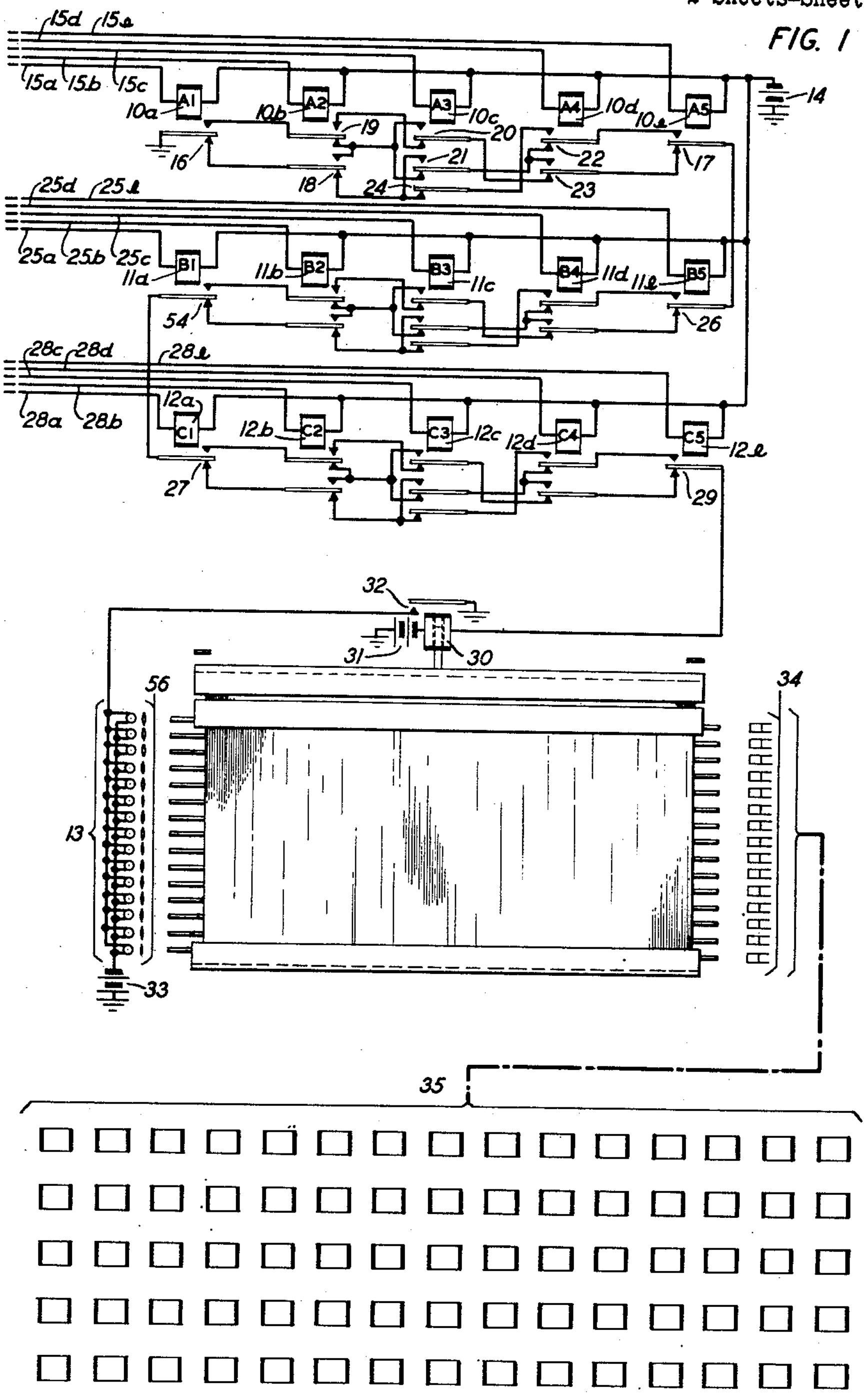
June 26, 1951 O. MYERS 2,558,577

ELECTROMECHANICAL TRANSLATOR

Filed Oct. 31, 1946 2 Sheets-Sheet 1

FIG. 1



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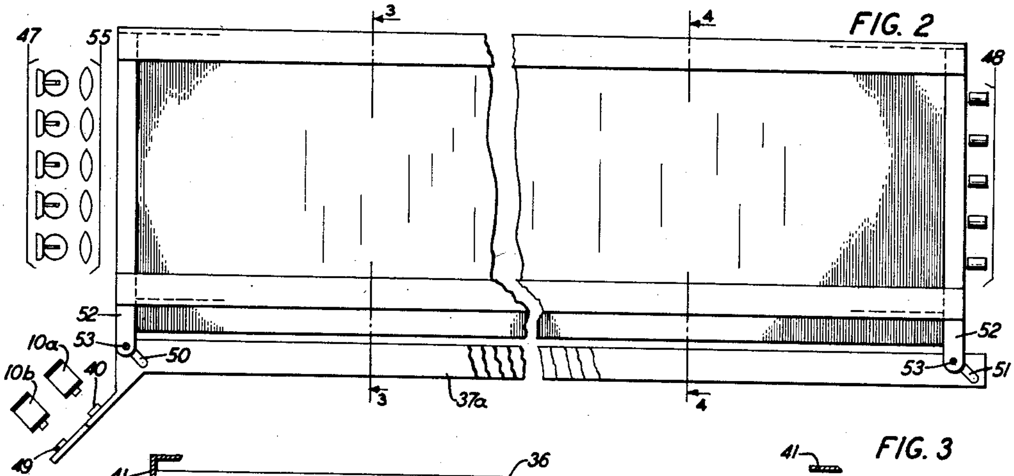

