Jan. 7, 1936. E. A. FORD 2,027,033

CARD ANALYZING MECHANISM

Filed July 26, 1933

FIG. 1.

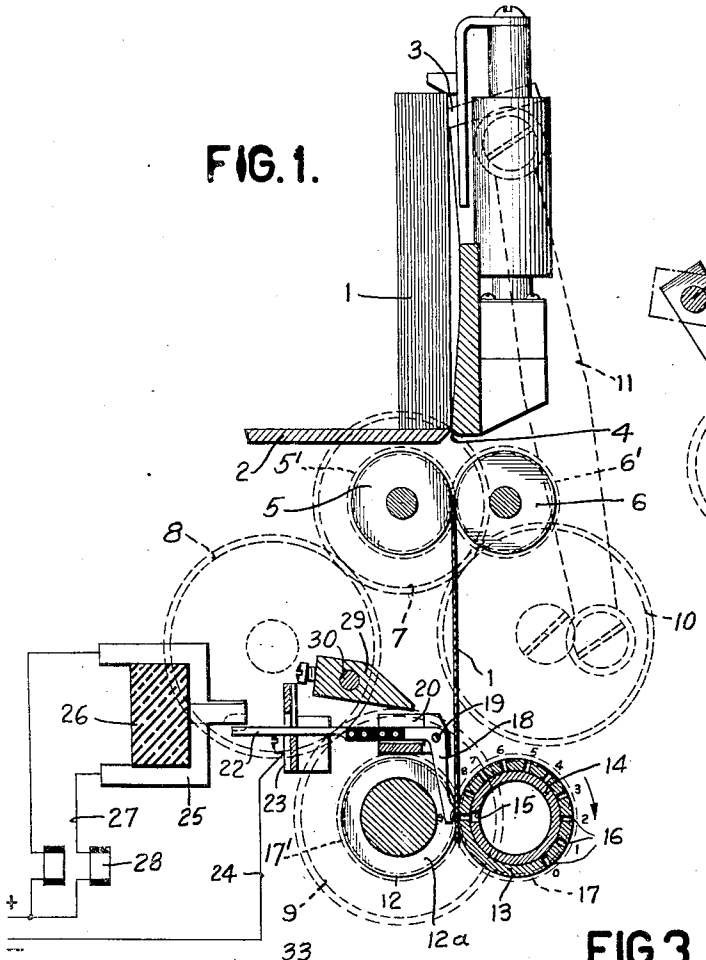


FIG. 4.

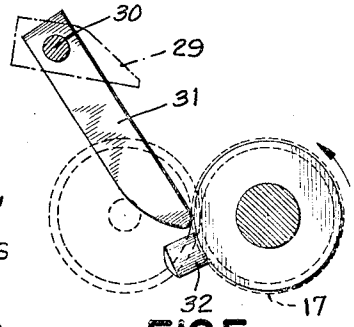


FIG. 5.

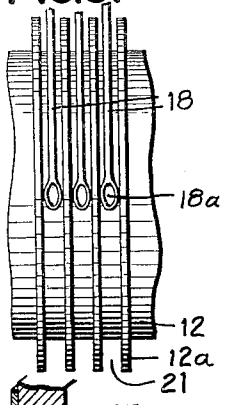


FIG. 3.

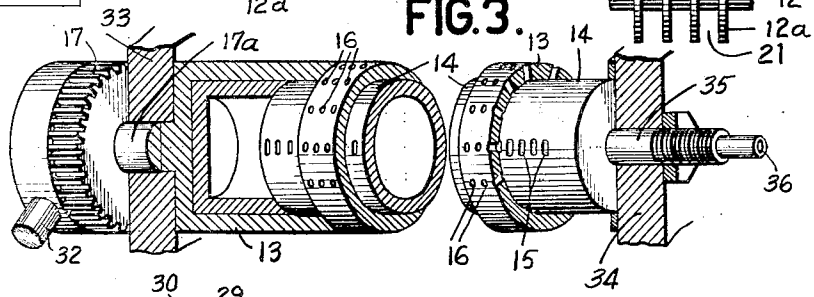
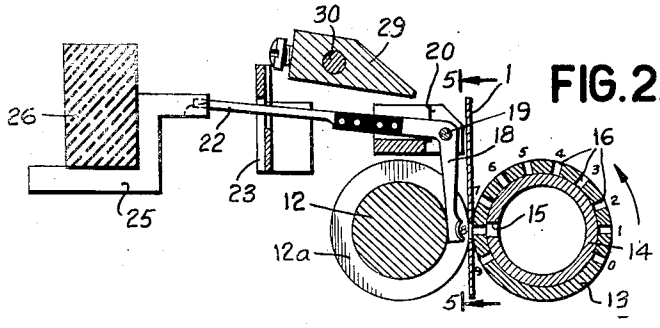


FIG. 2.



