May 15, 1962 R. E. JACKSON 3,034,684

APPARATUS FOR DISPENSING ARTICLES FROM STACKS

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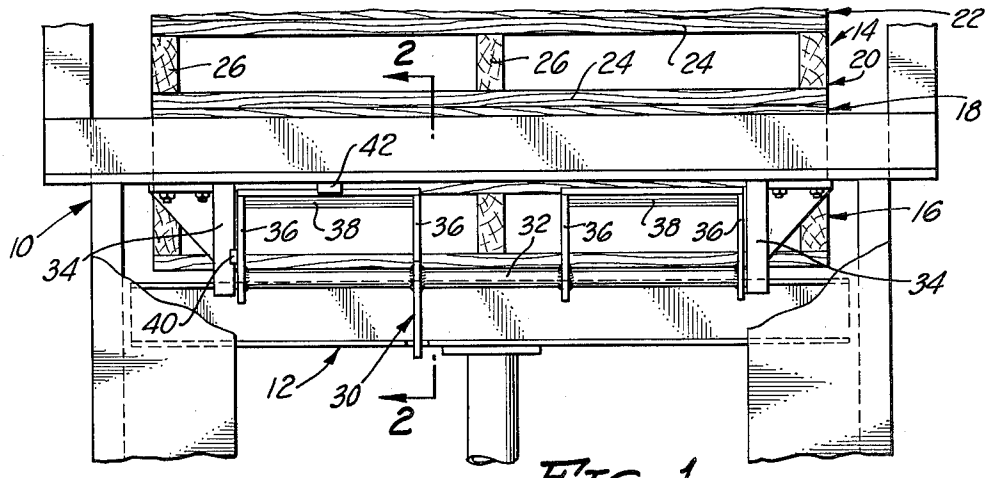


FIG. 1.

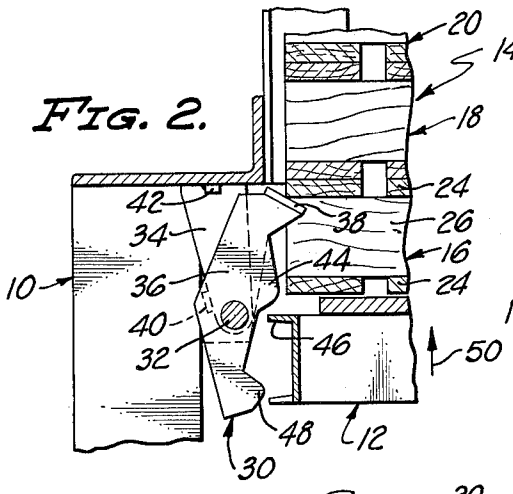


FIG. 2.

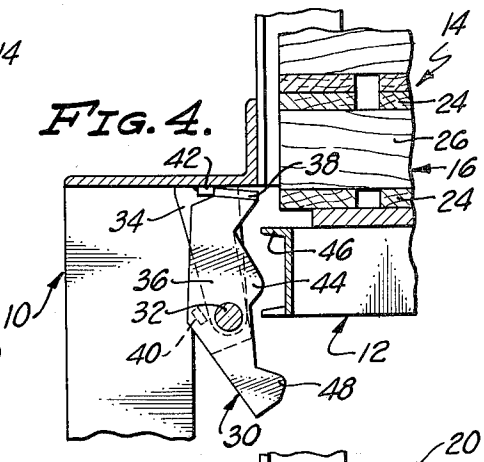


FIG. 4.

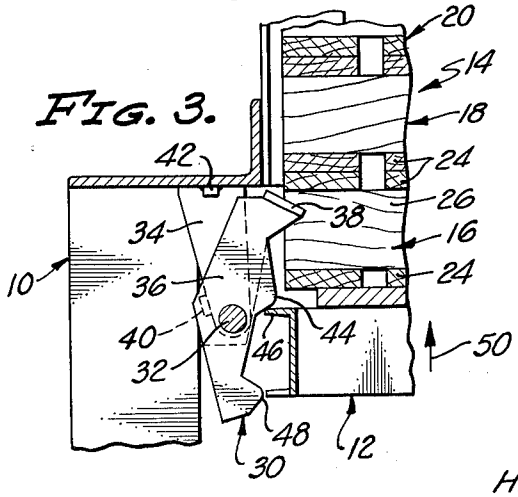


FIG. 3.

