

[54] **APPARATUS FOR CLASSIFYING SHEET-LIKE MATERIAL**

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[58] Field of Search **235/151.32, 151.3, 61.11 E, 235/151.2; 214/1 PE, 11 C**

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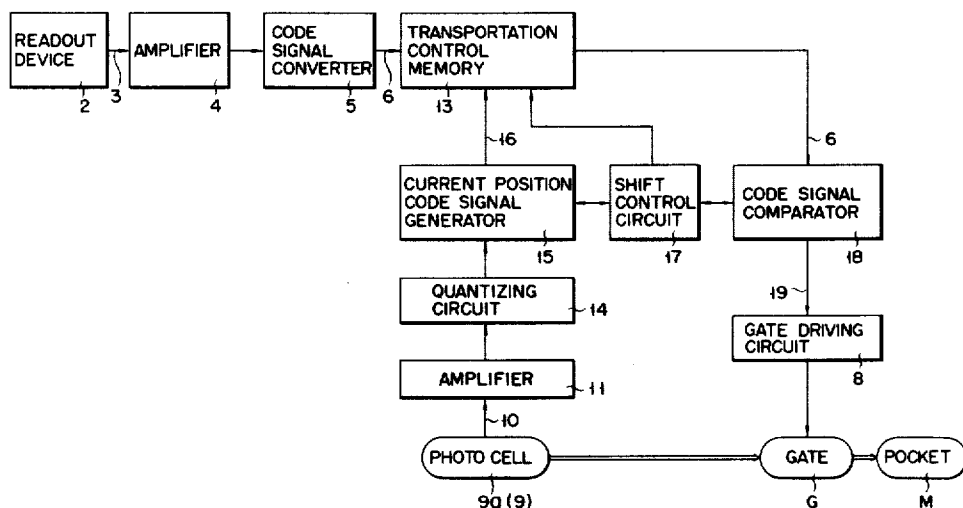
Assistant Examiner—Edward J. Wise

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[57] **ABSTRACT**

An apparatus for classifying a sheet-like written piece in the designated pocket corresponding to the classification code indicated on the surface of the written piece selected from among the pockets provided on a written material passageway, which comprises a device for supplying data designating the pocket to which the written piece is to be distributed; a device for furnishing data on the current position of the written piece when it passes during transit on the passageway through one of a plurality of detectors provided thereon; a counting device for counting the length of time required for the written piece to cover a distance between the adjacent ones of said detectors; a memory device consisting of at least as many storing sections as written pieces jointly traveling on the passageway at a given time, each of said sections being stored with data designating the pocket in which the written piece is to be received, data on the current position of the written piece and a counted time required for the written piece to cover a distance between any two adjacent ones of the plural detectors; a data-replacing device for successively replacing data on the current position of the written piece while traveling on the passageway and, when a prescribed relationship is detected to exist between the pocket-designating data and data on any current position of the written piece, guiding the written piece into the designated pocket; and a device for taking proper measures to cope with the abnormal condition when a signal denoting an excess time count over a prescribed level is detected.

