

June 1, 1926.

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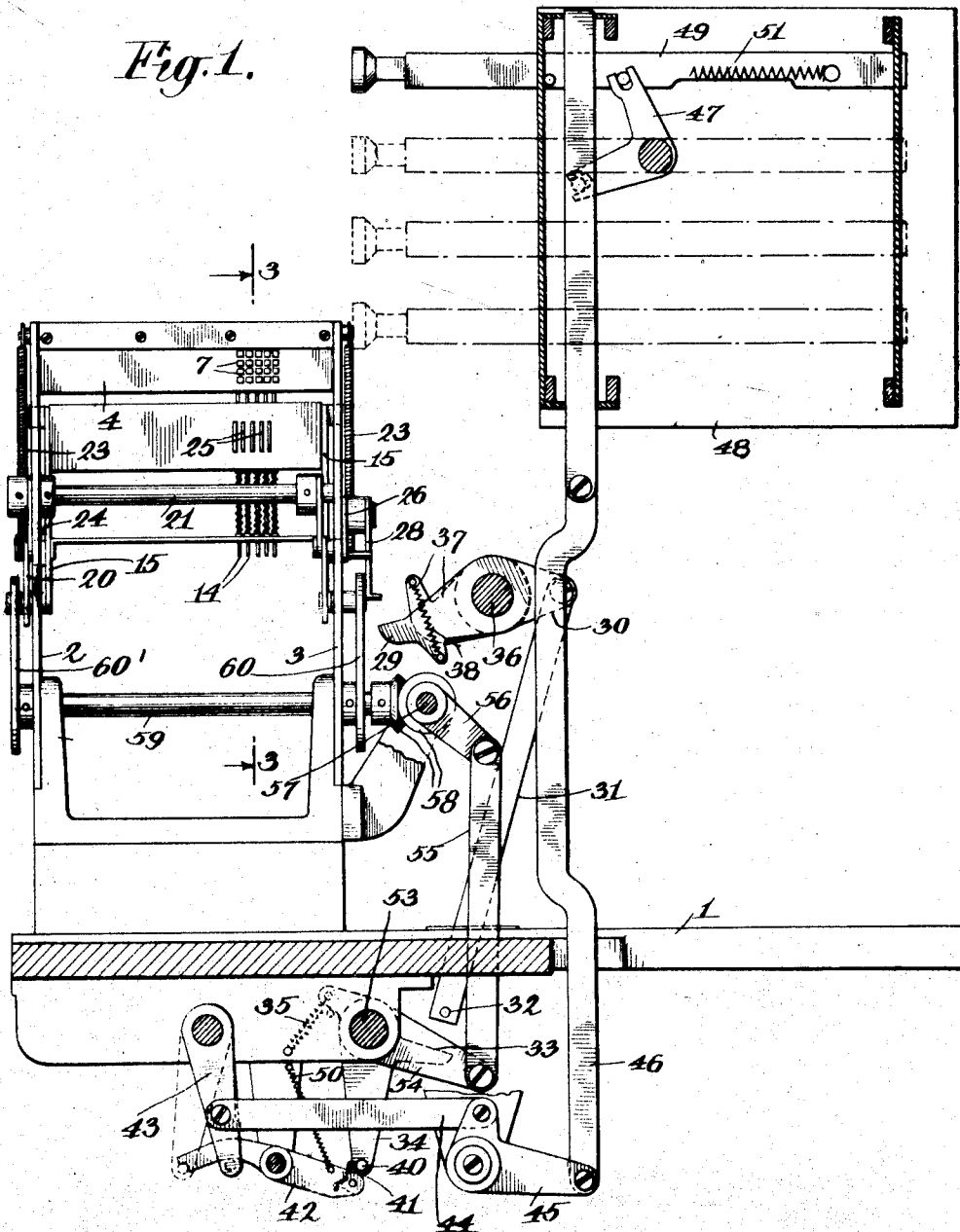
J. R. PEIRCE

CONTROLLING DEVICE FOR RECORD CONTROLLED MACHINES

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3 Sheets-Sheet 1

Fig. 1.



