

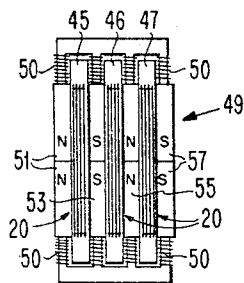
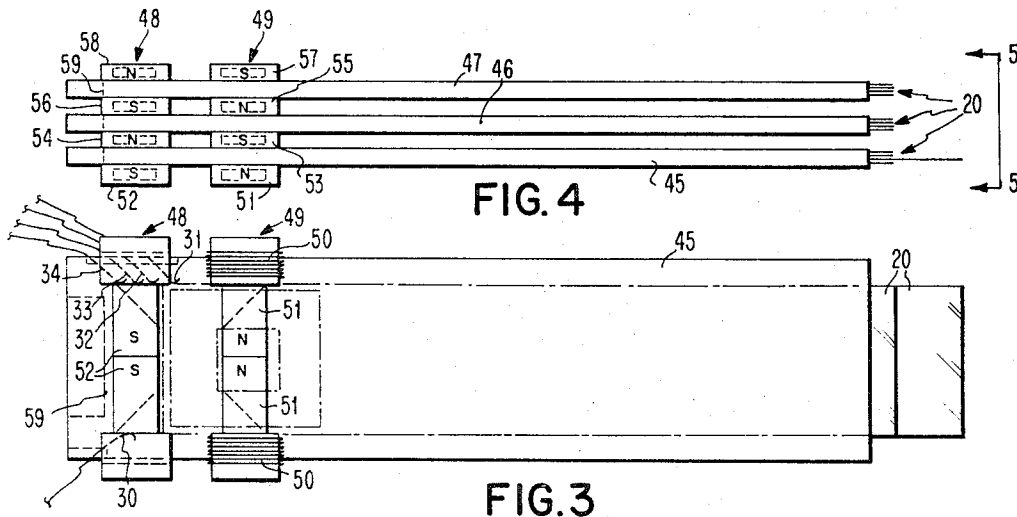
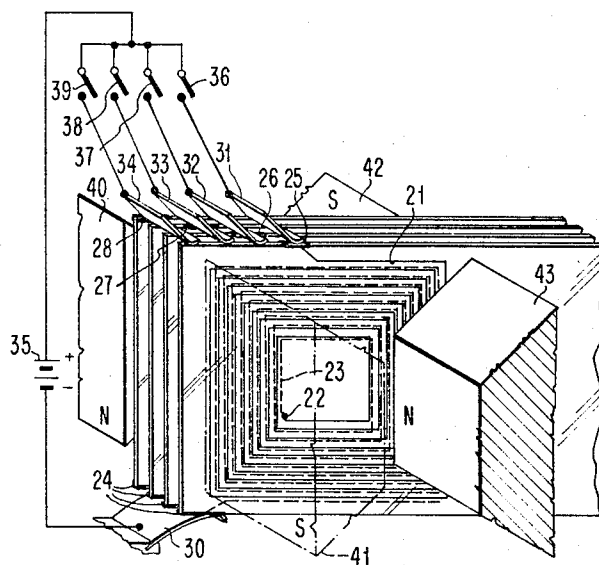
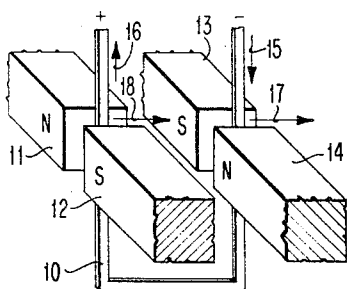
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SELECTION APPARATUS

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SELECTION APPARATUS

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ABSTRACT OF THE DISCLOSURE

Apparatus for random selection of a desired strip or card. Each strip in a given container has a coil laminated thereon. A plurality of contact bars are provided extending across the container, each perpendicular to and in contact with an edge of each strip. Each coil terminates in a unique combination of two, separate contact points along an edge or edges of the strip. Each coil is thus in contact with a unique combination of two of the contact bars. Magnets are arranged to provide opposite magnetic fields through the opposite parts of the coils. Current is applied to a selected set of contact bars and, thereby, to a selected one of the coils. The current direction is such that the coils coact with the magnetic fields to drive an end of the selected strip linearly out of the open container, thereby selecting that strip.

Background of the invention

Field of the invention.—The invention relates to apparatus for selecting a desired strip or card and, more particularly, to apparatus for selecting and driving a strip from a group of such strips.