5 Claims, 8 Drawing Figures



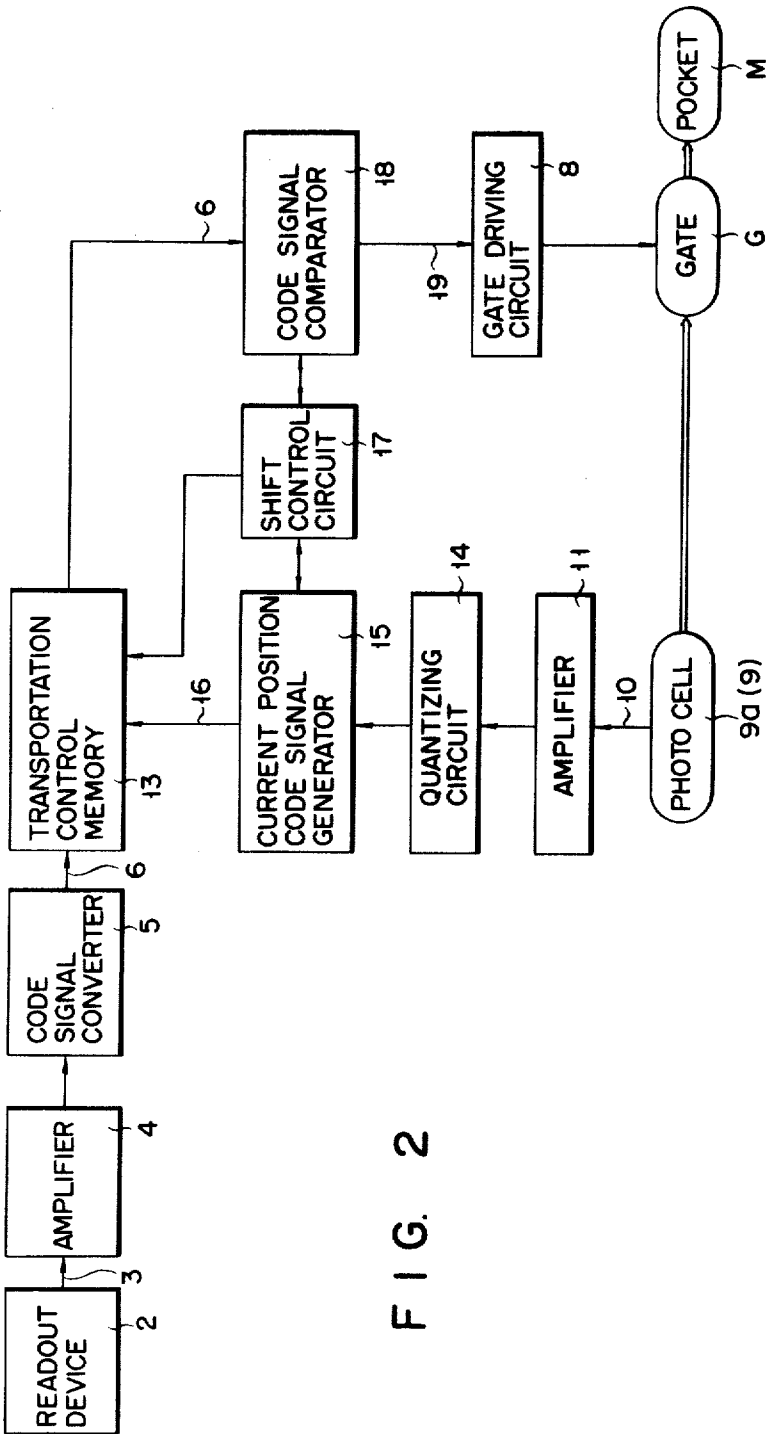


FIG. 2

FIG. 3A

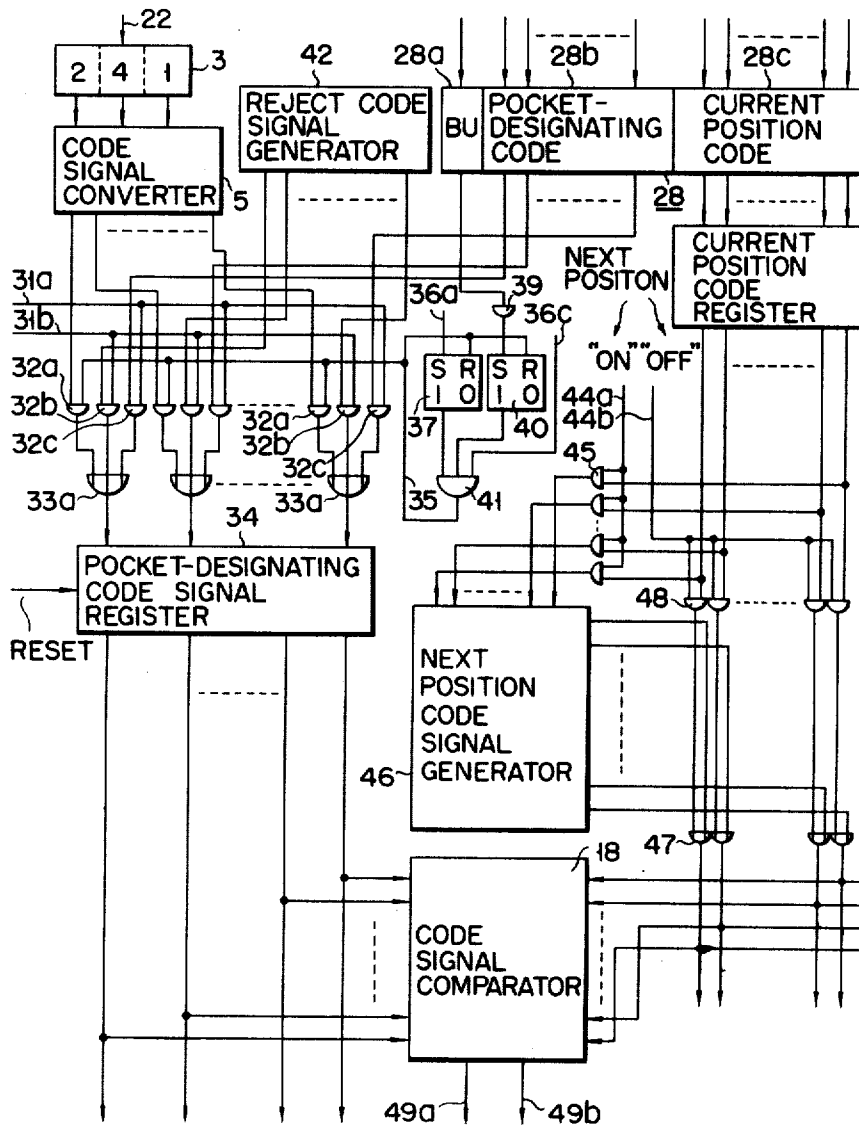


FIG. 3B

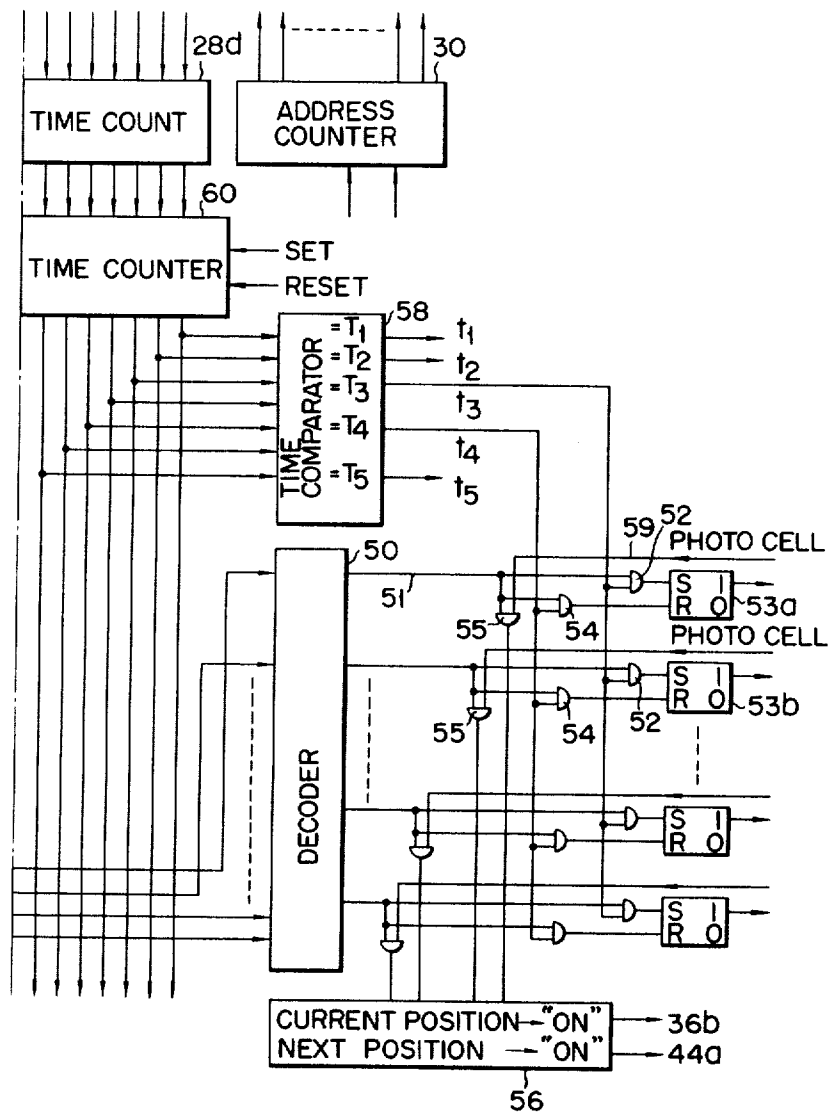


