

[54] **CARD FEEDER**

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Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 330,328, Feb. 7, 1973, abandoned.

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271/165; 271/171

[51] **Int. Cl.**² **B65H 3/06; B65H 1/06**

[58] **Field of Search** 271/6, 7, 10, 34, 35, 37,
271/104, 121, 122, 124, 125, 137, 138, 165,
171

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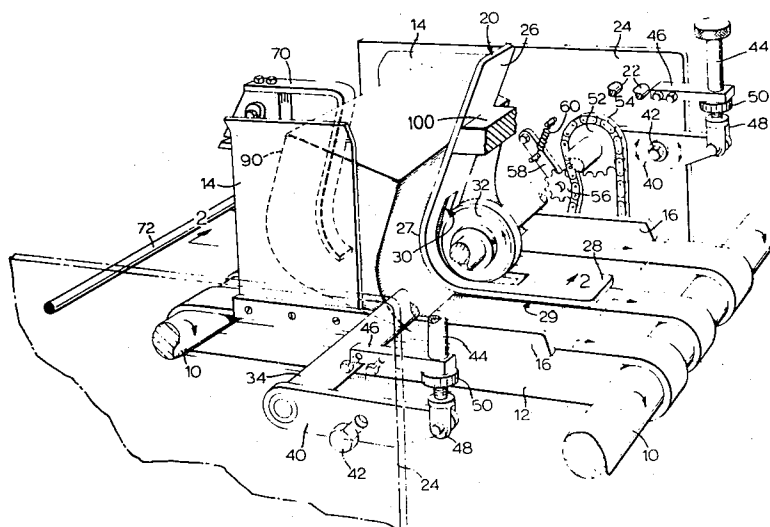
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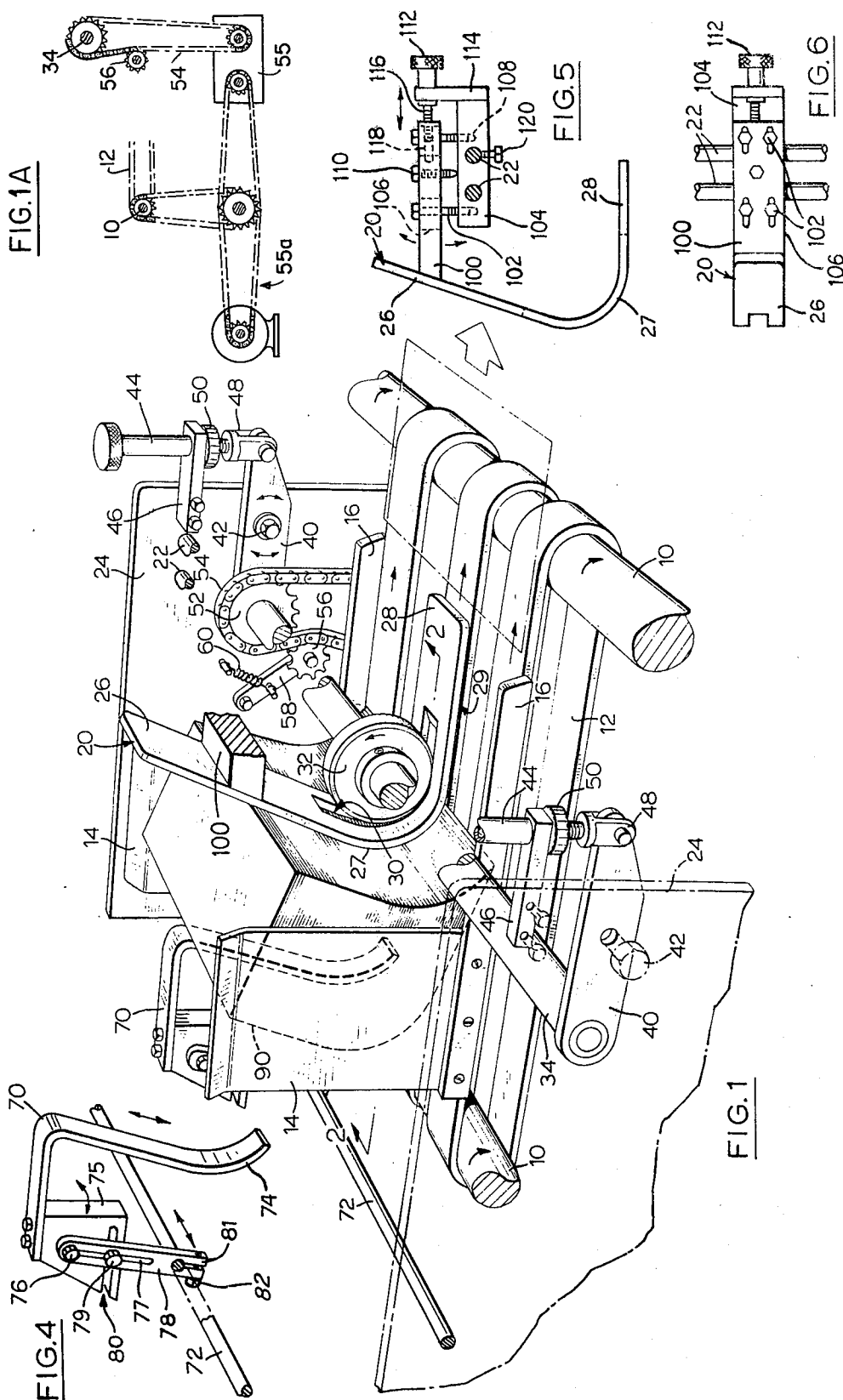
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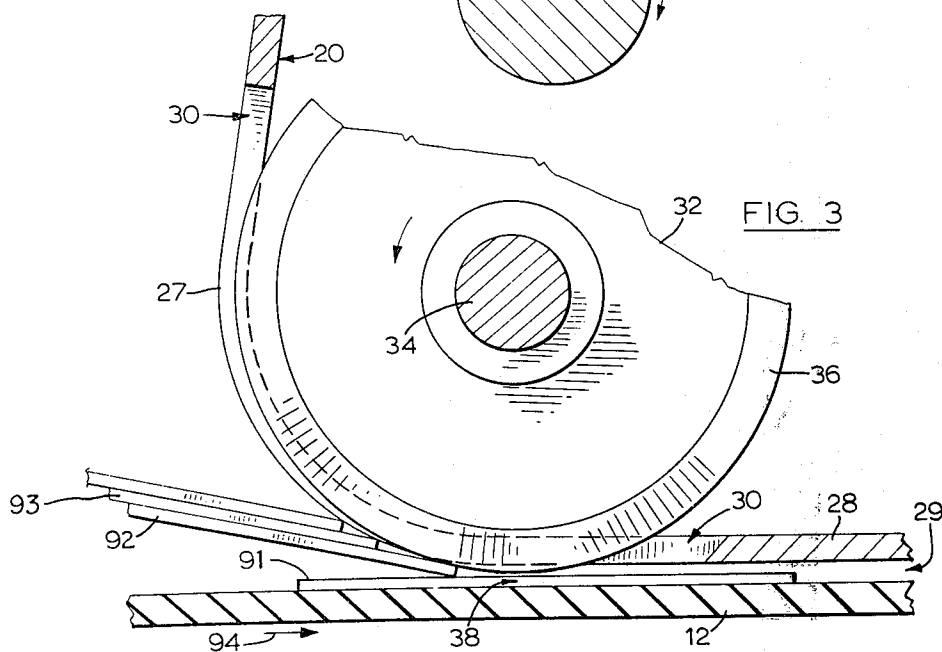
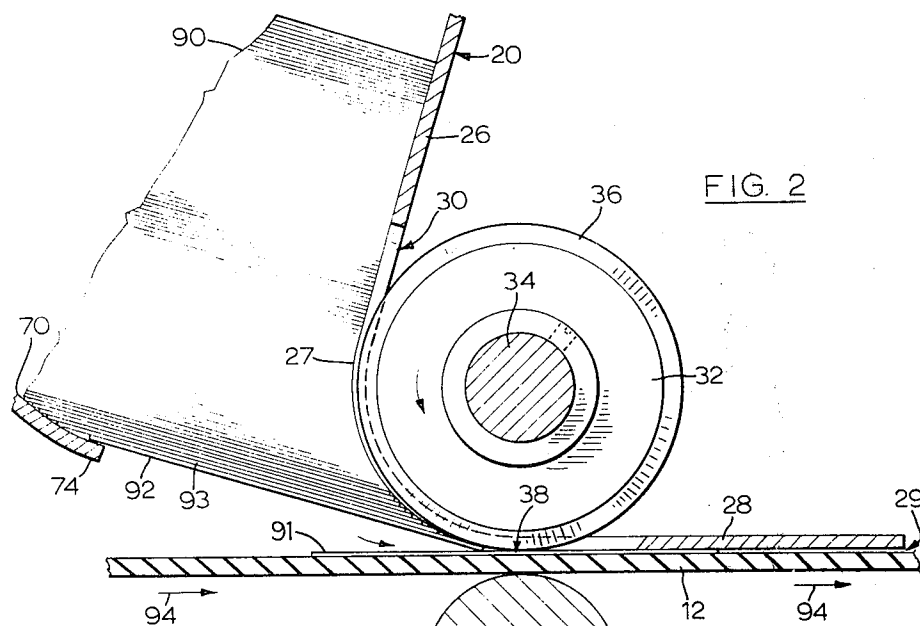
ABSTRACT

