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|------|--|--|---------|----------------------|---------|
| [54] | <b>CARD STACKER</b>  | 3,092,380  | 6/1963  | Anderson et al. .... | 271/185 |
| [75] | Inventors: <b>Hiroshi Mano</b> , Yokohama; <b>Hiroshi Yamada</b> , Ichikawa, both of Japan | 3,220,569  | 11/1965 | Willits et al. ....  | 271/185 |
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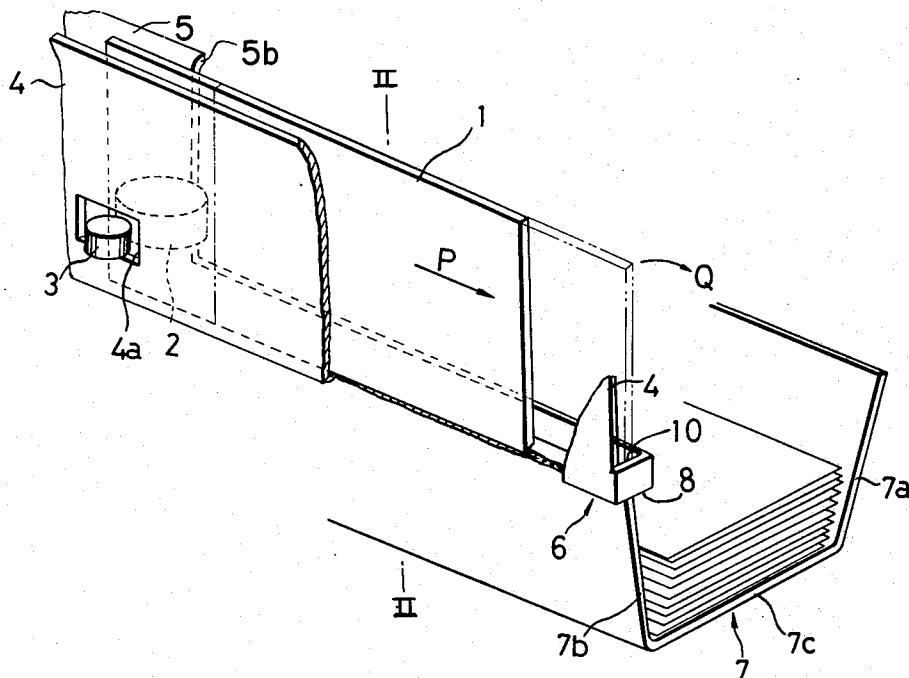
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- [51] **Int. Cl.**<sup>2</sup>..... **B65H 29/26**
- [58] **Field of Search** ..... 271/80, 177, 178, 179,  
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- [56] **References Cited**
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- 2,036,409 4/1936 Gollnick et al. .... 136/100

[57] **ABSTRACT**

A stacker for thin and relatively stiff cards, such as IBM cards, guides successive cards travelling on an edge and is so arranged with respect to a tray that the cards fall by gravity sideways to be stacked on top of each other in an orderly stack on the bottom of the tray.

### 4 Claims, 2 Drawing Figures





## CARD STACKER

## BACKGROUND AND SUMMARY OF THE INVENTION

Machines which process successive cards, e.g. through a copying operation, commonly have some means for stacking the processed card. For example, successive processed cards may be mechanically moved one by one into a processed card tray in which they stand on an edge parallel to each other. Alternatively, successive processed cards are mechanically moved on their flat sides and are allowed to drop on top of each other onto a tray below the card path to form a stack thereon.

While the prior art devices discussed above may be satisfactory for certain uses, it is desirable in certain other uses to have a device in which successive processed cards are moved on an edge but are then arranged in a neat stack, flat over each other, so that the stack can be conveniently moved to another processing step without further need for manual rearrangement. The invention is directed to providing a stacking device of this type.

The card stacker which reflects the invention is designed to work with thin and relatively stiff cards, such as tabulator cards commonly known as IBM cards. The card stacker includes a channel-shaped guide having a first and a second upright wall connected at their bottom edges by a bottom wall. The guide extends along the top edge of one of the upright walls of a card tray, and the top end of the guide leans toward the other upright wall of the tray. The bottom wall of the guide and the bottom wall of the tray are substantially horizontal. The upright wall of the guide which faces the far upright wall of the tray has an opening which is larger than a card, so that a card aligned with the opening can fall through it toward the bottom of the tray due to gravity and the inclined position of the guide. The far upright wall of the tray may be inclined in the same direction as the guide, so as to cause the top edge of a card which falls sideways through the opening in the guide to strike the inclined far wall of the tray and slide therealong toward the bottom of the tray, so that the edges of all the cards in the stack can be aligned against the same tray wall to form a neat stack. A stop may be provided in the guide if the cards are travelling along the guide at such speed that their inertia would not allow them, without the stop, to fall through the opening, or if the cards do not travel at a steady speed along the guide.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a card stacker in accordance with the invention.

FIG. 2 is a sectional view along line 2—2 of FIG. 1.

