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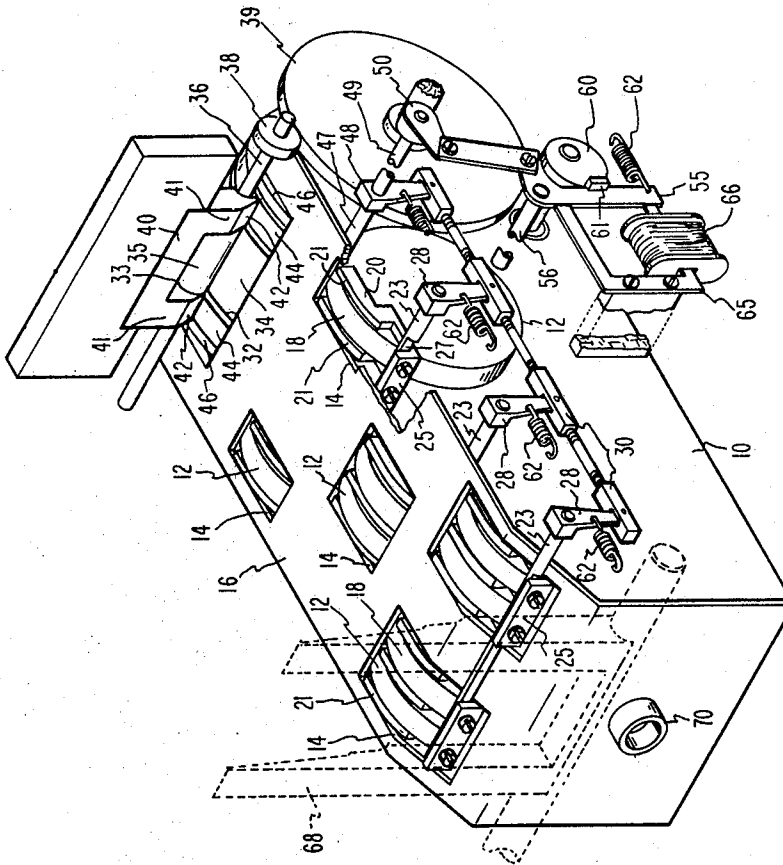
3,486,749

