



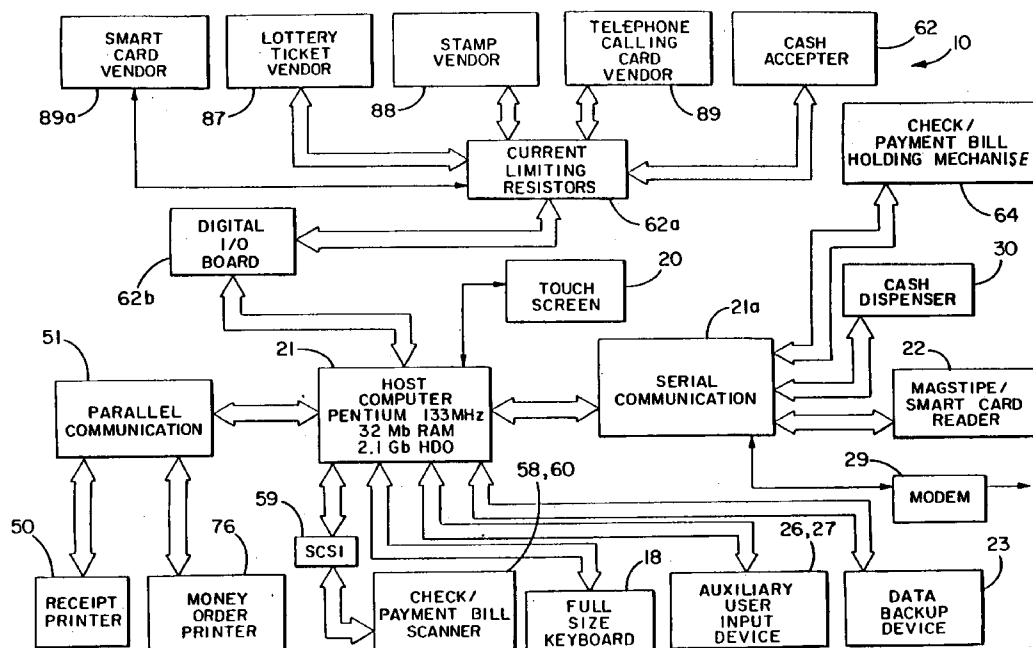
US 20050035193A1

(19) **United States**(12) **Patent Application Publication**  
**Gustin et al.**(10) **Pub. No.: US 2005/0035193 A1**(43) **Pub. Date: Feb. 17, 2005**(54) **AUTOMATED DOCUMENT CASHING  
SYSTEM**(75) Inventors: **Robin Haley Gustin**, Chicago, IL (US);  
**Troy W. Livingston**, Northbrook, IL  
(US); **Namsoo Park**, Schaumburg, IL  
(US); **Nabil Shekoory**, Chicago, IL  
(US)

Correspondence Address:

**FITCH EVEN TABIN AND FLANNERY**  
**120 SOUTH LA SALLE STREET**  
**SUITE 1600**  
**CHICAGO, IL 60603-3406 (US)**(73) Assignee: **Capital Security Systems, Inc.**(21) Appl. No.: **10/889,453**(22) Filed: **Jul. 12, 2004****Related U.S. Application Data**(63) Continuation of application No. 09/113,913, filed on  
Jul. 10, 1998, now abandoned, which is a continua-  
tion-in-part of application No. 08/866,139, filed on  
May 30, 1997, now Pat. No. 5,897,625.**Publication Classification**(51) **Int. Cl.<sup>7</sup> ..... G06F 17/60; G06F 7/08**(52) **U.S. Cl. .... 235/379; 235/381**(57) **ABSTRACT**

An automated document cashing system is provided with an automated machine that cashes monetary transaction documents such as checks, money orders, and that makes deposit entries into the bank account of the user after validation of the user and monetary transaction document, without the aid of a bank teller. Validation of the identity of the user is performed with the use of a card associated with intelligence that identifies the user. A biometric device also may be used in identifying the validity of the user. Validation of the document involves one or more of: validating the presence of a signature; validating the amount of the monetary transaction document including a manual entry of the amount by the user; validating CAR against the LAR; and validating the banking system parameters and rules for the customer and/or the transaction. To assist in the automatic analysis of data on monetary transactional documents or on remittance documents, the user is prompted to provide a bounding box about the data. An image touch screen may be touched by the user to locate the bounding box and the user may magnify the data to fill the boundary box to exclude other data from this analysis. After document and person validation, the system will dispense money or transfer monies to a savings account, a checking account, a smart card, or the like. The system will also write money orders or wire transfer money. By supplying monies in the form of cash, credit card authorization, smart card balance, or the like to the machine, the user can pay bills such as a utility bill through the system or purchase items dispensed by the system.



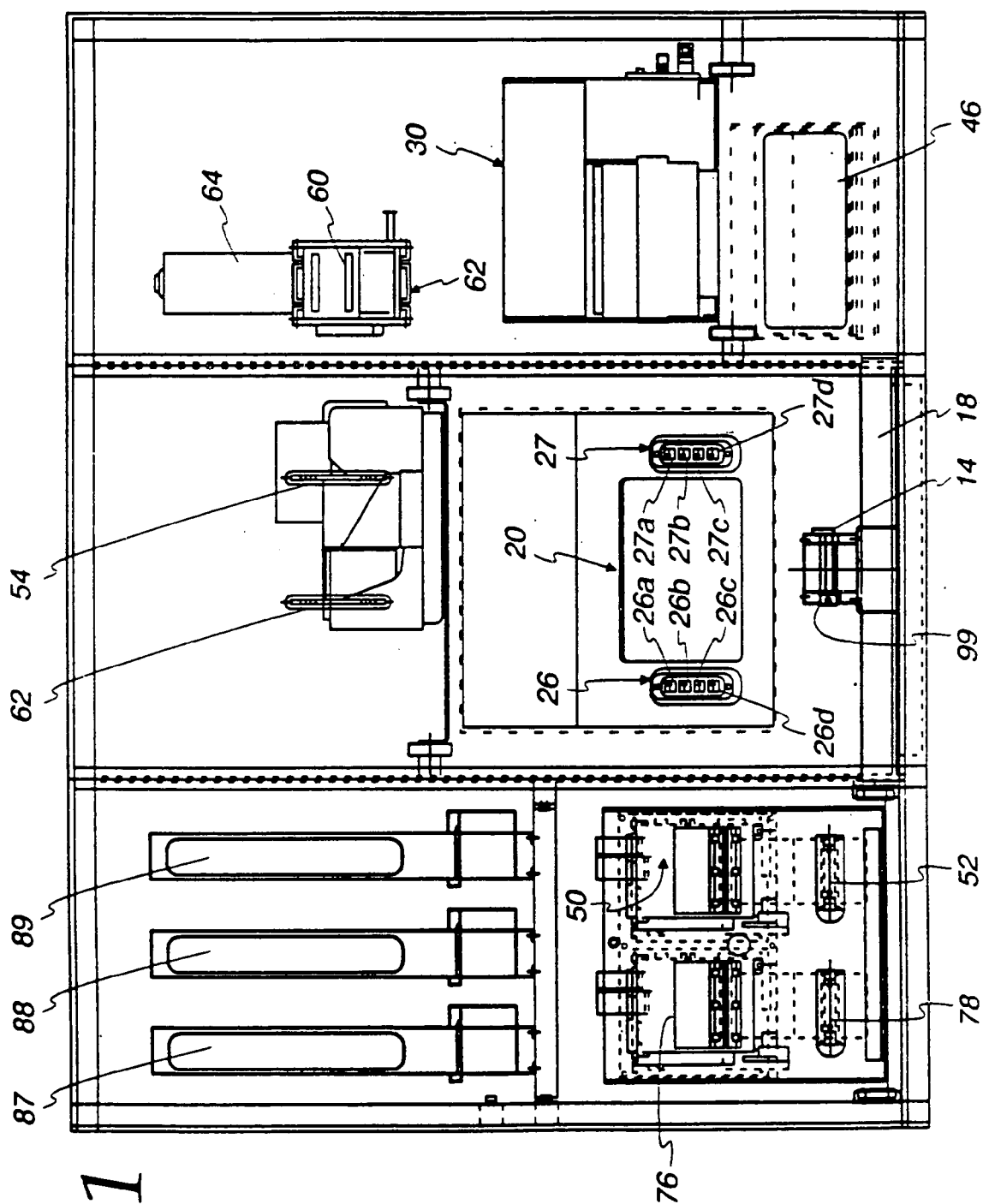


Fig. 1

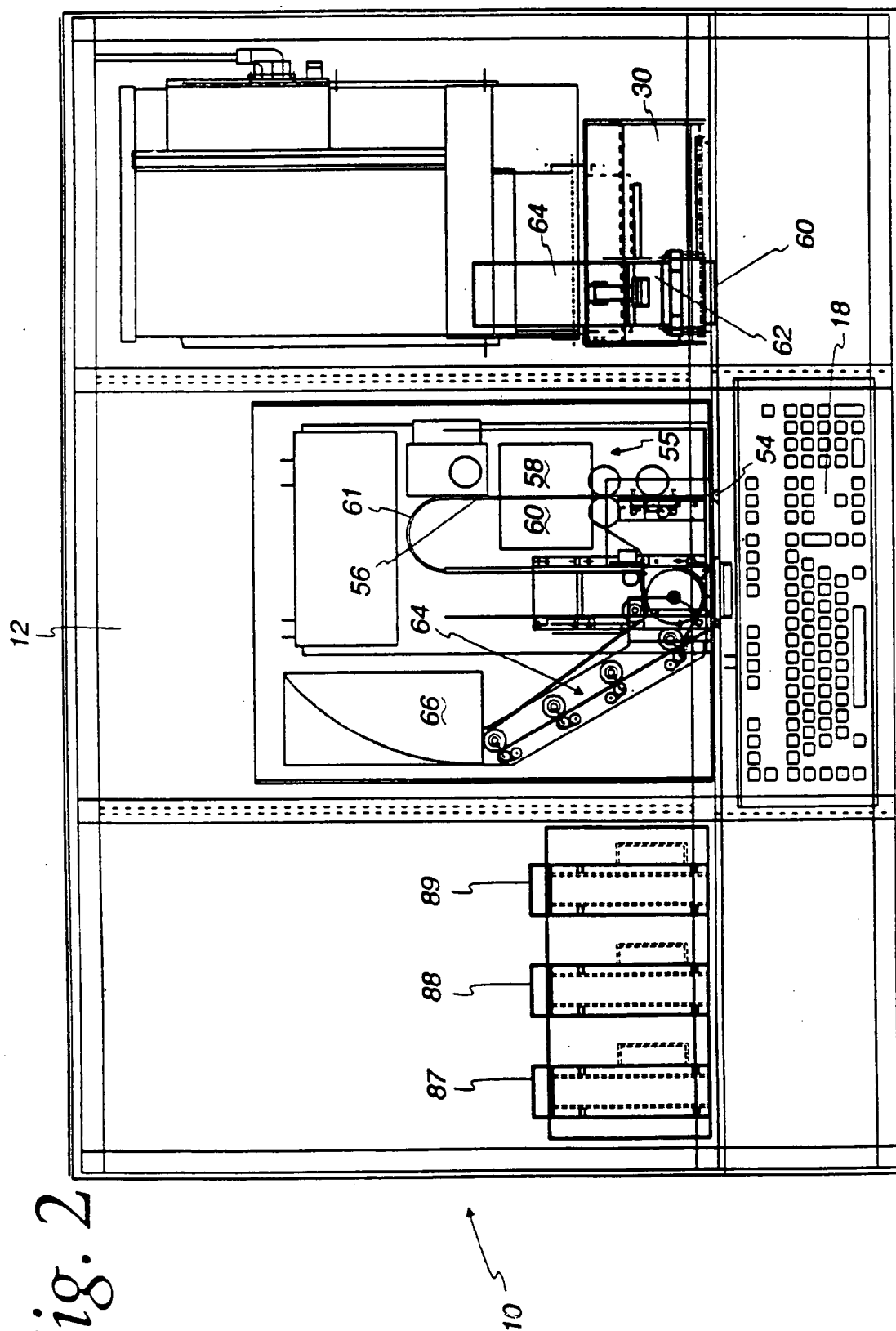
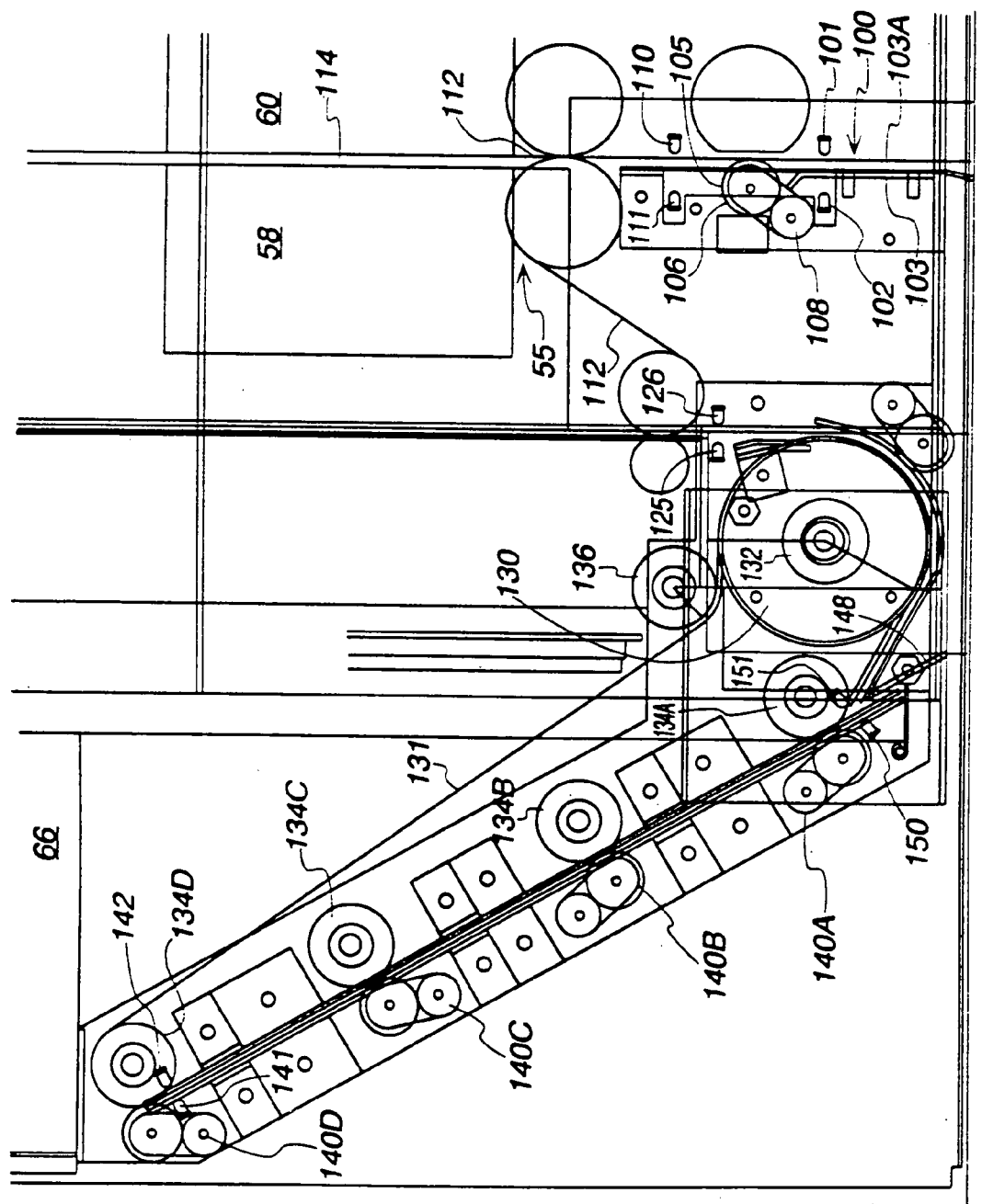


