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Mast et al.

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[54] DRIVE AND CONTROL MEANS FOR EDUCATIONAL DEVICES SUCH AS CARD READERS AND THE LIKE

[72] Inventors: **Gifford M. Mast; Lloyd E. Moeller,** both of Davenport, Iowa

[73] Assignee: **Mast Development Company,** Davenport, Iowa

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[52] **U.S. Cl.**.....**235/61.11 D,** 35/35 C, 74/89.22, 179/100.2 T, 192/48.1, 192/72, 274/4 J

[51] **Int. Cl.**.....**F16d 21/00,** G06k 7/00, G11b 5/00

[58] **Field of Search**.....235/61.11, 61.111–61.117, 235/61.6 E; 35/35 C; 178/6.8; 271/58–60; 250/219 LG; 274/4; 74/58, 89.22, 89.21, 89.2; 192/72, 48.1; 179/100.2 T

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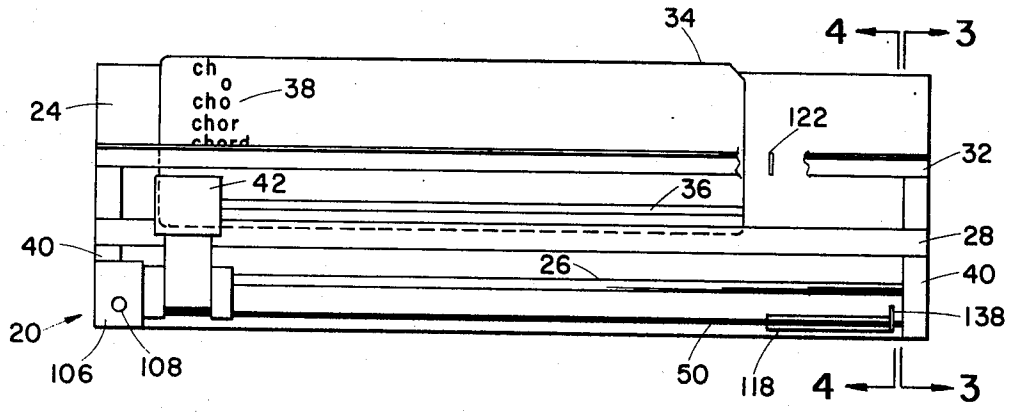
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Primary Examiner—Maynard R. Wilbur
Assistant Examiner—Thomas J. Sloyan
Attorney—Harold M. Knoth

[57] **ABSTRACT**

Drive and control mechanism of a reversible character for positively driving a "reading" head in advance and return phases so as to avoid the use of return springs, including, in particular, a transmission including a unitary inner- and outer-periphery wheel means and selective stops responsive to cards of different lengths.

