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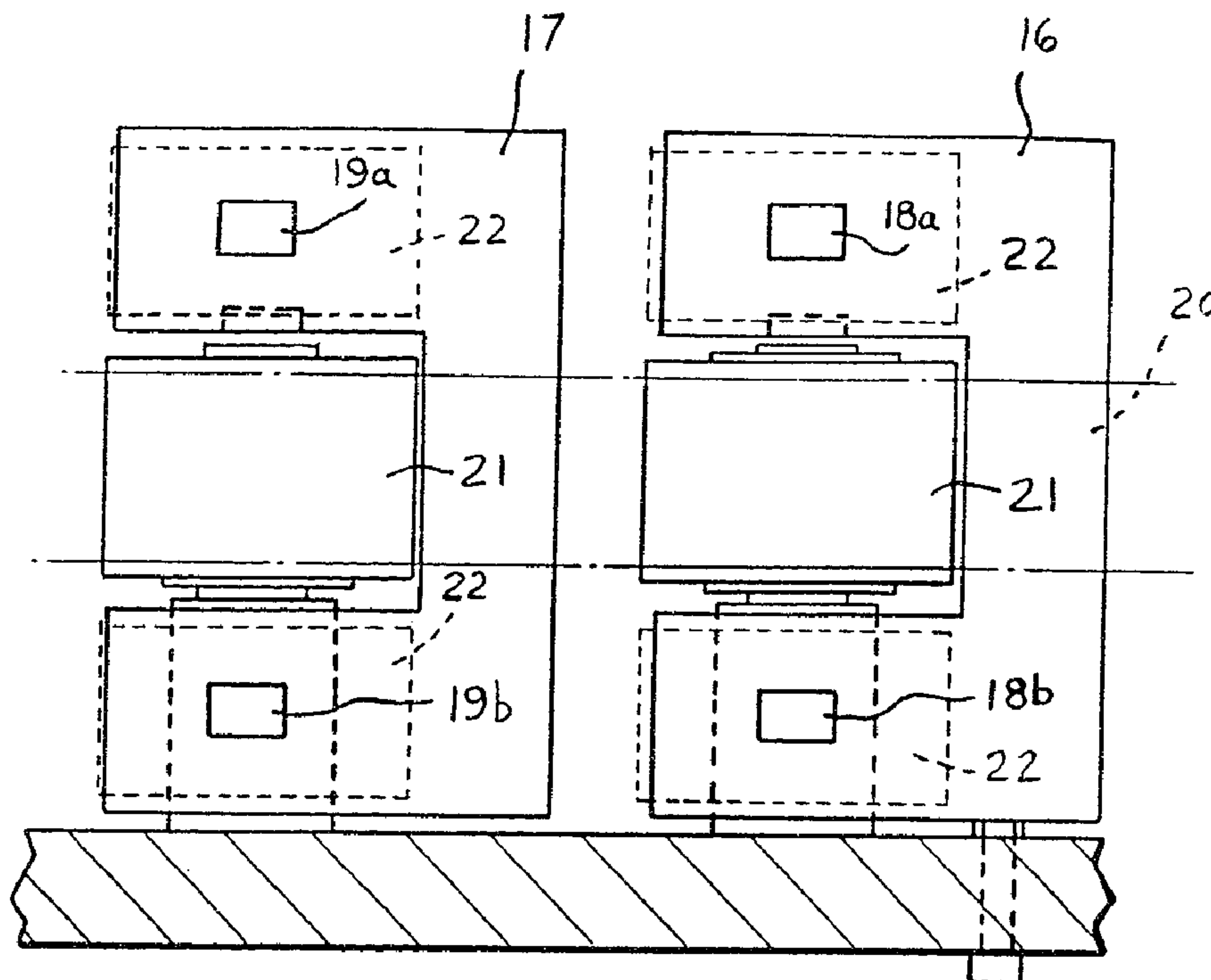
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(54) Titre : APPAREIL SERVANT A DETERMINER L'ORIENTATION D'UN DOCUMENT, ET METHODE CONNEXE

(54) Title: METHOD AND APPARATUS FOR DETERMINING THE ORIENTATION OF A DOCUMENT



(57) Abrégé/Abstract:

To identify the orientation of specified documents, such as checks bearing magnetic ink markings, steps are taken to magnetize ink markings associated with the document, and to then detect magnetized ink markings on the document to develop electrical signals which can then be subjected to processing for identifying the orientation of the document based upon certain preestablished criteria. The result is a stand-alone device adapted to operate upon documents which are contained within envelopes to be subjected to an extraction procedure, prior to extraction from the envelopes, achieving a pre-processing of envelopes to identify those which contain the specified documents, and the orientation of the identified documents. The device is similarly adapted to operate upon the extracted documents, to identify those requiring special handling, and their orientation.



Abstract of the Disclosure

To identify the orientation of specified documents, such as checks bearing magnetic ink markings, steps are taken to magnetize ink markings associated with the document, and to then detect magnetized ink markings on the document to develop electrical signals which can then be subjected to processing for identifying the orientation of the document based upon certain preestablished criteria. The result is a stand-alone device adapted to operate upon documents which are contained within envelopes to be subjected to an extraction procedure, prior to
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METHOD AND APPARATUS FOR DETERMINING
THE ORIENTATION OF A DOCUMENT

The present invention relates generally to the bulk processing of mail and the like.

For some time, various devices have been developed to facilitate the extraction of contents from envelopes received in a mail room setting. Initially, this involved the development of devices which could be used to receive a plurality of envelopes for extraction of their contents, to serially sever envelope edges and expose the contents for presentation to an operator for manual extraction. One example of this type of apparatus which
10 has found acceptance in the industry is the "Model 50" Rapid

Extraction Desk which is manufactured by Opex Corporation of Moorestown, New Jersey. Later efforts turned to the bulk processing of mail, in fully automated devices which could receive large quantities of envelopes for serial delivery to an apparatus which could sequentially open the envelopes, extract their contents, and orient the extracted contents for subsequent stacking. One example of this type of apparatus which has found acceptance in the industry is the "Model 100" extraction system, which is also manufactured by Opex Corporation of Moorestown, New Jersey.

