

[54] SHEET FEEDING MECHANISM

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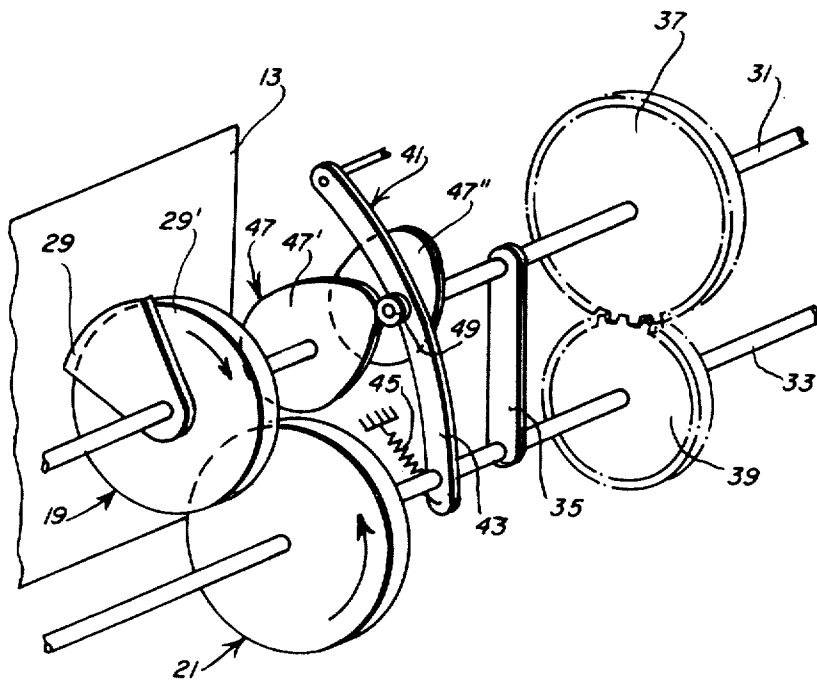
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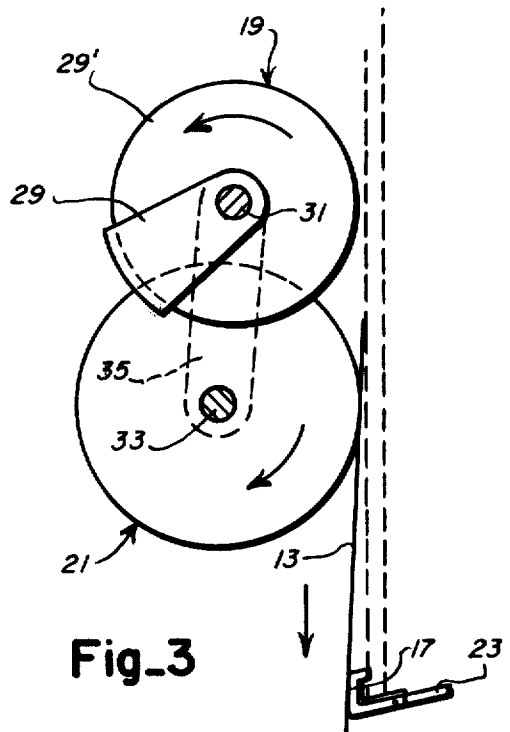
