A record card reading apparatus of the type wherein cards are transported from a supply hopper to a reading track, are read, and then transported to a receiving hopper, wherein the receiving hopper is located under the supply hopper, and wherein the cards are found in the receiving hopper in the same order as they were first stacked in the supply hopper.

12 Claims, 4 Drawing Figures
RECORD CARD READING APPARATUS

BACKGROUND OF THE INVENTION

The present invention relates to record card reading apparatus of the type provided with a transport mechanism which advances the cards in a direction parallel to their length, from a feed hopper out of which the cards are guided one-by-one, through a throat, onto a track, under a reading station transverse to the track, and into an output stacker located at a lower level than the feed hopper.

One card reader of this type has been described in the French Patent No. 1,363,473. Because the output stacker is disposed at a lower level than the supply hopper, the dimensions of such reader are smaller than those of most current readers. In the reader of such patent, the cards during transport change direction by turning 180° around a shaft parallel to their transverse edge. Although the cards are placed printed face down in the feed hopper, they fall into the output stacker printed face up, thereby requiring the insertion of each card arriving at the stacker under the accumulated preceding cards to prevent the cards being stacked in inverse order from that in which they were placed in the feed hopper. This manner of insertion may lead to jamming of the cards when the output stacker contains a large number of cards. This is because the upper cards of the stack exert a substantial pressure on the lower cards, which thereby oppose the insertion of a card. In order to remedy this disadvantage, it has been necessary to provide means for thrusting the stack upwardly to make a place for the cards which enter the output stacker, which substantially complicates the structure of the reader.

Therefore it is the object of the present invention to eliminate these disadvantages of the prior art readers of this type.

Another object of the invention is to provide a simple and less costly card reader, adapted to be more easily operated.

SUMMARY OF THE INVENTION

In accordance with the present invention, the card reader is arranged with the output stacker located below the feed hopper, and so that the cards emerging from the feed hopper arrive on the reading track by being transported along a feed track inclined to the horizontal. Each card leaving the feed hopper is transported first by a first driving apparatus and then by a second driving apparatus along the supply track and the reading track until the card has almost passed entirely by the reading station, and whereupon the card is arrested by a stop at the end of the reading track. Next, the card is transported in the opposite direction under the reading station by a third driving apparatus, at which time the reading of the card occurs. Finally, the card is conducted by the first driving apparatus still in the opposite direction, along the reading track where it arrives at the output stacker.

The card reader of the invention is characterized in that its size is considerably reduced. Because the output stacker is located below the supply hopper, the reader can also be operated very easily. Because of this, the reader of the invention is particularly appropriate for being used with a terminal set which is connected by a telephone or telegraph line to a central computer. The pulses delivered by the card reader, after possible conversion to a suitable code, can be transmitted to a telephone line connected to such computer.

BRIEF DESCRIPTION OF THE DRAWING

The invention will be described with reference to the accompanying drawing, wherein:

FIG. 1 is a perspective view of a terminal set equipped with a card reader realized in accordance with the present invention;
FIG. 2 is an end view of the card reader of the invention;
FIG. 3 is a schematic block diagram of the electronic control circuits of the reader of FIG. 2; and
FIG. 4 represents waveforms of signals which occur in the circuits of FIG. 3.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The terminal set shown in FIG. 1 is connected by a telephone or telegraph line to a central computer. A card reader LC, realized in accordance with the instant invention, is combined with a teletypewriter of a kind currently employed for terminals.

The teletypewriter is provided with a tape punch PB, a tape reader LB, a console having a control keyboard CC, and a printer IM. By means of keyboard CC it is possible, if necessary, to transmit information directly to the central computer. However, since such a transmission requires considerable time, it is preferable to couple keyboard CC to tape punch PB in order that the information can be stored first on a punched tape. Then, the transmission of the tape-stored information is controlled by means of reader LB, which provides for reading of the tape, and printer IM, which provides for printing of the transmitted message in accordance with the signal pulses received thereby.

After the transmission control terminates, the information is transmitted very rapidly to the central computer with the aid of the punched tape.

Card reader LC comprises a feed hopper 1, in which are placed the cards to be read, an output stacker 2, or receiving hopper, in which accumulate the cards that are rejected after reading, and a series of conspicuous push buttons 3, serving to command and control the operation of the card reader. Card reader LC is preferably mounted on a support-cabinet 4, which contains the necessary control circuits, as well as the connection elements for connecting the reader to the exterior.

