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ROTARY DRIVE MECHANISM FOR CARD PICKERS

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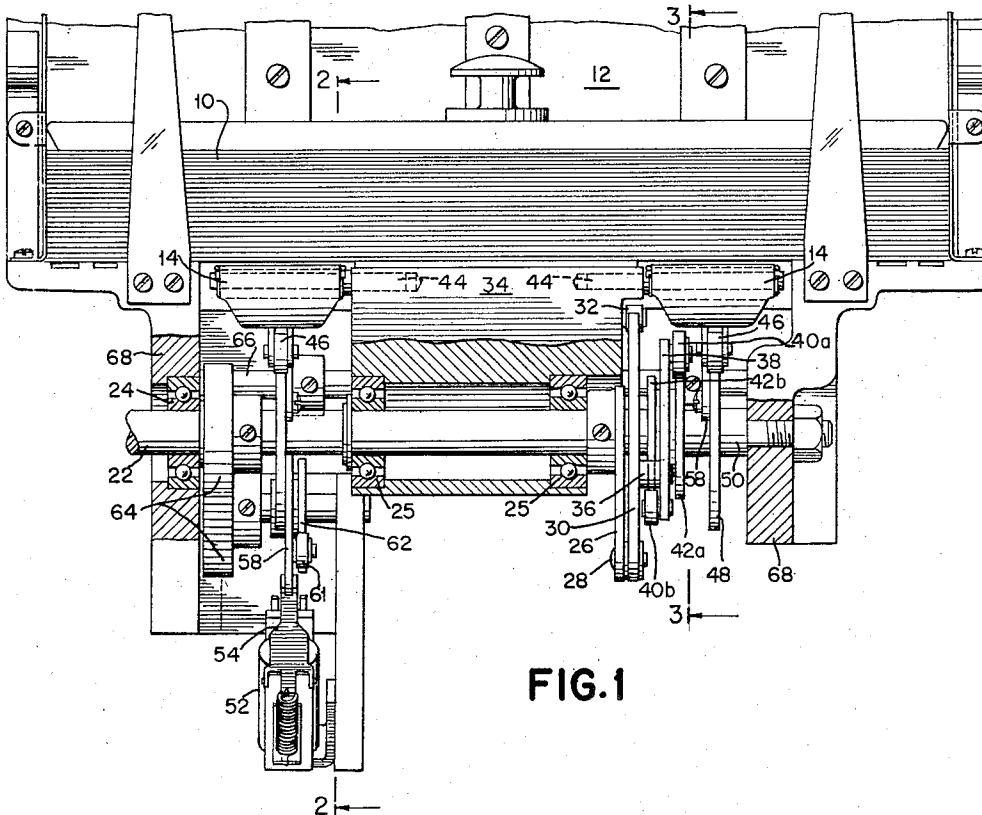


FIG. 1

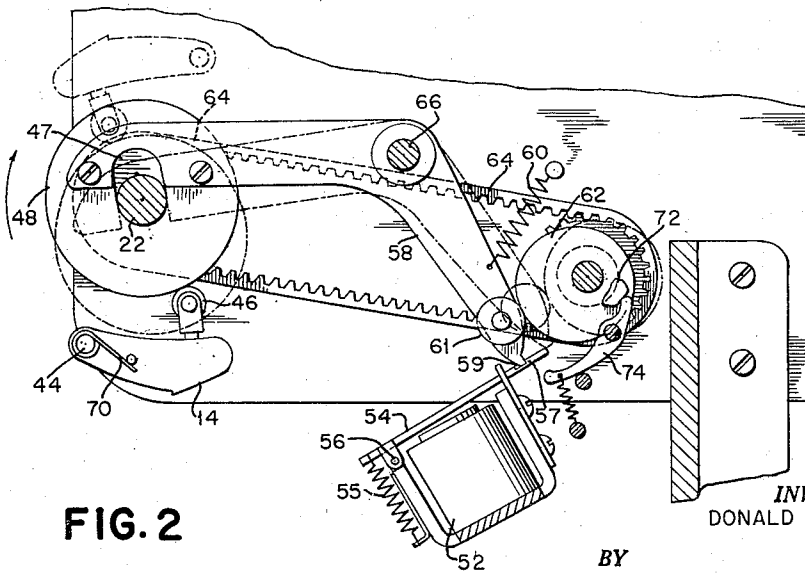


FIG. 2

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ROTARY DRIVE MECHANISM FOR CARD PICKERS

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The present invention relates to a feeding mechanism and more particularly to a rotary type mechanism for feeding record cards from a supply hopper at extremely high speeds.