CARD FEEDING MECHANISM

Filed Aug. 14, 1967

2 Sheets-Sheet 1

FIG. 1



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2 Sheets-Sheet 2

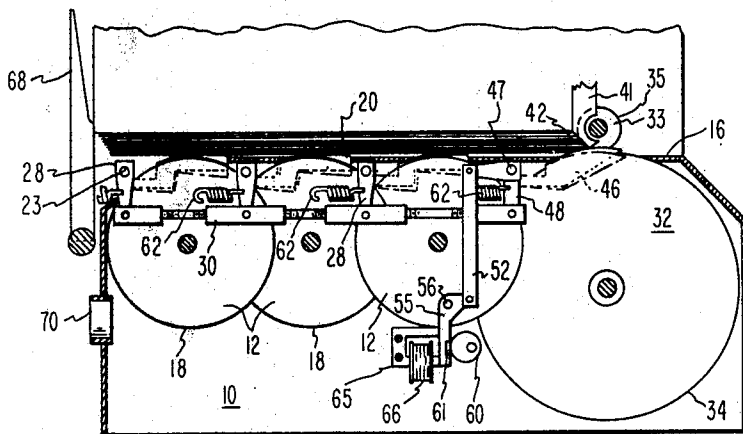


FIG. 2

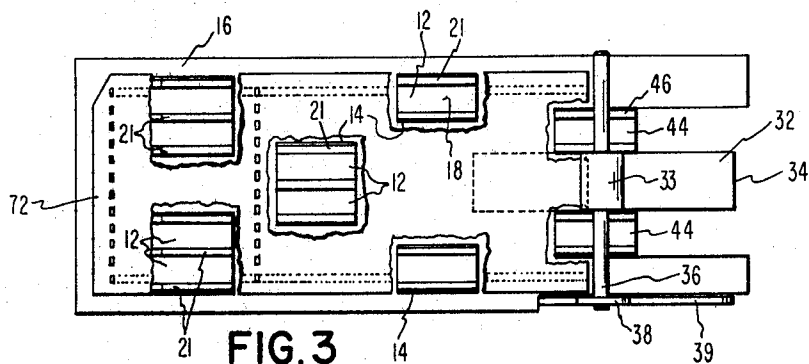


FIG. 3

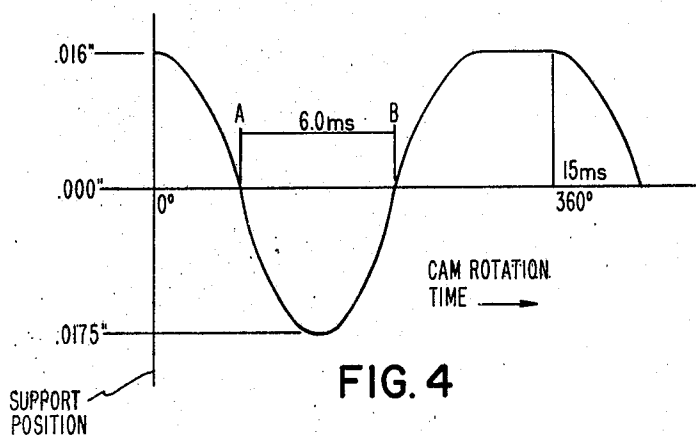


FIG. 4

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CARD FEEDING MECHANISM

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7 Claims

ABSTRACT OF THE DISCLOSURE

A mechanism for feeding cards from the bottom of a stack wherein a drive means operating about fixed axes is brought into contact with the lowermost card of a stack by raising and lowering the card stack with a movable support structure.

BACKGROUND OF THE INVENTION

This invention relates to apparatus for handling sheet materials and more particularly, to a device for feeding sheet materials serially from the bottom of a stack which is suitable for high speed operation.

In prior devices for feeding cards it has been the practice to raise and lower the drive mechanism to bring it into contact with the lowermost card of a stack to shear it away from the stack for sequential feeding to associated apparatus. Although this structure has been satisfactory in prior applications it becomes increasingly difficult in application as higher speeds are utilized because of the inherently large moving mass involved.

The structure of this invention is a feed control for delivering punched data processing cards one at a time from the bottom of a stack at high speed. The bottom card is sheared from the stack by a series of driving rolls which are brought into engagement with the bottom surface of the card and arranged to give maximum support and contact to the bottom card. The card is thereupon passed through a throat to assure delivery of only a single card and thereafter grasped by an opposed pair of feed rolls that rapidly accelerate the card to the predetermined desired transport feed.

Feed control is effected by lifting fingers axially adjacent the contact surfaces of each feed roll which normally raise the stack of cards and hold them out of contact with the drive rolls. The lifting fingers are interlocked for simultaneous pivotal movement to permit control by a single cam which upon initiation of the feed cycle lowers the stack causing engagement between the driving rolls and the lowermost card. The bottom card is driven through the throat and engaged by the opposed feed rolls. Following engagement between the card and the feed rolls and prior to the card moving beyond a position overlying the drive rolls, the lifting fingers are raised to prevent drive rolls from driving a second card into the throat.

It is an object of this invention to provide an improved punched card feed mechanism suitable for high speed operation.

It is a further object of this invention to provide a card feeding device for high speed operation without card damage.

It is a further object of this invention to provide a card feeding mechanism wherein the mass of the moving mechanism is limited to permit lighter linkage, use less power, and facilitate high speed operation.

It is also an object of this invention to provide a card feeding mechanism requiring minimum travel between card stack and a location of positive card control.

The foregoing and other objects, features and advantages of the invention will be apparent from the follow-

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ing description as illustrated in the accompanying drawings wherein:

FIG. 1 is an isometric view partially broken away showing the card feed mechanism of this invention.

FIG. 2 is a side elevation of the card feed mechanism of FIG. 1 with portions broken away.

FIG. 3 is a plan view of the card feed mechanism of FIG. 1 with a punched card partially broken away and overlying the feed rolls.

FIG. 4 is a diagram showing the position of the card stack support as related to a cycle of the control cam rotation.

DETAILED DESCRIPTION

Referring to FIG. 1, the feed mechanism is shown within an enclosure 10 forming the base of the card hopper. A plurality of drive rolls 12 are mounted on fixed axes within enclosure 10 with upper peripheral portions projecting through apertures 14 in the upper closure plate 16 of the enclosure. Each of the drive rolls has a high friction peripheral surface 18 to assure a positive driving contact with an overlying card brought in contact therewith. The drive rolls 12 are continuously driven during operation at a peripheral speed equivalent to the machine transport speed. Adjacent each side of each drive roll is a finger portion 20 which presents an upper card engaging surface 21. Each of the fingers is connected to a shaft 23 which is mounted within the enclosure and pivotable about a fixed axis. As shown, each of the fingers 20 at a given closure plate aperture 14 is a cantilevered element projecting from a common base portion 25 secured at a flat 27 on the cooperating shaft 23. Each of the shafts 23 has a lever 23 fixedly connected thereto for rotation in unison therewith, with the lower depending end portion pivotally connected to a link assembly 30 to cause each of the shafts 23 and the fingers 20 connected thereto to pivot in unison.