A device for feeding cards or like paper stock singly from a stack of such cards, in which each card is guided downwardly and fanned forwardly to bear obliquely against a circular friction means and against the next preceding card until that preceding card has passed beneath the friction means along a conveyor platform. The friction means is rotated in proportion to the linear speed of the platform and at approximately the speed of advancement of the cards being fanned forwardly.

10 Claims, 7 Drawing Figures







CARD FEEDER

This is a continuation-in-part of U.S. Pat. application Ser. No. 330,328 filed Feb. 7, 1973 now abandoned.

The present invention relates to a method and apparatus for feeding cards or like paper stock singly from a stack onto a movable conveyor platform.

Devices have been developed for scoring, folding and stacking cards, such as greeting cards, at high speed. To operate such machines it is necessary to feed single card blanks continuously into them. An example machine is described in my U.S. Pat. No. 3,748,937 issued July 31, 1973 and assigned to Longford Equipment International Limited. Various types of feeding devices have been developed but they suffer from problems of jamming or rapid wear with the need for frequent adjustment, causing periodic shutdowns of the machines. These problems are aggravated by the machine of U.S. Pat. No. 3,748,937 which significantly increases the speed of operation in handling cards.

It is an object of the present invention to provide a method and apparatus for the improved continuous feeding of single cards, from a stack of such cards, at high speed onto a movable conveyor platform.

An example embodiment of the invention is shown in the accompanying drawings in which:

FIG. 1 is a perspective view of a card feeding device;

FIG. 1A is a schematic view of the drive mechanism for the device of FIG. 1;

FIG. 2 is a view in cross-section taken along the line 2—2 of FIG. 1;

FIG. 3 is an enlarged, disproportionate view of the region of FIG. 2 beneath the circular friction means;

FIG. 4 is a perspective view of the retainer bar of the device shown in FIG. 1;

FIG. 5 is a side view of the guide bar of the device shown in FIG. 1; and

FIG. 6 is a plan view of the guide bar of FIG. 5.

As seen in FIG. 1 of the drawings, the example embodiment comprises a pair of journaled rollers 10, suitably driven and mounted on a frame (not shown), which carry a plurality of horizontally disposed bands 12 adjustable in known manner for yaw and for speed. Bands 12 form a conveyor platform movable in the direction of arrows 94 and are located between a pair of upright, spaced guide flanges 14 fixed on parallel, spaced guide rails 16 which are adjustably mounted on the frame.

A curved guide bar 20, mounted on a pair of crossbars 22, is located above bands 12 and in front of guide flanges 14 (with respect to the direction of travel of bands 12). Cross-bars 22 are fixed on a pair of lateral walls 24 mounted on the frame of the device. The upper portion of guide bar 20 forms an arm 26 sloping downwardly and rearwardly and the guide bar then curves forwardly in an arc 27 to form a horizontally disposed forwardly directed tongue 28 spaced from bands 12 to define a passage 29. Arc 27 of guide bar 20 has a centrally disposed longitudinal slot 30 extending into arm 26 and into tongue 28.

As seen in FIG. 5 of the drawings, arm 26 of guide bar 20 carries a forwardly projecting fixed plate 100 which is connected by a plurality of bolts 102 to a block 104 slidably mounted on crossbars 22. Bolts 102 each pass through a slot 106 in plate 100 and is threaded into a bore 108 in block 104. Bolts 102 bracket a pivot bolt 110 which is threaded in a bore in plate 100 and has the free end of its shank bearing against block 104. A hori-

zontal adjustment screw 112 is mounted for free rotation on a flange 114 of block 104 and the threaded free end portion 116 of the screw engages a bore 118 in plate 100. A releasable locking screw 120 mounted on block 104 clamps the block to crossbars 22.

