

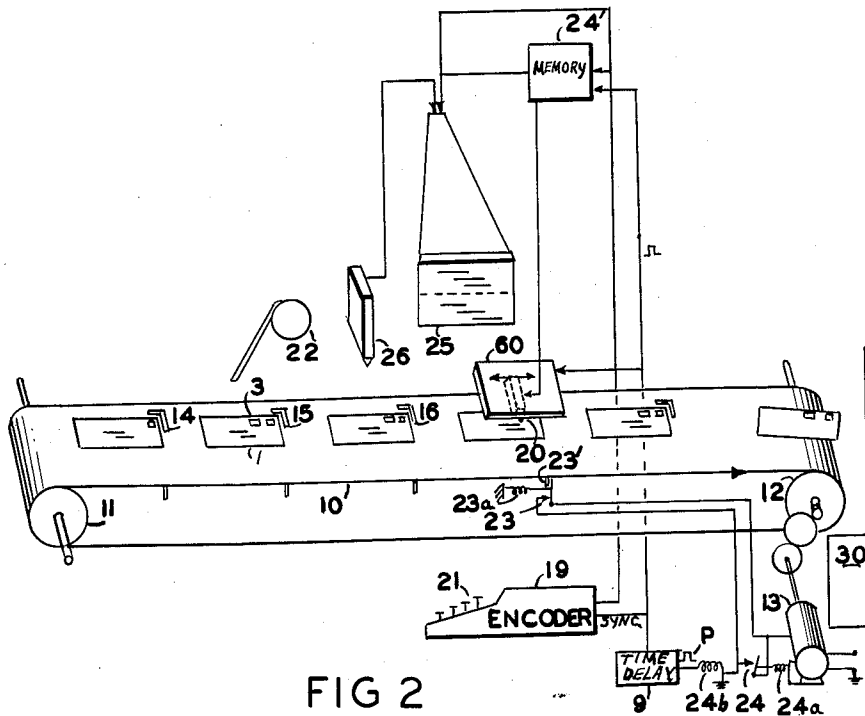
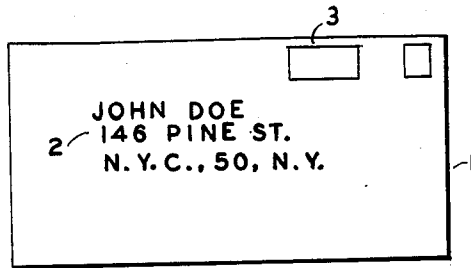
June 19, 1962

