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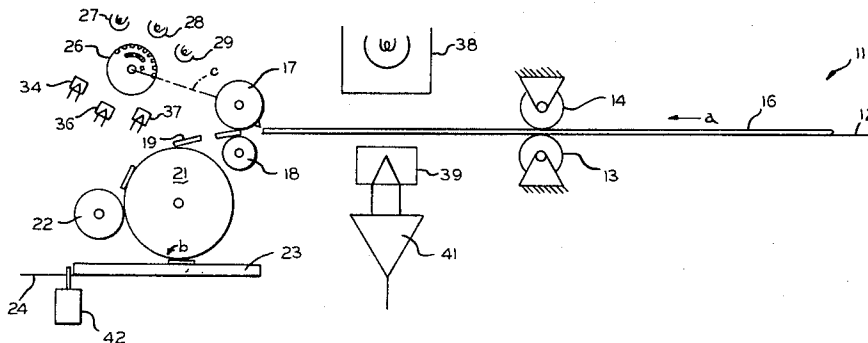
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[54] **AUTOMATIC MAIL SORTER**
19 Claims, 6 Drawing Figs.

[52] **U.S. Cl.**..... **209/111.7,**
156/566; 250/219
 [51] **Int. Cl.**..... **B07c 3/14**
 [50] **Field of Search**..... **250/219Doc;**
209/72, 72MSD, 111.7; 156/566;
93/93.2

ABSTRACT: Automatically sorts bulk mailings into common groups. Optically scans address labels and recognizes "codes" on the labels, such as changes in the zip codes. A solenoid is activated in response to codes. The solenoid forces an envelope with "code" thereon out of alignment to indicate a new common group.