A wheel 32 oriented in a vertical plane lying in the direction of movement of bands 12 and keyed on a shaft 34, has a rim 36 of hard rubber or other material, such as a tungsten carbide coating on steel, of a high coefficient of friction and is located in the lower portion of slot 30 of guide bar 20 adjacent bands 12. As seen more particularly in FIG. 3 of the drawings, wheel 32 is so located that the periphery of rim 36 extends downwardly slightly beyond the lower surface of tongue 28 but does not extend laterally beyond the rearward surface of arm 26 or arc 27, i.e., only the lower portion of wheel 32 is exposed below guide bar 20. A gap 38 is formed between the lowest point of the rim 36 on wheel 32 and bands 12.

Shaft 34 is journaled in a pair of arms 40 pivotally mounted by pins 42 in each of frame walls 24. Arms 40 are each counterbalanced by an adjustment screw 44 which passes freely through a bracket 46 fixed to wall 24 and is threaded in a yoke 48 pivotally connected to that end of arm 40 remote from shaft 34. A lock nut 50 is also threaded on screw 44 and bears against bracket 46. A sprocket 52 is keyed on shaft 34 adjacent one pivot arm 40 and is engaged by a chain 54 which is driven through a reducing gear 55 from the drive 55a of rollers 10. An idler sprocket 56 laterally engages chain 54 and is freely journaled on an arm 58 pivotally mounted on frame wall 24 and urged towards the chain by a tension spring 60.

A retainer bar 70, spaced behind guide bar 20, is mounted on a further crossbar 72 which is in turn mounted in known manner on lateral frame walls 24 and adjustable in the direction of movement of bands 12. Retainer bar 70 is contoured in a manner similar to arm 26 of guide bar 20 but terminates in a lower lip 74 spaced above bands 12, as seen in FIG. 4 of the drawings. Retainer bar 70 is fixed on a block 75 which is pivotally mounted on a releasable locking bolt 76 which is slidable in a slot 77 in a brace 78. A further releasable locking bolt 79 is slidable in slot 77 and is also slidable in a slot 80 in block 75. Brace 78 terminates at its lower end in a split collar 81 which encompasses crossbar 72 and a releasable locking screw 82 clamps the collar to the crossbar. It will be appreciated that multiple retainer bars 70 may be used for wider cards.

A roller 86, freely rotatable in the fixed frame of the device, supports bands 12 directly below wheel 32, as seen in FIG. 2 of the drawings.

To operate the device, a stack 90 of cards is placed between guide bar 20 and retainer bar 70, as seen in FIG. 1, which hold the stack sloping downwardly in a forward direction. To centre stack 90, locking screws 120 and 82 allow bars 20 and 70 to be moved laterally along crossbars 22 and 72 respectively. To adjust the forward and downward tilt of stack 90, retainer bar 70 is pivotable about bolt 76, using locking bolt 79 sliding in slot 80 of block 75, and brace 78 is also rotatable on crossbar 72. Guide bar 20 is movable horizontally in a direction perpendicular to crossbars 22 by adjustment screw 112 and a precise alignment of the guide bar is achieved by adjusting bolts 102 to tilt plate 100 about pivot bolt 110. The position of wheel 32 in slot 30 of guide bar 20 is adjustable by screws 44 which also ad-

just the width of gap 38 between the wheel and bands 12. Because of the curvature of lip 74 of retainer bar 70 and arc 27 of guide bar 20, the weight of stack 90 fans the lower cards of the stack forwardly.

When these adjustments have been made, the operation of the device is initiated by moving bands 12 in the direction of arrows 94. As the bottom or first card 91 in stack 90 is moved downwardly by the weight of the stack, the leading edge of that card touches bands 12 and is pulled forward to gap 38 by the continuous movement of the bands in the direction of arrows 94 as seen in FIGS. 2 and 3. The forward movement of bottom card 91 allows the trailing edge of the card to clear lip 74 of retainer bar 70 and drop onto bands 12. Gap 38 and passage 29 are both of a width sufficient only to pass a single card 91 freely.

