

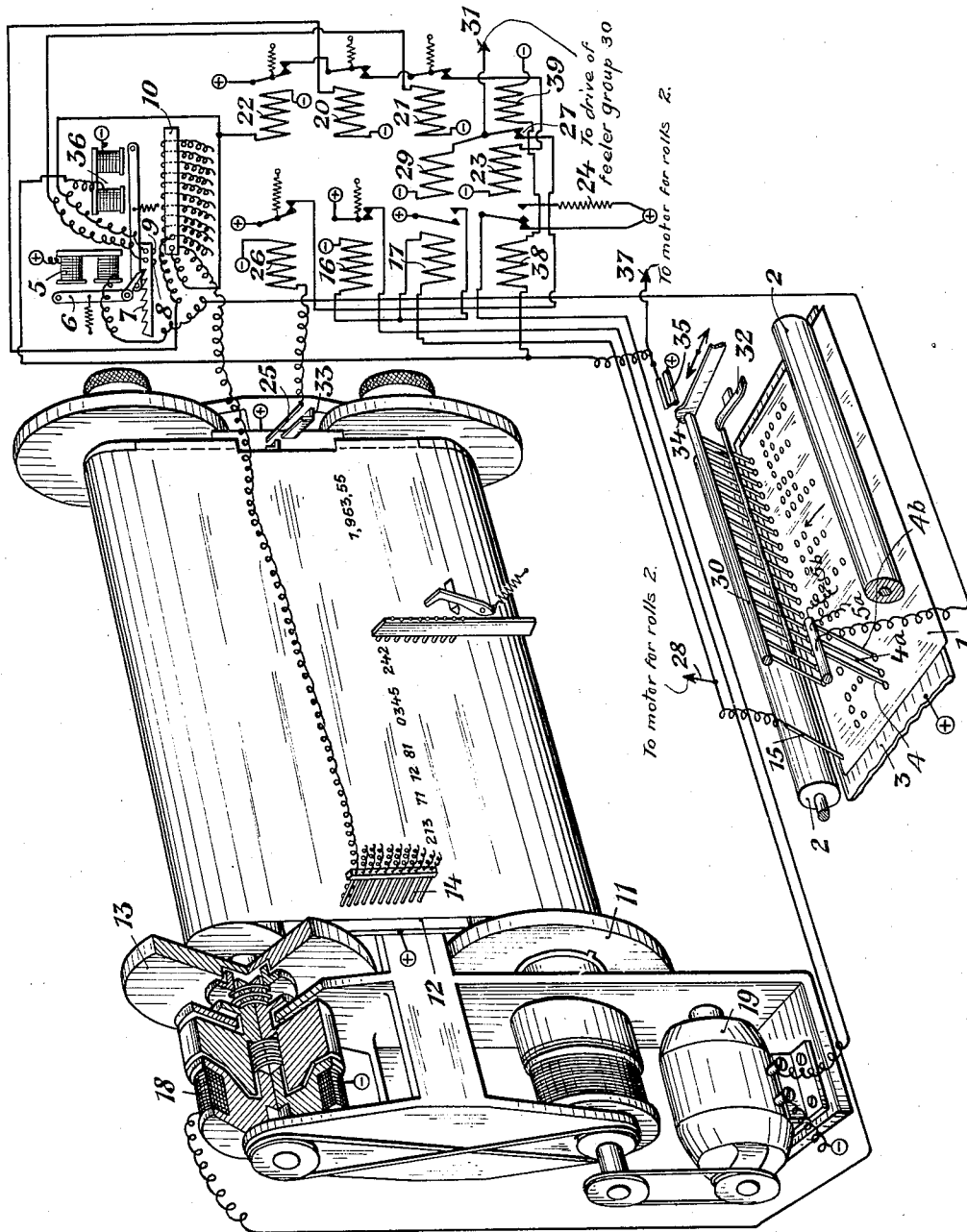
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PERFORATED CARD BOOKKEEPING MACHINE

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PERFORATED CARD-BOOKKEEPING
MACHINE

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My invention relates to machines such as tabulating machines and the like for calculatively interpreting the values represented by the holes of perforated cards. More particularly the invention relates to machines of the kind which automatically perform bookkeeping operations. The term "bookkeeping operations" is, in this specification to be understood as the distribution and the entry of single items or unrelated entries of different accounts. A perforated card, for instance, serves the purpose of representing each particular item, whereas the accounts are represented on a long strip or web, which is moved past the printing device of the machine, each section representing an account and being characterized by a special hole symbol representing a classification.

