

April 7, 1942.

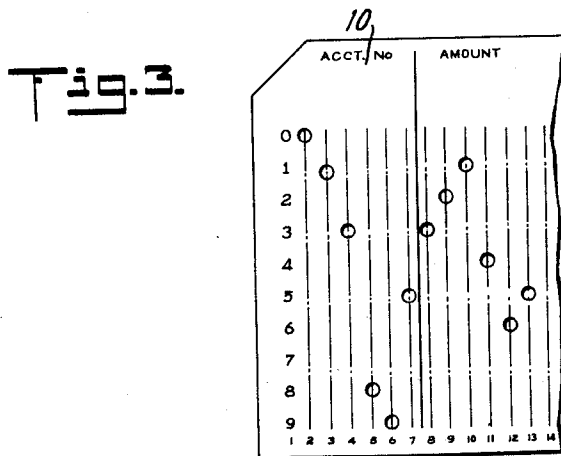
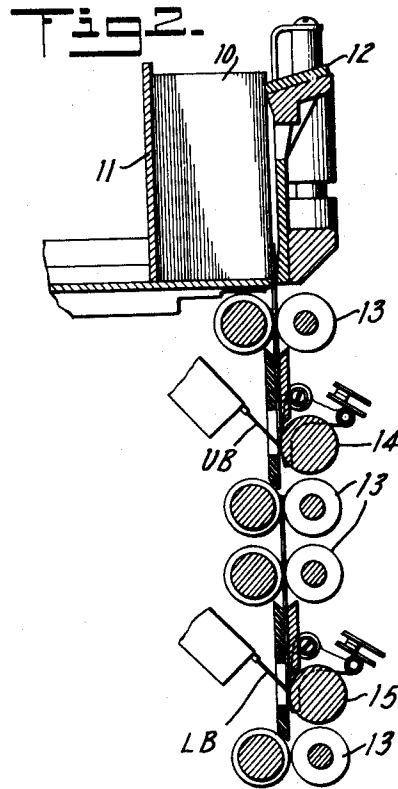
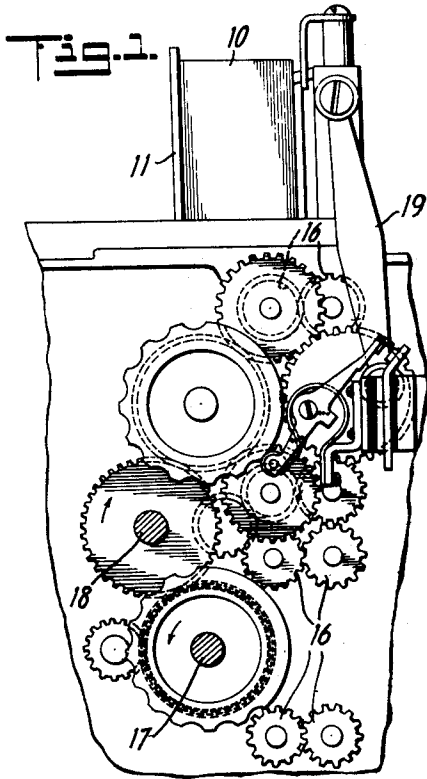
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2,278,993

RECORD CONTROLLED INDICATING MECHANISM

Filed Jan. 23, 1940

4 Sheets-Sheet 1



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4 Sheets-Sheet 2

Fig. 6.

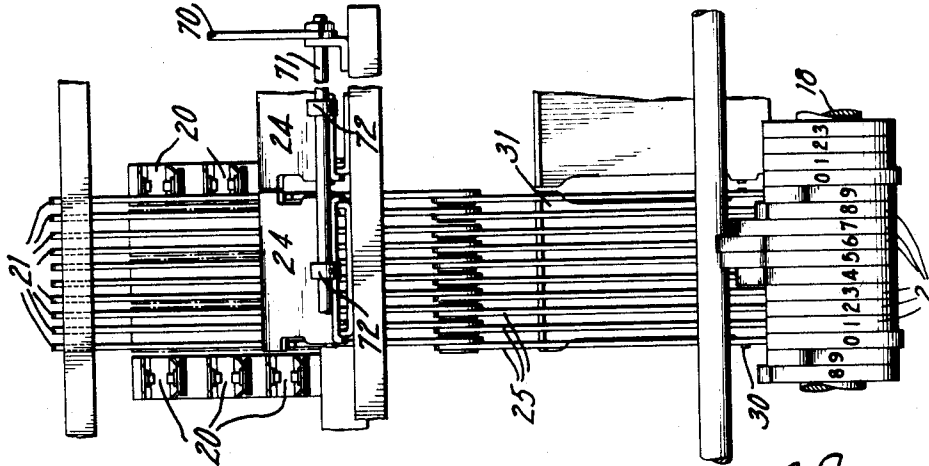


Fig. 5.

