

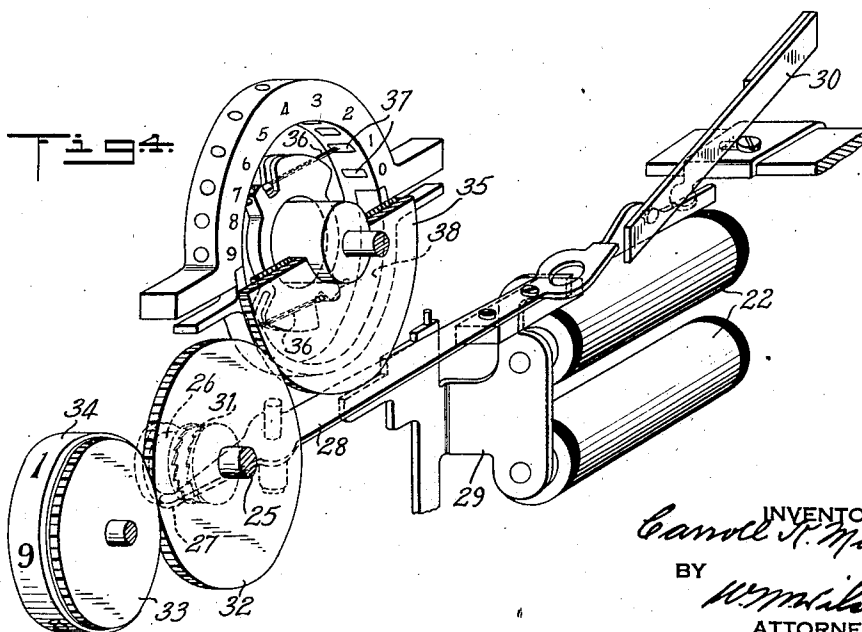
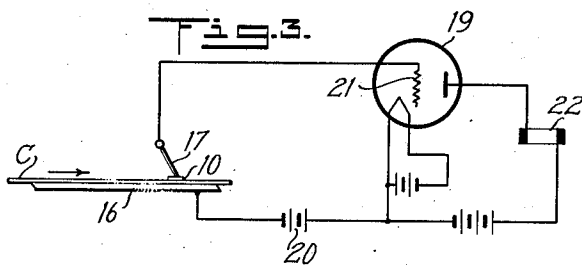
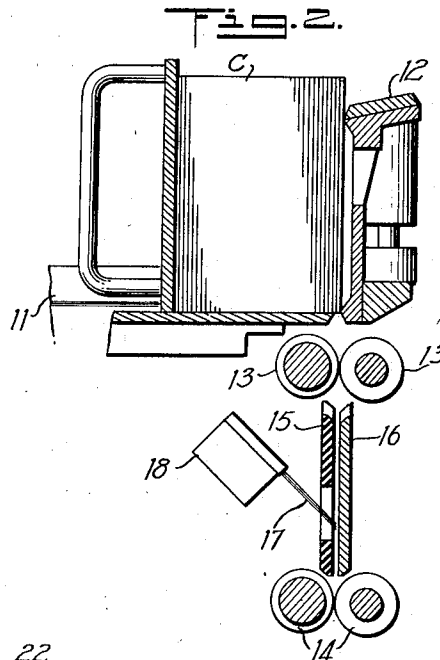
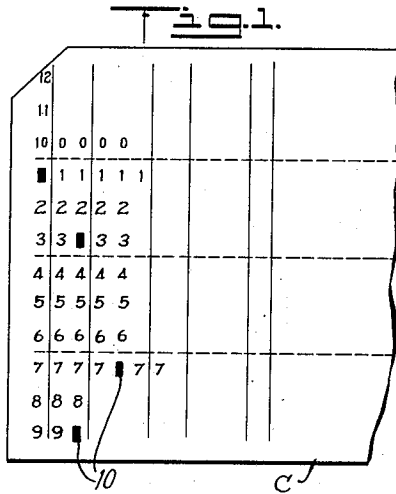
Sept. 1, 1942.

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2,294,681

RECORD CARD CONTROLLED MACHINE

Filed June 6, 1939



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2,294,681

RECORD CARD CONTROLLED MACHINE

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Application June 6, 1939, Serial No. 277,601

3 Claims. (Cl. 235—61.11)

This invention relates to record card controlled machines and more particularly to the data sensing circuits of such machines wherein the sensing of the data designations disposed on the record cards is controlled by the capacity effects created by the record cards and the data designations thereof.

Heretofore, in tabulating machines of the well known Hollerith type, electrical sensing circuits including sensing brushes have been provided for sensing the data represented on the record cards in the form of differentially positioned perforations thereby controlling the associated tabulating mechanisms accordingly. Sensing circuits including means for sensing marks or index points comprising electrical conducting marks have been suggested as well as sensing perforate or imperforate areas in a record card by means of light rays.

