

Sept. 6, 1966

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3,270,882

DOCUMENT SORTER

Filed Oct. 2, 1964

3 Sheets-Sheet 1

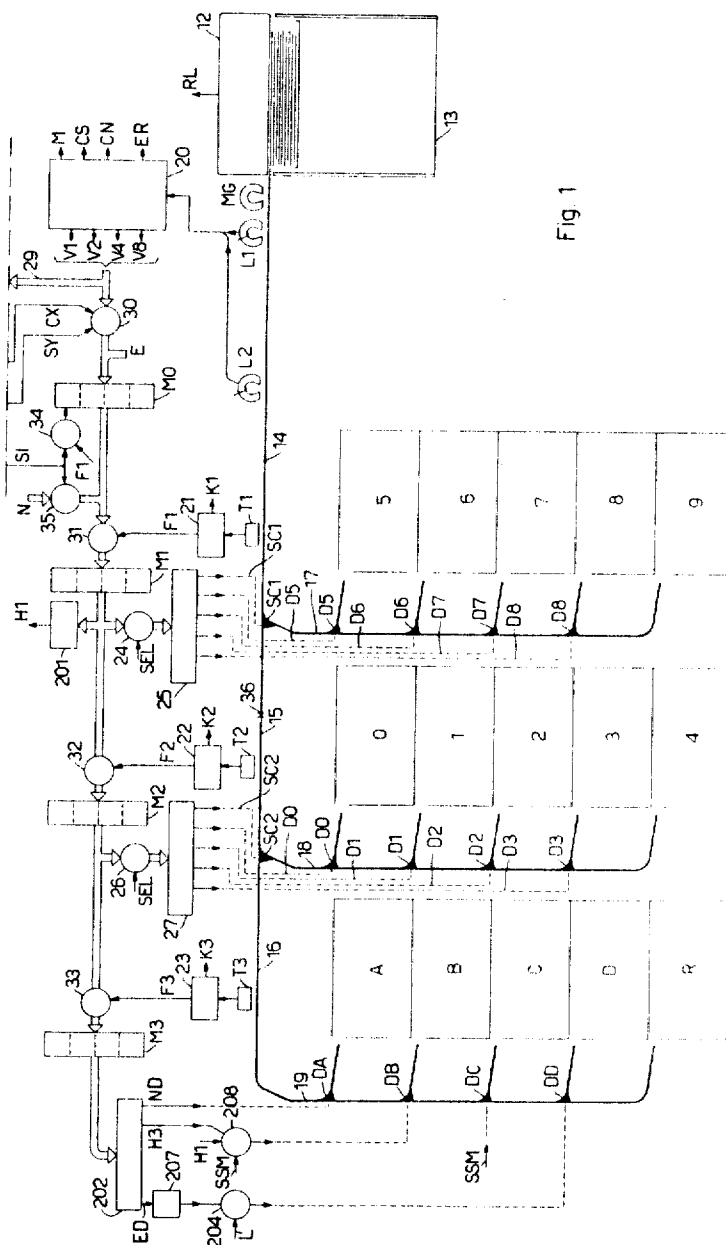


Fig 1

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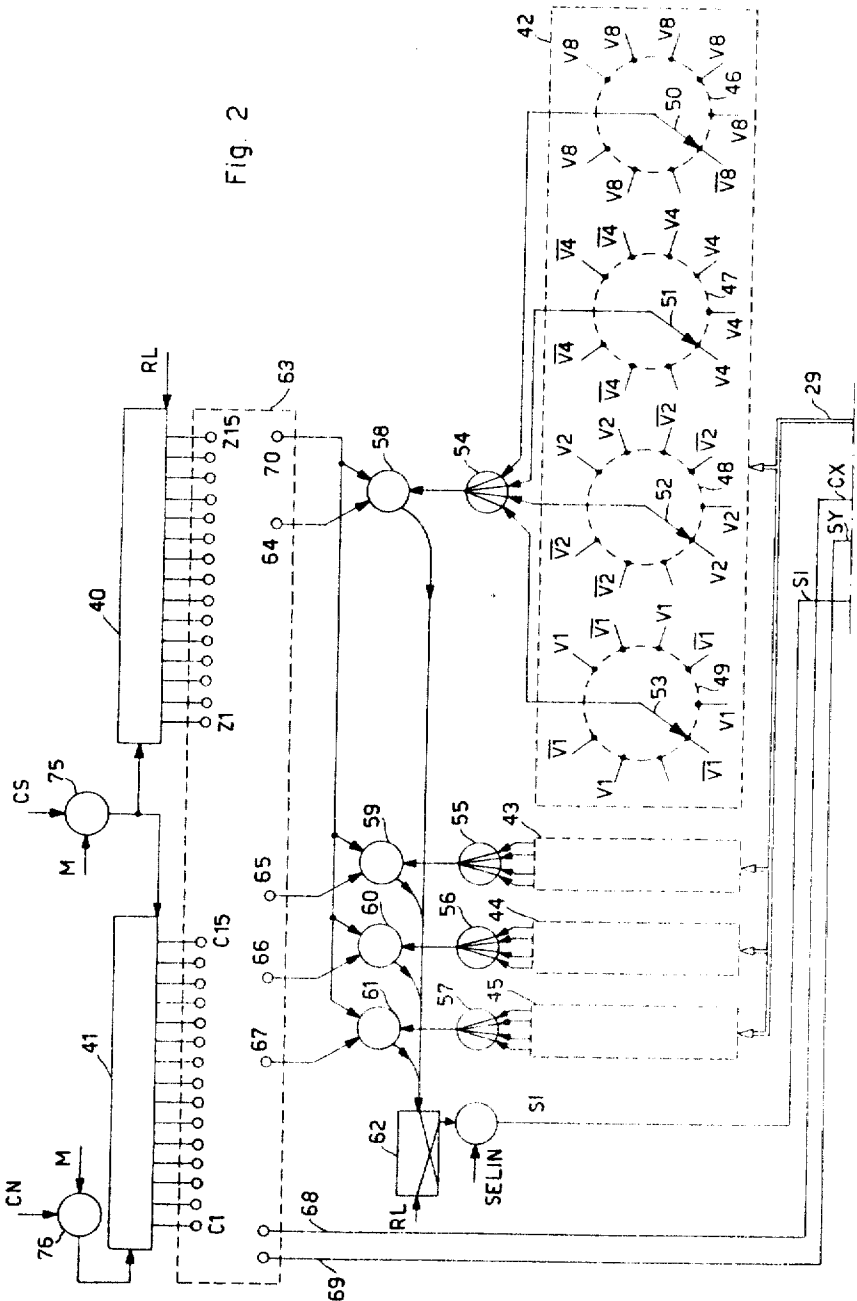
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3 Sheets-Sheet 2