W. BRENNER ET AL
MAGNETIC CODING MEANS

3,040,323

Filed March 23, 1959

3 Sheets-Sheet 1



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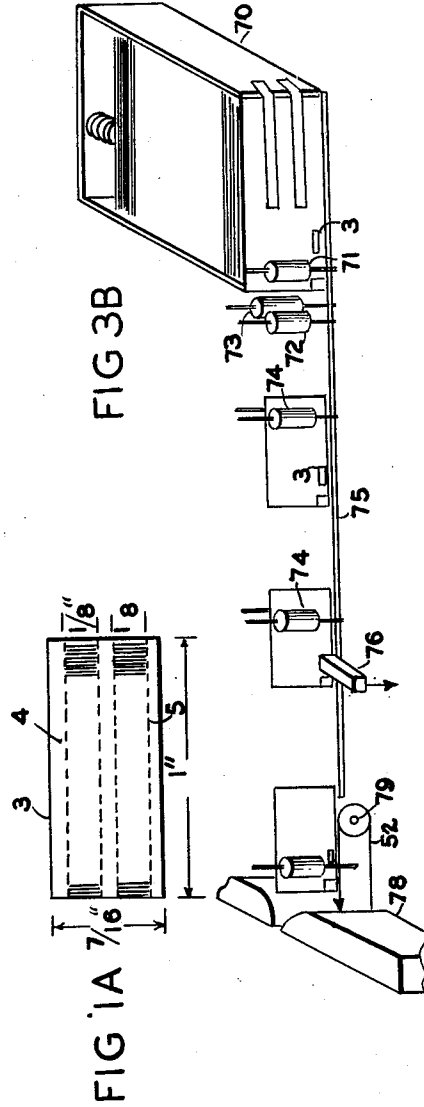
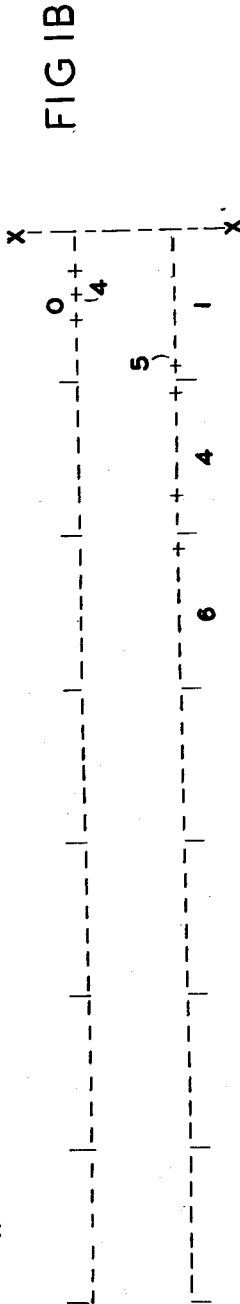
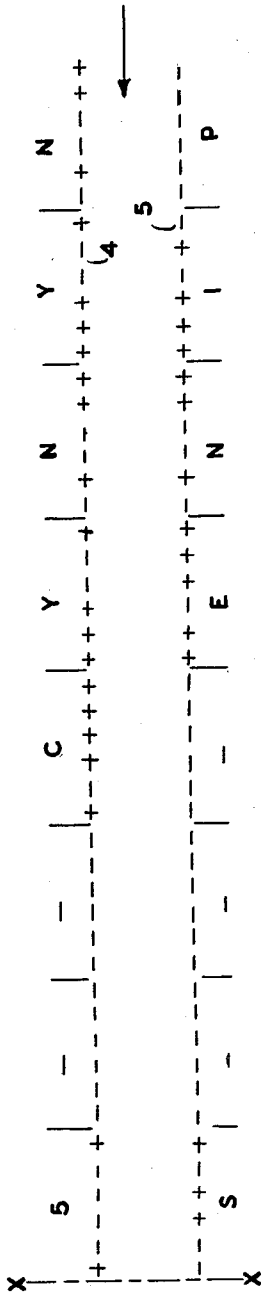
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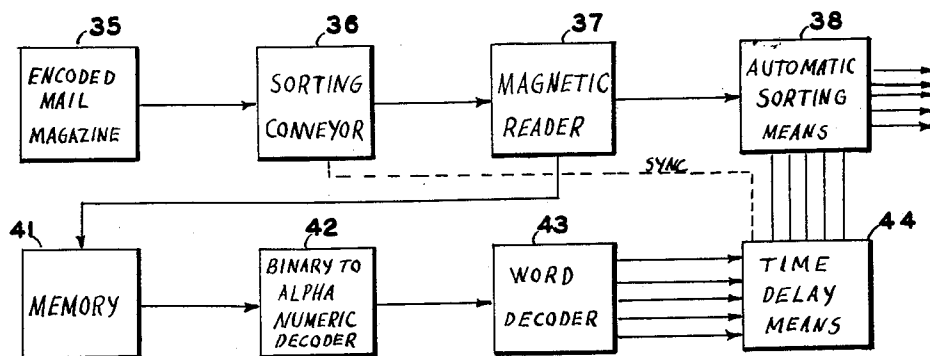
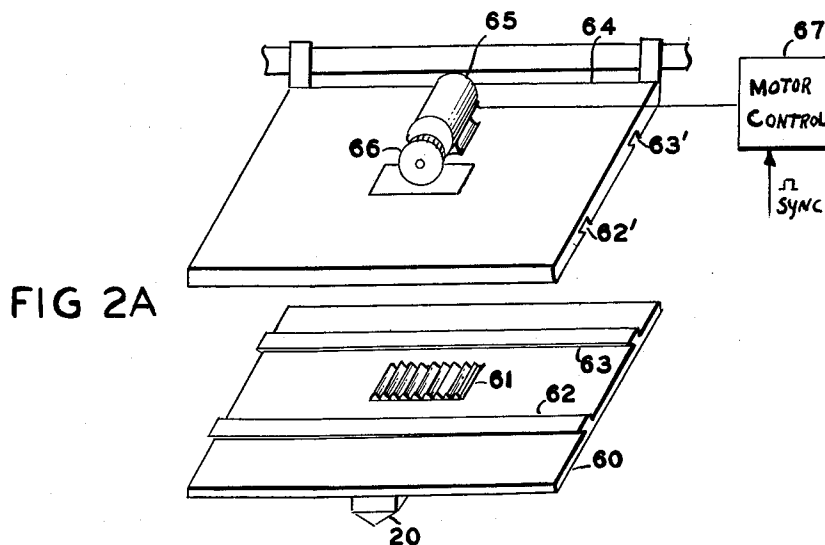
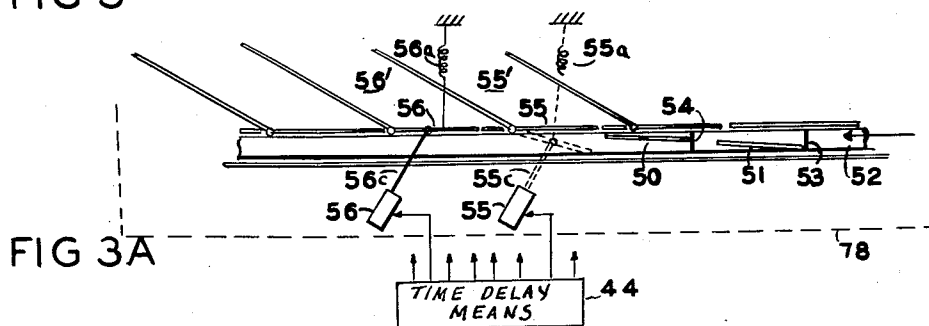