FIG. 2

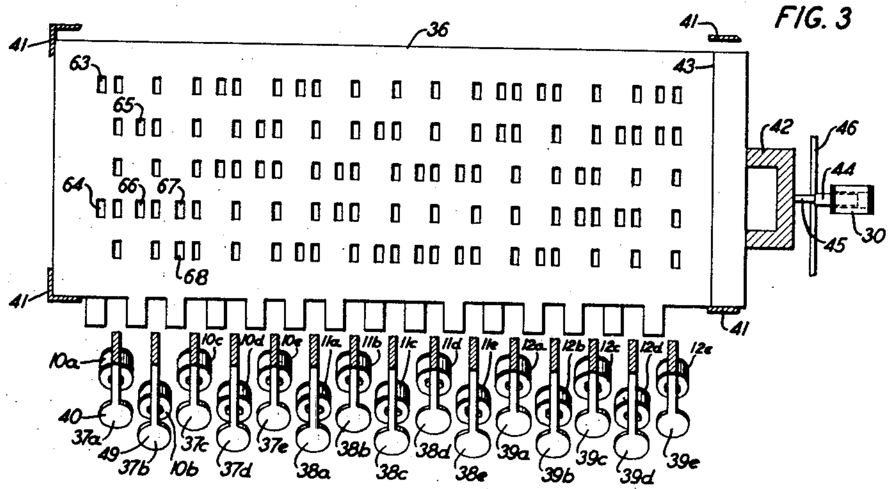

FIG. 3

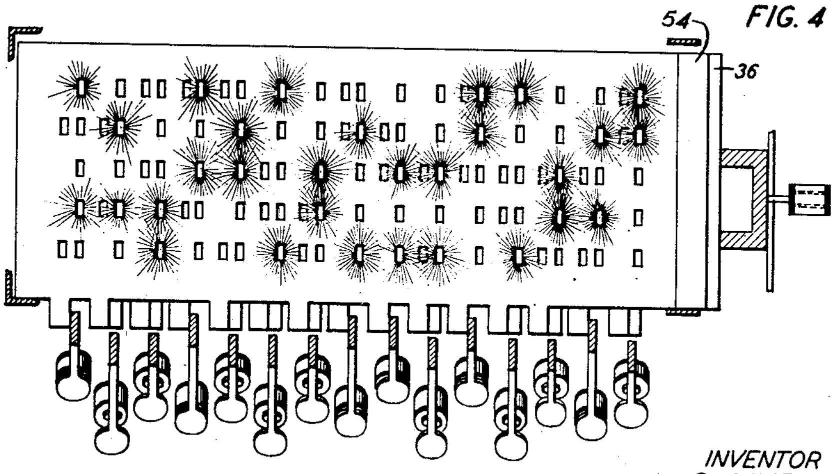

FIG. 4

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ELECTROMECHANICAL TRANSLATOR

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23 Claims. (Cl. 179—18)

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This invention relates to translators and, more particularly, to card translators and methods of translation using photoelectric effects to register their output information.

A feature of the present invention is a card translator which will be comparatively simple in construction, easy in operation, compact in form and inexpensive to build.

Another feature of the subject invention is a card translator whose input information is obtained by the operation of two registers in each of a number of groups containing five registers in a group, each group serving to convey information as to a different one of the digits constituting the input code number.

A further feature of the subject invention is a translator arrangement in which each card has a distinctive pattern of wide and narrow notches along one edge of the card and in which the card to be selected is operated on only at those places where it has wide notches.

Still another feature of this invention is a translator arrangement in which the output information from a selected card is transmitted by means of a radiant energy system, which passes energy through a distinctive pattern of apertures in the card and energizes a distinctive pattern of registers on the output side.

A still further feature of the invention is a translator arrangement in which a card may be replaced with another card having a different pattern of wide and narrow notches or a different pattern of apertures without necessitating any changes in the construction of the translator itself and without complicating its method of operation, thereby making the apparatus adaptable for a variety of uses in which translators of this kind may be employed.

Still other advantages of the invention will become apparent during the following discussion, when considered in conjunction with the accompanying drawings.

In this system of card selection, each card is provided with a plurality of wide and narrow notches along a corresponding edge, with the pattern of wide notches varying from card to card. When the cards are aligned together, two narrow notches along the edge of one card will extend the length of a wide notch at a corresponding position along the edge of another card. The resultant number of notches which appear when the cards are viewed in their stacked relationship will exceed the number of notches appearing on any one card. A selecting bar lies adjacent to each of the notches appearing in the stacked

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card relationship and an input register is associated with each selecting bar. The input registers are actually magnets which when operated cause their associated selecting bars to be displaced by the attractive force of the magnets on magnetic plates fastened to the ends of the selecting bars and as a result the selecting bars are inserted into their adjacent notches. Selection of a card is obtained by inserting selecting bars into the notches only at those places where the particular card has wide notches. Since all of the cards except the selected card will have selecting bars inserted into at least one narrow notch, these cards will be clamped against movement while the wide notches will permit some lateral movement in the selected card.

