United States Patent [19]

Gatti

[11] **3,770,265**

[45] **Nov. 6, 1973**

[54] **CARD FEEDER**

[75] Inventor: **Giancarlo Gatti,** Varese, Italy

[73] Assignee: **Honeywell Information Systems Italia,** Caluso, Italy

[22] Filed: **June 14, 1971**

[21] Appl. No.: **152,926**

[30] **Foreign Application Priority Data**

June 20, 1970 Italy 26312 A/70

[52] **U.S. Cl.** **271/10,** 271/34, 271/DIG. 4

[51] **Int. Cl.** **B65h 3/04,** B65h 5/06

[58] **Field of Search** .... 271/34, 39, 10, 4, 271/52, 53, 59, 60, 62 B, DIG. 4

[56] **References Cited**

UNITED STATES PATENTS

3,411,768 11/1968 Gatti .... 271/39 X

3,159,396 12/1964 Barber 271/34

3,015,486 1/1962 Weidenhammer .... 271/52 X

3,539,179 11/1970 Bergman et al. 271/39

3,580,566 5/1971 Vasse 271/10

Primary Examiner—Evon C. Blunk

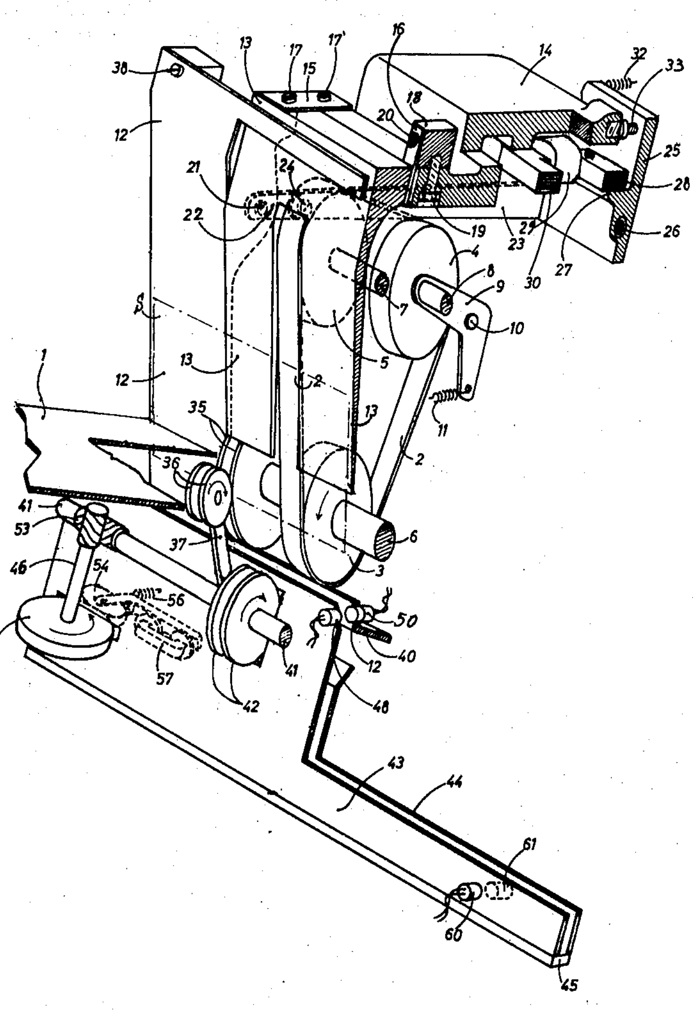
Assistant Examiner—Bruce H. Stoner, Jr.

Attorney—Fred Jacob et al.

[57] **ABSTRACT**

A device for feeding and aligning cards for use with data handling systems is provided with a plate which supports a card stack and is moveable to initiate movement of the first card of the stack through a plurality of rotating members and aligning bars which effect feeding and aligning of a card in asynchronous manner.