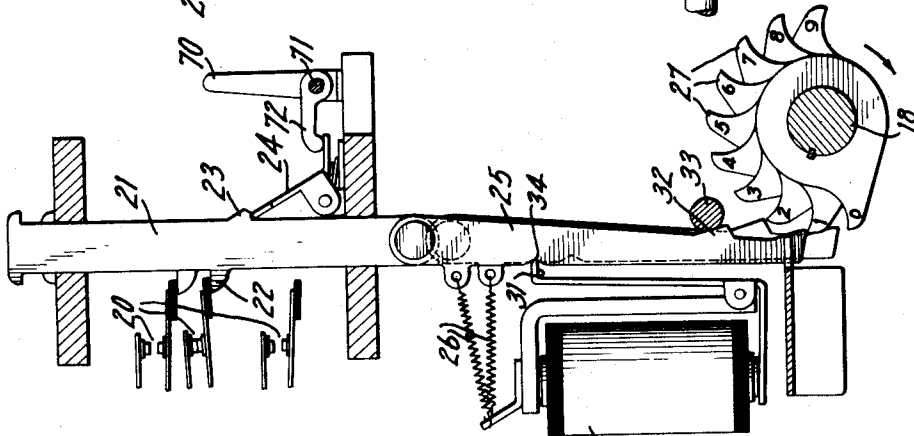
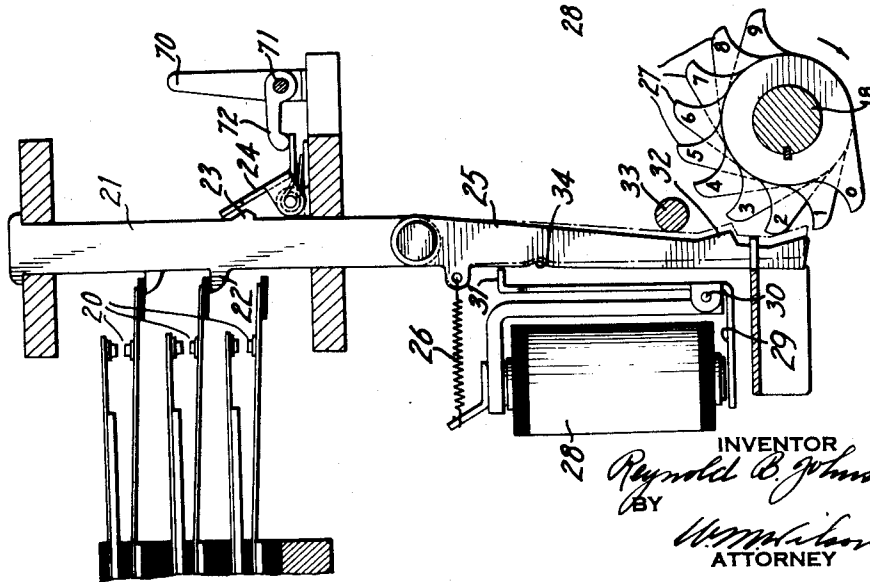


Fig. 4.