After a particular card has been selected, the output information on the card is obtained through radiant energy means. Each card is provided with series of apertures, or, more restrictively in the preferred embodiment, perforations which are punched in the cards in such a manner that the apertures on the different cards are aligned when the cards are stacked in their normal relationship. Next to some of the apertures in the regular series are auxiliary apertures but these apertures, unlike the regular series of apertures, are distinctively patterned on each card. Thus if a card is displaced a certain distance all of the original apertures will become covered by the displaced card except for those apertures which have auxiliary apertures punched in adjacent positions, since the auxiliary apertures of the displaced card will now be in the position that the first apertures formerly occupied. An individual source of radiant energy is aligned with each of the apertures common to every card when the cards are in their normal stacked relation and a separate means responsive to the radiant energy sources is aligned with each aperture and radiant energy source. When a selected card is displaced, however, only those responsive means which are aligned with apertures individual to the selected card will be energized, since the displaced card will block continuity between all other radiating sources and responsive means.

After registering the output information from a selected card, the same means which operated to displace the card are now operated in reverse to return the card to its normal stacked relationship, thereby restoring the translating device to normal preparatory to the start of another cycle of input registartion.

A translator of this type has a fundamental advantage. In former types of translators complicated systems of relays and other apparatus were employed. Suppose in such a system as used in telephony for translating each of ten thousand numbers into other numbers it became desirable or necessary to change the cross-connections so that a given number which was translated into a second number would be translated into a third number; this involved difficult changing of electrical connections. By means of a translator according to the present invention, however, the change may be made by the easily performed operation of substituting one card for another.

Referring to the accompanying drawings,

Fig. 1 is a simplified circuit diagram of the electrical features of the invention, with the electrical features being viewed in relation to the mechanical details upon which they act;

Fig. 2 shows a side view of the cards in their stacked position and illustrates how the cards are acted upon by an input register;

Fig. 3 shows a front view of a particular card before it has been selectively operated upon by certain of the input registers;

Fig. 4 is a front view of a second card, with particular emphasis being placed upon its relationship to the first card after the first card has been selectively displaced.

In Fig. 1, to which reference is now made, a simplified circuit diagram of the electrical features of the invention is shown. These comprise the electromagnets **10***a* through **10***e*, inclusive; **11***a* through **11***e*, inclusive; and **12***a* through **12***e*, inclusive, which serve as the input registers; and radiant energy producing means, shown as the numeral **13**. The electromagnets **10***a* through **10***e*, inclusive, are arranged so that one terminal of each magnet is connected to one side of the battery **14**, the other side of which is grounded. The other terminals of the electromagnets connect to the leads **15***a* through **15***e*, inclusive, these leads in turn connecting to the "sender," which receives the dialed information and feeds it to the card translator for decoding action by the translator. The electromagnets shall thereafter be referred to simply as magnets. The "sender" is not shown in Fig. 1, since it is just one of a number of means for introducing an input code to the card translator. When the first digit of a code number is dialed, two out of the five input leads **15***a* through **15***e* are grounded, and thus two of the first five magnets become energized, with the particular two magnets which are energized depending upon the number that is dialed. Thus, for example, if the number "2" is dialed, magnets **10***a* and **10***c* may be excited, while magnets **10***c* and **10***e* may be excited if the digit "9" is dialed. Associated with the magnets **10***a* through **10***e*, **11***a* through **11***e*, and **12***a* through **12***e* are movable contact armatures comprising, with the magnets, relays designated **A1** through **A5**, **B1** through **B5**, and **C1** through **C5**, respectively. Associated with the particular magnets **10***a* and **10***e* are the two relay armatures **16** and **17**, respectively. When the magnets are not energized, these armatures are positioned so as to make electrical connection with the lower contact. When their respective magnets are energized, however, the armatures are attracted toward the magnets so as to establish a continuous circuit at the upper contacts. The magnets **10***b*, **10***c* and **10***d* each have two armatures similar to the armatures **16** and **17** associated with them and in addition the magnet **10***c* has associated with it a third armature **24**, which is of the one contact variety. The lower contact **16** of relay **A1** is connected to the armature **18** of relay **A2**, and the upper contact **16** of relay **A1** is connected to the armature **19** of relay **A2**, both the armatures **18** and **19** being responsive to the magnet **10***b*. In addition, the upper contact **18** of the relay **A2** is connected to the lower contact **19** of the relay **A2**. In like manner, the upper contact **19** of the relay **A2** is connected to the lower contact **20** of the relay **A3** and the lower contact **19** of the relay **A2** is connected to the upper contact **20** of the relay **A3** as well as the lower contact **21** of the relay **A3**, while both the upper contact **21** and contact **24** of the relay **A3** are connected to the lower contact **18** of the relay **A2**. From the armatures **20**, **21** and **24** connections are made to the lower contact **23** of the relay **A4**, the upper contact **23** of the relay **A4**, and the upper contact **22**, also of the relay **A4**, respectively, with an additional connection being made from the armature **21** of the relay **A3** to the lower contact **22** of the relay **A4**. Similarly, the armatures **22** and **23** of the relay **A4** connect to the upper and lower contacts, respectively, of the relay **A5**. It will thus be seen that unless two of the magnets **10***a* through **10***e*, inclusive, are energized, a continuous circuit will not be established from the armature **16** of the relay **A1** to the armature **17** of the relay **A5**. Suppose, however, that the number "2" is dialed and magnets **10***a* and **10***c* are energized. This in turn will cause the armature **16** of relay **A1** and the armatures **20** and **21** of the relay **A3** to be attracted to their upper contacts. Simultaneously the armature **24** of the relay **A3** will break electrical connection with its contact. A continuous circuit will now be established from the armature **16** through the upper contact of relay **A1** to the armature and lower contact **19** of relay **A2**, then to the upper contact and armature **20** of relay **A3**, through the lower contact **23** and armature of relay **A4** until finally the lower contact **17** and armature of relay **A5** is reached. In like manner, a continuous circuit may be traced from the armature **16** of relay **A1** to the armature **17** of relay **A5** when any other combination of two magnets is energized.