*Fig. 2a*



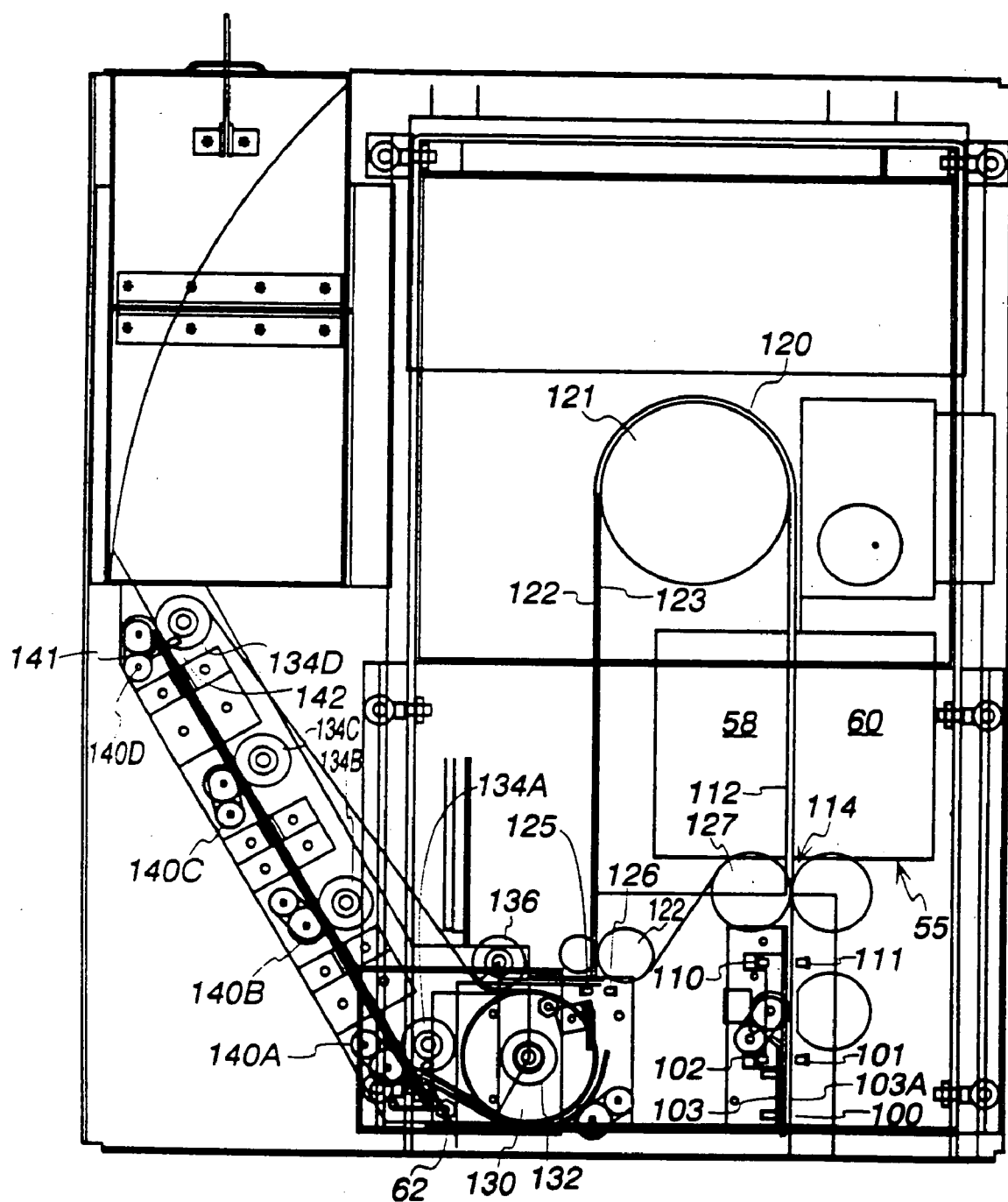


*Fig. 2b*

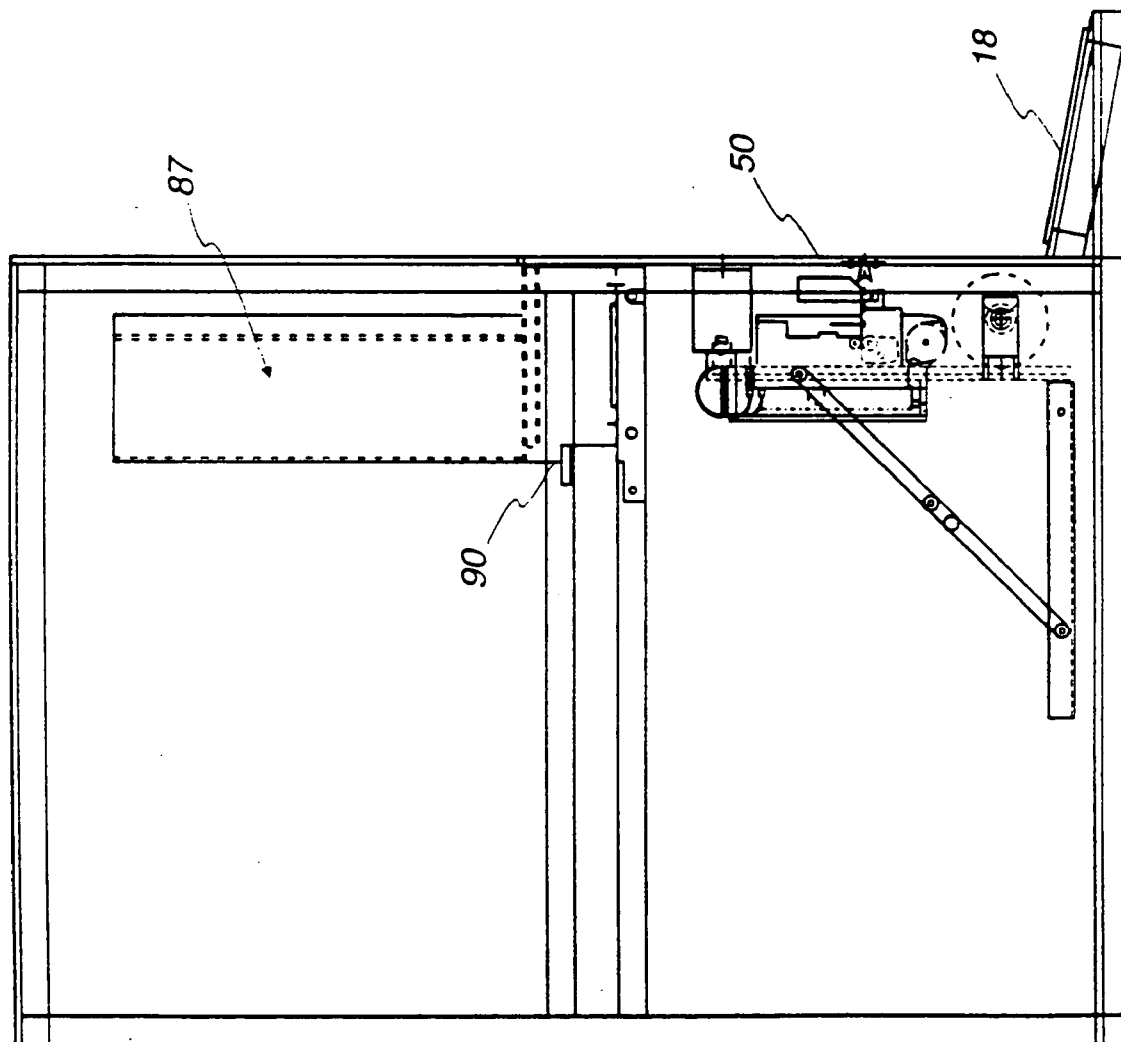


Fig. 3

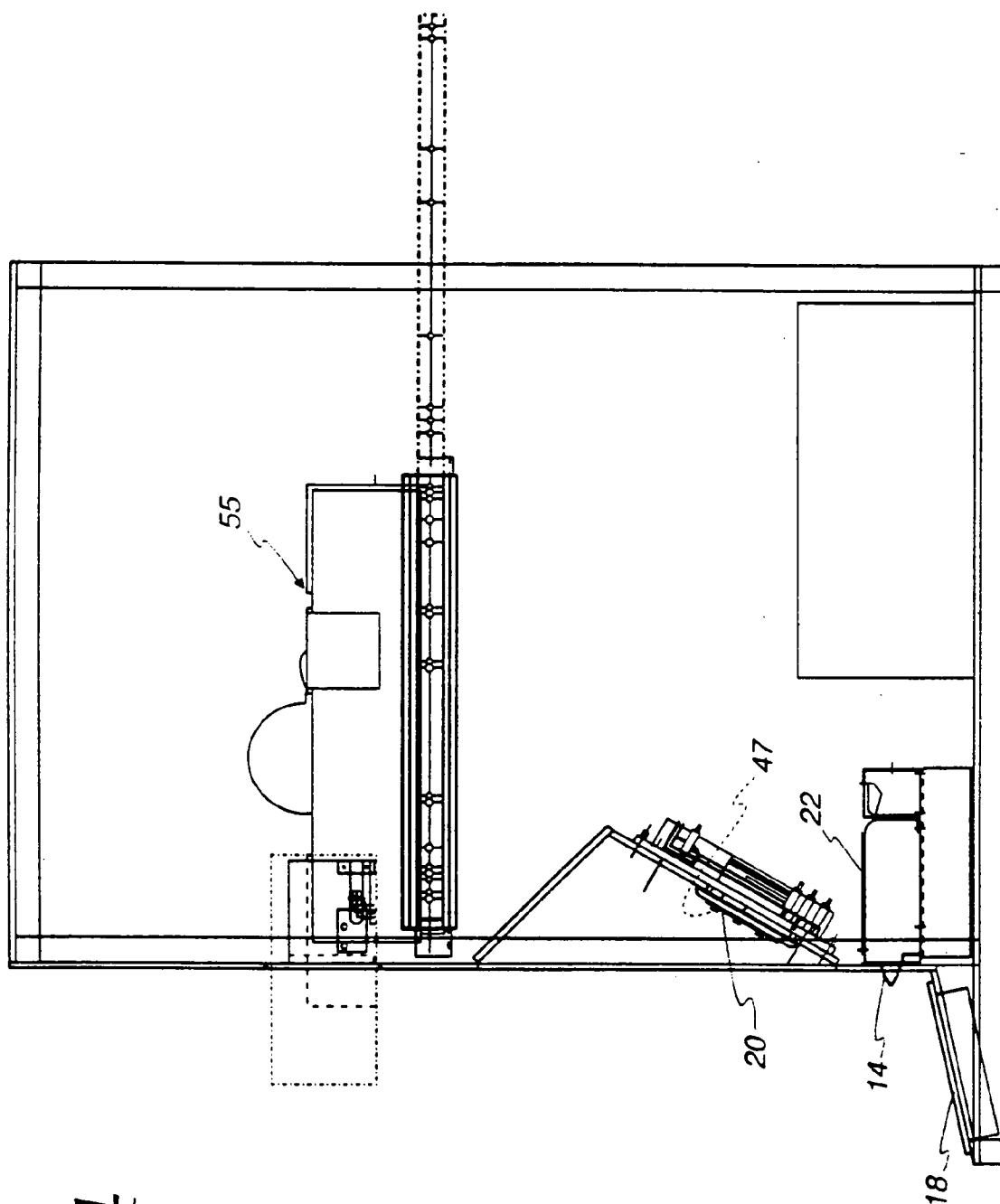


Fig. 4

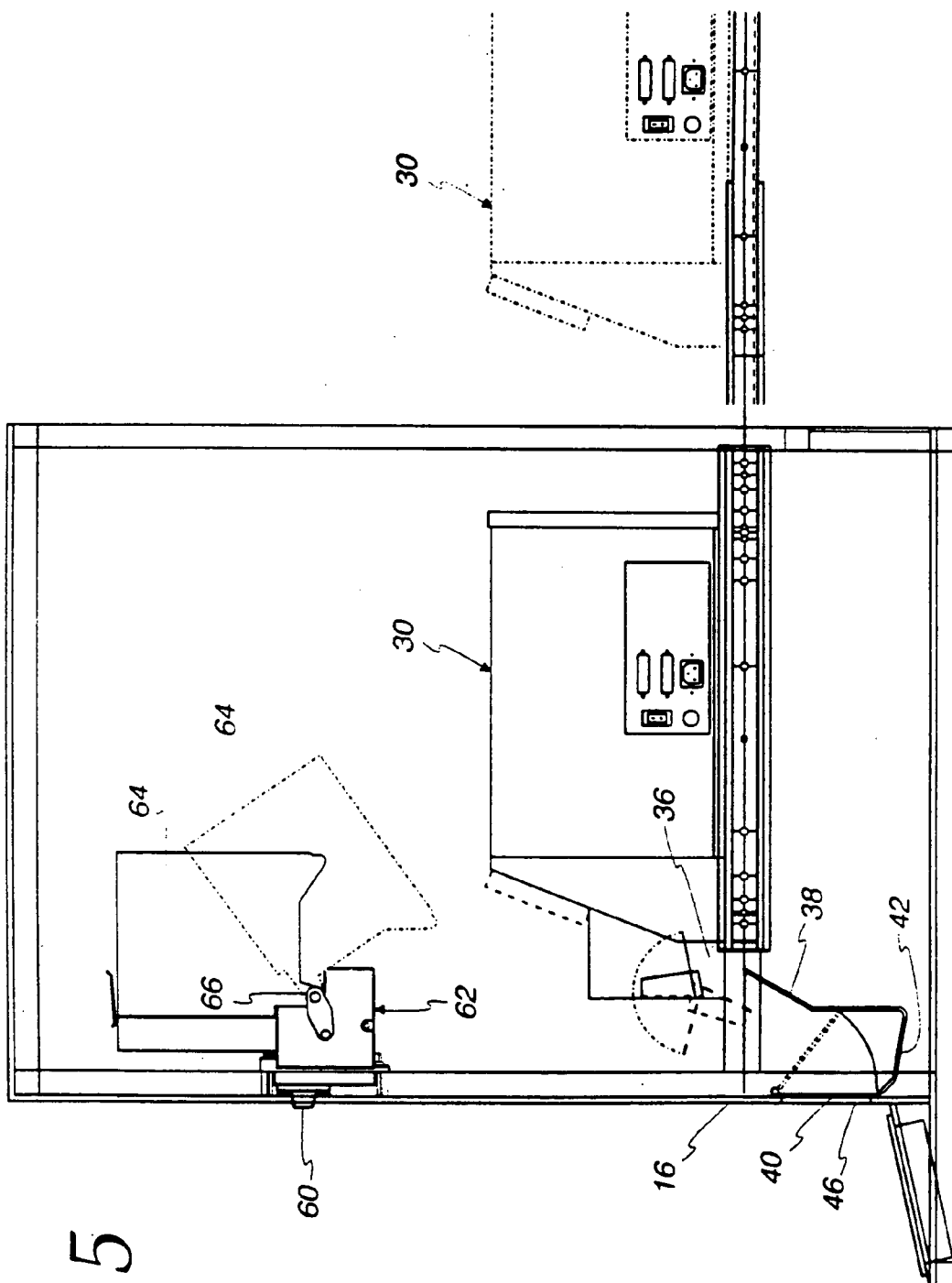
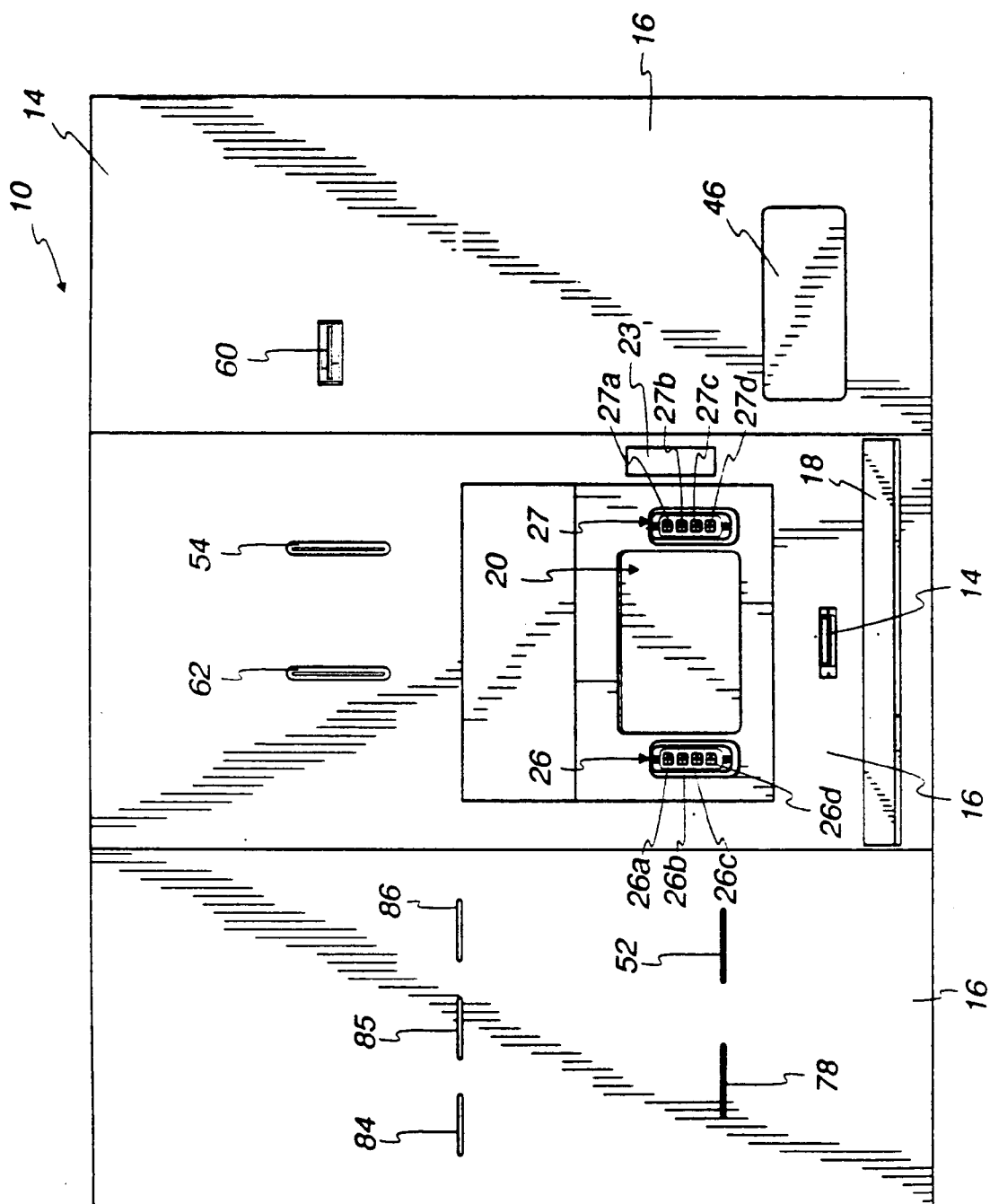


Fig. 5

Fig. 6



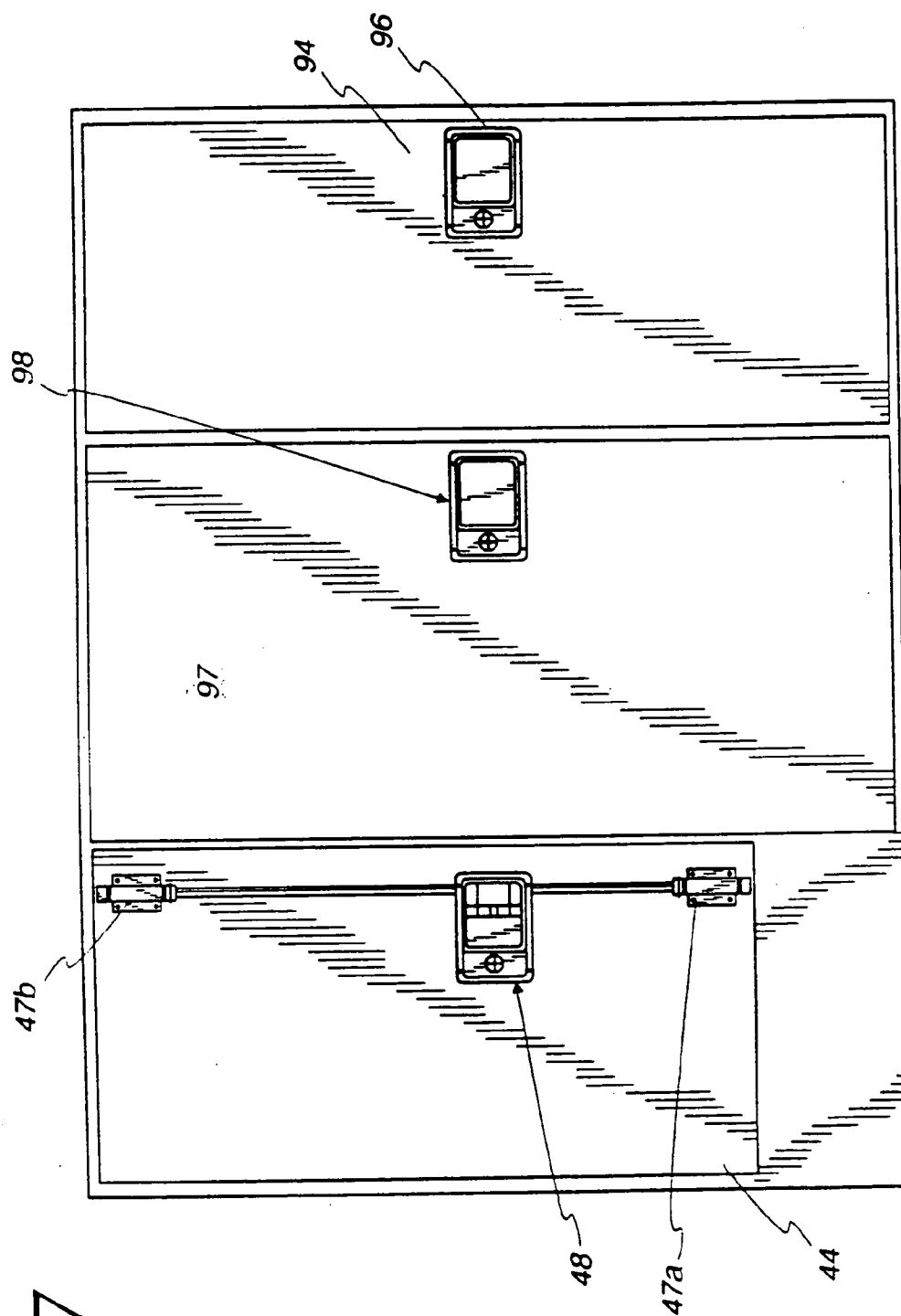
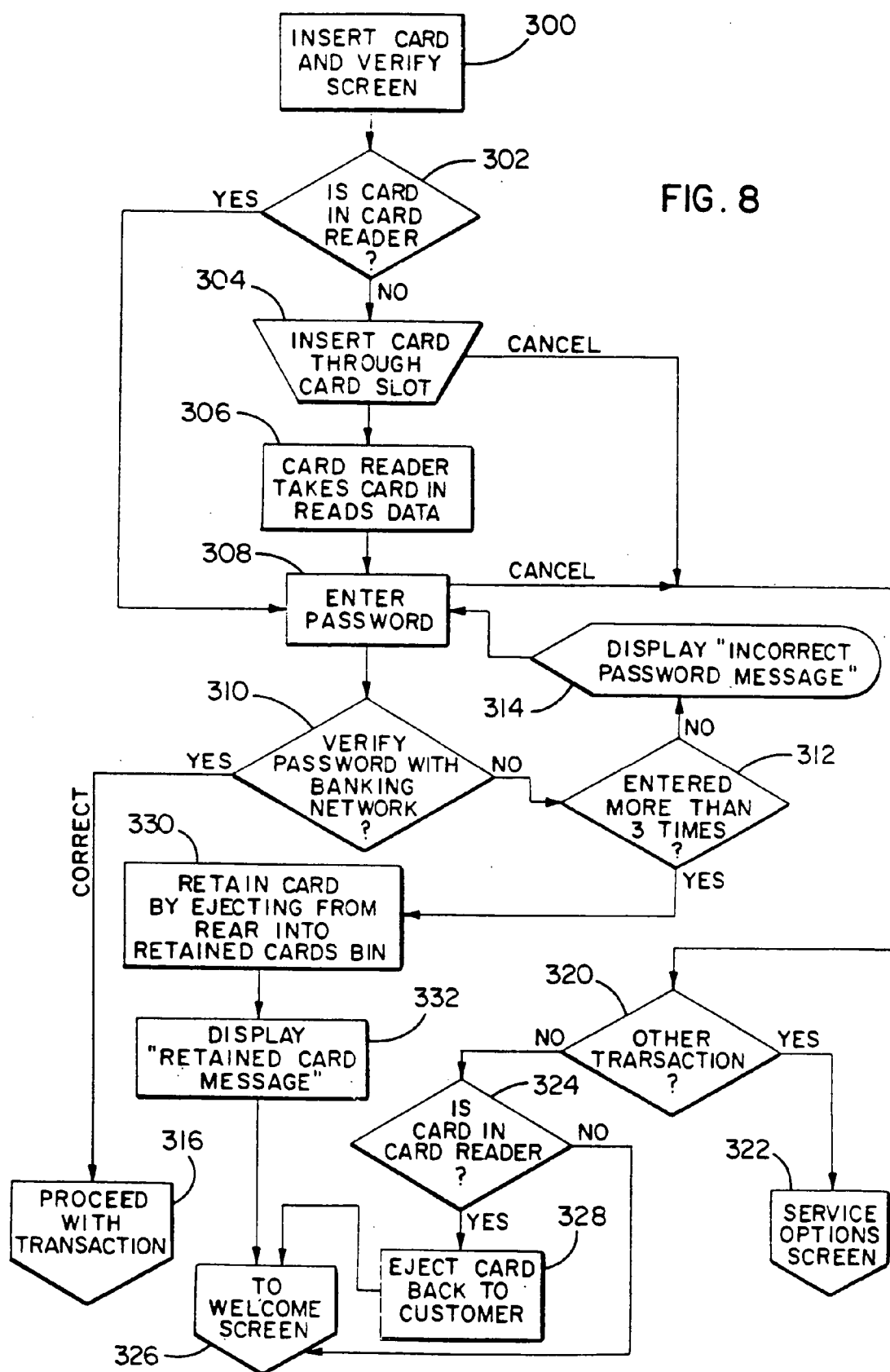


Fig. 7



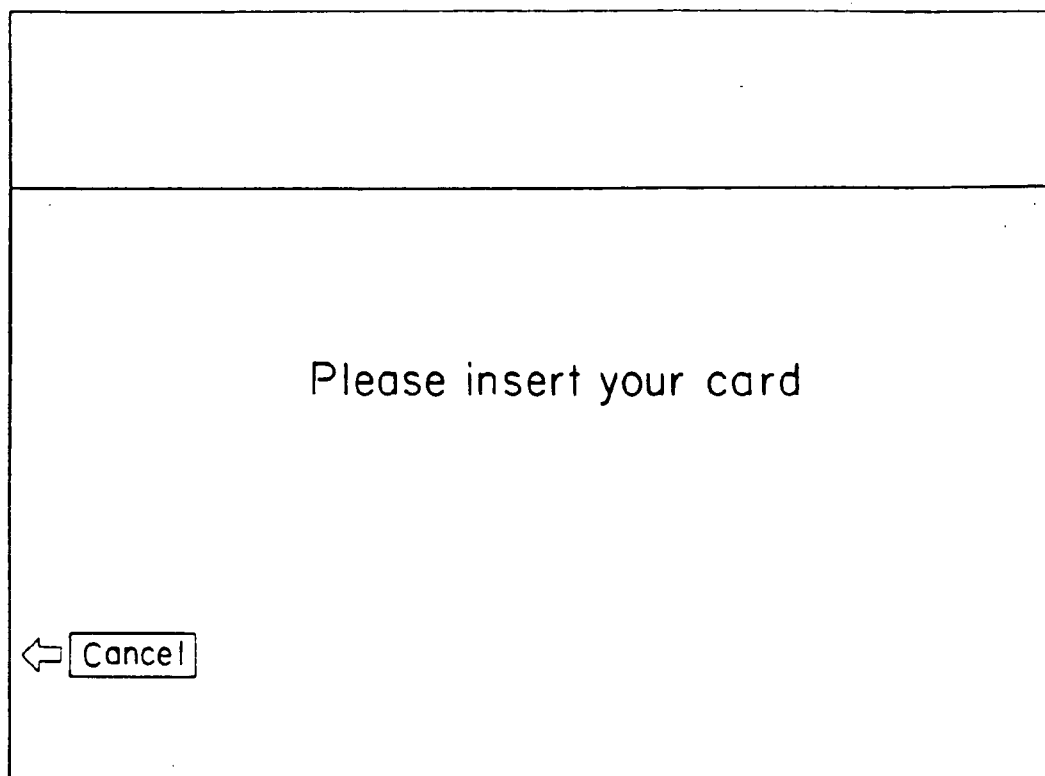
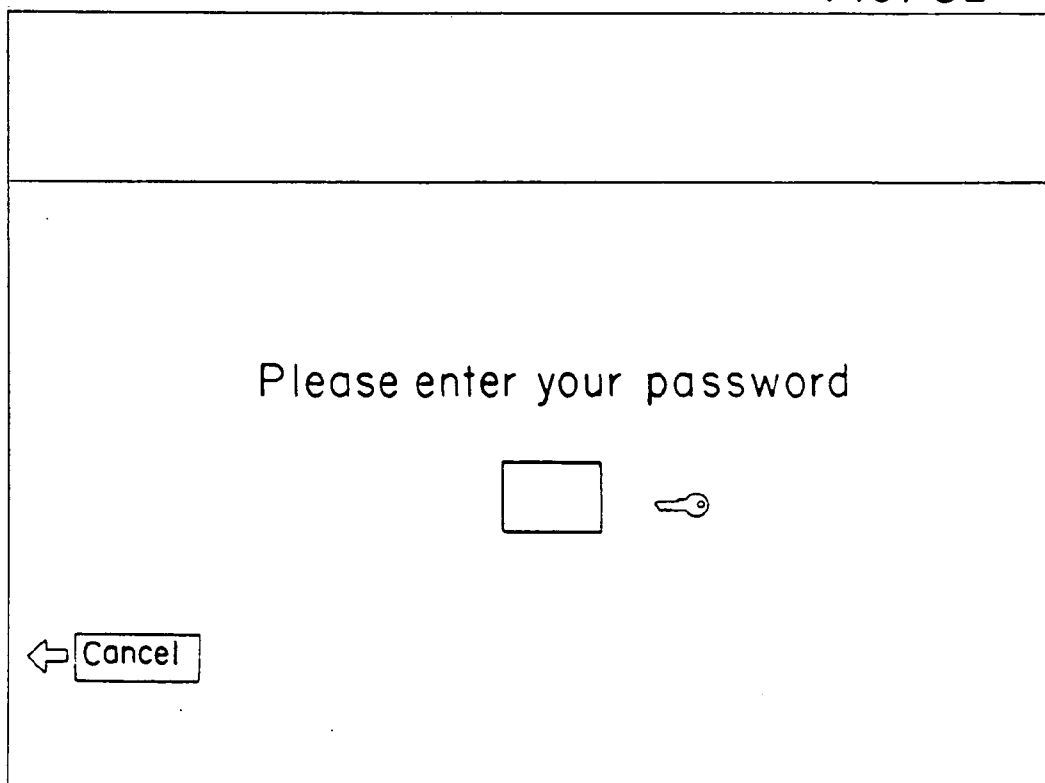


FIG. 8A

FIG. 8B



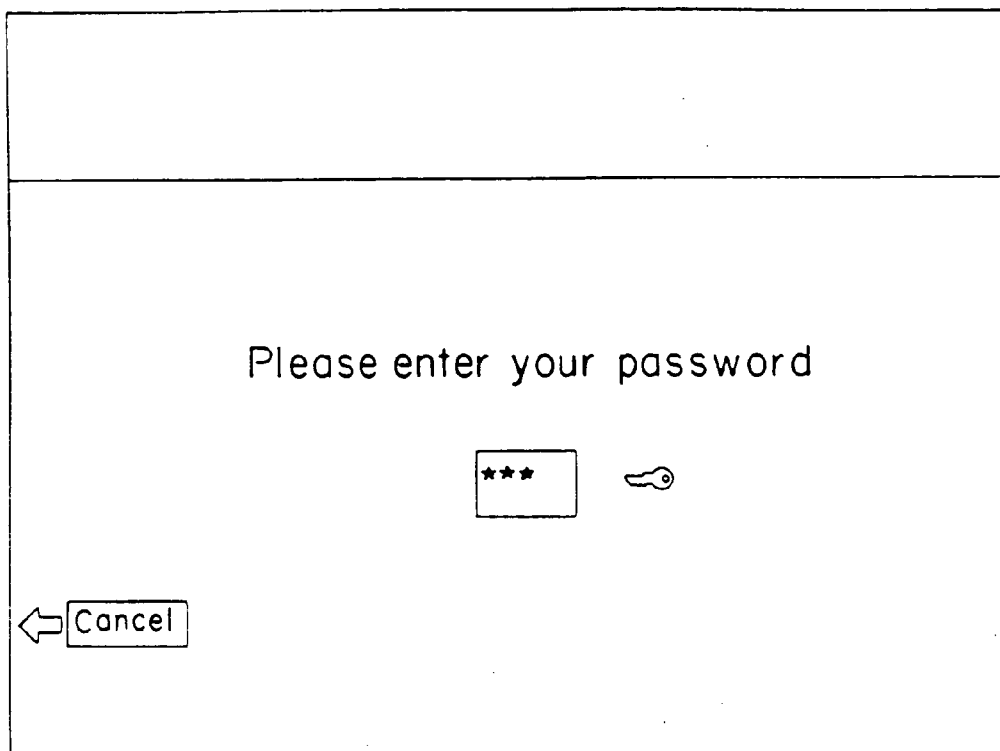
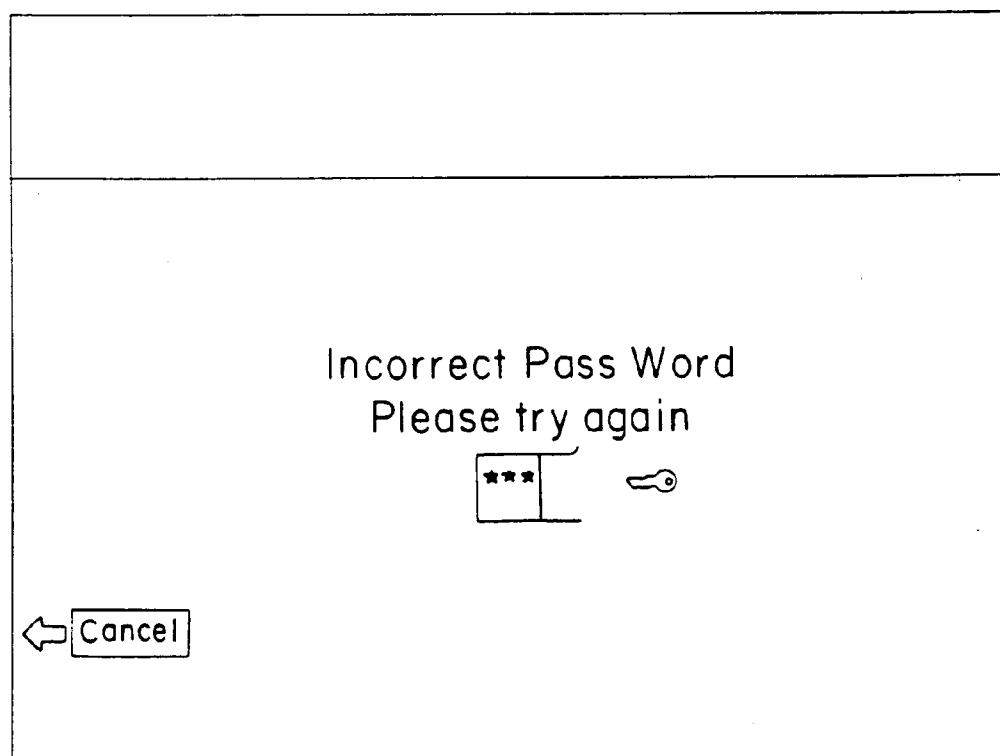