13 Claims, 4 Drawing Figures



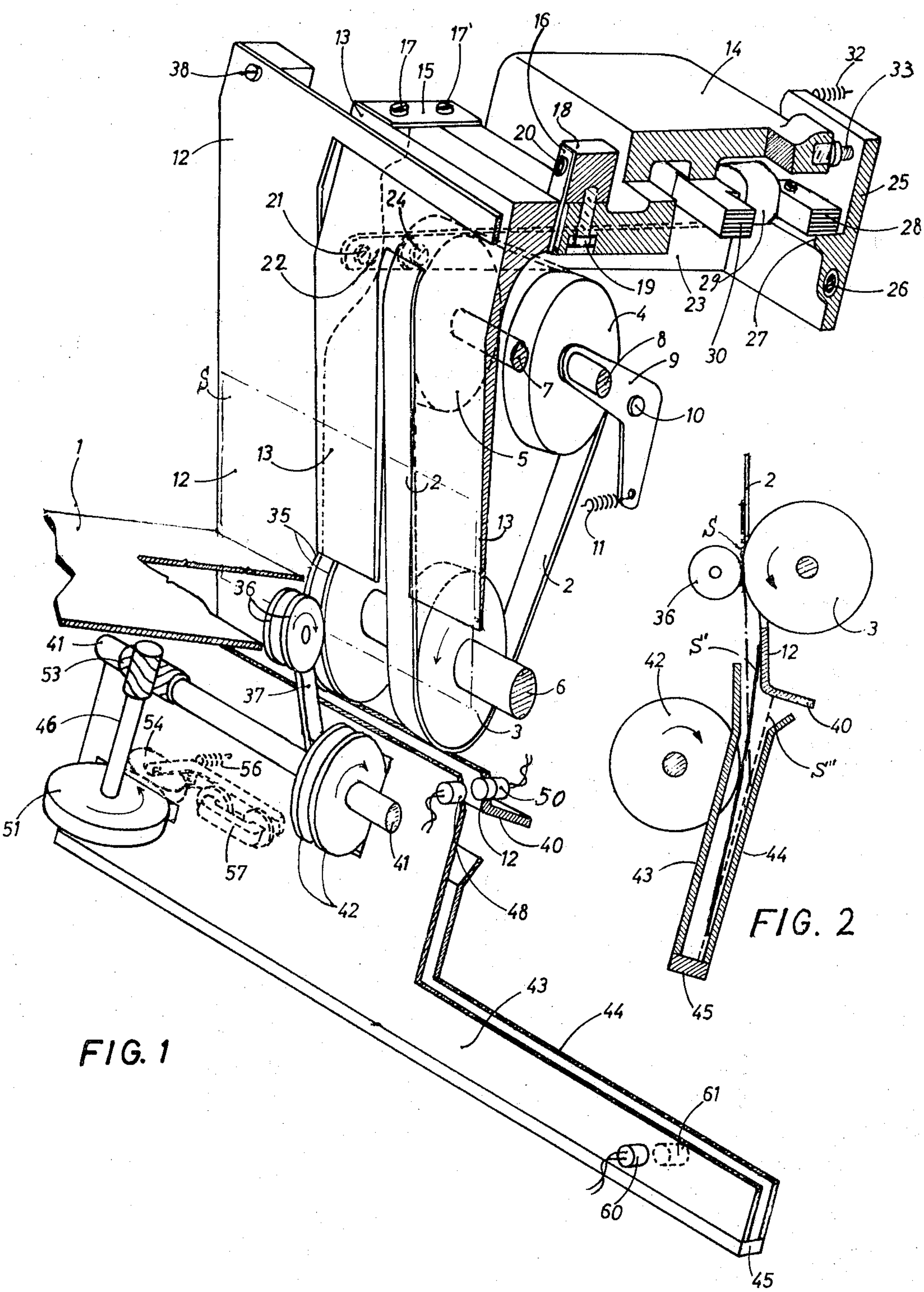


FIG. 1

FIG. 2

Giancarlo GATTI INVENTOR

By ATTORNEY

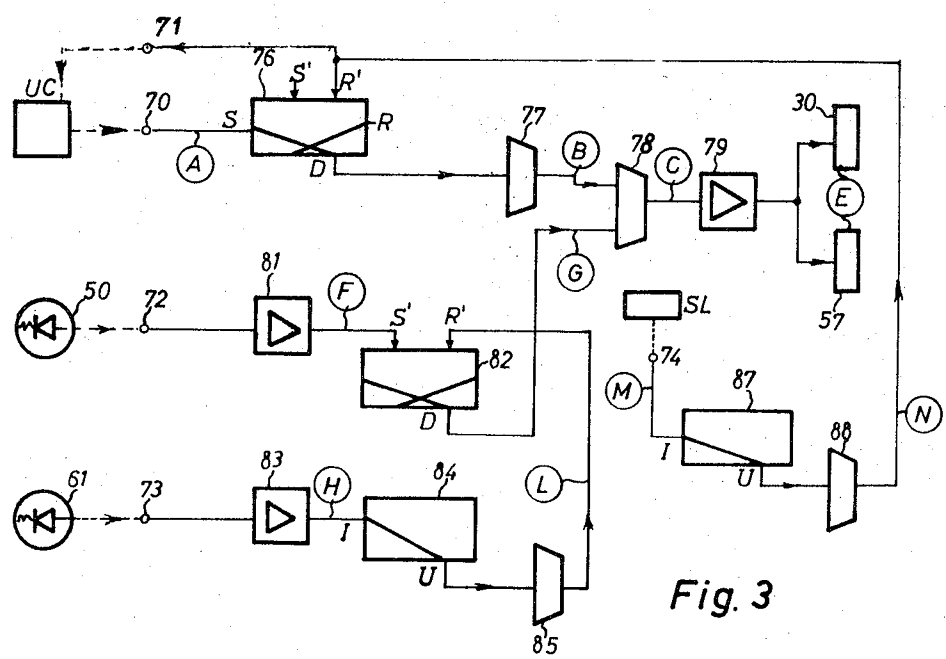


Fig. 3

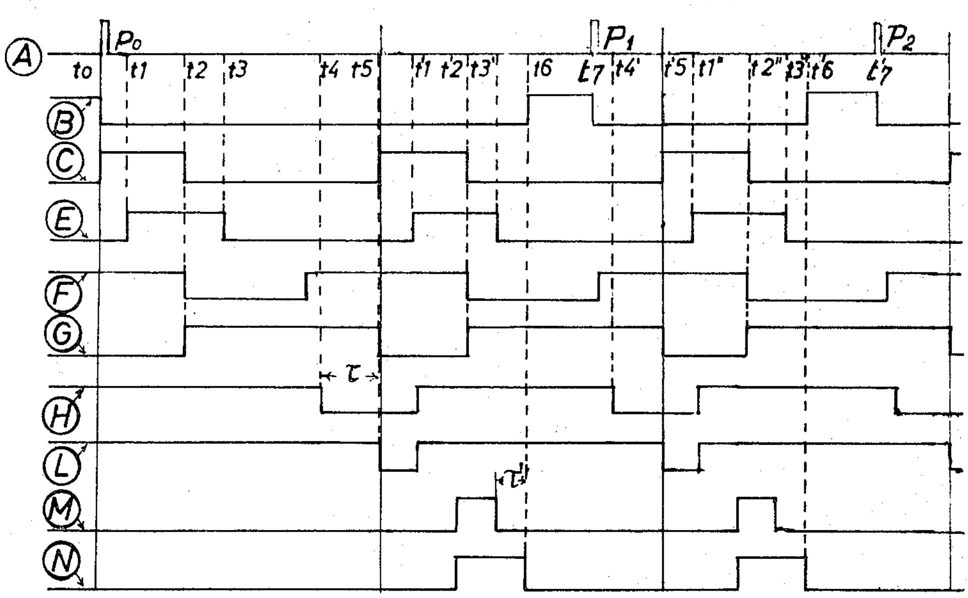


Fig. 4

Giancarlo GATTI
INVENTOR.

By [signature]
ATTORNEY.

CARD FEEDER

BACKGROUND OF THE INVENTION

The invention relates to a device for feeding and aligning punched cards in a card reading, punching or selecting apparatus, as used in data handling systems.

The cards, which may already be punched or yet to be punched, are usually stacked on an inclined plane, and pushed against the feeding device by a sliding plate driven by a spring. The feeding device has the task of removing one card at a time from the stack and of transporting it through a predetermined path to an operating station, which may be a punching, a reading or a selecting device, or a combination of the same.

Usually the card is removed from the stack by imparting to it an almost vertical motion, directed perpendicularly to the major side of the card. The removed card must subsequently be conveyed along the following path in a direction initially perpendicular to the former one. Therefore, before initiating the movement along this path, the card must be aligned, that is, positioned so, that its major sides be parallel to the initial direction of conveyance along the path. This alignment is obtained, according to prior art, by the use of a set of roller pairs which press the card on a fixed stopping member arranged in a suitable position, the roller pairs continuing their action until the card is moved in the direction of the path by a proper mover device.

The continued rubbing action of the rollers may cause considerable wear to the cards, and furthermore, there is no positive guaranty that the correct alignment position is reached, because the card is pressed against the fixed stopping member only along the lower edge, and its upper edge is free.

In most known devices, the cards are removed in a steady sequence, by effect of periodical motions controlled by rotating mechanical members. This is called synchronous feeding. It is convenient, on the contrary, for reasons of realiability of operation and flexibility of use, to remove the cards according to an asynchronous mode of operation, so that the interval between the removal of one card and that of the following one, as long as it is greater than a minimum required value, may be arbitrarily chosen, and does not depend upon any period of operation of the mechanical members.