In the operation of the machine, as soon as a perforated card is in the position for interpretation, the machine, according to the invention, operates to move the paper strip until the account in which the item or value represented by the particular card is to be entered occupies a printing position opposite the printing device of the machine. This is effected by special controlling members which arrest the paper strip as soon as the characterizing or classification perforation of a web section corresponds to the classification perforation of the card to be interpreted.

In the accompanying drawing one form of mechanism for carrying out the intended objects is shown diagrammatically and in perspective and since the accumulating and printing mechanisms do not form any part of the present invention, they are not shown in detail but it is intended that they be incorporated in the usual manner in connection with tabulating machines. For the purpose of the invention it is also immaterial what kind of hole symbols are used for representing the number or values on the cards and whether the cards are sensed electrically, mechanically or pneumatically. The mechanisms of the present invention can be adapted to any of the sensing or probing methods in question.

The construction shown by way of example operates as follows: A perforated card 1 is passed by means of a feeding roller 2 to an electric current conducting surface 3 thereby opening the contact between a feeler 4 and the surface 3. On further movement of the card this feeler, however, enters the holes in a column of the card which symbolize the action upon which the booking is to be carried out. With the feeler 4 is associated a magnet 5 which, when the feeler

passes through a hole of the card representing a classification is energized and attracts its armature 6 which advances, by means of a pawl, a rack 7 for a distance of one tooth space. Two contact terminals 8 and 9 fixed to the rack 7 are thereby brought into a position in which they are opposite contact terminals fixed upon a stationary bar 10, the terminals 8 and 9 contacting terminals on the bar 10 which are determined by the number of classification perforations engaged by the feeler 4. The ten contacts of the bar 10 are connected in such order to feelers 14 so that the first contact on the left in the figure (or the tenth from the right) is in connection with the second feeler (from the top) and the 10th contact with the 11th feeler. The uppermost feeler 14 is provided for a special purpose. The 11 feelers 14 are arranged at the side of the printing mechanism of the machine in such a manner that as soon as the paper web passes under them they come into contact with classification perforations in the web. The web is stretched from a spool 11 over an electric current conducting surface 12 to a spool 13. As will be explained below, the rack 7 is advanced one tooth before its actuation by the magnet 5 begins. If, therefore, the record card contains two classification controlling perforations, the feeler 4 makes contact twice with the conducting surface 3 and the contacts 8 and 9 are then respectively connected to the 2nd and 3rd terminals of the rack 10 which in turn are connected to the 3rd and 4th feelers of the group 14.

The uppermost feeler of the feeler group 14 is connected (by the bar 10) to a magnet 22 and to the contact terminal 9 of rack 7. The first contact on the left of the bar 10, which, as previously stated is connected with the second feeler 14, is also connected to a magnet 20.

In the next step in the cycle of operation the card lifts a feeler 15 from the surface 3, thereby opening a card circuit across two relay magnets 16 and 17 and a conductor 28 which supplies current to a motor for actuating the feeding rollers 2 in a well known manner, so that the card is thereby arrested in its feeding movement. By the release of the spring controlled armature of the relay 16 a circuit is closed to the magnet of an electromagnetic coupling device 18 so that the spool 13 starts to turn under the action of the motor 19. If now the section of the paper web having two perforations representing a classification number arrives under the feeler group 14, at the moment when the uppermost feeler rests on the surface of the paper the 2nd and 3rd feel-

ers pass through the perforations. The fourth feeler, however, is still on the surface of the paper. The relay magnets 20 and 21 are therefore energized, while the point 9 not being connected to a "live" feeler 14 relay magnet 22 on the other hand will not be energized. A circuit is thereby closed across the armatures of magnets 20, 21, and 22 to a magnet 23 which attracts its armature and connects a resistance 24 in the circuit of the motor 19 so that the motor now runs slowly. Simultaneously the magnet 23 also closes the switch 27.