With the increasing utilization of electronic circuits in conjunction with punch card equipment, the problem of feeding cards into the machines at the greater speeds thereby required for efficient operation has become more acute. In many of these machines, groups of record cards are placed in what is generally termed a supply hopper, from which the cards are fed individually to the first of a series of high speed feed rolls which transport the cards through the various functional units of the machine.

There are two limiting factors which must be considered in the design of feeding mechanism for such a machine. The first of these is that at the time a card is initially engaged by the card picking device, the speed of the device must be sufficiently slow to prevent damage to the edge of the card so engaged. Secondly, in order that the card be properly registered as it is passed through the machine, it is required that the feeding device attain the velocity of the first set of feed rolls before the card being advanced reaches the bite of these rolls. In many machines of present design, the feeding mechanisms utilized are reciprocatory in nature, the card being initially engaged at the end of the stroke in one direction at which time the velocity of the card picking device is at or near its minimum and then displaced to reach the bite of the feed rolls during the subsequent stroke at a time when the velocity is at or near its maximum. However, as the speed of operation of such mechanism increases, the loading due to the reversal of the motion of the parts becomes critical and the maximum speed obtainable for reliable operations over long periods is necessarily limited by the mass of the parts being reversed. A further limitation exists when the design of a particular machine requires that the feeding mechanism be capable of being rendered ineffective to feed a card during certain feed cycles. This is ordinarily accomplished by a clutching device of the well-known one-tooth ratchet type, the utilization of which presents a further obstacle of the same nature to the higher speeds required in present day electronic record card equipment.

Thus, it becomes a principal object of the present invention to provide an improved feeding mechanism capable of feeding record cards from a supply hopper at exceedingly high speeds.

In carrying out this object, the feeding mechanism disclosed as a preferred embodiment of the invention is rotary in nature and is driven by a drive shaft which is continuously rotated at a constant speed. A pair of picker knives is coupled to the drive shaft for rotation therewith to feed cards individually from a supply hopper. The linkage coupling the shaft to the picker knives includes a pivotable lever which in turn pivotally carries a cam follower. This cam follower cooperates with a stationary cam which has a lobe provided thereon to effect pivoting of the coupling linkage at that time in each cycle when the picker knives initially engage a card in the sup-

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ply hopper. The effect of this pivoting when transmitted to the picker knives is to reverse their rotational movement with respect to the constant speed drive shaft. This reverse motion results in a deceleration of the picker knives which is sufficient to ensure that a card being fed will not be damaged when it is initially engaged. The surface of the stationary cam is such that the card pickers quickly attain their normal high speed as they advance the card picked to the first of feed rolls.

In order to allow for selective feeding, the card pickers are pivotally connected to the drive linkage and each is biased so that, as it is rotated, a roller connected thereto will follow the surface of one of a pair of guide cams. Each of these guide cams is mounted on a lever which is ordinarily held in such a position as to guide the card pickers to feed cards from the supply hopper. However, the levers and the cams attached thereto can be selectively lowered under the control of a magnet and armature assembly allowing the card pickers to be pivoted so that they will be ineffective to feed cards from the hopper.

Thus another object of the invention is to provide a high speed feeding mechanism in which the velocity of the card picking devices is decreased as a card to be fed is initially engaged.

A feature of the invention lies in a provision of means for obtaining such a deceleration of the card picking devices without changing the velocity of the drive mechanism rotating the card pickers.

Another object of the invention is to provide a high speed rotary card feeding mechanism which may be rendered ineffective to feed cards during preselected feed cycles.

Other objects of the invention will be pointed out in the following description and claims and illustrated in the accompanying drawings, which disclose, by way of examples, the principle of the invention and the best mode, which has been contemplated, of applying that principle.

In the drawings:

Fig. 1 is an end view of the novel feeding mechanism with part of the outer structure broken away.

Fig. 2 is a positional view of the mechanism for suppressing feeding and is taken generally along the lines 2—2 of Fig. 1.

Fig. 3 is a sectional view taken along the lines 3—3 of Fig. 1.