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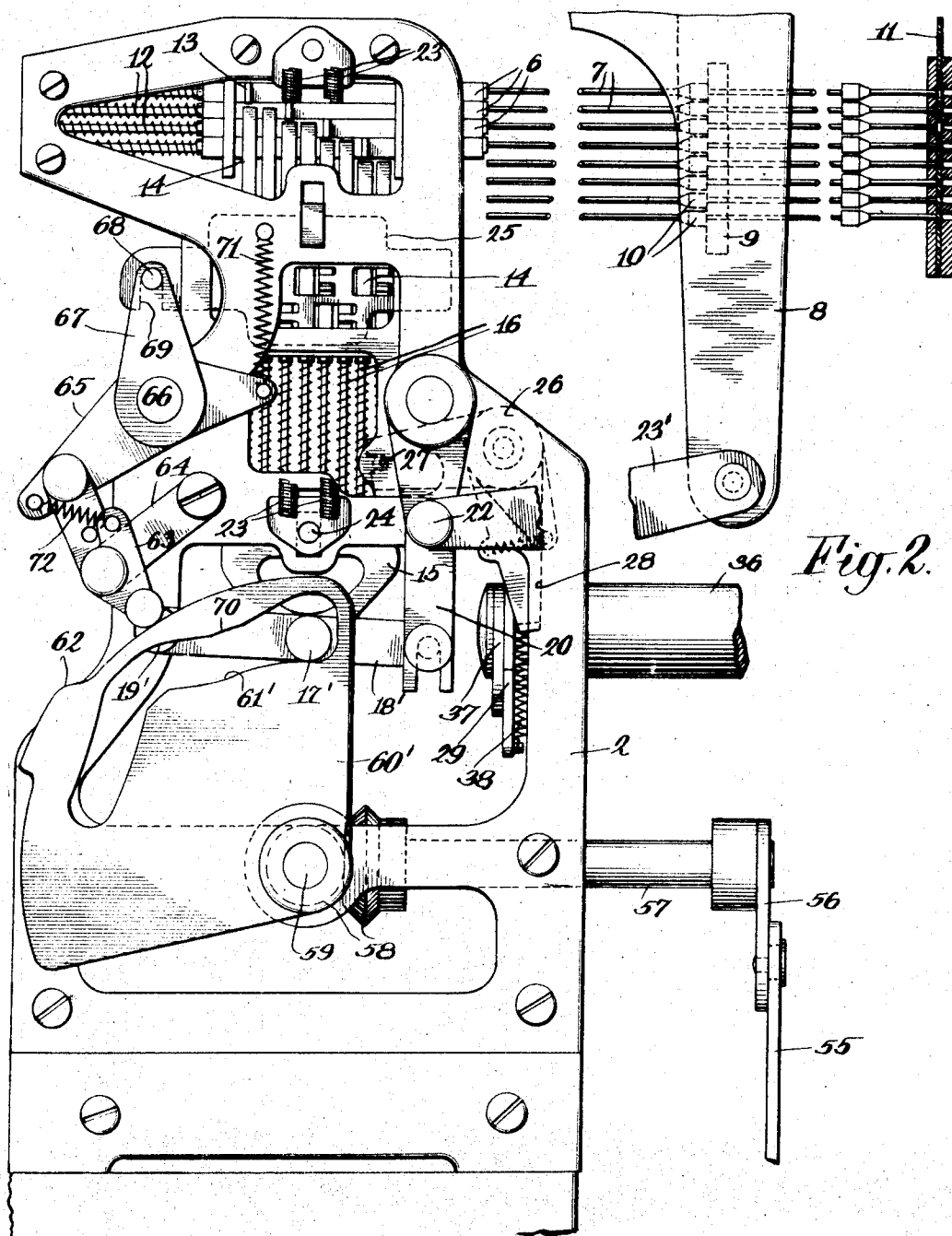
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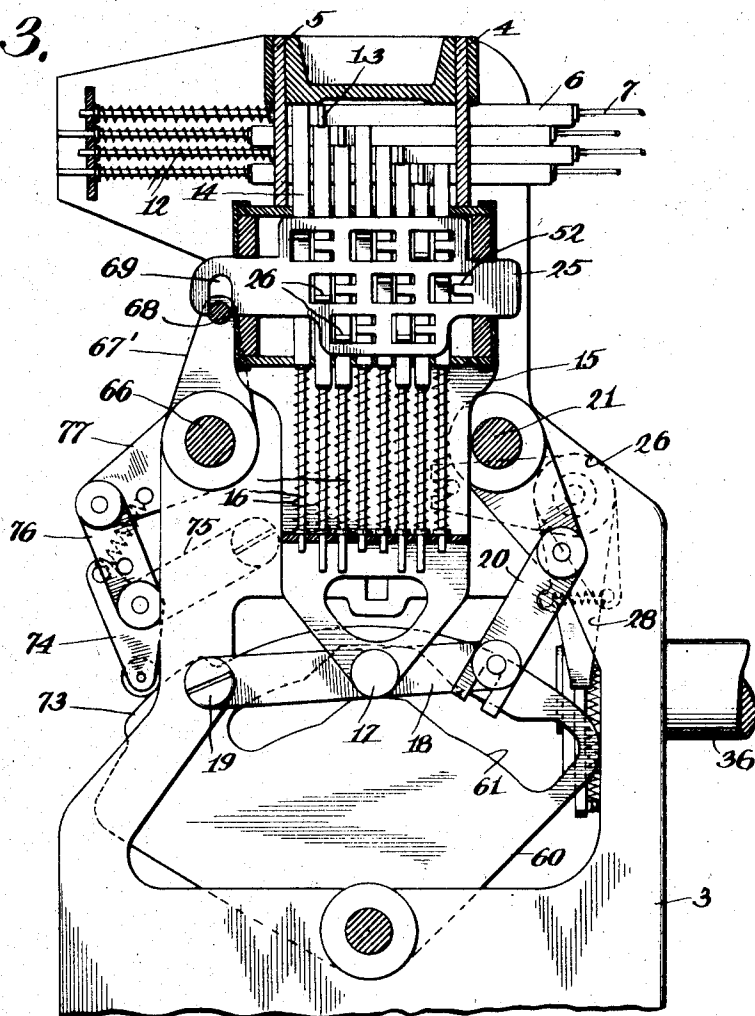
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CONTROLLING DEVICE FOR RECORD CONTROLLED MACHINES