FIG. 4A

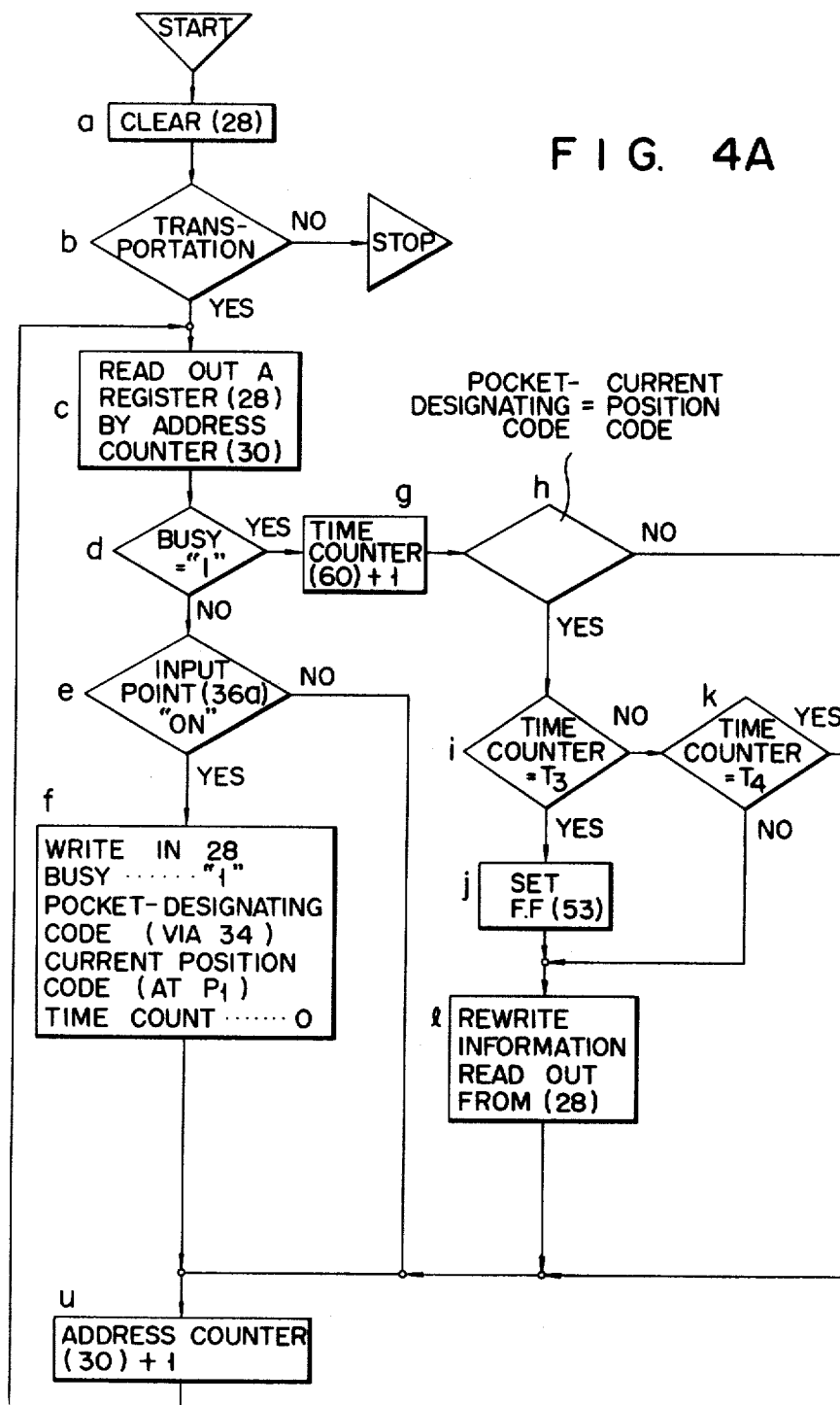


FIG. 4B

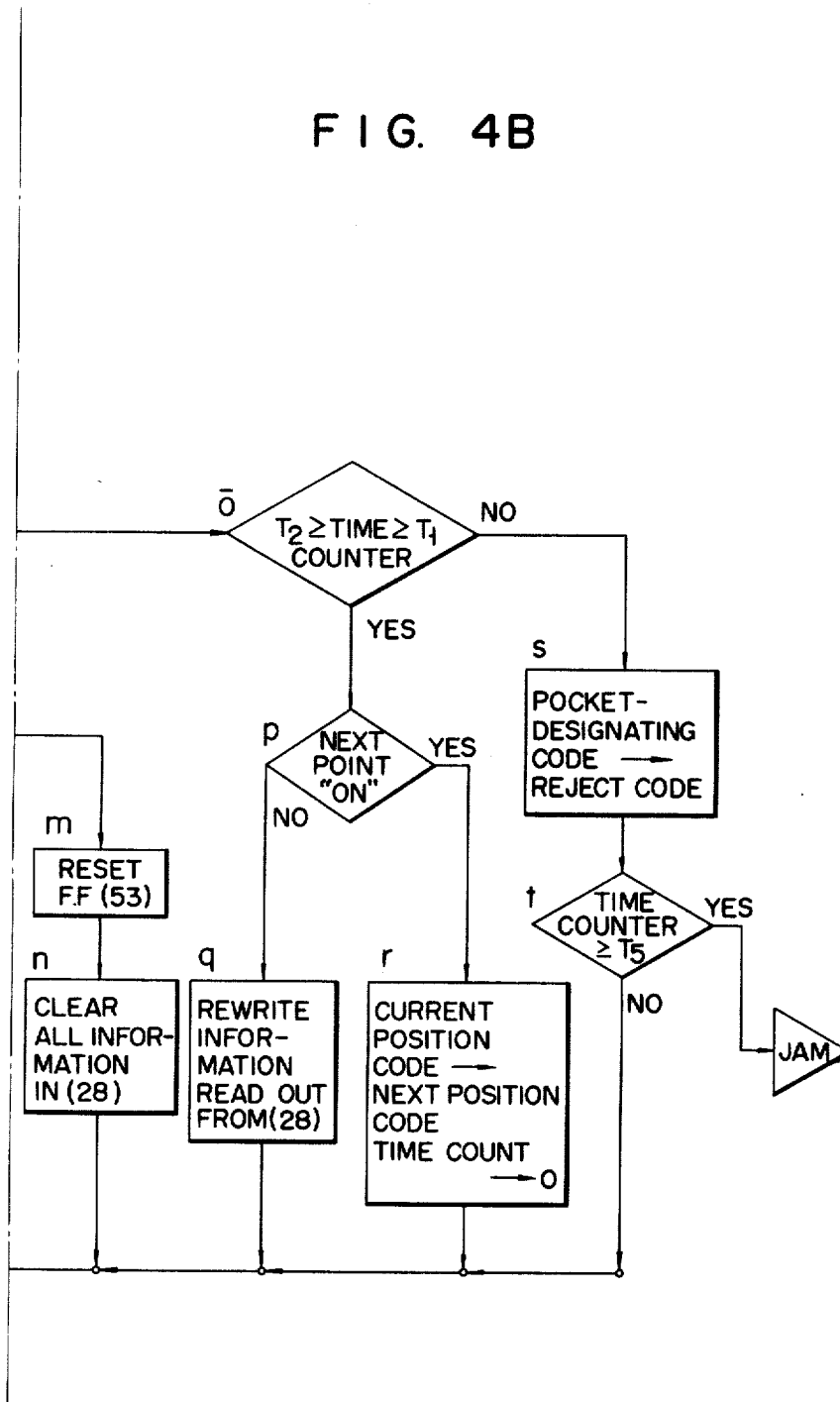
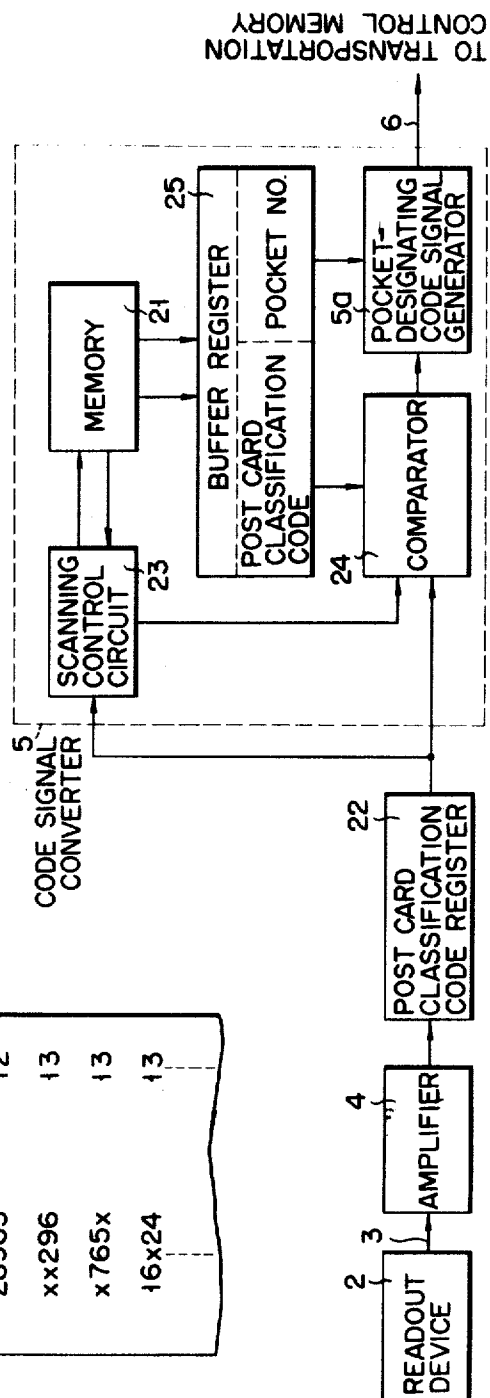