FIG. 8C

FIG. 8D



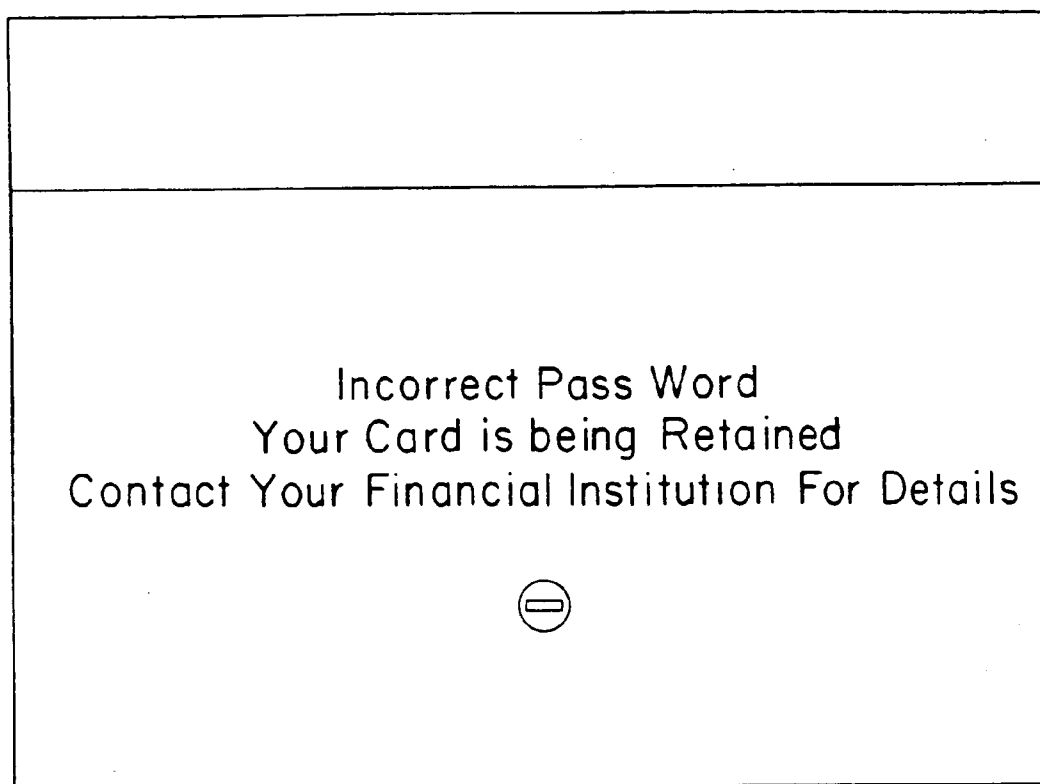
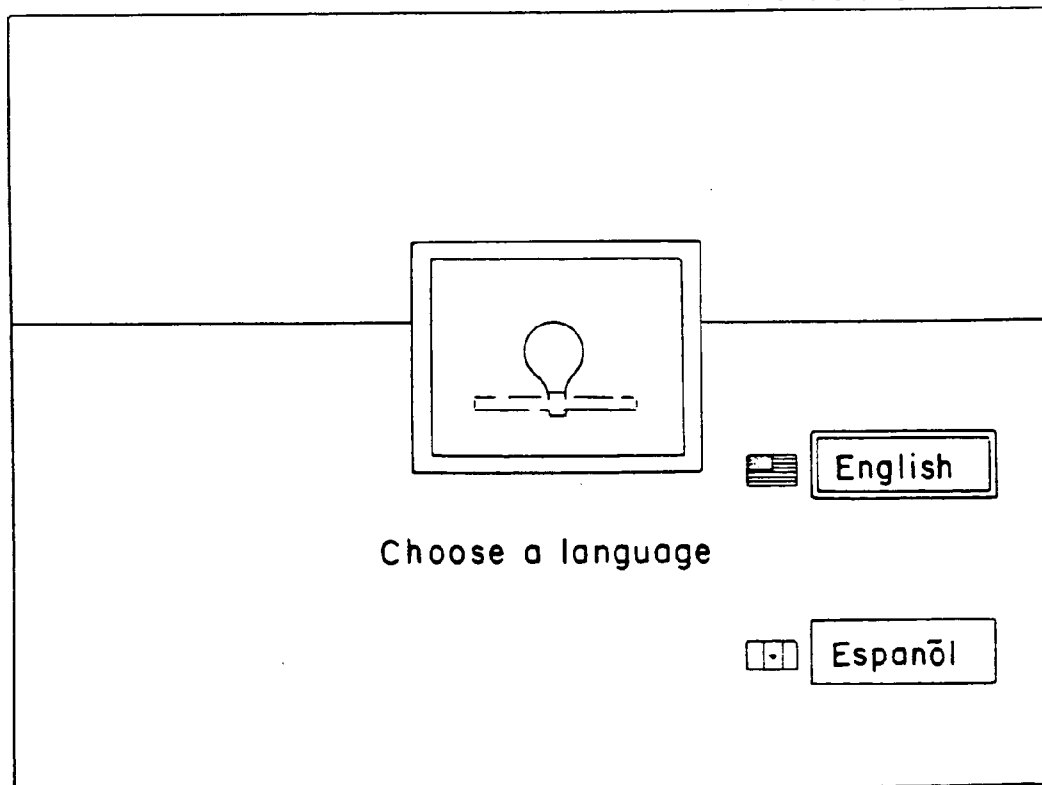


FIG. 8E

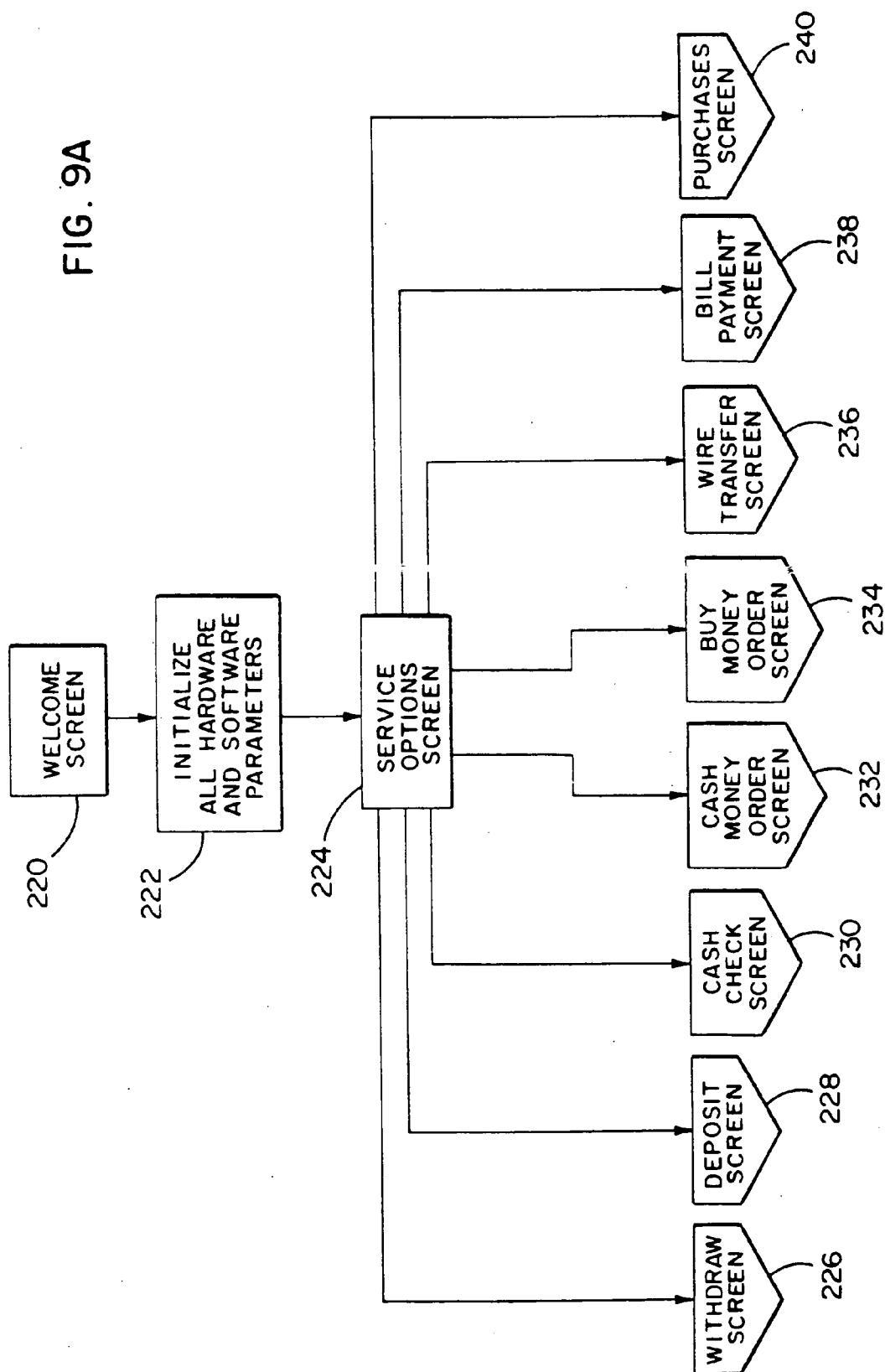
FIG. 8F



|                                          |                                                 |
|------------------------------------------|-------------------------------------------------|
|                                          |                                                 |
| Please choose from the following Options |                                                 |
| 1- Withdraw                              | Buy Money Order -5                              |
| 2- Deposit                               | Wire-Transfer -6                                |
| 3- Cash Check                            | Bill Payments -7                                |
| 4- Cash Money Order                      | Buy Lottery Tickets,<br>Stamps & Phone Cards -8 |

FIG. 9

FIG. 9A



Choose Account

← 1. Checking

← 2. Saving

← Cancel

FIG. 10

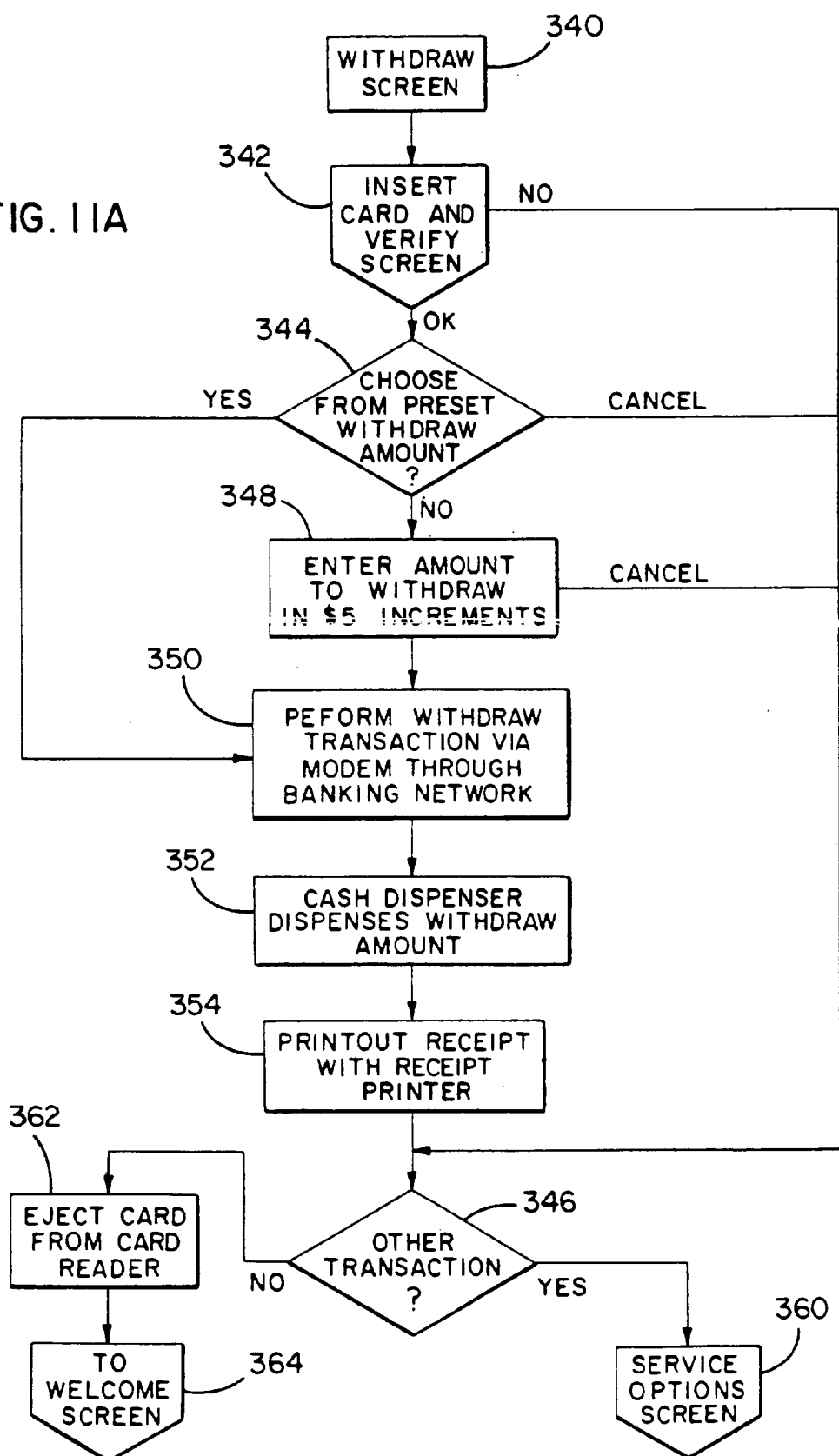
FIG. 11

Withdraw  
from Checking

|                                                                       |                                                                        |
|-----------------------------------------------------------------------|------------------------------------------------------------------------|
| ← <span style="border: 1px solid black; padding: 5px;">\$20.00</span> | <span style="border: 1px solid black; padding: 5px;">\$100.00</span> → |
| ← <span style="border: 1px solid black; padding: 5px;">\$40.00</span> | <span style="border: 1px solid black; padding: 5px;">\$200.00</span> → |
| ← <span style="border: 1px solid black; padding: 5px;">\$50.00</span> | <span style="border: 1px solid black; padding: 5px;">Other</span> →    |

← Cancel

FIG. 11A



A dialog box titled "Withdraw from Saving" with a large rectangular area in the center. Inside this area is a smaller box containing the text "\$500.00". At the bottom left is a "Cancel" button with a left-pointing arrow to its left. At the bottom right is a "Continue" button with a right-pointing arrow to its right.

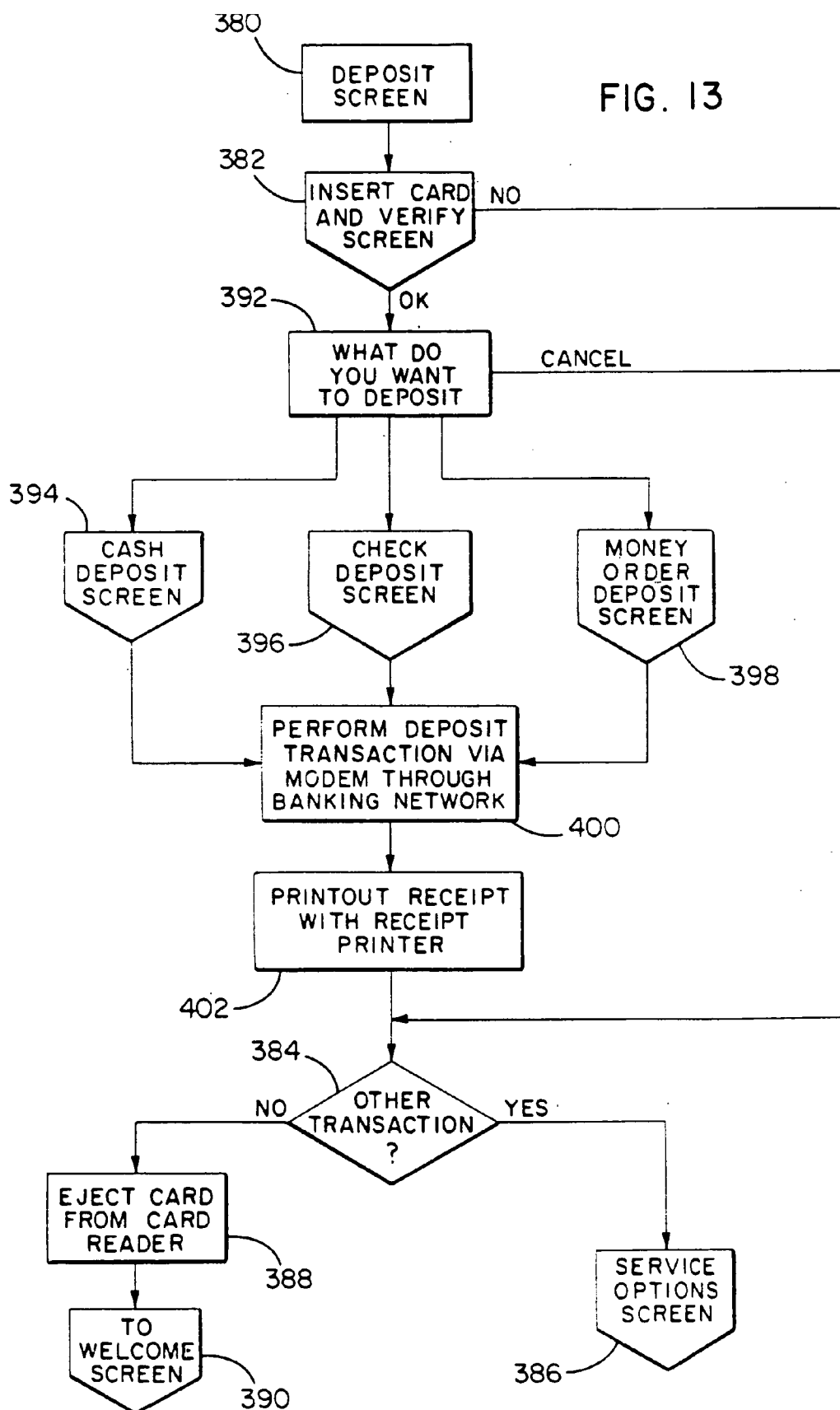
Withdraw  
from Saving

\$500.00

← Cancel

Continue →

FIG. 12



|                                                                                                                                                                           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <u>Deposit</u><br><u>into Checking</u>                                                                                                                                    |
| What would you like to deposit                                                                                                                                            |
| <div style="display: flex; flex-direction: column; gap: 10px;"> <div>⇐ 1. Cash</div> <div>⇐ 2. Check</div> <div>⇐ 3. Money Order</div> </div>                             |
| <div style="display: flex; align-items: center;"> <span style="margin-right: 10px;">⇐</span> <div style="border: 1px solid black; padding: 2px 10px;">Cancel</div> </div> |

FIG. 13A

FIG. 13B

|                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <u>Deposit Check</u>                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <div style="position: relative; height: 200px; border: 1px solid black; margin: 10px auto; width: 80%;"> <div style="position: absolute; top: 10px; right: 10px; border: 1px solid black; padding: 2px 10px;">\$675.52</div> </div>                                                                                                                                                                                                           |
| <div style="display: flex; justify-content: space-between; align-items: center;"> <div style="display: flex; align-items: center;"> <span style="margin-right: 10px;">⇐</span> <div style="border: 1px solid black; padding: 2px 10px;">Cancel</div> </div> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px 10px;">Continue</div> <span style="margin-left: 10px;">➡</span> </div> </div> |

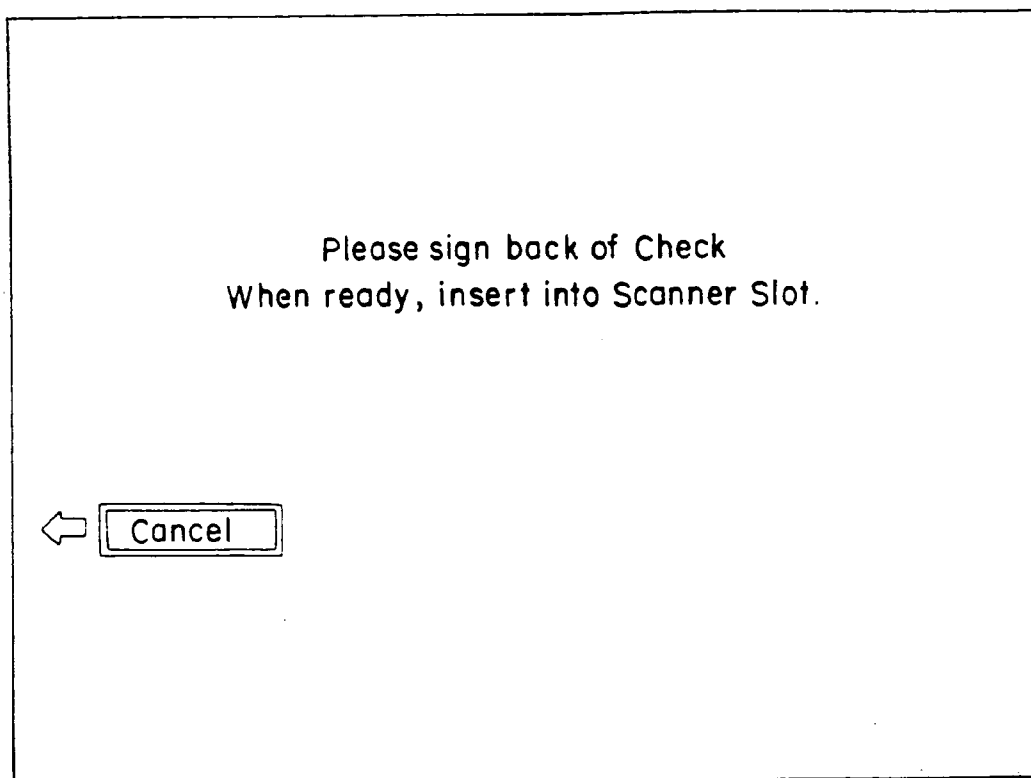
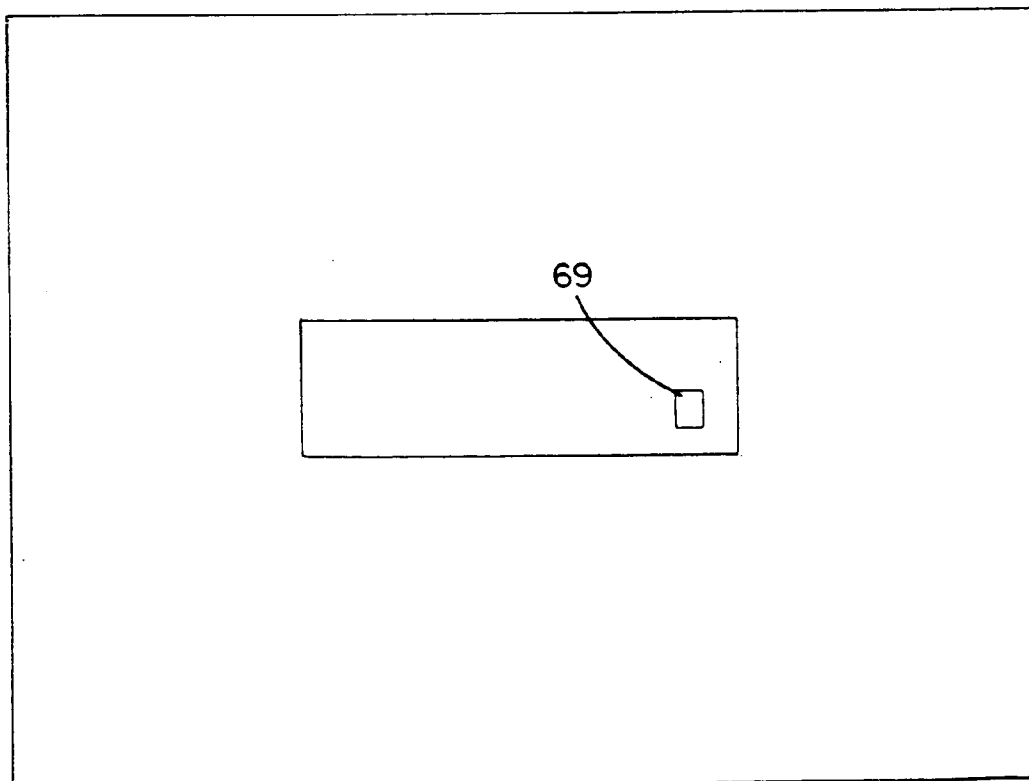


FIG. 13C

FIG. 13D



|                                                                                                                                                                                                                               |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <div data-bbox="353 602 1248 659" data-label="Text"> <p>\$674.52 Will be deposited into your account.</p> </div> <div data-bbox="564 837 1032 945" data-label="Text"> <p>Please take your receipt<br/>Thank you...</p> </div> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

FIG. 13E

FIG. 13F

|                                                                                                                                                                                                                                                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <div data-bbox="664 1297 933 1421" data-label="Section-Header"> <p><u>Deposit</u><br/><u>into Saving</u></p> </div> <div data-bbox="287 1461 948 1518" data-label="Text"> <p>What would you like to deposit</p> </div>                            |
| <div data-bbox="287 1596 508 1644" data-label="Text"> <p>⇐ 1. Cash</p> </div> <div data-bbox="287 1686 535 1734" data-label="Text"> <p>⇐ 2. Check</p> </div> <div data-bbox="287 1774 690 1829" data-label="Text"> <p>⇐ 3. Money Order</p> </div> |
| <div data-bbox="287 1871 531 1919" data-label="Text"> <p>⇐ Cancel</p> </div>                                                                                                                                                                      |

Deposit Cash

You have inserted \$0.00

Please insert your \$\$ bills  
into the bill acceptor slot....

← Cancel

Continue →

FIG. 13G

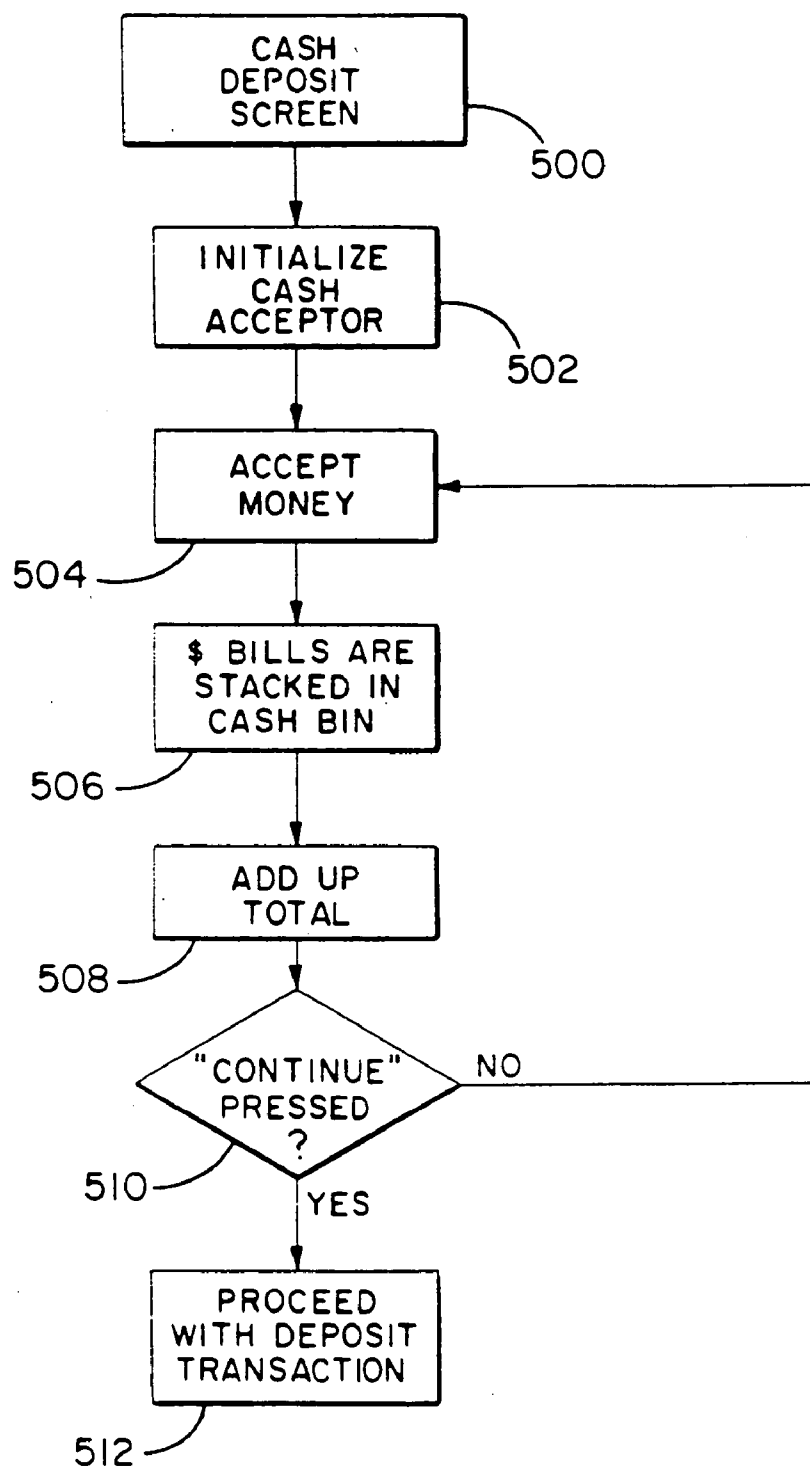


FIG. 13H

Deposit Cash

You have inserted \$ 20.00

Please insert your \$\$bills  
into the bill acceptor slot....