8 Claims, 9 Drawing Figures



Patented May 23, 1972 3,665,163

2 Sheets-Sheet 1

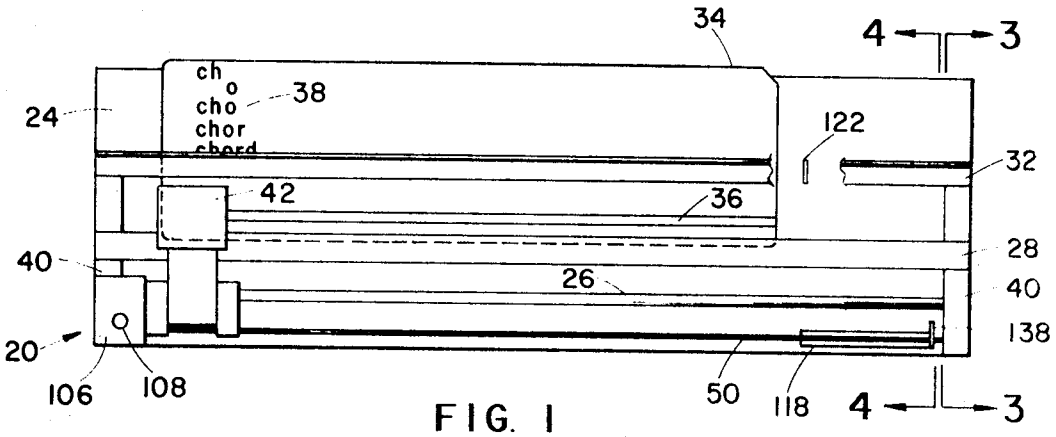


FIG. 1

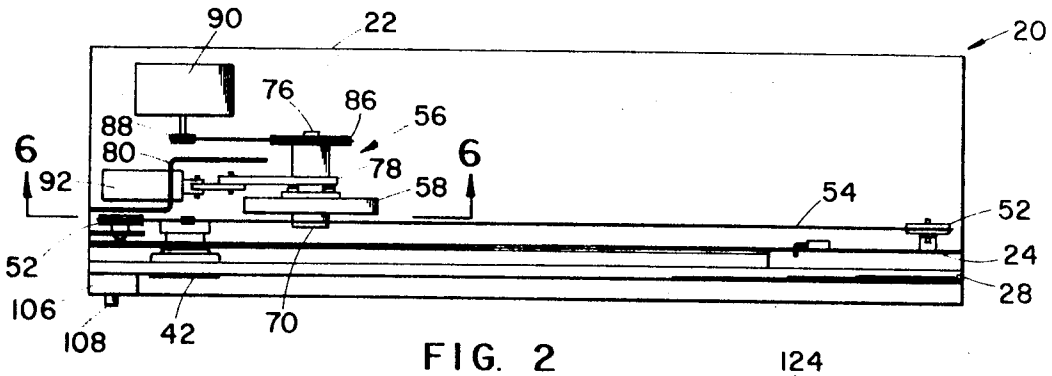


FIG. 2

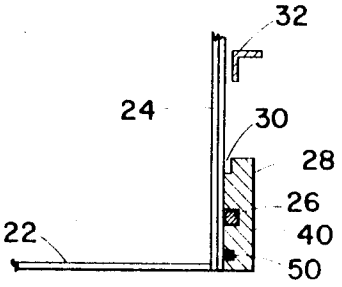


FIG. 3

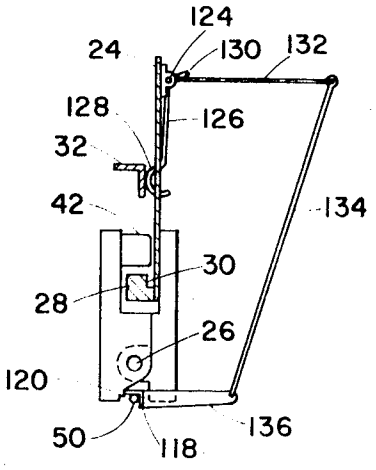


FIG. 4

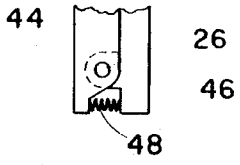


FIG. 5

INVENTORS
G. M. MAST
L. E. MOELLER

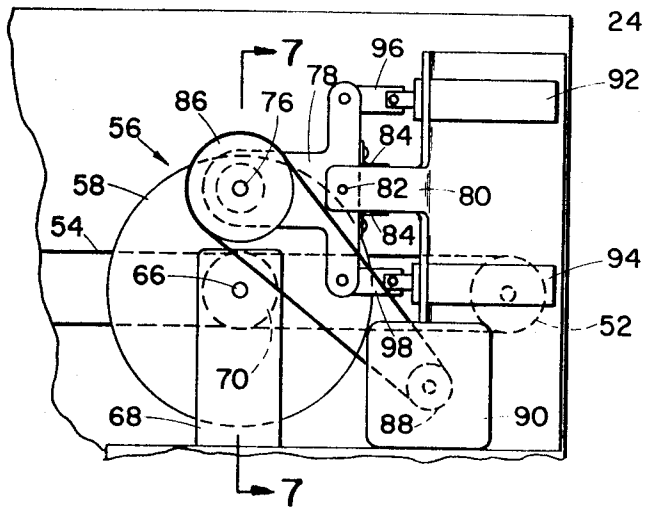


FIG. 6

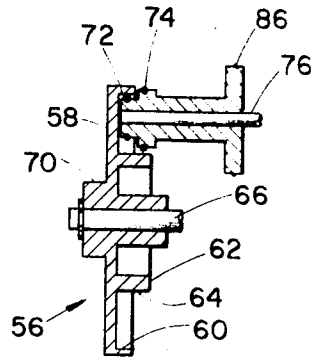


FIG. 7

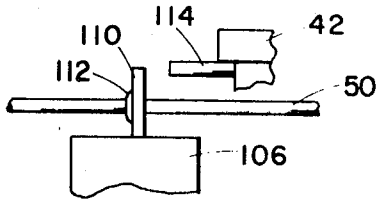


FIG. 8

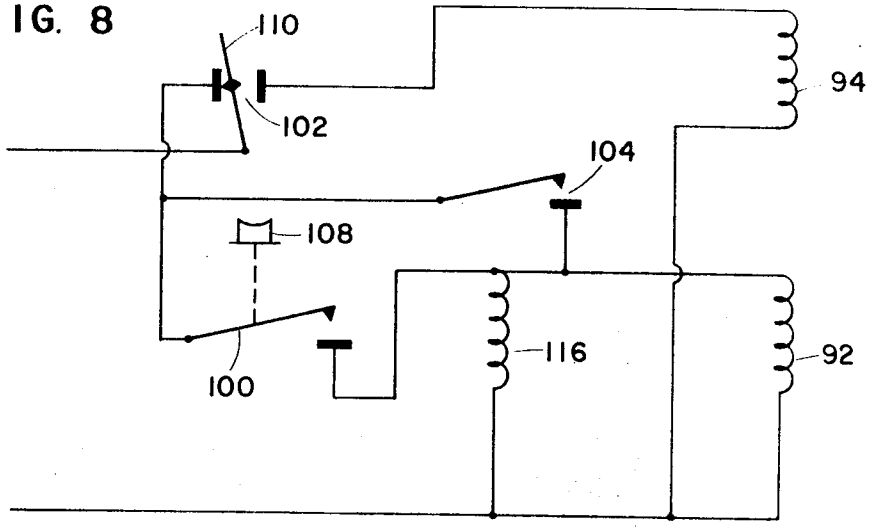


FIG. 9

INVENTORS
G. M. MAST
L. E. MOELLER

DRIVE AND CONTROL MEANS FOR EDUCATIONAL DEVICES SUCH AS CARD READERS AND THE LIKE

BACKGROUND OF THE INVENTION

Educational devices such as card readers are well known in which there is provided a support affording a linear path along which a "reader" such as a magnetic head travels along a card to inform the student both visually and audibly of the accepted pronunciation of words. Such a device normally includes a "-package" of electronic components by which the student may read words and at the same time may hear the accepted "audio" of the words by means of mechanism which advances and then returns the instructional card between starting and end positions. It is known of course to advance the head to a predetermined end position at which the head is automatically returned to "start" for a further advance of the same or different card. In the prior art, return has been accomplished by springs and the like, the disadvantage of which is that the head returns rapidly to "start" but accompanied by annoying and otherwise detrimental shock as the head "bounces" off the return stop. The prior art also suffers from the defect that the mechanism cannot accommodate teaching cards of different lengths.

SUMMARY OF THE INVENTION

According to the present invention, advance and return of the card-reading means is accomplished positively and without the use of springs, besides which the invention provides for the control of the mechanism by cards of varying length. To achieve the first purpose, there is provided a positive-drive transmission for advancing and returning the "reader" head; i.e., springs are eliminated by means of driving the head in both directions. Further, the transmission, besides being reversible, is also of a two-speed character so that advance is relatively slow while return is quite rapid. The reversibility is achieved by a unitary wheel means including inner and outer peripheral driven surfaces, the former providing a slow speed and the latter a comparatively fast speed, together with an input means selectively engageable with either periphery, according to the direction of travel. This is tied in with automatic means for achieving reversal and manual means for starting the reading.