The availability of such devices, as well as the ever-present impetus to expedite the processing of certain types of mail (i.e., those containing an invoice and check for deposit), has led to the need for ancillary equipment capable of facilitating the pre-processing of sealed envelopes, prior to an extraction procedure, and the post-processing of documents, following an extraction procedure. In pre-sorting envelopes, it is important to identify envelopes containing checks, and which are therefore to be processed on an expedited basis (to expedite deposit of the extracted checks), as well as to identify the orientation of the checks contained within the envelopes to facilitates their subsequent extraction and processing. In post-sorting extracted documents, it is again important to identify extracted checks, and to identify the orientation of the extracted checks prior to stacking and subsequent processing.

Such pre-processing and post-processing is desirable to

facilitate the handling of extracted checks, significantly expediting their processing for deposit (which is the overall objective of mail extraction procedures of this general type).

It is therefore the primary object of the present invention to provide an improved method and apparatus for determining the orientation of specified documents, primarily checks for deposit.

10 It is also an object of the present invention to provide a method and apparatus for determining the orientation of specified documents either prior to or subsequent to subjecting the documents to an extraction procedure.

It is also an object of the present invention to provide a method and apparatus for identifying the orientation of specified documents at different stages of a mail extraction procedure, separate from the devices which are used to actually perform the extraction procedure.

20 These and other objects are achieved in accordance with the present invention by providing a method and apparatus for identifying the orientation of specified documents bearing indicia which are capable of being operated upon by external stimuli. Primarily, this is directed to the magnetic ink markings of checks associated with a remittance processing operation. To this end, steps are taken to magnetize the ink

markings associated with the document, and to then detect magnetized ink markings on the document to develop electrical signals which can then be subjected to processing for identifying the orientation of the document based upon certain preestablished criteria.

United States Patent No. 4,863,037 discloses means for performing the foregoing operations in conjunction with an automated mail extraction procedure. In accordance with the present invention, steps are taken to isolate those portions of the apparatus disclosed in United States Patent No. 4,863,037 which accomplish this task, for stand-alone operation. The resulting device is adapted to operate upon documents (primarily checks) which are contained within envelopes to be subjected to an extraction procedure, prior to extraction from the envelopes, achieving a pre-processing of envelopes to identify those which contain the specified documents, and the orientation of the identified documents. The device is similarly adapted to operate upon the extracted documents, to identify those requiring special handling, and their orientation. Irrespective of the manner in which the apparatus is employed, an effective stand-alone device is provided for determining the orientation of specified documents at desired stages of the mail extraction procedure.

For further detail regarding a preferred embodiment apparatus produced in accordance with the present invention, reference is made to the detailed description which is provided below, taken in conjunction with the following illustrations.

Figure 1 is a plan view illustrating a check for processing in accordance with the present invention.

Figure 2 is a top plan view of a detection fixture for processing documents in accordance with the present invention.

Figure 3 is a sectioned, elevational view of the detection fixture of Figure 2, taken along the line 3-3.

Figure 4 is a schematic diagram showing a circuit for receiving and processing signals from the detection fixture of Figure 2.

10 In the several views provided, like reference numbers denote similar structures.

20 The improvements of the present invention are generally achieved by analyzing the "profile" of a check 1 as revealed by certain of its characteristic features. For example, with reference to Figure 1, every check 1 must include a MICR (magnetic ink character recognition) "data line" for processing through the banking system. Moreover, this data line, shown at 2, is uniformly placed at a specified distance ("d") from the lower edge 3 of the check, and only the identifying characters which comprise this data line may be placed in this segregated band. This feature therefore constitutes a known characteristic

which may serve as a primary basis for making determinations as to orientation. Most checks further include personalized identification fields such as the name of the account owner, and a checking account sequence number. If used, the account name is uniformly placed at 4, while the sequence number is uniformly placed at 5. It has been found that a second data line, shown at 6, which is also spaced at a specified distance ("d") from the top edge 7 of the check, will intersect with the fields 4, 5, if provided, and that only these identifying fields will be found in this segregated band. This feature therefore constitutes a known characteristic which may serve as a secondary basis for making determinations as to orientation. It has been found that by analyzing such characteristic features, along the data lines 2, 6, the orientation of a check 1 can be identified.

To accomplish this, a detection apparatus 10 is provided which, generally speaking, operates upon the magnetic ink which is traditionally used to print conventionally available checks. To be noted is that since the data lines 2, 6 which are to be operated upon are rather precisely spaced from the edges 3, 7 of the check 1 (by the specified distance "d"), it is important for the bottom most edge of the document being scanned to be at a known and proper location. It is for this reason that the documents to be processed are preferably subjected to a justification step immediately proceeding their introduction to the detection apparatus 10, which may be accomplished either manually, in a tamping procedure, or automatically, making use of

an edge justification device of the type disclosed in United States Patent No. 4,863,037.

Referring now to Figures 2 and 3, upon entering the detection apparatus 10, documents are presented to a detection fixture 11, entering a nip 12 which is defined between an opposing pair of belt systems 13, 14 which serve to draw the received documents through the detection fixture 11, along a transport path 15. Positioned along the transport path 15 which is developed by the belt systems 13, 14 are a pair of fixtures 16, 17. The fixture 16 includes a pair of charge heads 18 (18a, 18b) which are capable of imparting a magnetic charge to the ink on the checks which are being passed through the detection fixture 11. Downstream from the fixture 16 is a second fixture 17, which includes a pair of read heads 19 (19a, 19b) which are responsive to flux variations resulting from the movement of charged characters (numerals or letters) past the heads 19. To be noted is that the charge heads 18a, 18b and the read heads 19a, 19b are respectively positioned above and below the belts 20 of the belt systems 13, 14, so that the heads 18, 19 are exposed to the documents being conveyed through the detection fixture 11. Further to be noted is that the heads 18, 19 are vertically and symmetrically positioned along the fixtures 16, 17 so that the heads 18, 19 will be aligned with each of the data lines 2, 6 of the checks which are being processed through the detection fixture 11, irrespective of the orientation of each check as it progresses through the detection apparatus 10. The reasons for

this will become apparent from the description which follows.

10 To enhance the reading of magnetic flux, it is important for each check to be maintained in proper association with the heads 18, 19 as the checks are drawn past the fixtures 16, 17. To this end, a pair of idler rollers 21 are preferably positioned in general alignment with the fixtures 16, 17 to enable careful adjustment of the belts 20 of the belt systems 13, 14 into alignment relative to the plane of the heads 18, 19. Paired rollers 22 are further preferably positioned in general alignment with, and spaced from (by a relatively small, adjustable gap) each of the heads 18a, 18b, 19a, 19b, on the opposite side of the transport path 15, to facilitate appropriate contact between the check 1 and the heads 18, 19. Non-magnetic leaf springs may also be used for this purpose. In any event, as a check is drawn through the detection fixture 11, the ink of the check is magnetized at 18, and read at 19, to provide electrical signals which can then be used to determine the orientation of the check.