If there are more than two holes in the paper web, the relay magnet 22, which in the stepped position of rack bar 7 is connected with the fourth feeler through the terminal 9 of bar 10 interrupts the circuit to the magnet 23 so that the entrances of the second and third feelers into the first two perforations have no effect.

As soon as the paper web has moved sufficiently so that the line on which the entries to be printed is reached, a feeler 25 engages the surface of the web and deenergizes relay magnet 26, so that a circuit is closed across the previously closed switch 27 to a magnet 29 and across a conductor 31 which leads to a motor (not shown) which causes oscillation of the feeler group or system 30 in a manner fully shown and described in the Tauschek Patent No. 1,617,088.

The cross bar of the feeler system 30 as fully explained in the Patent No. 1,617,088 is arranged to be oscillated in any suitable manner and in a direction parallel to the plane of the record cards to sense the value representing perforations therein. The feeler system therefore oscillates in the directions shown by the double headed arrow shown at the side of contact 35. When magnet 29 attracts its armature by its energization the relay magnet 16 opens the circuit to the magnet of the magnetic coupling device 18, so that the spool 13 is now brought to rest. The devices preferably employed for winding and unwinding the web from the spools are fully described and shown in the United States Patent No. 1,762,749.

The feeler system 30 oscillates in the directions of the double arrow and as shown fully in Patent No. 1,617,088 during its forward movement is pressed by means of a resilient device 32 against the card, while it is lifted during the return movement out of contact with the card. The values represented by the card perforations are thereby introduced in the accumulating mechanism of the machine and printed by the printing mechanism, one order of which is shown diagrammatically in the drawing. Any suitable type of printing mechanism may be employed such as that disclosed in the patent to G. Tauschek No. 1,617,088 or in the British Patent No. 285,456 of 1928. In each of these patents a printing member is differentially adjusted by mechanism under control of the card value representing perforations and by a percussive action is impressed upon the web. An extra hammer is provided at the side of the group of printing hammers and is released with the latter, but instead of striking against a type carrier strikes against an angular knife blade 33 and moves it forward so that by cutting out the edge of the web a contact point is again provided for the feeler 25 for the next line. When the excision has been made the feeler 25 again contacts with the surface 12 and the magnet 26 is again energized and thereby the magnet 29 deenergized which, however, has no effect, as the armature of the magnet 29 remains in the

same position until it is attracted by the magnet 17.

At the end of the oscillation of the feeler system 30, a nose 34 temporarily closes the contact 35 whereby a magnet 36 is energized and withdraws the feed pawl of the rack 7 so that the latter under the action of a spring (not shown) returns to the position shown in the drawing. Circuits are also closed through the conductors 37 which effects the start of the feeding rollers 2 while the feeler system 30 is brought to rest and magnets 38 and 39 are energized and open the circuit closed by the magnet 23.

In the next part of the operating cycle the feeler 4 runs off the card as the latter continues to move and the feeler then makes contact with the surface 3 to cause energization of magnet 5 which by the pawl advances the rack 7 a distance of one tooth space.

The position of the rack 7, when it has been shifted one tooth to the right or from the "end position" may be called the "starting position". After the release of its pawl the rack 7 is in its restoring position moved one step to the left of the "starting position" or to the "end position" in order to neutralize the effect of the single step of movement of the rack 7 occurring during the intervals between the feeding of successive cards through the machine at which time the feeler 4 makes contact with the conducting plate 3. If the rack 7 is shifted one step from its starting position as is the case if a single classification perforation of the card passes below the feeler 4, the terminal 8 encounters the first contact of the rack 10, as is necessary when the account is characterized by a single hole in the card and in the paper web.

In the next part of the operating cycle the feeler 15 again comes into contact with a conducting surface 3 and thereby causes the relays 16 and 17 to be deenergized. The relays 20, 21 have already been energized and placed in circuit opening positions by the return movement of the rack 7. The machine is therefore in condition to receive the next card and carry out the next entry operation in the same manner.

If the next card has the same number of characteristic or classification holes as the preceding one, the paper web will be advanced for one line only by the devices described above.

