

Sept. 23, 1969

K. W. H. WHITTINGTON

3,468,531

DRIVE MECHANISMS

Filed Aug. 3, 1967

4 Sheets-Sheet 1

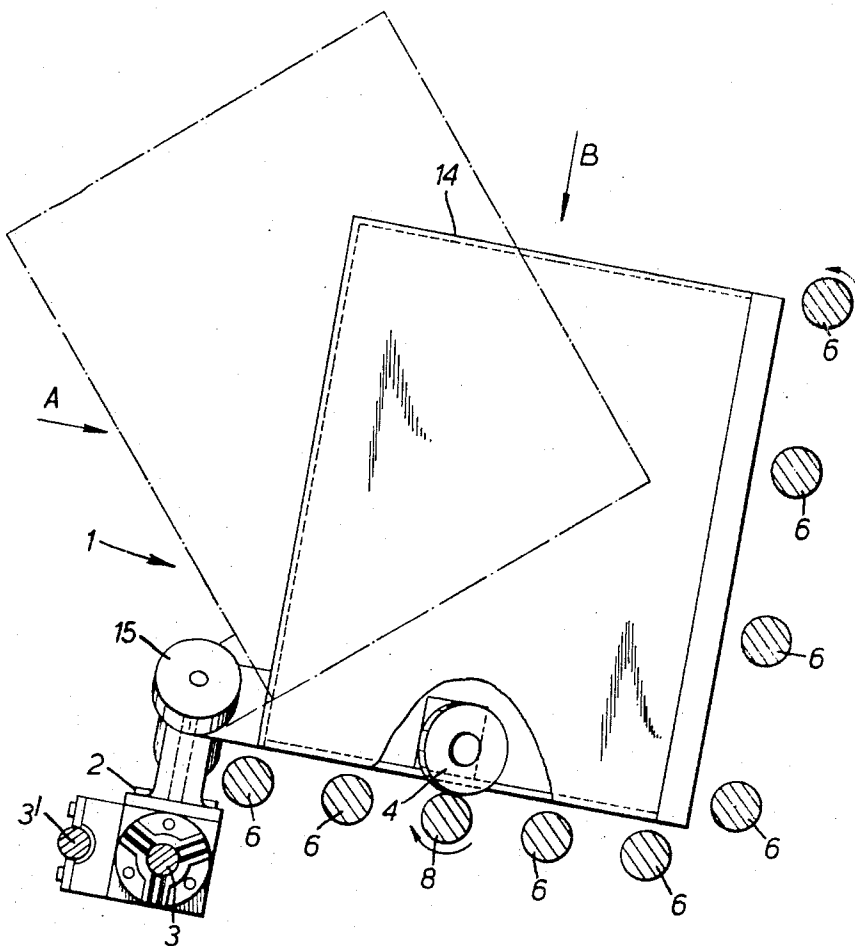


FIG. 1.