20 In implementation, the detection fixture 11 may form part of a mail extraction apparatus, such as the "Model 100" extraction system manufactured by Opex Corporation of Moorestown, New Jersey (and as disclosed in U.S. Patent No. 4,863,037) or the "Model 50" Rapid Extraction Desk manufactured by that same company. The detection fixture 11 may also form part of a stand-alone apparatus useful in the pre-processing and post-processing of documents, if desired. For example, in some cases it may be desirable to present sealed envelopes to the detection fixture

11, prior to subjecting the envelopes to an extraction procedure, to identify envelopes containing checks (for expedited processing) and/or to identify the orientation of checks contained by the envelopes (to facilitate their subsequent processing). In other cases, it may be desirable to present extracted documents to the detection fixture 11, following an extraction procedure, to identify checks and/or their orientation to facilitate their subsequent processing.

10 Irrespective of its manner of implementation, the overall operation of the detection apparatus 10 remains unchanged since the detection fixture 11 is capable of operating either directly upon checks which are exposed to it, or indirectly upon checks contained within an envelope (and which are therefore separated from the detection fixture 11 by one or more paper thicknesses). The only potential variable is that of gain (in operating the charge heads 18 and/or the read heads 19), which may be adjusted as needed and in accordance with the particular application involved. Upon detecting the orientation of a
20 particular document, steps may be taken to either record the determined orientation (in memory for subsequent processing) or to develop electrical signals for presentation to document re-orienting devices (inverting and/or reversing devices) such as are disclosed in United States Patent No. 4,863,037.

As documents pass the detection fixture 11 (irrespective of the manner in which the detection apparatus 10 is employed), electrical signals are developed for application to

a detection circuit 25 such as is shown in Figure 4. As previously indicated, a magnetic charge will first be imparted to any magnetic ink markings which are provided along the data lines 2, 6 of the check 1 being scanned as the check passes the charge heads 18. This magnetic charge is preferably imparted to the magnetic ink using a permanent magnet, although electromagnetic means could be employed, if desired. To be noted is that an appropriate charge will be imparted to the magnetic ink characters on the check even if the magnetic ink is separated from the charge heads 18 by one or more paper thicknesses, since the desired charge will pass through the paper of the check, or an overlying envelope, as it passes the charge heads 18. Similarly, the read heads 19 will operate to read the magnetic markings either directly, or through the check (for post-processing), or through the overlying envelope (for pre-processing), for subsequent interpretation.

Each of the read heads 19a, 19b are separately coupled to a circuit 26, 27 for respectively processing the analog signals received from the upper most read head 19a and the lower most read head 19b. Each of the circuits 26, 27 are preferably positioned close to the read heads 19 to immediately amplify and process the signals which are received from the read heads 19, prior to their introduction to the remainder of the apparatus as will be described more fully below.

The circuits 26, 27 are identical in construction (only the circuit 26 is shown in detail to simplify the drawings), and

each include a pre-amplifier 28 for immediately amplifying the signals received from the associated read head (in this case the read head 19a). The pre-amplified signal is then applied to a wave shaping circuit 29. Wave shaping circuit 29 includes an amplifier 30 for receiving signals from the pre-amplifier 28, a full-wave rectification circuit 31 which is coupled to the amplifier 30 to receive the amplified signal for full-wave rectification, preferably without any offset, and a differential amplifier 32 to set the final level for maximum noise immunity. Lastly, the wave shaping circuit 29 communicates with a Schmitt trigger circuit 33 which readies the amplified signal for digital processing.

A microprocessor 35 is provided to receive the various signals derived from the read heads 19, via the analog circuits 26, 27, to provide outputs which are indicative of the orientation of the check passing through the detection fixture 11 as will be described more fully below. To this end, the signals from the Schmitt trigger circuits 33 of the analog circuits 26, 27 are applied to the microprocessor 35. Also applied to the microprocessor 35 is an enabling signal 36 which is indicative of the passage of a check through the detection fixture 11, and which serves to initiate the orientation detection scheme to be described below. Passage of the check (the leading edge) through the detection fixture 11 may be detected by various means, such as a photodetection device 37 (See Figure 2) positioned between the charge heads 18 and the read heads 19. A common buss 38

operatively connects the microprocessor 35 with EPROM 39, and a peripheral interface 40 for enabling communication with ancillary equipment (e.g., data recorders or equipment for reorienting documents).

10 The detection circuit 25 can operate to determine the orientation of two different types of checks including standard personal checks, which never vary in size, as well as commercial checks, which are nearly standard but which may vary to some extent. This is accomplished by magnetizing the ink of the check as previously described, and by reading the magnetized ink as the check passes through the detection fixture 11. Symmetrically paired, upper and lower charge heads 18 and read heads 19 are provided to enable the desired data to be obtained in a single pass of the check through the detection fixture 11, irrespective of its orientation.

20 The decision as to the orientation of a check relative to the detection fixture 11 is based not upon an attempt to read portions of the MICR data line 2, but rather results from an interpretive process which is performed within the microprocessor 35. To this end, beginning at a set time after the leading edge of a check passes the photodetection device 37 (to account for the distance between the photodetection device 37 and the read heads 19), data is provided to the microprocessor 35 which is indicative of the presence or absence of characters encountering the read heads 19. The microprocessor 35 then operates to monitor the length of "continuous" data fields which are

encountered at the read heads 19, as well as discontinuities which exist between such data groupings, in accordance with procedures which are presently employed in the above-discussed "Model 100" extraction system. However, for purposes of explanation, a summary of these procedures is provided below.

10 Within the microprocessor 35, a series of counters are developed to monitor the lengths of marking groups read from the check being scanned, as well as gaps between such marking groups. Separate counters are provided to interpret the data being received from the upper read head 19a and the lower read head 19b. Since the characters on the data line 2 are conventionally provided at one-eighth inch spacings, a corresponding sampling period is established by the microprocessor 35. If, during the sampling period, a character is passing the read head 19a or 19b, the microprocessor 35 will operate to count a marking for the corresponding data line. If, during the sampling period, a character does not pass the read head 19a or 19b, the microprocessor 35 will operate to count a space for the corresponding data line.