Whereas the magnets **10***a* through **10***e*, inclusive, are responsive to the first digit of an input code number, the magnets **11***a* through **11***e*, inclusive, are actuated by the second digit that is dialed. As with the first bank of magnets, each of the magnets **11***a* through **11***e*, inclusive, also has one side connected to the battery **14**, while the other side is connected to the leads **25***a* through **25***e*, respectively, which in turn connect to the same "sender" as the leads **15***a* through **15***e*, inclusive. A number of relay armatures similar to the armatures **16** through **24**, inclusive, are associated with the magnets **11***a* through **11***e*, inclusive, comprising relay **B1**, **B2**, **B3**, **B4**, and **B5**, respectively. These armatures are connected together and operate in the same fashion as was previously described in connection with the relays **A1** through **A5**. Thus, in order that a continuous circuit be established from the armature **26** of the relay **B5** to the armature **54** of the relay **B1**, which are operated upon by the magnets **11***e* and **11***a*, respectively, two of the magnets **11***a* through **11***e*, inclusive, must be excited.

From the armature **54** of the relay **B1**, connection is made to the armature **27** of the relay **C1**, which is associated with the magnet **12***a*. The relay **C1** is the first of a number of relays similar to the relays **A1** through **A5**, inclusive. These relays perform the same functions when any combination of two of the magnets 12a through 12e are actuated that the relays A1 through A5, inclusive, perform when a combination of any two of the magnets 10a through 10e is actuated. Whereas, however, the magnets 10a through 10e are actuated by the first digit dialed, the magnets 12a through 12e, inclusive, are actuated by the third digit of an input code number. These magnets are connected in a similar fashion to the magnets 10a through 10e, inclusive, with one side of each magnet being connected to the battery 14 and the other side being connected to one of the leads 28a through 28e, inclusive, these leads in turn being connected to the same sender as the leads 15a through 15e and 25a through 25e, inclusive. When two of the magnets 12a through 12e, inclusive, are actuated, a continuous circuit will be established from the armature 27 of the relay C1 to the armature 29 of the relay C5. Since a continuous electrical path will already have been formed between the armatures 16 and 17 of the relays A1 and A5 and between the armatures 26 and 54 of the relays B5 and B1 by the dialing of the first two digits and since the armatures 17 and 54 of the relays A5 and B1 are connected to the armatures 26 and 27 of the relays B5 and C1, respectively, a continuous circuit will be formed from the armature 16 of the relay A1 to the armature 29 of the relay C5. Although only three banks of relays are shown, it should be realized that additional banks may be provided if the input code number contains more than three digits. Likewise, if more than ten values should be obtainable for each digit, an increase over the five registers shown in each bank might be necessary. Thus, for example, a two-out-of-six code would yield fifteen combinations and a two-out-of-seven code would yield twenty-one different combinations. The relay circuit described above could be adjusted easily to accommodate the additional magnets in each bank.

When a continuous electrical path is established to the armature 29 of the relay C5, the electromagnet 30 will be energized, since one side of the electromagnet 30 is connected to the armature 29 of the relay C5 and the other side is connected to the battery 31. A return path is provided through the armature 16 of the relay A1, which is grounded together with the second side of the battery 31. Excitation of the electromagnet 30 causes the contact 32 to close and thus allows a continuous circuit to be established from the battery 33 through the series 13 of radiating energy sources through the contact 32 and then back to the ground side of the battery 33 by means of the ground connection on the armature 32.