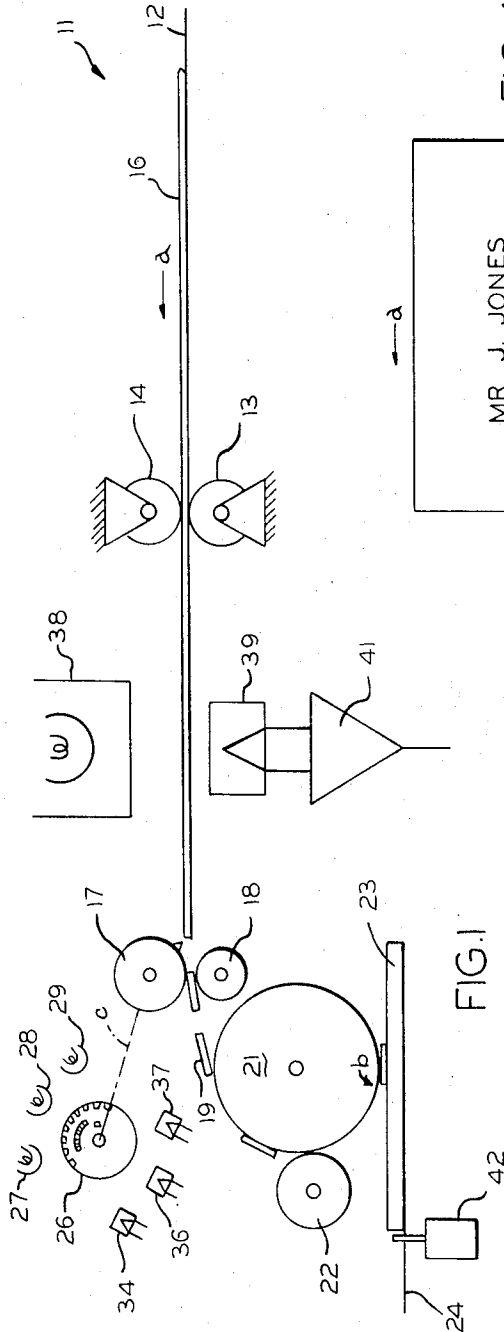


FIG. 4A

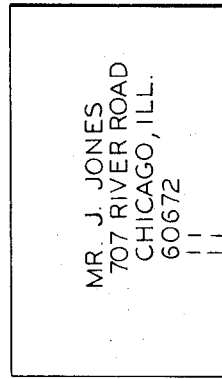


FIG. 4B

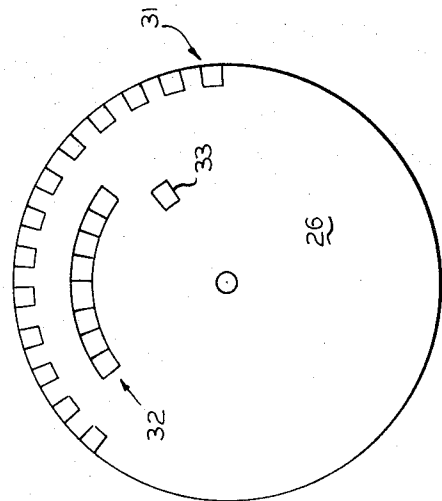
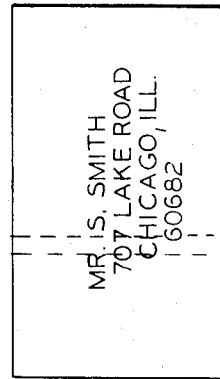
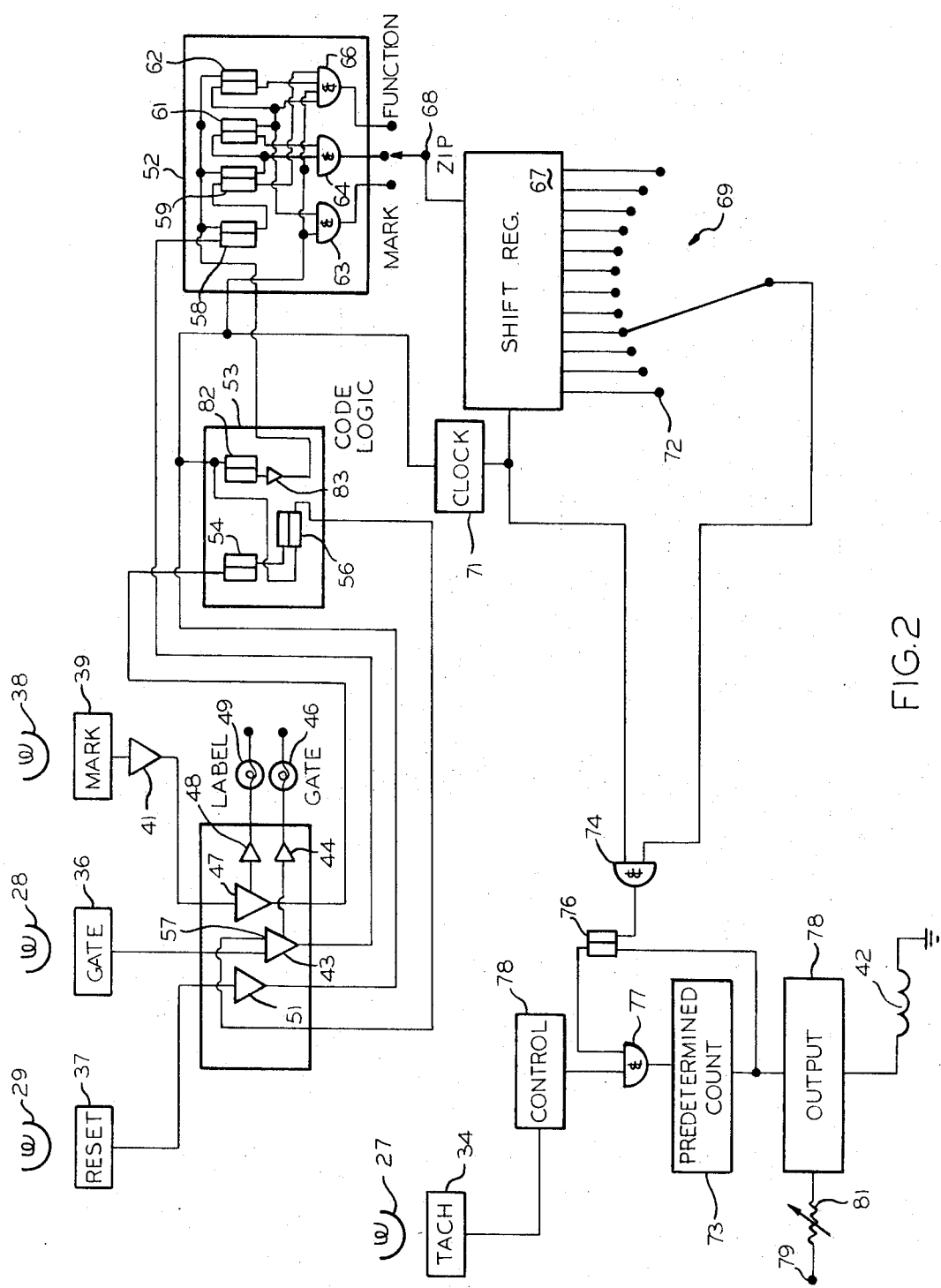