20 For encountered markings, the appropriate marking counter is incremented. Otherwise, the appropriate space counter is incremented. If a space counter ever counts more than a specified number (e.g., six) of spaces prior to a resumption of encountered markings, the occurrence is designated as a gap. The appropriate gap counter is incremented and the space counter and marking counter are reset to zero. If markings are again

encountered before the space counter counts the specified number of spaces, the occurrence is not designated as a gap, but rather is designated as a space within the marking group. In such cases, the value of the space counter is added to the marking counter, and the space counter is reset to zero. Thus, the encountered spacing is treated as part of a continuous marking group. The various counters proceed in this fashion to identify the length of the last encountered marking group, and the number of any gaps, on each of the data lines 2, 6 of the check 1 being
10 scanned. These values are then used to make a determination as to the orientation of the check 1 based upon various stored, empirically determined criteria (EPROM 39) within the microprocessor 35.

For example, if it is determined that the upper gap counter is non-zero and the lower gap counter is zero, while the upper pulse counter is greater than nine and the lower pulse counter is at least twenty-two, then the check has passed through the detection fixture 11 while upright and facing away from the read heads 19. If it is determined that the lower gap counter is
20 non-zero and the upper gap counter is zero, while the lower pulse counter is less than seven and the upper pulse counter is at least twenty-two, then the check has passed through the detection fixture 11 while inverted and facing away from the read head 19. If it is determined that the lower gap counter is non-zero and the upper gap counter is zero, while the upper pulse counter is at least twenty-two and the lower pulse counter is greater than

nine, then the check has passed through the detection fixture 11 while inverted and facing the read head 19. Lastly, if it is determined that the upper gap counter is non-zero and the lower gap counter is zero, while the upper pulse counter is less than seven and the lower pulse counter is at least twenty-two, then the check has passed through the detection fixture 11 while upright and facing the read head 19.

10 The above criteria assume that a check having the characteristic features 2, 4, 5 has passed through the detection apparatus 10. However, other types of documents can also be sensed in accordance with the present invention, if desired. For example, in the event that all gap and pulse counters equal zero, it can be assumed that the document is not a check, but rather is a corresponding invoice passing through the detection apparatus 10.

20 In the event that the document is a check, but does not include either of the fields 4, 5, different criteria may be devised to establish the orientation of such documents. For example, assume that a check does not include a sequence number at 5. Such a document can be analyzed provided a count is made of the gap which extends between the leading edge of the document and the first detected marking group. This may be accomplished by retaining the data which is developed from the start of the count (responsive to the photodetection device 37) to the first encountered marking group. If it is determined that the lower gap counter exceeds the lower leading edge gap counter, the lower

pulse counter exceeds twenty-three and the lower pulse counter exceeds the upper pulse counter, then the check has passed through the detection fixture 11 while upright and facing the read head 19. If it is determined that the upper leading edge gap counter exceeds the upper gap counter, the upper pulse counter exceeds twenty-three and the upper pulse counter exceeds the lower pulse counter, then the check has passed through the detection fixture 11 while inverted and facing the read head 19. If it is determined that the upper gap-counter exceeds the upper leading edge gap counter, the upper pulse counter exceeds twenty-
10 three and the upper pulse counter exceeds the lower pulse counter, then the check has passed through the detection fixture 11 while inverted and facing away from the read head 19. Lastly, if it is determined that the upper leading edge gap counter exceeds the upper gap counter, the lower pulse counter exceeds twenty-three and the lower pulse counter exceeds the upper pulse counter, then the check has passed through the detection fixture 11 while upright and facing away from the read head 19.

Other detection schemes (criteria) may be derived to
20 determine the orientation of still other types of checks in similar fashion.

It will therefore be understood that various changes in the details, materials and arrangement of parts which have been herein described and illustrated in order to explain the nature of this invention may be made by those skilled in the art within the principle and scope of the invention as expressed in the following claims.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. An apparatus for determining the orientation of a document receivable in differing orientations relative to said apparatus, said document including magnetic ink markings on a surface of the document, and said apparatus comprising:

means for magnetizing the magnetic ink markings on said document;

means for detecting magnetized ink markings on said document; and

means for determining the orientation of said document based upon the location of detected magnetic ink markings on said document;

wherein said magnetizing means and said detecting means are configured for magnetizing and detecting magnetic ink markings separated from said magnetizing means and said detecting means by at least one paper thickness.
2. The apparatus of claim 1 wherein said document is a check.
3. The apparatus of claim 2 wherein said paper thickness comprises paper forming the check.
4. The apparatus of claim 2 wherein said paper thickness comprises paper forming an envelope containing said check.
5. The apparatus of claim 1 wherein said means for magnetizing and said means for detecting are magnetic heads associated with fixtures positioned in alignment with the passage of documents through said orientation determining apparatus.
6. The apparatus of claim 5 wherein said means for magnetizing comprises a first pair of magnetizing heads, coupled with said means for detecting, which comprises a first pair of detecting heads.
7. The apparatus of claim 6 wherein a said first paired couple of magnetizing and detecting heads are positioned in alignment with lower portions of said documents.
8. The apparatus of claim 7 wherein the lower portions of said documents include a magnetic ink character recognition data line.

9. The apparatus of claim 7 further comprising a second paired couple of magnetizing and detecting heads positioned in alignment with upper portions of said documents.
10. The apparatus of claim 9 wherein the upper portions of said documents include account identifying indicia.
11. The apparatus of claim 9 wherein said documents are symmetrically received by said first and second paired couples of magnetizing and detecting heads.
12. A method for determining the orientation of a document receivable in differing orientations, said document including magnetic ink markings on a surface of the document, and said method comprising the steps of:

magnetizing the magnetic ink markings on said document;

detecting magnetized ink markings on said document at two separate locations; and

determining the orientation of said document based upon the location of detected magnetic ink markings on said document;

wherein said magnetic ink markings are magnetizable and detectable through at least one paper thickness.
13. The method of claim 12 which further comprises the step of transporting a check.
14. The method of claim 13 wherein said magnetizing and said detecting through said paper thickness includes magnetizing and detecting through paper forming the check.
15. The method of claim 13 wherein said magnetizing and said detecting through said paper thickness includes magnetizing and detecting through paper forming an envelope containing said check.
16. The method of claim 13 wherein lower portions of said check include a magnetic ink character recognition data line, for magnetizing and detecting.
17. The method of claim 16 wherein upper portions of said check include account identifying indicia, for magnetizing and detecting.
18. The apparatus of claim 1 wherein
said means for magnetizing and said means for detecting are

capable of magnetizing and detecting magnetic ink markings separated from said means for magnetizing and said means for detecting by at least one paper thickness; and wherein the means for determining the orientation of said document is operable to determine that said document is in a first defined orientation, or that said document is in a second defined orientation different from the first orientation, and is operable for identifying documents in said first orientation and documents in said second orientation based upon the location of detected magnetic ink markings on said documents.