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3 Sheets-Sheet 3

Fig. 3.



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UNITED STATES PATENT OFFICE.

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CONTROLLING DEVICE FOR RECORD-CONTROLLED MACHINES.

Application filed July 9, 1924. Serial No. 724,932.

This invention relates to control devices for perforated card-reading machines. In my copending application, Serial No. 682,365, filed December 24, 1923, for accounting machines, I showed a tabulating machine adapted to be controlled by perforated cards. In this machine, when the first card of a group is presented at the reading station the machine takes a reading of a control number. This number is locked into what is termed the finder. Thereafter, as long as the successive cards being read contain the same group number, the finder permits the machine to continue accumulating operations. When a card having a different group control number is presented at the sensing station the reading of such new group control number does not agree with the number locked into the finder, and the finder then controls the operation of certain parts of the machine, causing stoppage of the feeding of cards, and the setting up of the machine to take a total of the data that had been accumulated from the cards of the previous group.

The present invention relates to a finder adapted to operate in such a machine to control the machine when a change occurs in the card groups. In my aforesaid application the finder disclosed is what may be termed a double control finder, that is, it is adapted to take readings from two group control numbers, and when a change occurs in one number it caused the machine to perform certain totaling operations, and when a change occurred in the other group number it caused the machine to take a different kind of total. In the present invention the finder is adapted to read but one group control number, and to set up certain controlling elements when a change takes place in such control number.

Referring to the drawings, wherein I have shown what I now consider to be the preferred form of my invention:

Fig. 1 is a sectional side elevation of the finder with certain control buttons and connecting mechanisms.

Fig. 2 is a front elevation of the finder, taken from the left of Fig. 1, the control keys being omitted.

Fig. 3 is a section of the finder taken on line 3-3 of Fig. 1.