FIG. 3

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TIMING FORMAT

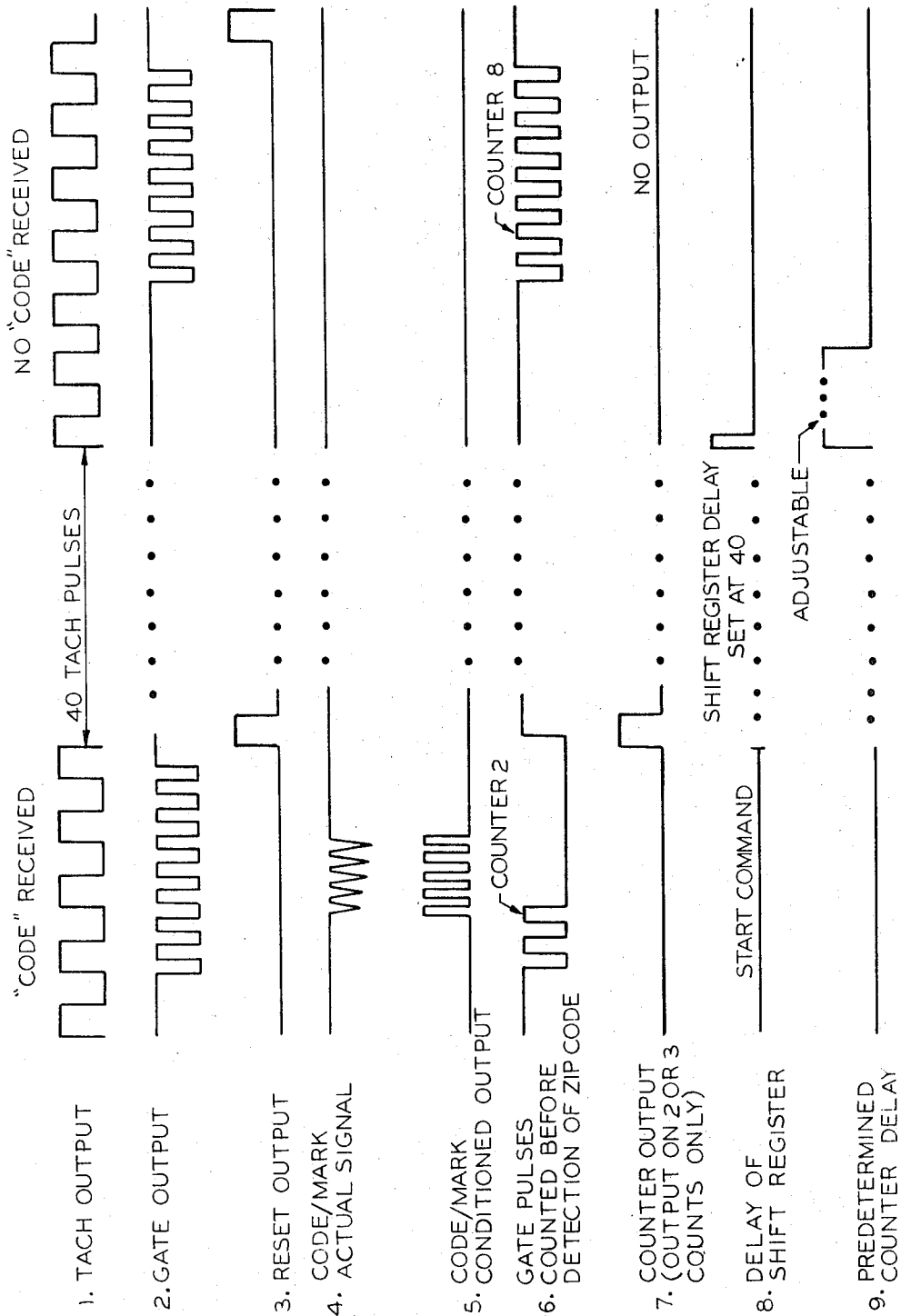


FIG.5

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AUTOMATIC MAIL SORTER

This invention relates in general to automatic mail-addressing equipment for use in bulk mailing and in particular to equipment for automatically sorting the addressed envelopes or the like, into common groups for mailing.

Large mail order houses, advertisers, magazine publishers and others send huge quantities of mailed literature to recipients taken from listings. The envelopes, magazines, or the like, are addressed and then the mail is sorted into common groups. The mail for the common groups is tied together and delivered to the Post Office. The common denominators for the groups are either the same town or the same zip code number, for example.

The large mail-order houses, advertisers, magazine publishers and the like, presently use computerized techniques to address the bulk mailings. That is they maintain mailing lists in computer memories. The computers feed the address information to large chain-type printer wheels which in turn print out the lists on continuous strips of paper, fed from rolls. The printed lists on the continuous strips of paper are then automatically cut and pasted to the matter to be mailed as it passes on a conveyor system. The addressed material is then sorted and bundled into common groups for mailing.

Accordingly, it is an object of this invention to provide equipment for automatically sorting the addressed material into common groups.

The computer-controlled printers provide carefully positioned name and address blocks on the labels that are glued to the material to be mailed. Accordingly, it is a more particular object of this invention to provide means for scanning the addressed labels to detect changes in the common denominators of the "common groups."

A still more particular object of the invention is to provide means for synchronizing the flow of addressed material with the grouping means so that the grouping means can be remotely located with respect to the scanning equipment.

Still another object of the invention is to provide means for positioning the grouping means at particular locations with respect to the labelling equipment.

In accordance with a preferred embodiment of the invention the automatic sorting equipment comprises an encoding wheel that is located over a conveyor belt that carries the printed label strips. The encoding wheel has three sets of windows which enable light to pass therethrough. The first set of windows provides tachometer pulses and is peripherally placed on the wheel. The first set of windows acts in cooperation with a tachometer scanner and is used to synchronize grouping equipment with the movement of the material that is labeled for mailing. The second set of windows acts in cooperation with a gate scanner, and provides counting pulses which are used for coordination and control purposes. The third set of windows may be a single window used in cooperation with a reset scanner and is used for resetting the sorting equipment after each cycle of the encoding wheel.

The labels are optically scanned for "codes" directing sorting action. In one preferred embodiment of the invention the "code" used is merely moving the zip code of the address slightly by the automatic printing equipment for each change of the zip code. The scanner used for detecting the "code" is referred to hereinafter as a "mark" scanner.

Thus, the sorting equipment uses four optical scanners; three are used in conjunction with the encoding wheel while the mark scanner scans independently of the encoding wheel.

The output pulses of the gate scanner are counted and registered by a counting circuit. The count is stopped by a signal from the mark scanner. Since the encoder rotates one complete revolution per piece of mailed material, normally the counter will reach a maximum count per revolution equal to the number of gate windows in the encoding wheel. If there is a displaced zip code indication then the counter is inhibited after a smaller count, such as, for example, a count of 2 or 3.