FIG 3



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3,040,323

MAGNETIC CODING MEANS

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5 Claims. (Cl. 346—74)

This invention relates to means and methods for sorting mail or other articles and more particularly to such means using magnetic recording.

More particularly the invention relates to means and methods for applying magnetic material, for instance, tape, to a predetermined portion of the envelope, recording the address information on the magnetic material, and sorting the mail by magnetically reading the address information and applying said information to automatic sorting apparatus.

There is a great need for a system of the present type since the mail today is still being sorted by hand in the same manner as centuries ago. This problem has not been solved or improved to any significant degree from its original state, although virtually all other fields have been mechanized by automatic labor-saving devices.

This problem is accentuated by the fact that an average piece of mail is sorted about five or six times as follows:

- (1) At the origination post office, local mail is sorted from non-local mail.
- (2) At the origination general post office, the mail is again sorted.
- (3) At the destination general post office, it is again sorted to local post offices or zones.
- (4) At the destination local post office, it is again sorted by route.
- (5) It is again sorted by the carrier to arrange the route.

Additional sortings are required to separate air mail, and possibly at intermediate general post offices.

The magnitude of the problem is shown by the fact that the United States Post Office has over half a million employees, the great majority of whom are employed in the tedious and monotonous hand sorting of mail.

The main difficulties in sorting mail are as follows: The addressing is done by the public with different handwritings, different inks and pencils, different spacing between lines and letters, and different spacing on the face of the envelope so that direct reading of the address is not practical. Also, the envelopes are of different sizes and shapes and made of different types of paper so that methods involving printing of codes on the envelopes with special inks are not practical due to the possibility of the ink running on certain types of paper.

The present invention solves all of these problems by placing magnetic material, for instance, tape or film, in a predetermined position on the envelope and recording the address information on the tape automatically or semi-automatically. Sorting is fully automatic, the tape being read by a magnetic head and the information fed to fully automatic sorting apparatus.

Magnetic recording has great advantages over all other coding methods.

(1) All necessary information may be recorded on a piece of magnetic material such as tape approximately 1" by $\frac{1}{8}$ " which is approximately the area of a small postage stamp.

(1a) Errors made in the present system are easily corrected. Other systems involving printing are impractical to correct. Systems which require printing on the reverse side are not practical to correct, for instance, with postcards.

(2) The tape or recording may be easily erased if a mistake is made.

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(3) The tape or recording is not affected by the type texture or color of paper or by any designs or marking on the paper.

(4) The tape or recording is not limited to use on paper but may be used on wood, metal, plastic, or any other material.

(5) The tape or recording is not affected by being wet.

(6) The coding is simply done by operation of a simple typewriter keyboard by anyone who can type with little or no special training.

(7) The coding is only done once, no matter how many sortings are required.

(8) Checking of coding and remote operation with closed circuit television monitors are easily arranged.

(9) Each operator sets his own pace as the conveyor belt carrying the envelopes is synchronized by the coding apparatus.

(10) Large mailers may supply their own coded tapes automatically coded when addressed, thereby saving postal encoding time.