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4 Sheets-Sheet 2

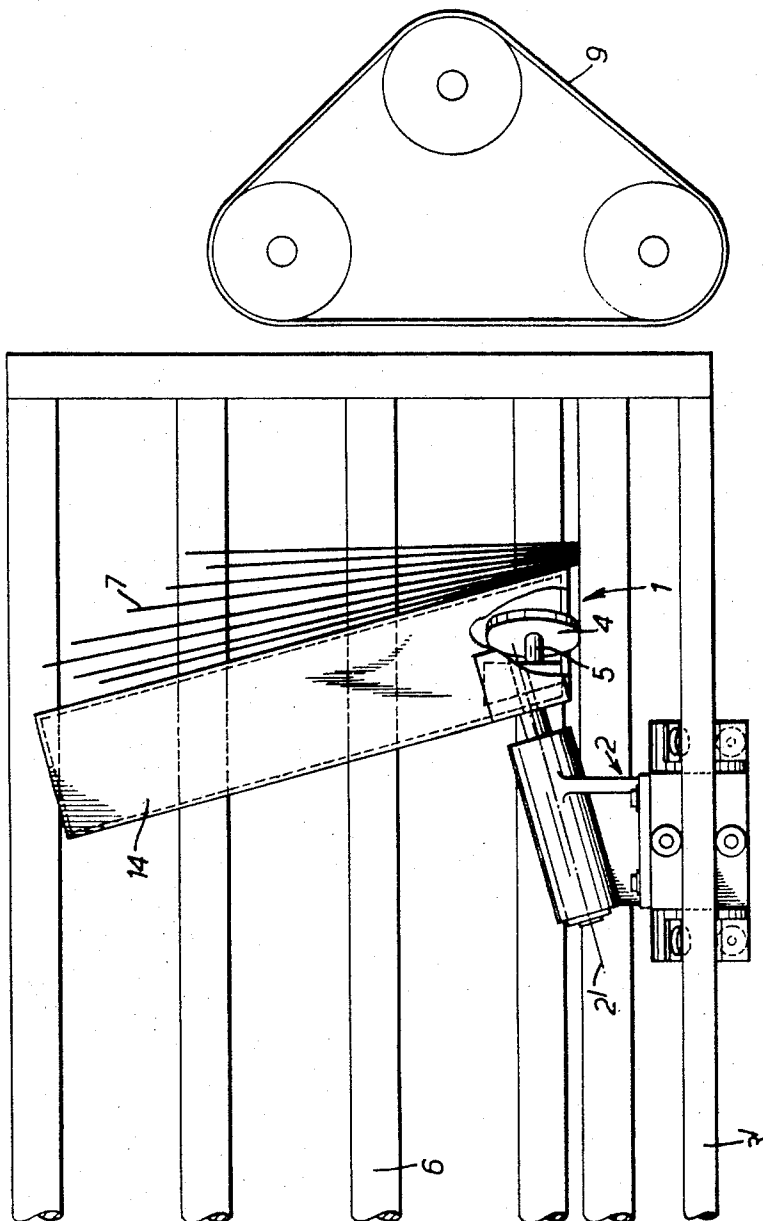


FIG. 2.

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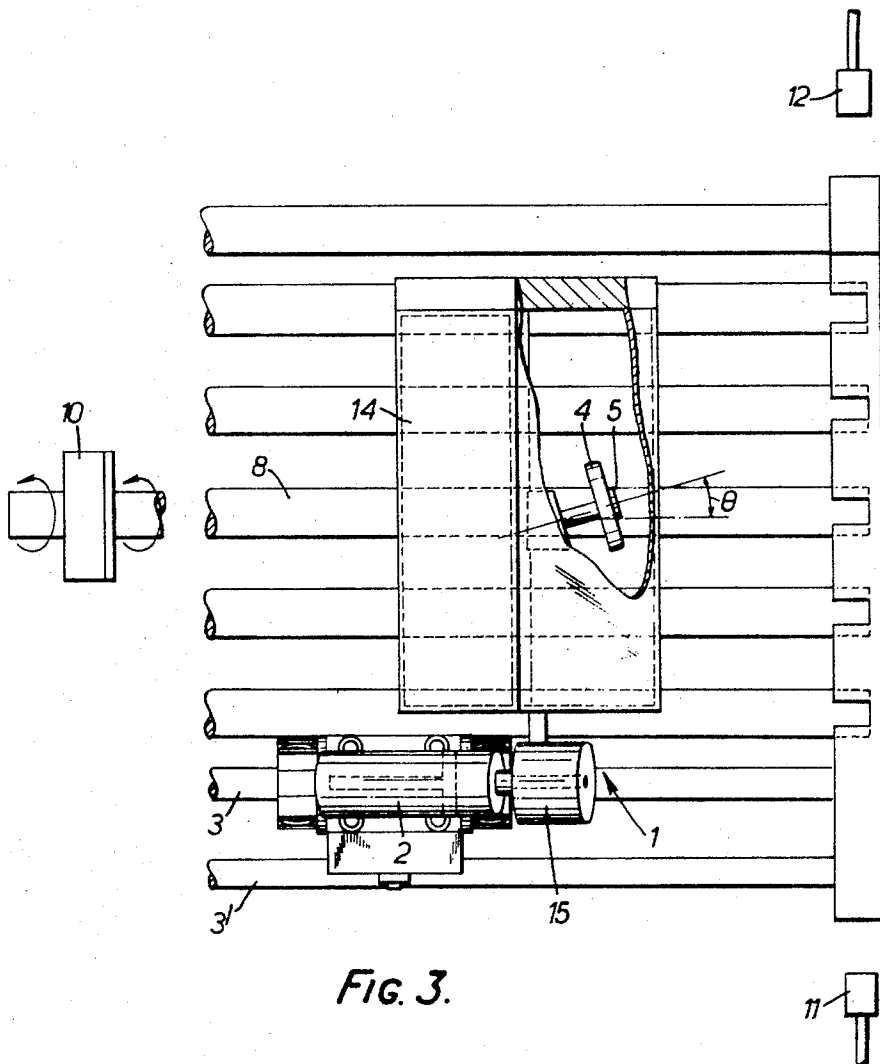
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4 Sheets-Sheet 3