It is thus possible to change the speed of operation of the apparatus simply by changing the duration of the said interval, without acting on the proper operation times, and without being forced to adjust the proper operating speed of the apparatus to the speed at which the cards are removed from the stack.

The asynchronous operation of such devices has been obtained until now by the use of mechanical clutches, which start and stop the motion of the feeding device under control of electrical signals. The use of mechanical switches, however, is often cause of inconveniences such as malfunctioning, wear, misadjustment, and lower reliability of operation of the machine.

SUMMARY OF THE INVENTION

These conveniences are obviated by a device according to the invention, which is particularly simple and efficient, and comprises a masking plate on which the stack of cards, in rest condition, is leaning, and which may be displaced backward under control of an electromagnet for the distance needed for exposing the first card of the stack to the action of removing members in

continuous motion, and by aligning the card by the rubbing action of a set of rollers cooperating with guiding members which submit the elastically curved card to the action of such rollers barely for the time needed to produce said alignment, which is assured by means of a upper limiting member cooperating with a lower aligning bar. The aligned cards is afterward moved along the following path by suitable rollers controlled by an electromagnet.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other advantages and features of the invention will appear from a detailed description of a preferred embodiment which follows, and from the accompanying drawings in which:

FIG. 1 shows, schematically, in section and perspective, a device according to the invention;

FIG. 2 is a sectional schematic view of a portion of the device of FIG. 1, indicating the subsequent positions of a card during the alignment process;

FIG. 3 is a logical block diagram of an electronic control circuit used with the device of FIG. 1; and,

FIG. 4 is a set of timing diagrams showing the different binary values for the signals in different points of the electronic circuit.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The device is for the most part symmetrically arranged with respect to a vertical central plane, and FIG. 1 shows a sectional view taken along the central plane of the major art of the device, showing in perspective the left half of the same. In the following description, the terms: left or right, front or back will be referenced to an observer looking in the direction of advancement of the stack of cards toward the feeding device.