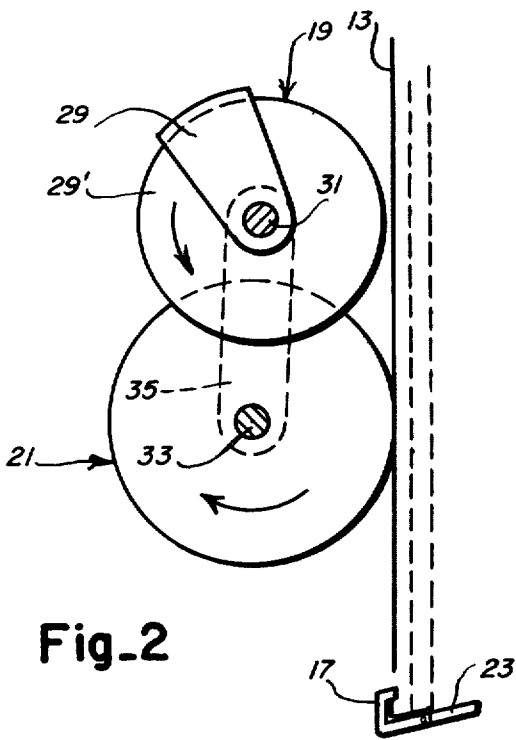
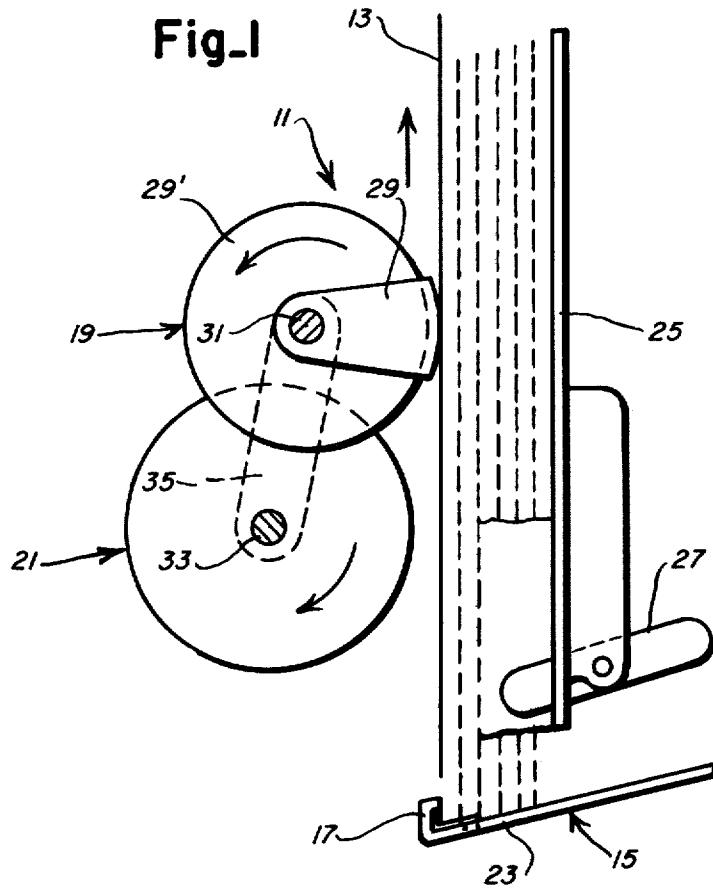
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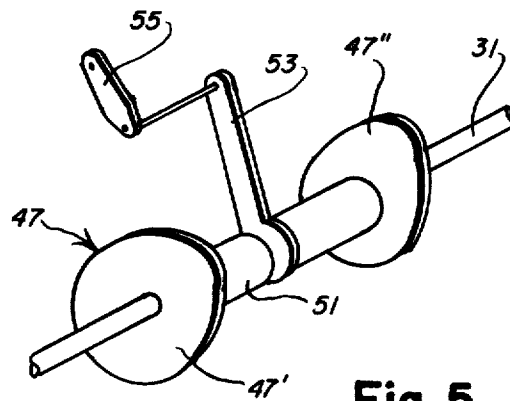
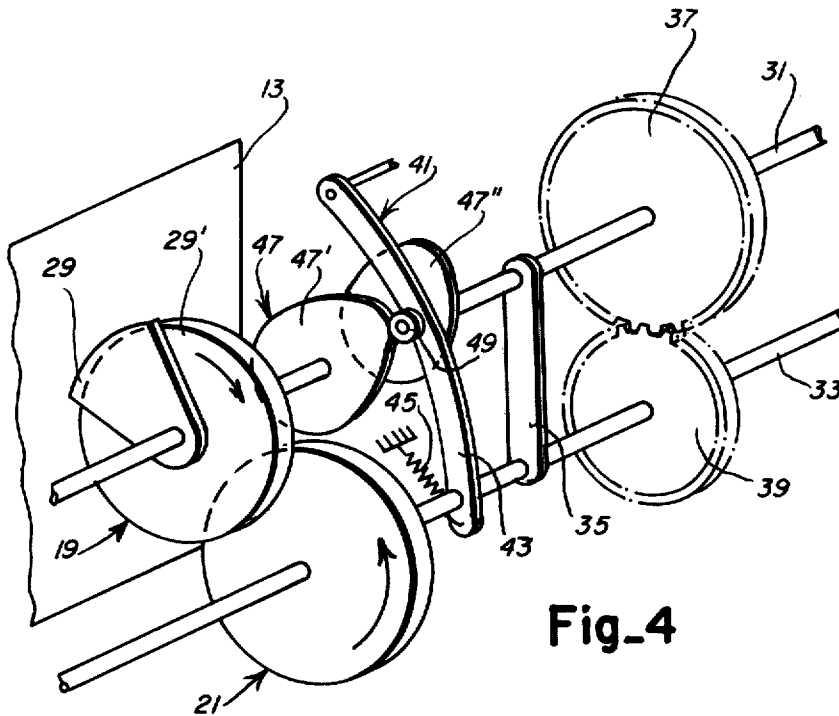
[57] ABSTRACT