Feed hopper 1 and output stacker 2 are superposed. Each side of the cards held in both of these hoppers is guided by a sidewall of the reader. The cards lie on an inclined base, not shown in FIG. 1, and are attracted by gravity toward an arresting wall.

A card-weight 5 is normally positioned on the stack of cards in feed hopper 1, thereby facilitating the extraction of the cards from the stack. The fourth side of each hopper may remain entirely open, providing complete accessibility to the cards contained in the hoppers and easy operation by a person situated in front of the console.

As shown in FIG. 2, two drive rollers 6 can be brought into contact with the lower card of the stack in feed hopper 1 through openings provided in the base of this hopper, thereby providing for transporting the card through the usual throat toward the reading track. For this purpose, the continuously turning rollers 6 can
be urged against the lower card in hopper 1, by means of an electromagnet M1.

A card emerging from hopper 1 by means of rollers 6 is picked up by a first driving apparatus which comprises a friction drive wheel 7, continuously turning, and an opposed friction pressure wheel 8.

A second friction pressure wheel 9 is located below drive wheel 7 and is adapted to be urged against drive wheel 7 by the action of an electromagnet M4, the purpose of which will be described hereinafter.

The card is transported by the first driving apparatus along a slanting feed track 10 toward the reading track 11, along which the reading station is denoted by the reference numeral 12.

A stop 13 is disposed at the end of reading track 11. The distance from reading station 12 to stop 13 is slightly less than the length of a card. Between reading station 12 and stop 13 there is located a second driving apparatus which comprises a friction drive wheel 14, continuously turning, and a friction pressure wheel 15, which is urged against drive wheel 14 by means of an electromagnet M2. A common motor 18 drives rollers 6 and wheels 7 and 14 in the same direction and at the same circumferential velocity by means of belts 19 and 20.

When a card leaves feed hopper 1 electromagnets M1 and M2 are energized, whereby the card is transported first by the first driving apparatus and then by the second driving apparatus along feed track 10 and reading track 11, and is finally arrested by stop 13. At this moment, the last column of the card viewed in the direction of motion is located opposite reading station 12. Since the cards are positioned in feed hopper 1 with printed faces down and cut corners toward the edge more distant from the track, this column opposite reading station 12 will be column 1 of the card.

A third driving apparatus is located immediately adjacent to reading station 12. This third driving apparatus comprises a friction drive wheel 16, adapted to be driven by a stepping motor 21, and a related friction pressure wheel 17, adapted to be urged against drive wheel 16 by means of an electromagnet M3.

Wheels 16 and 17 act on a longitudinal edge of the card. The direction of driving of wheel 16 is such that, after energization of electromagnet M3 and the arrival of appropriate pulses at stepping motor 21, the card is transported in a direction opposite to its prior motion.

A detection station, B, located immediately in front of stop 13, generates a signal at the time of passage of the leading edge of a card, whereby electromagnet M2 is de-energized. However, pressure wheel 15 is not entirely disengaged from drive wheel 14 but continuous to rest against wheel 14 with a slight resilient pressure, so that the card continues to be urged against stop 13 with a small force.

Next, electromagnet M3 is energized, wherupon the card is conducted step-by-step through reading station 12 in a direction opposite to its prior motion. During this step-by-step displacement, the card is read column-by-column. The card then passes under feed track 10 and is pushed between wheels 7 and 9. Following the complete reading of the card, its trailing edge passes reading station 12, which provides for the appearance of a signal that ends the energization of electromagnet M3 and initiates the energization of electromagnet M4.

The card, now held between wheels 7 and 9, is conducted toward output stacker 2 at a high velocity. The aforementioned signal corresponding to the trailing edge of the card also initiates at the same time the transport of a new card from hopper 1 toward feed track 10. During this transport, the new card slides partially along the card being ejected. A detection station A is provided immediately adjacent to the throat of feed hopper 1. Detection station A generates a signal which falls at the time of the passage of the leading edge of the card. If this signal occurs after a predetermined time delay, the card feeding is automatically interrupted by the control circuits.

Detection station B is located preferably a distance of a few millimeters from stop 13. Since the energization of electromagnet M2 ceases before a card reaches a stop 13, deterioration of the front edge of the card is prevented. When electromagnet M2 is de-energized, the card is driven in a slipping manner, so that it will only be pushed lightly against stop 13.