Fig. 2



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DOCUMENT SORTER

Filed Oct. 2, 1964

3 Sheets-Sheet 3

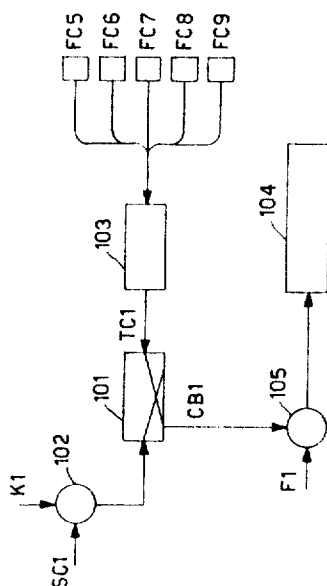


Fig. 3

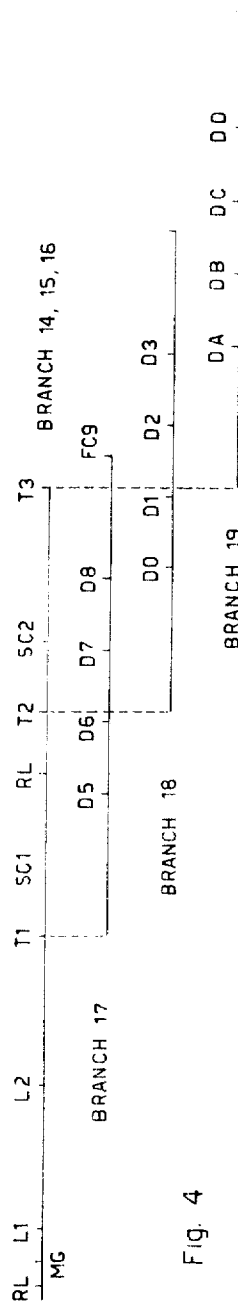


Fig. 4

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3,270,882

DOCUMENT SORTER

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5 Claims. (Cl. 209—74)

The present invention relates to a document sorter wherein the documents to be sorted are sequentially fed past a reading station for reading the intelligence recorded thereon and thereafter conveyed on a sorting path for being routed into sorting pockets spaced along said sorting path as directed by deflectors inserted on said path and actuated according to the intelligence read.

In the known document sorters the sorting path is generally rectilinear.

In order to attain a great sorting speed, the successive documents fed into the sorting path must be closely spaced, because the documents cannot be conveyed at a speed exceeding a practical limit. In this case, in order to avoid jamming or other damage due to interference in the sorting operation for two successive documents, two different types of sorters have been proposed.

In apparatus of the first type the deflectors are concentrated in the point where sorting path begins, whereby after said point the documents follow independent paths each uniquely directed into one of the sorting pockets. Therefore a distinct and long sorting path is required for each pocket. Moreover the concentration of the deflectors in a single point entails hard mechanical problems.

In apparatus of the second type a deflector is located at the entrance of each pocket, each pocket having associated therewith a distinct memory for storing the sorting decision which commands the actuation of the corresponding deflector, whereby the actual actuation of said deflector is delayed until the document reaches the entrance of said pocket. The apparatus of this type are complicated and expensive due to the number and complexity of the required memories.