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DRIVE MECHANISMS

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4 Sheets-Sheet 4

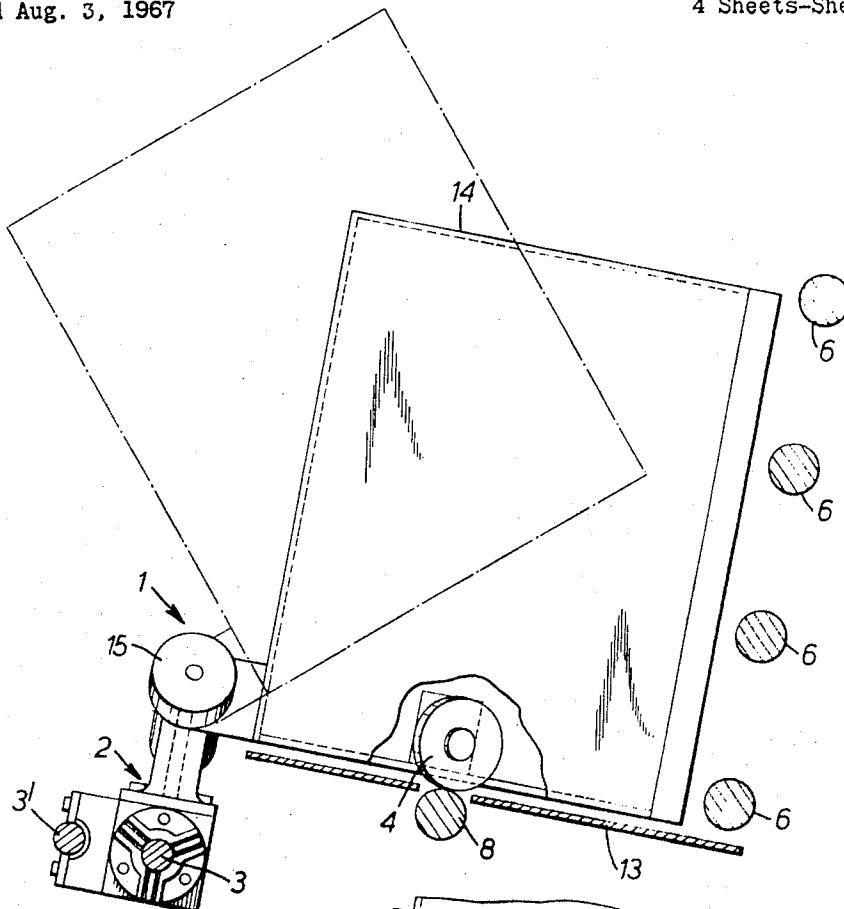


FIG. 4.

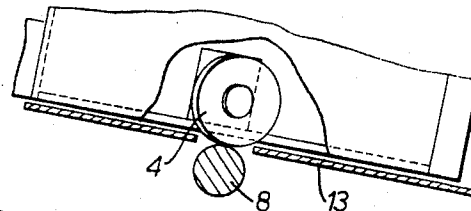


FIG. 5.

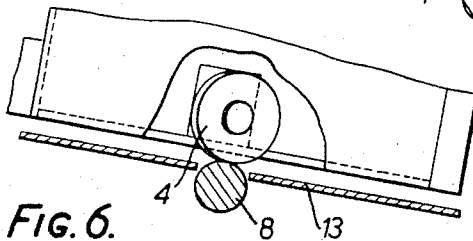


FIG. 6.

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3,468,531

DRIVE MECHANISMS

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Claims priority, application Great Britain, Aug. 12, 1966,
36,255/66

Int. Cl. B65h 1/04, 1/14

U.S. Cl. 271—62

5 Claims 10

ABSTRACT OF THE DISCLOSURE

A card stack moving device to fit on a bed of rollers supporting the stack, the device having a wheel engageable with one or more of the rollers, the axes of the wheel and roller being skew so that rotation of the roller "screws" the wheel and the device along the length of the roller.

This invention relates to drive mechanisms for moving stacks of letters, cards and like flat, thin items, and has particular reference to the driving mechanisms used in postal item destackers.

One requirement of the type of letter destacker incorporated in postal facing, coding and sorting machines is that the letter about to be destacked must be pushed lightly against a destacker belt or roller. Insufficient pressure may result in hesitation, unacceptable in machines requiring synchronous feeds, whilst excessive pressure may lead to double feeding or even, in the extreme, to complete stoppage of the feed because of excessive friction between the back of the letter and the front of the next letter.

