direction generally transversely to said wall, whereby said plungers move against the axial biasing force to accommodate the arcuate movement while effecting an automatic opening of said door.

6. Material handling apparatus as defined in claim 5 and further characterized by a door actuating member extending outwardly from said door, and a bar comprising an angle iron carried by said plungers, one leg of said angle iron engaging said plungers and being disposed at an angle to position the other leg of the angle iron with its free edge forming a vertically disposed intersecting lip to engage said door actuating member.

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