In the drawings, 1 represents the machine

base. 2 and 3 represent the front and rear frames, respectively, of the finder. Supported between the plates 2 and 3 are guide plates 4 and 5 for the rear, enlarged, square ends 6 of the sensing pins 7. In Fig. 2 a member 8 carries a plate 9, shown in dotted lines, having slots through which the pins 7 pass. Collars 10 are fixed to the pins 7 so that when the member 8 moves to the left in a manner more fully described in the said copending application, the pins 7 will be withdrawn from the card 11, while when the member 8 moves to the right to release the pins the latter will be pressed by springs 12. The square portions 6 of the feeler pins are provided with stop tabs 13. At right angles to the square members 6, and reaching downwardly, are certain locked pins 14, carried in a frame 15. The pins 14 are spring-pressed upwardly with respect to their frame 15 by springs 16. The frame 15 is attached at 17 and 17' to levers 18 and 18', and fulcrumed at 19 and 19' to the back frame 3 and front frame 2, respectively. The levers 18 and 18' have pin and slot connection to toggle devices 20, one of which toggle devices is connected at its intermediate point 22 by a link 23' attached to the member 8. Thus, when the member 8 rocks forward to permit the pins to take a reading, the toggles 20 are broken. This permits springs 23, attached at their lower ends to ears 24 on the frame 15, and at their upper ends to the frames 2 and 3, to raise the frame 15 with the pins 14. Some of these pins will now engage the stop tabs 13 and be prevented from rising.

Presuming the card being read to be the first card in the machine, the several pins 14 are locked against movement relative to their frame 15 by a locking plate 25 co-operating with tabs 26 on the pins 14, the plate in such instance being in a relatively left hand position, as shown in Fig. 2, the plate 25 being adapted to slide laterally in the frame 15, and being adapted to move up and down with said frame. The pins 14 being thus locked with respect to their frame 15, and some of them being prevented from rising, will prevent the frame 15 from rising. A bell crank, shown in dotted lines 26, has pin and slot connection at 27 with the frame 15 and a resilient connection with an arm 28. If the frame 15 rises, the arm 28 is rocked

clockwise as viewed in Figs. 2 and 3, into the path of the end 29 of a lever 30. This lever has connected thereto a downwardly extending link 31, having a pin 32 at its lower end, adapted when depressed to engage an arm 33 of a bell crank 34, held normally in the position of Fig. 1 by a spring 35. The lever 30 is loose on a shaft 36, which shaft has fixed thereto a lever 37 connected by a spring 38 to the lever 30. The shaft 36, according to my aforesaid application, is constantly rocking back and forth during the operation of the machine, so that when it turns in a clockwise direction, as viewed in Fig. 1, the link 31 will normally be depressed but when the carriage 15 rises and actuates the bell crank 26 the arm 28 will be moved to the position of Fig. 3 into the path of the end 29 and will prevent lever 30 from following the lever 37 and the link 31 will not be depressed.

If the lever 28 fails to move into the path of the end 29 of lever 30 then when the shaft 36 rocks in a clockwise direction, as viewed in Fig. 1, the lever 30 will take its full stroke, depressing link 31 so that the pin 32 will actuate the lever 34. The latter lever carries a pin 40 adapted to cooperate with a cam 41 on a lever 42, so that when pin 40 moves to the left, lever 42 will be turned clockwise about its pivot to unlatch a lever 43 to permit the latter to move from its dotted line position to its full line position. This lever is connected by a link 44 to a bell crank 45 which, in turn, is connected by a link 46 to a bell crank 47, pivoted to the frame 48, and also connected to the start key 49. It will be recognized that when the start key is pushed to the right it will, through the instrumentalities described, rock the lever 43 from its full line to its dotted line position. The latch lever 42 will be caused by its spring 50 to latch the lever 43 in this position. This causes the machine to operate for accumulating, according to my aforesaid application. When the lever 43 is unlatched, the spring 51, attached to the start key 49 and to the frame 48, turns the parts to their normal positions with the lever 43 in its full line position to stop the accumulating operations of the machine.