← Cancel

Continue →

FIG. 13I

FIG. 13J

Deposit Cash

You have inserted \$ 65.00

Please insert your \$\$bills  
into the bill acceptor slot ....

← Cancel

Continue →

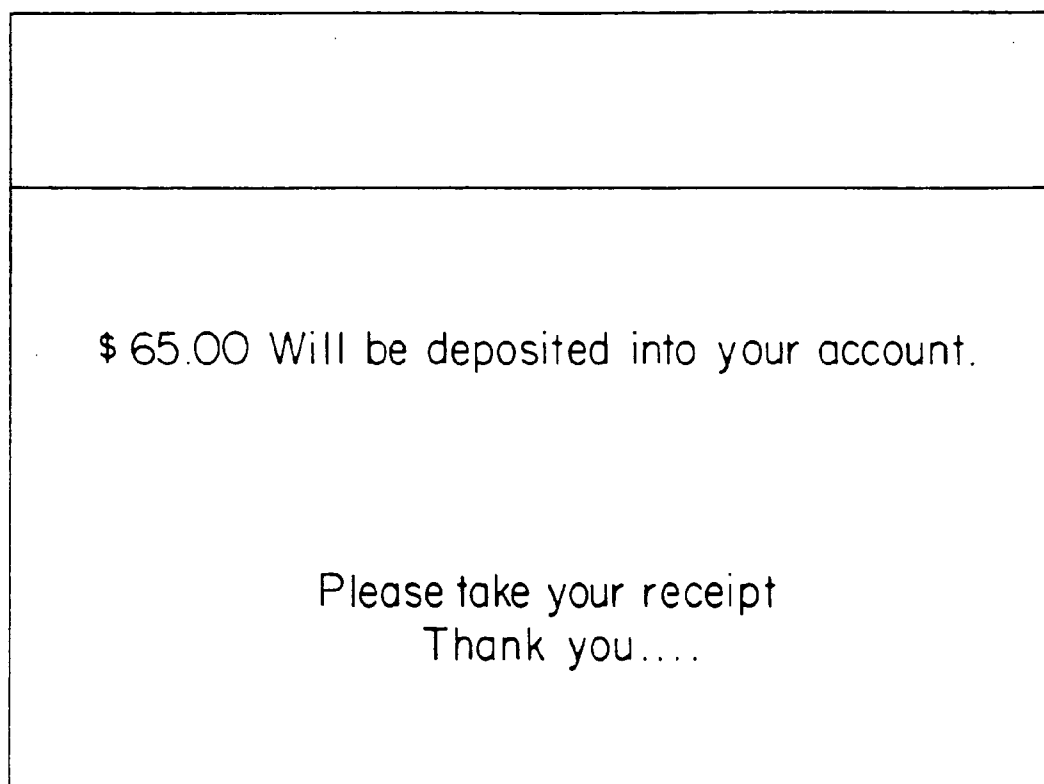
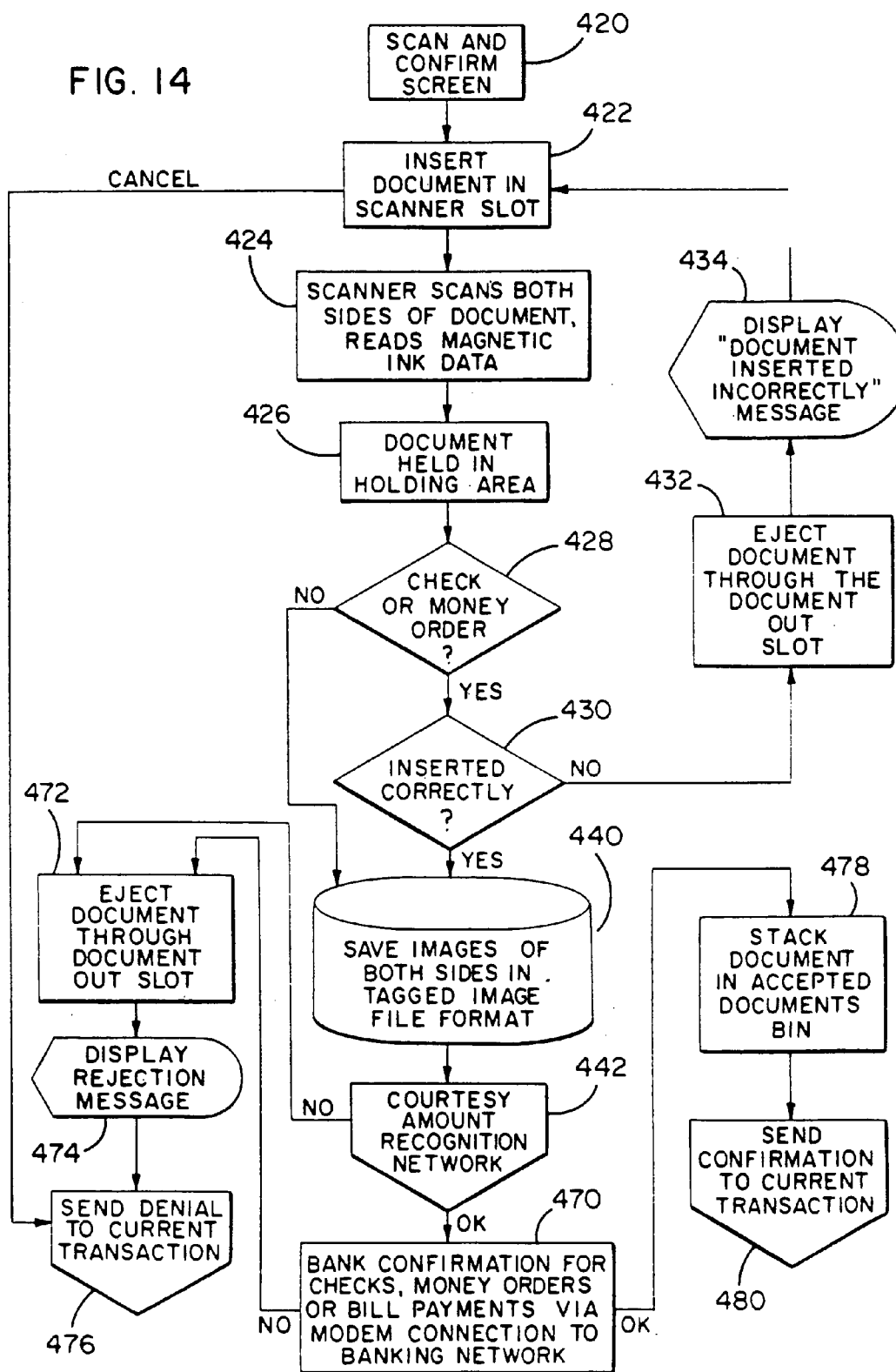
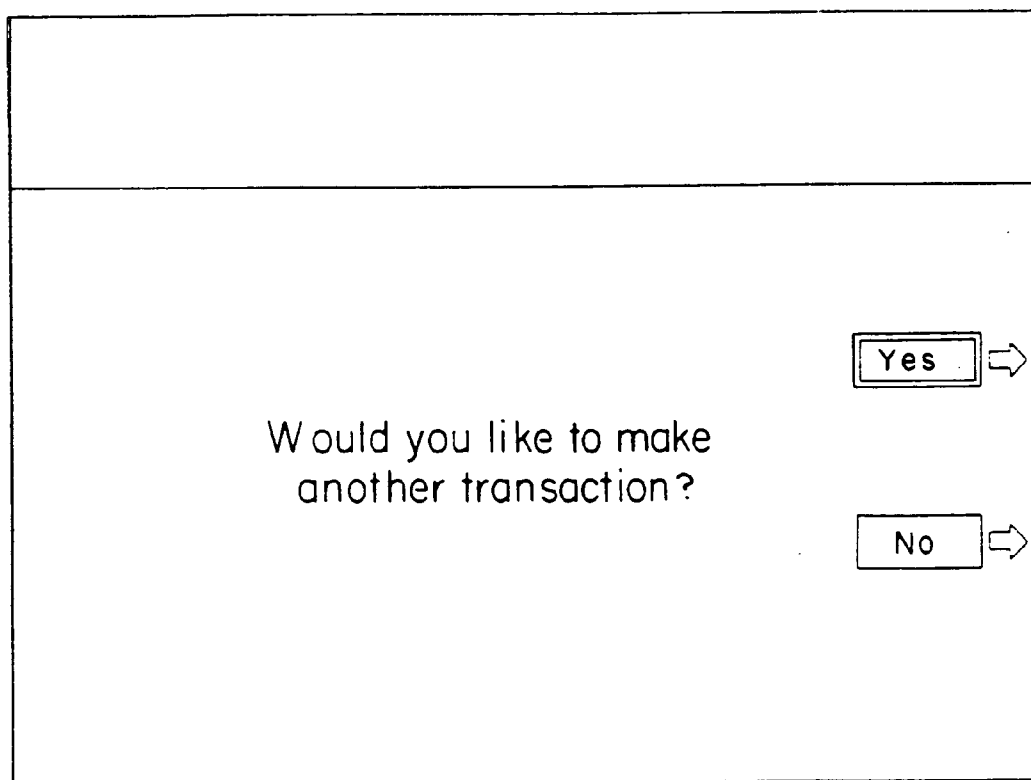


FIG. 13K

FIG. 14





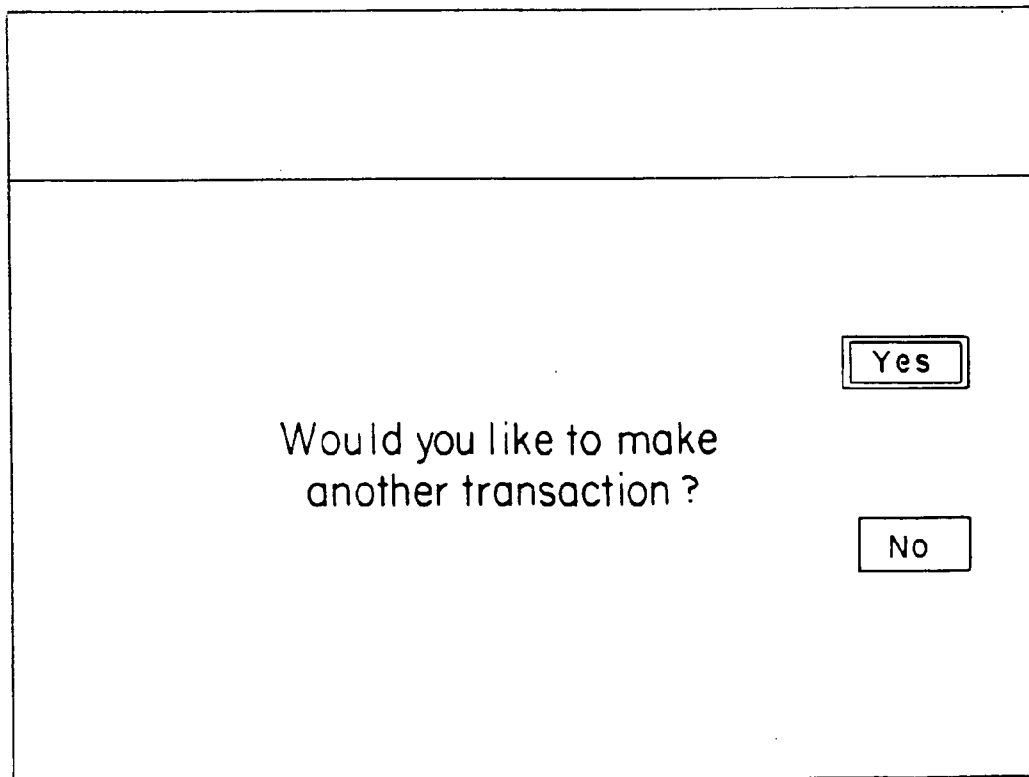
Would you like to make another transaction?

Yes →

No →

FIG. 15A

FIG. 15B



Would you like to make another transaction ?

Yes

No

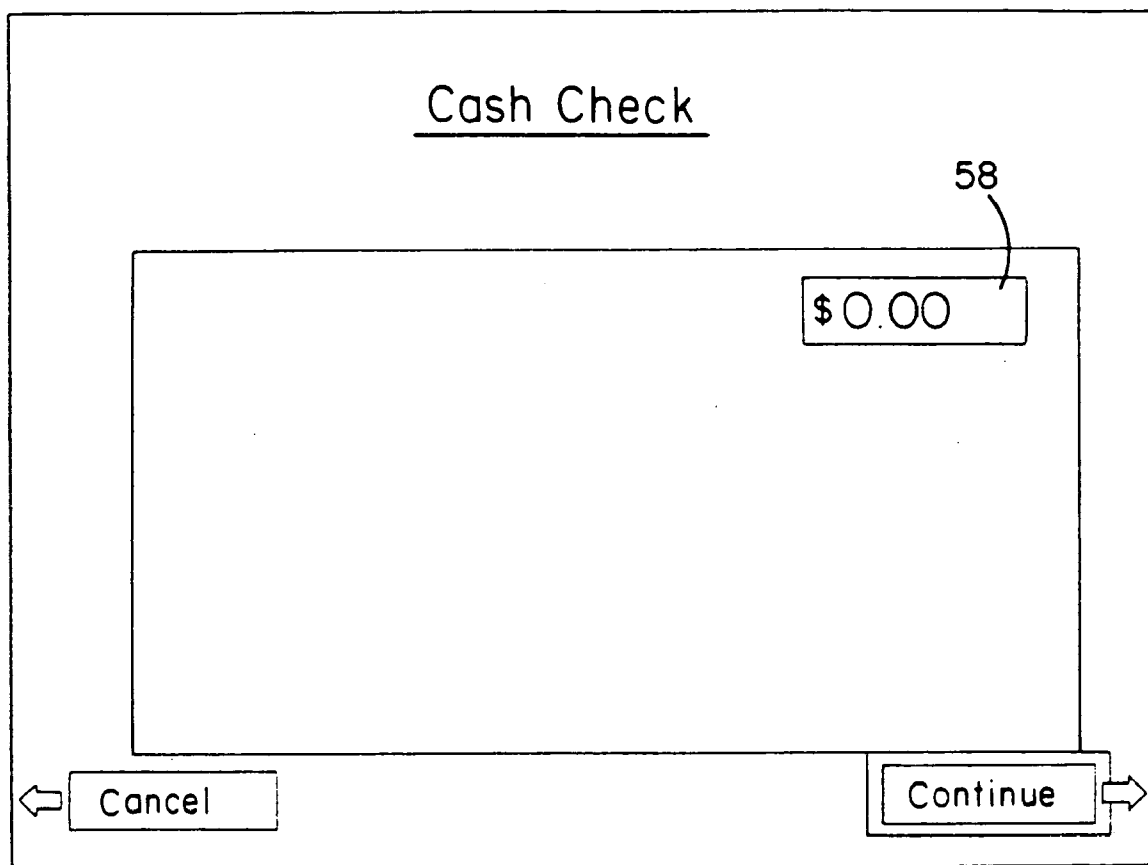
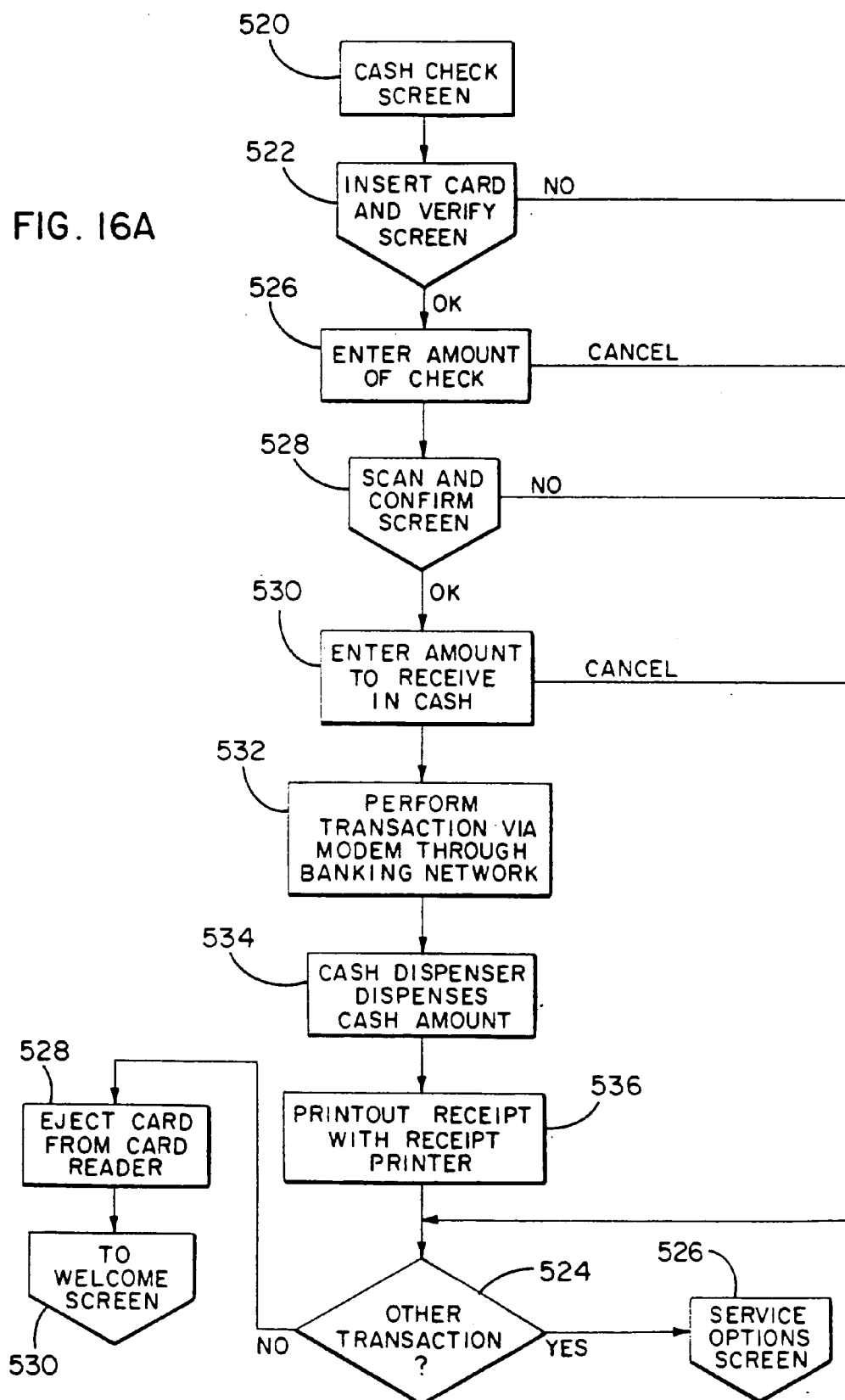


FIG. 16

FIG. 16A



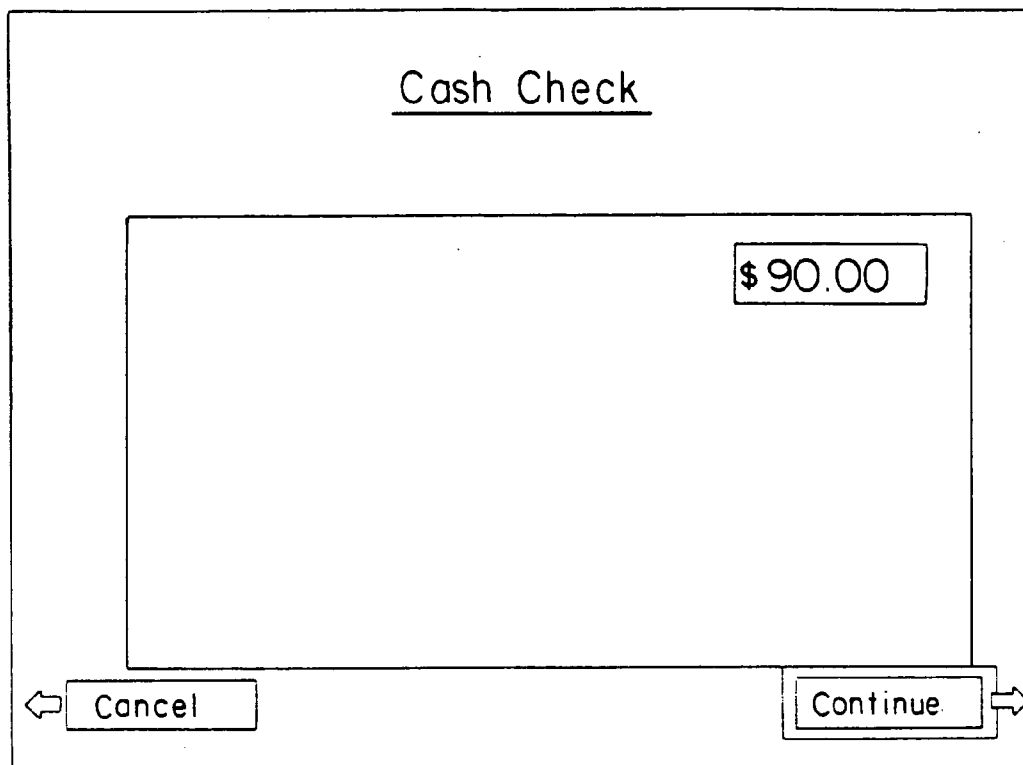
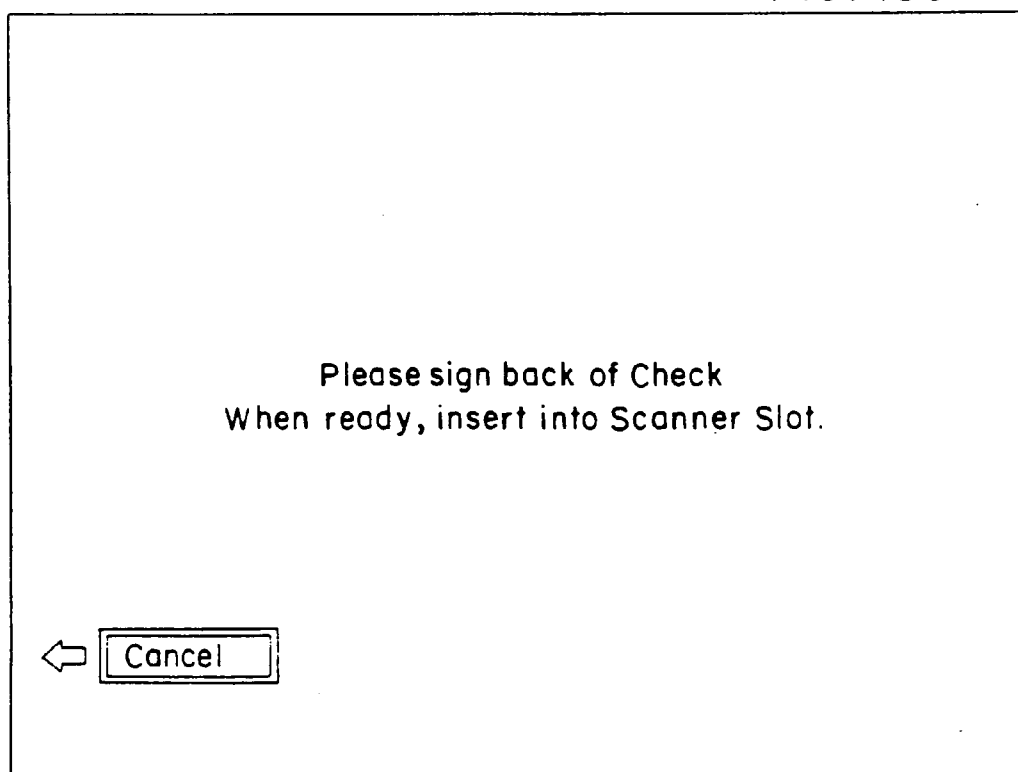