Description of the prior art.—In existing strip selection devices where the exact location of a desired strip is not known in advance, selection is typically made by mechanical action. Each strip is uniquely coded by means of tabs and/or notches along an edge. Selected mechanical rods or fingers are then positioned to engage or interact with the coded tabs or notches on the strip or card. A driving means is then provided to cause relative motion between the strip engaged by the rods or fingers and the mass of strips to thereby place the selected strip or card in position to be engaged by an auxiliary means for moving the strip or card out of the storage area. Thus, existing devices require three sequential mechanical operations before a strip or card is selected and moved out of the storage area.

The mechanical selection of the strip or card and the forces generated between the selection apparatus and the tabs or notches in the movement of the selected strip or card relative to the mass of strips subjects the tabs or notches to substantial tearing forces and to wear. The tabs and notches are also vulnerable to being caught or twisted during movement, causing failure of the apparatus and substantial wear to the strip or card.

Summary of the invention

An object of the present invention is to provide apparatus for non-mechanically selecting and driving a strip from a random group of such strips and thereby avoid the necessity for tabs or notches thereon.

The invention comprises apparatus for selecting a strip from a group of strips by electromechanically driving the selected strip outwardly from the group of strips. Each strip in the group of strips has an electric coil laminated thereon, terminating in coded contact points. Coded contact means are in individual electrical contact with each of the coils as determined by the coded contact points. Magnetic means is arranged in linear-motor relationship with the coils, such that the magnetic field therefrom ex-

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tends through each of the coils in a manner whereby a current in a predetermined direction in a coil exerts a force with respect to the magnet means to drive the coil, and hence the associated strip, in a linear direction. Selection apparatus is provided for supplying electric current to a selected one of a coded contact means, thereby energizing a selected coil. The current in the selected coil thus coacts with the magnet means to drive the strip associated with the coil linearly outwardly with respect to the group of strips, thereby selecting the desired strip.

Brief description of the drawings

FIGURE 1 is a schematic illustration of force on a current carrying conductor in a magnetic field;

FIGURE 2 is a perspective view of a strip selection device in accordance with the present invention;

FIGURE 3 is a side view of a strip selection device constructed in accordance with the present invention;

FIGURE 4 is a top view of the strip selection device of FIGURE 3; and

FIGURE 5 is a front view of the strip selection device of FIGURE 3.

Description of the preferred embodiment

FIGURE 1 illustrates the linear motor structure employed to drive a selected strip or card linearly out of an open container, thereby selecting that strip.

The linear motor comprises a conductor 10 shaped in the form of a coil, and magnetic poles 11 through 14. Magnetic poles 11 and 12 are opposite in polarity so as to impose a magnetic field extending through the gap therebetween. Likewise, magnetic poles 13 and 14 are of opposite polarity to impose a magnetic field at the gap therebetween, the polarity of poles 13 and 14 being the reverse of poles 11 and 12. Thus, the magnetic field between poles 13 and 14 is opposite in direction to the magnetic field between poles 11 and 12. In the specific arrangement shown, poles 11 and 14 are north magnetic poles and poles 12 and 13 are south magnetic poles.

A current i may be applied to conductor 10 in the direction of arrows 15 and 16. The current thus flows downward through the magnetic field formed by magnetic poles 13 and 14, thereby generating a force on conductor 10 in the direction of arrow 17. The current also flows through conductor 10 upwards through the reverse field formed by magnetic poles 11 and 12, thereby generating a like force in the direction of arrow 18. The forces thus generated on opposite sides of coil 10 are in the same direction and hence, tend to move coil 10 linearly out of the respective magnetic fields in the direction of arrows 17 and 18.

FIGURE 2 illustrates a strip selection device constructed in accordance with the invention. The construction employed is designed to correspond to the linear motor structure outlined in FIGURE 1.

A plurality of strips or cards 20 are provided, each of which may be uniquely selected by the apparatus of the present invention. Each strip is provided with a coil 21-23, which may be laminated thereon. In the preferred embodiment shown, the coil is wound in a rectangularly-shaped spiral 21 on one side of the card, terminating at contact 22. Contact 22 extends through strip 20 and connects spiral 21 to a similar spiral 23 laminated on the other side of the strip. Spiral 23 terminates at terminal 24 at one edge of the strip, and spiral 21 terminates at terminal 25 at the opposite edge of the strip. In the embodiment shown, the terminal 24 for each strip 20 is located at the same point along the edge of the strip. Terminals 25, 26, 27 and 28, however, are each located at a unique point along the edge of the strip.

Contact means 30-34 make electrical contact with the terminals 24-28 on strips 20.