FIG. 6

POST CARD CLASSIFICATION CODE	POCKET NO.
0x253	12
334xx	12
61000	12
28963	12
xx296	13
x765x	13
16x24	13

FIG. 5



APPARATUS FOR CLASSIFYING SHEET-LIKE MATERIAL

This invention relates to an apparatus for automatically classifying sheet-like written material, for example, mail matter such as enveloped writing and post cards in the designated pockets according to the classification codes indicated on the surface of the written material.

It is demanded quickly to classify written material, for example, not only mail matter such as enveloped writing and post cards but also documents, bills, notes and any other forms of writing used in or handled by financial corporations including banks, securities companies, insurance companies, etc. The above-mentioned written material (for convenience of description, hereinafter represented by post cards, though not limited thereto) has been automatically classified by one of the following two processes. The first process consists in providing a plurality of card-receiving pockets along a passageway; fitting a device for reading out the classification code appearing on the surface of a post card to the inlet of each pocket; deciding whether or not a particular card should be received in a given pocket from data on the classification code indicated on the surface of the card, thereby receiving in the pocket only the card whose classification code coincides with the code previously allotted to said pocket; in case of noncoincidence between both data, forwarding an unmatchable post card to any succeeding pocket; reading out the classification code of said unmatchable post card again at said succeeding pocket; and carrying out the same decision as described above. The readout devices provided for the first process in a number equal to that of pockets should be of such simple construction as can only read out a classification code punched in a card, indicating that the first process is unadapted for the high speed classification of cards.

According to the second process, the classification code of a card is read out before it is delivered to a passageway and the readout data on said classification code is converted into a code signal designating the pocket to which the card is to be destined for classification. The pocket-designating code signal is stored in a shift register, where the code signal is shifted, as the card moves on. When the card is brought to a prescribed point, the code signal shifted at this time is examined by a decoding network. An output signal from the decoding network opens the magnetic gate of the designated pocket to receive the card therein. With this second process, not only flip-flop circuits have to be provided in a number equal to the detectors for detecting the current position of a traveling card, but also shift registers should be considerably increased in number, when more pockets are required. Where, therefore, numerous pockets should be provided as in classifying post cards, shift registers also have to be used in a tremendous number, rendering the classifying machine complicated and bulky. Moreover, the flip-flop circuits constituting the registers are utilized only in a very low frequency.

It is of vital importance that classification of post cards is free from any error. To this end, transportation of post cards should always be watched to maintain it in a normal condition. To date, however, no satisfactory watching device has been developed.

It is accordingly the object of this invention to provide an apparatus of simple construction capable of

quick, reliable classification of sheet-like written pieces which comprises reading out the classification codes indicated on the surface of the written pieces by a single readout device, storing the current position of the written pieces during transit in a small number of storing sections constituting a memory device, thereby eliminating the necessity of using a shift register and detecting any abnormal feeding of the written pieces for prevention of erroneous classification thereof.

The apparatus of this invention wherein a series of sheet-like written pieces are carried one by one on a passageway, the passageway is provided with a plurality of pockets, and a particular written piece is received in the pocket whose allotted code coincides with the classification code of the written piece is characterized in that it comprises means for reading out the classification code of a written piece and supplying data designating the pocket in which the written piece is to be received; means for supplying data on the current position of a traveling written piece which means comprises a plurality of detectors disposed along the passageway and including those corresponding to each of the pockets and supplies the current position data when the traveling written piece passes through the detectors; a time-counting device for counting a length of time required for a transported written piece to cover a distance between any two adjacent detectors; a memory device including at least as many storing sections as a plurality of written pieces jointly traveling on the passageway at a given time, each of said storing sections being stored with data designating a pocket associated with a traveling written piece, data on the current position thereof and data on a length of time counted by the time-counting device; means for replacing the preceding time count of the time-counting device stored in the storing section by another time count freshly obtained thereby as a traveling written piece passes through a distance between any two succeeding adjacent detectors; means for detecting whether the time count stored in the storing section lies within a prescribed range and, in that case, replacing data on the first current position of a written piece already stored in the storing section by data on the second current position of the written piece corresponding to a detector following that associated with the first current position of the written piece; means for comparing the pocket-designating data with data on the second current position of the written piece and, when a predetermined coincidence is detected to exist between both data, receiving the written piece in the designated pocket; and means for detecting whether a time count stored in the storing section lies outside of a prescribed range and, in that case, taking proper measures to cope with the abnormal condition in which a written piece was transported on the passageway.