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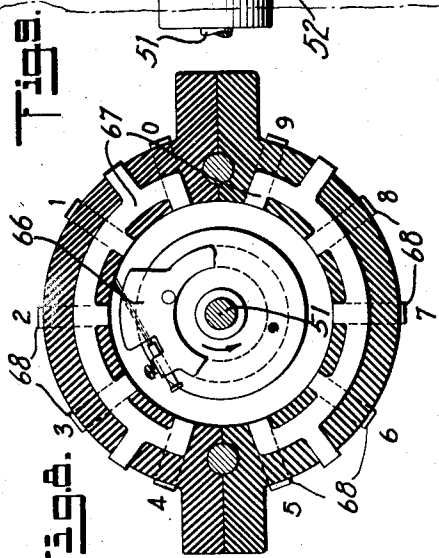
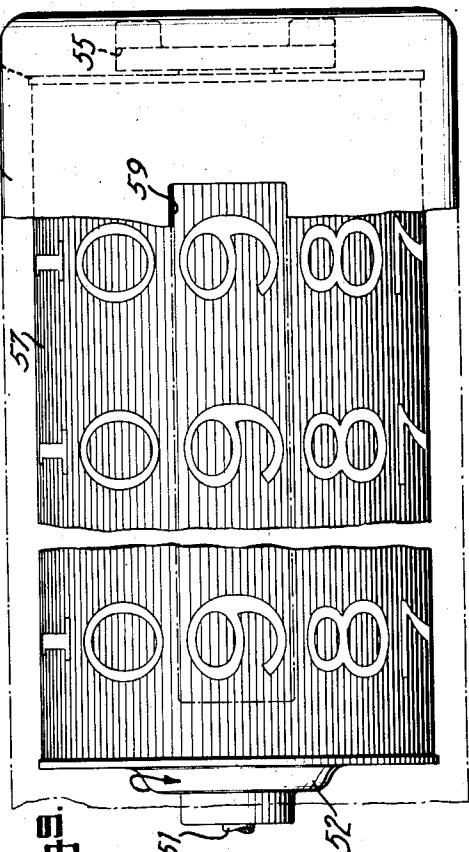
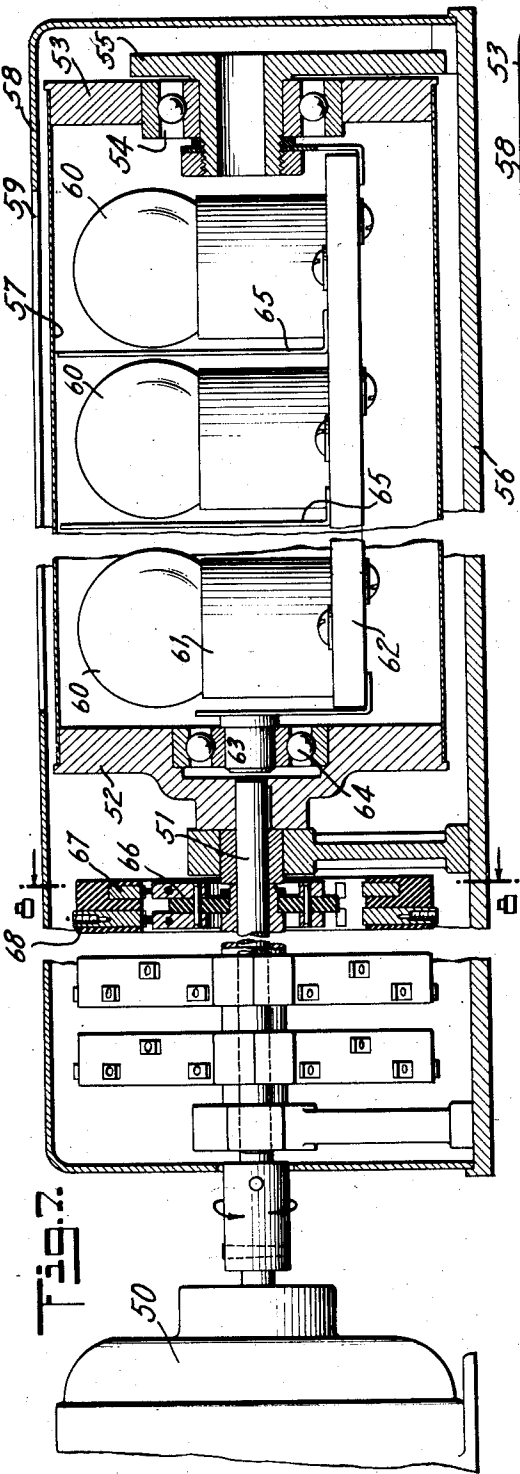
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4 Sheets-Sheet 3