As the leading edge of bottom card 91 passes into gap 38 the leading edge of the cards immediately above it, second card 92 and third card 93, in stack 90 are forced forwardly by the weight of the stack and the curvature of bars 20 and 70, aided by the friction created as bottom card 91 is pulled from the stack. At this point the leading edge of card 92 comes into contact with wheel 32 which projects slightly below arc 27 of guide bar 20. Wheel 32 is geared to rotate at an extremely slow speed, say 1:3000 in relation to the speed of bands 12, and the wheel draws card 92 further forward into a position where its leading edge is against bottom card 91 and closer to gap 38, thus augmenting the fanning action caused by bars 20 and 70. Bottom card 91 continues to be carried forward by bands 12, affected only by the friction of the leading edge of card 92, and is carried forward by the bands through gap 38 into passage 29, between the bands and tongue 28 of guide bar 20, to be delivered by the bands to a subsequent station. When card 91 has passed through gap 38 the leading edge of the next card 92 drops onto bands 12 and is carried forward, causing the trailing edge of card 92 to clear lip 74 of retainer bar 70, whereupon card 92 passes through gap 38 and passage 29 in the same manner.

The invention provides an improved continuous feeding device for high speed operation. It is particularly advantageous in feeding embossed cards where the nesting of the cards in the stack inhibit the fanning of the bottom portion of the stack under its own weight. Here it must be emphasized that single cards are fed from such a device at a very high speed, in the order of fifty thousand to one hundred thousand per hour, and any fluctuation in the pattern of approach of the cards to the conveyor would cause jamming using conventional machines at this speed.

A further advantage of the invention will be appreciated when it is considered that the high delivery speed of cards 92 wears away rim 36 in this area of contact with the cards and would normally cause the feeding device to malfunction. The very slow rotation of wheel 32 additionally produces even wearing around the whole periphery of rim 36. Since the wear of rim 36 varies its degree of protruberance through slot 30, adjustment screws 44 allow shaft 34 to be lowered to compensate for this wear. Idler sprocket 56 keeps chain 54 taut as wheel 32 is adjusted downwardly. Thus accurate adjustment of gap 38 is achieved during operation, avoiding shutdowns which are costly when it is considered that the device feeds thousands of cards per hour. The device when properly adjusted avoids marks,

scratches or similar damage to either side of each card fed through it.

I claim:

1. A device for feeding cards and like paper stock singly from a stack thereof, comprising:

a conveyor having a planar, forwardly movable platform and drive means therefor;

means to hold the stack of cards above the platform in a downwardly sloping position in the forward direction of travel of the platform and spaced therefrom, said holding means comprising a forward guide bar and a rearward retainer bar each having a forwardly curving lower portion to fan the bottom cards of the stack forwardly as the cards move downwardly in the holding means between the bars under the weight of the stack;

circular, rotatable friction means positioned above the platform forwardly of the guide bar of the holding means and a vertical plane lying in the direction of movement of the platform, the friction means being spaced from the platform to provide a gap allowing free passage of a single card therethrough and projecting below the forwardly curving lower portion of the guide bar to provide an exposed arc whereby as the cards move downwardly and forwardly in the stack the leading edge of the lowest card held by the stack contacts the exposed arc of the friction means; and

means to rotate the friction means to advance said lowest card towards said gap.

2. A device as claimed in claim 1 in which the means to rotate the friction means comprises reduction gear means connected with the platform drive means and with the friction means.

3. A device as claimed in claim 1 in which the friction means comprises a wheel with a rim having a high coefficient of friction.

4. A device as claimed in claim 3 in which the wheel is steel having a rim of tungsten carbide thereon.

5. A device as claimed in claim 1 including means to adjust the friction means at least in a direction towards the platform while the platform is moving.

6. A device as claimed in claim 5 in which the friction means comprises a wheel keyed on a shaft, a spaced pair of arms each pivotably mounted on a fixed frame, adjustment means linked to each arm on one side of the pivot axis and the shaft being freely journaled in each arm on the other side of the pivot axis.

7. A device as claimed in claim 6 in which the means to rotate the friction means comprises reduction gear means connected with the platform drive means and connected with the friction means by endless drive means, and means to keep the endless drive means taut on adjustment of the friction means.

8. A device as claimed in claim 1 in which the forwardly curving lower portion of the guide bar carries a slot, the lower portion of the friction means projecting through the slot to provide the exposed arc.

9. A device as claimed in claim 1, in which the guide bar includes a tongue extending forwardly from the lower curved portion thereof and spaced from the platform.

10. A device as claimed in claim 1 in which the guide bar is adjustable for orientation with the friction means, and the guide bar and the retainer bar are adjustable to orient the card stack with respect to the platform.

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