FIG. 16B

FIG. 16C



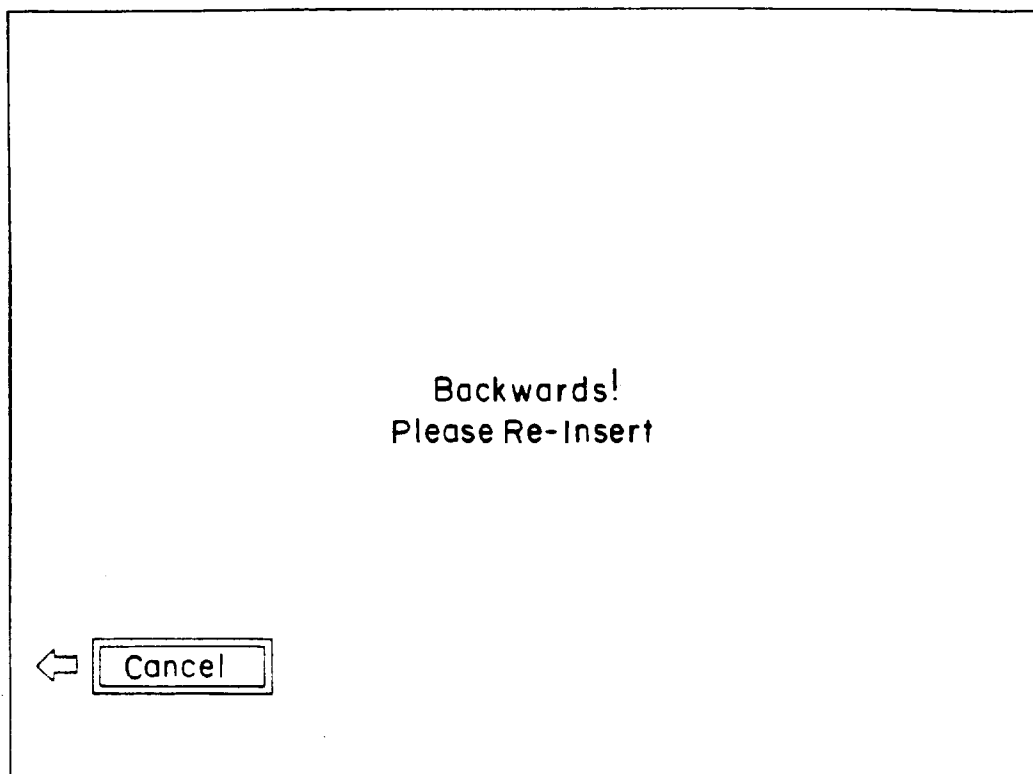
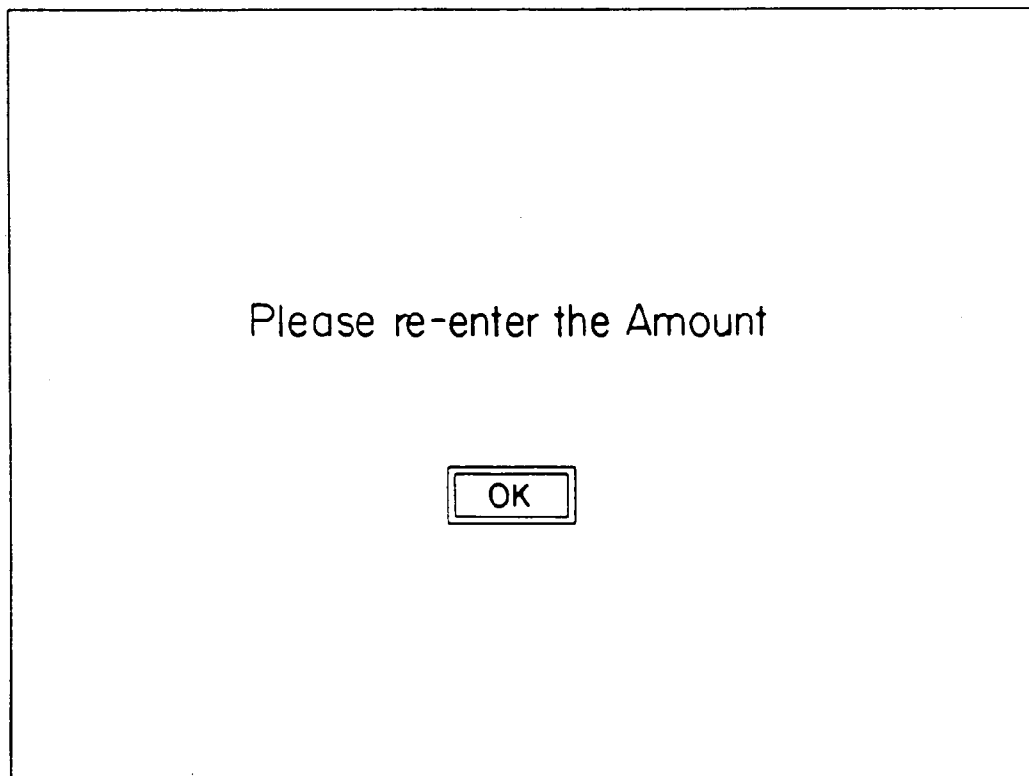


FIG. 16D

FIG. 16DD



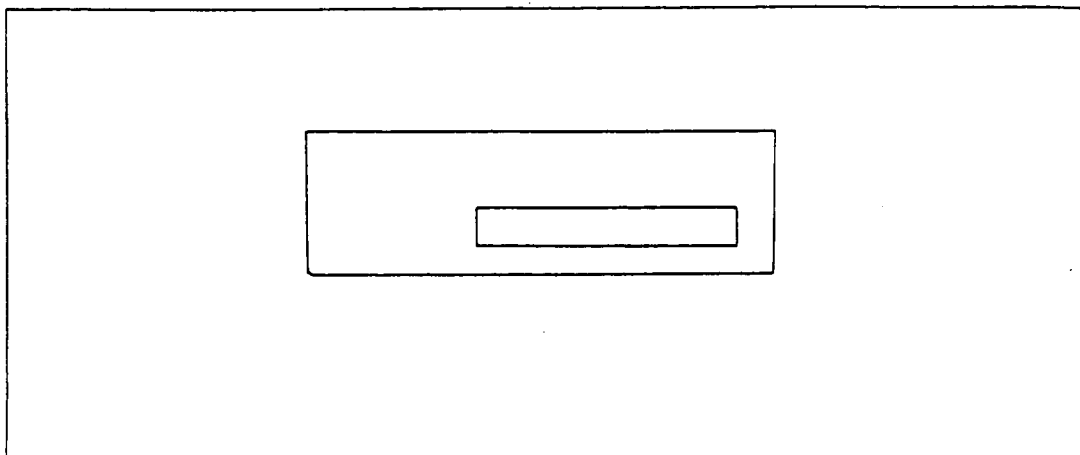


FIG. 16E

FIG. 16F

Cash Check

|  |         |
|--|---------|
|  |         |
|  |         |
|  | \$40.00 |

70

← Cancel Continue →

A diagram of a user interface for a "Cash Check" screen. The screen has a title "Cash Check" at the top. Below the title is a large rectangular area containing three input fields. The bottom input field is labeled "70" and contains the text "\$40.00". At the bottom of the screen are two buttons: "Cancel" on the left and "Continue" on the right. The "Continue" button has a right-pointing arrow next to it.

Receive \$40.00

49.00 Will be deposited into your account.

Please take your receipt  
Thank you....

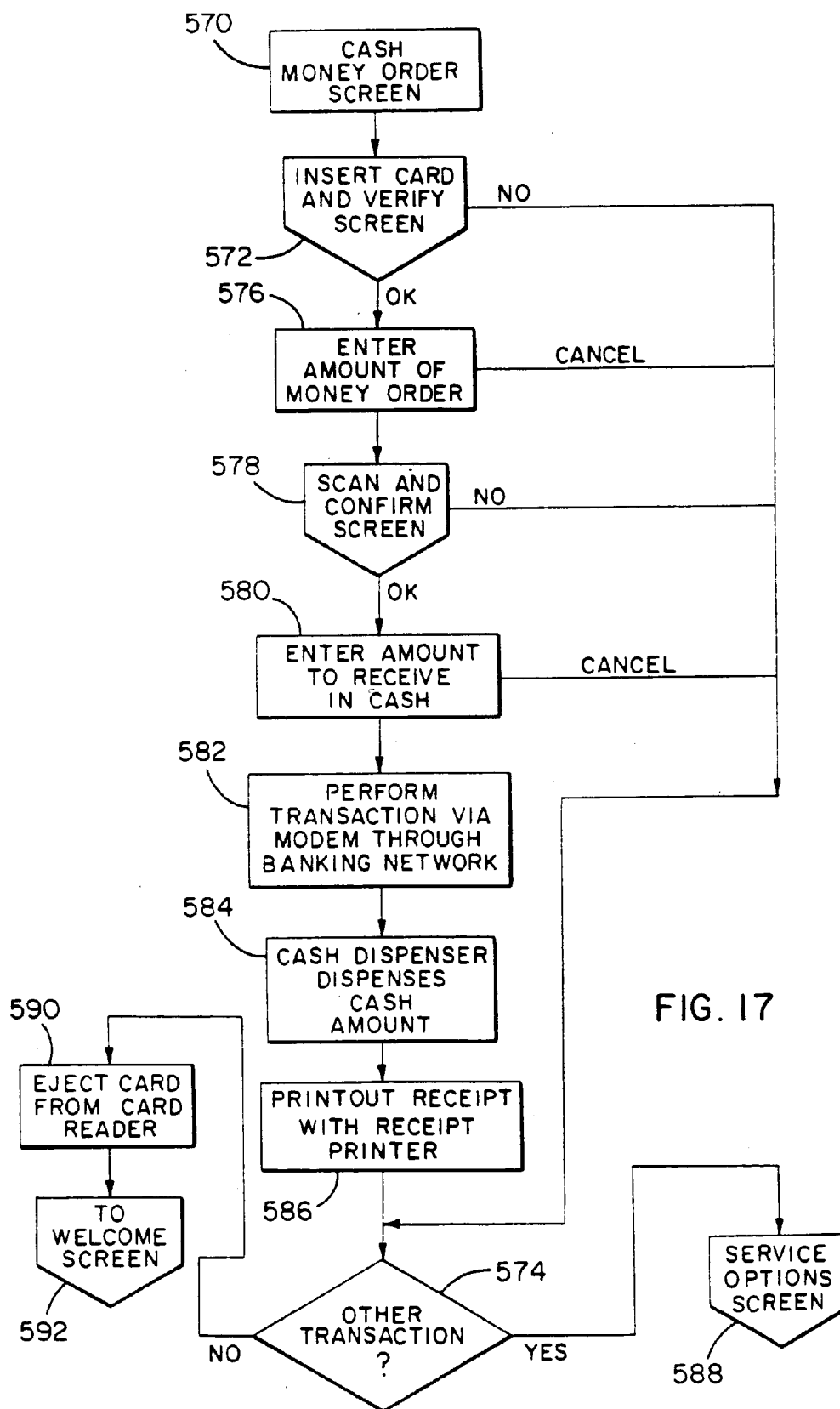
FIG. 16G

FIG. 16H

Cash Check

Enter Amount of Check

Service Charge \$1.00



Cash A Money Order

\$100.00

← Cancel
Continue →

FIG. 17A

FIG. 17B

Please sign back of Money Order  
When ready, insert into Scanner Slot

← Cancel

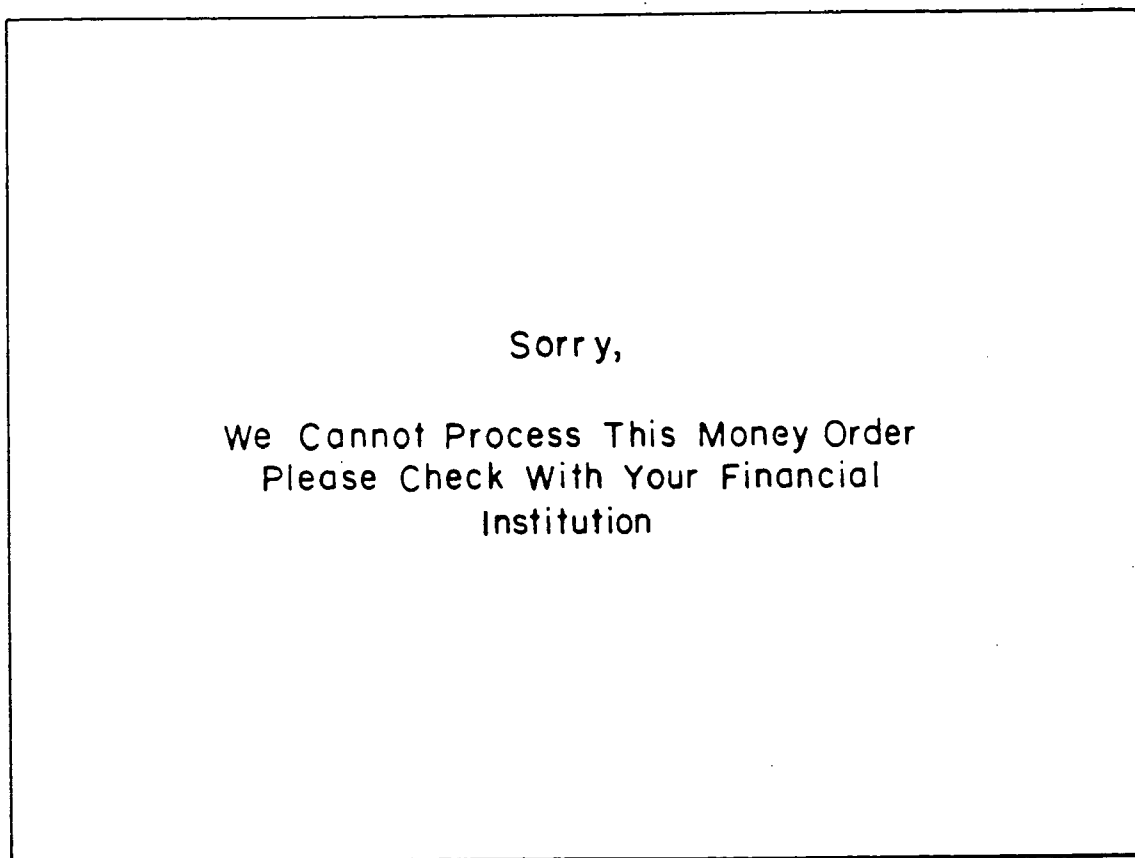


FIG. 17C

Purchase Money Order

Please enter information.

Pay To: JOHN

← Cancel

FIG. 18

FIG. 18A

Purchase Money Order

Please enter information.

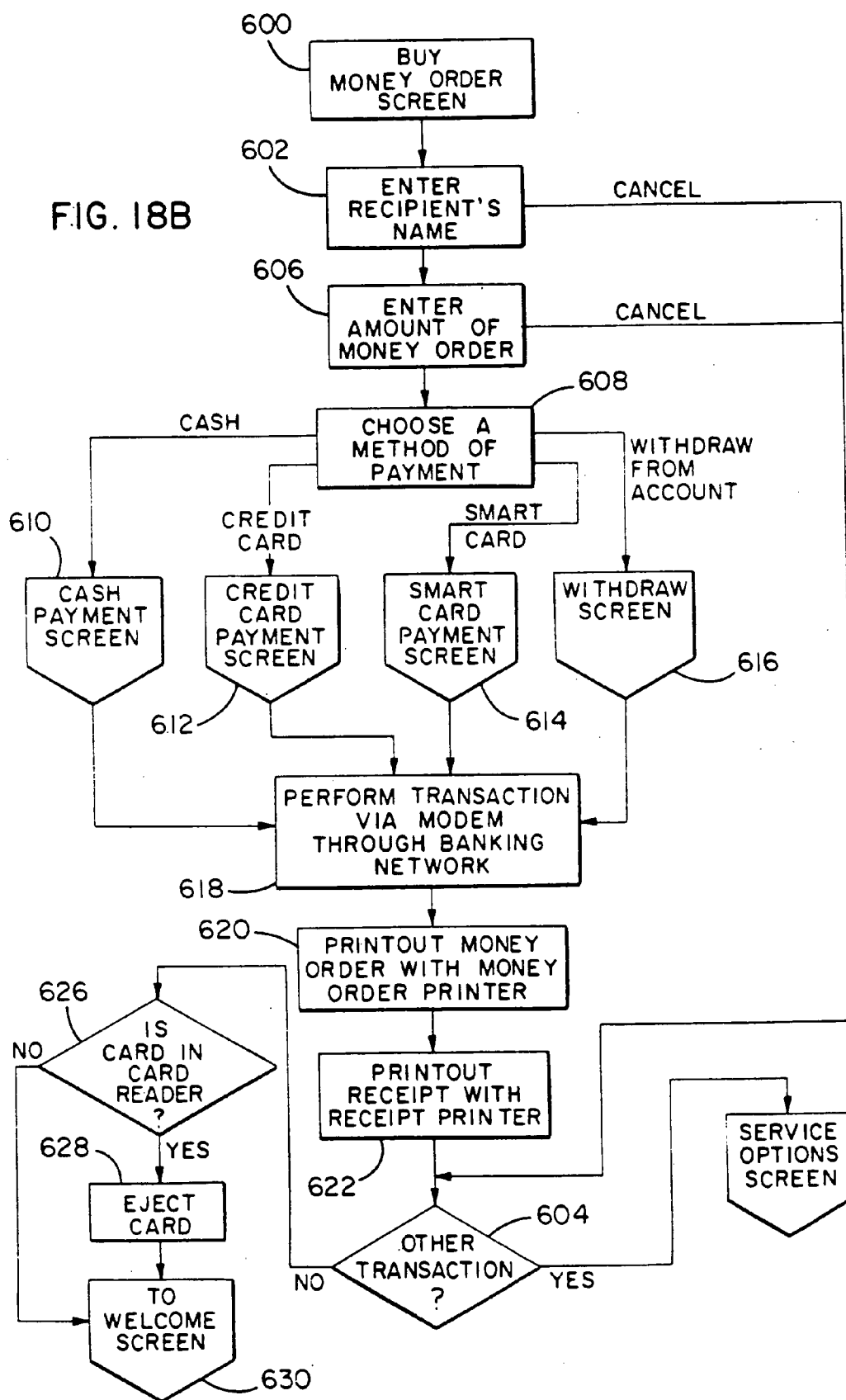
Pay To: JOHN DOE

\$ 500.00

\$ 500.50

← Cancel

Continue →



A screen display within a rectangular frame. At the top, a smaller rectangle contains the text "\$ 500.50". Below this, the text "Please Select a Method of Payment :" is displayed. Underneath, there are four options, each preceded by a left-pointing arrow in a box:

- 1. Cash
- 2. Credit Card
- 3. Withdraw from my Account
- Cancel (this option is enclosed in a double-bordered box)

On the right side of the screen, there are two additional options with right-pointing arrows in boxes:

- Smart Card .4
- Back to Money Order .9

FIG. 18C

FIG. 18D

A screen display within a rectangular frame. It is divided into two horizontal sections. The top section contains a message in a rectangular box: "\$ 500.50 is withdrawn from your account". The bottom section contains the following text centered on the screen:

Your Money Order is being  
Printed  
Please take your receipt  
Thank you....

Wire Money

Please enter information, when done press 'Enter'

To:

Bank's Name

FED Routing Code (ABA #)

ACCOUNT NUMBER

FIG. 19

FIG. 19A

Wire Money

Please enter information, when done press 'Enter'

To:

Bank's Name

FED Routing Code (ABA #)

ACCOUNT NUMBER

Wire Money

Please enter information, when done press 'Enter'

|                         |                |
|-------------------------|----------------|
| To:                     | JOHN DOE       |
| Bank's Name             | FIRST AMERICAN |
| FED Routing Code (ABA#) | 7896654        |
| ACCOUNT NUMBER          |                |

← Cancel

FIG. 19B

FIG. 19C

Wire Money

Please enter information, when done press 'Enter'

|                         |                |
|-------------------------|----------------|
| To:                     | JOHN DOE       |
| Bank's Name             | FIRST AMERICAN |
| FED Routing Code (ABA#) | 7896654        |
| ACCOUNT NUMBER          | 987-87654      |

← Cancel

## Wire Money

Please enter information, when done press 'Enter'

|                         |                                             |
|-------------------------|---------------------------------------------|
| To:                     | <input type="text" value="JOHN DOE"/>       |
| Bank's Name             | <input type="text" value="FIRST AMERICAN"/> |
| FED Routing Code (ABA ) | <input type="text" value="7896654"/>        |
| ACCOUNT NUMBER          | <input type="text" value="987-87654"/>      |

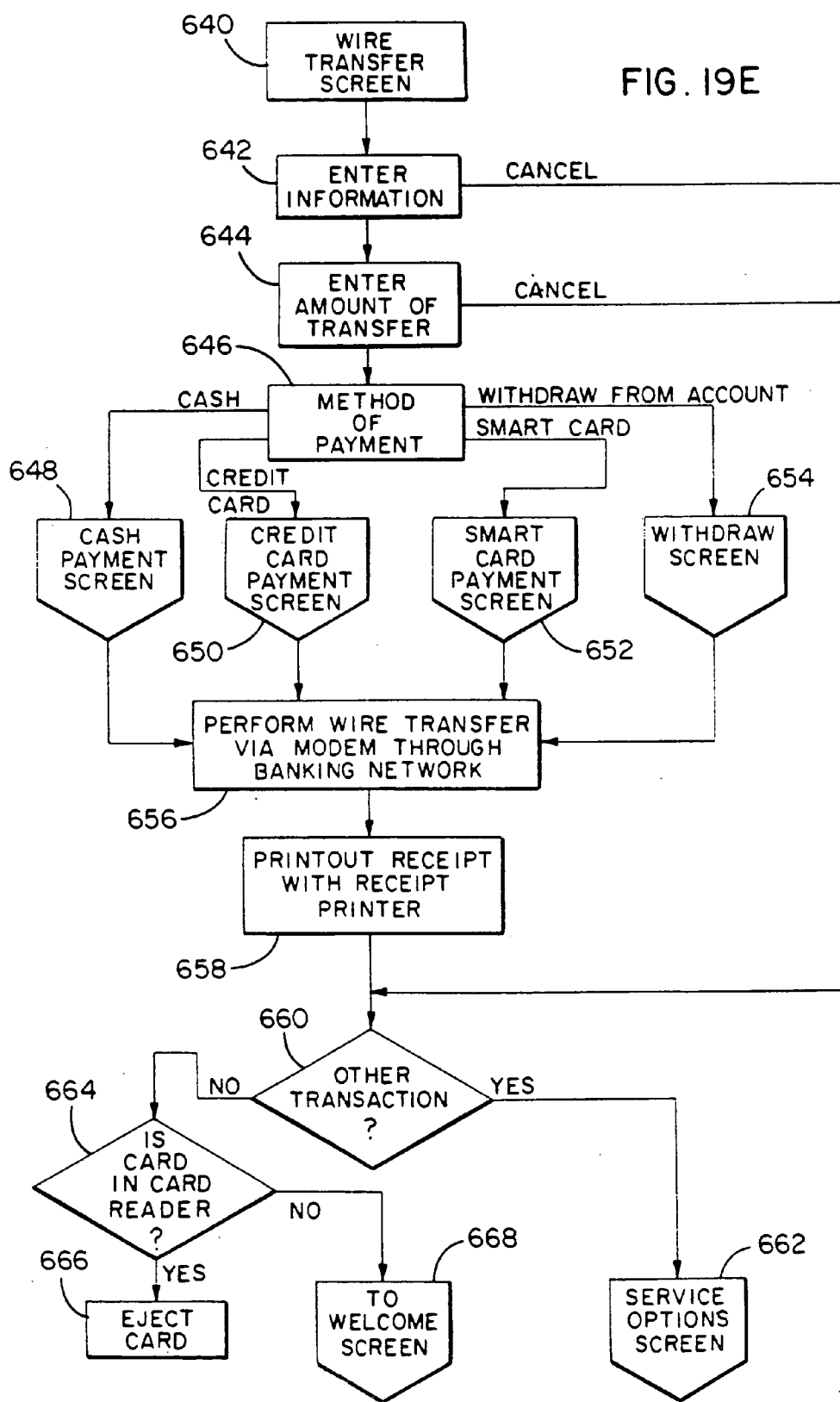
78

\$ 850.00

\$ 935.00

78a

FIG. 19D



\$ 935.00

Please Select a Method of Payment:

⇐ 1. Cash
Smart Card .4 ⇐

⇐ 2. Credit Card
Back to Wire Transfer .9 ⇐

⇐ 3. Withdraw from my Account

⇐ Cancel

FIG. 19F

Pay Bills

\$ 0.60 per bill Service Charge

Select the bills you want to pay, follow instructions. When done, press Continue

|                                                                                                     |                                                                                                          |
|-----------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> Phone<br><input type="checkbox"/> Electric<br><input type="checkbox"/> Gas | <input type="checkbox"/> Cable<br><input type="checkbox"/> Water<br><input type="checkbox"/> Credit Card |
|-----------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|

← Cancel

Serv. Charge \$0.00  
 \$0.00

Continue > →

FIG. 20

FIG. 20A

Pay Bills

\$ 0.60 per bill Service Charge

Enter amount to Pay on your Phone bill ....  
 Select another bill to pay ....  
 When done, press Continue

|                                                                                                                                                                               |                                                                                                          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> Phone <span style="border: 1px solid black; padding: 2px 10px;">\$129.67</span><br><input type="checkbox"/> Electric<br><input type="checkbox"/> Gas | <input type="checkbox"/> Cable<br><input type="checkbox"/> Water<br><input type="checkbox"/> Credit Card |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|

← Cancel

Serv. Charge 0.60  
 \$130.27

Continue > →

Please insert Phone bill into Scanner Slot

← Cancel

FIG. 20B

FIG. 20C

Pay Bills  
0.60 per bill Service Charge

Enter amount to Pay on your Gas bill ....  
Select another bill to pay ....  
When done press Continue

|                                     |          |
|-------------------------------------|----------|
| ← <input type="checkbox"/> Phone    | \$129.67 |
| ← <input type="checkbox"/> Electric |          |
| ← <input type="checkbox"/> Gas      | \$45.22  |

|             |                            |
|-------------|----------------------------|
| Cable       | <input type="checkbox"/> → |
| Water       | <input type="checkbox"/> → |
| Credit Card | <input type="checkbox"/> → |