In the lowermost part of the view of FIG. 1, as the different members are not symmetrically arranged, the device is shown in perspective, without sectional views.

Referring to FIGS. 1 and 2, there is shown an inclinated plate 1 supporting a stack of cards. In the FIG. 1, a portion of this plate is removed to show the underlying mechanism. The stacked cards S are resting on the plate 1 by their major lower edge, and are pushed against the feeding device by a plate tensioned by a spring, not shown in the drawing.

The feeding device comprises a pair of belts (of which only belt 2 is shown), symmetrically located with respect to the section plane. The belt 2 is partially wound around three rollers 3, 4 and 5 as further shown in FIG. 1. The roller 3 is mounted and fastened on a shaft 6, which is rotated counterclockwise at constant speed, by a motor means (not shown). The idle roller 5 is freely rotatable on a fixed shaft 7 and the tension roller 4 is mounted on a shaft 8. The shaft 8 is carried by a tension arm 9, pivoted on a pivot shaft 10 and tensioned by a spring 11 for suitably tightening the belt 2.

Other auxiliary rollers may be provided, in particular between the rollers 3 and 5, to contrive the belt 2 to follow the required path, exactly. Thus, in a suitable portion of the path between the idle roller 5 and the driving roller 3 the belt 2 is guided along a substantially vertical direction and run in a botton-opened slit cut in a masking plate 13. The stack of cards S, at rest, is shown to lean against the plate 13, the belt 2 being prevented from contacting the foremost card of the stack, as the belt is in a slightly recessed position with respect to the plate **13.**

The masking plate **13** is fastened to a yoke **14** (which may be part of the main frame of the machine) by a pair of flexible horizontal blades, symmetrically located, of which only blade **15** is shown, and by flexible vertical blade **16.** The horizontal blades, such as blade **15** shown, are fastened to the masking plate **13** and to the yoke **14** by screws such as screws **17** and **17'** respectively, and the vertical blade **16** is fastened to the masking blade **13** by a screw not shown, and to a small block **18** by a screw **20.** The block **18** is further shown to be secured to the yoke **14** by a screw **19.** The two horizontal blades such as blade **15,** and the vertical blade **16** support the masking plate **13** and permit it to accomplish a small backward oscillation.

At each side of the masking plate **13** there is a rib to which a small link **22** is pivoted by means of a pivot member **21.** At the opposite end, the link **22** is pivoted, at a pivot point **24,** to an arm **23** which is an extension of an oscillating member **25.**

This oscillating member **25** is secured to a shaft **26** which is rotatably supported by yoke **14** in any manner well known in the art, such that the yoke may accomplish a small counterclockwise rotation together with the shaft. An armature **28,** consisting of sheets of suitable ferromagnetic material, is secured to a step **27** machined out of the oscillating member **25,** and is subject to the attractive action of an electromagnet **30,** fastened to the yoke **14** and provided wth energizing coils **29.**

In the rest condition, the axis of pivot **21,** of link **22,** of pivot **24** and of the shaft **26** are substantially contained in the same plane: thus the force applied by the card stack leaning on the masking plate does not produce any moment tending to rotate the oscillating member **25.** When electromagnet **30** is energized, the armature **28** is attracted forward and the oscillating member **24** rotates counterclockwise by a small angle, overriding the action of springs such as spring **32.** This rotation is limited by an adjustable stop screw **33.** By effect of this rotation, the pivot **21** is moved downward and, through the associate motion of rod **22** and pivot **21,** the masking plate **13** rotates counterclockwise so, that its lower portion is moved backward, letting the belt **2** project out of the slit where it was formerly concealed.

The foremost card of the stack is thus submitted to the action of the portion of the belt projecting out of the slit, and is moved downward. During this motion, according to a known arrangement, the card is forced to pass through a gauged slit, not shown in the drawing, which lets only one card at a time pass as the gap of the gauged slit is barely wider than the thickness of a single card.

As soon as the lower edge of the card has passed this slit and is under the plane of the plate **1,** the card is engaged by two pairs of driving rollers, secured on the rotating shaft **6,** of which only a pair designated by reference numeral **35** is shown. On these rollers **35** leans a corresponding pair of pressure rollers **36,** carried by an oscillating arm **37** pivoted on a spring which is not shown. By the action of the driving rollers **35** and pressure rollers **36,** and of their symmetrical counterparts at the right side of the device, the card is driven downward. The position of the card at this moment is shown by the dot-and-dash outline indicated by reference letter S'. (FIG. 1).

The whole device described above, comprising the masking plate **13,** the pair of belts such as belt **2** and associated rollers, and the two pairs of rollers such as the pair of rollers **36,** is projecting out of a substantially rectangular window cut out of the fixed plate **12,** which is fastened to the main frame by means of screws as the one indicated by the reference number **38,** and others not shown, these screws permitting adjustment of the vertical position of the plate **12.** The horizontal width of the plate **12** is at least equal to the length of the card. On its lower side, the plate **12** is bent to form an upper limiting bar **40** whose purpose will be explained later as the description proceeds.