The reset signal operates to cause the counter circuit to read out the count in the counter. The read-out signal from the counter operates a shift register which in conjunction with the tachometer signal obtained from the peripheral windows energizes an output circuit to actuate a solenoid. The actuated solenoid displaces the material having the new zip code number. The displaced envelope, magazine, or the like, indicates the start of the new common group.

The above mentioned and other objects and features of the invention will now be explained in detail with the aid of the accompanying drawings, wherein:

FIG. 1 schematically illustrates the mechanical and optical portions of the automatic addressing and sorting system;

FIG. 2 illustrates in block diagram form the logic circuitry used to control the sorting equipment;

FIG. 3 illustrates the encoding wheel used in FIG. 1;

FIGS. 4A and 4B illustrates sample address labels, showing how the zip code is displaced when there is a change in zip code number; and

FIG. 5 illustrates the timing format of the control pulses from different pertinent portions of the sorting equipment control circuit.

In FIG. 1 an automatic addressing and sorting system is shown generally as 11. The system comprises a conveyor belt 12. The conveyor belt is moved by any means known to those skilled in the art, such as drive wheel 13 working in cooperation with idler wheel 14. A printed label strip 16 comprising a continuous paper strip having addresses serially printed thereon rides on the conveyor belt 12. As the strip 16 moves along it reaches cutting wheel 17 and its follower wheel 18. The cutting wheel 17 is synchronized so that at each revolution thereof it cuts one complete addressed label such as label 19. The label drops onto a suction vacuum wheel 21, such as those which are known in the art. The suction vacuum wheel 21 provides suction from the point where the label contacts the wheel until the point indicated by arrow *b* where the suction is removed and the label consequently released. While the label is held it goes by glue wheel 22 which applies a coat of glue to the label so as to enable the label to be glued to the material to be mailed, such as an envelope 23.

The material to be mailed is conveyed down conveyor belt 24. Conveyor belt 24 is shown transverse to belt 12 and moving toward the viewer. The material to be mailed is synchronized with the labels, so that one label is glued to each envelope.

The automatic mail sorter equipment shown in FIG. 1 comprises a scanning or encoding wheel 26. As shown by the dashed line *c* the encoding wheel 26 is synchronized with the cutting wheel 17 so that one revolution of the encoder wheel 26 occurs per complete address label. It should be understood of course that the encoding wheel 26 could be synchronized with the labels in any manner, not merely by synchronizing it to the cutting wheel.

Means are provided that operate in conjunction with the encoding wheel 26 to generate signals for controlling the operation of the automatic sorting equipment. More particularly the embodiment of the invention shown in FIG. 1 has three light sources, 27, 28 and 29 associated with the encoding wheel 26.

The encoding wheel, may be a disc of clear plastic having a negative or other opaque material glued to its surface. As best shown in FIG. 3 the negative has a continuous series of windows 31 peripherally disposed about the entire circumference of the disc 26. These are the tachometer windows.

A second series of windows 32 is provided at an intermediate radius and having precise widths. The widths are, for example, equal to the displacement of the zip code when a changed zip code occurs. These are the gate windows.

Another window 33 is provided at a different radius from the other series of windows. This window is used for generating a signal for resetting the logical automatic sorting equipment. This is the reset window.

Means are provided for receiving the light signals through the sets of windows and converting the light signals to electri-

cal signals. In greater detail a photocell is associated with each set of windows and thus with each light source. Thus, light source 27 is associated with window set 31 and photocell 34. Light source 28 is associated with window set 32 and photocell 36, and light source 29 is associated with window 33 and photocell 37.

Means are provided for actually detecting a "code" that signifies a new common group. In great greater detail a light source 38 is provided above the printed strip 16 on conveyor belt 12 for scanning the printed matter; or in the case of the example presented herein, for scanning the zip codes on the printed strips. A photocell 39 is provided below the belt 12 to receive the light signals from light source 38. Thus, it is apparent that the belt 12 is transparent. Any printed matter, such as the zip code causes the photocell 39 to generate electrical signals.

As best shown in FIG. 4, the printed mailing labels move in the direction indicated by arrow *a*. FIG. 4a shows a label that belongs to the common group that is being processed. FIG. 4b shows a label by having the zip code indented by an amount *X*. The indentation of the zip code indicates the start of a new common group. Thus, if the label of FIG. 4b followed the label of FIG. 4a, the automatic sorting equipment recognizes the initiation of a new common group.

The signals from each of photocells are amplified to provide signals of usable amplitude. For example as best seen in FIG. 2, photocell 39 is connected to amplifier 41. Each of the other photocells are also connected to amplifiers as will be explained in conjunction with the description of the operation of the control circuit shown in FIG. 2.

Means are provided for indicating the initiation of a new common group responsive to a "code" signal on the printed labels. In the system illustrated in FIG. 1, a solenoid 42 is shown juxtaposed to the conveyor belt 24 at a position overlooking the mailing material after the marriage of the material and an addressed label. The solenoid 42 is actuated by the automatic sorting equipment to force the envelope bearing the "coded" label out of its normal alignment.