← Cancel

Serv. Charge \$1.20

\$176.09

Continue > →

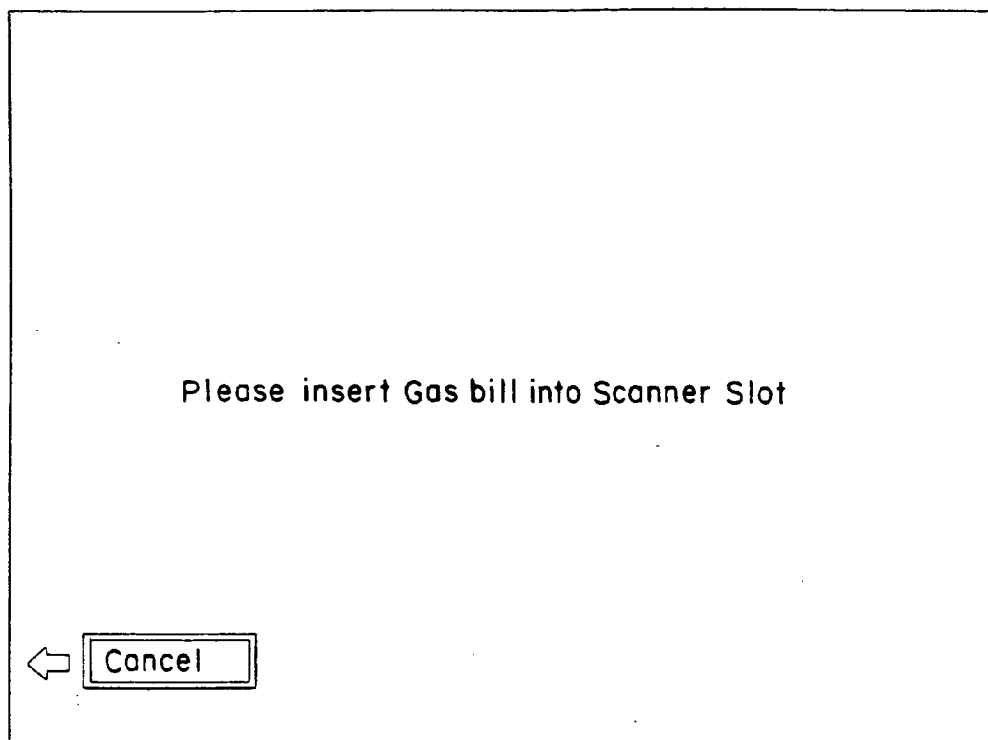
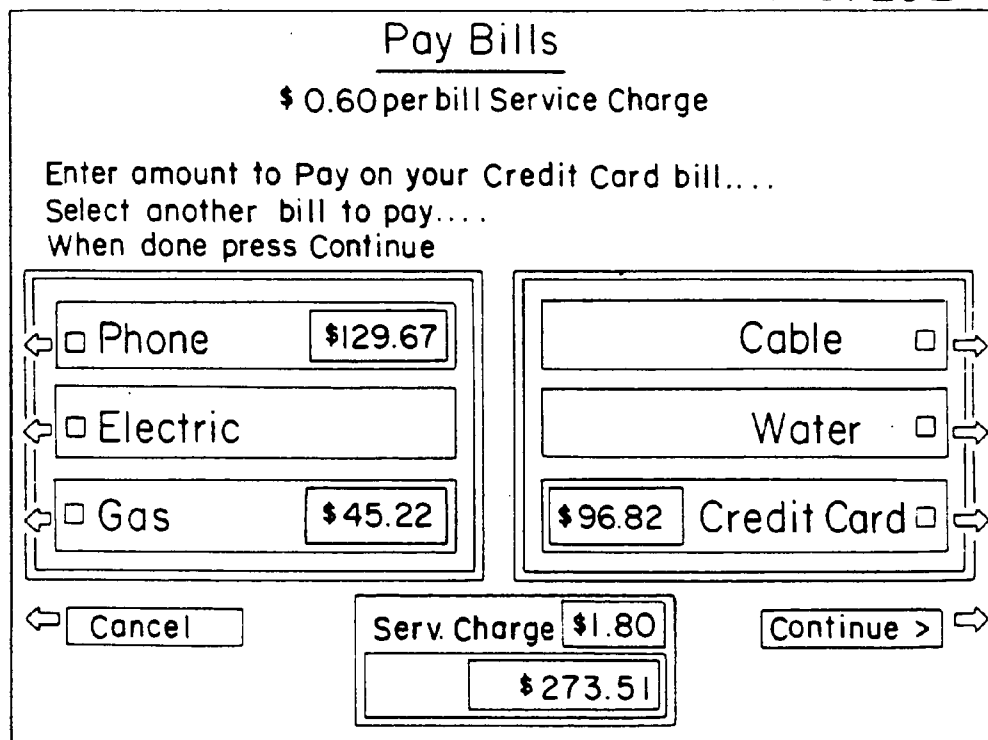


FIG. 20D

FIG. 20E



\$273.51

Please Select a Method of Payment:

⇐ 1. Cash Smart Card .4 ⇐

⇐ 2. Credit Card Back to Bill Payment .9 ⇐

⇐ 3. Withdraw from my Account

⇐ Cancel

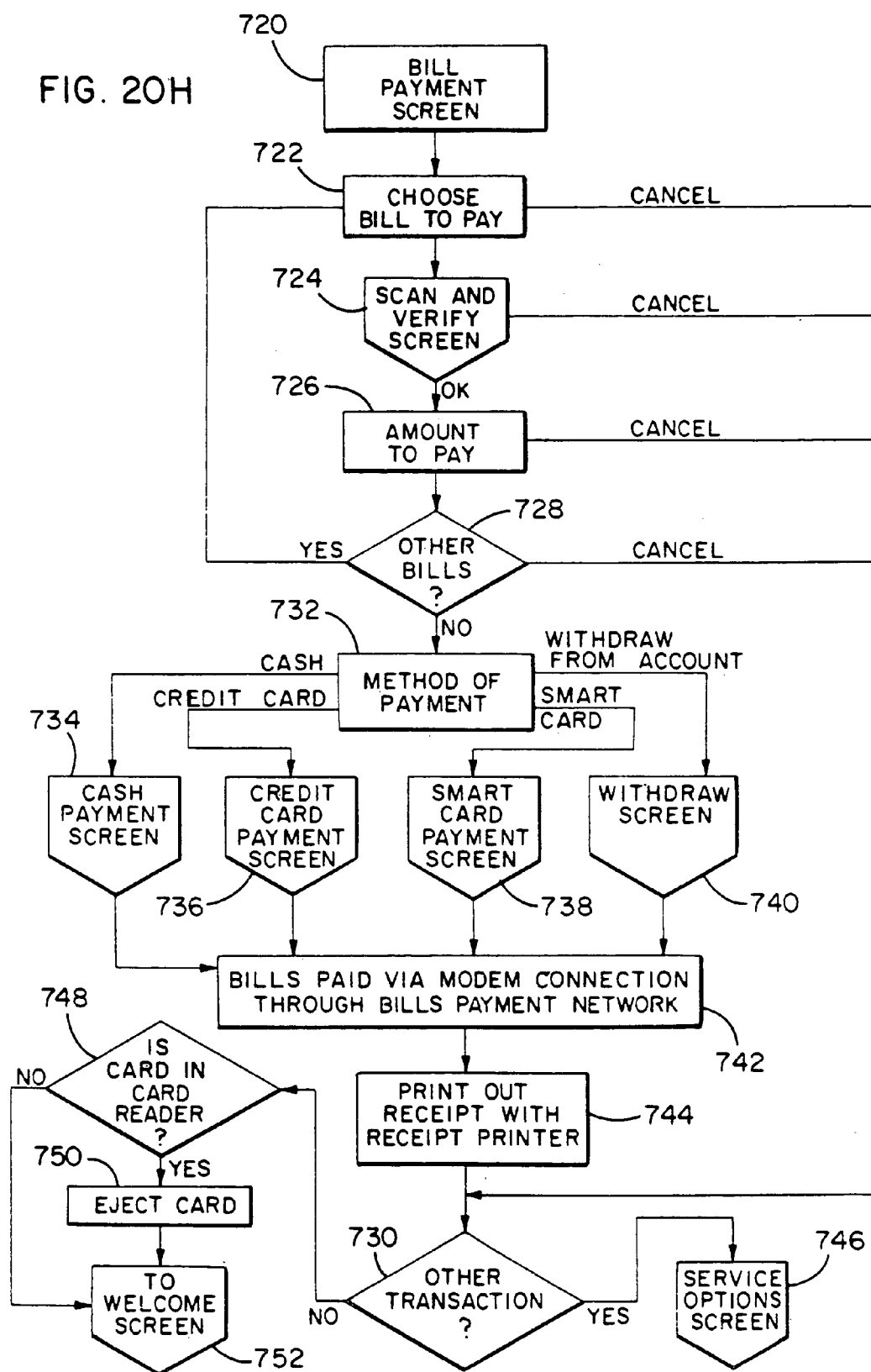
FIG. 20F

FIG. 20G

Please insert Credit Card bill into Scanner  
Slot

⇐ Cancel

FIG. 20H



\$273.51 is withdrawn from your account

Your Bills are Paid  
Please take your receipt  
Thank you....

FIG. 20I

FIG. 20J

☐ Phone  
☐ Electric  
☐ Gas

Cable ☐  
Water ☐  
Credit Card ☐

Cancel

Serv. Charge \$0.00  
Total \$0.00

Continue >

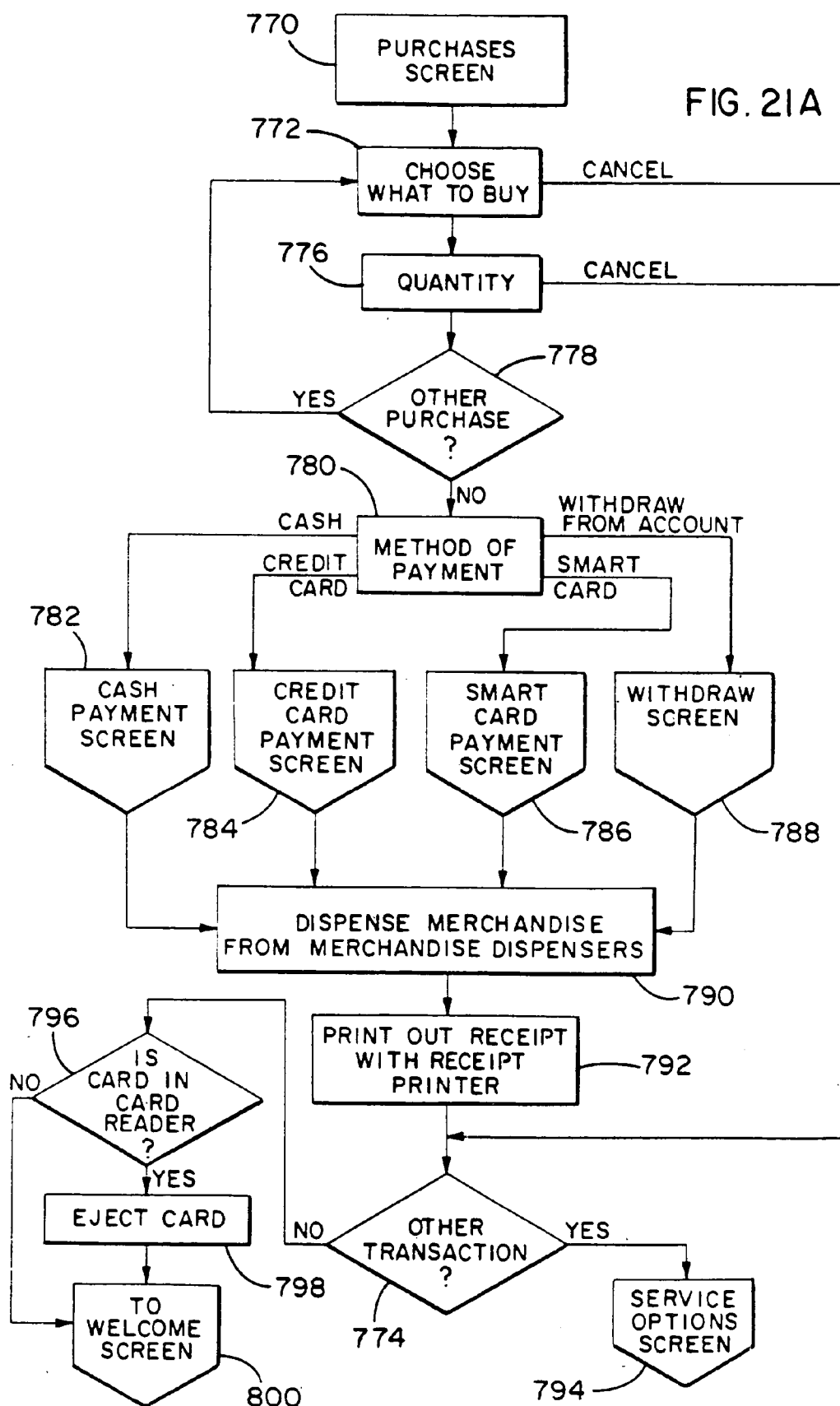
Purchase

Please check items to buy, enter quantity. When done press Continue

|   |                                     |                          |                                                                                                                                 |
|---|-------------------------------------|--------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| ← | <input type="checkbox"/>            | Stamps \$6.50/booklet    |                                                                                                                                 |
| ← | <input type="checkbox"/>            | Smart Card \$5.00/card   |                                                                                                                                 |
| ← | <input checked="" type="checkbox"/> | Phone Cards \$10.00/card | 1                                                                                                                               |
| ← | Cancel                              |                          | <div style="display: flex; justify-content: space-between; align-items: center;"> <div>\$10.00</div> <div>Continue</div> </div> |

FIG. 21



Purchase

Please check items to buy, enter quantity. When done press Continue

|   |                                                              |         |          |
|---|--------------------------------------------------------------|---------|----------|
| ← | <input type="checkbox"/> Stamps \$6.50/booklet               |         |          |
| ← | <input checked="" type="checkbox"/> Smart Card \$5.00/card   | 3       |          |
| ← | <input checked="" type="checkbox"/> Phone Cards \$10.00/card | 1       |          |
| ← | Cancel                                                       | \$25.00 | Continue |

FIG. 21B

FIG. 21C

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <div style="border: 1px solid black; padding: 5px; display: inline-block;">\$25.00</div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |
| <p>Please Select a Method of Payment:</p> <div style="display: flex; justify-content: space-between;"> <span>⇐ 1. Cash</span> <span>Smart Card .4 ⇒</span> </div> <div style="display: flex; justify-content: space-between;"> <span>⇐ 2. Credit Card</span> <span>Back to Purchase .9 ⇒</span> </div> <div style="display: flex; justify-content: space-between;"> <span>⇐ 3. Withdraw from my Account</span> </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <span>⇐ <div style="border: 1px solid black; padding: 2px 10px;">Cancel</div></span> </div> |  |

\$ 25.00

You have inserted \$ 0.00

Please insert your \$\$ bills  
into the bill acceptor slot....

← Cancel

FIG. 21D

FIG. 21E

\$ 25.00

You have inserted \$ 20.00

Please insert your \$\$ bills  
into the bill acceptor slot....

← Cancel

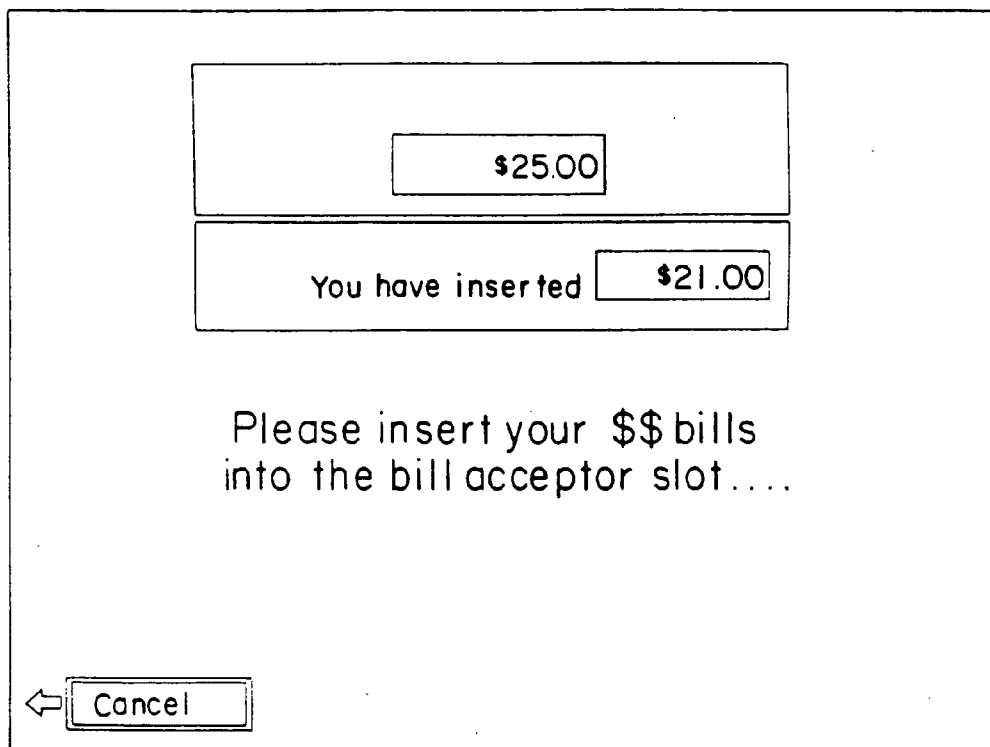
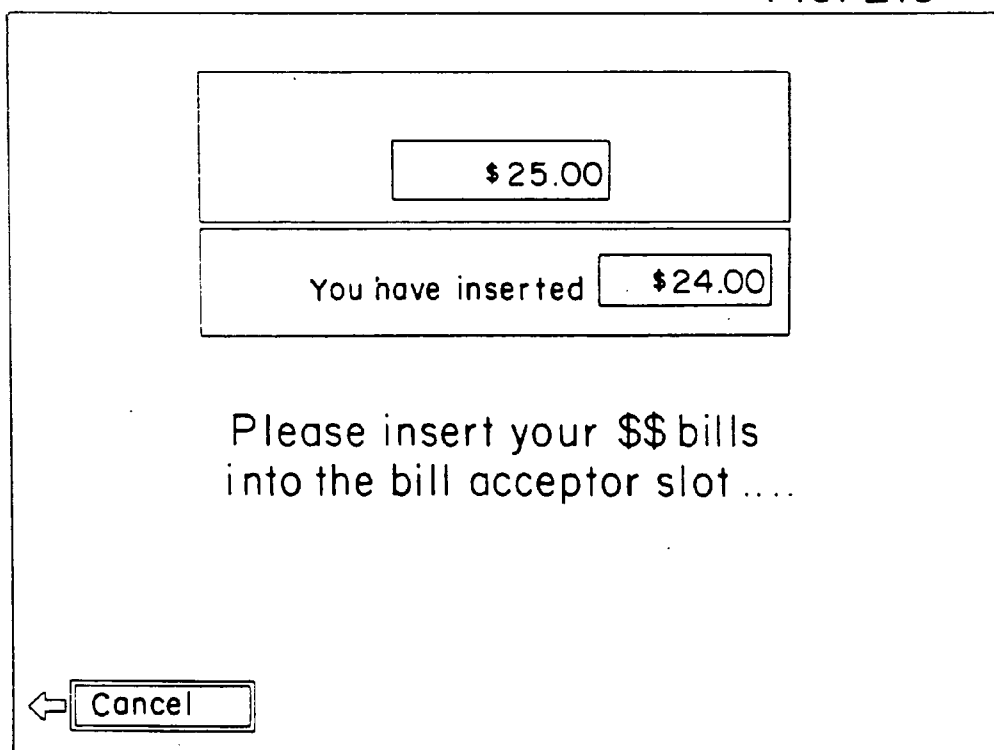


FIG. 21F

FIG. 21G



Please Take Your Merchandise  
Please take your receipt  
Thank you ....

FIG. 21H

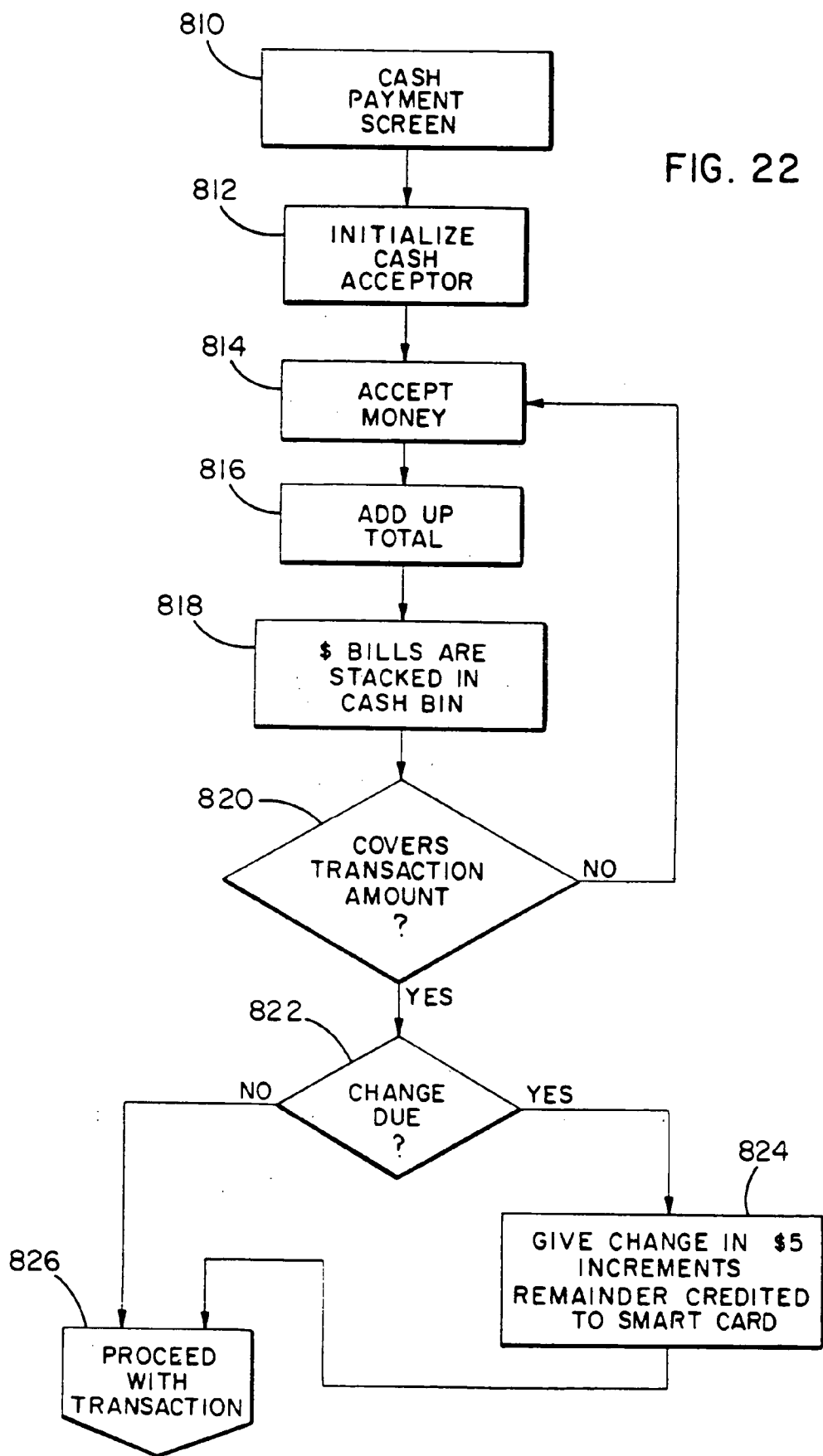
FIG. 21I

Purchase

Please check items to buy, enter quantity. When done press Continue

|                                                   | Total |
|---------------------------------------------------|-------|
| <input type="checkbox"/> Stamps \$6.50/booklet    |       |
| <input type="checkbox"/> Smart Card \$2.50/card   |       |
| <input type="checkbox"/> Phone Cards \$10.00/card |       |

Cancel      Grand Total      \$ 0.00      Continue



Change Due

This machine can dispense CASH only in \$5 increments  
We still owe you \$3.50  
Please choose how you would like to receive that