Moreover, in both types the actuation of the deflectors and more generally the entire sorting process is synchronous with respect to the feeding of the documents past the reading station, whereby complex synchronizing devices are required. Moreover, due to the distribution of the sorting pockets along a rectilinear path, the overall dimension and cost of said sorters are exceedingly high.

To eliminate the last mentioned disadvantage, a third type of sorters has been proposed, including a branched sorting path where deflectors are located at the branching points and at the entrances of the sorting pockets. However in said sorters no document can be fed into the sorting path until the next preceding document has entered the corresponding pocket, whereby the sorting speed is very low.

Moreover, should a document be sorted in accordance with intelligence read on one or more following documents, sorters of said known types must be provided with an additional reading station ahead of the first one and spaced therefrom a distance equal to the interval between two successive documents or alternatively they must be provided with additional memories for storing the intelligence read on a document until reading of the following document is completed, whereby cost, complexity and dimensions of the sorter are further increased.

Said disadvantages are obviated by the sorter according to the invention, which is characterized in that said branched sorting path is divided into sections each one including a plurality of pockets, each section having associated therewith a memory to which said read intelligence is transferred when the document reaches the beginning

2

of said section, said memory being able to control the deflectors of the associated section according to the intelligence stored therein, the distance between any two documents simultaneously present in the sorting path being greater than the longest partial path included in said section.

Therefore it is apparent that, by dividing the sorting path into a suitable number of sections, the cost, the complexity and the dimensions of the sorter can be substantially reduced in comparison with the sorters of the two first mentioned types while the sorting speed can be substantially increased in comparison with the sorters of the third type.

According to a further feature of the invention, the sorter, which comprises a plurality of groups of aligned pockets arranged side by side, each group belonging to a single section of the sorting path, and which is able to sort a document into special pockets according to the intelligence read on said document and on one or more following documents, is characterized in that said special pockets are in the group farthest away from the beginning of the sorting path, and that the deflectors of said special pockets are jointly controlled by the memory of the section to which said last mentioned group belongs and by the memories of preselected preceding sections. It is thus apparent that said kind of sorting does require neither additional reading stations nor additional memories.

These and other features and advantages of the invention will be apparent from the following description of a preferred embodiment thereof, taken in conjunction with the accompanying drawings, wherein:

FIG. 1 shows schematically the reading and sorting path for the documents and a part of the circuits associated therewith;

FIG. 2 shows other control circuits of the sorter;

FIG. 3 shows a supervisory circuit for the document conveying device;

FIG. 4 is a time diagram showing the successive positions of the leading edge of a document along the sorting path.

According to the described embodiment the sorter is arranged to process documents, for instance bank checks, bearing a series of characters printed with magnetizable ink and readable by a reading device of the type described in the British Patent No. 916,305.

It is a common practice to record on the document said series of characters on a single row parallel to an edge of the document itself. On the contrary, the sorter according to the invention, is able to process also documents whereon said series of characters is distributed on two or more lines, whereby more intelligence may be recorded on each document.

Said series of characters is divided into fields or groups of contiguous characters, the beginning of each field being marked by a special character CS. In the described embodiment a maximum of fifteen characters per field is allowed, means being provided for conditioning the sorter to process any two contiguous fields as a single field.

The sorter comprises a document feeding device 12, which is able to pick up from a magazine 13 and feed into the reading and sorting path one document at a time, which thereafter will be transported at constant speed on said path. Moreover said document feeding device 12 produces a document start signal RL at the beginning of the movement of each document.

Said reading path comprises a magnetizing station MG, a first reading station L1 provided with a first magnetic head arranged to scan a first row of the document and a second reading station L2 provided with a second magnetic head arranged to scan a second row of the docu-

ment, and other reading stations for scanning other rows if necessary, each reading station being spaced from the next preceding one a distance not less than the maximum length of a row of the document. The magnetic heads of all reading stations L1, L2 feed a character recognizing device 20 of the type described in the aforementioned patent and able to recognize ten numeric characters and four special characters. For the purposes of the present description it is sufficient to point out that the character recognizing device 20 is able to produce an end-of-character signal M just before the completion of the recognition of each character, four binary signals V1, V2, V3, V4 which represent in binary notation said recognized character, a signal CS upon recognizing any one of the special characters and a signal CN upon recognizing any one of the ten numeric characters respectively. The signals V1, V2, V3, V4, CS and CN last from the completion of the recognition of the related character until the beginning of the recognition of the next following character. Moreover upon occurrence of a reading error, the character recognizing device produces an error signal ER.

The sorting path comprises three main branches 14, 15, and 16 and three lateral branches 17, 18 and 19.

A document traveling on main branch 14 is routed into either lateral branch 17 or main branch 15 depending on whether a branch deflector SC1 is actuated or not. Likewise a document traveling on main branch 15 is routed into either lateral branch 18 or main branch 16 depending on whether a branch deflector SC2 is actuated or not, whereas a document traveling on main branch 16 is directed in any case into lateral branch 19.