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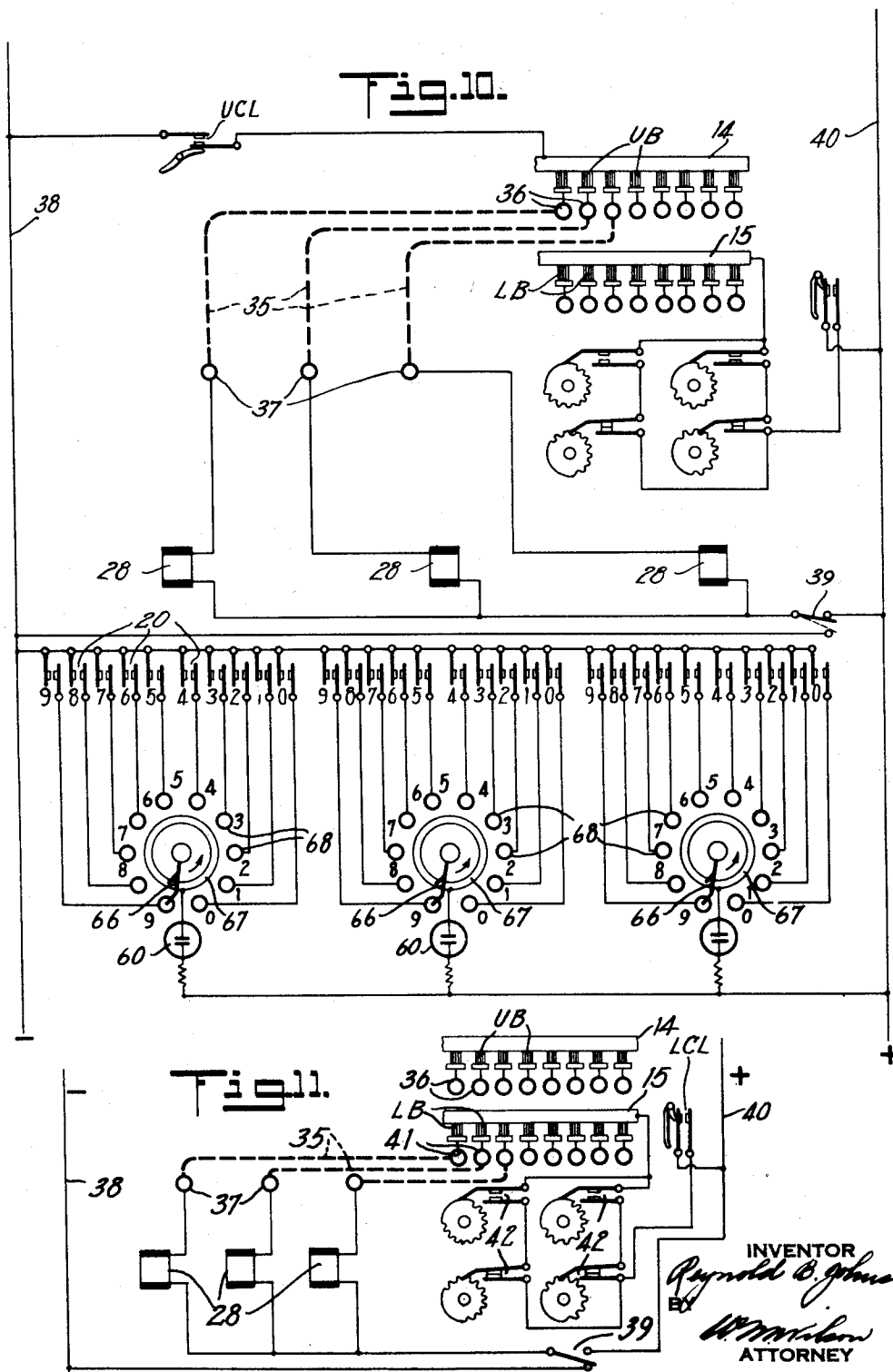
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RECORD CONTROLLED INDICATING MECHANISM

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4 Sheets-Sheet 4



UNITED STATES PATENT OFFICE

2,278,993

RECORD CONTROLLED INDICATING
MECHANISM

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Application January 23, 1940, Serial No. 315,176

2 Claims. (Cl. 177—337)

This invention relates to data indicating devices for record card controlled tabulating machines and more particularly to a device arranged in the form of an attachment for use with commercial machines.

An object of the invention is to provide a simple mechanism in the form of an independent unit which may be controlled by perforated record cards to give a visual indication of data values in successively advanced record cards.