Under the plate **1,** a shaft **41** rotatably supported by the main frame, and driven, by a motor means (not shown), to rotate counterclockwise, carries two rididly fastened pairs of rollers, of which only a pair indicated by reference numeral **42** is shown. A guiding plate **43** and a counter plate **44,** resting on an aligning bar **45,** define an aligning channel into which the card S' falls by effect of the action of the driving rollers **35** and pressure rollers **36,** as may be seen in FIG. **2,** which is a schematical section of the lower part of the feeding device along the central plane. The thick dot-and-dash line shows the position of the card S' as soon as its lower edge has entered the channel, facilitated by the inviting upper bends of the guiding plate **43** and counter plate **44.** Being pushed down into the channel by the action of rollers **35** and **36,** the card is forced to bend longitudinally, and, when its upper edge is free from the rollers, it rests against the fixed plate **12.** By effect of the longitudinal bending and of the elasticity of the card, its middle longitudinal portion is driven toward the guiding plate **43,** as shown by the solid thick line indicated by S'.

The plate **43** has two openings, symmetrically located with respect to the section plane, only one of them being shown in the drawing. The pair of rollers **42** project through this opening and into the channel by a portion of its periphery as shown in FIG. **2.** The external peripheral surface of the rollers is covered with a suitable high friction material, such as rubber, and acts on the middle portion of the card which is pressed against the rollers by the effect of its longitudinal bending, driving it downward until its lower edge rests on the aligning bar **45.** The distance between the upper surface of this aligning bar and the lower surface of the limiting bar **40** is barely larger than the height of the card. Therefore, as soon as the upper edge of the card has cleared the lower edge of the limiting bar, **40,** that is, as soon as the lower edge of the card is resting on the aligning bar **45,** the card straightens out and leans against the counter plate **44,** so escaping the driving action of rollers **42,** and assumes the position indicated in FIG. **2** by S''. It is apparent that, due to the symmetrical arrangement of the two pairs of rollers, and to the described device, a card which presents itself in oblique relation to the horizontal, is subject to a prolonged action of the downward driving rollers only on its higher side, that is, on the side which is the last to descend under the edge of the limiting bar **40.** Thus a redressing effect against the obliquity takes place. The pressure of the card against the rollers **42** is given only by the bending of the card and its elasticity, and ceases as soon as the card is able to resume the straight condition, entering with its upper edge under the limiting bar **40.** The rubbing action of the rollers **42** on the card is thus very gentle and gradual, and ceases immediately as soon as it is no more needed.

When the card rests in the channel vertically delimited between the lower bar **45** and upper bar **40,** and leans on the counterplate **44** it is bound to be perfectly aligned in the required direction, and is no longer subject to any wearing action, or to any force.

On the middle plane of the machine as shown in FIG. **1,** there is a first photoelectric device, comprising a light source **48,** preferably a solid state photoemitter, on one side of the aligning channel, and a photodiode **50,** on the opposite side of the same channel. This photoelectric device is placed at a suitable height, so that when the lower edge of the card, in its downward motion, interrupts the light coming from the photoemitter **48,** its upper edge is just leaving the lower edge of the masking plate **13.** The interruption of the light causes an electrical signal to be emitted by the photodiode **50.** As will be explained later in greater detail, this signal interrupts the current energizing the electromagnet **30** and therefore releases the armature **28,** thus permitting the oscillating plate **25,** under the action of springs **32,** to return to the rest position as indicated in FIG. **1.** As a consequence the masking plate reverts to the forward position, pushing back the stack of cards and removing the foremost card of the stack from the action of belt **2.** Therefore, no more than one card may be removed at a time, and this is done in a completely asynchronous manner, that is, the removing operation is not bound to any phase of any operation period of any one of the continuously oscillating or rotating machine members.

When the card is aligned, on the bar **45,** the device for further moving the card along the following path may be activated. It comprises a roller **51,** mounted and secured to a shaft **46** which is continuously rotating in the direction indicated by the arrow, and which derives its motion from the shaft **41** by means of a helical gear **53.** A portion of the periphery of the roller **51** projects into the aligning channel through a window opened in the plate **43.** A corresponding pressure roller **54** projects into the same channel from a corresponding window opened in the counter plate **44** and is carried by an arm **55** subject to the action of an electromagnet **57,** opposed to the action of a spring **56.**

When the electromagnet **57** is de-energized, spring **56** holds the pressure roller **54** at a suitable distance from roller **51,** so that it cannot interfere with any card entering the channel, nor act on the card which may be contained in the channel. When, on the other hand, electromagnet **57** is energized, its armature overrides the action of the spring **56** and pushes the pressure roller **54** toward the rotating roller **51,** so that a card resting in the aligning channel is moved along the following path.

A second photoelectric device comprising a photoemitter **60** and a photodiode **61** is located near the bottom of the aligning channel and near its right extremity.

FIG. **3** shows the logic block diagram of the electric circuit for controlling the different operations, and particularly for controlling the energizing or de-energizing of electromagnets **30** and **57,** which operate respectively the masking plate **13** and the pressure roller **54.**

FIG. **4** shows the timing diagrams reporting the binary values in different points of the logical diagram indicated by the circled capital letters.