According to this invention, the current position of each of a plurality of written pieces, for example, post cards jointly traveling on the passageway at a given time is stored in one of a small number of storing sections constituting a memory device. After a particular card is received in the designated pocket, all data stored in the storing section associated with said card is cleared ready to be used with another traveling card. Namely, each storing section of a memory device is used very frequently. The number of storing sections is determined simply by that of cards jointly traveling on the passageway at a given time, and does not increase,

even if pockets are provided in a larger number. Therefore, the written piece classifying apparatus of this invention is of far simpler construction than the prior art apparatus wherein more shift registers have to be provided with an increasing number of pockets, thus displaying a prominent effect when applied in the classification of, for example, post cards.

Other prominent features of this invention are that counted lengths of time required for a written piece to travel through a distance between any two adjacent ones of detectors in succession are recorded in the storing section; a written piece is classified only when the counted length of time consumed by the written piece in covering a distance between given two adjacent detectors lies within a prescribed range; where the counted length of such time falls outside of said range, then the written piece is decided to have been transported on the passageway under an abnormal condition; the written piece is thrown into a reject pocket; or an alarm is given to notify the abnormal traveling condition of the written piece or the classifying machine is brought to rest. The above-mentioned features display a prominent effect in an apparatus for classifying sheet-like written pieces which should always be safe from any wrong classification.

Readout data on a classification code indicated on the surface of, for example, a post card may be used intact as pocket designating data or applied as such after converted into a proper code signal. Similarly, detection signals obtained by detecting the successive current positions of a post card at a plurality of detectors may be used intact to indicate said current positions or applied for the same purpose after converted into proper code signals.

This invention can be more fully understood from the following detailed description when taken in conjunction with the accompanying drawings, in which:

FIG. 1 schematically illustrates the arrangement of the apparatus of this invention for classifying sheet-like written material;

FIG. 2 is a block circuit diagram of a control circuit for controlling the transportation of a series of written pieces one by one on the passageway;

FIGS. 3A and 3B are detailed circuit diagrams of the control circuit of FIG. 2;

FIGS. 4A and 4B are flow charts showing the sequential steps by which the control circuit of FIGS. 3A and 3B is operated;

FIG. 5 is a block circuit diagram of the conversion circuit of FIG. 2 for converting a classification code indicated on the surface of a written piece into a proper code signal; and

FIG. 6 presents data originally stored in the memory device of FIG. 5.

Referring to FIGS. 1 and 2, referential numeral 1 denotes a post card feeder where a plurality of post cards bearing a classification code (consisting of a plurality of digits in this embodiment) are superposed in a horizontal direction. The classification code of the foremost post card is statically read out by a readout device 2 consisting of, for example, an optical pattern recognizing type. Readout data 3 on the classification code of the post card (FIG. 2) is amplified by an amplifier 4 and conducted to a code converter 5, where readout data on the classification code is converted into a code signal 6 designating the pocket to which the post card is to be destined for classification. The card whose clas-

sification code was read out is separated by a mechanical device (not shown) from the other post cards remaining in the card feeder 1 and delivered to a main passageway. It will be noted that the readout device is not limited to a static type.

The points P_5 , P_7 , P_9 and P_{10} on the main passageway 7 are connected to the branch passageways D, C, B and A respectively, which are provided with the groups $D_1, \dots, C_1, \dots, B_1, \dots$, and $A_1, \dots$ of card-receiving pockets respectively. The pockets are fitted with gates $G_{d1}, \dots, G_{B1}, \dots, G_{C1}, \dots$ and $G_{A1}, \dots$ acting to admit or reject post cards brought thereto. Also provided at the junctions of the main passageway 7 and the branch passageways D, C and B are gates G_1 , G_2 and G_3 . This latter group of gates have their operation controlled by an output signal from a magnetic gate-driving circuit 8. Provided at the terminal ends of the branch passageways A, B, C and D are reject pockets A_R , B_R , C_R and D_R for receiving the post cards which were not properly guided into the designated pockets. In this embodiment, the four branch passageways A, B, C and D are each provided with 50 pockets, totaling 200 pockets. Detectors 9 are disposed at the points P_1 to P_{10} on the main passageway 7, the points P_{11} , $P_{12}, \dots$ on the branch passageway D, the points P_{21} , $P_{22}, \dots$ on the branch passageway C, the points P_{31} , $P_{32}, \dots$ on the branch passageway B and the points P_{41} , $P_{42}, \dots$ on the branch passageway A. The detectors generate a detection signal 10 when a traveling post card passes there-through. The detector 9 consists of, for example, a photocell 9a for optically detecting the passage of a post card.

There will now be described by reference to the block circuit diagram of the control circuit of FIG. 2 the manner in which a post card is treated during transit. In the post card feeder 1, the classification code, for example, 241 (FIG. 3) is read out by a readout device 2. Readout data 3 on the classification code 241 is amplified by an amplifier 4 and then conducted to a code converter 5, which converts the classification code into a code signal 6 designating the pocket to which the post card is destined for classification. The pocket-designating code signal 6 is stored in one of a plurality of storing sections 28 (FIG. 3) constituting a memory device 13 for controlling the transportation of a post card. According to this embodiment, the memory device 13 has 32 storing sections. When the light path of the photocell 9a of the detector 9 is obstructed by a card delivered to the passageway after having its classification code read out, a resulting detection signal 10 is amplified by an amplifier 11 and conducted to a quantizing circuit 14, where the amplified output signal is quantized. An output signal from the quantizing circuit 14 is supplied to a circuit 15 for generating a code signal denoting the current position of the post card during transit. The current position code signal 16 is stored in that storing section where the pocket-designating code signal is already recorded. A shift control circuit 17 (FIG. 2) is interposed between the current position code signal generator 15 and the later described code signal comparator 18 so as to maintain such a relationship as admits of mutual transfer of signals in the directions of the indicated arrows. An output signal from the shift control circuit 17 is transmitted to the aforesaid section of the memory device 13 for controlling the transportation of a post card so as to replace the current position code signal stored

therein by fresh data on any succeeding current position as the card is carried further. The comparator 18 compares the pocket-designating code signal 6 stored in the register when the classification code of the card was initially read out with a code signal 16 denoting the current position of the post card which is replaced each time the post card passes through one detector 9 after another. Where coincidence is detected to exist between both code signals, a gate G is opened by a coincidence signal 19 from the comparator 18 through a magnetic gate-driving circuit 8, thereby guiding the post card into the prescribed pocket M corresponding to the initially set pocket-designating code signal 6. In case of noncoincidence, an unmatched post card is forwarded to a succeeding detector 9. At this point, a code signal showing the first current position of said unmatched post card is replaced by fresh data on the second current position thereof and comparison is again made between data on said second current position and the original pocket-designating code signal 6. Though not shown in FIG. 2, the storing section 28 is stored, as later described by reference to FIG. 3, with a counted length of time required for the post card to travel through a distance between any two adjacent ones of photocells 9a. Data on said counted length of time is replaced, each time the post card passes through a distance between any two adjacent detectors 9. Decision is made from the freshly replaced counted length of time as to whether data on a given current position of the card should be replaced by data on the succeeding current position thereof, or whether the card should be diverted to a suitable reject pocket or whether the classifying machine should be stopped, thereby preventing the erroneous classification of the post card.