Fig. 3a is a positional view of parts shown in Fig. 3.

Fig. 4 is a sectional view taken along 4—4 of Fig. 3 which has been extended to show the relation of the parts to the side frame of the machine.

The novel feeding mechanism will now be explained with reference to the drawings. Specifically, referring to Fig. 3 there is shown a supply hopper 12 containing a group of record cards 10 which are to be fed individually by a pair of card pickers 14 through a throat assembly, comprising roller 16 and block 18, to a pair of high speed feed rolls 20. The further card feeding means which receive the cards from feed rolls 20 and the machine functional units to which the cards are thereby advanced, not being part of the present invention, are not shown. Card pickers 14 are driven to feed cards to the feed rolls 20 in the following manner.

Referring to Figs. 1 and 4, a shaft 22 mounted in bearings 24 is continuously rotated at a constant speed by a source of power not shown. Secured to shaft 22 and continuously rotated therewith is a constant speed arm 26 which, as shown in Fig. 3, is pivotally connected at 28 to a U-shaped operating lever 30. Lever 30 is bifurcated at its other end to engage a stud 32 on a card picker operating arm 34. Pivotally connected to lever 30 at 36 is a cam follower arm 38 which carries at its ends a pair of cam followers 40a and 40b. These cam followers

are mounted to cooperate with the complementary cams 42a and 42b mounted on a stud 50 which is secured to side frame 68 (see Fig. 4).

Operating arm 34 extends below the supply hopper 12 and is rotatable about bearings 25. Provided at the lateral extremities of arm 34 are a pair of holes into which are press fitted a pair of pins 44 each of which is in turn pivotally connected to one of the two card pickers 14. The linkage which transmits the rotary motion of shaft 22 to the card pickers 14 may thus be traced from the shaft through constant speed arm 26, operating lever 30 and operating arm 34 to the card pickers 14. To each of the pickers 14 there is attached a bias spring 70 (see Fig. 2). These springs urge the pickers to pivot in a counterclockwise direction and thereby cause the rollers 46 attached thereto to cooperate with cams 48. This arrangement provides a guide for the rotary motion of the pickers 14 and, as will be hereafter explained, allows the pickers to be rendered ineffective to feed a card during any card feed cycle.

As above explained, the card picker arm 34 carrying the card pickers 14 is drivably connected through operating lever 30 to the constant speed arm 26 which is secured to the continuously running shaft 22. However, the cam follower arm 38 pivotally connected to operating lever 30 is provided to govern the actual velocity of the pickers 14 and it is this mechanism which allows for the desired deceleration of the card picker 14 as it first engages a card.

The mechanism is shown in Fig. 3 with the card picker about to engage the bottom card in the hopper. As the shaft 22 and the arm 26 attached thereto continue their rotation in a clockwise direction from this position to that of Fig. 3a the cam follower 40a carried on arm 38 will engage a lobe on cam 42a as the other cam follower 40b reaches a complementary indentation in cam 42b. The action of the cams against the cam followers will urge the cam follower arm 38 counterclockwise about pivot point 36 and also tend to raise both the arm 38 and operating lever 30 which is pivotally connected thereto. As shown in Fig. 3a the effect of this motion will be to rotate the lever 30 about the pivot point 28 in a counterclockwise direction with respect to constant speed arm 26. Since the other end of lever 30 is bifurcated to engage stud 32 on the card picker arm 34, this counterclockwise pivoting is thereby transmitted to the card pickers to in effect reverse their motion with respect to constantly rotated shaft 22 and thereby decrease the absolute velocity of the card pickers with respect to the stationary cards in the hopper.

The deceleration of the card pickers 14 allows for initial engagement of the cards at a time when the pickers are moving at a speed much less than their normal speed during the remainder of the cycle. The high and low dwells of cams 42a and 42b respectively are short so as to cause the card pickers 14 to be quickly accelerated to again attain the rotational velocity of shaft 22 and constant speed arm 26 as they feed the picked card toward feed rolls 20.

Thus, it may be seen that the operation of the novel feeding mechanism is such as to allow the card to be initially engaged while the picker is moving at a relatively slow speed and also ensure that the record will be moving at the proper velocity when it reaches the bite of the first feed rolls.