The circuitry used for controlling the solenoid 42 responsive to the combination of pulses received from the four photoelectric cells is shown in block diagram form in FIG. 2. Where possible the same designation numbers are used throughout this description of the invention. Thus, the light sources, 27, 28 and 29, 38 are shown associated with photoelectric cells 34, 36, 37 and 39 respectively.

Means are provided for "setting up" the automatic sorting system to perform responsive to the desired "code." For example, the gate windows 32 are moved to a position where they are aligned with the light source 28 and gate photocell 36. The output of the gate photocell 36 is connected to an amplifier 43. One of the outputs of amplifier 43 is coupled to output drive amplifier 44 which serves "gate" lamp 46. Thus, every time a window of set 32 passes lamp 28, photocell 36 provides a pulse. The pulse is amplified and lamp 46 is operated to the "on condition."

The output of the mark photocell 39 is coupled to a preamplifier 41 and subsequently to amplifier 47. One of the outputs of amplifier 47 is connected to output drive amplifier 48. The amplifier 48 is connected to "label" lamp 49. Thus, each time printed matter passes between light source 38 and photocell 39 lamp 49 is operated by the pulse generated by the photocell.

The reset photocell 37 is coupled to amplifier 51 so that the pulse generated by the reset photocell 37 is also amplified. The amplified signal has sufficient power to operate the subsequent circuitry.

Means are provided for counting the number of gate windows (set 32) which pass between light source 28 and gate photocell 36 before any printed matter passes between light source 38 and mark photocell 39. Thus, counting means such as the count-by-16 circuit 52 are provided. An output of the gate amplifier 43 is connected directly to the count-by-16 circuit 52.

Means operated responsive to printed matter passing between source 38 and photocell 39 are provided for preventing the count of pulses received from the gate photocell 36.

More specifically, an output of the mark amplifier 47 is connected to code logic circuitry 53. An output of the code logic circuitry 53 is fed back to amplifier 43 to inhibit or block that amplifier.

The code logic is shown as comprising one-shot multivibrator circuit 54. The output of the mark amplifier 47 is coupled to the input of the one-shot multivibrator circuit 54. The output of the circuit 54 is connected to the "set" terminal of flip-flop circuit 56. The output of the flip-flop circuit 56 is coupled to an inhibit terminal 57 on gate amplifier 43. Thus, after printed matter is scanned by light source 38 and photocell 39, gate-amplifier 43 is inhibited and no more pulses are fed to the counter circuit 52.

The counter circuit 52 is designed to count at least as high as the number of windows in set 32. Thus, in this example where set 32 contains eight windows, a count-by-16 counter is used. The counter 52 thus comprises four flip-flop circuits 58, 59, 61 and 62. The output of the gate amplifier 43 is connected to the "set" input of the first flip-flop 58. As is known to those skilled in the art the output of each flip-flop is connected to the "set" input of the immediately following flip-flop circuit.

Means such as AND gates 63, 64 and 66 are used for providing logic outputs from the counter circuit 52. The output terminals are labeled "mark," "zip" and "function," respectively.

Gate 63 is a two input AND gate. One input to gate 63 is the output of flip-flop circuit 61. The other input to gate 63 is the output of reset amplifier 51. Thus, if there is an output from flip-flop circuit 61 when a reset pulse is received then a signal is provided at the "mark" terminal. As is well known to those skilled in the art, there will be an output from flip-flop circuit 61 responsive to the fourth through eighth gate pulses, and the twelfth through fifteenth gate pulses received by counter 52.

Gate 64 is a three input AND gate. One input to gate 64 is the second output of the flip-flop circuit 59. A second input to gate 64 is the first output of flip-flop circuit 61. The third input to gate 64 is the output of reset amplifier 51. Thus, from well known "truth tables" it is seen that if a "mark" pulse is received during either the second or third gate pulse then there will be an output at the "zip" terminal. Gate 66 is shown as a four input AND gate. The inputs to gate 64 are the first output of flip-flops 59, 61, and 62 respectively along with the output of reset amplifier 51. Thus, it can be seen by examining applicable "truth tables" that the "function" terminal will have an output signal if the "code" occurs during the first or 16 pulse.

Means, such as the switch 68 selectively couple the outputs of the counter circuit 52 to a shift register circuit 67. The switch 68 can be selectively set at either the "marks," "zip" or "function" terminals of count-by-16 counter 52.

When the switch is set at the "mark" terminal the counter 52 will provide an output if a "code" is detected, for example, after the fourth gate pulse is received and before the eighth gate pulse is received. Thus, the "mark" terminal output is not as critical as the "zip" terminal output which provides a signal only if a "code" is detected during the second or third gate pulse. The "function" terminal on the other hand which is coupled to gate 66, has an output if there is a "code" detected by the mark scanner during either the first or 16 pulse.

It should be understood that the AND gate functions could easily be changed to provide outputs responsive to any combination of outputs from the flip-flops of the counter 52. This emphasizes the extreme versatility of the system to respond to a great variety of codes. Thus, a "mark" at any designated position on the printed label which would provide a pulse at some designated time during the gate pulses could serve as a "code."

The shift register provides means for delaying the operating pulse of the solenoid 42 so that the solenoid can be remotely

located relative to the code-scanning equipment. Thus, the output of the shift register is controlled by switch 69 to selectively determine how many cycles of delay will be introduced between the receipt of the signal from the counter 52 by the register 67 and the activation of the solenoid.