The device according to the invention is preferably applied to a card reader being part of a data handling system, comprising, for example, a Central Processor which may send out command pulses each one of which causes a card to be removed from the stack.

These command pulses must be separated by time intervals not shorter than a minimum value corresponding to the maximum operating speed. In the instance where the maximum operating speed is 600 cards per minute, the time interval between the pulses must be at least 100 milliseconds. These intervals, however, may be longer, as the sending out of each command pulse by the central processor is conditioned to the reception of a consensus signal, sent out by the card reader, which signal may be delayed if for any reason the removing and the aligning of a card is delayed. The card reader which is located along the path followed by the card after alignment, comprises a reading position, not shown, about which it is sufficient, for the purposes of this description, to known that it can send out a signal for indicating the start and the end of the reading operation. It may be assumed that the "start of reading" signal is a transition from a binary ZERO to a binary ONE and the "end of reading" signal is the opposite one.

The circuit of FIG. **3** has four input and one output terminal. Input terminal **70** is connected to the output of the apparatus generating the command pulses, for example the Central Processor UC of a data handling system. Input terminal **72** is connected to the output of the photodiode **50** being part of the aforesaid first photoelectric device. Input terminal **73** is connected to the output of photodiode **61** being part of the aforesaid second photoelectric device.

Input terminal **74** is connected to the output of device SL being part of the reading position and which sends out the "start of reading" and "end of reading" signals.

Output terminal **71** is connected to the Central Processor for sending to the same a consensus signal.

The circuit comprises substantially the following circuital elements:

a. NOR gates, as the one indicated by reference numeral **78** which has two inputs leads and an output lead. The output lead is at a binary ONE if, and only if, both input leads are at binary ZERO: if one, or both, the input leads are at binary ONE, the output lead is at binary ZERO. If both input leads are connected together to form a single input, the NOR gate operates simply as an inverter, as the one indicated by reference numeral **77.**

b. Bistable circuits, called flip-flops, as the one indicated by reference numeral **76.** These circuits may take over either one of two different conditions, a *work* condition and a *rest* condition, and have a direct output lead D. In work condition, direct output lead D is at binary ONE, in rest condition, D is at binary ZERO. There are two static input leads, indicated by reference letters S and R, and two dynamic input leads indicated as S' and R'. The flip-flop goes into the work condition (and therefore output D is at binary ONE) when a binary ONE level is applied to the static input S (Set), or when a binary ONE to binary ZERO transition is applied to dynamic input lead S': it reverts in rest condition (and therefore D output is a binary ZERO) when a binary ONE is applied to the static input lead R (Reset), or when a transition from a binary ONE to a binary ZERO is applied to the dynamic input lead R'.

c. Monostable circuits as the one indicated by reference numeral **84**, having an input lead I and output lead U. When input lead I goes over from a binary ZERO to a binary ONE, output lead U goes to ZERO; when the input lead I reverts to ONE, output U reverts to ONE not immediately, but after a definite time interval depending upon the characteristics of the monostable circuit.

d. In addition amplifiers of known types, are used, having an input lead and an output lead, and either providing for adapting the external signals to the standard characteristics prescribed for the signals circulating in the described circuit, such as these indicated by reference numerals **81** and **83**; or providing for the power needs for driving external devices in response to signals coming from the circuit, such as the one indicated by reference numeral **79**.

A terminal **70** is connected to input S of a flip-flop **76** whose output D is connected to an inverter **77** having the output connected to a first input lead of a two-input NOR gate **78**. The output lead of the gate **78** is connected to the input lead of an amplifier **79** which controls the energizing of parallel connected electromagnets **30** and **57**.

Terminal **72**, connected to the output of the photodiode **50** is connected to the input of an amplifier **81** whose output is connected to the dynamic input S' of a flip-flop **82**. When the diode **50** is illuminated, the output of amplifier **81** is at binary ONE, when the diode is obscured, the output is a binary ZERO. The output D of the flip-flop **82** is connected to a second input lead of the NOR gate **78**.

Terminal **73**, connected to the output of photodiode **61**, is connected to an input lead of an amplifier **83**, whose output controls the input I of a univibrator **84**. The output U of the univibrator **84** is connected to the input of inverter **85**, whose output is connected to input R' of the flip-flop **82**.

Terminal **74** which receives the signals of "start of reading" and "end of reading" coming in from the reading position SL, is connected to input lead of a monostable circuit **87**. The binary output signal of the circuit **87** is inverted by an inverter **88** and applied to input R' of flip-flop **76** and to output terminal **71**.

The operation of the circuit is described hereafter, with reference to diagrams of FIG. **4** which show the binary values in the various points of the circuit marked by the same letters. Diagram E indicates the conditions of operation on release of electromagnets **30** and **57**.

In rest conditions flip-flops **76** and **82** are at rest, and their D outputs are at binary ZERO.

The first input lead B of NOR gate **78** is at binary ONE; its output lead C, is at binary ZERO, and the amplifier **79** does not energize the electromagnets **30** and **57**.