Accordingly, a principal object of the invention is to provide new and improved means and methods for sorting mail or the equivalent.

Another object of the invention is to provide means and methods for encoding the maximum information on the smallest area on mail to be sorted.

Another object of the invention is to provide new and improved means and methods for sorting mail, articles or the equivalent by utilizing magnetic material placed on the outside of the envelopes, or articles.

Another object of the invention is to provide new and improved means and methods for sorting mail or the equivalent comprising placing magnetic material such as tape on the envelopes, magnetically recording the address information onto said material, and sorting said mail by placing the envelopes under a magnetic reading head, decoding the information read, and feeding the information to mechanical sorting apparatus.

Another object of the invention is to provide means and methods for coding mail which is not dependent upon the type of paper or size of the envelopes.

Another object of the invention is to provide new and improved means and methods for coding mail or the like in which the coded information may be easily erased from the envelopes to correct errors, or change the information when necessary for forwarding mail, for change of address, or when entering a new country.

Another object of the invention is to provide new and improved means and methods for coding and sorting mail which is fully automatic.

Another object of the invention is to provide new and improved means and methods for sorting mail which is simple and permits training an operator with a minimum of effort.

Another object of the invention is to provide new and improved means and methods for sorting mail wherein the only skill required of the operator is the ability to read and to type on a simple keyboard.

Another object of the invention is to provide new and improved means and methods for coding mail from a remote location.

These and other objects of the invention will be apparent from the following specification and drawings, of which:

FIGURE 1 is a front view of an envelope face showing the use of the invention.

FIGURES 1A and 1B are detail views illustrating one method of coding.

FIGURE 2 is a schematic view of an embodiment of the coding means of the invention.

FIGURE 2A is a detail view of the magnetic head mounting.

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FIGURE 3 is a block diagram of the automatic sorting process.

FIGURES 3A and 3B are detail views of the automatic sorting means.

FIGURE 1 shows a typical envelope or article label 1 having an area 2 for name and address. The magnetic material or tape 3 of the present invention which is about $\frac{7}{16}$ " by 1" is placed on a predetermined portion of the envelope preferably close to two sides so that the spacing can be easily controlled.

FIGURE 1A illustrates a pair of magnetic tracks 4 and 5 illustrating typical spacing of the information. The information is binary in form consisting of + and - magnetic recordings of + and - pulses. The information is fed from memory or other respect means to a magnetic head which scans the piece of tape. A preferable mode of operation is serial coding and is not affected by slight misregistration of the envelope providing the magnetic area 3 is scanned by the recording head. The registration tolerance can be increased by increasing the track widths and the magnetic area. Typical dimensions are shown.

FIGURE 2 shows a coding arrangement comprising a conveyor belt 10 mounted on the rollers 11 and 12 which are connected to be driven by the motor 13. The conveyor belt contains a series of raised corner pieces or clips 14, 15, 16, and so forth, which are used to locate the envelopes so that the magnetic tapes will pass operatively through the magnetic field of the magnetic head 20 which is mounted above the conveyor belt. Since it is necessary that the head scan the tape it may be preferable to stop the conveyor belt and have the head 20 movably mounted for the necessary scanning. Only a very small movement is required and the head may be mounted on a simple mechanical rack as shown in FIGURE 2A.

FIGURE 1B illustrates one method of coding. A six space binary code is used to provide sixty-four combinations for the alphabet, numbers 0 to 9, plus any special instructions. The illustrative address is spelled adjacent the corresponding binary symbols. An area of 1 inch by $\frac{7}{16}$ of an inch is sufficient. In the figure the tracks are broken by line X-X.

The information may be recorded on the tape preferably in binary form by means of coding means 19 having a standard keyboard 21. Coding apparatus of this type is conventional, being used to insert information into conventional computers with and without memory means, as shown on page 54 of "Review of Input and Output Equipment Used in Computer Systems," published March 1953 by American Institute of Electrical Engineers. See also, High Speed Computing Devices, Engineering Research Association, McGraw-Hill, page 43. A typical machine is the Flexowriter manufactured by Commercial Controls, Inc., Rochester, New York, and also shown in Patent 2,905,298. This machine has a standard keyboard which controls various switches in combinations which change the letters and numbers on the keyboard to binary type information, namely, various combinations of + pulses and - pulses. Other equivalent information input or coding means may be used.