The characteristic or classification holes may, of course, represent a number of several denominations. In this case, for several denominations there are provided supplemental feelers 4a, 4b and for each supplemental feeler a magnet 5, a group of feelers 14, and a rack 7 together with the appertaining switch and relay magnets. However, in the present case, only one feeler 4 and its associated row of account symbolizing holes, magnets, rack and relays are shown in the drawing in order to avoid complicating the latter. When several feelers are used the relays 20, 21 and 22 of all denominations are connected in series so that a current impulse across the magnet 23 is possible only if all the relays are closed.

What is claimed is as follows:—

1. A bookkeeping machine adapted to sense and interpret values represented by perforations in cards fed to the machine and to enter such values upon a web of paper, comprising printing mechanism, means for feeding a web of paper past said printing mechanism, said web being divided into sections by different characteristic perforations, and means controlled by characteristic perforations in a card fed to the machine for

controlling the feeding means of said web in such manner that the section of such web having corresponding characteristics is brought in front of said printing mechanism in position to receive the item represented by perforations on said card.

2. A machine as set forth in claim 1, including mechanism for arresting the movement of said web when the latter is in proper position in front of the printing mechanism.

3. A bookkeeping machine adapted to sense and interpret values represented by perforations in cards fed to the machine and to enter such values upon a web of paper, comprising printing mechanism, means for feeding a web of paper past said printing mechanism, said web being divided into sections by different characteristic perforations, and mechanism for controlling the feed of said web including feeler devices for the characteristic perforations in a card fed to the machine and in said web, said controlling mechanism operable, when the characteristic perforations in said web and card correspond, to reduce the rate of movement of said web.

4. A machine as set forth in claim 3 wherein said controlling mechanism includes means operative after the characteristic perforations in the card have been sensed, to set the web in motion.

5. A machine as set forth in claim 3 wherein said controlling mechanism includes means operative after the characteristic perforations in the card have been sensed, to set the web in motion, and mechanism operatively associated with the card feeler device and operative when the web feeler device encounters perforations corresponding to the characteristic perforations in said card to cause said feeding means to run slowly.

6. A machine as set forth in claim 3 wherein said controlling mechanism includes means operative after the characteristic perforations in the card have been sensed, to set the web in motion, and a feeling device operative upon encountering an excision at the edge of said web corresponding to the line on which the next entry is to be printed, stops said feeding means.

7. A machine as set forth in claim 3 wherein said controlling mechanism includes means operative after the characteristic perforations in the card have been sensed, to set the web in motion, a feeling device operative upon encountering an excision at the edge of said web corresponding to the line on which the next entry is to be printed, stops said feeding means, and a cutting device arranged to prolong said excision by the distance between two lines after the entry has been printed.

8. A bookkeeping machine adapted to sense and interpret values represented by perforations in cards fed to the machine and to enter such values upon a web of paper, comprising printing mechanism, means for feeding a web of paper past said printing mechanism, said web being divided into sections by different characteristic perforations, a feeler device arranged to sense the characteristic perforations of a card, a second feeler device adapted to sense the characteristic perforations in said web, and mechanism associated with said feeler devices and operative to control said feeding mechanism to bring said web to rest with the next blank line of the proper section to be printed in front of the printing mechanism.

9. A machine as set forth in claim 8, wherein

said control mechanism includes a movable contact member, and means controlled by the card feeler device for advancing said member.

10. A machine as set forth in claim 8 wherein said control mechanism includes means operative upon engagement of the web feeler device with the perforations corresponding to the characteristic perforations of the card to reduce the speed of said feeding means.

11. A machine as set forth in claim 8 wherein said control mechanism includes means operative upon engagement of the web feeler device with the perforations corresponding to the characteristic perforations of the card to reduce the speed of said feeding means, and a feeler arranged to engage in an excision cut along said web and operatively connected to said feeding means to stop the latter at said blank line.

12. A machine as set forth in claim 8 wherein said control mechanism includes means operative upon engagement of the web feeler device with the perforations corresponding to the characteristic perforations of the card to reduce the speed of said feeding means, a feeler arranged to engage in an excision cut along said web and operatively connected to said feeding means to stop the latter at said blank line, a knife disposed adjacent to said excision, and means for actuating said knife at the end of the printing operation to extend said excision by the depth of a line.