Selective feeding

The novel mechanism provided to allow for suppression of card feeding during selective feed cycles is best explained with reference to Fig. 2. The mechanism, there shown, is under control of a magnet 52 which has associated therewith an armature 54. Armature 54 is urged in a counterclockwise direction about its pivot 56 by tension spring 55. With the armature 54 in the normal deenergized condition shown, the notch 57 provided therein engages a lip 59 on control lever 58. Lever 58 is secured to shaft 66 which extends laterally beneath the supply hopper 12 and is freely mounted in the opposing

side frames 68. The other end of lever 58 is screw connected to the cam 48 which cooperates with roller 46 connected to the card picker 14. As shown in Fig. 1, a similar lever 58 is secured near the right hand end of shaft 66 which lever is screw connected to the cam 48 provided to cooperate with the roller 46 connected to the right hand card picker 14. As shown in Fig. 2, cam 48 has at its center a slot 47 which is provided to allow the cam to be raised and lowered without interfering with shaft 22. A similar slot is provided in the cam 48 at the right side of the mechanism and serves the same function with respect to stud 50 which extends through that cam.

If the magnet 52 is energized with the mechanism in the full line position shown in Fig. 2, the card pickers 14 will be rendered ineffective to feed a card in the following manner. Energization of magnet 52 will attract armature 54 causing it to be pivoted clockwise about its pivot 56. Pivoting of the armature will free lip 59 from the notch 57 in the armature. A spring 60 is provided to urge a roller 61 carried by the lever 58 against the surface of a cam 62 which cam is continuously rotated by a belt and pulley connection 64 to the shaft 22. At the time magnet 52 is energized the cam 62 is in the position shown in full lines in Fig. 2, in which position it is contacting the roller 61 thereby relieving the latching pressure on the notch 57 in armature 59. This action ensures proper armature operation and lessens the possibility of failures due to sticking or binding when magnet 52 is energized. The rotation of cam 62 from the full line position in Fig. 2 to that shown dotted will allow the lever 58 and shaft 66 connected thereto to be pivoted in a counterclockwise direction. This pivoting of shaft 66 will result in the lowering of the cams 48 allowing the springs 70 to pivot the card pickers 14 in a counterclockwise direction so that when the pickers reach the picking position they will be below the level of the card line as is shown dotted in Fig. 2. In this manner the pickers are rendered ineffective to pick a card during the feed cycle under consideration.

The continued rotation of cam 62 will bring a camming stud 72 carried thereon into engagement with a knock off arm 74 to thereby pivot the arm and raise armature 54 to its original position. The continued rotation of the cam will at the same time pivot lever 58 back in a clockwise direction so that the lip 59 may be again engaged by the notch 57 in the armature. The parts are thus restored to their original position with the cams 48 raised to render the card pickers 14 effective during the subsequent cycle to feed a card to the feed rollers 20.

While there have been shown and described and pointed out the fundamental features of the invention as applied to a preferred embodiment, it will be understood that various omissions and substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled in the art, without departing from the spirit of the invention. It is the intention therefore, to be limited only as indicated by the scope of the following claims.

What is claimed is:

1. A mechanism for feeding cards from a supply hopper comprising, in combination, constant speed drive means, feeding means movably carried on said drive means and operative to pick a card in said hopper, and cam means associated with said feeding means and effective by positive engagement therewith to move said feeding means on said drive means to cause said feeding means to move at a decreased velocity relative to said card as the latter is initially picked thereby.

2. A mechanism for feeding cards from a supply hopper comprising, in combination, rotary drive means, an element movably carried by said rotary drive means and revolvable therewith to engage a card in said hopper and feed it therefrom, and further means associated with said element for moving said element relative to said drive

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means during rotation thereof to cause said element to be moved relative to said card at a decreased velocity as it initially engages the card in said hopper; said further means including stationary cam means, and cam follower means revoluble with said element by said drive means.

3. A mechanism for feeding cards from a supply hopper comprising, in combination, rotatable card picking means adjacent said hopper, constant speed drive means for rotatably driving said card picking means to cause said means to pick and feed a card in said hopper, and stationary cam means mounted in a fixed position and associated with said card picking means for decelerating said picking means as a card to be fed is initially picked thereby.

