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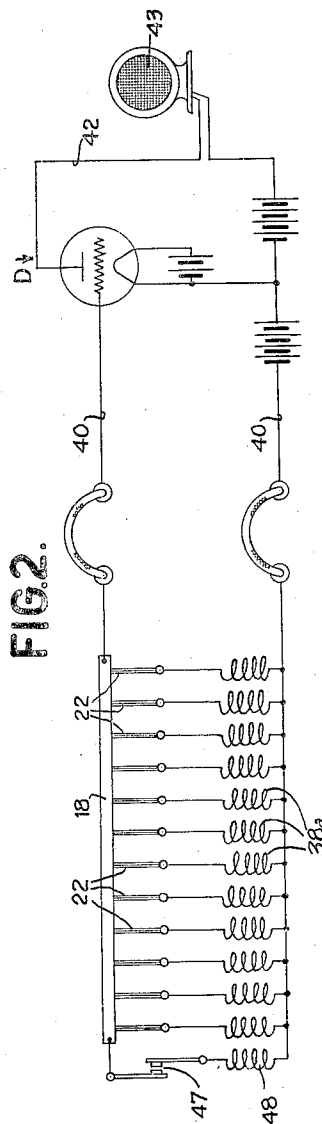
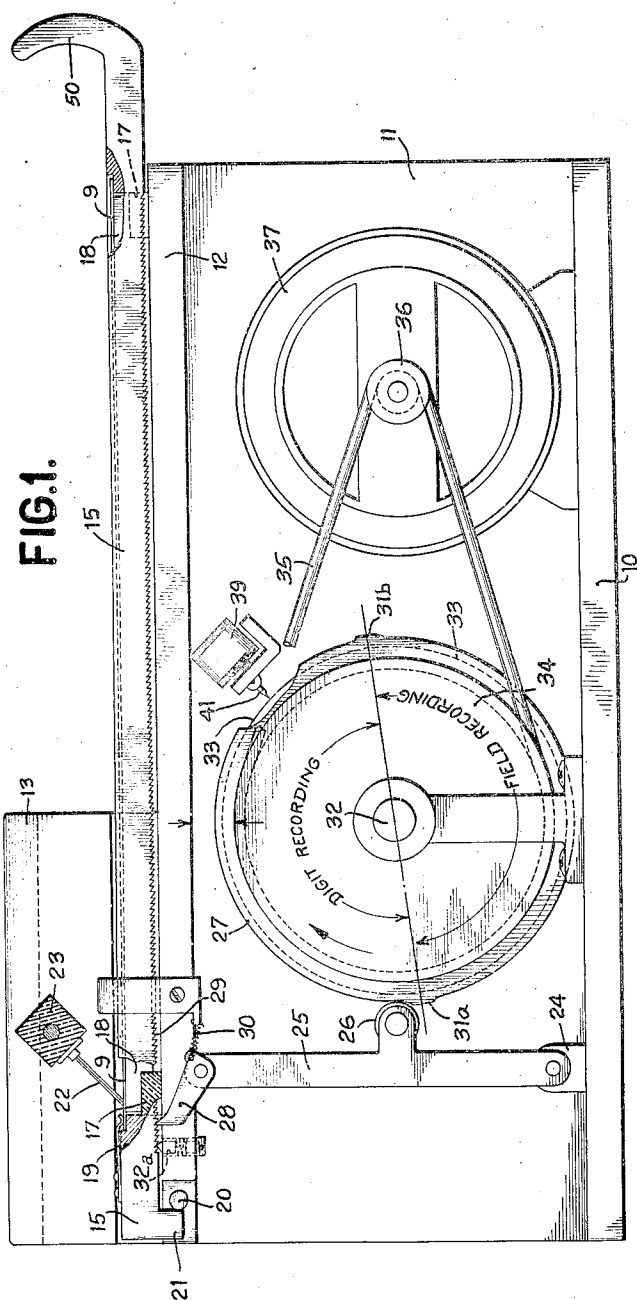
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SOUND RECORDING AND REPRODUCING MACHINE

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2 Sheets-Sheet 1



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2 Sheets-Sheet 2

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## UNITED STATES PATENT OFFICE

2,089,309

SOUND RECORDING AND REPRODUCING  
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8 Claims. (Cl. 179—100.1)

This invention relates to sound reproducing machines and of the type in which an announcement is made of the character on, or represented by, the controlling record.

It is the main object of the invention to analyze a representation on a record by suitable means and audibly announce the representation.

More specifically, it is an object of the invention to analyze perforations in a tabulating card representing different characters, such as digits, and audibly announce the digit that is represented on the record.

A still further object is the inclusion of means for announcing the completion of the announcement of one or a set of correlated digits which alone or in a set have some significance.