At the start of the operation the Central Processor UC sends out a P_0 pulse to the input S of flip-flop **76**, whose output D goes over to a binary ONE. The lead B goes to ZERO, and as the second input lead (G) of NOR gate **78** is at ZERO, flip-flop **82** being at rest, the output of NOR gate **78** becomes ONE (lead C) and amplifier **79** energizes electromagnets **30** and **57**. After a short time interval, corresponding to the energization time the two electromagnets attract at the instant t_1 (see diagram E of FIG. **4**).

Electromagnet **30** moves the masking plate **13** backward and the first card is removed from the stack. Electromagnet **30** pushes the pressure roller **54** against the moving roller **51**, but this operation has no effect, as the aligning channel is empty.

The first card goes down, under the action of the rollers **35**, and its lower edge at time t_2 obscures the photodiode **50.** Therefore the dynamic input S' of flip-flop **82** goes from binary ONE to binary ZERO (diagram F) and its output D goes from binary ZERO to binary ONE (diagram G). This causes the passage to binary ZERO of the output of NOR gate **78**, (lead C) and the interruption of the energization of the electromagnets **30** and **57**, which, after a short release time, go back to the rest condition at time t_3. The masking plate reverts in the forward position, pushing back the stack of cards and preventing the removing of the following card. The pressure roller **54** is removed from the roller **51**, making the aligning channel free to receive the card.

When the card, in its downward motion, obscures the photodiode **61** by the card's lower edge, at time t_4 the input of monostable circuit **84** goes over from binary ONE to binary ZERO (diagram H). The output, which is a binary ZERO, remains at the same level for a predeterminated time interval τ, until time t_5. The time interval $t_0 - t_5$ is substantially equal to the minimum time interval between the removal of two consecutive cards: for example, in the instance of an operating speed of 600 cards per minute, this interval is 100 ms.

At time t_5 the output of flip-flop **84** goes to binary ONE, and therefore the output of inverter **85** (diagram L) goes from ONE to ZERO.

This zero-going front applied to the dynamic input R' of flip-flop **82** resets the same in rest condition. The output D goes back to ZERO, and so does the second input G of NOR gate **71**. As the first input of the same is already ZERO, the output goes to ONE, and the amplifier **79** energizes the electromagnets, which operate. Electromagnet **30** moves back the masking plate **13**, and causes a second card to be removed from the stack. The electromagnet **57** pushes the pressure roller **54** against the roller **51**, and therefore the first card is moved along the following path to the reading position. As the card is moved out of the aligning channel the photodiode **61** is illuminated and the leads H and L go back to binary ONE. When the card reaches the reading position, the terminal **74** and the input lead to flip-flop **87** go over to a binary ONE (diagram M) and, in correspondence, the output of the inverter **88**, whose input is connected to the output of flip-flop **87**, goes over similarly from ZERO to ONE, without producing effects (diagram N).

When the reading operation is terminated, the input of monostable circuit **87** goes over from binary ONE to binary ZERO, and its output goes over from ZERO to ONE after a predetermined time interval τ'. As a consequence, the output of inverter **88**, sends out at time t_6 a zero-going front, which, applied to the dynamic input R' of flip-flop **76** resets the same in rest position, that is, its output D reverts to ZERO. The first input of NOR gate **78** goes to ONE, its output to ZERO, and the electromagnets are de-energized. At the same time t_6 the same zero-going front applied to terminal **71** gives to the Central Processor the consensus for initiating a new operation cycle. The Central processor sends a new pulse P_1, for example at time t_7, setting flip-flop **76** in work condition, and the lead B goes to binary ZERO. But the new cycle is initiated only at time T'_5, when the second card, which has been removed from the stack at time t_5 is aligned on the aligning channel. From this time on the sequence of operations of the various devices proceeds in the manner already indicated. The start of a new cycle is conditioned by a command pulse incoming from the Central Processor and setting flip-flop **70** (lead B to ZERO) and by the signal indicating that the last removed card is positioned and aligned in the aligning channel, which resets flip-flop **81** (lead G to ZERO).

The intervals of time corresponding to instant t_1 to t_6, as indicated in FIG. **4** are, with reference to the start of the first cycle, that is, to instant $t_0 : t_1 = 10$ ms; $t_2 = 30$ ms; $t_3 = 45$ ms; $t_4 = 82.5$ ms; $t_5 = 100$ ms; $t_6 = 150$ ms.

In the instance of an operating speed of 600 cards per minute, the delay τ introduced by monostable circuit **84** is 17.5 ms, and the command pulses are normally separated by 100 ms intervals. In the instance of a lower reading speed, for example 400 or 350 cards per minute, the delay of the monostable circuit is adjusted respectively at 67.5 ms and 89.5 ms. No other adjusting operation is required for changing the operation speed of the device.

Numerous modifications, variations and equivalents will now occur to those skilled in the art all of which are intended to fall within the spirit and scope of the present invention. Hence the invention herein is limited only by the scope of the appended claims.