A more specific object is to provide such a device in which the principles of a stroboscope are employed. The device comprises a set of digit representing contacts for each card column, which sets of contacts are settable under control of a card to represent the value of the perforations sensed as the card passes a sensing position in the tabulating machine. A drum is provided with openings about its periphery configured to represent the digits and, as the drum is rotated, the digits are presented in succession to a sight or reading line. A lamp within the drum is controlled by the contacts to repeatedly flash for the instant that any selected digit on the drum is at the reading line. With the speed of the drum greater than 16 revolutions a second, a repeated flashing of the lamp once for each time a digit is at the reading line, the selected digit will appear to be stationary and constantly illuminated due to the persistence of vision of an observer.

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

In the drawings:

Fig. 1 is a view showing the card feed drive gearing of a well known form of tabulating machine.

Fig. 2 is a sectional view through the card feed mechanism showing the successive sensing brush stations.

Fig. 3 is a fragment of a perforated record card

Fig. 4 is a detail of the contact device settable under control of the cards.

Fig. 5 is a similar view with parts in operated position.

Fig. 6 is an end view of Fig. 4 looking from the right hand side.

Fig. 7 is a central section through the stroboscopic device.

Fig. 8 is a detail section on line 8—8 of Fig. 7.

Fig. 9 is a plan view of the right half of Fig. 7, showing the arrangement of the digits about the drum.

Fig. 10 is a wiring diagram showing the circuit connections through which the device is associated with the reading brushes of the tabulating machine.

Fig. 11 is a part of the wiring diagram with different plug connections and switch setting.

The type of machine to which the present invention is applied is shown and described in detail in Patent No. 1,976,617 granted to C. D. Lake et al. on October 9, 1934. In the machine, record cards 10 such as shown in Fig. 3 control the operation of calculating which the machine performs. The cards are provided with data receiving columns in which digit representing perforations are made as indicated, the position occupied by the columnar perforation representing its value. Thus, in Fig. 3 the card is perforated to represent an "Account number" 01389 and an "Amount" 321465.

The cards are arranged in "Account number" groups and placed in a hopper 11 (Fig. 1) from which they are fed singly by a picker knife 12 to sets of feed rollers 13 which advance the cards past a set of upper sensing brushes UB and a set of lower sensing brushes LB. In each set there is provided a separate brush for each card column, which brush makes contact through a perforation with a common contact roller 14 for the upper set and a roller 15 for the lower set.

The ends of the rollers 13 carry gears 16 (Fig. 1) which are driven through the usual gearing as shown from a shaft 17 through a shaft 18. An eccentric link 19 causes reciprocation of the picker and the ratio of the gearing is such that shaft 18 makes one complete revolution for each card advanced past a set of brushes; that is, during one rotation of shaft 18 a card passes brushes LB and the following card passes brushes UB with the same index point positions on the cards being concurrently sensed by the two sets of brushes and in the order 9, 8, 7, 6, etc.

The operation of the card feeding mechanism may be interrupted in the usual way by automatic or manual means and when the devices come to rest, the relative positions of the cards are as shown in Fig. 2 with the leading margins between the brushes and contact rollers in readiness to sense the "9" hole positions upon resumption of feeding operations.

The arrangement and operation as thus far described are the same as in the patent referred to. The manner in which the invention is ap-

piled will now be explained. A plurality of contact setup devices shown in Figs. 4, 5 and 6 are provided, each of which has ten pairs of contacts 20 arranged in columns of three, there being one pair for each of the digits. Associated with each pair of contacts is a vertically slidable bar 21 with a ledge 22 positioned beneath the lower blade of its pair of contacts. Each bar 21 has a tooth 23 along a common line for cooperation with a spring urged and pivoted plate 24.

Pivoted to and depending from each bar 21 is a lever 25 normally held by a spring 26 in the full line position of Fig. 4. In line with each lever 25 there is a lifting arm 27 secured to a shaft which may be the shaft 18 of Fig. 1 or a shaft geared thereto with a 1:1 ratio. The arms 27 are positioned about the shaft in the form of a helix and spaced so that the leading edge of the first arm is just below the lower end of its related lever 25 at the time the corresponding index point position is at the sensing brushes. Specifically, when the "1" index point position is at the brushes, the arm 27 designated "1" is in the position shown in Fig. 4.