A stack of record carriers in the form of rectangular-shaped cards supported in a vertical upright position are advanced sequentially in a business machine by a sheet feeding mechanism. The forward end of the leading card is pressed against a resilient stop at a feeding position, and the leading card is separated from the remainder of the stack by retracting means driving the card rearwardly to withdraw the forward end of the leading card from the resilient stop. In timed relation with the operation of the retracting means, a feed roller is brought into engagement with the leading card to drive the card forwardly past the resilient stop. The timed relation between the operation of the retracting means and the operation of the feed roller is determined by camming means including a plurality of different cams which are selectively operable to accommodate cards of different sizes.

6 Claims, 5 Drawing Figures







## SHEET FEEDING MECHANISM

This invention relates to a sheet feeding mechanism for a business machine, for example a bookkeeping machine, and more particularly to a mechanism for separating and advancing a card from a stack of cards for further processing at a reading, writing or other station in the machine.

In a business machine, a method is known for listing and printing a stack of rectangular-shaped record carriers utilizing automatic conveyer means for feeding the record carriers. Such an arrangement is disclosed, for example in DOS 1,921,127 wherein the record carriers are arranged in a stack pressed against a stop means and an individual record carrier is fed from the stack by a single feed roller which is driven in one direction to pull the card from beneath the stop means and is then driven in an opposite direction for advancing the record carrier into the business machine. However, the feeding of a record carrier with such an arrangement requires too much time since the single feed roller must be alternately driven in opposite directions.

Accordingly, an object of the present invention is to provide a feeding mechanism which reduces the time involved in separating and feeding a record carrier from a stack.

Still other objects, features and advantages of the present invention will become apparent to those skilled in the art from a reading from the following detailed description of a preferred embodiment of the invention, taken in conjunction with the accompanying drawing wherein:

FIG. 1 is a diagrammatic illustration of a sectional view of a sheet feeding mechanism constructed in accordance with the present invention and showing the movement of the record carrier in a direction opposite to the feeding direction;

FIG. 2 is a partial view of the sheet feeding mechanism illustrated in FIG. 1 and showing the condition of the sheet feeding mechanism after the record carrier has been withdrawn from the stop means;

FIG. 3 is a view similar to FIG. 2 and showing the movement of the record carrier in the feeding direction;

FIG. 4 is a partial schematic view of the sheet feeding mechanism of FIG. 1 and illustrating the mechanism for controlling, in timed relation, the forward and reverse movements of the record carrier; and

FIG. 5 is a partial schematic illustration of the mechanism for varying the timed relation of the forward and reverse movements of a record carrier.

Referring now in detail to the figures of the drawing, there is shown a sheet feeding mechanism, generally indicated 11, for sequentially advancing a plurality of record carriers in a business machine, not shown, for further processing at a reading, printing or other station of the machine. The record carriers are in the form of rectangular-shaped cards 13 which are arranged in a stack and supported by holding means, generally indicated 15, with the leading or uppermost card at a feeding position for advancement from the stack. At the feeding position, the forward edge of the leading card 13 is pressed by suitable means, not shown, against stop means 17, and the leading card 13 is separated from the remainder of the stack by a sheet retracting means, generally indicated 19, which drives the card 13 rearwardly, as shown in FIG. 1, to withdraw the forward

end from engagement with the stop means 17. After the leading card 13 is separated from the remainder of the cards forming the stack, the card 13 is driven forwardly in the feeding direction, as shown in FIG. 3, by sheet advancing means, generally indicated 21. The means for pressing the leading card 13 against the stop means 17, as well as other parts of the sheet feeding mechanism 11 are not shown since they form no part of the present invention and may desirably be conventional.

As shown, the holding means 15 includes an inclined plate 23 supporting the stack of cards 13 in a generally vertical and upright position with the forward end of the leading card 13 engaging the stop means 17, which may be in the form of one or more resilient fingers suitably connected to the inclined plate 23. The leading card 13 is pressed against the stop means 17 by a plate 25 which engages the bottom card of the stack and is supported for movement by suitable supporting means, not shown, along a guide slot 27 which may be formed in a suitable wall or other supporting structure of the business machine. As more particularly shown in FIG. 4, the retracting means 19 for imparting a rearward movement to the leading card 13 is in the form of a wheel segment 29 which is associated with a roller 29' having a smaller diameter and is carried on a drive shaft 31 rotatably driven by a suitable means, not shown. The sheet advancing means 21 is in the form of a feed roller carried on another shaft 33 which is rotatably driven in a direction opposite to the shaft 31. As shown, the shaft 33 is pivotally supported on the shaft 31 by a connecting linkage 35, and the shaft 33 is rotatably driven by the shaft 31 through cooperating gears 37, 39 carried on the shafts 31, 33 respectively. Although only a single wheel segment 29, feed roller 21, and connecting linkage 35 are shown, it is to be understood that a plurality may be used.