⇐ 1. Credit To My Smart Card

⇐ 2. Deposit into My Bank Account

⇐ Cancel

FIG. 23

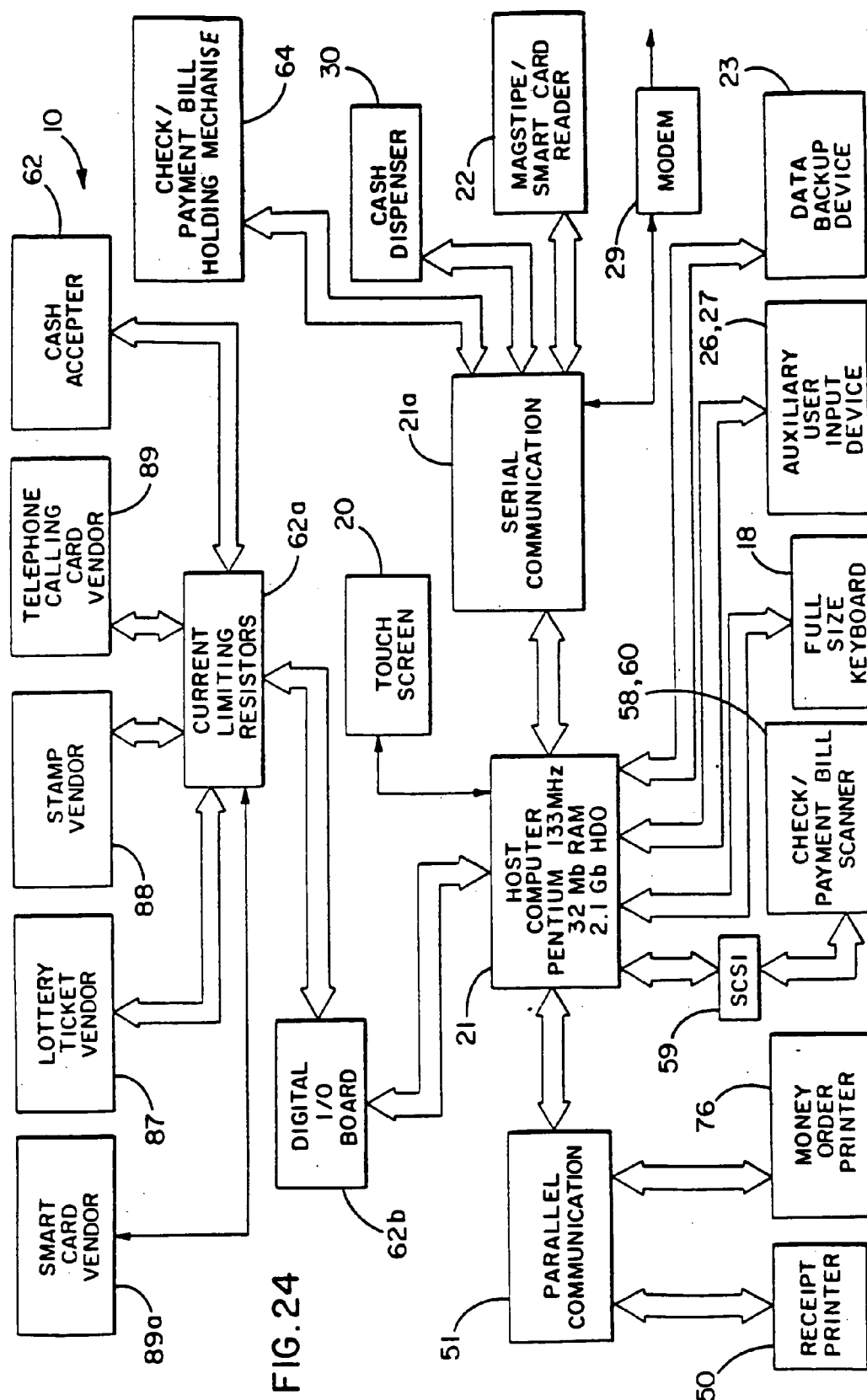


FIG. 24

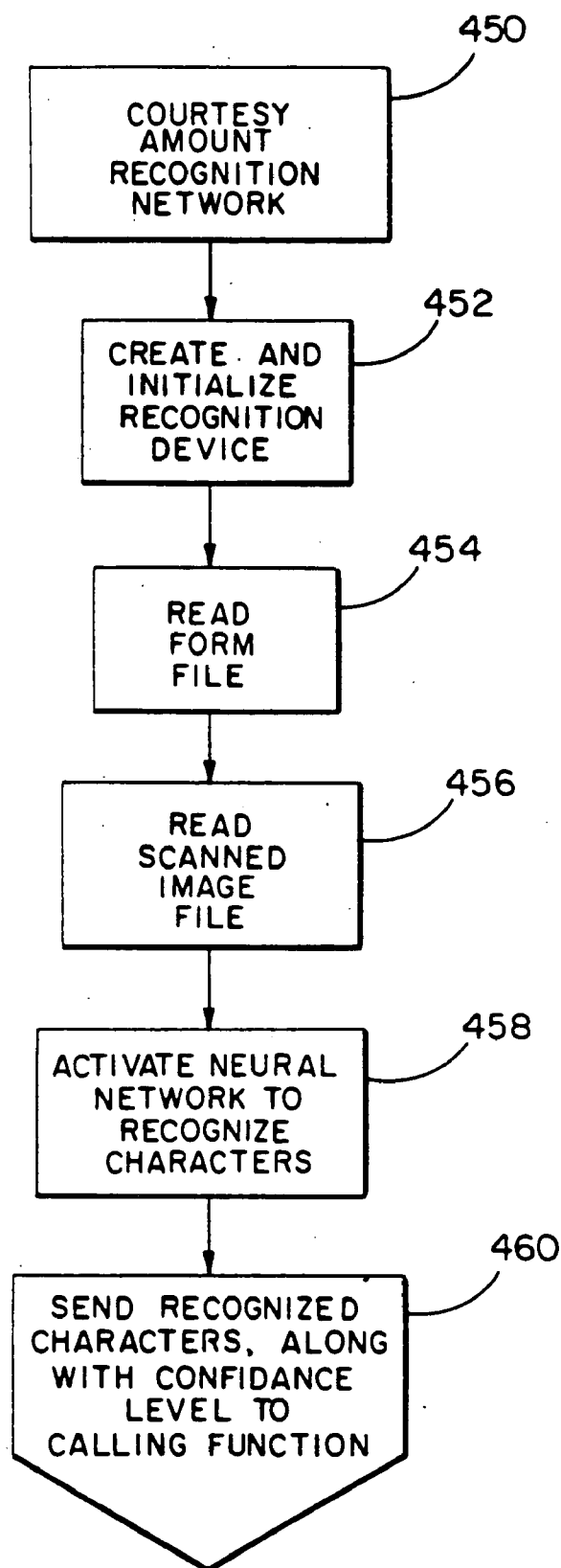


FIG. 25

# CIRS Architecture

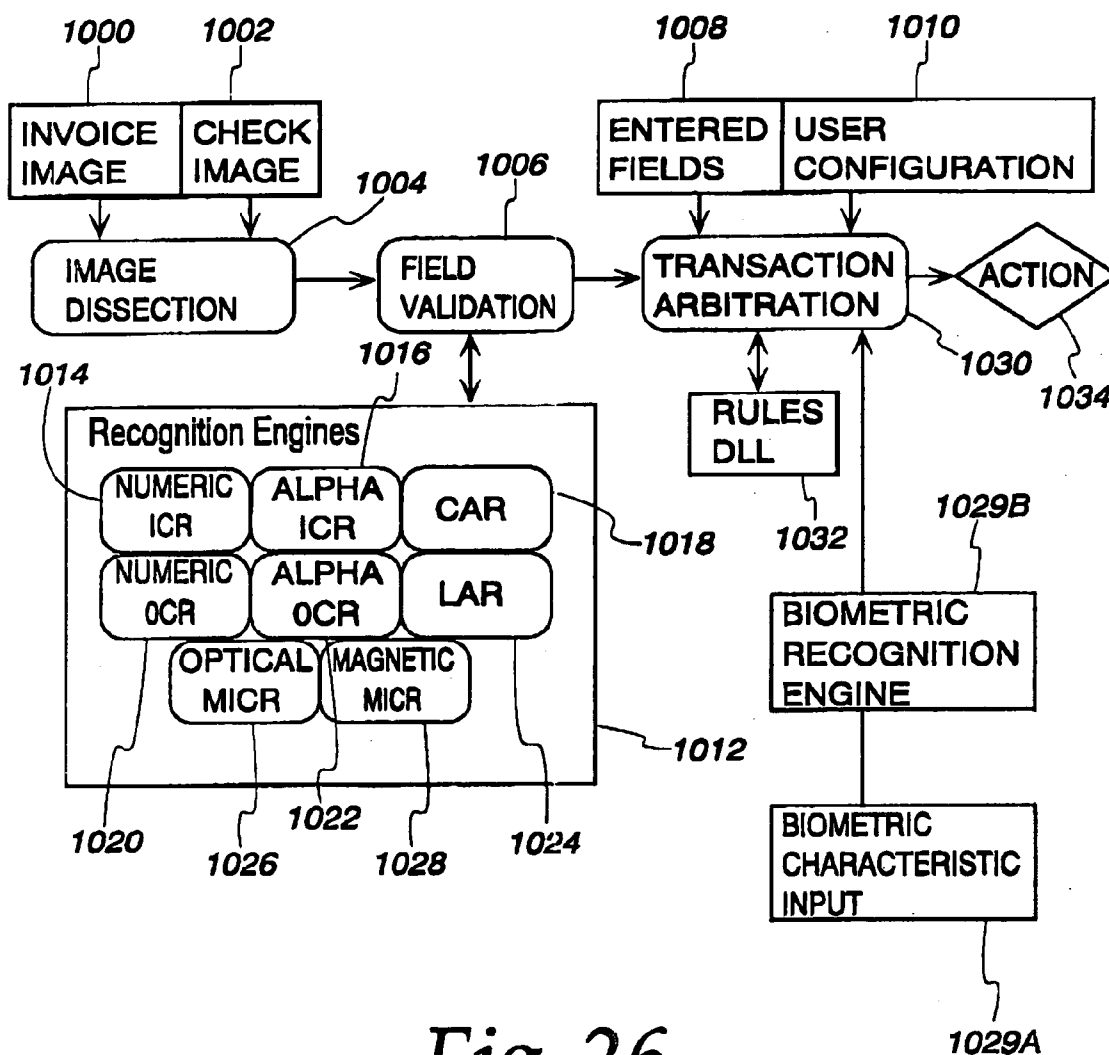
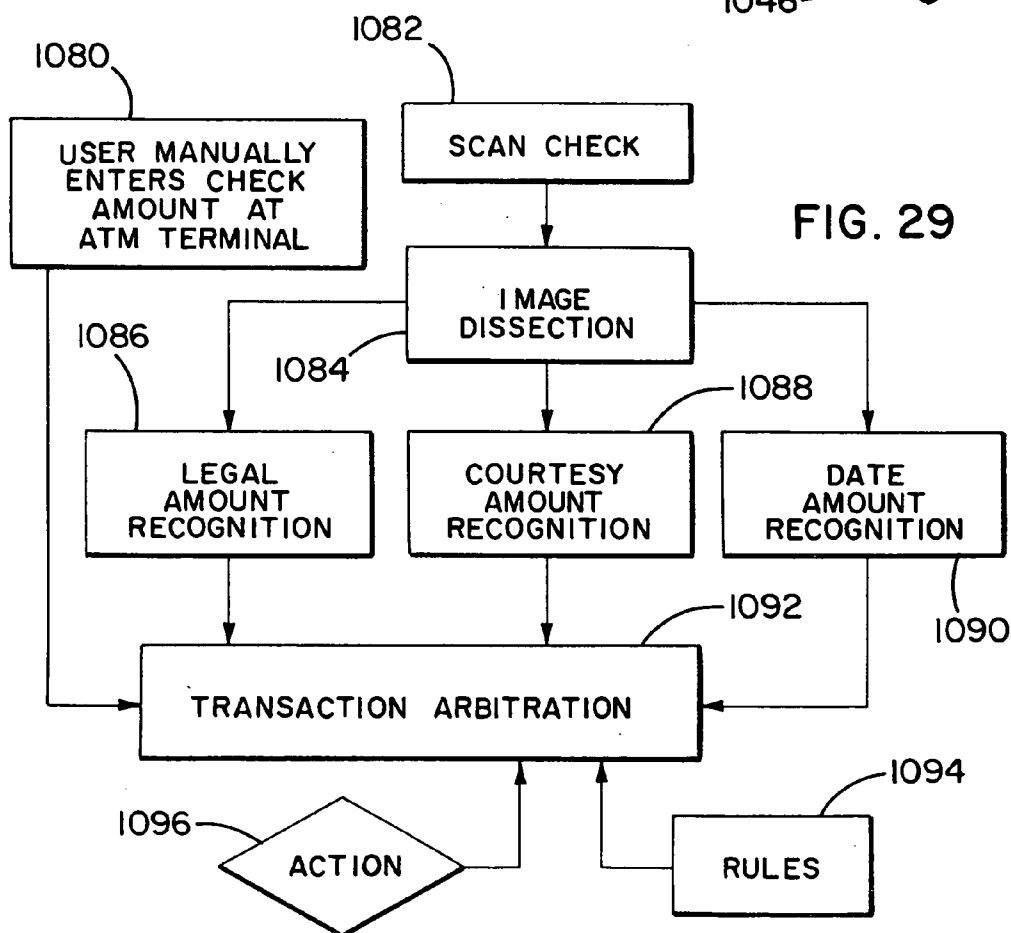
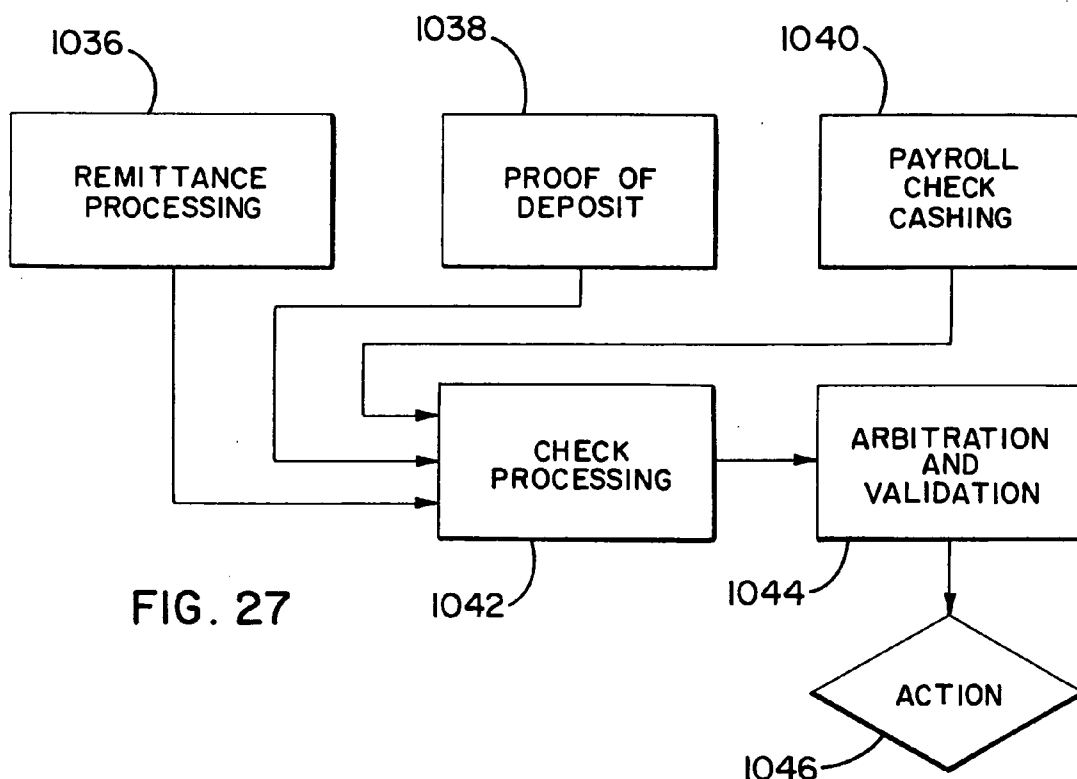


Fig. 26



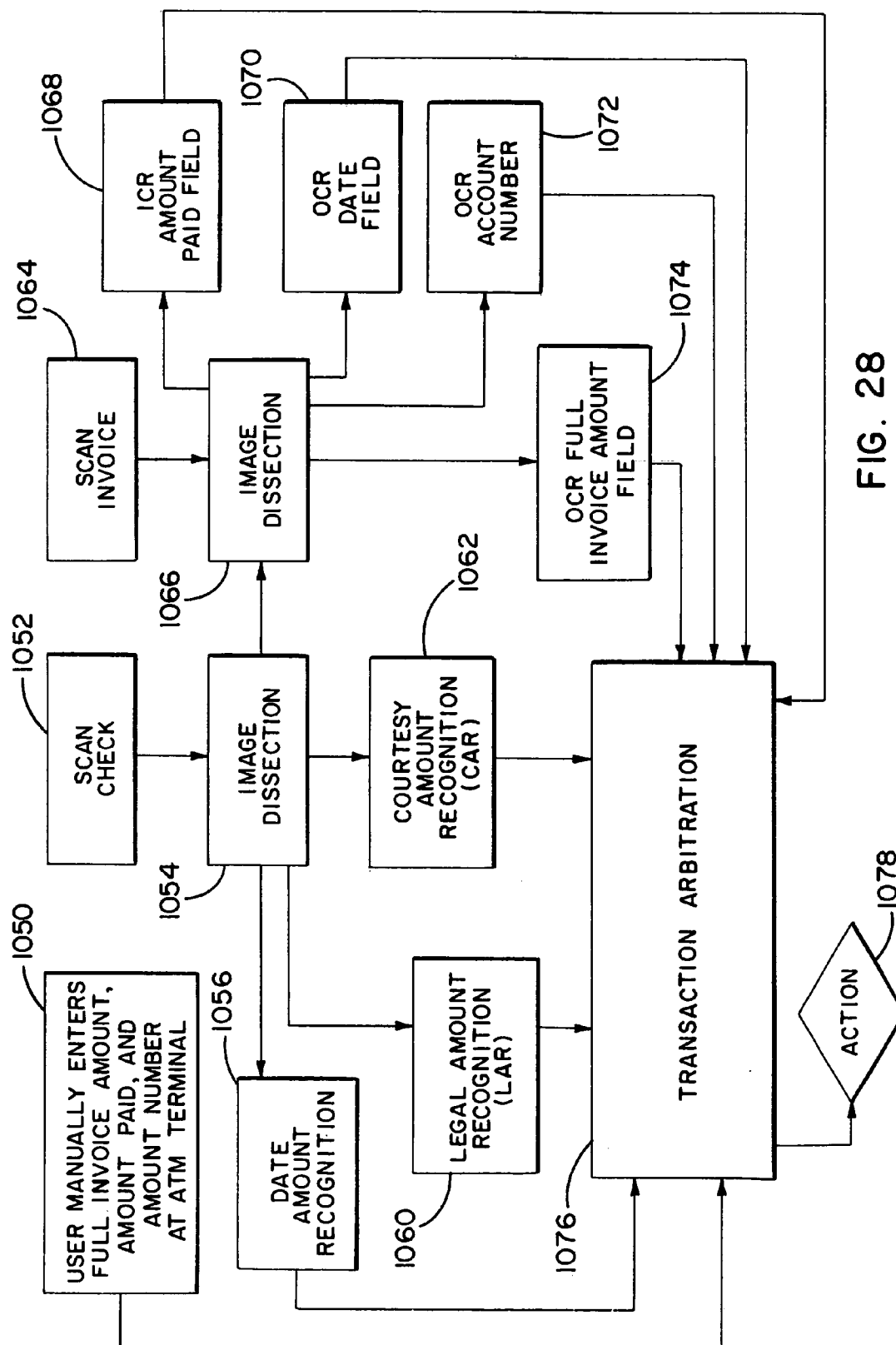


FIG. 28

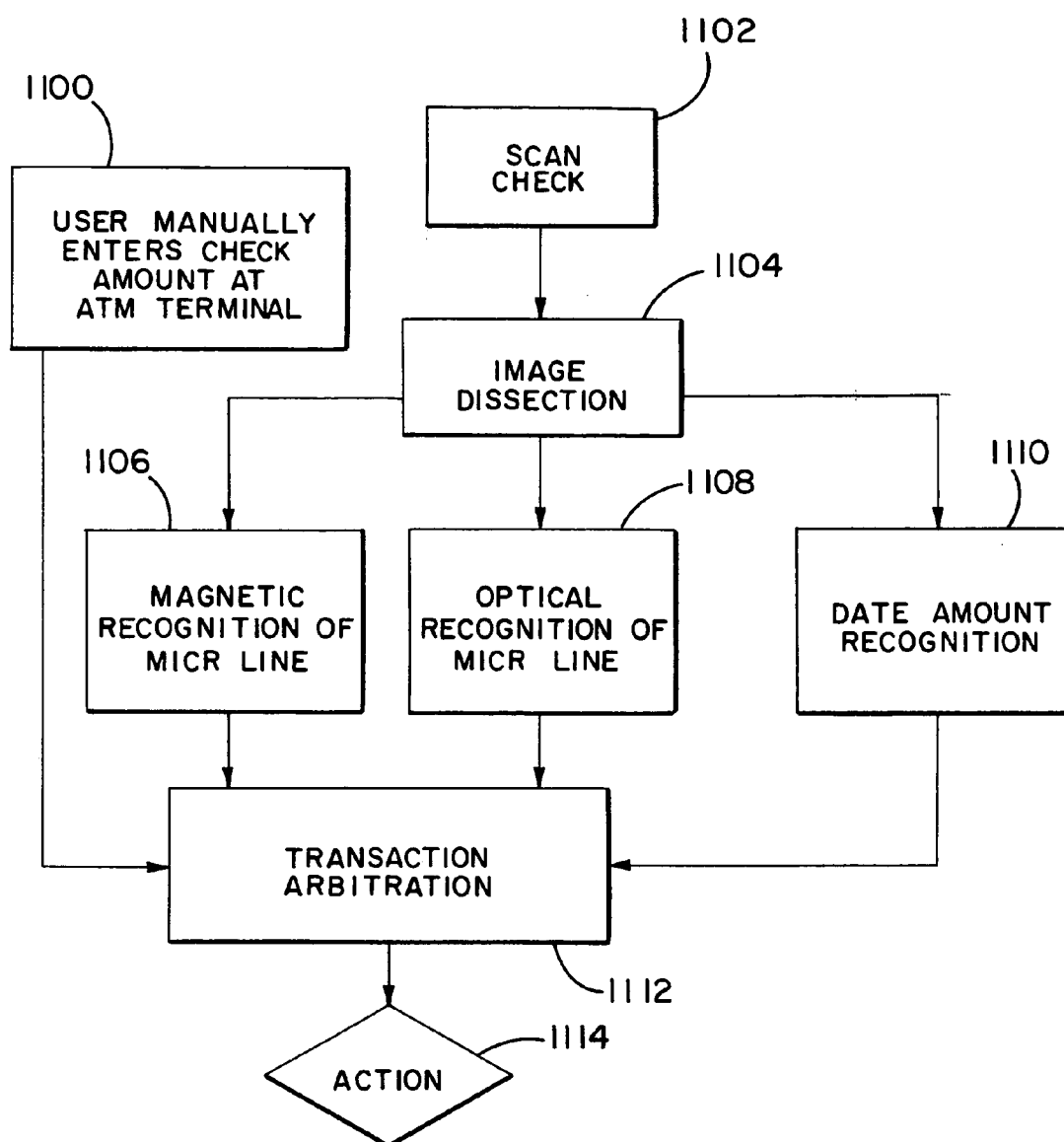


FIG. 30

### Detail of LAR and CAR Arbitration Procedures

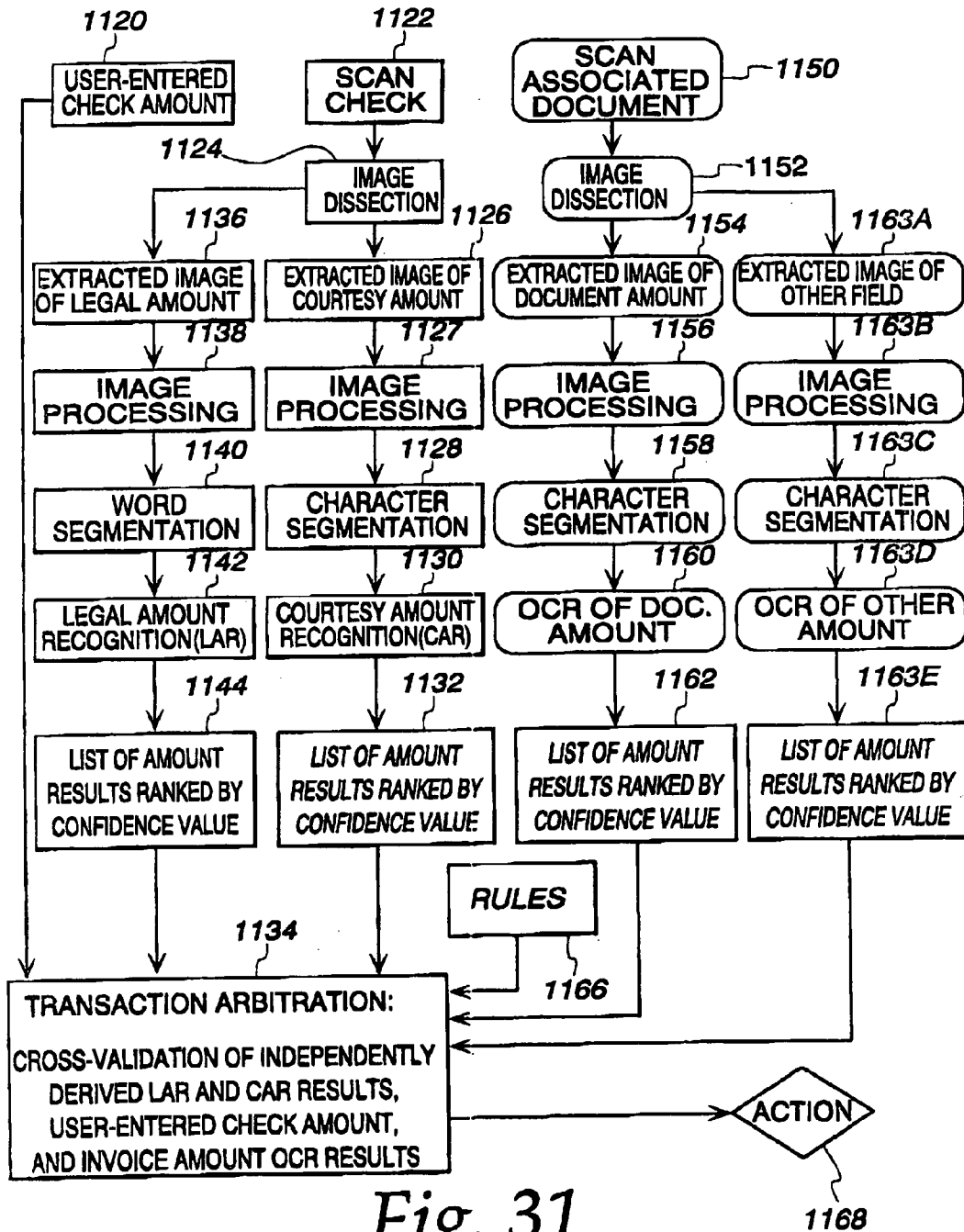


Fig. 31

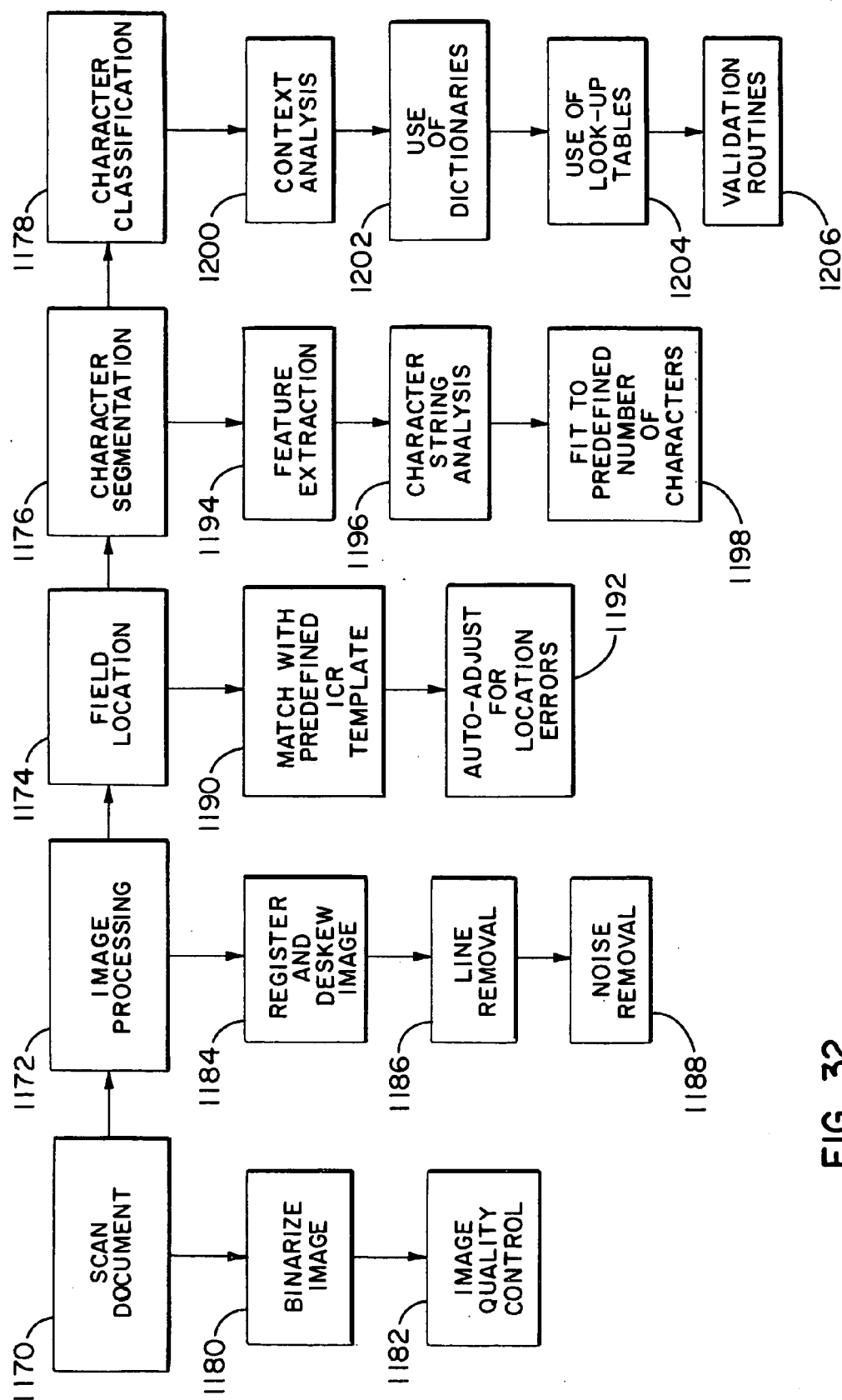
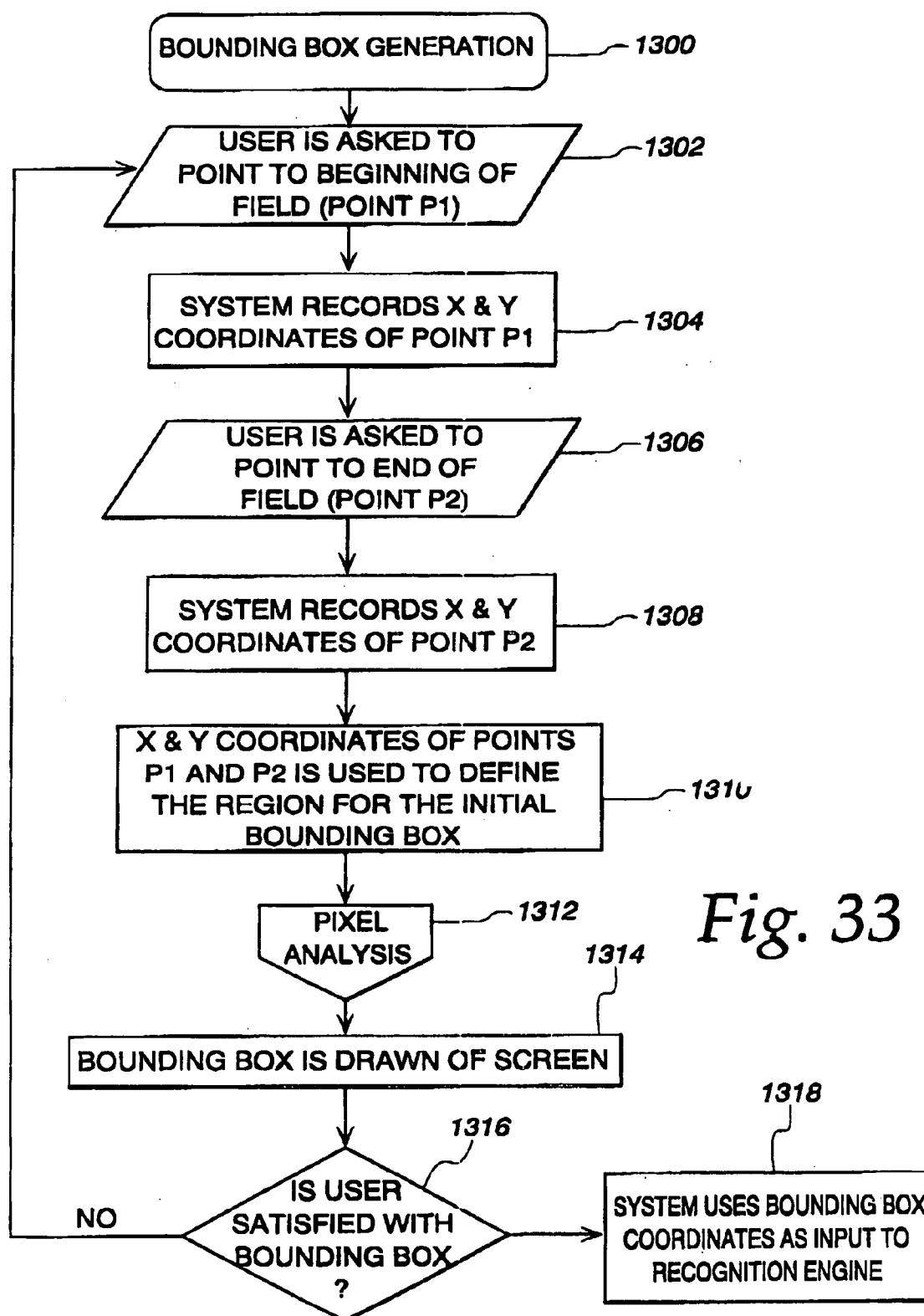