In known feeding devices for letter destackers the letters are stacked on a bed of rotating rollers and are moved towards the destacking belt by a back plate. The back plate is urged forward by a cord, which passes over a series of pulleys and is connected to a dead weight or a long tension spring. In both cases an electromagnetic brake is found to be necessary, in order to avoid excessive pressure building up as the stack empties. The brake is energised and de-energised in response to signals from a sensing mechanism which determines whether or not letters are present at the destacking position.

The cord associated with the driving mechanism causes trouble by jamming under the pulleys, tangling and breakage.

It is an object of the present invention to provide an improved drive mechanism.

According to the present invention apparatus for moving a stack of letters, cards or like flat, thin items along a floor comprises a member adapted to engage the stack of items and being freely movable in a direction substantially parallel to the longitudinal axis of the stack, the member having a freely rotatable wheel mounted so that the periphery of the wheel is in frictional engagement with the cylindrical surface of a roller, the longitudinal axis of which is substantially parallel to the longitudinal axis of the stack, the axis of the wheel being in skew non-intersecting relationship with the axis of the roller.

In one embodiment of the invention, the upper surface of the roller is at or below the level of the floor, the floor having a slot through which the wheel engages the roller.

In a further embodiment, the floor is composed of several rollers, and the wheel engages with at least one of the rollers of the floor.

In an alternative embodiment of the invention, a number of rollers is used, the rollers being disposed with their

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longitudinal axes parallel to form a trough along which the items are moved by the member.

The member engageable with the stack of letters may be in the form of an open-bottomed box, the wheel being rotatably mounted in the box and protruding through the open bottom of the box.

The member may be mounted in such manner that it can be moved in a plane perpendicular to the roller axis, so that the wheel can be moved away from the surface of the roller.

The skew position of the wheel may also be adjustable to control the feed pressure exerted on the items and adjustment may be controlled automatically by pressure-sensitive means for example.

Means may be provided for controlling rotation of the roller or rollers with the surface of which the wheel is in contact.

A letter destacker embodying the invention and suitable for use with postal machinery will now be described in greater detail with reference to the accompanying drawings of which:

FIG. 1 is an end elevation of a destacker, partly in section,

FIG. 2 is a side view partly in section on the arrow A of FIG. 1,

FIG. 3 is a plan view, partly in section, on the arrow B of FIG. 1,

FIG. 4 is an end elevation of a further destacker, partly in section, and

FIG. 5 is a sketch end elevation of a portion of another embodiment partly in section,

FIG. 6 is a sketch end elevation of a portion of a further embodiment partly in section.

A backing box assembly 1 is mounted on a carrier 2 to pivot about the axis 2'. The carrier 2 is freely movable along an extended guide rod 3 and is prevented from rotating about the rod 3 by being in movable engagement with the rod 3'. Rotation of the backing box 14 about the axis 2' causes the box to move both upwards (as seen in FIG. 1) through the ghosted position in FIG. 1 and to the left (as seen in FIG. 2). A wheel 4, having a peripheral surface of a high coefficient of friction is freely rotatable on a spindle 5 fixed inside the backing box 14 in a position such that the wheel just projects from the bottom of the box.

Rollers 6 form a bed of rollers constituting an L-shaped trough capable of supporting a stack of letters 7. The L is tilted slightly as can be seen from FIG. 1. Those rollers forming the base of the L are rotatable in a clockwise direction, as seen in FIG. 1, while the rollers forming the vertical limb of the L are rotatable in the opposite, anti-clockwise direction. Means for rotating the rollers are not shown in the drawings. The described rotation of the rollers has two effects on the stack of letters, firstly the rotation urges any badly stacked letters into their correct positions in the stack and, secondly, the rotation reduces the frictional drag to movement of the letters from the static to the kinetic value.

As can be seen, wheel 4 is in contact with the surface of one, 8, of the rollers 6, the axis of the wheel being in skew, non-intersecting relationship with that of the roller 8. As the rollers 6 are rotated, the backing box assembly 1 is "screwed" forward along roller 8 at a speed which depends on the rotational speed of the latter roller, the diameters of the roller 8 and wheel 4, and the angle θ between the axis of the roller 8 and the axis of the wheel 4 when both axes are projected into a plane perpendicular to the arrow B. Obviously, if angle θ is reduced to zero, no forward motion will be imparted to box assembly 1. If the inclination of spindle 5 to the longitudinal axes of the roller 8 is reversed, or if the roller rotates in the op-

posite direction, motion of box assembly 1 in the opposite direction will result.