13. A machine as set forth in claim 8 wherein said control mechanism includes a movable rack having contacts thereon, a stationary rack having contacts thereon, means operative upon engagement of said card feeler device with perforations in such card to advance said movable rack along said fixed rack, a feeler device for interpreting the item punched in said card, driving means for said last-mentioned device, and means for returning said movable rack to its original position.

14. A machine as set forth in claim 8 including a feeler device for interpreting the item punched in the card and means operative when said web has been brought to rest to actuate said feeler device.

15. A tabulating machine comprising, a printing mechanism, means for sensing the value representing perforations in a card fed to the machine to control printing upon a strip by said printing mechanism of the values represented by the perforations in the card, means for comparing the classification perforations of the card, which carries the value representing perforations controlling the setting of the printing mechanism, with the classification perforations of the paper strip printed by said printing mechanism, and means for feeding the paper strip to the printing mechanism for a printing operation thereby and into position for having its classification perforations analyzed.

16. A card controlled machine comprising, a printing mechanism, a feeding mechanism for feeding a perforated sheet to said printing mechanism, sensing mechanism for sensing classification perforations of the sheet fed thereto, means controlled by the sensing mechanism for comparing the classification perforations of the sheet with the classification perforations of a card, means for sensing data representing perforations of the card for controlling the setting of the printing mechanism, and means operative to control the feeding mechanism to bring the sheet at rest with the first blank line to be printed by the

printing mechanism to print on the first blank line data represented by the data representing perforations of the card.

17. A card controlled machine comprising a perforation sensing mechanism, a printing mechanism, a feeding mechanism for feeding a perforated sheet to the perforation sensing mechanism, means cooperating with the latter for comparing the classification perforations of the sheet with the classification perforations of a card, means for sensing the value representing perforations of the card to control the setting of said printing mechanism to print a value upon the sheet adjacent the classification perforations thereof which agree with classification perforations of the card and means controlled by the sheet for causing the printing to be effected at the first blank line of the sheet.

18. A card controlled machine comprising, a printing mechanism, means for analyzing classification perforations of each of a series of tabulating cards, means for analyzing and comparing the classification perforations of one of the cards with the classification perforations of a sheet, means for analyzing the value representing perforations of the card to control the setting of the printing mechanism to print the value on the sheet adjacent the perforations thereof representing the same classification as the card classification perforations, means for feeding cards to the analyzing means for the classification and value representing perforations and means for feeding the sheet to the printing mechanism.

19. A card controlled machine comprising, means for feeding a sheet, means whereby classification perforations therein are electrically analyzed, means for electrically analyzing classification perforations of a card and comparing them with the classification perforations of the sheet, a printing mechanism, and means for analyzing value representing perforations of the card to

control the setting of the printing mechanism for printing an item adjacent the classification perforations of the sheet fed to the printing mechanism which agree with the classification perforation of the controlling card.

20. A card controlled machine comprising, means for analyzing perforations of a single card, devices set under control of the analyzing means, contacts closed under control of said devices, and means for feeding a perforated sheet to a perforation sensing mechanism after said card has been analyzed, said sensing mechanism comprising brushes completing electric circuits only through similar perforations in the sheet and said contacts when said contacts are already closed.

21. A card controlled machine comprising, an analyzing mechanism for searching classification perforations of a card, a device positioned under control of the analyzing mechanism, contacts closed under control of said device, and means for feeding a sheet to a sensing mechanism after said card has been analyzed, said mechanism sensing the perforated sheet while the latter is in motion and cooperating with the contacts to determine a comparison between the classification perforations of the sheet and card.

22. A card controlled machine comprising, means for feeding a record and means for searching classification perforations therein while the record is in motion, means for feeding a perforated sheet, means for searching the classification perforations of the sheet while the sheet is in motion and comparing them with the classification perforations of the record, and means for analyzing value representing perforations of the record to control the printing of the value on the sheet adjacent the classification perforations thereof which agree with the classification perforations of the record.

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