It is now proposed to provide in the conventional types of tabulating machines sensing circuits for detecting the data disposed on the record cards based upon the capacity effects of the record cards. Conducting marks or index points are used on record cards for forming one plate of a condenser and employing the material of the tabulating card as a dielectric of the condenser thus formed by the index points, the record card, and a fixed conducting plate which is a permanent part of the machine.

The varying capacity effects thus created are adapted to control the conductivity of an electronic device which is included in the sensing circuit for controlling the associated tabulating mechanisms in accordance with the conductivity of the device.

Therefore, one of the objects of the present invention resides in the provision of a sensing circuit for statistical machines the operation of which is controlled by capacity effects created by record cards.

Another object of the present invention is the provision of a data sensing circuit controlled by the capacity effects created by record cards and wherein the index points on the record cards and the record cards form one plate and the dielectric of a condenser.

Another object of the present invention is the provision of means whereby the conductivity of an electronic device is controlled by the capacity effects created by the record cards to be sensed.

Another object of the present invention is the provision of means whereby the sensing of data disposed on record cards is effected by the capacity effects created by the cards and with a con-

tinuous relative movement between the plates of the condensers.

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

In the drawing:

Fig. 1 shows a partial section of a tabulating card provided with conducting index points.

Fig. 2 is a sectional view of card feeding means.

Fig. 3 is the circuit diagram of the machine.

Fig. 4 is an isometric view of one denominational order of a statistical machine.

Record cards

Referring now to Fig. 1, a partial view of a well known type of tabulating card C is shown provided with differentially positioned index points 10 representing the value of the data in accordance with the different positions of the index points. The said data representations may be formed of any suitable electrical conducting material. It has been determined that the following solution gives highly satisfactory results when used in conjunction with the present invention:

	Percent by weight
30 Aquadag 34%	28
Glycerine	18
Water	36
Alcohol	18

The Aquadag constituent of the solution is a colloidal graphite solution of the strength indicated.

Record card feeding means

Referring now to Fig. 2, the record cards C are shown placed in a feed hopper of the machine indicated generally by the reference character 11, from which they are fed downwardly, one by one, by picker 12, so that the leading edge is moved into cooperation with a pair of feed rollers 13, and thence downwardly past the pair of rollers 14 to a card stacker mechanism (not shown).

Between the pairs of feed rollers 13 and 14 are provided card directing or guide plates 15 and 16 and a set of analyzing brushes 17 mounted in insulating blocks 18 and arranged so as not to engage the guide plate 16 which forms part of the sensing circuit arrangement. The guide plate 15 is preferably formed from suitable electrical insulating material whereas the plate 16 is formed from any suitable conducting material.

The brief description of the card feeding means is believed to be sufficient for the present purposes since the feeding means per se forms no part of the invention. For a detailed description of the parts shown and for suitable driving means for the card feeding means reference should be made to U. S. Patent No. 1,976,617.

Operation of data sensing means

With reference now to Fig. 3, assume that the card feeding means is rendered operative to feed the cards C successively through the guide plates and past the sensing brushes 17. As long as no card is present at the sensing station, or if a card is present and as long as no index marks 10 are engaged by the brushes 17 the electronic device 19 remains non-conductive. Now, upon presentation of a data representation in the form of a conducting mark 10 (the showing of which on the card in Fig. 3 is exaggerated for purposes of clarity) and upon engagement of the said mark by the sensing brush, there is formed between the index mark 10, record card C and conducting plate 16 a condenser of small capacity, the index mark 10 and plate 16 forming the condenser plates and the record card C forming the dielectric of the said condenser. The effect of charging the condenser thus formed causes the battery 20 to impress upon the grid element 21 of the device 19 an electrical impulse which is amplified by the device and causes the control magnet 22 to be energized at the particular time the condenser is formed, or stated in other words at the particular timed interval the data representation is sensed. In this manner the normal and predetermined capacity characteristics of the grid circuit are altered to control the conductivity of the electronic device. It is to be understood that device 19 is representative of an amplifying system of well known types, and of the class referred to, which may if desired consist of several stages of amplification. The control magnet 22 may be representative of a control element of any type of statistical machine. However, to complete the instant disclosure a particular type of data accumulating device will be shown which can be controlled by the energized control magnet or element 22.

Data accumulating mechanism

Referring now to Fig. 4, a brief description of a well known type of data accumulating mechanism will be given. The driving connections for the accumulating device and the related gearing between the card feeding means and accumulating device is not shown nor is it deemed necessary, since this exact mechanism is shown in the prior art, and for detailed description thereof reference may be made to the above-mentioned U. S. patent.

The data accumulating mechanism to be described is operated in synchronism with the card feeding means so that the sensing operations and the data accumulating operations are effected in a predetermined timed relationship, this type of operation is well known and described fully in the said patent referred to.