The letters are placed on the conveyor belt with the stamped corner placed against the corner members 14, 15, and so forth on the conveyor. The letters may be placed by hand, or conventional mechanical means outside the scope of the present invention may be utilized. A small piece of magnetic tape is then affixed to the envelope from the roll 22, with a predetermined spacing from the edges of the envelope in the corner holders 14, 15, and so forth. The pieces of tape may be placed by hand or preferably by automatic apparatus as manufactured by Minnesota Mining & Mfg. Co. which is outside the scope of the present invention.

Alternatively a strip film of magnetic material may be rolled, printed or sprayed on the envelope or the paper

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or the envelope or label may be impregnated with magnetic material.

The conveyor belt may be arranged and controlled to automatically stop with the tape underneath the recording head 20 by means of automatic control switch means 23 connected to the motor and operated by finger 23' on belt 10. Switch 23 is adapted to be by-passed by switch 24 in response to a release key after the information is applied to the keyboard 21.

The information may be recorded in the following sequence:

- (1) Type all information into memory 24.
- (2) Press release key whereby:

Head 20 scans

Memory empties to recording head 20 and

Belt 10 moves to next position after time delay.

Memory 24' preferably holds one or more addresses so that the head scanning can take place on one letter while typing the following letter address. The memory may be a conventional magnetic drum or register device. As the envelopes are advanced, they will ride off the end of the conveyor belt over the corner spacers into a magazine 30, or directly to a sorting means such as shown in FIGS. 3A and 3B.

A suggested improvement is to have a closed circuit television display 25 connected to the encoder 19 which displays the typed information as it is inserted in the keyboard 21. This will provide a check for the operator.

Another suggested improvement is to incorporate a video camera 26 mounted above the conveyor belt and connected to a split video display on tube 25. This would provide the picture of the address on the envelope which would then be compared directly with the picture of the typed information to be recorded on the tape. With this arrangement the operator would not have to look at the envelope but only at the video display tube 25. Therefore, the operator could be remote from the conveyor belt, even in a different building or in a different part of the city. This arrangement would provide great flexibility, for instance, operators at a central location could encode mail at various other stations in the city and could switch from one post office station to another depending upon the various loads of mail in the different stations.

Switch 23 is normally closed by spring 23a and switch 24 is normally opened by spring 24a. When the release or sync key is pushed, switch 24 is momentarily closed by a pulse P from time delay 9 through coil 24b to start belt moving again to new position.

Error correction may be effected by counting the total number of pulses per track, at the encoding or reading stations.

FIGURE 1A shows a detail of the magnetic tape to be pasted on the envelope. Suggested dimensions are preferably $1'' \times \frac{7}{16}''$ and the information is preferably serially recorded along two linear magnetic tracks 4 and 5 which are each approximately $\frac{1}{8}''$ wide. The magnetic impressions are represented by lines on the tracks 4 and 5 in FIGURE 1A. The magnetic impressions are produced by + or - pulses.

FIGURE 1B shows a typical method of coding with the + and - pulses illustrating the coding for the address given in FIGURE 1, namely, 146 Pine Street, N.Y.C. 50, N.Y. For instance, the upper track 4 would first receive the N.Y. state information and then the N.Y.C. city information. This is followed by two blank spaces to accommodate locations requiring more letters and is then followed by the zone 50 designation. The other track 5 shows typical coding for Pine plus three blank spaces for streets requiring more letters, followed by the symbol S for street and the numbers 146. Additional spaces on either track may be used for additional coding information, for instance, for foreign or air mail or any other pertinent information. The code illustrated is a six element code which provides 64 different combina-

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tions for the alphabet and numbers plus additional combinations for other purposes. A piece of tape of the size shown, namely, 1" in length, will accommodate spaces for at least 15 letters or symbols in each track as illustrated in FIGURE 1B, for a minimum of 30 letters.

FIGURE 2A illustrates one method of scanning the magnetic coder 20. In this method the magnetic head 20 is mounted on a movable plate 60 which has a rack 61 and a pair of sliding bars 62 and 63 which are adapted to fit in the slots 62' and 63' of the upper plate 64 which is fixedly mounted on a suitable frame. The motor 65 is mounted on the fixed plate 64 and has an output drive gear 66 which is adapted to move the rack 61 and, therefore, scan and return the head 20 in response to motor control 67 which is triggered by a sync pulse from encoder 19.