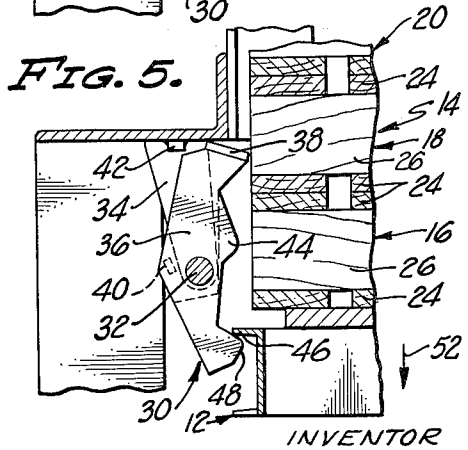


FIG. 5.

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APPARATUS FOR DISPENSING ARTICLES FROM STACKS

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The present invention relates in general to an apparatus for dispensing articles one at a time from a stack of such articles and, more particularly, to an apparatus for dispensing the lowermost article from the stack.

In general, an object of the invention is to provide an apparatus which includes stack supporting means engageable with the lowermost article in the stack to support the stack, an elevator engageable with the lowermost article in the stack for supporting the stack temporarily so that the stack supporting means may be moved from an operative position into an inoperative position, and means for returning the stack supporting means to its operative position after the elevator has lowered the stack a distance such that the lowermost article is below the level of the stack supporting means, whereby the supporting means then engages and supports the second lowermost article so that the lowermost article disengages the second lowermost article upon continued downward movement of the elevator, the second lowermost article thus becoming the lowermost article in the stack.

More particularly, an object of the invention is to provide interengageable cam means on the elevator and the stack supporting means for causing the stack supporting means to release the lowermost article in the stack in response to upward movement of the elevator when the elevator is in a position to engage the lowermost article, and to provide another interengageable cam means on the elevator and the stack supporting means for moving the stack supporting means into engagement with the second lowermost article in the stack after the lowermost article in the stack has been moved below the level of the stack supporting means.

An important object is to provide an apparatus wherein the first interengageable cam means mentioned does not cause the stack supporting means to move into its inoperative position, and thus disengage the lowermost article in the stack, until after the elevator engages the lowermost article in the stack, thereby providing a smooth transfer of the load from the stack supporting means to the elevator, which is an important feature.

Another object is to provide an apparatus which includes a cam on the elevator selectively engageable with upper and lower cams on the stack supporting means, the cam on the elevator being engageable with the upper cam on the stack supporting means during upward movement of the elevator to move the stack supporting means into its inoperative position, and the cam on the elevator being engageable with the lower cam on the stack supporting means during downward movement of the elevator to return the stack supporting means to its operative position.

Another object is to provide a stack supporting means which is pivotable between its operative and inoperative positions.

The foregoing objects, advantages, features and results of the present invention, together with various other objects, advantages, features and results thereof which will be evident to those skilled in the art to which the invention relates in the light of this disclosure, may be achieved with the exemplary embodiment of the invention described in detail hereinafter and illustrated in the accompanying drawing, in which:

FIG. 1 is a fragmentary side elevational view, with

parts broken away, illustrating an apparatus which embodies the invention; and

FIGS. 2 to 5 are enlarged, fragmentary sectional views taken along the arrowed line 2—2 of FIG. 1 and illustrating successive events in the operating cycle of the invention.

Referring to the drawing, the apparatus of the invention includes a suitable supporting structure or framework 10 which provides a shaft for an elevating means 12, hereinafter termed an elevator, of any desired construction. The supporting structure 10 provides space above the elevator 12 for a stack 14 of articles 16, 18, 20, 22, etc., these articles being shown as pallets each having upper and lower walls 24 separated by spacers 26. However, it will be understood that the invention is applicable to articles other than pallets.

The apparatus includes two stack supporting means 30 respectively located on opposite sides of the elevator 12 and the stack 14 and respectively engageable with opposite sides of the lowermost, or the next to the lowermost, pallet in the stack. Only one of the stack supporting means 30 is shown in the drawing, the other being identical, but reversed in position.