19. The apparatus of claim 18 wherein said means for detecting includes a magnetic head for providing electrical signals to a circuit for interpreting said signals and for providing an indication of the orientation of said document in accordance with said electrical signals.
20. The apparatus of claim 19 wherein said circuit includes means for determining indicia-defined features located on said document.
21. The apparatus of claim 20 wherein said indicia defined features include continuous groups of markings, and gaps separating said marking groups.
22. The apparatus of claim 21 wherein said gaps include spacings which exceed a defined length, and wherein said marking groups include spacings which do not exceed said defined length.
23. The apparatus of claim 21 wherein said means for detecting include a pair of magnetic heads, and wherein a separate count of marking groups and gaps is maintained for signals received from each of said magnetic heads.
24. The apparatus of claim 21 wherein said indicia defined features further include gaps separating edges of said document and said marking groups.
25. The apparatus of claim 21 wherein said indicia are monitored responsive to passage of a leading edge of a document to said means for detecting.
26. The apparatus of claim 21 wherein said circuit includes microprocessor means for receiving said electrical signals, and for determining the orientation of said document based upon defined criteria selected according to the normal location of the indicia-defined features on said document.

27. The apparatus of claim 18 which further comprises means for orienting said document responsive to signals received from said means for determining the orientation.
28. The apparatus of claim 18 wherein the first orientation for said document is assumed by a document which is inverted and facing toward the means for magnetizing and the means for detecting, and the second orientation for said document is assumed by a document which is inverted and facing away from the means for magnetizing and the means for detecting.
29. The apparatus of claim 28 wherein the document is a check which, in said first orientation and in said second orientation, has a magnetically encodable data line disposed along top portions of the check.
30. The apparatus of claim 18 wherein the first orientation for said document is assumed by a document which is upright and facing toward the means for magnetizing and the means for detecting, and the second orientation for said document is assumed by a document which is upright and facing away from the means for magnetizing and the means for detecting.
31. The apparatus of claim 30 wherein said apparatus further includes means for determining that said document is in a third defined orientation different from the first and second orientations, and for identifying documents in said third orientation based upon the location of detected magnetic ink markings on said documents.
32. The apparatus of claim 31 wherein said apparatus further includes means for determining that said document is in a fourth defined orientation different from the first, second and third orientations, and for identifying documents in said fourth orientation based upon the location of detected magnetic ink markings on said documents.
33. The apparatus of claim 32 wherein the third orientation for said document is assumed by a document which is inverted and facing toward the means for magnetizing and the means for detecting, and the fourth orientation for said document is assumed by a document which is inverted and facing away from the means for magnetizing and the means for detecting.
34. The apparatus of claim 33 wherein the document is a check which, in said first orientation and in said second orientation, has a magnetically encodable data line disposed along bottom portions of the check.

35. The method of claim 12 wherein the step of determining the orientation comprises:

determining that said document is in a first defined orientation, or that said document is in a second defined orientation different from the first orientation, and identifying documents in said first orientation and documents in said second orientation based upon the location of detected magnetic ink markings on said documents.

36. The method of claim 35 which further comprises the steps of:

deriving electrical signals responsive to said detecting step; and

interpreting said signals and providing an indication of the orientation of said document in accordance with said derived electrical signals.

37. The method of claim 36 wherein said interpreting includes the step of determining indicia-defined features located on said document.

38. The method of claim 37 wherein said indicia defined features include continuous groups of markings, and gaps separating said marking groups.

39. The method of claim 38 wherein said gaps include spacings which exceed a defined length, and wherein said marking groups include spacings of up to said defined length.

40. The method of claim 38 which further comprises the step of counting the marking groups and gaps of the derived electrical signal.

41. The method of claim 38 which further comprises the step of counting gaps separating edges of said document and said marking groups.

42. The method of claim 38 which further comprises the step of monitoring said indicia responsive to passage of a leading edge of a document.

43. The method of claim 38 which further comprises the steps of introducing said electrical signals to microprocessor means; and

determining the orientation of said document based upon defined criteria selected according to the normal location of the indicia-defined features on said document.

44. The method of claim 35 which further comprises the step of orienting said document according to the orientation defined by said determining step.
45. The method of claim 35 wherein the first orientation for said document is assumed by a document which is inverted and facing toward means for magnetizing and means for detecting the magnetic ink markings on the document, and the second orientation for said document is assumed by a document which is inverted and facing away from the magnetizing means and the detecting means.
46. The method of claim 45 wherein the document is a check which, in said first orientation and in said second orientation, has a magnetically encodable data line disposed along top portions of the check.
47. The method of claim 35 wherein the first orientation for said document is assumed by a document which is upright and facing toward means for magnetizing and means for detecting the magnetic ink markings on the document, and the second orientation for said document is assumed by a document which is upright and facing away from the magnetizing means and the detecting means.
48. The method of claim 47 which further comprises the step of determining that said document is in a third defined orientation different from the first and second orientations, identifying documents in said third orientation based upon the location of detected magnetic ink markings on said documents.
49. The method of claim 48 which further comprises the step of determining that said document is in a fourth defined orientation different from the first, second and third orientations, identifying documents in said fourth orientation based upon the location of detected magnetic ink markings on said documents.
50. The method of claim 49 wherein the third orientation for said document is assumed by a document which is inverted and facing toward the means for magnetizing and the means for detecting, and the fourth orientation for said document is assumed by a document which is inverted and facing away from the means for magnetizing and the means for detecting.
51. The method of claim 50 wherein the document is a check which, in said first orientation and in said second orientation, has a magnetically encodable data line disposed

along bottom portions of the check.