4. A mechanism for feeding cards from a supply hopper comprising, in combination, a rotatable card picker adjacent said hopper, constant speed drive means, means for coupling said picker to said drive means for rotation therewith to cause said picker to engage and feed a card in said hopper, cam follower means carried on said coupling means, and camming means associated with said cam follower means and effective by cooperation therewith to cause said picker to be decelerated as it initially engages a card to be fed.

5. A mechanism for feeding cards from a supply hopper comprising, in combination, a card picker mounted adjacent said hopper and effective each time it is rotated to engage a card in said hopper and feed it therefrom, constant speed drive means, a lever pivotally carried by said drive means and coupled to said picker to cause said picker to be rotated with said drive means, cam follower means pivotally carried on said lever, and cam means cooperating with said cam follower means to cause said lever to first decelerate the card picker as it initially engages a card to be fed and then to accelerate said card picker as it feeds the card engaged from said hopper.

6. A mechanism for feeding cards from a supply hopper comprising, in combination, rotatable feed means mounted adjacent said hopper for engaging cards in said hopper and feeding them therefrom, cam follower means coupled to said feed means and rotatable therewith, and camming means associated with said cam follower means and effective by cooperation therewith during rotation thereof to first decelerate said rotatable feed means as a card to be fed is initially engaged thereby and then accelerate said rotatable means as the card engaged is being fed from said hopper.

7. A device for feeding cards from a supply hopper comprising continuously operated rotary drive mechanism, shiftable cam guide means, a card picker pivotally connected to said drive mechanism for rotation therewith, a cam follower carried on said card picker, means for biasing said card picker to cause said cam follower to cooperate with said guide cam means, said guide cam means cooperating with said cam follower being normally effective to guide said picker to pick a card in said hopper each time it is rotated, and control means for shifting said guide means to allow said biasing means to pivot said card picker as it is rotated and thereby render it ineffective to pick a card in said hopper.

8. A mechanism for feeding cards from a supply hopper comprising, in combination, rotary drive means, a positionable element connected to said drive means for rotation therewith, said element being normally effective to feed a card from said hopper when it is rotated, means to position said element as it is rotated to render it ineffective to feed a card from said hopper, and cam means

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for decelerating said element as it is rotated to cause it to move at a decreased velocity as it initially contacts a card in said hopper.

9. A mechanism for feeding cards from a supply hopper comprising a continuously driven positionable element normally effective to successively engage and feed individual cards from said hopper, means to position said element as it is driven to render it ineffective to engage and feed cards from card hopper, and cam means for decelerating said element as it is driven to cause it to move at a decreased velocity as it initially engages each card to be fed from said hopper.

10. A device for feeding cards from a supply hopper comprising rotary driving mechanism, a pivotable control lever, a guide cam mounted on said control lever, a pivotable card picker connected to said drive mechanism for rotation therewith, a cam follower carried on said card picker, means biasing said card picker to cause the cam follower thereon to cooperate with said cam, means for latching said lever in a position such that by cooperation with said cam follower said guide cam mounted on said lever renders said card picker effective to feed a card from said hopper each time it is rotated, means controllable to unlatch said control lever, and further cam means associated with said control lever and effective each time said lever is unlatched to first pivot said control lever and guide cam mounted thereon to a position such that said biased card picker carrying said cam follower cooperating with said guide cam is rendered ineffective for one rotation thereof to feed a card from said hopper and to then return said lever to its latched position.

11. A mechanism for feeding cards from a supply hopper comprising, in combination, continuously operated drive means, feeding means movable with respect to said drive means and operable thereby to engage and feed a card in said hopper, and fixedly mounted cam means associated with said feeding means and effective by positive engagement therewith as it is operated for moving said feeding means relative to said drive means to cause said feeding means to move at a first velocity less than that of said drive means as a card to be fed is initially engaged thereby and then to move at a second velocity greater than said first velocity as it feeds said card from said hopper.

12. A mechanism for feeding cards from a supply hopper comprising, in combination, rotary drive mechanism, feeding means including card picking means coupled to said drive mechanism for rotation therewith, first cam means mounted to cooperate with said feeding means and normally effective to guide said feeding means as it is rotated so that said card picker is effective to feed a card from said hopper each time it is rotated but positionable to be ineffective to so guide said feeding means as it is rotated, and second cam means for positively engaging said feeding means as it is rotated to decelerate said card picking means as it initially engages a card to be fed.

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