As shown in FIG. 2 the switch 69 has 12 positions. Each position is coupled to the next sequential flip-flop circuit (not shown) of the shift register. This signifies that the shift register can introduce at least a 12 cycle delay. In one exemplary system, one cycle of the encoding wheel occurred during 20 inches of travel by the conveyor belts. 12 cycles is therefore, in that system, equal to 240 inches. Thus, as depicted in FIG. 2 every cycle of the encoding wheel 26 generates a reset pulse at the output of amplifier 51. This output among other functions drives clock 71 which continuously shifts the shift register 67. An output from counter 52 would cause an output from shift register output 72. If the switch 69 were set at the fourth step then the useful output of the shift register would be delayed four cycles until the output at position 72 were shifted to the fourth position of switch 69 of register 67 or the equivalent of 80 inches of conveyor travel.

Means, such as predetermined circuit 73 are provided for adding a vernier delay to the solenoid actuation voltage to assure that the solenoid is operated when the mailing material is strategically located adjacent to the solenoid. The vernier control is necessary because the items to be mailed may be different sizes of envelopes during different runs. Thus, to assure that the solenoid 42 strikes each such item at approximately its center point, the vernier delay is used. As is well known, the predetermined counter 73 is set to produce an output when the number of pulses fed into the counter 73 equals the number of pulses to which the predetermined counter is set.

Means are provided for feeding the tachometer photocell pulses into the predetermined counter under the control of the shift register 67. In greater detail the output of the shift register 67 received from the wiper of switch 69 is fed into an AND gate 74. The other input of AND gate 74 is a cycle pulse from the clock 71. The output of AND gate 74 is coupled to the "set" input of a flip-flop circuit 76 causing circuit 76 to produce a signal that is connected to AND gate 77. The other input of AND gate 77 is connected to the tachometer photocell 34 through control circuit 78. Control circuit 78 includes well-known amplifiers and shaping circuits for making the output of the photocell usable. The output of AND gate 77 is connected to the input of the predetermined counter 73.

Thus, for example if there are 40 tachometer windows per revolution then each pulse of the tachometer would be equivalent to one-half inch in the system where the conveyor belt moves 20 inches per revolution of the encoding wheel. Therefore, if the predetermined counter were set at 10 the vernier adjustment would be five inches.

The output, the predetermined counter 73 is coupled to the "reset" input of flip-flop circuit 76 and to an output circuit 78.

The output circuit 78 includes any well-known power amplifier and switching equipment for switching the power connected at point 79 through rheostat 81 to pulse solenoid 42. The actuation of solenoid 42 forces the piece of addressed mail juxtaposed thereto on conveyor 24 out of alignment.

The timing format of FIG. 5 aids in explaining the operation of the system. In FIG. 5 a series of pulsed outputs are shown. On the left-hand side of FIG. 5, the pulses represent what occurs if a "code" is detected. The "code" used in this example is the change of zip code number position.

The top line on both sides show the tachometer pulses at the output of control circuit 78 and consequently the pulses going into predetermined counter 73 at the output of AND gate 77. The second lines show the pulses generated by the eight gate windows of window set 32. These are the pulses that are fed into the count-by-16 circuit 52. The third line shows the count generated by the reset window at the output of amplifier 51.

Means are provided for delaying the reset pulse. (The delayed reset pulses are not shown.) The code logic circuits 53 includes a one-shot multivibrator circuit 82. The output of the

one-shot multivibrator is delayed and connected to the reset inputs of the flip-flops 58, 59, 61 and 62 in the count-by-16 circuit 52 through buffer amplifier 83. The delay of the reset pulse enables the counter circuit 52 to be read responsive to the receipt of the reset pulse prior to resetting the counter 52 with the same reset pulse.

The fourth line shows the actual signal received from the mark cell 39. Note that this mark is only shown where the code was detected. The pulses on the fifth line are the mark pulses after conditioning in the amplifiers and associated circuitry.

Line six shows the output of counter circuit 52. On the left-hand side two pulses are shown indicating that two pulses from the gate output were counted prior to the receipt of the mark pulse which, as explained above, inhibits the gate amplifier 47 to prevent any further gate pulses from being transmitted to counter circuit 52. The right-hand side of the timing format of FIG. 5 shows that the counter receives all eight window pulses from the gate amplifier when no "code" is detected.

Line seven shows the output of counter 52. The left-hand side has a pulse whose position is determined by the reading or reset pulse. The right-hand side of the seventh line of the timing format of FIG. 5 has no output since the gate amplifiers of counter 52 do not enable any signal output when there are eight counts registered in the counter 52.

The counter output signal acts as a start command to shift register 67. If the switch 69 had its wiper set at the first position then the shift register would delay its output by one complete cycle or 40 tachometer pulses in the example given. Thus, line 8 shows the shift register delay set at 40 tachometer pulses or 20 inches. If the wiper was set at the fourth position then the delay would be 80 inches in the exemplary system described.

Line 9 shows the vernier delay added by the predetermined counter. Both lines 8 and 9 are concerned only with the case "code received."