In addition to closing a circuit through battery 33 so as to illuminate the radiant energy sources 13, the magnet 30 also exerts a lateral pull on all the cards in the stack, as may be seen from the top view of the translator in Fig. 1. Similarly the magnets 10a through 10e, 11a through 11e, and 12a through 12e in addition to operating the relays A1 through A5, B1 through B5, and C1 through C5, respectively, also operate upon the selecting bars 37a through 37e, 38a through 38e, and 39a through 39e, respectively, as shown in Fig. 3, so as to select a card in accordance with the input code, as shown by Fig. 4. It should be realized that a number of forms of radiant energy may be used, such as photoelectricity, infrared energy or ultra-violet energy. Thus, the series 13 of energy sources might be electric bulbs or sources of infra-red or ultra-violet energy. The following discussion will proceed on the theory that electric light bulbs are used. Since a continuous circuit is established, the bulbs 13 will glow and will send out light through certain apertures which will be present in each card in their stacked relationship, even when one of the cards has been displaced by the action of the magnets 10a through 10e, 11a through 11e and 12a through 12e and also the magnet 30, which also operate relays A1 through A5, B1 through B5, and C1 through C5. The cards are shown in their stacked relationship in Fig. 1, and the electric bulbs 13 are located on one side of the stack, facing the cards in such a way that the light will shine completely on the face of the first card. A directive device is aligned with each radiating source and aperture for the purpose of directing into a beam the energy from the radiating source, and this beam passes through the corresponding aperture and energizes an output register associated with the particular energy source and aperture. The output registers may be means responsive to the same form of energy as used for the radiating source, such as photoelectric or ultra-violet or infra-red responsive means. Since the following discussion will proceed on the theory that photoelectricity is the form of energy used, the series 34 of output registers must be means responsive to photoelectric energy such as photoelectric tubes. Such responsive means are known and need not be enumerated here. This series 34 of output registers is shown as being in corresponding positions to the light bulbs 13 but on the opposite side of the stack of cards to the bulbs 13 so that only those registers will be operated corresponding to the bulbs which are allowed by the displaced card to pass light through the cards. If the output registers could be viewed from a position in which the full face of the card stacked closest to the output registers could be completely seen, they would appear as the plurality of registers 35 shown at the bottom of Fig. 1. The number of output registers may be different from the number of input registers and the output code be different from the input code. Additionally, since the discussion will proceed on the basis that photoelectricity will be the form of radiating energy employed, the directive devices between the series 13 of bulbs and the corresponding apertures may be a series of collimating lenses shown as the numeral 56.

Referring now to Fig. 3, the factors which cause a particular card to be selected and a code to be transmitted are illustrated by means of a face view of the card 36. Briefly, the notches on the bottom of the card 36, when operated upon by the selecting bars beneath the notches, cause the card to be selected, while the apertures cut into the face of the card determine the particular code that will be transmitted by the card. As may be seen in Fig. 3, fifteen selecting bars are positioned beneath the card 36 although a different number of selecting bars and a different number of notches may be used as discussed previously in connection with the input registers shown in Fig. 1. If these selecting bars be considered divided into three groups containing five bars in a group and if a combination of two bars out of the five bars in each group be actuated by one of the three digits in a three-digit code number, a particular card may be selected. Thus, the selecting bars 37a through 37e, inclusive, comprise the first group; the selecting bars 38a through 38e, inclusive, comprise the second group; and the bars 39a through 39e, the third group. Each selecting bar has a magnetic plate similar to the magnetic plate 40 shown at the end of the selecting bar 37a. These magnetic plates lie below magnets which, when actuated, operate on the corresponding magnetic plates so as to lift the selecting bars upward into the notches on the card. Thus the magnets 10a through 10f operate on the selecting bars 37a through 37e; likewise, the magnets 11a through 11e operate on the selecting bars 38a through 38e, inclusive, and the magnets 12a through 12c, inclusive, operate to raise the selecting bars 39a through 39e. The magnets 10a through 10e, 11a through 11e, and 12a through 12e are the same magnets as shown in Fig. 1, which also operate relays A1 through A5, B1 through B5, and C1 through C5.

As has been previously mentioned, each card has a series of notches cut from the bottom edge of the card. Each of these notches is directly above one of the selecting bars such that when the selecting bar is raised by the action of the corresponding magnet, it will be inserted into the notch. If, now, notches for all of the selecting bars were cut into each card, each card would have a number of teeth between notches corresponding to the number of selecting bars, that is to say, fifteen teeth. Also, when any selecting bars were raised, all of the cards would be locked from movement in a horizontal direction so long as the bars fitted snugly into the notches. If, however, in each group, two teeth are removed so that a combination of three narrow notches and two wider notches is formed, insertion of the selecting bars into those notches where a particular card had teeth removed would allow that card to be moved. However, since the combination of teeth removed is different for each card, every other card in the stack would have a selecting bar inserted into at least one narrow notch on the card and so these cards would be restrained from moving in a horizontal direction. As may be seen from Fig. 3, the card 36 has had the teeth between notches removed from the first and fourth teeth of the first group, the third and fourth teeth of the second group and the first and fourth teeth of the third group. This may be seen from the fact that these teeth appear in Fig. 3 from cards in back of the card 36. Thus, if the proper numbers be dialed so that the selecting bars 37a and 37d in the first group, 38c and 38d in the second group, and 39a and 39d in the third group are raised, only the card 36 will be allowed to move to the right, the other cards being positioned with respect to any movement to the right in the plane of the paper by at least one of the inserted selecting bars. The detent means 41 restrain the cards from movement in any direction except a possible movement to the right.

Movement to the right in the plane of the paper, as viewed with respect to Figs. 3 and 4, is accomplished by means of the permanent magnet 42. This magnet rests against a corresponding edge of each card in the stack in juxtaposition to a magnetic strip placed on each card, such as the magnetic strip 43 on the card 36, the magnetic strip running along that edge of the card which is in juxtaposition to the magnet 42. Instead of a magnetic strip at the edge of each card, however, the same result may be obtained by making each card from a magnetic material. In the normal position, when the cards are in alignment with each other, none of the cards can move by the action of the magnet 42 on the magnetic strips since the magnet 42 touches the strips. However, when the electromagnet 30, which is the same electromagnet as that described in connection with the discussion

of Fig. 1, is energized, it attracts the armature 44 towards it. Since the armature 44 as well as the magnet 42 is attached to the shaft 45, the magnet 42 will move towards the electromagnet 30 and its reaction on the magnetic strips will exert a force to the right on all of the cards. However, only that card having wide notches at the positions where the selecting bars were inserted will be free to move, the other cards being positioned by the snug fit of at least one selecting bar into a corresponding notch. Fig. 4 shows how the card 36, if it is selected, would be displaced with respect to the position of all the other cards in the stack, as represented by the card 54.