Each stack supporting means 30 is shown as including a shaft 32 rotatably mounted on brackets 34 carried by the supporting structure 10. Fixed on the shaft 32 are stack supporting members 36 which are shown as arranged in pairs, those of each pair being interconnected by a stack supporting element 38 engageable with the undersides of the upper walls 24 of the various pallets, as shown in FIG. 2.

The stack supporting members 36 of each stack supporting means 30 are pivotable inwardly and downwardly about the axis of the corresponding shaft 32 from inoperative positions, shown in FIG. 4, to operative positions, shown in FIG. 2. When the stack supporting members 36 are in their inoperative positions, the supporting elements 38 thereon are out of engagement with the pallets of the stack 14. However, when the stack supporting members 36 are in their operative positions, the supporting elements 38 are, as hereinbefore indicated, engageable with the underside of the upper wall 24 of one of the pallets. Since the stack supporting members 36 pivot inwardly and downwardly into their operative positions, the weight of the stack 14 tends to force them into their operative positions. Thus, the stack supporting means 30 are self energizing.

Movement of the stack supporting members 36 inwardly and downwardly beyond their operative positions is prevented by a stop 40 on one of the stack supporting members which is engageable with one of the brackets 34. Movement of the stack supporting members 36 outwardly beyond their inoperative positions is prevented by a stop 42 on the supporting structure 10 engageable by one of the supporting elements 38. It will be understood that stops other than the stops 40 and 42 may be employed to perform the functions of these stops.

One of the stack supporting members 36 of each stack supporting means 30 is provided thereon with a first or upper cam 44 which is engageable by a cam 46 on the elevator 12 during upward movement of the elevator after the elevator has engaged the lowermost pallet 16 to transfer the weight of the stack 14 from the stack supporting means 30 to the elevator. The stack supporting member 36 having the upper cam 44 thereon is also provided with a second or lower cam 48 which is engageable by the cam 46 on the elevator 12 during downward movement of the elevator after the lowermost pallet 16 of the stack 14 has been moved below the level of the stack supporting elements 38.

Considering the operation of the invention, the stack 14 is normally supported by the stack supporting means

30, the stack supporting members 36 being in their operative positions, as shown in FIG. 2, so that the supporting elements 38 engage the underside of the upper wall 24 of the lowermost pallet 16. When it is desired to remove or dispense the lowermost pallet 16 from the stack 14, the elevator 12 is moved upwardly, as indicated by the arrows 50 in FIGS. 2 and 3, until the elevator engages the lowermost pallet 16 and supports the weight of the stack 14. After the load has been transferred to the elevator 12, the cam 46 on the elevator engages the upper cam 44 of the stack supporting means 30 shown and pivots such stack supporting means into its inoperative position, as shown in FIG. 4, the same applying to the other stack supporting means.

Thereafter, the elevator 12, with the stack 14 thereon, is moved downwardly, as indicated by the arrow 52 in FIG. 5 of the drawing. After the lowermost pallet 16 has moved below the level of the supporting elements 38, the cam 46 on the elevator 12 engages the lower cam 48 of the corresponding stack supporting means 30 to pivot such stack supporting means into its operative position, the same applying to the other stack supporting means. Continued downward movement of the elevator 12 ultimately results in engagement of the stack supporting elements 38 with the underside of the upper wall 24 of the second lowermost pallet 18, as will be clear from FIG. 5 of the drawing. When this occurs, the entire stack 14, except for the lowermost pallet 16, is carried by the stack supporting means 30, only the lowermost pallet being supported by the elevator 12. Consequently, further downward movement of the elevator results in disengagement of the lowermost pallet 16 from the second lowermost pallet 18, which now becomes the lowermost pallet in the stack 14.

At this point, the pallet 16 may be removed from the elevator 12 in any suitable manner. For example, the elevator 12 may include a suitable conveyor, not shown, for discharging the pallet 16 therefrom onto another conveyor, not shown, for delivering it to a point of use.

The foregoing accomplished, the next pallet 18 may be dispensed from the stack 14 in a similar manner, the same being true of the succeeding pallets 20, 22, etc.

Thus, the present invention provides a simple and effective means of unstacking articles from the bottom of the stack. Since the stack supporting means 30 do not release the stack during upward movement of the elevator 12 until such time as the weight of the stack has been transferred to the elevator, the transfer from the stack supporting means 30 to the elevator is effected very smoothly, which is an important feature. Similarly, the stack 14 is transferred back to the stack supporting means 30 smoothly during downward movement of the elevator 12.