A feed drum 32 and confronting pressure drum 33 are each driven at the transport speed of the device. The periphery 34 of drum 32 is surfaced with high friction material while pressure drum 33 is provided with a polished metal surface to avoid excessive wear at the high rotational speeds to which it is subjected. To avoid high impact forces that might damage cards being fed through the device, a gap of about four one-thousandths inch is provided between pressure drum 33 and the feed drum 32 when feeding cards of seven-thousandths inch thickness. The pressure drum 33, mounted on a flexible shaft 36, is driven by the contact between the roller 38 and wheel 39 to maintain a pressure drum peripheral speed that is substantially identical to that of the confronting feed drum 32. A two part throat knife 40 has downwardly projecting portions 41 with surfaces 42, inclined at 45 degree angle to the vertical, terminating in an edge which confronts correspondingly confronting steel gauge drums 44 with a clearance therebetween that permits only one card at a time to pass through the throat. The angular disposition of the throat knife surface 42 which positions the gauging clearance portion of the throat in close longitudinal proximity to the confronting peripheral surfaces of the drums 32 and 33 minimizes the distance which a card travels between the card stack and a location of positive control between feed drum 32 and pressure drum 33.

At either side of feed drum 32 and gauge drums 44 are fingers 46 similar to fingers 20 which are mounted on a rod 47 that includes a lever 48 secured thereto for unitary pivotal movement. The lever 48 is pivotally connected at its lower distal end to the link assembly 30 to effect common rotation of the shafts 23 with shaft 47. The extension 49 of the shaft 47 carries a lever 50 which is pivotally connected through a link 52 to the bell crank

55 mounted on the stub shaft 56 which bell crank in turn carries a cam follower 61. The raising and lowering of the fingers 20 and 46 is effected by rotation of a cam 60 with the bell crank cam follower 61 urged toward engagement with the cam by the series of springs 62. The fingers 20 and 46 are normally maintained in a raised or non-feed position by a non-work magnet 65 including a coil 66 which is normally energized to retain bell crank 55 against the biasing force of springs 62.

Shown in phantom view at the rear of the hopper is a jogger member 68 which is actuated independently of the feed mechanism at a slower rate timed so as not to coincide with the feed cycle. The enclosure 10 about the feed mechanism is substantially complete with the exception of the apertured portions of the top closure which surround the projecting drive wheel portions and feed drum portion. The conduit stub end 70 portion mounted on the end wall of the enclosure 10 communicates with the interior and is connected to a source of partial vacuum, not shown, which exhausts the interior of the enclosure to create a partial vacuum of approximately two inches water column that effects a suction at the apertures 14 which assists in placing the lowermost card in intimate frictional engagement with the drive wheels and feed drum.

FIG. 3 shows a data card 72 overlying the feed mechanism with the support fingers 20 each underlying non-information portions of the card or the lands intermediate the horizontal rows of punched holes.

In operation a stack of cards is received in the hopper and are supported on the upper surfaces 21 of the fingers 20 which establish a plane of support in the non-actuated condition about .016 inch above the plane defined by the maximum projection of the drive wheel peripheral surfaces 18. The feed cycle is initiated by de-energizing the normally energized coil 66 of magnet 65 to permit the release of the bell crank 55 during the period of maximum cam lift. Thereafter the biasing force of springs 62 urges the cam follower 61 against the cam surface whereupon during the fall of the cam the fingers 20 are allowed to pivot downwardly to a position where the maximum projection of the upper surfaces 21 is .0175 inch below the surface defined by the maximum projection of the drive wheel peripheries. The rise portion of the cam 60 restores the fingers 21 to their elevated position and also pivots the bell crank 55 to a position of proximity with the magnet 65. One feed cycle occurs during each revolution of the cam 60 and when it is desired to terminate the feed, the coil 66 of the magnet 65 is re-energized whereupon during the next passage of the maximum diameter cam portion past the cam follower 61 the bell crank 55 is re-established in retained engagement with the magnet 65 and ceases to follow the cam 60 until the magnet is again de-energized to commence a subsequent feed cycle.