Coding Operation

A piece of magnetic tape about 1" by $\frac{7}{16}$ " is placed with adhesive on the envelope in a predetermined position, preferably by machine.

The tape on the envelope is then placed under a magnetic recording head. The head may be a conventional recording head of the type used in recording on magnetic tape. In the present application it is preferable to use a double or multiple head for making several separate magnetic tracks, with corresponding memory means.

The address on the envelope is read visually, and the operator operates a standard typewriter keyboard on a conventional coding machine. Equivalent conventional input means may be used. The purpose of the coding machine is to translate the visual symbols of the address into information that may be easily handled with standard computer techniques. The information is preferably converted into a binary form which is a code consisting of only two types of characters, for instance + or -. The encoder may be a conventional machine of the type used in coding and feeding binary information to conventional computers. This type machine has a standard typewriter keyboard and each key operates a switch which energizes a matrix. For instance, when key A is punched, the output may be + + + - - - where + represents positive electrical pulses and - represents negative electrical pulses. The different letters and numbers have different combinations. The use of binary information is a well-known computer technique.

After the operator has inserted the information on the memory 24, he presses a release key and the head is scanned or moved relative to the tape by a simple mechanical arrangement, for instance, a rack, the movement of which is synchronized with the memory. The operator may then press another key connected to relay 24' to move the belt, or it may preferably be done with the release key through a time delay 9 sufficient for the recording. A typical address has a street number and name, city, possibly a zone number, and state information. Each bit of information has its own field on the tape.

The tape 3 itself may be conventional magnetic tape of the type used in magnetic recorders and dictating machines with the addition of an adhesive to affix it to the envelope. The adhesive is preferably of the pressure sensitive type.

Alternatively, a magnetic film may be rolled, sprayed or printed on the envelope or a magnetic film or tape may be incorporated in the postage stamp. The main difficulty in using the magnetic postage stamps is that their location on the envelope is not under the direct control of the Post Office.

FIGURE 3 shows a block diagram of the automatic sorting apparatus comprising an input magazine 35, a conveyor 36, magnetic reading head 37, and automatic sorting apparatus 38. Information from the reading head 37 is fed to a memory means 41, then to a binary to alpha-numeric decoder 42, and word decoder 43, then to a time delay means 44, the output of which would be con-

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nected to the sorting gates, FIGURE 3A. This system envisions a series of sorting gates spaced along the conveyor belt. Since the different gates necessarily would require different times for a particular envelope to reach them, a different time delay would be required to operate each gate.

Memory 41 may be a conventional magnetic drum as manufactured by Laboratory for Electronics, Boston, Mass., or Bryant Computer Products, Springfield, Vermont, or other conventional register means.

More specifically, the mail to be sorted is fed on a belt as described in connection with FIG. 2 under a conventional magnetic reading head 37. The envelopes must be located on the belt, as in FIGURE 2, with sufficient registration so that the pieces of tape will pass in operative proximity to the magnetic reading head. This may be done by clipping the envelopes in corner brackets on a horizontal belt or by holding the envelopes vertically by means of clips or rollers. As the tape of a particular envelope passes the reading head, the binary information is read, decoded, and fed to automatic sorting apparatus.

Serial coding makes lateral registration and skewing less critical. Longitudinal registration is not critical at all. The sorting apparatus may comprise a series of pivotally mounted gates which are selectively opened to guide the letters into particular slots. Due to the fact that it takes the envelopes a definite time to travel from the reading head to the particular slot or gate, time delay 44 must be utilized between the reading and the mechanical operation of the particular gate.

The decoding apparatus directly connected to the reading head 37 preferably comprises a memory 41, which may be a magnetic drum, a binary to alpha-numeric decoder 42 similar to the conventional teletypewriter except that instead of actuating typewriter keys the information will be utilized by a word decoder 43 to actuate the sorting apparatus. For instance, to separate New York mail from all other mail, the N.Y. binary information which may be - - - - - + + -, - - - - - + +, would have to be collated to actuate the N.Y. gate. Time delay 44 may be a magnetic drum synchronized with the conveyor.

Specifically, the pluses and minuses which are read are preferably fed to a memory device 41 which may be a magnetic drum, then to a decoder 42 which is a conventional computer type having various circuit combinations of vacuum tubes to sort out the different combination of symbols. For instance, assuming the letter N is represented by - - - - - -, the first - would choose one of two circuits, the second - would choose one of two circuits connected to the first chosen circuit, the next symbol which is a - would choose one of two circuits connected to the second chosen circuit, and the fourth symbol which is a - would choose one of two circuits connected to the third chosen circuit, etc. At the termination of this combination of circuits would be a utilization device, for instance, a relay which would be responsive to the "N" and to no other combination.