The control includes selective stops according to cards of different length; that is, with a short card one stop is effective and with a longer card a second stop is brought into play, thus improving the versatility of the apparatus. In a preferred embodiment, these results are achieved electrically by solenoids and appropriate electrical circuit means.

DESCRIPTION OF THE DRAWINGS

FIG. **1** is a front elevation of the apparatus, with portions broken away.

FIG. **2** is a plan view of FIG. **1**.

FIG. **3** is a section on the line **3—3** of FIG. **1**.

FIG. **4** is a section on the line **4—4** of FIG. **1**.

FIG. **5** is a fragmentary view illustrating the head-to-card relationship.

FIG. **6** is an enlarged partial view as seen along the line **6—6** of FIG. **2**.

FIG. **7** is a partial section taken along the line **7—7** of FIG. **6**.

FIG. **8** is a fragmentary view of the return-advance stop means.

FIG. **9** is a schematic view of the electrical circuit employed.

DESCRIPTION OF A PREFERRED EMBODIMENT

The overall structure has been simplified in this disclosure to a considerable extent in the interests of brevity and clarity. A conventional educational device may take the general form of that shown, for example, in the U. S. Pat. to Mac Chesney, No. 2,603,006; i.e., there are mechanical, electrical, audio and aural components. Shown in the present disclosure is the basic mechanical improvement and considerable liberty has been taken by way of simplification.

The basic support is shown at **20** as comprising a bottom or base **22** and a generally upright plate-like front **24** and means providing a track, here a rod **26** defining a linear path. The front includes a lower strip **28** including a card-receiving slot or groove **30** and an upper bar or angle **32** spaced forwardly from the front **24** to enable a card **34** to be received between the front and bar and resting in the groove **30** so as to be visible from the front of the apparatus. The card typically bears a magnetic tape portion **36** as well as visible indicia **38**. The rod **26** is carried at opposite ends in blocks **40** and is preferably rigid; i.e., it neither rocks nor shifts lengthwise.

Mounted for movement to run lengthwise of the rod **26** is a "reading" head **42** that "reads" the tape **36** on the card **34**, as is conventional, being tied in with an acoustic device, not shown, to give the student both the audio (**36**) as well as the visual (**38**) effects of the system. These details are not elaborated, because they are well known. As shown best in FIGS. **4** and **5**, the head **42** is of the "pincer" type and may include any conventional cam means for disengaging the head from the tape **36** during return or retract movement. As an example, the head may include portions **44** and **46** that are spring-biased at **48** to assure proper head-to-tape relationship during advance; i.e., left to right as seen in FIGS. **1** and **2**.

As part of the control means, the blocks **40** carry a second rod-like element **50** that is not only parallel to the rod **26** but is also rockable and shiftable lengthwise in the blocks. This rod is part of the means that determines the status of the drive mechanism, as will be explained below. This means trips the drive and control means at the end condition so as to return the head or member **42** to its start position.

In a typical arrangement, the head, such as that shown at **42** here, has a starting position, best exemplified in FIGS. **1** and **2**, from which the member or head advances along and to "read" the tape **36** on the card **34**, after which the head returns to its starting position either to repeat on the card **34** or to "read" a subsequent card, the object being that the combination of audible and visual "read-outs" instructs the student. The problem to be solved by the present invention is to transport the member or head **42** back and forth between its starting and end conditions, besides which a further feature is to accommodate the transport to cards of different lengths, thus giving the end condition two or more phases or positions.