## DETAILED DESCRIPTION

Successive cards 1 are moved in the direction of the arrow P along a guide 6 by a feed roller 2 and a keep roller 3 and fall sideways, as indicated by the arrow Q, into a tray 7 where they are stacked in a neat stack over each other and parallel to the bottom wall of the tray 7. The guide 6 comprises a pair of parallel upright walls 4 and 5 and a bottom wall 8 connecting the bottom edges of the upright walls 4 and 5. The upright wall 4 may be continuous, except for a cutout 4a for the keep

roller 3, but the upright wall 5 has, in addition to a cutout 5a for the feed roller 2, a larger cutout 5b which corresponds to the length of the card 1 but starts at a vertical distance  $a$  from the bottom wall 8 which is less than the distance  $b$  between the facing surfaces of the upright walls 4 and 5. The tray 7 has two upright walls 7a and 7b connected at their bottom edges by a bottom wall 7c. The guide 6 and the tray 7 are supported by a suitable fixed bracket 9 such that the walls of the guide and of the tray extend along the same direction  $p$ , the bottom wall 8 of the guide is at the height of the top edge of the upright wall 7b of the tray and adjacent thereto, and the top of the guide is inclined towards the far wall 7a of the tray. The cutout 5b of the guide faces the far wall 7a of the tray. The far wall 7a of the tray is inclined in the same direction from the vertical as the guide 6, and the bottom wall 7c of the tray is sufficiently wide to accommodate a card 1 lying flat thereon. The upper edge of the far wall 7a is preferably at a level higher than the horizontal extent of the cutout 5b in the upright wall 5 of the guide. The feed roller 2 and the keep roller 3 engage each other and the feed roller 2 may be rotated by suitable drive means (not shown) to move a card 1 introduced between the rollers in the direction of the arrow P.

In operation, a card 1 is introduced between the rollers 2 and 3 to be engaged thereby and is moved by the rollers in the direction of the arrow P in an upright position, with the bottom edge of the card sliding along the bottom wall 8 of the guide 6. The card continues travelling along the guide 6 by inertia after its trailing end leaves the nip between the rollers 2 and 3 until its trailing edge moves within the cutout 5b in the upright wall 5 of the guide. At that time, since the guide 6 is inclined as seen in FIG. 2, the card starts falling sideways by gravity, along the direction of the arrow Q shown in FIG. 1. Note that at this time the bottom edge of the card 1 is still supported by the bottom wall 8 of the guide 6, so that the card 1 falls sideways in a pivoting motion, with its top edge inscribing an arc along the arrow Q and with its lower end resting either on the bottom wall 8 of the guide or on the short portion of the upright wall 5 below the cutout 5b. As the upper edge of the card 1 continues its falling motion along the arc Q, it engages the far wall 7a of the tray and slides downwardly along the far wall 7a as the opposite edge of the card 1 clears the guide 6 and the entire card starts falling downwardly into the tray 7 and ultimately comes to rest in a position parallel to the bottom wall 7c of the tray 7, with one of its edges against the upright wall 7a of the tray. As successive cards are introduced in the nip of the rollers 2 and 3, and go through the same path, successive cards 1 are piled in a neat stack in the tray 7, with one edge against the upright wall 7a of the tray. If the speed of travel of the cards 1 along the guide 6 is so great that inertia carries them too far past the cutout 5b, or if the speed of the cards is irregular, a stop 10 may be provided to stop all cards at the same position and ensure that a neat stack is formed in the tray 7.

The invented card stacker relies on a unique relative arrangement of a guide and a tray which can use the force of gravity so that cards which move one by one in an upright position, on an edge, can be stacked flat, one over the other, in a neat stack having the corresponding edges of the cards arranged along a single up-

right plane. The invented card stacker is simple in construction and operation, inexpensive and reliable.

I claim:

1. A stacker for thin and relatively stiff cards comprising:

a guide having a first and a second upright wall connected at their bottom edges by a bottom wall, said walls defining therebetween a path for a card travelling in a plane parallel to the planes of the upright walls, with an edge of the card supported by the bottom wall of the guide;

a card tray having a first and a second upright wall connected at their bottom edges by a bottom wall, said upright walls of the tray being spaced from each other by a distance exceeding the upright dimension of the card when the card is travelling along the card path in the guide;

means for supporting the guide and the tray in a position in which the upright walls of the guide and of the tray extend along the same direction, the bottom edge of the first upright wall of the tray and adjacent thereto, the upright walls of the guide lean toward the tray, and the second upright wall of the guide is closer to the second upright wall of the tray than the first upright wall of the guide;

means defining an opening in said second upright wall of the guide which is larger than the card and

is aligned with the tray along the direction of the card path; and

means for moving successive cards along said card path at a speed at which each card falls by gravity sideways toward the tray through said opening in the second upright wall of the guide, whereby the successive cards which fall by gravity through said opening come to rest stacked flat over each other and parallel to the bottom wall of the tray.

2. A card stacker as in claim 1 wherein the second upright wall of the tray is inclined from the vertical away from the first upright wall of the tray and is positioned to engage the edge of each falling card opposite the edge on which the card has travelled along the card path and to guide each falling card toward a position in which an edge of the card is against said second upright wall of the tray.

3. A card stacker as in claim 1 wherein said opening in the second upright wall of the guide is spaced upwardly from the bottom wall of the guide by a distance which is less than the distance between the facing sides of the upright walls of the guide.

4. A card stacker as in claim 1 including stop means disposed on said card path to cause each card travelling therealong to stop at a position aligned with said opening in the second upright wall of the guide.

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