There will now be described by reference to FIGS. 5 and 6 the classification code converter 5. A memory device 21 is stored, as shown in FIG. 6, with data on the classification codes, for example, 0x253, 334xx, 61000 and 28963 for indicating the post cards which should be received in the 12th pocket. 2nd data on the classification codes, for example, xx296, x765x and 16x24 for indicating the post cards which should be destined to the 13th pocket, with said classification codes given opposite to the sequential numbers of the pockets. The above-mentioned mark x denotes any integer of 0 to 9. Accordingly, a classification code represented by 0x253 shows that post cards bearing 10 kinds of classification code ranging from 00253 to 09253 should all be received in the 12th pocket. From the above-mentioned code signals 0x253, 334xx, 61000 and 28963, it will be understood that the twelfth pocket will receive post cards being 112 kinds of classification code in all. This arrangement enables post cards whose destinations are indicated by numerous classification codes to be easily classified in a small number of pockets. Obviously, it is possible to store a memory device with data on the number of one pocket and data on the identical classification code of post cards so as to receive only such cards in one pocket.

Referring to FIG. 5, data 3 on the classification code of a post card read out by the readout device 2 is amplified by the amplifier 4 and temporarily stored in a classification code register 22 and thereafter supplied to a scanning control circuit 23 and a classification code signal comparator 24. Scanning by the scanning control circuit 23 causes the classification codes of post cards and the sequential numbers of the corresponding pocket-

ets shown in FIG. 6 to be successively written in a buffer register 25 from the memory device 21. Data on the classification code of a post card written in the buffer register 25 is transmitted to the comparator 24 and the corresponding pocket number signal written in said buffer register 25 is conducted to the pocket designating code signal generator 5a. When scanned by the scanning control circuit 23, the comparator 24 compares data on the post card classification code supplied from the buffer register 25 with data on said classification code delivered from the aforesaid classification code register 22. When coincidence is detected to exist between both data on the classification code, an output coincidence signal is supplied to the pocket-designating code signal generator 5a. Data on the pocket number which is transmitted at this time from the buffer register 25 to the pocket-designating code signal generator 5a is converted into a prescribed pocket-designating code signal 6, which in turn is stored in the memory device 13 of FIG. 2 for controlling the transportation of a post card.

There will now be described by reference to FIG. 3 the operation of the sheet-like written material classifying apparatus of this invention. Referential numeral 28 denotes one of, for example, 32 storing sections constituting the memory device 13 of FIG. 2 for controlling the transportation of a post card. The storing sections or registers are provided on the peripheral surface of a rotating drum. Each storing section 28 is stored with one word consisting of 32 bits and is divided into the first to the fourth subsections 28a, 28b, 28c and 28d. The first memory subsection 28a is stored with a busy signal BU showing whether or not the storing section or register is already supplied with data on a traveling card. If the busy signal BU is stored in the register, then it will indicate that the register is already used to control the transportation of a given post card. The storing subsection 28b is stored with the pocket-designating code signal 6 of FIG. 2 converted from the readout data on the post card classification code 3 by the code signal converter 5 through a pocket-designating code signal register 34.

The storing subsection 28c is stored with a code signal 16 (FIG. 2) denoting the current position of a traveling post card. The storing subsection 28d is successively stored with data on a counted length of time required for a post card to cover a distance between any two adjacent detectors. For the object of this invention, the storing sections 28 are chosen to be provided in a number equal to or preferably larger than that of a plurality of post cards jointly traveling on the passage way at a given time.

The thirty-two memory sections 28 are each designated by an address counter 30, which is actuated by scanning to read out data stored in each of the storing sections 28. The scanning cycle takes a time of 1 millisecond, while a post card consumes a time of about 80 milliseconds in traveling through distance between any two adjacent detectors 9.

When a timing control signal 31a is supplied to an AND gate circuit 32c, a pocket-designating code registered in the memory subsection 28b is transferred to the pocket-designating code signal register 34 through an AND gate 32c and OR gate 33a. When the later described signal 35 is conducted to an AND gate circuit 32a, the pocket-designating code signal 6 delivered from the code converter 5 is written in the memory

subsection 28b through the AND gate 32, the OR gate 33a and the pocket-designating signal register 34. The time at which said writing is made, namely, at which the aforesaid signal 35 is generated is controlled jointly by three factors, that is, a discrimination flip-flop circuit 37 which, when the classification code of a post card is read out by the readout device 2, is set by a timing control signal 36a supplied from said readout device 2 when the card is read out; a busy flip-flop circuit 40 which is set upon receipt of a nonbusy signal obtained by inverting the busy signal BU already recorded in the memory subsection 28a by an inverter 39; and the later described input point-ON signal 36c. The above-mentioned signal 35 denotes an output coincidence signal from an AND circuit 41 when coincidence takes place among an output signal from the discrimination flip-flop circuit 37, an output signal from the busy flip-flop circuit 40 and the input-ON signal 36c. This coincidence signal 35 immediately resets both flip-flop circuits 37 and 40. The above-mentioned input-ON signal is herein defined to mean signal generated when a written piece, for example, a post card passes through the initial detector P_i provided on the main passageway. There is further provided a reject code signal generator 42 for generating a reject code signal to guide that card to any of the reject pockets A_R, B_R, C_R and D_R which happened to have its classification code missed from reading or whose traveling condition was judged abnormal from the later described time count. This reject code signal is temporarily stored in the pocket-designating code signal register 34 through the AND gate circuit 32b and OR gate circuit 33a and thereafter written in the storing subsection 28b.

The current position code signal stored in the memory subsection 28c is written in the current position code signal register 43 upon scanning by the shift control circuit 17 of FIG. 2. When the later described next position -ON signal 44a is produced, the current position code signal from the current position code signal register 43 is conducted to a next-position code signal generator 46 through an AND gate circuit 45. As used herein, the current position-ON signal 36b is defined to mean a signal given forth when the post card having a code signal denoting its current position already written in the memory subsection or register 28c passes through the photocell 9a of the detector 9 corresponding to said current position. The next position-ON signal 44a is defined to mean a signal generated during the period in which the post card having a code signal denoting its current position already stored begins to cross another photocell 9a of a detector 9 following that corresponding to its current position.