52. The apparatus of claim 1 wherein the means for determining the orientation is operable to determine that said document is in a first defined orientation, or that said document is in a second defined orientation different from the first orientation, and is operable to identify documents in said first orientation and documents in said second orientation.
53. The apparatus of claim 52 wherein said document is a check.
54. The apparatus of claim 52 wherein said paper thickness comprises paper forming the check.
55. The apparatus of claim 53 wherein said paper thickness comprises paper forming an envelope containing said check.
56. The apparatus of claim 53 wherein said means for magnetizing and the means for detecting are magnetic heads associated with fixtures positioned in alignment with the passage of documents through said orientation determining apparatus.
57. The apparatus of claim 52 wherein a pair of magnetizing heads are coupled with a pair of detecting heads.
58. The apparatus of claim 56 wherein a detecting head is positioned in alignment with lower portions of said documents.
59. The apparatus of claim 56 wherein the lower portions of said documents include a magnetic ink character recognition data line.
60. The apparatus of claim 58 wherein a detecting head is positioned in alignment with upper portions of said documents.
61. The apparatus of claim 58 wherein the upper portions of said documents include account identifying indicia.
62. The apparatus of claim 60 wherein said documents are symmetrically received by a paired couple of detecting heads.
63. The apparatus of claim 60 wherein said means for detecting includes a magnetic head for providing electrical signals to a circuit for interpreting said signals and for providing an indication of the orientation of said document in accordance with said electrical signals.

64. The apparatus of claim 63 wherein said circuit includes means for determining indicia-defined features located on said document.
65. The apparatus of claim 64 wherein said indicia-defined features include continuous groups of markings, and gaps separating said marking groups.
66. The apparatus of claim 65 wherein said gaps include spacings which exceed a defined length, and wherein said marking groups include spacings which do not exceed said defined length.
67. The apparatus of claim 65 wherein said means for detecting includes a pair of magnetic heads, and wherein a separate count of marking groups and gaps is maintained for signals received from each of said magnetic heads.
68. The apparatus of claim 65 wherein said indicia-defined features further include gaps separating edges of said document and said marking groups.
69. The apparatus of claim 65 wherein said indicia are monitored responsive to passage of a leading edge of a document to said means for detecting.
70. The apparatus of claim 65 wherein said circuit includes microprocessor means for receiving said electrical signals, and for determining the orientation of said document based upon defined criteria selected according to the normal location of the indicia-defined features on said document.
71. The apparatus of claim 52 which further comprises means for orienting said document responsive to signals received from said means for determining the orientation.
72. The apparatus of claim 52 wherein said means for determining and said means for identifying operate responsive to the detection of magnetized ink markings on said document.
73. The apparatus of claim 52 wherein the first orientation for said document is assumed by a document which is inverted and facing toward the means for magnetizing and the means for detecting, and the second orientation for said document is assumed by a document which is inverted and facing away from the means for magnetizing and the means for detecting.
74. The apparatus of claim 73 wherein the document is a check which, in said first orientation and in said second

orientation, has a magnetically encodable data line disposed along top portions of the check.

75. The apparatus of claim 52 wherein the first orientation for said document is assumed by a document which is upright and facing toward the means for magnetizing and the means for detecting, and the second orientation for said document is assumed by a document which is upright and facing away from the means for magnetizing and the means for detecting.
76. The apparatus of claim 75 wherein said apparatus further includes means for determining that said document is in a third defined orientation different from the first and second orientations, and for identifying documents in said third orientation.
77. The apparatus of claim 76 wherein said means for determining and said means for identifying operate responsive to said means for detecting magnetized ink markings on said document.
78. The apparatus of claim 76 wherein said apparatus further includes means for determining that said document is in a fourth defined orientation different from the first, second and third orientations, and means for identifying documents in said fourth orientation.
79. The apparatus of claim 78 wherein said means for determining and said means for identifying operate responsive to said means for detecting magnetized ink markings on said document.
80. The apparatus of claim 78 wherein the third orientation for said document is assumed by a document which is inverted and facing toward the means for magnetizing and the means for detecting, and the fourth orientation for said document is assumed by a document which is inverted and facing away from the means for magnetizing and the means for detecting.
81. The apparatus of claim 80 wherein the document is a check which, in said first orientation and in said second orientation, has a magnetically encodable data line disposed along bottom portions of the check.
82. The method of claim 12 wherein the step of determining the orientation of said document comprises:

determining that said document is in a first defined orientation, or that said document is in a second defined orientation different from the first orientation, and

identifying documents in said first orientation and documents in said second orientation.

83. The method of claim 82 which further comprises the step of transporting a check along a longitudinal transport path.
84. The method of claim 83 wherein said magnetizing and said detecting through said paper thickness includes magnetizing and detecting through paper forming the check.
85. The method of claim 83 wherein said magnetizing and said detecting through said paper thickness includes magnetizing and detecting through paper forming an envelope containing said check.
86. The method of claim 83 wherein lower portions of said check include a magnetic ink character recognition data line, for magnetizing and detecting.
87. The method of claim 86 wherein upper portions of said check include account identifying indicia, for magnetizing and detecting.
88. The method of claim 82 which further comprises the steps of:

deriving electrical signals responsive to said detecting step; and

interpreting said signals and providing an indication of the orientation of said document in accordance with said derived electrical signals.
89. The method of claim 37 wherein said interpreting includes the step of determining indicia-defined features located on said document.
90. The method of claim 89 wherein said indicia-defined features include continuous groups of markings, and gaps separating said marking groups.
91. The method of claim 90 wherein said gaps include spacings which exceed a defined length, and wherein said marking groups include spacings which do not exceed said defined length.
92. The method of claim 90 which further comprises the step of counting the marking groups and gaps of the derived electrical signal.
93. The method of claim 90 which further comprises the step of

counting gaps separating edges of said document and said marking groups.

94. The method of claim 90 which further comprises the step of monitoring said indicia responsive to passage of a leading edge of a document.
95. The method of claim 90 which further comprises the steps of introducing said electrical signals to microprocessor means; and

determining the orientation of said document based upon defined criteria selected according to the normal location of the indicia-defined features on said document.
96. The method of claim 82 which further comprises the step of orienting said document according to the orientation defined by said determining step.
97. The method of claim 82 wherein said determining and said identifying are responsive to the detecting of magnetized ink markings on said document.
98. The method of claim 82 wherein the first orientation for said document is assumed by a document which is inverted and facing toward means for magnetizing and means for detecting the magnetic ink markings on the document, and the second orientation for said document is assumed by a document which is inverted and facing away from the means for magnetizing and the means for detecting.
99. The method of claim 98 wherein the document is a check which, in said first orientation and in said second orientation, has a magnetically encodable data line disposed along top portions of the check.
100. The method of claim 82 wherein the first orientation for said document is assumed by a document which is upright and facing toward means for magnetizing and means for detecting the magnetic ink markings on the document, and the second orientation for said document is assumed by a document which is upright and facing away from the means for magnetizing and the means for detecting.
101. The method of claim 100 which further comprises the step of determining that said document is in a third defined orientation different from the first and second orientations, identifying documents in said third orientation.