The control circuits will now be described with reference to FIG. 3. The transfer of information to the central computer takes place by means of a rotating electromechanical distributor RV. A rotating armature of distributor RV makes electrical connection in succession with ten contacts during each revolution. The ten contacts comprise a start segment SD, eight contacts of which each is coupled to output line TL through the moving contact of a respective one of coding relays CR, and a stop segment SA. The armature of distributor RV rotates continuously during the operation of the reader. When the reader is added to a teletypewriter, as shown in FIG. 1, distributor RV may be formed by the distributor already present in the teletypewriter. The moving contact of a validity relay VR is provided in output line TL, so that a signal transmission may only take place if relay VR is energized.

The control circuits receive supply voltage through a principal circuit breaker HS. Upon the closing of breaker HS, a rectifier GR commences operation. Rectifier GR furnishes the direct voltage necessary for supplying the control circuits, and a pilot lamp L1 lights at the same time. The reader may be controlled manually by means of three buttons; namely, a start button T1, a stop button T2, and an ejection button T3. By depressing button T1, the reader is started, whereas its operation is interrupted by depressing button T2. Depressing button T3 initiates the ejection of the card present under reading station 12.

The starting of the reader may also be initiated by a signal S1 and the stopping also by a signal S2, each of those two signals being provided by the central computer.

Lastly, this control may be effected by means of a combination of punch codes in a card. For example, if it is desired to read only a limited number of columns of a card, the punch code Ejection UC may be entered in the column following the last column to be read, wherein the punch code Ejection UC initiates ejection of the card. If it is desired to interrupt the operation of the reader after the reading of a certain card column, the punch code Stop SC may be entered in the following column, which punch code initiates the stopping of the reader.

Since the information is punched in the cards according to a 12-position code, whereas the transmission to the central computer takes place according to an 8-position code, reading station 12 is connected to a decoder-encoder CV. Thus, decoder-encoder CV is pro-
vided with eight output terminals for transmitting information, each of these eight output terminals being connected to a respective one of coding relays CR. Decoder-encoder CV is also provided with three output terminals for controlling the operation of the reader; namely, an output terminal UC, on which a signal appears when the punch code Ejection is read, an output terminal GK, on which a signal appears when all of the photo-electric cells of the reading station are illuminated as when there is no card under reading station 12, and an output terminal SC, on which a signal appears when the punch code Stop is read.

When the reader is started by the depression of button T1, or by the arrival of a signal S1, a flip-flop FF1 is set through an OR-gate O1. The setting of flip-flop FF1 causes the setting, in turn, of a flip-flop FF2, whereby principal motor 18 begins to turn. In addition, a pilot lamp L2 lights and rotating distributor RV is coupled to the voltage source G1. A flip-flop FF3 is set through an AND-gate E2 enabled by signal GK, which signal is present because there is not yet a card under reading station 12. The setting of flip-flop FF3 initiates the energization of electromagnets M1, M2 and M4. The energization of electromagnet M1 is provided by a monostable multivibrator (one-shot) T14, which generates a pulse of approximately 100ms duration. At the termination of this pulse, a differentiator D1 generates a signal which controls the card located at that time in the vicinity of detection station A. When electromagnet M1 is energized rollers 6 are urged against the lower card of the stack in feed hopper 1, whereby such lower card is transported toward reading track 11. Prior to the end of the period of energization of electromagnet M1, this card is picked up by the first driving apparatus, comprising wheels 7 and 8, and is conducted past reading station 12. After passing reading station 12 the card is picked up by the second driving apparatus, comprising wheels 14 and 15, and is conducted towards stop 13. When the leading edge of the card reaches detection station B, flip-flop FF3 is reset and terminates the energization of electromagnets M2 and M4. At the same time, a flip-flop FF4 is set and initiates the energization of electromagnet M3. The reading of the card now commences.

Flip-flop FF4 furnishes a signal to a first input terminal of an AND-gate E3. Now, when the armature of rotating distributor RV leaves stop segment SA, a differentiator D2 delivers a signal to the second input terminal of AND-gate E3, which thereupon delivers a signal to set a flip-flop FF5. The output signal of flip-flop FF5 energizes validity relay VR and is also applied to a first input terminal of an AND-gate E4 through a delay element R.