Referring again to Fig. 3, the means by which a distinctive output registration for each card may be obtained is also illustrated. As may be seen, a vertical row of main apertures is positioned in alignment with the selecting bar 37a. Likewise, a row of main apertures is positioned above each of the other selecting bars. Thus fifteen vertical rows of main apertures, corresponding to the fifteen selecting bars, are shown in Fig. 3, with each row containing five apertures. However, any other number of rows than fifteen could be used and likewise the number of apertures in each row could be varied from five. Also, the apertures need not be aligned with the selecting bars as illustrated in the accompanying drawings but may be arranged in any desired manner. To the left of some of the apertures in each row of main apertures are auxiliary apertures, all of which are spaced the same distance from their corresponding main apertures. Thus, in the first row of apertures on the card 36, the first and fourth apertures in the row, indicated as the numerals 63 and 64, respectively, are auxiliary apertures located to the left of the original apertures and horizontally aligned with the original apertures. Likewise, in the second row, the second and fourth apertures have the auxiliary apertures 65 and 66 and in the third row the fourth and fifth apertures have the auxiliary apertures 67 and 68. Examination of each row on the card 36 will disclose that two of the original apertures in the row have auxiliary apertures to their left. If, now, the card to be selected is shifted to the right a distance equal to the distance between the centers of the main and auxiliary apertures, the selected card will cover all the main apertures of the other cards in the stack except for those places which have auxiliary apertures. Only at those places where the displaced card has auxiliary apertures will the auxiliary apertures be able to assume the position of the original apertures so as to allow light from electric bulbs to pass through the stack and and register information on the output registers. The plate 46 serves to limit the distance the selected card may be displaced to the distance between the centers of the original and auxiliary holes. It will thus be seen that a distinctive pattern for each card may be obtained from the output registers.

It should be realized that the main apertures do not have to be aligned in rows. As long as an electric bulb and an output register are aligned with each of the main apertures, the main apertures may be arranged in any manner desired. The main apertures are aligned in rows in Fig. 3 only for the purpose of simplifying the appearance of the drawings. Furthermore, transparent portions substituted for the apertures would serve the same function as the apertures, namely, allowing energy to pass from the radiating source to the responsive source. Consequently, an actual opening in a card and a portion which is transparent to the particular kind of radiant energy employed are considered to be equivalents and the appended claims are to be read as though either of these expressions included the other. likewise, instead of having both main and auxiliary apertures the main apertures might be increased in width wherever an auxiliary aperture was formerly used. This would still allow a coded pattern of apertures to be apparent whenever a card was displaced.

Fig. 2 is a side view with respect to Fig. 3 and shows the cards in their stacked position. Five electric bulbs for lighting the first row of apertures shown on the card in Fig. 3 are shown at the left side of Fig. 2 and are indicated as the numeral **47**, and the five associated lenses for directing the light from each of the bulbs are shown as the numeral **55**. The five output registers which register the information from the bulbs **47** are shown at the right of Fig. 2 as the numeral **48**. The selecting bar **37***a* is shown at the bottom of the stack of cards and extends all the way across the stack, with a portion extending downward and away from the stack at the left. This portion is shown as the part that is not cross-hatched in Fig. 3. Referring again to Fig. 2, the magnetic plate **40** is located in this extension of the rod **37***a* and is attracted upward by the magnet **10***a*, which is located above the plate **40** in such a direction that its axis is perpendicular to the portion of the selecting bar **37***a* that extends beyond the stack of cards. The magnet **10***b* is located below the magnet **10***a*, as shown in Fig. 2 and illustrated further in Figs. 3 and 4, while the magnetic plate **49**, which is associated with the magnet **10***b*, is a corresponding distance below the plate **40**. Each of the selecting bars has a pair of slots, such as the slots **50** and **51** in the selecting bar **37***a*, and thus, when a selecting bar is attracted by its associated magnet, it moves along its slot. However, the slots extend in a vertical as well as horizontal direction, as shown in Fig. 2; consequently, when a selecting bar is attracted by its magnet it will move in an upward direction while moving towards the magnet. The sectional lines **3—3** and **4—4** in Fig. 2 indicate where the views shown in Figs. 3 and 4, respectively, are taken.

While certain specific embodiments of the invention have been described, it should be understood that various other embodiments of the invention may be made by those skilled in the art without departing from the spirit of the invention as defined in the scope of the appended claims.

What is claimed is:

1. An input register and an output register in combination with a stack of opaque plates having a normal position and having a plurality of transparent apertures common to all of said plates, further transparent portions in each plate adjacent to certain of said common transparent apertures in a distinctive pattern for each plate, radiant energy producing means aligned with all of said common apertures, radiant energy responsive means aligned with each of said common apertures, means controlled by said input register for selectively modifying the aligned position of said common apertures in such manner as to obstruct passage of radiant energy from said producing means to all of said responsive means except those responsive means aligned with aligned transparent portions of all said plates, means for affecting said output register means selectively in accordance with the selectivity of the modification, and means for restoring the normal alignment of said plates upon completion of such output registration.