If the "1" position contains a perforation in the column sensed, a circuit is completed at the time of sensing to energize magnet 28 and cause rocking of armature 29 about its pivot 30. The armature 29 has an upstanding angle 31 integral therewith which extends across the levers 25 to rock them to the broken line position of Fig. 4. This brings all the lower ends of levers 25 into the circle of action of their related arms 27, and the "1" arm 27 will engage and raise its lever 25 to the position of Fig. 5. As a consequence, bar 21 is elevated to close contacts 20 and plate 24 snaps under tooth 23 to retain the bar and contacts in shifted position. In a similar manner, each of the arms 27 will raise its related lever 25 when the sensing of the related hole position causes magnet 28 to become energized. When a second bar 21 is elevated, the incidental rocking of plate 24 thereby will release any previously latched bar, so that the contacts assume the new setting and release the old.

Each lever 25 has a cam tooth 32 positioned to engage a fixed rod 33 as the lever is raised, to cause it to move out of engagement with its arm 27. This rocking of lever 25 through cam tooth 32 also acts against the angle 31 to restore armature 29 and permit springs 26 on the other levers to immediately retract them. A notch 34 in each lever 25 is in line with angle 31 when the lever is in its upper position, so that the lever does not interfere with the action of the angle in subsequently moving the other levers.

In Fig. 10 are shown the circuit connections for controlling three sets of contacts 20. Plug connections 35 are made between three selected sockets 36 of the upper brushes UB and sockets 37 wired to magnets 28. As a card passes the brushes UB, a circuit will be completed in each of the three columns at the time a hole arrives at the brushes. Such circuit is traceable from negative side of line 38, through the usual card lever contacts UCL (closed while a card is passing brushes UB), contact roller 14, hole in the card, brush UB, socket 36, plug connection 35, socket 37, magnet 28, switch 39 to positive line 40. If the hole encountered were in the "2" position, contacts 20 in the "2" position would be latched closed. If the next card passing the upper brushes contains a "5" hole, the same circuit will be completed when the "5" hole in this card is sensed, resulting in the opening of the "2" 75

contacts 20 and closure of the "5" contacts 20. It is understood, of course, that each of the three sets of contacts 20 shown is separately and independently set in accordance with the holes sensed by its connected brush UB.

Accordingly, upon any interruption of card feeding, there will be a contact setting which represents the number perforated in the card that passed the upper brushes UB just prior to the interruption of the feeding.

If it is desirable to have the contacts set in accordance with the value of the holes in the last card passing the lower brushes prior to interruption of feeding, the plug connections 35 are made between sockets 37 and sockets 41 of the lower brushes LB as shown in Fig. 11 and switch 39 is shifted to the position shown. With this change, the lower brushes control the contact setting with the circuits traceable from positive side of line 40, the usual lower card lever contacts LCL (closed while cards are passing the brushes LB), the usual circuit controlling contacts generally designated 42, contact roller 15, hole in the card, brush LB, socket 41, connection 35, socket 37, magnet 28, switch 39 to negative line 38.

Thus, the device may be conditioned to respond to either the upper or lower brushes to successively receive and retain the value of selected data on each card sensed, the setting for each card superseding that for the previous card and the setting for the last card sensed prior to interruption of card feeding being retained indefinitely.

Referring now to Figs. 7, 8 and 9, there is shown the indicating device by means of which the contact setting is visually displayed. A motor 50 drives a shaft 51 upon the end of which is keyed the head 52 of a drum or closed cylinder whose opposite head 53 is rotatable upon a bearing 54 on a standard 55 secured to base 56. Extending between the heads 52 and 53 is a sheet or film of opaque material 57 with translucent figures 0 to 9 spaced thereon in parallel lines. A casing or shield 58 encloses the drum and this shield has a longitudinal window 59 through which the film may be viewed. As the drum is rotated, the numbers 0, 1, 2, 3, etc. are caused to pass the window.

Within the drum and in line with each column of figures is a neon bulb or flash lamp 60 in a socket 61, all of which are carried by a frame 62, one end of which is supported by a pin 63 extending into a bearing 64 in head 52, and the other end of which is locked to the fixed standard 55, so that the lamps are stationary beneath window 59 while the figures move past the same. Partitions 65 on frame 62 separate the lamps.

For each ring of digits there is a brush structure 66 secured on shaft 51, which structure comprises two brushes, electrically connected with one another, one of which cooperates with a common segment 67 while the other contacts successively with individual segments 68. In Fig. 10 the brush structure 66 and the segments 67, 68 are shown diagrammatically. The relationship of the parts is such that, when the digits "0" are at window 59, brush 66 connects the common segment 67 with individual segment 68 designated "0"; when the digits "1" are at the window, the brush connects the common segment 67 with individual segment "1" and so on.