The already stored code signal denoting said current position of the post card is read out by the current position code signal register 43, and a code signal showing the second current position of the post card delivered from the next position code signal generator 46 is written as a signal denoting the fresh current position of the post card in the storing subsection 28c through an OR circuit 47. An output signal from the next position code signal generator 46 which generates a signal denoting the position of a post card corresponding to that of the succeeding detector is written in the memory subsection or register 28c through the OR circuit 47 to indicate the fresh current position of the post card. For convenience of description, the current code signal denoting the current position of the post card to be

freshly written is hereinafter referred to as "a second current position code signal," and the current code signal showing the preceding current position of the post card which was already stored in the register ready to be replaced by another similar current code signal is referred to as "a first current position code signal."

When a signal 44b other than the next position-ON signal 44a is supplied to an AND gate circuit 48, then the first current position code signal stored in the register 43 is written intact in the storing subsection 28c through the AND gate 48 and OR circuit 47. A second current position signal code delivered from the OR circuit 47 is transferred to the code signal comparator 18 (FIGS. 2 and 3) to be compared with the pocket designating code signal supplied from the register 34. According to the result of said comparison, a coincidence signal 49a (corresponding to the signal 19 of FIG. 2) or a noncoincidence signal 49b is generated. The coincidence signal 49a is used to open a gate G (FIG. 2) corresponding to the pocket designated by the pocket-designating code signal stored in the storing subsection 28b. The noncoincidence signal 49b is applied in replacing the first current position code signal written in the storing subsection 28c by a fresh second current position code signal. A current position code signal stored in the storing subsection 28c or a next position code signal generated by the next position code signal generator 46 is conducted to a decoding circuit 50 to be converted into a proper decoded signal 51. This decoded signal 51 is transmitted to the set terminal S of a flip-flop circuit 53 through one input terminal of an AND gate circuit 52, to the reset terminal R of said flip-flop circuit 53 through one input terminal of an AND gate circuit 54, and to a circuit 56 consisting of a group of gate circuits for producing the current position-ON signal 36b and next position-ON signal 44a through one input terminal of an AND gate circuit 55. Though only four flip-flop circuits 53 are indicated in FIG. 3, as many flip-flop circuits 53 as the detectors 9 are provided in practical application. The other input terminal of the AND gate circuit 52 is supplied with an output signal *r*3 from the later described time comparator 58. The other input terminal of the AND gate circuit 54 is supplied with an output signal *r*4 from said comparator 58 and the other input terminal of the AND gate is supplied with a detection signal 59 (an amplified output signal from the amplifier 11 of FIG. 2). A time count stored in the storing subsection 28d is rewritten into a fresh time count by the scanning operation of a control circuit whose flow chart is shown in FIG. 4. The time count is temporarily stored in a time counter 60. A time count indicated by the time counter 60 is replaced by a new time count by the action of set and reset signals, each time a time count is read out from the storing subsection 28d. A fresh time count reckoned by the time counter 60 is again written in said storing subsection 28d. Time counts are made by a series of the above-mentioned operations. Output signals denoting time counts from the counter 60 are transferred to a time comparator 58 where various time counts obtained are compared with the prescribed referential lengths of time T₁ to T₃, thus generating output coincidence signals *r*1 to *r*5, if coincidence is detected by comparison to exist between the referential data and obtained data. Though later detailed by reference to FIG. 4, T₁ - T₂ denotes the range of the referential time length required for a post card to travel through a distance be-

tween any two adjacent detectors under a normal condition. T_3 shows a referential length of time normally consumed until a prescribed gate is opened after detection of coincidence between the code signals denoting the designated pocket and second current positions of a post card. T_4 is referential length of time required until said gate is closed. T_5 is a referential length of time from which the abnormal traveling condition of a post card is judged. When said abnormal condition is detected, a jam signal is given forth upon receipt of the coincidence signal t_5 .

There will now be further detailed by reference to the flow chart of FIG. 4 the operation of the written material-classifying apparatus of this invention. The moment the subject apparatus is started, the memory device 13 (FIG. 2) for controlling the transportation of, for example, a post card has all data in the register 28 of FIG. 2 cleared (step *a*). In this case, it is examined whether the post card-classifying apparatus as a whole is fully operated for transportation of the post card (step *b*). Unless the apparatus has fully started operation, the apparatus is stopped. Data on the classification code 3, for example, 241 of a post card read out by the readout device 2 is converted into a pocket-designating code signal 6 by the code converter 5. One of a plurality of sections of storing registers 28 constituting a memory device 13 is read out by the address counter 30 (step *c*). It is examined whether the storing subsection 28*a* of said storing section 28 is already stored with a busy signal "1" (step *d*). Unless the busy signal "1" is not written (NO condition), the storing section 28 can be used with a fresh post card whose classification code has been read out. It is decided whether an input-ON signal 36*c* is in the ON condition. Further, it is examined whether the classification code of a post card has been properly read out by the readout device 2, and the discrimination flip-flop circuit 37 is set by a timing control signal 36*a* transported from the readout device 2 (step *e*). If the flip-flop circuit 37 is not set due to the improper reading of the classification code of the post card, then the address counter 30 makes one more count to read out another storing register 28 bearing an address following that of the preceding register 28 already read out (step *u*). Where, in this case, the discrimination flip-flop circuit 37 is set and the input point-ON signal 36*c* is in the ON condition, fresh data on the post card whose classification code has just been read out is written in a register 28 which is not stored with the busy signal "1." Namely, the storing subsection 28*a* is stored with the busy signal "1;" the storing subsection 28*b* with a pocket designating code signal denoting the just read out post card through the pocket-designating code signal register 34; the storing subsection 28*c* with the current position code signal of the post card corresponding to the input point or the initial detector P_i ; and the storing subsection 28*d* with a signal indicating a zero time count (step *f*). After completion of the step *f*, the address counter 30 makes one more count, as described with respect to the step *u*, to read out the succeeding storing register 28.

Where it is found that the register 28 read out by the step *d* has already been stored with the busy signal "1" (YES condition), then the time counter makes one more count to increase the time count stored in the storing subsection 28*d* by one count (step *g*). Comparison is made by the code signal comparator 18 between a pocket-designating code signal delivered from the

storing subsection 28*b* to the pocket-designating code signal register 34 and a current position code signal supplied from the storing subsection 28*c* to the current position code signal register 43 (step *h*). Where coincidence is detected to exist between both code signals, it indicates that the post card is brought up to a detector disposed immediately before the designated pocket. Consequently, it is examined whether the time counter 60 indicates a count of T_3 (step *i*). In this case, the corresponding one of the flip-flop circuits 53 is set by a signal t_3 through the AND gate 52 (step *j*). The resultant output signal from the flip-flop circuit 53 opens the gate G of the designated pocket M (FIG. 2) to guide the post card thereinto. In this case, the register 28 associated with the received post card is stored with the data read out in the aforesaid step *c* (step *l*).