2. A plurality of plates each having a normal or undisplaced position, radiant energy producing means, selective instrumentalities for selectively displacing one of said plates, means operable incident to the selective displacement of any one of said plates to cause said radiant energy producing means to become active, a set of radiant energy responsive devices, paths for transfer of radiant energy from said producing means to said responsive devices, a selected plurality of said paths being established incident to the displacement of a selected one of said plates whereby certain of said responsive devices are energized selectively in accordance with the plate displaced.

3. The method of converting a registration of a multidigit number into another registration which comprises causing the first registration to selectively establish a path or paths for the transmission of radiant energy, causing energy to traverse said established path or paths, and causing the traversing energy to establish said other registration.

4. The method of deriving information from a registration of a number and registering said information in converted form which comprises causing the registration of the number to selectively establish, according to the number, paths for the transmission of radiant energy, projecting radiant energy over said paths, causing currents to flow selectively under control of the radiant energy according to the paths established, and causing the converted information to be registered by said currents.

5. In a card record system, a plurality of perforated cards having identically positioned primary perforations, means for maintaining said cards in stacked relation wherein corresponding primary perforations in all of said cards are aligned, each of said cards having distinctively positioned secondary perforations adjacent to certain of said primary perforations in accordance with a record code, and means for selectively displacing any one of said cards in said stack by a distance corresponding to the spacing between said primary perforations and said secondary perforations, whereby the distinctively positioned secondary perforations of said displaced card may be sensed through the aligned primary perforations of said cards remaining in stacked relation.

6. A translating arrangement comprising, a plurality of input registers, a plurality of output registers, a plurality of stacked cards, means for maintaining said cards in stacked relation, perforations in all of said cards arranged in accordance with a distinctive code for each card, means for selectively displacing any of said cards while maintaining them in said stacked relation by operation of said input registers, and means operable through the perforations of a displaced card to control operation of said output registers.

7. A translator arrangement comprising a plurality of input registers, a plurality of output registers, a plurality of stackable cards, means for maintaining said cards in stacked relation, main perforations in all of said cards arranged in alignment when said cards are in stacked relation, means for displacing selected cards in accordance with a designation set up on said input

registers, auxiliary perforations in said cards arranged in a distinctive pattern for each card, and means operable through the auxiliary perforations of said displaced cards and the main perforations of said stacked cards for operating said output registers.

8. A translating arrangement comprising, a plurality of input registers, a plurality of output registers, a plurality of stacked cards, means for maintaining said cards in stacked relation, main apertures in all of said cards arranged in alignment when said cards are in stacked relation, auxiliary apertures in said cards adjacent to certain of said main apertures and so placed as to be aligned with corresponding main apertures of said stacked cards when a card is selectively displaced, means controlled by said input registers for selectively displacing any of said cards, and radiant energy means operable through the auxiliary apertures of said displaced card and aligned main apertures of said stacked cards to control operation of said output registers.

9. A translating arrangement comprising, a plurality of input registers, a plurality of output registers, a plurality of stackable cards, means for maintaining said cards in stacked relation, main apertures in all of said cards arranged in alignment when said cards are in stacked relation, means for selectively displacing one or more of said cards by operation of said input registers, auxiliary apertures in said cards arranged in a distinctive pattern for each card, said auxiliary apertures displaced from their corresponding main apertures by a distance approximately equal to the distance that the cards are displaced by operation of said input registers, and radiant energy means transmitted through the auxiliary apertures of said displaced cards and the main apertures of said stacked cards for operating said output registers.

10. A translating arrangement comprising a plurality of input registers, a plurality of output registers, a plurality of stackable cards of magnetic material, means for maintaining said cards in stacked relation, main apertures in all of said cards arranged in alignment when said cards are in stacked relation, a magnet in juxtaposition to the edges of all the cards in the stack, means for moving the magnet away from the edges of the cards, said magnet simultaneously attracting one or more of said cards in accordance with a designation set up on said input registers, auxiliary apertures on said cards and radiant energy means operable through the auxiliary apertures of said displaced cards and aligned main apertures of said stacked cards for operating said output registers.

11. A translating arrangement comprising, a plurality of input registers, a plurality of output registers, a plurality of stackable cards, strips of magnetic material attached to a corresponding edge of each card, means for maintaining said cards in stacked relation, a magnet in juxtaposition to the magnetic edge strips of all the cards in the stack, means for moving the magnet away from the edges of the cards, said magnet simultaneously displacing one or more of said cards in accordance with a designation set up on said input registers, main apertures in all of said cards arranged in alignment when said cards are in stacked relation, auxiliary apertures in said cards, and radiant energy means controlled by the auxiliary apertures of said displaced cards and the aligned main apertures of said stacked cards for operating said output registers.

12. A translating arrangement comprising a plurality of input registers, a plurality of output registers, a plurality of stackable cards, a plurality of notches arranged along corresponding edges of each card, a selecting bar associated with each of said notches and said input registers, means for maintaining said cards in stacked relation, main apertures in all of said cards arranged in alignment when said cards are in stacked relation, means for selectively displacing one of said cards in accordance with the insertion into notches of bars selectively chosen by said input registers, auxiliary apertures in said cards, and radiant energy means controlled by the auxiliary apertures of said displaced card and the main apertures of said aligned cards for operating said output registers.