Motor 50 drives the drum at a rate exceeding 10 revolutions a second and through the commutator device 66, 67, 68 the flash lamp will be

momentarily illuminated each time a selected digit is at window 59. Repeated momentary illumination will cause the selected digit to appear stationary and constantly illuminated due to the persistence of vision of the observer.

The selection of what digits are to be rendered visible is controlled by the contacts 20 which, as shown in Fig. 10, are wired to the corresponding segments 68 so that, if, for example, the "9" contacts in any set are closed, a circuit will be completed each revolution of brush 66 at the time the "9" digit appears at window 59. This circuit is traceable from negative line 38, "9" contact 20, "9" segment 68, brush 66, segment 67, lamp 60 to positive line 40. During each revolution the other sets of contacts 20 will also complete circuits appropriate to the digits they are set to represent with the net result that the entire multiple digit number appears in window 59 and, after card feeding has been interrupted, this number will continue to be visible as long as motor 50 continues to operate or until all contacts 20 are opened. Provision is made for opening all the contacts 20 which comprises a lever 70 (Figs. 4, 5 and 6) secured to a rod 71 which has figures 72 overhanging the several latch plates 24. Rocking of lever 70 will simultaneously release all bars 21, so that all contacts 20 will open.

Motor 50 may be in operation continuously throughout card feeding operations and the account numbers on the successive cards will appear in succession in window 59. In this connection it may be pointed out that the cards are generally fed at the rate of 80 or 150 cards a minute depending upon whether the machine is "listing" or "accumulating" data from the cards. With a so-called 16 point cycle machine (in which a "point" is the interval between successive hole positions on a card) a hole position passes the brushes in about $\frac{1}{20}$ of a second for the 80 card per minute speed and in about $\frac{1}{40}$ of a second for the 150 card per minute speed. Thus, the shift in the setting of the contacts 20 is very rapid and results in only a slight flicker in the illuminated number as it passes from one number to another.

The device has great utility in the operation of tabulating equipment, especially in the type of accounting involving the posting of entries on ledger sheets. In such use, the cards are arranged in groups according to account numbers and the machine is adjusted to stop automatically when the last card of one group and the first card of the next following group have concurrently passed the lower and upper brushes, respectively. At the time of stopping, the window 59 will display the account number of the next group about to be fed past the lower brushes which control the adding and printing functions of the machine. This serves to inform the operator of the next account number and enables him to select from a file the proper ledger sheet and insert it in the printing section of the machine in readiness to receive thereon the data

contained in the cards of the next group when feeding is resumed.

A further feature of utility lies in the ability to continuously feed cards with the account numbers successively appearing in window 59, whereby the operator upon the appearance of sought-for cards can press the stop key and prepare the machine to receive data from any selected card or cards.

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

What is claimed is:

1. An indicating device comprising an opaque cylinder having a plurality of like rings of translucent characters about its periphery, said rings being arranged in parallel with corresponding characters in the several rings lying on a common line parallel to the axis of said cylinder, a stationary shield with a window therein, said window extending across all the rings of characters, a separate flash lamp for each ring, said lamps being located within the cylinder so that each lamp illuminates only its related ring of characters, means for rotating the cylinder at a rate of about sixteen revolutions a second so that in each ring the characters appear at the window in rapid succession, with corresponding characters in all rings appearing concurrently, a plurality of selectively settable devices, one for each ring and each settable in accordance with any character in its related ring, a timing device for each ring coordinated with said moving means and means controlled by said timing devices and said settable devices to cause the repeated flashing of each lamp when the selected characters in the related rings are at the common window whereby the several selected characters appear as a single stationary transilluminated line of characters forming a composite of all the characters.

2. In a machine of the class described, a plurality of pairs of contacts, a lever for each, operable to close the related pair of contacts, a constantly moving actuator for each lever, the separate actuators being arranged to effect operation of their levers in succession at different predetermined times in their movement, means for moving all the levers into engaging positions with respect to their actuators at any of said predetermined times, said movement rendering the one of the actuators whose time of effective operation coincides with the time of movement of the levers, effective to operate its related lever to close the related contacts, and means for moving the selected lever out of engaging position upon operation thereof.

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