To maximize the rate at which the cards 13 are fed from the stack, the sheet advancing roller 21 is brought into engagement with the leading card 13 as soon as the forward end thereof is withdrawn a suitable distance from the resilient fingers of the stop means 17 and before the forward end of the card 13 moves a distance even with the shaft 33. To control the movement of the feed roller 21 into engagement with the leading card 13 in closely timed relation with the movement of the retracting means 19, the sheet feeding mechanism 11 is provided with moving means, generally indicated 41, for pivoting the feed roller 21 into engagement with the leading card 13. As shown in FIG. 4, the moving means 41 includes a pivotally supported arm 43 which carries the shaft 33 of the feed roller 21 and is urged toward the stack of cards 13 by suitable resilient means in the form of a spring 45 stretched between the arm 43 and a suitable portion of the business machine. To bring the feed roller 21 into engagement with the leading card 13 in timed relation to the movement of the retracting means 19, the moving means 41 also includes camming means, generally indicated 47, carried on the shaft 31 and acting against a roller 49 on the arm 43. Although only a single moving means 41 are shown, it is to be understood that similar moving means 41 may be provided at each end of the shafts 31 and 33.

In operation, the rotational movement of the retracting means 19 brings the wheel segment 29 into engagement with the leading card 13 to impart a rearward movement sufficient to clear the stop finger 17. As the wheel segment 29 drives the card 13 rearwardly, the

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camming means 47 acts against the arm 43 to hold the feed roller 21 from engagement with the card 13. After the card 13 is separated from the remainder of the stack, the feed roller 21 is brought into engagement with the card 13 in accordance with the movement of the camming means 47 so as to immediately drive the card 13 forwardly past the stop fingers 17 for further processing in the machine.

To vary the timed relation between the retracting and feeding movements for feeding cards 13 of different sizes, the camming means 47 may include a plurality of cams 47', 47'' for selectively acting on the roller 49 of the arm 43, with the cam 47' being adapted for larger cards 13 than the cam 47''. As more particularly shown in FIG. 5, the cams may be carried on a sleeve 51 which is slidably carried on the shaft 31 and selectively moved into engagement with the roller 49 of the lifting arm 43 by means of an arm 53 suitably connected to a handle 55 which may be operated outside a housing of the machine.

What is claimed is:

- 1. A sheet feeding mechanism comprising: holding means for holding a stack of sheets at a feeding position from which the leading sheet may be advanced forwardly in a feeding direction and including stop means for engaging the forward end of the leading sheet, sheet retracting means located adjacent the feeding position for imparting a rearward movement to the leading sheet and being movable in engagement with the leading sheet for a period of time sufficient to withdraw the forward end of the sheet from engagement with said stop means, sheet advancing means for imparting a forward movement to the leading sheet in the feeding direction and being supported for movement relative to the feeding position, a pivotally supported arm carrying said sheet advancing means and being resiliently biased for moving said sheet advancing means into engagement with the leading sheet at the feeding position, and camming means movably associated with said sheet retracting means and acting on said pivotally supported arm for bringing said feed roller into en-

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gement with the leading sheet at the feeding position upon withdrawal of the forward end thereof from engagement with said stop means.

2. A sheet feeding mechanism according to claim 1, wherein said camming means comprises a plurality of different cams selectively engageable with said pivotally supported arm for varying the timed relation between the movement of said sheet retracting means and the movement of said sheet advancing means into engagement with the leading sheet at the feeding position.

3. A sheet feeding mechanism according to claim 1: said sheet retracting means being in the form of a wheel segment carried on a rotatable shaft adjacent the feeding position, and

said sheet advancing means being in the form of a feed roller rotatable in a direction opposite to the wheel segment of said sheet retracting means and supported for movement relative to the feeding position.

4. In a mechanism for sequentially feeding a stack of sheets in a feeding direction of the type having an end stop and holding means for holding a stack of sheets, retracting means rotatably mounted and driven in the direction opposite the feed direction to retract a sheet from said end stop, and feeding means rotatably mounted and driven in the feed direction to feed said sheet past the end stop wherein said retracting means and said feeding means are connected in timed relationship to cooperatively retract a sheet from said end stop and then feed the sheet past the end stop, the improvement comprising:

a pivotally supported arm connected to said feeding means for engaging said feeding means with and disengaging said feeding means from a sheet.

5. The improvement of claim 4 further comprising camming means connected to said retracting means and acting on said arm for engaging and disengaging said feeding means.

6. The improvement of claim 5 wherein said camming means comprises a plurality of cams selectively engageable with said arm for varying the timed relationship between said feeding means and said retracting means.

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