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CARD ANALYZING MACHINE

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Application July 26, 1933, Serial No. 682,285

4 Claims. (Cl. 235—58)

This invention relates to perforated record controlled machines and more particularly to means for sensing perforations in the records as they are fed through the machine.

One of the objects of the invention is to provide more accurate and positive means for sensing the perforations in the records when using compressed air for this purpose.

Another object is to provide perforation sensing means of this type in which the air may be forced through the perforations in the record with a minimum amount of loss of pressure.

Another object is to provide a sensing means of this character capable of sensing perforations in columns arranged more closely together than has heretofore been customary or possible.

Another object is to provide sensing means of this character in which the jet of air forced through a perforation in one column of a record will not actuate the control elements associated with adjacent columns.

These and other objects will be apparent in the following description of the invention.

Referring to the drawing:

Fig. 1 is a side elevation in section of record feeding and sensing mechanism adapted for use in connection with tabulating and like machines.

Fig. 2 is a sectional detail of the perforation sensing device shown in Fig. 1 on a slightly larger scale.

Fig. 3 is a perspective detail view of the compressed air device for supplying air to the several columns on the record to sense the perforations therein.

Fig. 4 is a detail of means for restoring the parts to normal position after the record has been analyzed.

Fig. 5 is a detail taken substantially on the line 5—5 of Fig. 2 on an enlarged scale.

In the drawing, the records to be analyzed are shown at 1 stacked in the usual card hopper 2. A card picker 3 is adapted to reciprocate up and down once for each cycle of operation of the machine and to feed the records downwardly one at a time through the throat 4 which is only wide enough to permit one card at a time to pass through. When the lower edge of the record card reaches the feed rollers 5, 6, it is gripped between these rollers and carried downwardly. Rollers 5 and 6 have intermeshing gears 5', 6' so that rotation of one will effect rotation of the other and when a card separates the rollers, the rotation of one will through the card effect the rotation of the other.

In the present instance, the roller 5, is provided with a gear 7 fixed with respect thereto and cooperating with a gear 8 which in turn cooperates with a driving gear 9. A gear 10 meshing with gear 7 operates a connecting link 11 to reciprocate the card picker 3. As the record card is fed downwardly by rollers 5 and 6, it passes between rollers 12 and 13 which serve as feed rollers to continue to feed the card downwardly. Roller 13 is in the form of a sleeve mounted over an inner tube 14. The tube 14 is provided with a row of perforations 15, or a horizontal slot if desired. As shown, there is one perforation 15 for each column on the record card. The sleeve 13 is provided with several horizontal rows of perforations 16. As shown here, there are ten of these horizontal rows of perforations 16 corresponding to the ten index point positions in each column of the well known Hollerith tabulating card. Where additional positions such as the 11 and 12 positions sometimes employed on these cards are to be analyzed, additional rows of perforations 16 may be provided in the sleeve 13.

There are as many perforations 16 in each row as there are perforations 15 in the tube 14 or, in other words, as many as there are columns of index point positions on the record cards. Tube 14 is fixed while the sleeve 13 is adapted to rotate on the tube. The rotation of sleeve 13, is effected by means of a gear 17 fixed with respect thereto and meshing with gear 17' fixed with respect to roller 12.

The distance between rows of the perforations 16 in the sleeve 13 is such that the index point positions on the card will register with perforations 16 as the card is fed between the roller 12 and sleeve 13. In other words, when the lowermost index point position in a column on a card, which represents the value 9, reaches the sensing position in the machine, it will register with the first perforation 16 in the corresponding column. Then, as the card continues to be fed downwardly, the next index point position in the column, which represents the value 8, will register with the next perforation 16 in the sleeve 13, etc. If there is a perforation in one of the index point positions in a column on the card, as that perforation passes through the sensing position, it will permit air to pass through the card. The time in the cycle of the machine at which the air passes through, determines the operation to be performed by the machine. As each lateral row of perforations 16 passes through the horizontal line, these perforations will pass over the perforations 15 in the tube 14. Compressed air contained in the tube will pass into the perforations 16 and press against the card 1. Where a perforation in the card appears over one of the perforations 16, the air will pass through the card and strike a lever 18 pivoted at 19 to a supporting member 20.