The "Y" pulses would go through the same type of selection. Decoder 42 may be a Uniprinter as manufactured by Remington Rand as described on page 59 of Review of Input and Output Equipment Used in Computers, published by American Institute of Electrical Engineers.

The combination of the "N" and "Y" information would be selected in the word decoder 43 in similar manner to actuate the N.Y. gate to receive the N.Y. mail. Due to the fact that there is a definite travel time for the envelopes between the reader and the N.Y. or other gate, it is necessary to insert a time delay 44 equal to the belt travel time.

Word or letter combination decoder 43 may be a series of conventional circuits arranged to give single outputs to different combinations of input circuits as described above or it may comprise conventional type coincidence circuits generally used in computer operations.

In the usual situation where the mail is being sorted

into many categories, each destination gate would have to have a different time delay since the gates would have to be spaced along the conveyor belt at different distances from the reading head.

FIGURE 3A shows a detail of typical sorting apparatus. The letters 50 and 51 ride on a belt 52 which is compartmented by vertical members 53 and 54. The letters are preferably carried between fairly narrow walls so that they remain substantially upright. The walls comprise a series of pivotally mounted gates 55 and 56 each opening into a slot 55' and 56' for the different locations, for instance, N.Y., N.J. The gates are normally held closed by the springs 55a and 56a but are opened by means of the corresponding relays 55b and 56b and linkages 55c and 56c which are operated from the delay means 44 of FIGURE 3.

More specifically as shown in FIGURE 3B, the mail to be sorted may be fed from a spring loaded magazine 70 in vertical position by means of rollers 71, 72, 73, 74, and so forth. The mail is preferably inverted so that the tape 3 rides a predetermined distance from the table 75 past the reading head 76, and then onto a conveyor belt 52 into the automatic sorting apparatus 78. The conveyor belt drive shaft 79 is synchronized with the time delay apparatus 44.

We claim:

1. Means for magnetically coding mail having magnetic material thereon comprising a magnetic recording head, memory means connected to said head, a keyboard encoder connected to said memory means, means to scan said head over said magnetic material, and means to synchronize said scanning means and said memory.

2. Means for magnetically coding mail having magnetic material thereon comprising a magnetic recording head, memory means connected to said head, a keyboard encoder connected to said memory means, means to scan said head over said magnetic material, means to synchronize said scanning means and said memory, a driven conveyor for said mail, and means to synchronize said conveyor motion.

3. Means for magnetically coding mail having magnetic material thereon comprising a magnetic recording head, memory means connected to said head, a keyboard encoder connected to said memory means, means to scan

said head over said magnetic material, means to synchronize said scanning means and said memory, a driven conveyor for said mail, means to synchronize said conveyor motion with said scanning means, means to operate said head and conveyor from a remote location comprising a video camera mounted adjacent said conveyor, and a video display means connected to said camera.

4. Means for magnetically coding mail of varying size having written address information on one surface comprising means for placing a strip of magnetic material externally on said surface and spaced from said written information, said strip of magnetic material being small in relation to said surface but large enough to receive said complete address information in magnetically recorded form, a magnetic recording head, memory means connected to said head, an encoder connected to said memory means, means to scan said strip of magnetic material with said head by moving one with respect to the other, means to synchronize said scanning means and said memory, means to move said articles past said head and means to synchronize said article moving means with said scanning means.

5. Apparatus as in claim 4 wherein said strip of magnetic material is substantially equal in size to a postage stamp and is placed in predetermined position relative one or more edges of said articles and said conveyor means has guide means to locate said article so that said strips of magnetic material will be scanned by said recording magnetic head.

References Cited in the file of this patent

UNITED STATES PATENTS

2,258,106	Bryce	Oct. 7, 1941
2,560,474	Potts	July 10, 1951
2,609,928	Doust	Sept. 9, 1952
2,719,629	Robinson	Oct. 4, 1955
2,856,256	Carman et al.	Oct. 14, 1958
2,981,830	Davis	Apr. 25, 1961

FOREIGN PATENTS

542,474	Canada	June 18, 1957
757,824	Great Britain	Sept. 26, 1956
823,597	Great Britain	Nov. 11, 1959