What is claimed is:

1. A card feeding device for moving cards along a predetermined path from an initial position to an aligning position and a reading station, comprising a plurality of card removing members in continuous and uniform motion, a masking plate having a corresponding plurality of slits encompassing suitable portions of said card removing members, means for pushing a stack of cards against said masking plate control means for imparting to said masking plate in succession a first displacement for subjecting the foremost card of the stack to the action of said card removing members, and a second displacement in opposite direction for withdrawing the stack of cards from said removing action, continuously, rotating aligning rollers on one side only of said aligning position, said path of the card comprising a portion defined by an upper guiding plate and a counter plate arranged at a mutual angle, said angle causing the card to bend longitudinally and pressing the card against said aligning rollers the operation of said control means being uncorrelated to the motion of said card removing members and to the operation of said aligning rollers.

2. The feeding device of claim **1**, wherein said card-removing members comprise at least a continuous belt.

3. The feeding device of claim **1**, wherein said control means for displacing said masking plate comprise at least an electromagnet means operating through passive mechanical links.

4. The feeding device of claim **3**, whereby said electromagnet means are responsive to current pulses generated in dependence of the passage of the card through a first photoelectric device comprising a photoemitter and a photoelectric signal generator located on opposite sides of the path of the card.

5. The feeding device of claim **4**, wherein said aligning position is defined by a lower longitudinal aligning member and an upper longitudinal limiting member, in cooperation with said counter plate, said counter plate being inclined with respect to the vertical by a substantially small angle, the inclination being in such a direction as to remove the card resting on said counter plate from the action of said aligning rollers.

6. The feeding device of claim **4**, whereby the resting of the card on said aligning position is signalled by means of a second photoelectric device comprising at least a photoemitter and a photoelectric signal generator located on opposite sides of said aligning position.

7. The feeding device of claim **1** further comprising: a first photoelectric device for signalling the passage of a card through a predetermined point of said predetermined path, a second photoelectric device for signalling the resting of a card in said aligning position, detecting means for indicating the passage of a card through the reading station and wherein said control means has start input to receive start commands from a central processor unit, first, second, third inputs responsive to signals provided by said first, second photoelectric device and said detecting means respectively and a conditioning network whereby the starting of the first card removing operation is depending on a start signal unit, the starting of the second card removing operation is depending on an aligning signal at the second input, signalling that the first removed card is aligned on said aligning position, and the starting of the subsequent card removing operations is conjointly dependent on both start signal and an aligning signal, said start signal being conditioned by a consensus signal sent to the central processor unit in response to a signal indicating the passage of the card through said operative position.

8. A card feeding device for moving cards along a predetermined path from an initial position to an aligning position, and a reading station, comprising a plurality of card-removing members in continuous and uniform motion, a masking plate having a corresponding plurality of slits encompassing suitable portions of said card-removing members, means for pushing a stack of cards against said masking plate, control means for imparting to said masking plate in succession a first displacement for subjecting the foremost card of the stack to the action of said card-removing members, and a second displacement in the opposite direction for withdrawing the stack of cards from said removing action, the operation of said control means being uncorrelated to the motion of said card-removing members, a first photoelectric device for signalling the passage of a card through a predetermined point of said predetermined path, a second photoelectric device for signalling the resting of a card in said aligning position, detecting means for indicating the passage of a card through the reading station and wherein said control means has a start input to receive start commands from a central processor unit, first, second, third inputs responsive to signals provided by said first, second photoelectric device and said detecting means respectively and a conditioning network whereby the starting of the first card removing operation is depending on a start signal unit, the starting of the second card removing operation is depending on an aligning signal at the second input, signalling that the first removed card is aligned on said aligning position, and the starting of the subsequent card removing operations is conjointly dependent on both start signal and an aligning signal, said start signal being conditioned by a consensus signal sent to the central processor unit in response to a signal indicating the passage of the card through said operative position.

9. The card feeding device of claim **8** wherein said motion imparting means comprises card-removing members in the form of a continuous belt.

10. The card feeding device of claim **8** which further includes along the path of the card apparatus for aligning a card comprising wall structure forming a card receiving channel having an upper guiding plate and a counter plate arranged at a mutual angle, and means adjacent one wall of said channel for moving a card contacted thereby toward an aligning member forming a wall of said channel, said angle being effective to cause the card on entering the channel to bend and thereby be pressed against said card moving means, and said channel being disposed such that a card at rest and in contact with said aligning member is out of contact with said card moving means.

11. The card feeding device of claim **10,** wherein said card moving means comprises continuously rotating alignment rollers having a portion of their periphery extending into said channel.

12. In a card feeding device for moving cards along a predetermined path, card aligning apparatus disposed along the path and comprising wall structure forming a card receiving channel having a lower guiding plate and a counter plate disposed substantially parallel to one another and in spaced relation, and an upper guiding plate arranged at a mutual angle with said counter plate and directed toward said counter plate, means adjacent said lower guiding plate and in spaced relation with said counter plate for moving a card contacted thereby toward an aligning member forming a wall of said channel, said angle being of a magnitude to direct a card against said counter plate, bending the card longitudinally and pressing the card against said card moving means, and said space between said card moving means and said counter plate being of a magnitude to provide an unobstructed area of said channel adjacent said counter plate whereby a card at rest and in contact with said aligning means is out of contact with said card moving means.

13. The device of claim **12,** wherein said card moving means comprises continuously rotating alignment rollers having a portion of their periphery extending into said channel.

* * * * *