The present invention finds utility in tabulating systems wherein an operator by a key controlled punching machine perforates a record to represent different data secured from material containing data or statistics which are to be compiled. Such data may be the result of taking a census, or in commercial work data pertaining to business transacted. After the perforations have been made extreme accuracy occasionally requires that the data represented on the record be checked or verified by comparison with the material representing the original statistics. Heretofore this has been done by placing the punched record in a verifying machine and again punching the keys corresponding to the original data. Instead of again punching the record, elements corresponding to the keys pass through the perforations if they have been properly made. If a perforation is not in the position it should have been in a particular record column a signal is given to the operator designating an error.

Obviously, this method of verification requires twice as much work and in the present invention the audible announcements of the digits represented on the record permits the operator to compare the original data with the perforated record as the digits are successively announced.

It should be understood that the apparatus may be useful in other relations and the invention is not limited to the specific application described. Other forms of digit analyzing and sound reproducing mechanisms may be substituted and the devices shown and described herein should be viewed only as illustrative embodiments.

The invention is exemplified in the drawings in which:

Fig. 1 is a view in side elevation of one form

of machine constructed according to this invention.

Fig. 2 is an electrical wiring diagram.

Fig. 3 is a representation of part of a controlling tabulating card.

Fig. 4 is a cross sectional view of the machine.

The type of data representing record utilized in connection with the present invention is illustrated, in part, in Fig. 3. The card 9 is provided with a series of record columns and each column is provided with a series of index point positions, twelve in number. One index point position in each record column is perforated to represent one of the digits or "11" and "12." The latter numbers are preferably used for indicating certain months. The record columns either singly or in sets constitute record fields, and each of the latter has a particular significance.

The first three record columns comprise three fields perforated to represent, in order, the 2nd month, 16th day, and 3rd year. The next field of four columns represents an amount entry of 12.55, and so on for representing the other pertinent data taken from a bill indicating a sale of merchandise, for example. As stated, the record has been punched by a punching machine under control of an operator as the latter secures the pertinent data from the original bill.

When the record has been perforated, it is placed in the machine now to be described for the purpose of verifying the punched data.

The various parts of the machine are carried by a framework comprising a base plate 10, an integral upstanding plate 11, an intermediate plate 12 parallel to the base plate 10, and a channel-shaped frame portion 13.

Slidably mounted by means of longitudinal slots 14 in the plate 12 are parallel bars 15, 16 between which extends a pair of bars 17 of insulating material fastened to the bars 15, 16, in any suitable manner. Resting on bars 17 but secured thereto by any suitable means is a base plate 18 of conducting material. The bars 17 are utilized to insulate the base plate 18 from the machine. The perforated record 9 is manually placed upon the base plate 18 and held fixedly against it by spring clips 19.

The position of the record for analyzing the first column is determined by coaction of a pin 20 secured to the plate 12 with a downward projection 21 of the bar 15.

When the record is in its proper position and held by the clips 19 the first record column is cooperatively related with a set of twelve flexible

wire analyzing brushes 22. Each analyzing brush is carried by a bar of insulating material 23 which is fixed to a vertical plate of the frame portion 13.

Such analyzing elements consist of flexible spring wires 22 which press on the surface of the record and when a brush 22 encounters a perforation the wires project therethrough and contact with the base plate 18. Obviously, there is one brush for each index point position so that the brushes determine which index point position is perforated, and therefore, which digit is represented in a record column.

For the purpose of shifting the record, column by column, so as to successively determine the digit representations in the various record columns the following mechanism is preferably employed.

Pivotaly mounted by means of a bracket 24 attached to the base plate 10 is an upstanding arm 25 carrying a roller 26 in the plane of a cam disk 27. The arm 25 has pivotally mounted thereto a pawl 28 which is in the plane of ratchet teeth 29 formed at the underside of bar 15. There is a pair of ratchet teeth for each record column so that when the arm 25 rocks to the left against the action of a spring 30 which tends to hold the pawl 28 in coaction with one of the ratchet teeth, the record will be shifted one half step to the left. A complete step of movement will bring the perforation of the next record column in operative relationship with the brushes 22.

To effect the rocking of the arm 25 there is provided on the cam disk 27 a pair of projections 31a and 31b coacting with the roller 26. As the cam disk 27 turns further the roller 26 leaves the projection 31a or 31b it has been in operative association with and thereby the spring 30 returns the arm 25 and the pawl 28, the latter slipping idly over a ratchet tooth 29 to operatively engage the next ratchet tooth. The successive shifted positions of the record may be impositively held by a spring pressed plunger 32a of any conventional design and coacting with the ratchet teeth 29.

The cam disk 27 is secured to a rotatable shaft 32 and to said shaft there is secured a sound recording cylinder 33 and a pulley 34. The latter has a belt connection 35 to a pulley 36 of the electric motor 37.

The sound recording cylinder 33 is of the usual phonographic type and has a series of twelve sound tracks 38 for announcing the ten digits 0-9 and "eleven" and "twelve".