The transport of the head or member **42** is accomplished typically by a pair of sheaves **52** spaced along the track **26** and having trained thereabout a cable or wire **54** that is fixed to the head **42** in any suitable manner, from which it will be seen that if the wire or cable **54** is moved linearly in opposite directions, the head **42** will be similarly moved from left to right and vice versa from advance to end and return to start position or condition. In a typical prior-art construction, advance is accomplished by a positive drive and, when the end position is attained, the drive is released and a spring returns the head, such as **42** here, to start position, resulting in an undesirable shock and nuisance condition.

The foregoing disadvantages are eliminated here by a drive or transmission **56** that is reversible so as to drive positively in both forward and reverse conditions. Furthermore, the reversibility includes a rapid reverse and a relatively slower or normal advance. This is combined with selective stops so as to accommodate the foregoing with cards, as at **34**, of different lengths.

The transmission comprises a dual-wheel structure including a unitized drive having an outer wheel **58** of cup shape providing an annular inner periphery **60** (FIG. **7**) and a center or hub **62** on which is established an outer periphery **64**. The dual-wheel is journaled on a shaft **66** that is carried by a part **68** of the basic support **20**. Thus the dual-wheel **58/62** is rotatable about a fixed axis established by the shaft **66**. The hub **62** includes an integral and concentric sheave **70** about which several turns of the cable or wire **54** are wound. Thus,

rotation of the wheel 58/62 in opposite directions operates through the wire or cable 54 to advance and return the head 42; that is to say, rotation of the wheel means 58/62 in one direction advances the head and in the opposite direction reverses the head. Because the inner and outer peripheries 60 and 64 are of different diameters, the advance and return movements will be at different rates or speeds on account of the selective engagement of these peripheries by a driving wheel means selectively engageable with and disengageable from these peripheries.

The driving wheel means includes integrated concentric wheels 72 and 74, each preferably being "rubber-tired" to improve the frictional drive. The wheels 72 and 74 are here shown as being concentrically unitized and rotatable in unison on a shaft 76 carried by an arm 78 of "T" shape carried by a support part 80 for rocking about a pivot 82. It is clear that, when the wheel 72 is engaged with and frictionally drives the wheel 58, the head 42 advances at a certain speed, dependent upon the ratio between the drive and driven elements; and that, when the wheel 74 frictionally engages the wheel or hub 62, the head returns or reverses and at a different rate because of the ratio at 64/74.

As best seen in FIG. 7, the small driving wheel 72 projects within the cup-shaped driven wheel 58 and the larger driving wheel is peripherally engageable with the small driven wheel or hub 62. In a neutral condition, the carrier arm 78 is centered in such manner that the driving wheels 72 and 74 are free from engagement with their respective driven wheels 58 and 62. Any form of centering means may be used, that shown here comprising a pair of opposed leaf springs 84. The two wheels 72 and 74 are preferably integral with an input sheave 86 which is belt driven from a sheave 88 of a small electric motor 90 carried by the support 20. The motor is connected to any source of electrical potential and is continuously driven in the sense that, once started, it runs even through the drive means or transmission is in neutral, forward or reverse.

Control of the status of the transmission 56 is achieved by upper and lower actuating means, here solenoids 92 and 94 carried by the support part 80 and suitably linked at 96 and 98 to the upper and lower branches of the arm 78. The solenoids are selectively energizable to rock the arm 78 to effect engagement of the wheels 72 and 74 respectively with the driven wheels 58 and 62. Thus, when the upper solenoid retracts, the arm 78 rocks clockwise as seen in FIG. 6 and engages the small wheel 72 with the inner periphery of the cup-shaped wheel 58 to advance the head 42. Retraction of the lower solenoid rocks the arm 78 oppositely and effects a drive at 74–62 to return the head to its starting position.

The electrical control circuit is shown in FIG. 9 and includes a manual switch 100, a trip switch 102 and a "hold" switch 104, along with suitable connections to the solenoids 92 and 94 and to a source of electrical potential separate from that for the motor, preferably 28 volts D. C. At least the manual and trip or reversing switches may be housed in a box 106 from which projects a button 108 for the manual switch. Housing of the other components may take any form not material here. A switch arm 110 for the trip switch projects through the rear of the housing or box 106 and is engageable from one side by a stop or abutment 112 fixed to the shiftable control or trip rod 50. A pin 114 at the rear of the head 42 is engageable with the arm 110 from the opposite side.