Output line TL is now coupled to distributor RV by the moving contact of relay VR, so that during the passage of the armature over the eight intermediate contacts signals are delivered to line TL in correspondence with the particular energized coding relays CR. When the armature again reaches stop segment SA, a differentiator D3 delivers a signal to the second input terminal of AND-gate E4. At this moment, delay element R is delivering an output signal, so that AND-gate E4 emits a pulse to stepping motor 21 through an OR-gate O5, thereby initiating the displacement of the card being read by one column. At the same time, flip-flop FF5 is reset as the signal from differentiator D3 passes through an OR-gate O4, whereupon relay VR is de-energized. When the armature of distributor RV again leaves segment SA, flip-flop FF5 is once again set, to enable the transmission of information from the next column of the card.

In this manner, the columns of a card are read one after the other and the information read is transmitted to the central computer. After the reading of the last card column the signal GK issues again, initiating the setting of flip-flop FF3 through AND-gate E2. The setting of flip-flop FF3 again initiates the energization of electromagnets M1, M2 and M4. The signal GK also resets flip-flop FF4, terminating the energization of electromagnet M3.

The above-described reading sequence is now repeated for the following card.

The operation of the reader is interrupted if button T2 is depressed, if a half signal S2 is received or if the punch code Stop SC is read. In each instance flip-flop FF1 is reset by passage of a respective signal through OR-gate O2, whereas the voltage supplied to distributor RV is removed. When the interruption of the operation takes place by the reading of the punch code Stop, a pulse is simultaneously delivered to stepping motor 21 through OR-gate O5. Thus, the card read is displaced to the next column and terminates the reading of the punch code Stop, which is necessary to permit the reader to start once again.

The operation of the reader must also be interrupted when, at the end of the energization period of electromagnet M1 there is no card present at detection station A. This signifies that feed hopper 1 is empty or that there is a throat jam. So long as there is no card at detection station A, a signal is supplied to one of the input terminals of AND-gate E1. The output signal of differentiator D1 is applied to the other input terminal of AND-gate E1. When the two input signals to AND-gate E1 arrive at the same time, a flip-flop FF1 is reset through OR-gate O2. At the same time flip-flop FF2 is reset following some delay through the intermediary of a one-shot T12 and a differentiator D4, whereupon principal motor 18 is halted and pilot lamp L3 lights. If button T3 is operated, or the punch code Ejection UC is read from a card, a flip-flop FF6 is set through OR-gate O3, thereby initiating the operation of a pulse generator G. Pulse generator G provides pulses at a recurrence frequency of 150 Hz, which pulses are applied to stepping motor 21. The card located under reading station 12 is thereupon displaced by stepping motor 21 at high velocity; i.e., at 150 steps per second, which may be contrasted with the reading velocity of a card of only 10 steps per second, during which each step is taken in synchronism with a revolution of distributor RV. Thus, during ejection, the card rapidly leaves reading station 12. When the card leaves reading station 12, the signal GK issues and resets flip-flop FF6, thereby removing the control voltage applied to generator G. At the same time, energization of electromagnet M3 is interrupted and electromagnets M1, M2 and M4 are energized. The card is then ejected by wheels 7 and 9, while the next card is fed by rollers 6 and wheels 7 and 8.

Waveforms appearing during the operation of the reader of FIGS. 1-3 are shown in FIG. 4. Waveforms M1, M2, M3 and M4 represent the intervals during which correspondingly identified electromagnets are energized. Waveforms A and B represent the output signals delivered by respective detection stations A and
B. Waveform D1 represents the output signal of differentiator D1, which signals during normal operation, must not coincide with the output signal delivered by detection station A. Waveform GK represents the signal GK delivered by decoder-encoder CV. Waveform SA represents the pulses delivered by stop segment SA of distributor RV. Waveform VR represents the intervals during which relay VR is energized. Waveform SM represents the pulses furnished to steering motor 21. When distributor RV makes ten revolutions per second, as is normal for teletypewriters, 10 card columns are read per second. Therefore 8 seconds are required in order to read 80 columns of the conventional punched card. The card requires about 300ms to reach stop 13 from feed hopper 1. Accordingly, the complete card cycle KC has a duration of approximately 9 seconds, if the entire card is to be read.