With the apparatus in the position shown in Fig. 1 rotation of the cam disk 27 in a clockwise direction will cause the projections 31a to shift arm 25 to the left thereby coordinating the brushes 22 with the first record column. One of said brushes will, if that column is perforated, pass through the perforation and contact with the plate 18. From Fig. 2 it is evident that this will place the related electrical sound pick-up coil 38a of a magnetic pick-up head 39 in electrical circuit connection with the grid circuit 40 of the thermionic detector tube D.

The pick-up heads 39 are of conventional design, the reproducing needle 41 thereof being vibrated according to the related sound recording track 38. The vibrating needle and magnetic pick-up coil 38a thereby affect the grid circuit 40, so that the current in the plate circuit 42 controls the loud speaker 43. The latter thereby reproduces and emits sounds in accordance with the sound track 38.

The latter described sound reproducing systems are well known and for this reason is briefly explained herein. Obviously, the nature of the announcement is dependent upon which index point position is perforated and in the case with the first record column the word "two" will be audible. After a half revolution of the shaft 32 during which time the desired numeral announcement is rendered, projection 31b will shift the record a half step in the manner previously described. This half step of movement after the digit value has been announced is for the purpose of audibly indicating when the next digit value comprises that of the next field, demarcated by means of a projection 44.

To the bar 16 there is secured a bar 45 which is formed with a series of holes 46 (Fig. 3) and in some of said holes are fitted the elements 44 having external wedge-shaped ends. Such elements are selectively inserted in the holes 46 to demarcate the various fields.

When the record is shifted the second half step the element 44 between the first and second record perforations will engage and shift the contact spring of a pair of contacts 47 to close the latter and thereby render operative the related pick-up device 48 by connecting it in the grid circuit 40 (see Fig. 2). The pick-up device 48 will be affected by the sound track 49 (Fig. 4) which may cause the announcement of a word, such as "Dash". Thereafter by a successive half-step of movement of the record the second perforation will be in position for control so that the announcement "one" follows. Then there will be stated "six-dash". The date represented by the record will be announced "two-dash-one, six-dash-three". As the operator holds the original data sheet the verification of the data can be readily followed. The machine therefore eliminates the necessity for an extra person reading and announcing the representation on the record, which, indeed, is a difficult task.

When all the fields desired have been analyzed and the representations announced the machine may be stopped in operation by the usual motor switch and the record then removed. By a handle 50 of bar 15 the record support is reversely brought to a start position and the next controlling record placed thereon with the action repeated as described.

While there is shown herein a sound recording apparatus of the mechanical type it is evident that the sound waves may be represented on a film and electrically analyzed to control a loud-speaker apparatus in the manner exemplified. Obviously, the representations on the record may also be of other types to control the loud speaker apparatus. The characters may be other than digits and may represent letters so that letters may be announced. Various other modifications are apparent when the principle of operation is understood.

What is claimed is as follows:

1. In a sound reproducing machine, means for reading a record having represented thereon designations of characters in separate fields each field having a different meaning, means for audibly announcing the characters designated in each field, and means for giving a signal when the announcement is to be for the next field.
2. In a sound reproducing machine, in combination, means for analyzing a record having different character representations thereon, a sound reproducing apparatus including sound recordings of the different characters represented

and a recording of a significant word, means operable independently of said analyzing means for selectively causing the audible reproduction of the significant word sound recording in between the audible announcements of the characters represented, and means controlled by said analyzing means for making an audible announcement of the characters represented.

3. In a sound reproducing apparatus, in combination, means for analyzing a series of representations on a record, means controlled by said analyzing means for audibly announcing the meaning of each representation, and means operable independently of said analyzing means for audibly announcing the completion of the announcement of the meanings of a significant set of representations or of a single representation having a certain significance.

4. In a sound reproducing apparatus, in combination, means for analyzing representations each of which alone or in sets have different significances, means controlled by said analyzing means for audibly announcing the meaning of each representation, and means operable independently of said analyzing means for giving an audible signal upon the completion of the announcement of the meaning of a representation or the meanings of a set of representations.

5. In a sound recording apparatus, in combination, electrical means for analyzing representations on a record, a sound recording apparatus including a series of sound recordings and

a series of magnetic pick-up devices, means whereby said magnetic pick-up devices are selected in accordance with the representations analyzed, and means settable at an operator's will for causing a special magnetic pick-up device to be operatively associated with a related sound recording.

6. In a sound reproducing apparatus, in combination, means for shifting step by step a record with representations thereon, sound recording and reproducing means, means whereby the latter upon the first shift of the record causes an audible announcement of a representation on the record, and means whereby a signal is given to the operator having a special significance effective upon occurrence of the next step of movement of the record.

7. In a sound recording apparatus, in combination, a cylinder having upon part of its periphery a series of different sound recordings and upon another part of the periphery a significant sound recording; a record analyzing means for selecting the different sound recordings, and means independent of said analyzing means for selecting the significant sound recording.

8. The structure claimed in the preceding claim 7 and including in combination therewith, a sound reproducing mechanism including a single loud speaker adapted under control of both of said selecting means to successively enunciate any or all of the sound recordings.

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