Contact means 30 is connected to the negative pole of a direct current source 35. The direct current source may comprise a battery, rectified A.C., or any other suitable D.C. source. Contact means 31-34 are individually connectible to the positive pole of D.C. source 35 by means of switches 36-39. Operation of a selected one of the switches thereby completes an electrical circuit from D.C. source 35 through the selected switch 36-39, the corresponding contact means 30-34, the corresponding terminal 25-28 at the edge of the corresponding strip 20, the selected coil 21-23, the corresponding terminal 24, and common contact means 30 to D.C. source 35.

Magnetic pole pieces 40-43 are provided and correspond to pole pieces 11-14 of FIGURE 1. Pole pieces 40 and 41 are of opposite magnetic polarity and form a gap therebetween, across which is generated a magnetic field. Likewise, magnetic poles 42 and 43 are of opposite polarity and form a gap, generating a magnetic field thereacross. The polarity of poles 42 and 43 are the reverse of poles 40 and 41. The arrangement of the magnetic polarities is identical to that of FIGURE 1, as is the arrangement of the electrical circuitry. Therefore, the electrical current generated as well as the magnetic fields are the same as those shown in FIGURE 1 such that the force generated due to the current flowing in the selected coil causes a force on each side of the coil corresponding to arrows 17 and 18 in FIGURE 1. Magnetic poles 40 and 41 may comprise opposite poles of a horseshoe magnet, as may magnetic poles 42 and 43. It is anticipated, however, that any suitable type of magnetic means may be used, including bar, horseshoe or other type of permanent magnet or electromagnet means.

In operation, one of the strips 20 may be selected by engaging the corresponding switch 36-39. For example, switch 37 may be engaged. Such engagement connects the positive pole of D.C. source 35 to contact means 32. The contact means 32 is electrically in contact with terminal 26 and completes an electrical circuit through the associated coil 21-23 to terminal 24. Terminal 24 is in contact with contact means 30, which is connected to the negative pole of D.C. source 35. By completing this electrical circuit, current is transmitted thereby and progresses through both spiral 21 and spiral 23 of coil 21-23 in a downward direction in the gap formed between pole pieces 42 and 43 and upward in the gap formed by pole pieces 40 and 41. This current reacts with the magnetic fields to form a linear motor forcing those conductors on a selected strip and within both gaps to the right. This causes the respective conductors to be ejected to the right from the respective fields, thereby moving the strip to the right. The initial movement of the strip removes terminals 24 and 26 from contacts 30 and 32 and thereby terminates the current in coil 21-23 before the conductor ejected from the gap between magnets 40 and 41 reaches the gap between magnetic poles 42 and 43. Thus, there is no opportunity for the poles 42 and 43 to slow the movement of the strip by tending to drive it backwards. The momentum given the selected strip 20 by the short activation of coil 21-23 is therefore sufficient to move the right end of the strip significantly out of the group of strips.

At this time well known means such as employed in other strip files may transfer data to or from the strip or alter data on the strip and then reinsert the strip into group of strips. Although the strip may be inserted at any point in the group of strips, for ease of operation, the selected strip should be inserted at one end of the group of strips.

Regardless of its position within the group of strips, the same strip will always be selected by energization of the same switch. For example, switch 37 will always select the same strip since it is associated with the terminal 26 belonging uniquely to the selected strip.

FIGURES 3 through 5 illustrate the preferred structural embodiment of a strip selection device in accordance with the present invention.

Referring to FIGURES 3-5, three cells 45-47 are shown, each holding four strips 20. These strips are each constructed exactly as shown in FIGURE 2. The strips within each cartridge may be arranged in any order. More cartridges than the three shown may be utilized and may be arranged in various manners, the manner utilized comprising no part of the present invention.

The closed end of the cartridges are positioned within electromagnet coil assemblies 48 and 49. Each assembly is formed from two identical comb-like arrangements wherein each tooth is wrapped with an individual coil 50. The coils 50 are connected to a current source in such a manner that the current flow therethrough generates magnetic fields causing the teeth of the comb to assume the following magnetic polarities: Magnetic poles 51, 54, 55 and 58—north magnetic polarity, and magnetic poles 52, 53, 56 and 57—south magnetic polarity.

Contact apparatus is provided for each cartridge which is connected to switching means and a current source substantially as shown in and described with respect to FIGURE 2. The arrangement with respect to cartridges 45 and 47 is the same as that of FIGURE 2, and the arrangement with respect to cartridge 46 utilizes a current source connected in the circuitry in the opposite direction and which otherwise is the same as that of FIGURE 2. The contacts 30-34 are shown in FIGURE 3 and are substantially identical to those shown in FIGURE 2. These contacts lie against the edges of the strips of cartridge 45 and in contact with terminals 24-28. The cartridge further includes a rear stop 59 against which the base of the strips rest when inserted in the cartridge.