Even when the time count indicated by the time counter 60 neither equals T_3 nor amounts to T_4 , the register 28 is stored with the data read out in the step *c* (NO condition in step *k*). When the time counter 60 makes a time count equal to T_4 (YES condition in step *k*), then the previously set flip-flop circuit 53 is reset by a signal t_4 through an AND circuit 54 to close the gate previously opened by designation in step *j* (step *m*). At this time, all data stored in the register 28 in connection with the received post card is cleared (step *n*).

When the code signal comparator 18 generates a noncoincidence signal showing that the current position code signal does not coincide with the pocket-designating code signal (NO condition in step *h*), then it is checked whether a time count indicated by the time counter 60 lies between T_1 and T_2 , namely, whether a post card traveled through a distance between any two adjacent detectors 9 in a prescribed length of time ($\bar{0}$ condition). If this is the case, it is examined whether the circuit 56 for generating current position-ON and next position-ON signals produced the next position-ON signal 44*a* (step *p*). Unless said signal 44*a* is not given forth (NO condition in step *p*), data read out from the storing subsection 28*c* is again written therein (step *q*). Where the next position-ON signal 44*a* is generated (YES condition in step *p*), then next position current code signal from the next position code signal generator 46 is written in the memory subsection 28*c* through the OR gate circuit 47 to indicate the second current position of the post card. At this time, the storing subsection 28*d* is stored with a time count of zero (step *r*). The busy signal and pocket-designating code signal which were read out are written in the storing subsections 28*a* and 28*b* respectively.

Where the time counter 60 shows a count falling outside of a prescribed range of T_1 to T_2 (NO condition in step $\bar{0}$), then the reject code signal generator 42 supplies a reject code signal to the storing subsection 28*c* through the AND gate circuit 32*b*, OR gate circuit 33*a* and pocket-designating code signal register 34. At this time the other storing subsections than 28*c* are again stored with the data just read out (step *s*). Where the time counter 60 makes a larger time count than the referential length of time T_5 (YES condition in step *t*), it indicates that a given card was arrested long somewhere on the passageway. Accordingly, a jam signal t_5 denoting the occurrence of an abnormal condition is given forth to stop the classifying apparatus. Where the time counter 60 makes a smaller time count than T_5 (NO condition in step *t*), then it can be judged that a post card did not stand at rest for long anywhere on the

passageway, but was transported under a normal condition. Therefore, the address counter 30 makes one more count ready to read out a register 28 bearing the succeeding address (step u).

The flow chart of FIG. 4 relates to the case where scanning was carried out by the shift control circuit 17 (FIG. 2) with respect to one of the 32 memory registers 28. Obviously, said scanning is practically made of all these registers 28 in turn. Scanning of any of the 32 registers is cyclically carried out in a time of 1 millisecond. FIG. 3 presents a circuit arrangement associated with the case where scanning is made of one of the 32 registers 28 provided on a rotating drum. It will be understood that the other registers 28 stored with different data replace the register 28 of FIG. 3 in turn when designated by the address counter 30.

Referential time lengths should be set in the time comparator 58 such that clear distinction can be made among the normal range of time lengths required for a post card to be transported through a distance between any two adjacent detectors; a length of time consumed by a given post card in traveling through said distance in a state partly overlapping another card running on the passageway at the same time; and a length of time a given card is arrested somewhere between any two adjacent detectors.

What we claim is:

1. An apparatus for classifying sheet-like written material designed to transport a series of written pieces one by one on a passageway and receive a particular written piece in the designated one of a plurality of pockets provided along the passageway which corresponds to the classification code of the written piece, characterized in that the apparatus comprises means for reading out the classification code of a written piece and supplying a pocket designating code signal designating the pocket in which the written piece is to be received; means for supplying a current position code signal of a traveling written piece which means comprises a plurality of detectors disposed along the passageway and including those corresponding to each of the pockets and supplies the current position code signal when the traveling written piece passes through the detectors; a time-counting device for counting a length of time required for a transported written piece to cover a distance between any two adjacent detectors; a memory device including at least as many storing sections as a plurality of written pieces jointly traveling on the passageway at a given time, each of said storing sections being stored with a pocket-designating code signal designating a pocket associated with a given traveling written piece, data on the current position thereof and data on a length of time counted by the time-counting device; means for replacing the preceding time count of the time-counting device stored in the storing section by another time count freshly obtained thereby as a traveling written piece passes through a distance between any two succeeding adjacent detectors; means

for detecting whether the time count stored in the storing section lies within a prescribed range and, in that case, replacing data on the first current position of a written piece already stored in the storing section by data on the second current position of the written piece corresponding to a detector following that associated with the first current position of the written piece; means for comparing the pocket-designating data with data on the second current position of a written piece and, when a predetermined coincidence is detected to exist between both data, receiving the written piece in the designated pocket; and means for detecting whether a time count stored in the storing section lies outside of a prescribed range, and in that case, taking proper measures to cope with the abnormal condition in which a written piece was transported on the passageway.

2. A written material-classifying apparatus according to claim 1 wherein the means for supplying the pocket-designating code comprises a readout device for reading out the classification code indicated on the surface of a written piece and a first code signal converter for converting the readout classification code signal into a prescribed pocket-designating code signal.

3. A written material-classifying apparatus according to claim 2 wherein the first code signal converter comprises a memory device stored with a plurality of different classification codes for the same sequential number of a given pocket, the different classification codes being correspondent to the classification codes indicated on the surface of written pieces; a code comparator for comparing the readout code of a written piece with the different classification codes already stored in the memory device; and a pocket-designating code signal generator for reading out the sequential number of a pocket associated by an output coincidence signal from the code comparator and converting the readout sequential number of the given pocket into a prescribed pocket-designating code signal.

4. A written material-classifying apparatus according to claim 1 wherein the means for supplying the current position code signal of a written piece comprises a detector for generating a detection signal when a traveling written piece shuts off a light path; and a second code signal converter for converting the detection signal into a prescribed current code signal denoting the current position of the traveling written piece corresponding to the associated detector.

5. A written piece-classifying apparatus according to claim 1 wherein that of a plurality of storing sections constituting the memory device which is stored with data on a given traveling written piece is further stored with a busy signal and, after the written piece is received in the designated pocket, has the stored busy signal cleared together with other stored data, and is rendered ready to be used with another traveling written piece.

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