13. A plurality of stacked cards, a plurality of wide and narrow notches arranged along a corresponding edge of each card in a distinctive pattern for each card, a plurality of selecting bars arranged adjacent to each of said notches, a plurality of input registers capable of inserting a combination of said selecting bars into corresponding notches whereby all of said cards are locked from movement except a particular card having all wide notches at the points of insertion, means for laterally displacing said particular card, a plurality of primary perforations common to all of said cards, additional secondary perforations in each card adjacent to certain of said primary perforations in accordance with a distinctive code for each card, and means for operating through said secondary perforations of said laterally displaced card and aligned primary perforations of the remaining stacked cards to effect a distinctive output registration from said displaced card.

14. An opaque plate having its opacity interrupted by coded transparent portions, means for displacing said plate, radiant energy producing means, a plurality of radiant energy responsive means aligned with said radiant energy producing means and said transparent portions in their displaced positions whereby certain of said responsive means are energized in a pattern corresponding to the pattern of said transparent portions.

15. A stack of opaque plates having transparent portions, certain of said transparent portions common to all of said plates in their stacked arrangement, other transparent portions individual to each plate, a source of radiant energy directed against a face of said stack, a plurality of radiant energy responsive means adjacent an opposite face of said stack, said responsive means aligned with said producing means and said common transparent portions, means for displacing a selected plate sufficiently to cause the transparent portions individual to said selected plate to be aligned with corresponding transparent portions common to all of said stacked plates whereby only the receiving means aligned with said individual portions in their displaced position are energized.

16. A plurality of opaque plates having rows of transparent portions common to all plates, further distinctive transparent portions in each plate aligned adjacent to certain of said common transparent portions in such manner that an individual pattern of said distinctive portions is represented on each plate, radiant energy producing means aligned with said common apertures on one side of said plates, separate radiant energy means responsive to said producing means, said responsive means aligned with said producing

means and said common transparent portions on the opposite side of said plates, means for displacing a selected plate sufficiently to cause the distinctive transparent portions individual to said selected plate to become aligned with corresponding transparent portions common to all of said plates whereby only the receiving means aligned with said distinctive portions of said displaced plate are energized.

17. In a telephone system the combination of a sender and a translator comprising an input register, a photoelectric output register, and a plurality of perforated cards in a stack, means for selecting one of said cards in accordance with a coded designation set up upon said input register, means for moving said selected card in translation with respect to said stack, and radiant energy means for operating said output register through coded perforations in said selected card.

18. The combination of an input register comprising a plurality of relays and electromagnets, an output register comprising a plurality of radiant energy responsive means, and an opaque plate having its opacity interrupted by coded transparent portions, means controlled by said input register for displacing said plate, radiant energy producing means directed against said opaque plate and aligned with said radiant energy responsive means and said transparent portions in their displaced positions whereby said responsive means are energized in a pattern corresponding to the pattern of said transparent portions.

19. An input register and an output register in combination with a group of opaque plates having transparent portions, certain of said transparent portions common to all of said plates in their normal grouped arrangement, other transparent portions individual to each plate, radiant energy producing means aligned with said transparent portions on one side of said group of plates and a plurality of radiant energy responsive means aligned with said radiant energy producing means and said common transparent portions on the opposite side of said group, means controlled by said input register for altering the position of a selected plate with respect to the group of plates in such manner that the transparent portions individual to said selected plate become aligned with common transparent portions of said group whereby the radiant energy responsive means aligned with individual transparent portions of said selected plate in its altered position are energized in an output registration pattern.

20. A translating arrangement comprising stacked card elements having a plurality of aligned openings therethrough, input register means capable of being selectively set in accordance with numerical designations, means operable following the setting thereof according to any one designation to move said card elements to selectively baffle certain of said openings, means operable to project radiant energy through the unbaffled openings, and means responsive to the projected unbaffled radiant energy to register information codewise as a function of the registered number.

21. A translating arrangement comprising stacked card elements having a plurality of aligned openings therethrough, input register means capable of being selectively set in accordance with numerical designations, means operable following the setting thereof according to any one designation to move said card elements to selectively baffle certain of said openings, radiant energy source means, means operable incident to the movement of said card elements to supply radiant energy from said source means, means operable to project radiant energy through the unbaffled openings, and means responsive to the projected unbaffled radiant energy to register information codewise as a function of the registered number.

22. A translating arrangement comprising a plurality of input registers, a plurality of output registers, a plurality of perforated magnetic plates each having a distinctive pattern of perforations and distinctive serrations, means for selecting any one of said magnetic plates by operation upon said distinctive serrations in response to designations set up upon said input registers, and means for operating upon said selected magnetic plates to produce a distinctive output registration corresponding to coded perforations of said plates.

23. A translating arrangement comprising a plurality of electromagnetic input registers, a terial situated between said output registers and a plurality of perforated plates of magnetic material situated between asid output registers and a source of radiant energy in such manner that said radiant energy is transmissible through perforations of said plates and incident upon said output registers, means for selecting one of said plates in accordance with a designation impressed upon said input registers, and means for controlling transmission of energy through perforations of said selected plate to effect a distinctive output registration corresponding to said perforations.

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