When the machine takes a reading of the first card the frame 15 is prevented from rising by reason of the locking plate 25 being in its normal left hand position with its stop members 52, cooperating with the tabs 26 to prevent movement of the pins 14 relative to the frame 15. These pins then cooperating with stop tabs 13 on the sensing pins will not be able to rise, so that the frame 15 will also be held down. The member 28 then will remain out of the path of the end 29 of lever 30, and said lever will be permitted to rock, depressing link 31, unlatching lever

43, and causing the machine to stop for a totaling operation. When the machine is put through its totaling operation, in the manner described in my aforesaid application, the shaft 53 (Fig. 1) is rocked in a counterclockwise direction and held in such position during the totaling operations. Fixed on this shaft is a lever 54 connected by a link 55 to the lever 56 and this on a shaft 57 connected through beveled gears 58 to a shaft 59. Fixed on shaft 59 are cams 60 and 60' having cam grooves 61 and 61' cooperating with the studs 17 and 17'. Thus when the machine is set up for totaling the cams 60 and 60' will be rocked clockwise approximately eighty degrees. During this rocking movement of the cam 60' the outer cam surface 62 is adapted to cooperate with a flipper 63 to rock lever 64 about its fulcrum and to rock a lever 65 fixed on shaft 66. This rocks lever 67, also fixed on said shaft, in a clockwise direction, and through a pin and slot connection the lever 67 is connected to a rod 68 passing through a slot 69 in the locking plates 25. Thus at the beginning of the movement of cam 60' the plates 25 will be moved to the right out of cooperation with tabs 26, thus unlocking the pins 14. When this unlocking takes place the portion 70 of cam 60' will be in cooperation with stud 17' and will have slightly depressed frame 15 to relieve tabs 26 and 52 of spring pressure friction. As soon as this unlocking takes place the cam groove 61' will raise stud 17' and also frame 15. This takes place when the machine is taking its next reading. This reading is, of course, of the same card that was read during the previous cycle which stopped the accumulating and card feeding operations of the machine. During this cycle the toggle 20 is broken again and it is at this time that the frame 15 is raised. In Fig. 3 some of the pins 7 are shown as having advanced to the right, passing through perforations in a card 11. The stop tab 13 of these particular pins will also advance to the right while the tabs 13 of the pins that did not advance to the right will remain in their normal positions. Some of the pins 14 will now rise and others will be stopped depending upon the positions of the several stop tabs 13. After this takes place the flipper 63 will ride down from the raised portion 62 of cam 60' and permit spring 71, attached to lever 65, to rock the latter and also lever 67 counterclockwise, moving the plates 25 to the left. This will lock the pins 14 in the position which they occupy in response to the reading of the card. During the remainder of the clockwise stroke of cam 60' a slot 61' depresses stud 17' and withdraws the frame 15 to its lower position. This in turn withdraws the pins 14 from their reading cooperation with stop tabs 13.

This completes the clockwise stroke of cam 60'. The parts remain in these positions until the completion of the totaling operations of the machine, after which, according to my aforesaid application, the shaft 53 (Fig. 1) rocks clockwise back to its normal position. This rocks the cams 60 and 60' counterclockwise back to their normal positions, as represented by the cam 60' in Fig. 2.

During this counterclockwise stroke of the cams 60 and 60' the outer cam surface 62 will strike the flipper 63 rocking the latter against the tension of its spring 72 so that it does not affect the positions of its associated parts. The cam surface 73 of cam 60, on the other hand, now cooperates with a flipper 74, raising lever 75 and through link 76 rocking lever 77 fixed on shaft 66. This then rocks levers 67 and 67', also fixed on shaft 66, in a clockwise direction. This moves the plates 25 to the right out of its locking position. While the raised cam portion 73 is riding under the flipper 74 the cam groove 61 raises the frame 15 during a reading operation of the pins 7. During the further movement of cam 60 the flipper 74 rides down from the cam surface 73 and the plates 25 are again moved to the left into locking relation with the pins 14. This again locks a reading into the pins 14 corresponding to the reading taken from the card which is still held in the reading position. The cams 60 and 60' then withdraw the frame 15 to its lower position with the pins 14 out of cooperation with stop tabs 13. The locked pins 14 now contain the reading of the card. This brings us to the end of the accumulating, setting stroke of the machine, after which the machine passes into its accumulating and listing cycles.