The lateral branches 17, 18 and 19 convey the documents into a first group of sorting pockets 5, 6, 7, 8 and 9, a second group of sorting pockets 0, 1, 2, 3 and 4 and a third group of sorting pockets A, B, C, D and R respectively. A document which has entered branch 17 is directed into pockets 5, 6, 7, 8 or 9 depending on whether a pocket deflector D5, D6, D7, D8 or none of them is actuated. Likewise the documents are routed into the pockets of the second and third groups under the control of pocket deflectors D0, D1, D2, D3 and DA, DB, DC, DD respectively.

It is apparent that the arrangement of the fifteen sorting pockets into three vertical groups closely spaced side-by-side as shown in FIG. 1, allows the overall dimensions of the sorter to be substantially reduced in comparison with the known sorters having the pockets arranged on a single line.

Spaced along the sorting path are photocells T1, T2, T3 each one defining by its location a sorting decision point. Each photocell T1, T2, T3 controls an amplifying and differentiating circuit 21, 22, 23 respectively for developing a leading-edge signal F1, F2, F3 respectively upon sensing the leading edge of each document and a trailing-edge signal K1, K2, K3 respectively upon sensing the trailing edge of said document.

In the embodiment shown in FIG. 1 a photocell, and thus a decision point, is located just ahead of each lateral branch 17, 18 and 19 of the sorting path. More particularly the decision points T1 and T2 are located ahead of branch deflector SC1 and SC2 respectively and spaced therefrom a distance that a document can travel in a time less than the interval between the electronic signal commanding actuation of a deflector and the effective actuation thereof. The decision point T3 is located ahead of the entrance of lateral branch 19. Therefore the sorting path is divided into three sections, the first section comprising the portion from point T1 to point T2 as well as lateral branch 17, the second section comprising the portion from point T2 to point T3 as well as lateral branch 18 and the third section comprising lateral branch 19.

In general, when more complicated sorting paths are used, the decision points will be located in such a way that along any one of the paths that a document can

travel, the spacing between any two successive decision points encountered by said document be less than the minimum distance between the leading edges of two successive documents, whereby the longest partial path included in each section is shorter than said minimum distance.

The first decision point T1 is located behind the second or in general the last reading head at such a distance that the leading edge of a document does not reach point T1 before said head has finished reading said document.

The location of the main points of the reading and sorting path may be clearly understood from FIG. 1, bearing in mind that the spacing between the two reading stations is equal to the length of a row of a document and thus slightly shorter than the length of the document itself and that the spacing between two successive documents is normally such that, when the leading edge of a document is under the head L1, the leading edge of the next preceding document is at point 36 assuming the deflector SC1 has not been actuated.

More particularly the time diagram of FIG. 4 shows the successive positions of the leading edge of a document along the sorting path, the time being measured from the moment when the document starts moving (signal RL), the interval between the moments at which two consecutive documents start moving being represented in FIG. 4 by the interval between two consecutive document-start signals RL.

Each decision point T1, T2, T3 and therefore each section of the sorting path is associated with a memory M1, M2, M3 respectively.

In the embodiment shown in FIG. 1 each memory M1, M2, M3 is capable of storing a four-bit character.

The memory M1 feeds via a gate 24 a decoder 25, which energizes the output D5, D6, D7 or D8 depending on whether the character stored in the memory M1 is the numerical character 5, 6, 7 or 8 respectively and the output SC1 when said stored character is any one of the characters 5, 6, 7, 8 or 9. Likewise the memory M2 feeds via a gate 26 a decoder 27, which energizes the output D0, D1, D2 or D3 depending on whether the character stored in the memory M2 is a numeric character 0, 1, 2 or 3 respectively and the output SC1 when said stored character is any one of the characters 0, 1, 2, 3, 4.

The outputs D5, D6, D7, D8, SC1, D0, D1, D2, D3, SC2 of said decoders when energized actuate the deflectors having the same designation respectively.

The four bits of each character recognized by the character recognizing device 20 are fed in parallel through line 29 to the sorting control circuit shown in FIG. 2.

Moreover said bits are fed in parallel to a gate 30, which is conditioned by signals CX and SY issued from said sorting control circuit for passing the bits of a single character for each document, said character being selected as described later.

Via gate 30 said character is transferred into a memory M0 similar to memories M1, M2, M3. The contents of memory M0, M1, M2, is shifted into memory M1, M2, M3 respectively when a leading-edge signal F1, F2, F3 opens a gate 31, 32, 33 respectively. As before stated, said signals F1, F2, F3 are successively produced as the document advances along the sorting path.

However, if upon reading a document the sorting control circuit (FIG. 2) produces a signal SI, whose significance will be explained later, then said leading-edge signal F1 is sent to erase the memory M0 through a gate 34 opened by said signal SI and a predetermined character "N" different from the ten numeric characters is written into memory M1 instead of the character stored in the memory M0. For this purpose a gate 35 connected to the memory M1 is opened by said signal SI.

On the other hand, if the character recognizing device 20 produces an error signal ER, said signal causes a spe-

5

cial character E, different from the ten numeric characters, to be written into memory M0.