As seen in FIG. 2, the support fingers 20 and 46 move from the solid line position to the phantom view position during the fall of cam 60 causing the drive rolls 12, which rotate in fixed bearings, to engage the lower surface of the bottom-most card driving it forward beneath the throat knife 40 and into engagement between the feed drum 32 and pressure drum 33. The feed drum 32 and pressure drum 33 are normally spaced a distance apart approximately equivalent to half the thickness of the card to afford a high pressure driving contact without causing impact that might damage the card. The rise portion of the cam commences to raise the fingers 20 as soon as contact is being made between feed drum 32, pressure drum 33 and the card to effect disengagement between the card and the drive wheels 12 before the card has moved beyond an overlying position with respect to the rear-most of drive wheels 12. This eliminates the tendency of the drive wheels to drive the second card toward the throat while the prior card is passing there-through.

Although the drive wheels 12 operate at the same

peripheral speed as the feed drum 32, the principal function is to shear the bottom card from the deck and deliver the card through the throat to the feed drum 32 which thereafter provides the primary acceleration and brings the card to transport speed. The feed drum, in the illustrated embodiment, has a peripheral transport speed of 740 inches per second and accelerates the card to the transport speed within approximately one and one-half inches of card travel. Referring to FIG. 4, the cam controlled cycle is shown commencing with the dwell at the maximum lift of the cam 60. The cycle of cam rotation is 15 milliseconds with a 6 millisecond card drive cycle portion indicated between A and B as the support fingers 20 drop below the surface of the drive rolls 12 and a 2½ millisecond dwell at the maximum lift of the cam. During the feeding operation the suction caused by exhausting air through the enclosure opening creates a downward suction through the apertures 14 of the enclosure top plate which cooperates with the high coefficient of friction of the peripheral surface material of the drive wheels 12 and drum 32 to effect a positive driving frictional interference between the drive wheel peripheral surfaces and the engaging card surface. By having the support fingers 20 and 46 engage the non-information portions of the card the tendency of aligned punched portions of adjoining cards to interlock causing card damage as the bottom card is sheared from the stack is significantly reduced or eliminated.

While the invention has been particularly shown and described with reference to a preferred embodiment thereof, it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the spirit and scope of the invention.

I claim:

1. A high speed card feeding mechanism comprising a plurality of circular drive rolls;

card support means including a selectively vertically movable support member disposed at each axial side of each said drive roll and adapted to support a stack of cards thereon,

said support members being movable between a first position wherein said support means defines a plane of support for said stack of cards above and out of contact with said drive rolls and a second position respectively adjacent the peripheral surface of said drive rolls tangent said stack of cards wherein said support means defines a plane below the surface of said drive rolls to permit said drive rolls to engage the lower surface of said card stack; and

control means for selectively moving said support members from said first position to said second position.

2. The card feeding mechanism of claim 1 wherein said support members are disposed to engage principally non-information portions of a card supported thereon.

3. The card feeding mechanism of claim 1 further comprising an enclosure surrounding said drive rolls with an upper wall portion having apertures therein through which said drive roll card stack engaging peripheral portions project;

an evacuating means communicating with said enclosure for inducing an air flow through said apertures into said enclosure, whereby the lowermost card in said stack of cards is urged toward said drive rolls.

4. The card feeding mechanism of claim 1 wherein each of said support members comprises a cantilevered element presenting a card engaging surface pivotable between said first and second positions.

5. A high speed card feeding mechanism comprising: card drive means including a plurality of drive rolls rotated about a common axis and positioned to engage transverse marginal surface of the adjacent card of a card deck supported thereagainst;

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selectively movable card deck support means including support members axially adjacent said drive rolls at the location of tangency with said card deck and movable between a first position wherein said card deck is supported thereby out of contact with said drive rolls and a second position permitting said card deck to be supported on said drive rolls; and control means for selectively moving said support members from said first position to said second position.

6. The high speed card feeding mechanism of claim 5 wherein said support members are positioned to engage said cards on non-information surface portions thereof.

7. The high speed card feeding mechanism of claim 5 further comprising:

a plate member adjoining said card deck having apertured portions through which said drive rolls and said support members project; and

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vacuum means communicating with said apertured portions to urge the nearest adjacent card in said card deck toward said drive rolls.

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EDWARD A. SROKA, Primary Examiner

U.S. Cl. X.R.

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