It is apparent that in the instance where only a limited number of columns need be read, this card cycle may be reduced considerably by the utilization of the aforementioned punch code for ejection. The same effect may be obtained by utilizing, for example, commutators which rotate under manual control and have 80 positions providing for the selection of zones desired to be read. In such instance, the card is displaced at high velocity in the zones located before, after, and between the selected zones.

The reading velocity may be increased within certain limits if the rotating distributor is replaced by an electronic pulse generator.

Finally, it is to be observed that the high velocity of the card (150 columns per second) which is present during the period when stepping motor 21 is driven by pulse generator G, corresponds, preferably, to the velocity of the card during its transport from feed hopper 1 to stop 13 and during its ejection by wheels 7 and 9.

What is claimed is:

1. A record card reading apparatus comprising: a feed hopper having a base for holding a stack of cards to be read, a reading station for reading a record card, a reading track extending under said reading station for guiding a card past said reading station, an output stacker disposed below said feed hopper for receiving cards after reading, a feed track inclined to the horizontal for guiding cards from said feed hopper to said reading track, first driving means for transporting a card emerging from said feed hopper along said feed track to said reading track, second driving means for transporting said card in a first direction along said reading track, and under said reading station, a stop disposed at one end of said reading track for arresting said card being transported along said reading track in said first direction immediately prior to its passing completely past said reading station, third driving means controlled for transporting said card in a second direction opposite to said first direction along said reading track and under said reading station after said card has reached said stop, means for controlling said reading station to read said card during transport by said third driving means, said first driving means transporting said card after the reading thereof in said second direction into said output stacker, continuously rotating drive rollers disposed below said feed hopper, means for moving said rollers through an opening in the base of said feed hopper and urging said rollers against the lower card of the stack in said feed hopper to drive said lower card from said feed hopper to said feed track and control means for energizing said first, second and third drive means and said means for moving said continuously rotating rollers.

2. The reading apparatus of claim 1, wherein said stop is disposed relative to said reading station such that the last column of said card viewed in the direction of said first direction of motion is located under said reading station when said card rests against said stop.

3. The reading apparatus of claim 1, wherein said first driving means is disposed between said feed hopper and said reading station and comprises a first friction drive wheel, continuously rotating, a first friction pressure wheel disposed above said drive wheel and cooperating with said first drive wheel to transport a card from said feed track to said reading track, a second friction pressure wheel disposed below said first drive wheel, and a first electromagnet for urging said second pressure wheel against said first drive wheel to transport a card from said reading track to said output stacker.

4. The reading apparatus of claim 3, wherein said second driving means is disposed between said reading station and said stop and comprises a second friction drive wheel, continuously rotating, a third friction pressure wheel, and a second electromagnet for urging said third pressure wheel against said second drive wheel, and wherein said third pressure wheel rests against said second drive wheel with only a slight resilient pressure when said second electromagnet is deenergized whereby a card between said third pressure and second drive wheels is urged against said stop with only a small force.

5. The reading apparatus of claim 4, wherein said third driving means is disposed proximate to said reading station and comprises a third friction drive wheel, in a stepping motor controlling rotation of said third drive wheel, a fourth friction pressure wheel, and a third electromagnet for urging said fourth pressure wheel against said third drive wheel, whereby said fourth pressure and third drive wheels act together on a longitudinal edge of a card.

6. The reading apparatus of claim 4, further comprising a second detection station is disposed proximate to said stop, and wherein an output signal is delivered by said second detection station during the passage thereby of the leading edge of a card and controls interruption of energization of said second electromagnet.

7. The reading apparatus of claim 4, further comprising means responsive to the passage of the trailing edge of a card under said reading station in said second direction for generating a signal to denote that the next card may be transported from said feed hopper to said reading track.

8. The reading apparatus of claim 5, further comprising means responsive to the reading of a punch code representing ejection in a card column by said reading station to activate a pulse generator to deliver relatively high frequency pulses to said stepping motor whereby said card is ejected at a high speed.

9. The reading apparatus of claim 1, further comprising means responsive to output signals delivered by said reading station to deliver an ejection-representing signal when said output signals represent information borne by said member denoting a premature ejection command, and means responsive to said ejection-
representing signal for controlling said third driving means to rapidly eject said member past said reading station.