The operation of the apparatus of FIGURES 3 through 5 is identical to that of FIGURE 2. Magnet assemblies 48 and 49 establish magnetic fields in one direction in the gaps between magnetic poles 51 and 53, between poles 54 and 56, and between poles 55 and 57. Magnetic fields in the opposite direction are established in the gaps between magnetic poles 52 and 54, between poles 53 and 55, and between magnetic poles 56 and 58. Referring additionally to FIGURE 2, a strip is selected by closing one of the switches 36-37. For example, assume that switch 37 is thrown so that current source 35 is connected via switch 37, contact 32, and terminal 26 to the coil 21-23 for the selected strip. The other terminal of current source 35 is connected via contact means 30 and terminal 24 of the selected card to coil 21-23 of the selected strip. The resultant current flow therefore proceeds downward in the gap between magnetic poles 51 and 53 and upward in the gap between poles 52 and 54. This current coacts with the magnetic fields to create a linear motor, as discussed above, which provides a force tending to eject the conductors to the right.

This force moves the strip to the right, ejecting the right end of the strip from cartridge 45. The movement of the strip removes terminals 26 and 24 from contact with contact means 30 and 32, thereby preventing further flow of current through the coil. The inertia given the strip by the force for the duration of the current flow through the coils 21-23 ejects the strip to the right until stopped by a stop or until friction brings the strip to a halt. The desired strip is thus selected by ejecting the right end thereof out from the remaining strips 20 in cartridge 45 where it may be engaged by a transfer station and data transferred to or from the strip.

As discussed above, the selection of the desired strip is accomplished regardless of the placement of the strip within cartridge 45. This selection is accomplished electrically and not mechanically, thereby avoiding mechanical wear and tear on the strips and on the selecting mechanism.

By additional switching means, an oppositely directed current may be impressed through the coils of the strips

which are not selected, thereby restraining them against movement out of the cartridge. The reverse current may be considerably less in amplitude than the driving current. The reverse current is just enough to prevent the non-selected strips from being moved by friction or viscous drag created by the selected strip.

While the invention has been particularly shown and described with reference to a preferred embodiment thereof, it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the spirit and scope of the invention.

We claim:

1. Apparatus for selecting a strip from a group of strips by driving the selected strip outwardly from said group of strips, comprising:

a plurality of strips, each strip having an electric coil substantially coplanar thereon;
coded contact means, a unique combination of which are in individual electrical contact with each of said coils;

magnetic means arranged in linear-motor relationship with said coils providing a magnetic field common to all the coils on said plurality of strips, and selection means for supplying electric current to a selected unique combination of said coded contact means, energizing one of said coils to coact with said magnetic means and drive the strip associated with said coil linearly outwardly with respect to said plurality of strips, thereby selecting said strip.

2. The apparatus of claim 1 wherein:

each of said strips comprises a substrate upon which is laminated electric conducting material in the form of an electric coil.

3. The apparatus of claim 1 wherein:

said coil terminates at two terminals having a unique combination of locations along the edge of said strips, and

said coded contact means are positioned against the edges of said strips, such that a unique combination thereof are in individual contact with each of said unique combination of terminals and, upon said selection of one of said strips, said terminals of said strip are moved out of contact with said unique combination of contact means.

4. The apparatus of claim 2 wherein:

said electric conducting material is laminated on both sides of said substrate, said material on each side being generally spiral in form and interconnected

at the centermost point of the spirals, said spirals being arranged such that the coaction of said electric current therein and said magnetic means provides linear motor force on both of said spirals acting in the same direction.

5. The apparatus of claim 4 wherein:

the outermost point of both of said spirals for each strip terminate at two separate terminals having a unique combination of locations along the edge of said strips, and

said coded contact means are positioned against the edges of said strips, such that a unique combination thereof are in individual contact with each of said unique combination of terminals and, upon said selection of one of said strips, said terminals of said strip are moved out of contact with said unique combination of contact means.

6. The apparatus of claim 1 wherein:

said magnetic means generates two magnetic fields extending in opposite directions through opposite sides of each of said coils, whereby an electric current in a predetermined direction in a coil exerts a force with respect to said magnetic means to drive both said opposite sides of said coil, and hence the associated strip, in a linear direction.

7. The apparatus of claim 4 wherein:

said spirals are generally rectangular in shape; and said magnetic means comprises means to generate two magnetic fields extending in opposite directions through two opposite sides of each of said spirals, whereby an electric current in a predetermined direction in a coil exerts a force between each of said two opposite sides of said spiral and said magnetic means to drive said sides of said spiral, and hence the associated strip, in a linear direction.

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