In operation the automatic mail sorter is used in conjunction with the conveyor type automatic addressing equipment wherein the address labels are automatically printed out in carefully positioned lists on a continuous strip of paper travelling on a first conveyor. The automatic addressing equipment automatically cuts the labels to size and mates them to envelopes or the like travelling in synchronism with the labels on a second conveyor. The labeled envelopes are transported down the conveyor in a continuous fixedly spaced relationship. At some point juxtaposed to the conveyor is a solenoid positioned to force a labeled envelope out of alignment to indicate a new group of addresses. Thus, each group of envelopes is included between misaligned envelopes. Each group has either a common zip code number or any other common feature marking a group.

The automatic sorter is initially set up by positioning a printed address having a "code" thereon, such as a changed zip code number, so that the first digit of the zip code is between the "mark" photocell 39. The label light 49 turns on when the label is so positioned.

The encoding disc 26 is mechanically rotated to position the line delineating the second and third windows between "gate" light source 28 and "gate" photocell 36. The gate lamp 46 then turns on. The system is now aligned so that only when a label containing a displaced zip code passes the "mark" light source will a signal be produced at the "zip" terminal of switch 68 which is the output of counter 52. Thus, switch 68 is set at the "zip" position.

Switch 69 is set at a position determined by the relative location of the solenoid 42 with respect to the detection of a "code." Thus, if the envelope, or the like, travels 80 inches (four cycles at 20 inches per cycle) between the time of detection and the time the envelope is opposite the solenoid then the switch 69 is set at the fourth position.

The predetermined counter 73 is set to assure that the force of the solenoid is applied at substantially the middle of the envelope or the like. Since each pulse from the "tach" photocell

34 represents 1/40th of a cycle or 1/2 inch, the predetermined count circuit 73 can control the position of the envelope or the like relative to the actuated solenoid 42 in 1/2 increments. It should be understood that the number of pulses and speed of the system that are given are merely by way of example, since either or both can easily be varied.

As the system functions, the conveyors move and the encoding disc rotates in synchronism therewith. As the "gate" windows 32 pass between the "gate" light source 28 and the "gate" photocell 36 pulses are generated and transmitted to counter, simultaneously, the "mark" scanning equipment scans the passing labels. If a regular zip code is present on a label then the "gate" amplifier is blocked as soon as a character of the zip code passes the "mark" scanning equipment. This occurs after the first pulse. If a displaced zip code number is present on the scanned label then the "gate" amplifier is blocked after the second pulse. When the reset window passes its associate scanning equipment the reset pulse is generated. The reset pulse opens gate 64. Only if a displaced zip code was present does a signal pass through gate 64 and switch 68 to the shift register 67. After four cycles the shift register provides a signal at the fourth terminal position of switch 69. This signal passes through AND gate 74 to "set" flip-flop circuit 76. The output of the flip-flop 76 in conjunction with the tachometer pulses received from the "tach" photocell through control circuit 78 operates the AND gate 77 to provide pulses to the predetermined counter circuit 73.

When the number of pulses received thereat is equal to the setting of circuit 73 a pulse is generated at the output of circuit 73. This pulse resets flip-flop 76 and provides a signal that causes output circuit 78 to actuate solenoid 42. The solenoid then forces the envelope with the displaced zip code thereon out of alignment to mark the beginning of a new group.

It should be understood that while solenoid 42 is shown it merely represents equipment for grouping the labeled mailing items. Similarly while "see-through" scanning is described, "reflective" scanning could also be used within the scope of this invention.

While the principals of the invention have been described in conjunction with specific apparatus and applications, it is to be understood that this description is made only by way of example and not as a limitation on the scope of the invention.

I claim:

1. An automatic mail sorter for grouping mail carried on conveyor means:

the mail is addressed and labeled for delivery according to codes on labels attached to the mail;
said mail sorter comprising label-scanning means for scanning said labels to detect said codes;
said codes being the relative position of the zip code on the label whereby a different zip code position indicates a new group;
means responsive to the code being in a usual position for generating a first number of pulses;
means responsive to said different zip code position for generating a second number of pulses;
means for discerning between said first number of pulses and said second number of pulses to thereby detect said second number of pulses;
control signal generator means synchronized with the conveyor means and operated responsive to the detection of said second number of pulses for generating a control signal; and
means responsive to the generation of a control signal for accomplishing said grouping.

2. The automatic mail sorter of claim 1, wherein said means for scanning said labels comprises mark light source means mounted adjacent to said conveyor means:

mark photoelectric cell means associated with said mark light source for generating mark pulses responsive to said code on any of said labels;
means for normally generating the first number of pulses; and

means responsive to said mark pulses for inhibiting said means for normally generating the first number of pulses to generate said second number of pulses.

3. An automatic mail sorter for grouping mail carried on conveyor means labeled for delivery according to codes on the labels, said mail sorter comprising:

label scanning means for scanning said label labels to detect said codes;

said scanning means comprising mark light source means mounted adjacent to said conveyor means, mark photo electric cell means associated with said mark light source for generating mark pulses responsive to said code on any of said labels;

control signal generating means synchronized with the conveyor means and operated responsive to the detection of said codes for generating a code signal;

said control signal generating means comprising means for generating a set of counting pulses during the period of scanning each label, counter means for counting said counting pulses;

means responsive to the number of said counting pulses being less than a predetermined amount or providing a control signal;

means operated responsive to said mark signal for stopping the count of said counting pulses prior to reaching said predetermined amount, and thereby providing the control signal; and

means responsive to the control signal for accomplishing said grouping.