Thus, with the head 42 in its start position, the switch 102 is closed to the left as seen in the drawings, and the switches 100 and 104 are open. The solenoids 92 and 94 are therefore not energized and the drive or transmission is in neutral while the motor 90, in its separate circuit, is running. To start the head to move to the right, the switch button 108 is depressed, and this energizes a "hold" solenoid 116 which closes the switch 104 to maintain effectiveness of the circuit even though the manual button 18 is released. So long as the switch 102 is closed to the left, the advance solenoid 92 will be energized to shift the drive or transmission into "forward" or advance so that the head 42 travels from left to right.

The rod 50, adjacent to its right hand end, carries a selective stop 118 which is engageable from the left by a projection 120 on the head 42 (FIG. 4) to shift the rod to the right enough to cause the rod abutment 112 (FIG. 8) to shift the switch arm 110 to the right, thus energizing the retract or reverse solenoid 94 so that the drive or transmission is reversed; that is, the drive is now via 74/62 instead of 72/58. When the head 42 returns fully to its start position, the head pin 114 switches the switch arm 110 again to its start position (FIGS. 8 and 9). Because the manual switch remains open until the button 108 is again depressed, the transmission remains in neutral as centered by the centering means or springs 84 (FIG. 6).

It is a feature of the invention that the reversing control includes an end condition at the right which has two stop or trip phases. This enables the use in the reader of cards of at least two different lengths. For example, the card 34 is a "short" card and tripping for reverse or retract is achieved when the head projection 120 strikes the left hand end of the stop bar 118. When such short card is used, there is exposed or uncovered at slot or opening 122 (FIG. 1) in the right hand end portion of the front wall 24. This wall carries at its rear a small rockshaft 124 (FIG. 4) to which is affixed a depending arm 126 having a terminal rounded end 128 that normally projects through the slot 122, but, because the card 34 is short, it remains free of the end 128. Any form of biasing means, such as a small torsion spring 130, may be used to bias the control arm 126 to its FIG. 4 position.

The arm 128 and rockshaft 124 include as an integral part thereof a rearward arm 132 which is linked at 134 to an arm 136 fixed to the stop bar 118 so that, when the end 128 of the arm 126 is pushed rearwardly, the bar 118 is rocked in a counterclockwise direction to clear it from engagement by the projection on the head 42 so that the head can continue a further distance to the right until it strikes a final stop 138 on the rod 50. In other words, the head 42 can "by-pass" the left hand edge of the stop bar (first phase) until it strikes the stop 138 (second phase). Depression of the end 128 of the trip arm 126 is automatically achieved when a card longer than the card 34 is used, because such longer card, interposed between the wall 24 and strip 32, will move the arm head 128 rearwardly to bring about the above second stop position or phase. Thus the invention features a positive drive in both directions (advance and retract) and a control or trip means that includes provision for at least two stops at the end of its advance movement so that media (cards) of different lengths can be used.

We claim:

1. A card reader or the like including a support having a track defining a linear path, means for carrying a card to lie along the path, a member guided by the track to move along the path and card between a starting condition and an end condition and return to the starting condition, drive and control means for advancing and returning the member from and back to its starting condition, characterized in that the drive and control means includes reversible two-speed drive mechanism operative respectively in relatively slow forward phases and relatively faster reverse phases for positively advancing and returning the member, said reversible mechanism including an integral unit comprising first and second concentric driven wheels of relatively large and small diameters, the first wheel being cup shaped and having an inside periphery and the second wheel being a hub having an outside periphery, and a driving wheel means selectively shiftable between and engageable with said peripheries for driving the first wheel via its inside periphery in a forward phase for advancing the member or the second wheel via its outside periphery in a reverse phase for returning the member, manual means for shifting the driving wheel means to engage said inner periphery so as to drive the drive mechanism in a forward phase to advance the member, trip means responsive to attainment by the member of its end condition for automatically shifting the driving wheel means to engage said outer periphery so as to reverse the drive mechanism to positively drive said member back to its starting condition, and deac-

tivating means responsive to attainment by the member of its starting condition for deactivating the drive mechanism until the manual means is again operated to energize said drive mechanism in a forward phase.