According to my aforesaid application the first of the accumulating cycles of the machine takes a reading from the card which is still standing in the sensing position. During this reading the frame 15 rises with pins 14 and since the reading locked in the pins 14 corresponds to the card at the sensing position the frame 15 is permitted to rise. Member 28 rocks into the path of lever 30 and prevents stoppage of the card feed and accumulating operations. This operation now takes place for each succeeding card as long as the readings of such cards correspond to the reading of the first card which is represented in the locked pins 14. As soon as a card is presented at the sensing station containing a group control reading which differs from that of the first card, and from the locked-in reading of pins 14, one or more of the sensing pins 7, which had previously been advancing, will be held back and one or more of the said pins which had been held back may now advance to take a reading. In other words, the position of one or more of the stop tabs 13 differs from

its previous position when the locked pins rise, so that whereas such tab had been out of the path of the pins 14 on either side thereof, it will now be in the path of one of such pins and that one of such pins having previously been permitted to rise now engages such tab, and being thus prevented from rising also prevents frame 15 from rising, being locked to the frame as we have seen. This failure of frame 15 to rise holds the member 28 out of the path of lever 30 and the card feeding and accumulating operations of the machine are stopped so that the machine may then be put through totaling operations, during which the finder unit will operate in the manner already described to unlock the old reading and lock in the new reading before proceeding with the next group of cards. It is to be understood that there is a separate set of pins 14 such as shown in Figs. 2 and 3 and also a separate locking plate 25 for each column on the card included in the group number field. Thus, in Fig. 1, I have shown five of the plates 25 and also five sets of pins 14 and five sets of reading pins 7.

It will be recognized that the pins 14 are locked with respect to a new reading at the beginning of the totaling operations, and unlocked and relocked again at the end of such totaling operations. The reason for the first of these locking operations is to give to the locked ends a reading corresponding to the card which is to be held in the sensing position throughout the totaling operations, so that the lever 43 (Fig. 1) after it has been set for the totaling operations will not be released by a disagreement between the finder and the reading in the card, it being understood that throughout the totaling operations the pins 7 take a reading of the card that happens to be in the sensing position for every cycle of operation of the machine. The reason for unlocking the reading in the locked pins 14 at the end of the totaling operations and then relocking it is to provide for the possibility of a jamming of the parts in the event that the card in the sensing position, which, as is understood, is the first card of a new group, should be removed by the operator and the machine put through certain operations.

Having described my invention what I claim and desire to secure by Letters Patent is:

1. In a group number change finder for card-controlled machines, a perforation sensing pin, a locked pin adapted to cooperate with said sensing pin, a frame supporting said locked pin, means for locking said locked pin with respect to said frame in accordance with a reading taken by said sensing pin, and means controlled by said frame for controlling the operation of the machine.

2. In a group control device for card-controlled machines, perforation sensing elements, means cooperating with said elements and adapted to be locked in accordance with a reading taken by said elements for causing a change in the operation of the machine when such of the locked-in reading of such members disagrees with the reading of said pins, a means for locking said members, said means being adapted to unlock and relock said members after predetermined operations of the machine.

3. In a group control device for card-controlled machines, a perforation sensing pin, a locked pin adapted to be moved relatively to said sensing pin, means for locking said locked pin in the position to which it moves with respect to said sensing pin, and means controlled by said locked pin for causing a change in the operation of the machine when said sensing pin takes a different reading.

4. In a control device for card-controlled machines, perforation sensing elements, means for controlling said elements, means movable in response to operation of said control means, a member adapted to be actuated in response to said movable means for controlling the operation of the machine, and means for preventing such movement of said member upon a change in the reading taken by said sensing element.

5. In a control device for record-controlled machines, record reading elements, a frame, pins supported by said frame, means for locking said pins relatively to said frame in

accordance with a reading taken by said reading elements, yieldable means for moving said frame, a control member actuated by movement of said frame, said pins being adapted to prevent movement of said frame when the locked condition of said pins bears other than a predetermined relation to a reading being taken by said elements.

6. In a control device for record-controlled machines, a constantly oscillating member, means resiliently connected to said member to be actuated thereby, said means being adapted when actuated to stop the machine, a record-sensing element, and means associated with said element adapted when said element takes a changed reading from a record for preventing actuation of said first mentioned means.

7. In a control device for record-controlled machines, a record-reading element, means for taking a reading from said element, a movable member carrying said means, a locking member for locking said means to said movable member in accordance with the reading taken from said elements, the movement of said movable member being controlled by the relative value of the locked reading in said means and a reading taken by said element, and said movable means being adapted to control the operation of a machine.

In testimony whereof I hereto affix my signature.

JOHN ROYDEN PEIRCE.