The roller 12 is provided with circumferential grooves 21 into which the levers 18 reach. The lower end 18a of each lever 18 may be spoon-shaped and is opposite the perforation 16 when the latter registers with a perforation 15, so that

if a perforation in the record card registers with a perforation 16 while the latter is passing perforation 15, compressed air will pass through a card and rock the lever 18 clockwise upon its pivot. Each lever 18 has attached thereto an electric contact finger 22. The finger 22 is insulated from the lever 18 and presses against a member 23 common to all of the contact fingers 22 and connected through wire 24 to one side of electric supply source. When the lever 18 is rocked from the position of Fig. 1 to that of Fig. 2, the finger 22 will engage a terminal 25 carried by an insulating block 26. Each terminal 25 is connected by a wire 27 to one side of an electromagnet 28 and all of these magnets are connected to the other side of the electric supply source. Thus, when any of the levers 18 rocks its finger 22 into contact with the terminal 25, a circuit will be closed from the negative side of the line through wire 24, common contact member 23, finger 22, terminal 25, wire 27, individual magnet 28 and back to the other side of the line. The energization of the magnet 28 will serve to control the operation of the machine in a manner well known in connection with tabulating and sorting machines.

The time in the cycle of the machine at which the magnet is energized depends upon the position of the perforation in the column on the record. The portions 12a of the roller 12 which presses against the card 1 serve to hold the card firmly against the sleeve 13 along the line on which the perforations in the card cooperate with perforations 16 and 15. The roller 12*a* thus holds the card firmly against the sleeve 13 so that the pressure of the air will not force the card away from the sleeve 13 and escape. Also the individual sections 12*a* of the roller 12 will act as partitions to prevent the air which passes through a perforation in a particular column on a card from spreading laterally and operating or tending to operate a lever 18 associated with an adjacent column.

After a card has been completely analyzed, all of the levers 18 that have been actuated to close contacts 22, 25 will be restored from the position of Fig. 2 to that of Fig. 1. This is effected by means of a common bar 29 pivoted at 30 and provided with an arm 31 fixed with respect thereto. Arm 31 lies in the path of a pin 32 fixed with respect to gear 17 and the shaft 17*a* on which the sleeve 13*a* is fixed. The position of the pin 32 is such that after the card has been completely analyzed, the pin will strike the arm 31, rocking the shaft 30 and restoring member 29 clockwise. Member 29 will then rock downwardly and engage all of the levers 18, rocking them counterclockwise about their pivot 19, restoring them and breaking the contact 22, 25. When a finger 22 is rocked into engagement with terminal 25, it is adapted to press resiliently against the side thereof to effect a rubbing and frictional contact. This structure will serve to keep the contact surfaces clean and also to hold the fingers 22 and levers 18 in set position until they are restored by member 31.

As shown in Fig. 1, the alternate contact terminals 25 may be mounted on the lower side of the common carrying bar 26 and the intermediate ones on the upper side in order to provide space for attaching the wires 27.

The tube 14 and sleeve 13 are mounted for rotation in the frame members 33, 34. The bearing 35 may be hollow and connected with a tube 36 adapted to supply compressed air to the tube 14. As shown, the perforations 15 may be elongated and may be longer than the perforations 16. When a perforation 16 is passing a perforation 15 the length of time that the air will be passing through the perforations will thus be controlled by the length of the perforation 15.

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 perforated record sensing machine, a hollow roller having a plurality of rows of perforations therein corresponding to index point positions on records to be analyzed, means for synchronously feeding records and operating said roller, means for supplying compressed air to one row of perforations in the roller at a time during operation, and means operable by air passing through a perforation in the roller and a perforation in the record registering with the roller for controlling operation of the machine.

2. In a machine adapted to be controlled by perforated records, a hollow roller having a plurality of rows of perforations corresponding to rows of index point positions on a record to be analyzed, means for synchronously operating said roller and for feeding a record, means for supplying compressed air to one row of perforations in said roller at a time during operation thereof, means for pressing a record being analyzed into engagement with the roller along the row of perforations to which air is supplied, and means operated by air passing through a perforation in a record coinciding with a perforation in the roller for controlling the operation of the machine.

3. In a machine adapted to be controlled by perforated records, a tube adapted to contain compressed air, said tube being provided with a row of perforations to permit the air to pass through, a sleeve rotatably mounted on said tube, said sleeve being provided with a plurality of rows of perforations adapted to cooperate one row at a time with the perforations in the tube, a roller having circumferential grooves cooperating with said sleeve to effect feeding of perforated records, means for operating said roller and sleeve to effect such feeding, and elements reaching into the grooves of said roller and adapted to receive air passing through perforations in a record coinciding with perforations in the sleeve and tube to control the operation of the machine.

4. In a machine adapted to be controlled by perforated records, a tube adapted to contain compressed air, said tube being open along a line parallel to its axis to permit air to pass through, a sleeve rotatably mounted on said tube and provided with a plurality of rows of perforations adapted to cooperate one row at a time with such opening, means for feeding a perforated record over said sleeve, and means adapted to be actuated by air passing through perforations in the record coinciding with the perforations in the sleeve and tube for controlling the operation of the machine.

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