The shaft 25 has slidably mounted thereon but keyed for rotation therewith a clutch element 26, one for each denominational order of the accumulator. The element 26 is provided with a groove in which fits the end of an arm 27 of a suitably pivoted lever 28. The said lever is normally held in the position shown by armature 29 of the control magnet 22. Upon ener-

gization of the control magnet the associated armature is attracted thereto thereby releasing the lever 28 which is positioned by the leaf spring 30 to cause the clutch element 26 to move into engagement with cooperating teeth 31 integral with a gear 32 loosely mounted on the shaft 25. Gear 32 when thus coupled to shaft 25 will rotate a gear 33 which meshes therewith and displace the associated accumulator index wheel 34. Also driven by gear 32 is a gear 35 which is displaced in the same manner as index wheel 34. Carried by and insulated from gear 35 is a pair of electrically connected brushes 36, one of which cooperates successively with the conducting segments 37 while the other cooperates with an arcuate conducting strip 38. The relationship of the parts is such that, when the index wheel is in its zero position, one of the said brushes is in contact with the zero segment and the other brush is in contact with the conducting strip, thus forming an electrical connection between the two. The positioning of the said brushes provides a convenient electrical readout mechanism for controlling total printing operations which will not be described in the instant application but which are described in the said U. S. patent referred to.

It is to be understood that the control magnet 22 can be energized at various points in the machine cycle depending upon the disposition of the data representations upon the record cards detected by the described sensing means. This energization may take place in response to the detection of a data representation in any of the index point positions represented by the accumulator. The data representations 10 are disposed on the record cards in such a manner, and the card feeding means and accumulator are operated in such timed relationship that, for example, a data representation sensed in the "9" position, indicated on the record card, will cause the clutch element 26 to be tripped to position the index wheel 34 and brushes 36 nine steps before a declutching operation is effected by the by the control elements of the machine, and the sensing of a data representation in the "1" position will cause the clutch element to be tripped to position the said index wheel and brushes one step before declutching thereof. For further detailed description the said U. S. patent may be referred to, wherein such well known accumulator operations, as denominational order transfer, restoration of the clutch elements and magnet armatures to normal position and resetting of the accumulator mechanism are specifically described.

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, therefore, to be limited only as indicated by the scope of the following claims.

What is claimed is:

1. In a machine controlled by record elements, each record element comprising a non-conductive body portion having index points differentially disposed in predetermined columnar areas, said index points constituting marks of electrically conducting material, the combination of spaced guide members for guiding the record elements, one of said members consisting of electrical con-

ducting material and the other of said members consisting of non-conducting material, means for sensing the said index points comprising a conducting element normally positioned in close proximity to but failing to contact physically, the conductive guide member, electron discharge means having input and output circuits, the input circuit being connected to the conducting element and the conducting guide member, a source of potential included in the input circuit capable of rendering the discharge means conductive at the differential times the index points are sensed, means for feeding the record elements through the spaced guide members so that the index points engage the said conducting element to form an electrical condenser consisting of an index point and the conductive guide member as the plates and the non-conductive body portion of the record element as the dielectric thereof, which condenser is charged by said source of potential for rendering the discharge means conductive only at the differential times the index points are sensed for producing electrical impulses in the output circuit in accordance with the disposition of the index points, and differentially operable devices controlled by the discharge means and responsive to the said impulses impressed on the output circuit.

2. In a machine controlled by a record element comprising a non-conductive body portion having index points differentially disposed in predetermined columnar areas, said index points constituting marks of electrically conducting material, the combination of normally non-conductive electron discharge means having input and output circuits, means for sensing the said index points included in the input circuit comprising a plurality of spaced conducting elements, a source of potential in the input circuit capable of rendering the discharge means conductive at the times the differentially positioned index points are sensed, means for feeding the record element between the spaced conducting elements so that the index points engage one of the said

conducting elements thereby forming an electrical condenser consisting of an index point and the other of said conducting elements as the plates and the non-conductive body portion of the record element as the dielectric thereof, which condenser is charged by said source of potential to cause the discharge means to be conductive at the times the index points are sensed for producing electrical impulses in the output circuit in accordance with the disposition of the index points thereon, and differentially operable devices controlled by the said discharge means and responsive to the said impulses impressed on the output circuit.

3. In a machine controlled by record sheets, each sheet comprising a non-conductive body portion having imperforate index points differentially disposed in predetermined columnar areas, said index points formed of electrically conductive material disposed thereon, the combination of normally non-conductive electron discharge means having a grid control circuit and an output circuit, means for sensing the said index points, included in the grid control circuit, comprising a fixed conducting plate and a conducting element, means for successively feeding the record sheets between the said plate and element, said index points when sensed forming part of an electrical condenser, said condenser consisting of an index point and said plate as the plates of the condenser and the non-conductive body portion of the record sheet as the dielectric thereof, means included in said grid control circuit for charging the said condenser to render the said discharge means conductive at the differential times the said index points are sensed for producing electrical impulses in the output circuit in accordance with the disposition of the index points, and differentially operable means controlled by the said discharge means and responsive to the said impulses impressed on the output circuit.

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