Said character N, having been written into memory M1, is subsequently shifted into memory M2 and thereafter into memory M3 as the document which has caused it to be written into memory M1 advances along the sorting path. Likewise said error character E, having been written into memory M0, is shifted into memories M1, M2 and M3 successively.

The memory M1 feeds moreover a decoder 201 which energizes its output H1 whenever the contents of the memory itself is equal to a character H, said character H being predetermined by the operator by suitable setting of manually changeable connections before starting operation of the sorter.

The memory M3 feeds a decoder 202 which produces a signal ED, H3, ND on its outputs having the same designation respectively, when the character stored in the memory itself is the character E, H and N respectively. Also decoder 202 is provided with manually changeable connections to allow predetermination of said character H in accordance with the setting of the changeable connections of the decoder 201.

The presence of signal ND on the corresponding output of the decoder 202 causes the deflector DA of pocket A to be actuated. The deflector DB of pocket B is actuated via an "and" gate 208 when a character H is simultaneously stored in the memories M1 and M3, the actuation of deflector DB being further conditional on the presence of a mode selecting signal SSM, whose significance will be explained later. The deflector DC is actuated any time said signal SSM is present. The deflector DD is actuated in presence of a read-only signal L, whose significance will be explained later, provided the error character E is not stored in memory M3. For this purpose the deflector D0 is connected to the output ED of the decoder 202 through an "and" gate 204 and an inverter 207.

The sorting control circuit comprises four push buttons, not shown in the drawings, for preselecting one of four possible modes of operations, namely "normal sorting," according to key number," "sorting according to following document," "reading only"; for this purpose said push buttons when operated produce a signal SEL, SELIN, SSM and L respectively, which is used for conditioning the sorting control circuit.

Moreover a field counter 40 is provided, which is zeroized by the document start signal RL produced before the reading of each document and is arranged to count thereafter the successive special characters read on said document so as to sequentially energize its outputs Z1 to Z15, the several fields of a document being separated by said special characters as previously stated.

Furthermore a character counter 41 is provided, which is zeroized by the same signal which causes the field counter to advance one step when reading of each zone of a document begins and is arranged to thereafter count the successive characters read in said zone so as to sequentially energize its outputs C1 to C15.

Four decade switches 42, 43, 44, 45 are provided for manually presetting four decimal digits respectively, which constitute a key number, said digits being compared with four characters selected among the characters recorded on a selected zone of each document for establishing a sorting criterion.

More particularly each decade switch 42, 43, 44 or 45 comprises, as shown in detail for switch 42 in FIG. 2, four contact banks 46, 47, 48 and 49 each one including ten stationary contacts and a rotary contact 50, 51, 52 and 53 respectively, the four rotary contacts of each decade switch being interconnected for being rotated manually in synchronism. Each contact bank corresponds to one of the four binary positions of a four-bit decimal digit expressed in pure binary code.

Through line 29 said stationary contacts are connected to the outputs V1, V2, V4, V8 of the character recogniz-

6

ing device 20. In FIG. 2 it is assumed that the device 20 be provided with inverse outputs V1, V2, V4, V8 not shown in FIG. 1, the direct outputs V1, V2, V4 and V8 being energized when the inverse outputs V1, V2, V4 and V8 respectively are deenergized and vice versa. It is apparent that upon reading a certain numeric character, a unique combination of four of said eight direct and inverse outputs is concurrently deenergized. The connection between the stationary contacts and said outputs through line 29 are such that the rotary contacts 50, 51, 52, 53, when set in the position corresponding to said certain numeric character, make contact to the four outputs of said unique combination.

The four rotary contacts 50, 51, 52, 53 of each one of the switches 42, 43, 44 and 45 are connected to an "or" gate 54, 55, 56 and 57 respectively, each one having an output which is connected to the "reset" input of a bistable circuit 62 through another "and" gate 58, 59, 60 and 61 respectively. The bistable circuit 62, when reset, keeps its output deenergized. Before reading each document, the document start signal RL sets the bistable circuit 62 so as to energize its output.

The outputs Z1 to Z15 of the field counter and the outputs C1 to C15 of the character counter can be connected, through manually changeable connections of a control panel 63, to the inputs 64, 65, 66 and 67 of the "and" gates 58, 59, 60 and 61 respectively and to the lines 68, 69 and 70.

The operation of the sorter will now be briefly described. It is first assumed that the button SEL has been pushed, whereby the mode selecting signal SEL is present to select the "normal sorting" mode while the other mode selecting signals SELIN, L, SSM are absent. In the "normal sorting" mode each document is sorted into the numerical pockets 0 to 9 according to the numerical value of the character recorded in a preselected character position of a preselected field of the document itself. In the following example, said preselected character position is assumed to be the third character position of the fourth field; this preselection has been established by the programmer by connecting in the control panel 63 the third output C3 of the character counter 41 and the fourth output Z4 of the field counter 40 to the line 68 and 69 respectively. The sorter having been started, the document feeding device 12 feeds the first document into the reading path and in the meantime produces a document start signal RL. The first document, having been magnetized in the magnetizing station MG, reaches the first reading station L1. As the first character of the first field is always a special character, the recognizing device 20 produces a special character signal CS besides an end-of-character signal M. Therefore the output of the "and" gate 75 (FIG. 2) is energized, whereby the character counter 41 is zeroized and the field counter 40 is advanced one step so as to energize the output Z1. Lines 68 and 69 remain deenergized, whereby absence of signals SY and CX keeps the gate 30 closed. Therefore said first character cannot be transferred into memories M0, M1, M2, M3, whereby it has no influence in the sorting process.