10. A record card reading apparatus comprising: a feed hopper having a base for holding a stack of cards to be read, a reading station for reading a record card, a reading track extending under said reading station for guiding a card past said reading station, an output stacker disposed below said feed hopper for receiving cards after reading, a feed track inclined to the horizontal for guiding cards from said feed hopper to said reading track, first driving means disposed between said feed track to said reading track and including a first continuously rotating friction drive wheel, a first friction pressure wheel disposed above said drive wheel and cooperating with said first drive wheel to transport a card from said feed track to said reading track, a second friction pressure wheel disposed below said first drive wheel, and a first electromagnet for urging said second pressure wheel against said first drive wheel to transport a card from said reading track to said output stacker, a stop disposed to one end of said reading track for arresting a card transported along said reading track immediately prior to its passing completely past said reading station, second driving means located between said reading station and said stop for transporting said card in a first direction along said reading track and under said reading station including a second continuously rotating drive wheel, a third friction pressure wheel, and a second electromagnet for urging said third pressure wheel against said second drive wheel, said third pressure wheel resting against said second drive wheel with a slight resilient pressure when said second electromagnet is deenergized for urging said card disposed therebetween against said stop with only slight force, a third driving means disposed proximate said reading station for transporting a card in a second direction opposite to said first direction, along said reading track and under said reading station after said card has reached said stop including a third friction drive wheel, a stepping motor controlling rotation of said third drive wheel, a fourth friction pressure wheel and a third electromagnet for urging said fourth pressure wheel against said third drive wheel, said fourth pressure and third drive wheels acting together on a longitudinal edge of a card, means for controlling said reading station to read said card during transport by said third driving means, said first driving means transporting said card after the reading thereof in said second direction into said output stacker, other continuously rotating drive rollers and a fourth electromagnet for moving said rollers against the lower card of the stack in said feed hopper and urging said other rollers in said feed hopper, whereby the lower card is driven from said feed hopper to said feed track and control circuits for energizing said first, second, third and fourth electromagnets.

11. The reading apparatus of claim 10, further comprising a first detection station disposed proximate to the throat of said feed hopper, wherein an output signal is delivered by said first detection station to said control circuits to denote that a card has been transported from said feed hopper to said reading station within a predetermined interval, and wherein said reading apparatus is halted if said interval is exceeded.

12. A record card reading apparatus comprising: a feed hopper having a base for holding a stack of cards to be read, a reading station for reading a record card, a reading track extending under said reading station for guiding a card past said reading station, an output stacker disposed below said feed hopper for receiving cards after reading, a feed track inclined to the horizontal for guiding cards from said feed hopper to said reading track, first driving means disposed between said feed hopper and said read station for transporting a card emerging from said feed hopper along said feed track to said reading track and including a first continuously rotating friction drive wheel, a first friction pressure wheel disposed above said drive wheel and cooperating with said first drive wheel to transport a card from said feed track to said reading track, a second friction pressure wheel disposed below said first drive wheel, and a first electromagnet for urging said second pressure wheel against said first drive wheel to transport a card from said reading track to said output stacker, a stop disposed to one end of said reading track for arresting a card transported along said reading track immediately prior to its passing completely past said reading station, second driving means located between said reading station and said stop for transporting said card in a first direction along said reading track and under said reading station including a second continuously rotating drive wheel, a third friction pressure wheel, and a second electromagnet for urging said third pressure wheel against said second drive wheel, said third pressure wheel resting against said second drive wheel with a slight resilient pressure when said second electromagnet is deenergized for urging said card disposed therebetween against said stop with only slight force, a third driving means disposed proximate said reading station for transporting a card in a second direction opposite to said first direction, along said reading track and under said reading station after said card has reached said stop including a third friction drive wheel, a stepping motor controlling rotation of said third drive wheel, a fourth friction pressure wheel and a third electromagnet for urging said fourth pressure wheel against said third drive wheel, said fourth pressure and third drive wheels acting together on a longitudinal edge of a card, means for controlling said reading station to read said card during transport by said third driving means, said first driving means transporting said card after the reading thereof in said second direction into said output stacker, other continuously rotating drive rollers and a fourth electromagnet for moving said rollers against the lower card of the stack in said feed hopper and urging said other rollers in said feed hopper, whereby the lower card is driven from said feed hopper to said feed track and control circuits for energizing said first, second, third and fourth electromagnets.

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