2. The invention defined in claim 1, further characterized in that the drive wheel means has a neutral status engageable with neither periphery.

3. The invention defined in claim 1, further characterized in that the drive wheel means includes first and second concentric drivers respectively engageable with the inner and outer peripheries.

4. A card reader or the like including a support having a track defining a linear path, means for carrying a card to lie along the path, a member guided by the track to move along the path and card between a starting condition and an end condition and return to the starting condition, and drive and control means for advancing and returning the member from and back to the starting condition, characterized in that the drive and control means includes reversible drive mechanism operative respectively in forward and reverse phases for positively advancing and returning the member, manual means for energizing the drive mechanism in its forward phase to advance the member, trip means responsive to the attainment by the member of its end condition for automatically reversing the drive mechanism to positively drive said member back to its starting condition, said trip means including a rod-like element parallel to the track and shiftable lengthwise of the track and having first and second member-engageable stops thereon spaced apart lengthwise thereof relatively closer to and more remote from the starting condition of the member, means responsive selectively to a short card for effectuating the first stop and to a longer card for effectuating the second stop, said support including an opening therein uncovered by a short card and covered by a long card, and the first stop includes a portion projecting through the opening and clear of a short card to incur effectiveness of the first stop means and displaced by a longer card to incur effectiveness of the second stop means, and deactivating means responsive to attainment by the member of its starting condition for deactivating the drive mechanism until the manual means is again operated to energize said drive mechanism in its forward phase.

5. The invention defined in claim 4, in which the rod-like element is also rockable and the first stop is carried by the element to be engaged by the member when a short card is used and is rockable out of the way of said member when a long card is used so that the second stop becomes effective.

6. A card reader or the like including a support having a track defining a linear path, means for carrying a card to lie along the path, a member guided by the track to move along the path and card between a starting condition and an end condition and return to the starting condition, and drive and control means for advancing and returning the member from and back to its starting condition, characterized in that the drive and control means includes reversible drive mechanism operative respectively in forward and reverse phases for positively advancing and returning the member, manual means for energizing the drive mechanism in its forward phase to advance the member, trip means responsive to attainment by the member of its end condition for automatically reversing the drive mechanism to positively drive said member back to its starting condition, and deactivating means responsive to attainment by the member of its starting condition for deactivating the drive mechanism until the manual means is again operated to energize said drive mechanism in its forward phase, said drive mechanism including a continuously running, unidirectional power means and a reversible transmission comprising wheel means connected to the member, said wheel means including a cup shaped, large-diameter driven part having an annular inner periphery and a concentric hub fixed to said part and having a small-diameter outer periphery, driving wheel means between and selectively engageable with either of said peripheries, carrier means movable on the support and carrying the wheel means, solenoid means for moving the carrier means in selective opposite directions for engaging the driving means selectively with said peripheries, and electrical switch and circuit means for selectively operating the solenoid means in response to the manual means, trip means and deactivating means.

7. The invention defined in claim 6, further characterized in that the carrier means has a neutral condition in which the driving wheel means is disengaged from both peripheries, and entering means is provided to achieve said neutral condition.

8. The invention defined in claim 7, further characterized in that the switch and circuit means includes a first switch operative by the manual means for energizing the solenoid means to engage the driving wheel means and inner periphery to advance the member, a second switch operative by the trip means to energize the solenoid means to engage the driving wheel means and outer periphery to return the member, and a third switch operative by return of the member to its starting position to deenergize the solenoid means.

* * * * *