Thereafter the second character is read. As it is a numeric character, the recognizing device produces a numeric character signal CN besides the end-of-character signal M. Therefore the output of the "and" gate 76 (FIG. 2) is energized to advance the character counter 41 one step so as to energize output C1. Lines 67 and 69 remain deenergized, whereby gate 30 remains still closed to prevent the second character from entering memory M0. The same occurs also for the following characters, until the third character of the fourth field, that is the preselected character, is read. When this character reaches the reading station L1 (or reading station L2 if it is recorded on the second row of the document) a numeric-character signal CN and an end-of-character signal M are produced. As a result, the output C3 of the character counter 41 and

the output Z4 of the field counter 40 are thereafter energized simultaneously. Therefore both lines 68 and 69 connected thereto are energized, whereby signal CX and SY open the gate 30 to allow the binary representation of said preselected character to be transferred from outputs V1, V2, V3, V4 of the recognizing device 20 to memory M0. The following characters cannot be transferred into memory M0 because none of them has such a position in the document as to cause the inputs CX and SY of gate 30 to be concurrently energized. Therefore, after reading the entire document, the memory M0 stores said preselected character, which establishes the sorting criterion for said document. Said character is assumed to be "3."

When the leading edge of the document conveyed along main branch 14 reaches the photocell of the first decision point T1, the leading edge signal F1 then produced by circuit 21 opens the gate 31, whereby said preselected character is shifted from memory M0 to memory M1. Therefore, the gate 24 being opened by the mode selecting signal SEL, said character is fed to the decoder 25 to control the actuation of the deflectors D5, D6, D7, D8, SC1. Deflector SC1 is not actuated because said character is different from 5, 6, 7, 8 and 9, whereby the document goes straight on into main branch 15. When its leading edge reaches the photocell of the second decision point T2, the leading edge signal F2 then produced by circuit 22 opens gate 32, whereby said preselected character is shifted from memory M1 to memory M2. Therefore, the gate 26 being opened by the mode selecting circuit SEL, said character is fed to the decoder 27, which thus causes the deflectors SC2 and DF3 to be actuated, whereby the document is directed into lateral branch 18 and thereafter into pocket 3.

In a similar manner the following documents are sorted.

It is apparent that, if the preselected character is not recognized as one of the numerical characters 0 to 9, the document is directed into reject pocket R, as no deflector is actuated.

It is now assumed that the push button SELIN has been pushed to preselect the "sorting according to key number" mode, whereby the mode selecting signal SELIN is present.

According to this sorting mode, all the document bearing the key number preselected on the decade switches 42, 43, 44, 45 are collected into pocket A.

In the following example it is assumed that the preselected key number comprise the digits 9, 7, 4 and 8 in the second, fifth, eighth, twelfth character positions of the second field. This key number is preselected by setting the decade switches 42, 43, 44 and 45 according to said four digits respectively, and by connecting in the control panel 63 the outputs C2, C5, C8, C12 and Z2 to the inputs 64, 65, 66, 67 and 70 respectively.

The sorter having been started, the document start signal RL for the first document energizes the output SI of the gate connected to the output of the bistable circuit 62.

As in the preceding sorting mode, reading a numeric character or a special character causes the character counter or the field counter respectively to advance one step. Moreover, upon reading each character the binary signals V1, V2, V4, V8 produced by the recognizing device 20 and representing said character are fed via line 29 to the decade switches 42, 43, 44, 45. As long as the second special character of the document, which marks the beginning of the second field, has not yet been read and counted by counter 41, the output Z2 of counter 41 remains deenergized, whereby the input 70 of the "and" gates 58, 59, 60 and 61 remains also deenergized. On the contrary, said line 70 is energized when reading said second field, and thereafter again deenergized. Upon reading the second character of said second field, also the output C2 of the character counter 41 is energized. Simultaneously the input 29 of the decade switch 42 receives the representation of said second character, which

is assumed to be just equal to the first character "9" of the preselected key number, whereby said representation will be $V1=1$, $V2=0$, $V4=0$, $V8=1$. As in the position "9" the rotary contacts 50, 51, 52, 53 of the decade switch 42 are positioned to contact the outputs V1, V2, V4, V8, all the inputs of the "or" gate 54 are concurrently deenergized, whereby the output of said gate is not energized. Therefore no signal is sent via gate 58 to reset the bistable circuit 62, whereby line SI remains energized. Likewise upon reading the fifth, eighth and twelfth character of the second zone no signal will be obtained on the output of the "or" gates 55, 56 and 57 respectively provided said characters coincide with the digits 7, 4 and 8 preset in the decade switches 43, 44 and 45 respectively.