4. The automatic mail sorter of claim 3, wherein means are provided for reading and resetting said counting means after each label is scanned.

5. The automatic sorter of claim 4 wherein said reading and resetting means comprises means for generating a reset signal after each label is scanned by said scanning means, reading means operated responsive to said reset signal for reading said counting means, and delay means operated responsive to said reset signal for resetting said counting means.

6. The automatic sorter of claim 5, wherein said counting means comprises a plurality of bistable circuits:

said bistable circuits comprising set inputs and reset inputs;
said reading means comprises first gate means operated responsive to simultaneously receiving outputs from at least one of said bistable circuits and said reset signal thereby providing gate output signals from said gate means;

wherein said delay means comprises monostable circuit means operated responsive to said reset signal; and
means for coupling the output of said monostable circuit means to said reset inputs to reset said counting means.

7. The automatic mail sorter of claim 6, wherein course delay means are provided to delay said gate output signal until said mail for sorting is adjacent to said means for accomplishing said grouping.

8. The automatic mail sorter of claim 7, wherein said course delay means comprises shift register means, and wherein vernier delay means are provided to delay said control signal until the article of mail bearing a label initiating a new group is substantially centered adjacent to said means for accomplishing said grouping.

9. The automatic mail sorter of claim 8, wherein tachometer signal-generating means are provided to generate a fixed number of tachometer signals during the period of scanning of each label:

wherein said vernier delay means comprises predetermined counter means;

said predetermined counter means providing the control signal responsive to the receipt of a predetermined number of signals, and

means responsive to the simultaneous receipt of said delayed control signal received from said shift register means and said tachometer pulses for transmitting said tachometer pulses to said predetermined counter means to obtain said output control signal.

10. The automatic mail sorter of claim 9, wherein said means for accomplishing said grouping comprises solenoid means operated responsive to said output control signal for forcing the article of mail bearing a label initiating a new group out of alignment with the articles of mail-bearing labels that do not initiate a new group.

11. The automatic mail sorter of claim 10 wherein said means for generating said counting pulses, said reset signals and said tachometer signals comprises encoding wheel means:

means for synchronizing the speed of rotation of said encoding wheel means with said conveyor means;
said encoding wheel means comprising a set of tachometer windows;

a set of gate windows and a reset window;

light source means individually associated with said set of tachometer windows, said set of gate windows and said reset window;

tachometer photoelectric cell means associated with said set of tachometer windows to generate said tachometer signals responsive to receiving light from said tachometer windows;

gate photoelectric cell means associated with said set of gate windows to generate said counting pulses responsive to receiving light from said gate windows; and

reset photoelectric cell means associated with said reset window to generate said reset signal responsive to receiving light from said reset window.

12. The automatic sorter of claim 11, wherein said means for preventing said counting means from counting said counting pulses comprises gate amplifier means coupled in series between the output of said gate photoelectric cell means and said counting means:

logic means coupled to the output of said mark photoelectric cell for providing a steady signal output responsive to the receipt of one of said mark pulses;

means for coupling the said output of said logic means to said gate amplifier means to block said gate amplifier and thereby prevent the said count of said counting pulses.

13. The automatic sorter of claim 12, wherein said logic means comprises logic monostable circuit means operated responsive to the receipt of said mark pulses to produce an output from said logic monostable circuit means to produce a blocking output signal that is coupled to said gate amplifier means, and means for coupling the reset signal to the reset input of said logic bistable circuit to reset said logic bistable circuit and thereby unblock said gate amplifier responsive to said reset signal.

14. The automatic sorter of claim 13, including clock means for providing a clock signal causing said shift register to shift

after each label is scanned:

shift register output AND gate means;

switch means for selecting and coupling the shift register output to said shift register output AND gate means;

means for coupling said clock signal to said shift register output AND gate means to thereby operate said shift register output AND gate means responsive to the simultaneous receipt of said shift register output signal and said clock signal to provide an output signal;

output bistable means operated responsive to said shift register output AND gate signal to provide an operating signal;

tachometer AND gate means operated responsive to simultaneously receiving said operating signal and said output control signal to provide said control signal; and

means for coupling the output control signal to reset said output bistable means.

15. The automatic sorter of claim 14, wherein a shift in the zip code position is the code that indicates the initiation of a new group, and wherein said mark scanner provides a pulse for every figure of the zip code.

16. The automatic sorter of claim 15, wherein means are provided for setting said encoding wheel to generate a certain number of said counting pulses, before said counting pulses are blocked by said mark signal provided by the first figure of said shifted zip code, and wherein said first gate means is operated only if said counting means receives said certain number of counting pulses.

17. The automatic sorter of claim 11, wherein said windows are reflecting surfaces.

18. The automatic sorter of claim 11, wherein said windows are transparent.

19. An automatic mail sorter for grouping mail having labels with common address portions:

said sorter comprising label conveyor means;

means for scanning the labels to detect codes indicating new common address portions;

means for generating a set of counting pulses during the period of scanning of each label;

means responsive to detecting said codes for blocking said counting pulses;

first counting means for determining the number of counting pulses received prior to the blocking of said counting pulses;

means responsive to the receipt of a certain number of counting pulses for generating a control pulse; and

means responsive to said control pulse for distinguishing sequential groups of different address portions.