102. The method of claim 101 wherein said determining and said identifying are responsive to the detecting of magnetized ink markings on said document.
103. The method of claim 101 which further comprises the step of determining that said document is in a fourth defined orientation different from the first, second and third orientations, identifying documents in said fourth orientation.
104. The method of claim 103 wherein said determining and said identifying are responsive to the detecting of magnetized ink markings on said document.
105. The method of claim 103 wherein the third orientation for said document is assumed by a document which is inverted and facing toward the means for magnetizing and the means for detecting, and the fourth orientation for said document is assumed by a document which is inverted and facing away from the means for magnetizing and the means for detecting.
106. The method of claim 105 wherein the document is a check which, in said first orientation and in said second orientation, has a magnetically encodable data line disposed along bottom portions of the check.

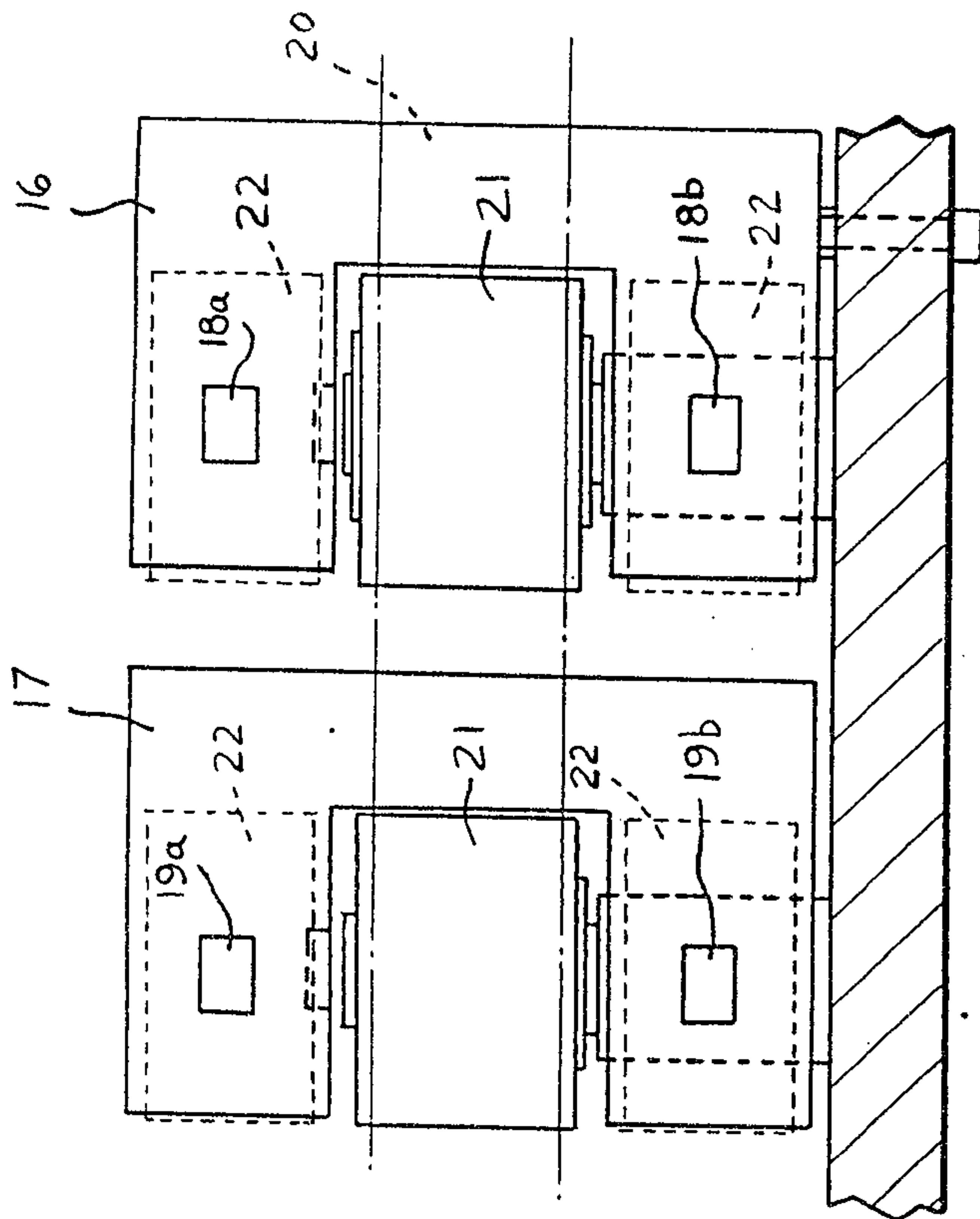
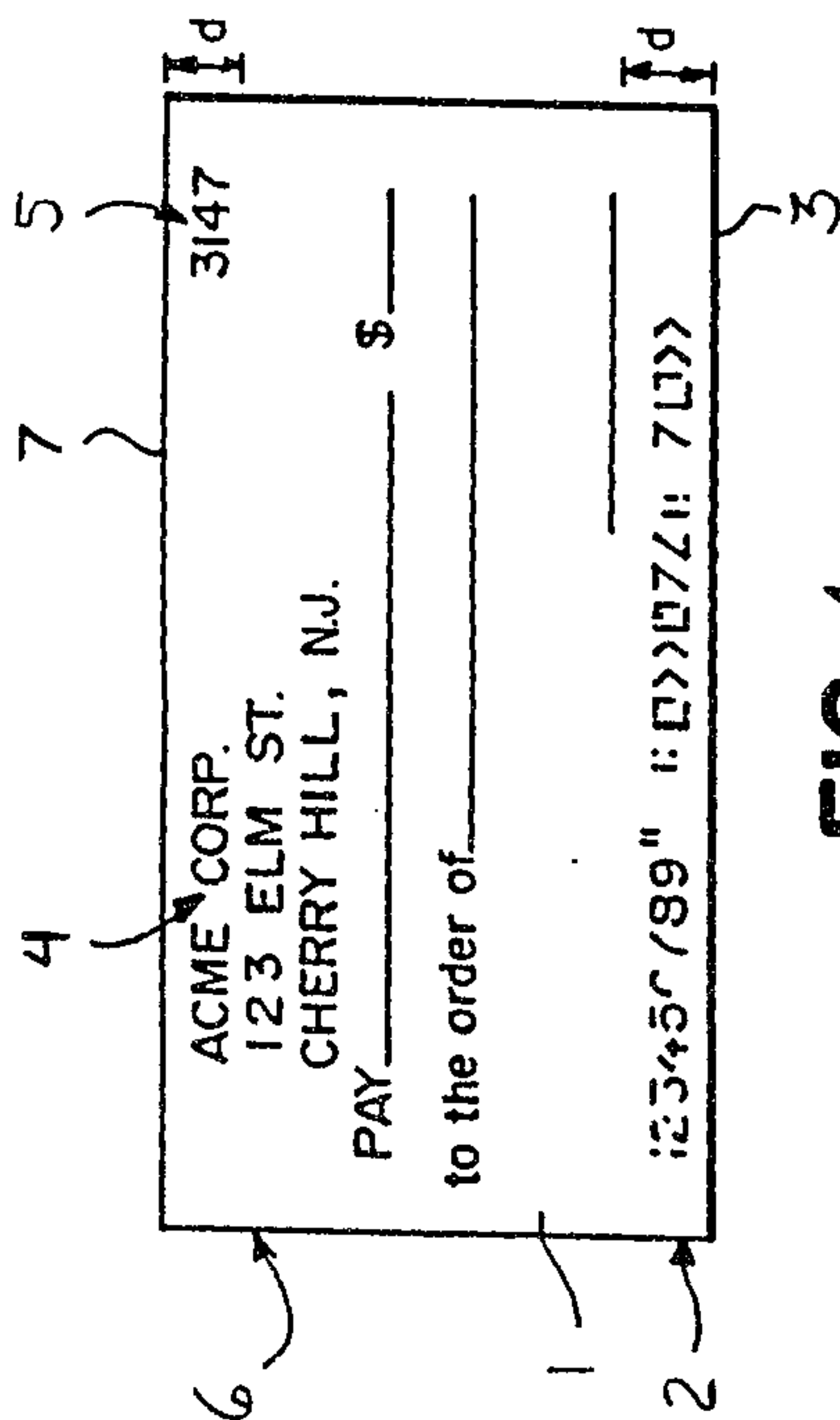
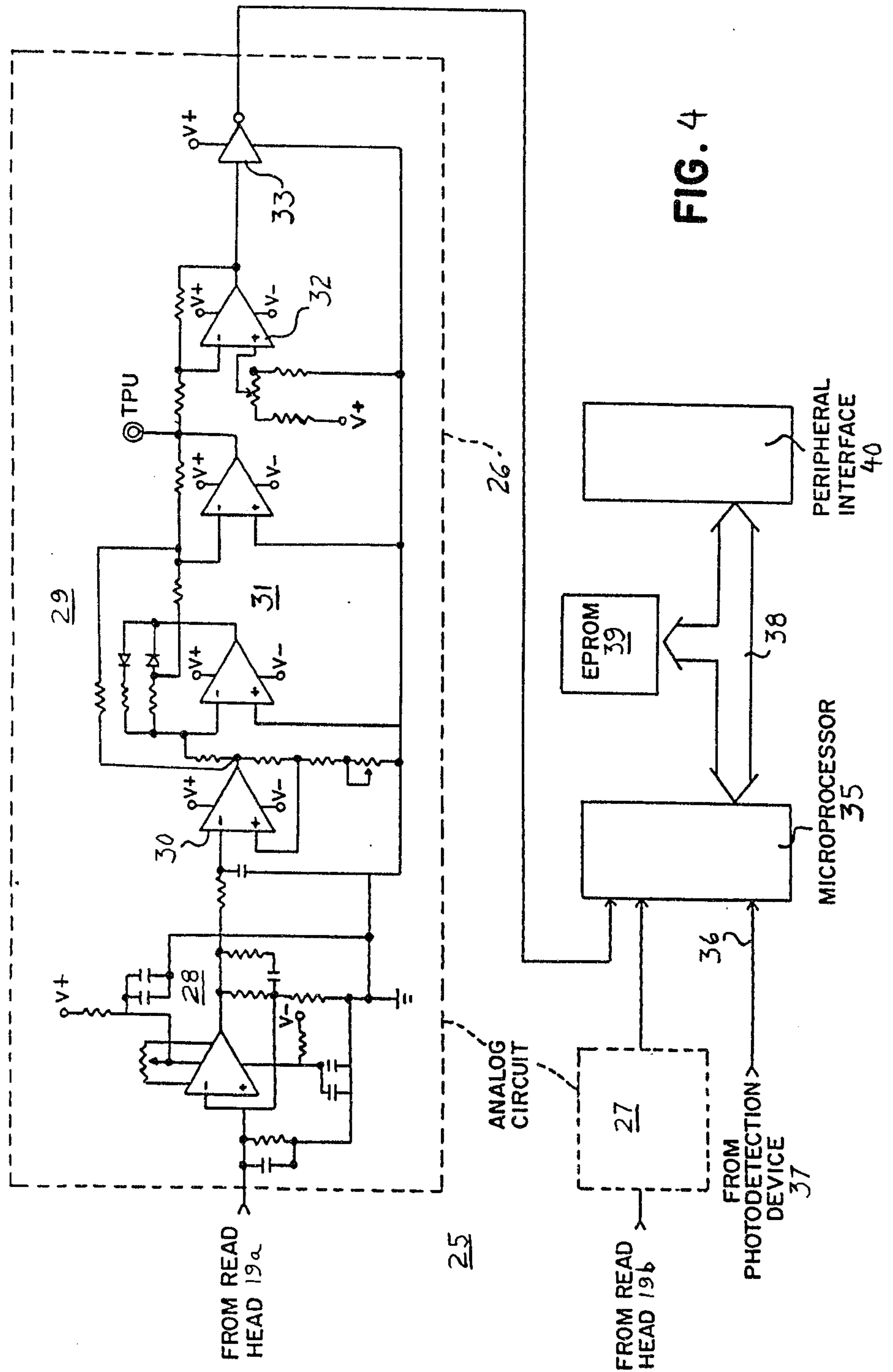


FIG. 3





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