In general, it is apparent that the line SI connected to the output of the bistable circuit 62, having been energized when the document has started moving, cannot thereafter be deenergized by any character read in a position different from the four preselected character positions, and that the characters of the four preselected positions can deenergize it only if they are different from the four characters of the key number respectively. Therefore, said line SI will be either energized or deenergized after reading a document and until the document start signal RL for the next following document depending on whether said document bears in the preselected positions said four digits of the key number or not.

When the leading edge of said first document reaches the first decision point T1, the leading edge signal then produced by the circuit 21 opens gates 31, 34 and 35, whereby the signal SI causes the memory M0 to be zeroized through gate 34 and character "N" to be written through gates 35 and 31 into memory M1. As said character N is different from the digits 0 to 9, the deflectors SC1 and SC2 are not actuated, whereby the document is conveyed on main branch 15 and thereafter on main branch 16 and said character N is shifted into memory M2 and thereafter into memory M3 as the leading edge of the document reaches the decision points T2 and T3. The memory M3, upon receiving said character N, causes the output ND of the decoder 202 to be energized, whereby the deflector DA is actuated to direct said document into pocket A.

It is now assumed that the push button SSM has been pushed to preselect the "sorting according to following document" mode, whereby the mode selecting signal SSM is present, and that the character H has been preselected in the decoder 201 and 202.

A particular case will be considered, wherein the sequence of documents to be sorted includes "master" documents bearing the character H in a predetermined position, each master document being followed either by one or more detail documents associated therewith and bearing no character H or by another master document. The master documents not followed by detail documents are to be collected in pocket B, while the remaining master documents with the associated detail documents are to be collected in pocket C.

To this end the documents are fed successively along the sorting path as usually. When a master document is being read, the character H recognized in said predetermined position is transferred, via gate 30, into memory M0 and thereafter shifted to memories M1, M2, M3, successively as the document advances along the sorting path.

The spacing between two successive documents on the sorting path is such that when the leading edge of said master document reaches the decision point T3, that is, when the character H has been shifted into memory M3, the next following document has already passed the decision point T1, whereby the character read in said predetermined position of said next following document has already been shifted into memory M1. Therefore, if said next following document is in turn a master docu-

ment bearing said character H in said predetermined position, the output M 1 of the decoder 201 is energized. The output of gate 208 is thus energized to actuate deflector DB for routing the first master document into pocket B. On the contrary, if said next following document does not bear the character H, the first master document is directed into pocket C by deflector DC permanently actuated by the mode selecting signal SSM.

At last it is assumed that the push button L has been pushed to preselect the "reading only" mode, whereby the mode selecting signal L is present. Under these conditions all the characters read on a document are transferred to a processor connected to the recognizing device 20 and all the documents are collected into a special pocket D, whose deflector is permanently actuated by the aforementioned signal L. If, however, upon reading a document an error signal ER is produced by the recognizing device, the document itself is directed into the reject pocket R, because the error character E introduced into memory M0 and thereafter shifted into memories M1, M2 and M3 causes the output ED of the decoder 202 to be energized to inhibit actuation of deflector DD.

The sorter is provided with a separate supervisory device for each one of the three groups of pockets for preventing accumulation and jamming of the documents in the sorting path.

With reference to FIG. 3, the supervisory device for the first group of pockets will be described. Said device comprises five photocells FC5, FC6, FC7, FC8, FC9 not shown in FIG. 1, located at the entrance of the pockets 5 to 9 respectively and feeding in parallel a circuit 103 which produces a signal TC1 when the trailing edge of a document is sensed by any one of said photocells, whereby a signal TC1 is produced whenever a document has been completely entered into any pocket of the first group.

It is assumed that, upon sensing the leading edge of a document in the decision point T1, the actuating signal for the deflector SC1 be produced, whereby said document is directed into lateral branch 17 of the sorting path. This being the case, when the trailing edge of said document reaches point T1, the trailing edge signal K1 produced by circuit 21 sets via a gate 102 a bistable circuit 101 so as to energize its output CB1. Said output CB1 is connected, via "and" gate 105, to an alarm device 104. On the other hand, the "and" gate 105 receives the leading edge signal produced by circuit 21 upon sensing the leading edge of each document. Moreover said bistable circuit 101 is reset by each signal TC1. It is thus apparent that said bistable circuit remains set from the moment in which the trailing edge of the document reaches the point T1 until circuit 103 has indicated that said document has been completely entered into a pocket of the first group. Therefore, if the leading edge of the next following document reaches point T1 before said indication has been given, the alarm device 104 is actuated by the leading edge signal F1 through gate 105.

It is intended that many changes, additions of parts and improvements may be made to the above described device without departing from the scope thereof.