In the embodiment shown in FIG. 4, the letters or cards are supported by the floor 13 and the wheel 4 engages the roller 8, the upper surface of which is at the same level as the surface of the floor. FIG. 5 shows the upper surface of the roller 8 below the surface of the floor 13. FIG. 6 shows the upper surface of the roller 8 above the surface of the floor 13.

It has been found, in practice, that the following values give satisfactory results on machines required for the continuous destacking of letters and postcards:

Angle θ -----degrees--	10
Peripheral speed of roller 8 -----feet per minute--	55
O.D. of roller 8 -----inches--	$\frac{3}{4}$
O.D. of wheel 4 -----do-----	$1\frac{1}{4}$

The remaining part of this description applies only to destacking machines of the synchronous or "on demand" type, in which intermittent stopping of a destacker belt 9, which transfers the letters and postcards from the stack 7, creates pauses during which no letters are removed from the stack. However, the box assembly 1 is still being urged forward through its skew drive, with the result that pressure tends to build up against the destacker belt, eventually causing double or even multiple feeding of letters and postcards.

To prevent this pressure build up a small electromagnetic clutch 10 (FIG. 3) is interposed in the drive to roller 8. A light source 11 and a photoelectric cell 12 are arranged to co-operate at the front of the stack and through suitable circuitry, to switch the clutch 10 on and off. Thus, as the front of the stack is depleted, the light from source 11 is allowed to impinge on cell 12 and clutch 10 is energized. This transmits rotation to roller 8 and causes wheel 4 to progress along roller 8 as previously described.

Alternative methods of interrupting the compression of the stacked letters during the periods when the destacker belt is stationary could include combinations of pressure sensitive devices and the magnetic clutch, or some means for altering the skew angle θ between wheel 4 and roller 8. For example, the wheel 4 could be spring loaded against the side of box 14, which touches the stacked letters, so that as the pressure builds up the axis of the wheel 4 is rotated to reduce the angle θ . Eventually, at a maximum permissible pressure, the angle θ is reduced to zero, and there is no further movement of box assembly 1 along roller 8 until letters are removed from the stack and the pressure is reduced.

It will be understood that the invention is not limited to the application described above but may be used in conjunction with feed mechanism for other flat, thin items, for example, cheques, account sheets and punched cards.

I claim:

1. Apparatus for progressing a stack of letters, cards and like thin flat items in a direction parallel to the longitudinal axis of the stack, comprising in combination a floor upon which the stack rests, a guide positioned alongside the floor and having a longitudinal axis parallel to that of the stack, a member having a first portion engageable with the stack, and a second portion mounted on the guide for movement therealong, the second portion being pivotally attached to the first portion whereby the latter can be swung away from the floor, a roller disposed adjacent the floor and having a longitudinal axis parallel to that of the stack, a wheel mounted upon the first portion for free rotation about an axis in skew, non-intersecting relationship with the longitudinal axis of the roller, the wheel being frictionally engageable with the roller, and driving means for rotating the roller about its longitudinal axis.

2. Apparatus as claimed in claim 1, said first portion further comprising an open-bottomed box, said wheel being rotatably mounted within the box with the periphery of the wheel projecting through the open bottom of the box.

3. Apparatus as claimed in claim 1 in which the floor is slotted in a direction parallel to the direction of progression, in which the roller lies beneath the slot, and in which the wheel is engageable with the roller through the slot.

4. Apparatus for progressing a stack of letters, cards and like thin flat items in a direction parallel to the longitudinal axis of the stack, comprising in combination, a floor for supporting the stack, a member engageable with the stack for progressing the latter, a member support supporting said member for movement in said direction of progression, a roller mounted adjacent the floor with the longitudinal axis of the roller parallel to the longitudinal axis of the stack, a wheel mounted upon said member for free rotation about an axis in skew, non-intersecting relationship with the longitudinal axis of the roller, the wheel being frictionally engageable with the roller, roller drive means for rotating the roller about its longitudinal axis, roller drive interruption means between said roller and said roller drive means, and stack sensing means controlling said roller drive interruption means.

5. Apparatus as claimed in claim 3 in which the stack sensing means comprises a light source on one side of the stack and a photo-electric cell on the other side of the stack.

References Cited

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RICHARD E. AEGERTER, Primary Examiner