Although an exemplary embodiment of the invention has been disclosed herein for purposes of illustration, it will be understood that various changes, modifications and substitutions may be incorporated in such embodiment without departing from the spirit of the invention as defined by the claims which follow.

I claim:

1. In an apparatus for dispensing the lowermost article from a stack, the combination of: a supporting structure; an elevator movable upwardly and downwardly relative to said supporting structure and engageable with the lowermost article in the stack; stack supporting means carried by said supporting structure and movable relative thereto between an inoperative position wherein it is out of engagement with the stack and an operative position wherein it engages and supports the lowermost article in the stack; interengageable cam means on said elevator and said stack supporting means, and interengageable in response to upward movement of said elevator after engagement of said elevator with the lowermost article in the stack, for moving said stack supporting means from said operative position into said inoperative position; and another interengageable cam means on said elevator and said stack supporting means, and interengageable in response to downward movement of said elevator after the lowermost article in the stack has been moved below the level of said stack supporting means, for moving said stack supporting means from said inoperative position into said operative position, whereby said stack supporting means engages and supports the second lowermost article in the stack so that the lowermost article disengages the second lowermost article upon continued downward movement of the elevator, whereupon the second lowermost article becomes the lowermost article in the stack.

2. In an apparatus for dispensing the lowermost article from a stack, the combination of: a supporting structure; an elevator movable upwardly and downwardly relative to said supporting structure and engageable with the lowermost article in the stack; stack supporting means carried by said supporting structure and movable relative thereto between an inoperative position wherein it is out of engagement with the stack and an operative position wherein it engages and supports the lowermost article in the stack; interengageable cam means on said elevator and said stack supporting means, and interengageable in response to upward movement of said elevator after engagement of said elevator with the lowermost article in the stack, for moving said stack supporting means from said operative position into said inoperative position, said interengageable cam means including a cam on said elevator and a first cam on said stack supporting means; and another interengageable cam means on said elevator and said stack supporting means, and interengageable in response to downward movement of said elevator after the lowermost article in the stack has been moved below the level of said stack supporting means, for moving said stack supporting means from said inoperative position into said operative position, whereby said stack supporting means engages and supports the second lowermost article in the stack so that the lowermost article disengages the second lowermost article upon continued downward movement of the elevator, whereupon the second lowermost article becomes the lowermost article in the stack, said other interengageable cam means including said cam on said elevator and a second cam on said stack supporting means below said first cam thereon.

3. In combination: a supporting structure; an elevator movable upwardly and downwardly relative to said supporting structure and having a cam thereon; and stack supporting means carried by said supporting structure and movable relative thereto between an inoperative position wherein it is out of engagement with a stack of articles on said elevator and an operative position wherein it is in engagement with the stack, said stack supporting means having thereon a first cam engageable by said cam on said elevator during upward movement of said elevator to move said stack supporting means from said operative position into said inoperative position, and having thereon below and spaced downwardly from said first cam a second cam engageable by said cam on said elevator during downward movement of said elevator to move said stack supporting means from said inoperative position into said operative position, said cam on said elevator being spaced from and out of engagement with said stack supporting means when it is at a level between said first and second cams, and said cam on said elevator being spaced from and located below said stack supporting means when said elevator is in its lowermost position.

4. In combination: a supporting structure; an elevator movable upwardly and downwardly relative to said supporting structure and having a cam thereon; pivot means; and stack supporting means pivotally mounted on said supporting structure by said pivot means and pivotable between an inoperative position wherein it is out of engagement with a stack of articles on said elevator and an operative position wherein it is in engagement with the

stack, said stack supporting means having thereon a first cam above said pivot means and engageable by said cam on said elevator during upward movement of said elevator to move said stack supporting means from said operative position into said inoperative position, and having thereon below said pivot means a second cam engageable by said cam on said elevator during downward movement of said elevator to move said stack supporting means from said inoperative position into said operative position, said cam on said elevator being spaced from and out of engagement with said stack supporting means when it is at a level between said first and second cams, and said cam

on said elevator being spaced from and located below said stack supporting means when said elevator is in its lowermost position.

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