I claim:

1. A document sorter comprising:

- (a) a reading station for reading intelligence on documents,
- (b) a branched sorting path divided into sections, each one including at least a portion of one or more branches and having associated therewith a distinct memory for storing intelligence,
- (c) a plurality of pockets located along said path, each one having an entrance from said path,
- (d) a pocket deflector located at the entrance of said pocket,
- (e) means for actuating said pocket deflector for directing documents from said path into said pocket,
- (f) a branch deflector located at each point of said sort-

ing path where two or more branches diverge from a preceding branch,

- (g) means for actuating said branch deflector for directing documents from said preceding branch into one of said diverging branches,
- (h) means fed by said memory for selectively operating the actuating means of the deflectors of the associated section according to the intelligence stored in said memory,
- (i) means for conveying documents along said sorting path,
- (j) and means for transferring said read intelligence from said reading station into said memory.

2. A document sorter comprising:

- (a) a reading station for reading intelligence on a document,
- (b) a branched sorting path divided into sections, each one including at least a portion of one or more branches and having associated therewith a distinct memory for storing intelligence,
- (c) a plurality of pockets located along said path, each one having an entrance from said path,
- (d) a pocket deflector located at the entrance of said pocket,
- (e) means for actuating said pocket deflector for directing documents from said path into said pocket,
- (f) a branch deflector located at each point of said sorting path, where two or more branches diverge from a preceding branch,
- (g) means for actuating said branch deflector for directing documents from said preceding branch into one of said diverging branches,
- (h) means fed by said memory for selectively operating the actuating means of the deflectors of the associated section according to the intelligence stored in said memory,
- (i) means for conveying said document along said sorting path,
- (j) means for transferring said read intelligence from said reading station into the memory of the first section of said path,
- (k) and means responsive to said document reaching the beginning of each section for shifting said read intelligence into the memory associated with the last mentioned section from the memory associated with the next preceding section.

3. A document sorter comprising:

- (a) a reading station for reading intelligence on a document,
- (b) a branched sorting path comprising a plurality of parallel lateral branches and a like plurality of aligned main branches, each lateral branch being joined to the next lateral branch and the first lateral branch being joined to said reading station by a different one of said main branches,
- (c) a distinct group of superimposed pockets located along each lateral branch, each pocket having an entrance from said lateral branch,
- (d) a pocket deflector located at the entrance of said pocket operable for directing documents into said pocket from said lateral branch,
- (e) a branch deflector located at the beginning of each lateral branch operable for directing documents into said lateral branch from the preceding main branch,
- (f) a memory associated with each group of pockets,
- (g) means fed by said memory for operating the branch deflector and the pocket deflectors of the associated group of pockets according to the intelligence stored in said memory,
- (h) means for moving said document along said sorting path,
- (i) and means for transferring said read intelligence into said memory in response to motion of said document.

4. A document sorter comprising:

11

- (a) a reading station for reading intelligence on a document,
 - (b) a branched sorting path comprising a plurality of parallel lateral branches and a like plurality of aligned main branches, each lateral branch being joined to the next lateral branch and the first lateral branch being joined to said reading station by a different one of said main branches, 5
 - (c) a distinct group of superimposed pockets located along each lateral branch, each pocket having an entrance from said lateral branch, 10
 - (d) a pocket deflector located at the entrance of said pocket operable for directing documents into said pocket from said lateral branch,
 - (e) a branch deflector located at the beginning of each lateral branch operable for directing documents into said lateral branch from the preceding main branch, 15
 - (f) a memory associated with each group of pockets,
 - (g) means fed by said memory for operating the branch deflector and the pocket deflectors of the associated group of pockets according to the intelligence stored in said memory, 20
 - (h) means for moving said document along said sorting path,
 - (i) means for transferring said read intelligence into said memory in response to motion of said document, 25
 - (j) bistable means associated with each pocket group settable in response to each document entering the corresponding lateral branch and resettable in response to each document entering any pocket of said group, 30
 - (k) signalling means operable by each document reaching a predetermined point located before beginning of the last named lateral branch,
 - (l) and alarm means jointly responsive to said bistable means when being set and to said signalling means when being operated. 35
5. A document sorter comprising:

12

- (a) a reading station for reading intelligence on a document,
- (b) a branched sorting path comprising a plurality of parallel lateral branches and a like plurality of aligned main branches, each lateral branch being joined to the next lateral branch and the first lateral branch being joined to said reading station by a different one of said main branches,
- (c) a distinct group of superimposed pockets located along each lateral branch, each pocket having an entrance from said lateral branch,
- (d) a pocket deflector located at the entrance of each pocket operable for directing documents into said pocket from said lateral branch,
- (e) a branch deflector located at the beginning of each lateral branch operable for directing documents into said lateral branch from the preceding main branch,
- (f) a memory associated with each group of pockets,
- (g) means fed by said memory for operating the branch deflector and the pocket deflectors of the associated group of pockets according to the intelligence stored in said memory,
- (h) means for moving said document along said sorting path,
- (i) means for transferring said read intelligence into said memory in response to motion of said document,
- (j) and means jointly fed by the memory of the last pocket group and by at least one preceding memory for operating the pocket deflectors of said last pocket group.

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