FIG. 32



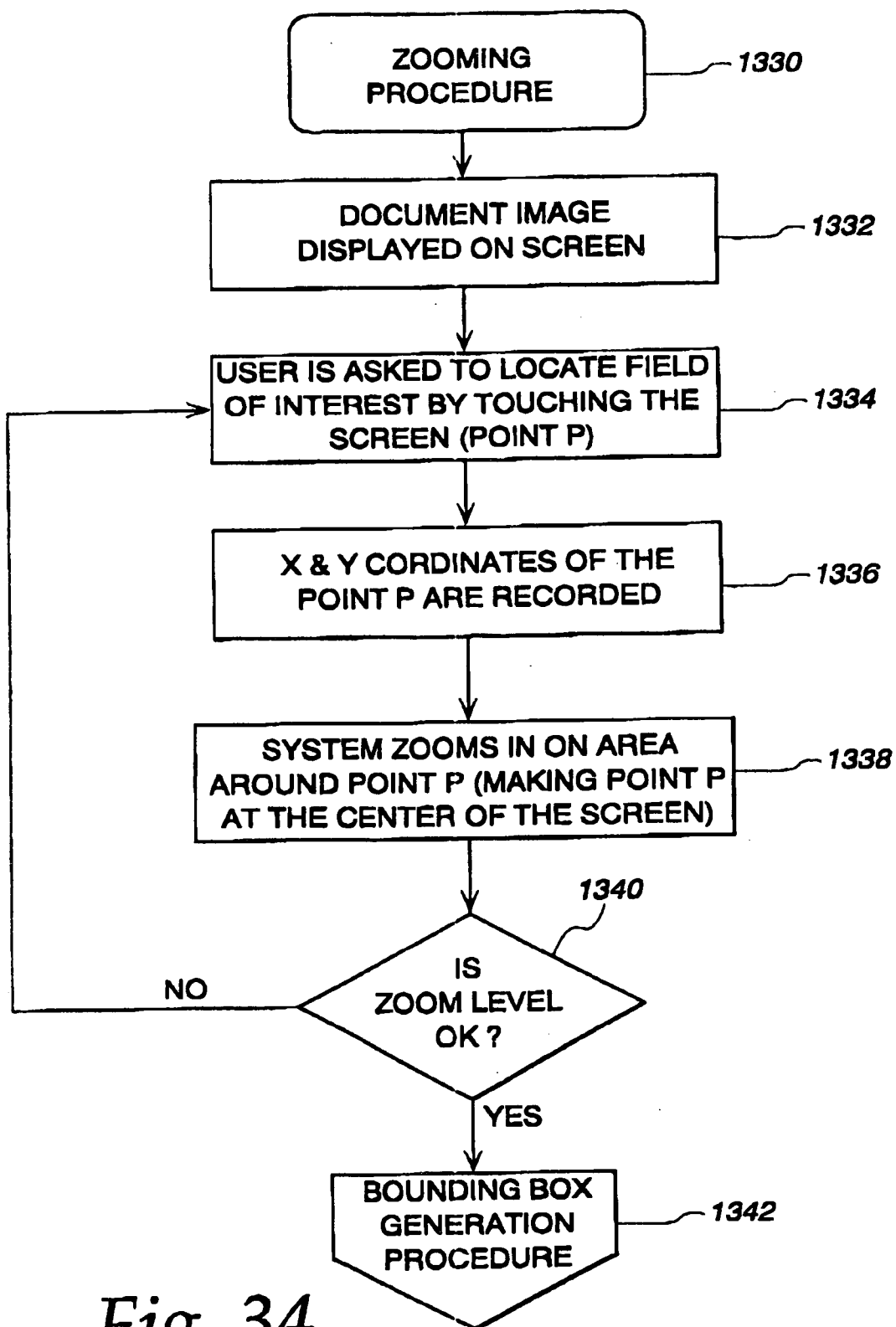
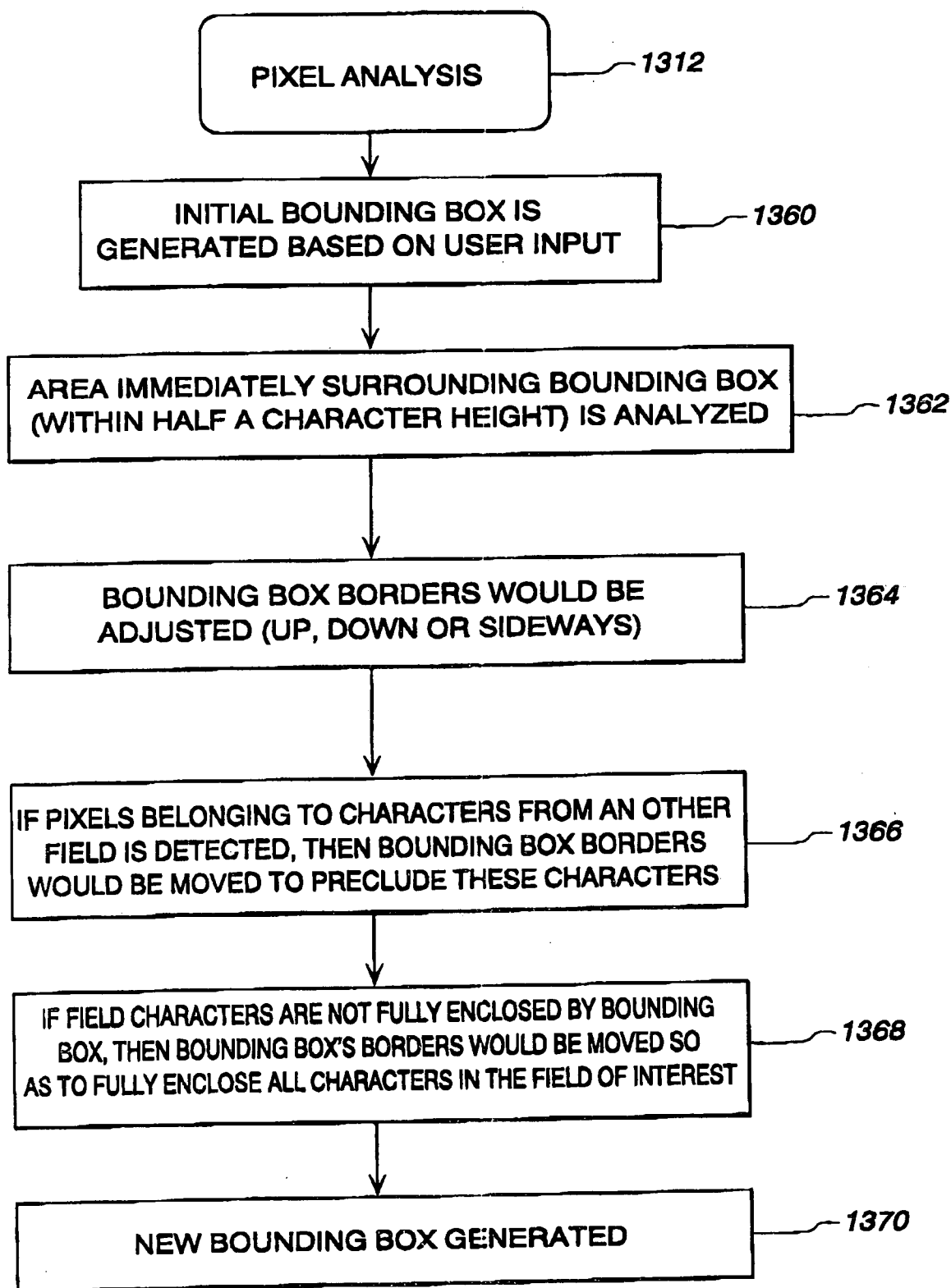


*Fig. 34*

*Fig. 35*

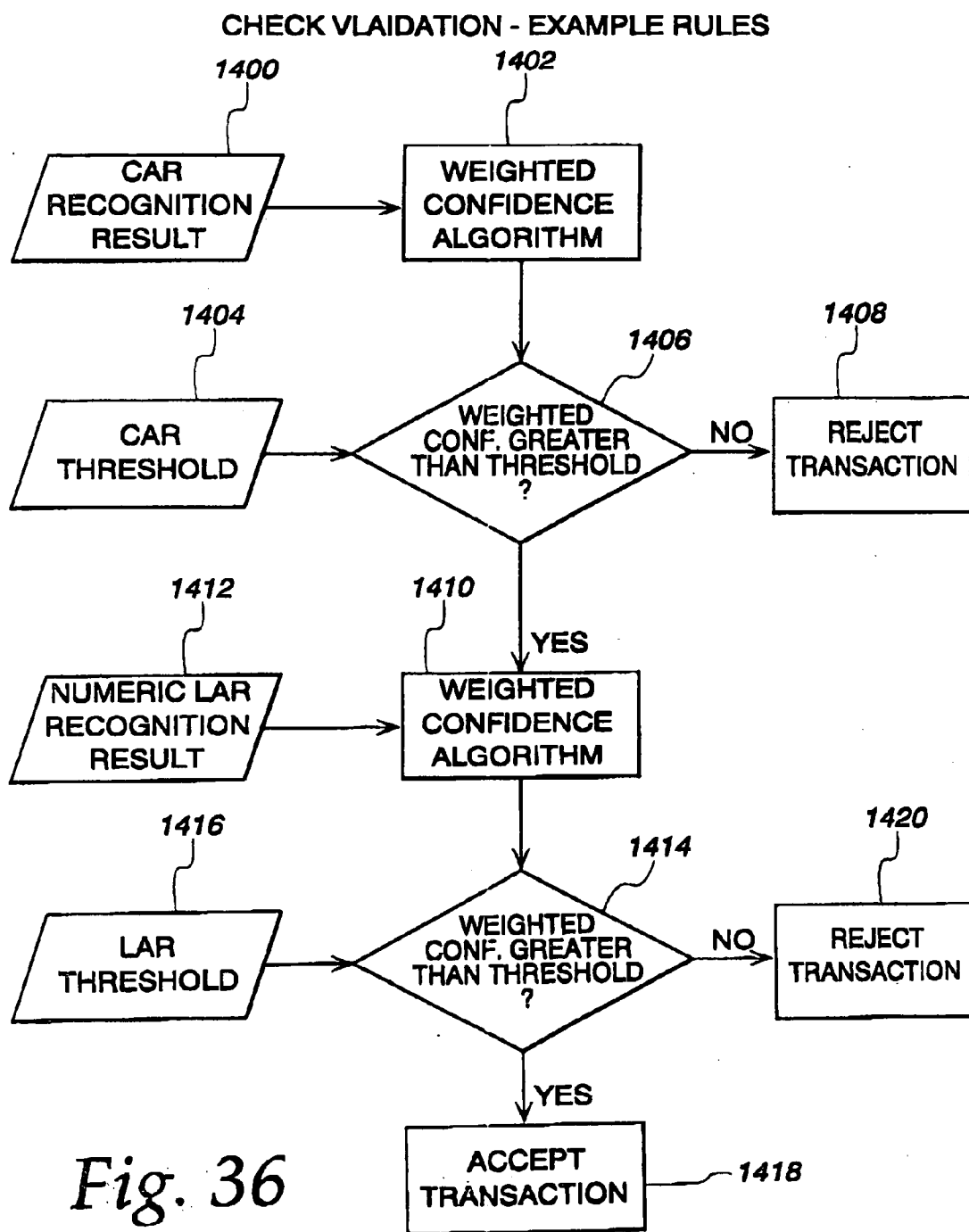


*Fig. 36*

**AUTOMATED DOCUMENT CASHING SYSTEM****CROSS-REFERENCE TO RELATED APPLICATION**

[0001] This is a continuation-in-part of copending U.S. application Ser. No. 08/866,139, filed May 30, 1997.

**BACKGROUND OF THE INVENTION**

[0002] The invention relates to automated banking systems and machines including those which employ or are an improvement over automatic teller machines (ATMs). The invention also relates to providing such ATMs with sufficient security confidence levels with respect to the user, to the document, and to the bank parameters and rules that cash can be securely dispensed to the user as a result of the cashing of payroll or third party remittances or the paying of bills. The confidence levels should be such as would normally be achieved or approach those in comparable transactions with a teller.

[0003] A number of security problems arise with the addition to ATMs of functions performed by full service banks and currency exchanges. Such functions include cashing checks and money orders, paying bills, or handling a cash equivalent transaction, such as making a deposit into a bank account. When the bank is to cover such checks and dispense cash to the user, the bank requires validation of the user identity, validation of the genuineness of the document, validation of the amount(s) set forth on the document, validation of a signature on the document, validation of an endorsement when needed, validation of the bank parameters or rules, etc. To date, ATMs have been unable to provide such validations with a reliability sufficient to cash many documents without the presence of a teller.

[0004] To provide an acceptable confidence level to the bank with respect to user validation prior to dispensing cash, a minimum requirement is the use of an ATM card, smart card, or the like, and a password such as a PIN number. The machine could read these, as in conventional machines. In accordance with the preferred embodiments of the present invention, a biometric check also is provided to assure that the person using the machine is a qualified user. This involves extracting recognition features from the user and preferably biometric features such as voice characteristics or features, facial recognition features, retinal features; fingerprint features, palm features; and/or signature features or the like. The qualified user will have previously provided such features to the bank system where they are stored for comparison to the extracted features of the person using the machine. The results comparison must reach certain confidence levels that can be set and/or adjusted by the bank to its satisfaction. Thus, if provided with confidence threshold levels as to card, password and/or the biometric features, the bank can be reasonably assured that the AIM user is a qualified user.

[0005] With respect to document validation including the amount of document such as the pay amount of the remittance, a number of validation techniques are desired. To assure that the document being cashed is the original and not merely a photocopy of a valid check having a MICR line thereon, the MICR line should be tested to ascertain that a sufficient magnetic field is present at the MICR line position. Another validation that is desired is a reading of the MICR

line contents and communicating to the banking system that a bank number and an account number for the identified bank refer to a real rather than a fictitious bank or account. Additionally, for checks, it is desired to be able to read the CAR amount and the LAR amount and to compare the same to detect whether or not the CAR line has been changed, for example, a "1" has been changed to a "4" or a "7" by merely adding pen strokes to the "1". Other validations can be used and obtained to guard against violation of bank parameters or rules.

[0006] Another significant document validation procedure with respect to checks is a determination that a signature is present. That is, the check is signed at the signature line. Going even further, it would be helpful to establish some acceptable signature confidence level by comparison of the signature against a stored signature of the user in instances where the user is signing a check or endorsing the back of the check. Also, in transactions where the check needs to be endorsed, there should be a validation by the machine that a signature is present at the endorsement line. Also, there may be a step of comparing a signature against a stored signature of the endorser.

[0007] When improper payments are made to the user if the transaction is fraudulent, it is an important security feature to be able to prove that the user had an intent to defraud the bank. Absent such proof of fraudulent intent, the user may escape civil or criminal liability by claiming that such improperly dispensed cash or cash equivalent was a solely due to the fault of the ATM or banking system and not attributable to the user. That is, the user may claim he did not intentionally cause the cash dispensed or dispensed in an amount to be larger than that to which he was entitled and that there was no culpability on his part for the amount of cash dispensed to him.

[0008] The wide variety of checks, money orders and bills presents a still further problem with transactions involving cashing of checks or the like, depositing funds to an account, or paying bills. As to each document, the location of the data fields to be analyzed may be different. Preferably, the ATM machine should be able to process large amount payroll checks, smaller amount personal checks, and bills having a bill pay amount located at various places on the bill.

[0009] Preferably, a cash or cash equivalent dispensing system used without a human teller also is able to meet various bank parameters or rules. Often there is a transaction maximum limit, which may be customized as to the drawer of the check issuer or the payee. The bank may have cash payout limits on a daily or other time basis that should be met with sufficient confidence before dispensing cash. The bank may also have check date rules with respect to processing antedated or post-dated checks that should be satisfied. Finally, the bank may want to set its own thresholds with respect to confidence levels with respect to the identity of the user and validation of document. The system should be able to meet the satisfaction levels desired by the bank, and to be able to adjust such levels for a given transaction, type of transaction, or different validations.

[0010] Another consideration for transactions such as cashing checks, paying bills, or other like things from a remote banking machine is the need to make a record and to leave an audit trail for later manual review, if required, of the transaction.

[0011] Among some of the mechanical problems that have been experienced with the remote ATM-type machines is that of providing change in coins or small bills. Already, over a single weekend, ATMs are being severely taxed often to the point that they are completely emptied of their cash contents. In addition, ATMs do not have change makers. When cashing checks, money orders or returning change from a cash bill payment, the ATM must be able to return to the user the exact amount. If the exact amount is in cash, the addition of a coin change maker and small denomination bill dispenser adds considerable expense and maintenance problems to the machine. This would be necessitated to provide the exact change, including coins, to the user who is cashing a check or performing some other function, such as paying a bill with cash from which change is due. The situation is aggravated when the ATM is performing transactions that include an automatic fee calculation and deduction of the fee because there will usually be change due for any cash payout after the transaction fee deduction.

[0012] Another problem with providing a commercially practical automated banking machine is that of the time needed for the transactions. Preferably, the transactions should be relatively brief and simple so that a minimal number of operator actions, such as touch screen pushes or keystrokes, are required for each transaction. If a particular transaction takes more than a minute or two, the system would probably be too slow to adequately service a line of people waiting to use the machine at a busy time, for instance on a weekend. Also, if the machine is able to process a large number of different types of transactions like those of a full-service bank or a currency exchange, the machine should provide the user a wide range of funds-delivery or payment options so that the payment can be made in cash, by credit card, by smart card, or by withdrawal from a checking or savings account.

[0013] Even if an ATM existed for paying bills or processing checks of various amounts, that ATM might have difficulty in automatically locating, reading or interpreting amount lines such as the CAR or LAR, an invoice account number, the amount of the invoice, the amount to be paid, etc. without assistance from the user. Often the numbers written, typed or printed in such lines are relatively small. They might need to be accurately separated from any other writing or numbers to provide a secure and accurate execution of the desired transaction for the document being read. To this end, there is a need for an efficient system or method to locate, read, and interpret such lines with a manual input from the user.

[0014] There is a need for an automatic banking machine which includes an ATM-like machine that performs and allows a number of service options, such as for example the withdrawing of cash, the deposit of cash, the cashing of a check, the cashing of a money order, the purchase of a money order, the transfer of funds by wire, payment of a bill and purchase of end user items.

#### SUMMARY OF THE INVENTION

[0015] In accordance with the present invention, there is provided an automated banking system including one or more machines which perform the usual ATM functions, but also have such significant security safeguards that they allow the cashing of monetary transaction documents such as

checks or money orders, or handling of cash equivalent transactions such as making a deposit in the bank account of the user, without the aid of a teller. These functions are achieved by having sufficient validation of the identity of the user, validation of document, such as being a signed or endorsed check or the like, validation of the amount to be paid in cash or deposited, and validation of the banking system parameters or rules for the customer and/or transaction.

[0016] With respect to validation of the personal identity of the ATM user, a first, minimal fraud protection procedure is to verify that the ATM card and/or the user, as presented at the machine, is associated with a qualified password or PIN number that, upon entry, validates the user as a qualified user. Preferably, and in accordance with the invention, an additional biometric comparison or recognition function is made between extracted features of the user such as face features, voice features, retina features, fingerprint features, palm features, handwriting features for signature verification, etc. In the present invention, the identity of the user is preferably validated with sufficient levels of confidence that cash will be dispensed if the other validation techniques are also satisfied. The bank will have its own rules with respect to how large a transaction will be permitted for the particular user, particularly with respect to the dispensing of cash to the user.

[0017] In the preferred embodiment of the invention, the validation of the document preferably includes the extraction of data to compare the LAR amount and the CAR amount. In instances where the check to be negotiated includes a magnetic ink character recognition (MICR) line amount for the amount of the check, the MICR line may be read and a comparison of the LAR to the CAR is not needed.

[0018] Additionally, other validation methods for checks may be provided and practiced such as validation that magnetic ink is present on the MICR line and that bank and account numbers are recognized as being valid within the banking system computer system.

[0019] To prove that the user intentionally requested the amount of cash being dispensed, the user must manually enter amounts using a manual entry device at the ATM, e.g., the pay amount of the check, so that user will not be able to contend later that a machine error caused a specific payment to him. A part of the proof of the intentional request yielded by scanning the check and presenting a computer-generated image of the check to the user and prompting the user to enter the payable amount via an entry device.

[0020] A still further validation technique is used in the preferred embodiment of the invention to safeguard the assets of the bank. Banks may have their own set of parameters or rules governing payouts and other transactions that must be validated. For example, validation techniques are used to assure that the amount of cash being paid out is equal or less than the transaction or daily limit for the user and the bank is satisfied with paying out those amounts based on credit history of user.

[0021] In accordance with a further aspect of the invention, the bank will receive a validation that a signature is present at the signature line of the document, such as a check, before performing the requested financial transaction with respect to the check. To this end, the signature line is

located and an analysis is made to an acceptable confidence level that a signature is present at the signature line. If a signature is lacking, the check will be rejected. Preferably, an analysis will be made as to verify the user's signature against stored user signatures to provide an additional security check to provide further confidence to the bank doing the transaction. Machine protection against a skilled forgery is difficult with current technology; nonetheless, unskilled forgeries or ambiguous signatures may still be detected. In instances where a third-party check or money order is to be processed and the ATM user must endorse the instrument, it is preferred to locate the endorsement line and at least validate that an endorsement is present in order to protect the receiving bank and others in the check reconciliation process against certain types of claims. Again, if the user has signatures of record, the endorsement can be compared to the signatures of record and a confidence level validation can be achieved if the transaction is to be completed.

[0022] In the preferred ATM machine, the user manually selects the transaction, for instance from a list of transactions including check cashing, check deposit, bill payment, etc. The user then further operates the machine by inserting the document into the machine to cause a computer generated image to be seen by the user and to allow for analysis of features of the document image reflective of the document's contents. Because of the wide variety of document sizes and the variety of locations of the amount line or lines such as CAR, LAR or bill payment due, it is preferred to prompt the user to locate the coordinates of and/or to bound one or more fields for analysis and validation. These fields may include a date field, a CAR field, a LAR field, an amount field, an account number or MICR line field. If the document fails to meet the threshold validity for any one or more of these bounded fields, further transaction processing is aborted without any cash being dispensed to the user.

[0023] In accordance with a further aspect of the invention, the ATM user is prompted by the display and the display provides a bounding box image. The bounding box can be adjusted by the user who then accepts or rejects with respect to a particular line. The accepted line in the bounding box is machine interpreted by OCR or some other image processing technique or the like. Typically, account numbers for bills and the amount of the bill to be paid are located often arbitrarily at various places. They are difficult to locate and must be precisely delineated from other adjacent typing, printing, letter or cursive to allow the transaction to be accomplished. In a preferred embodiment of the invention, the user is prompted to touch a touch screen display at the desired location, e.g., the account number on an invoice. The user then has the option of "tweaking" or adjusting the bounding box to cover only the desired information.

[0024] The user is prompted to point to the general area of the document image that contains the information, such as an account number or an amount, to be bounded. The identified region would have its image zoomed on the screen. The first zoom step might be 1.8 $\times$  linear magnification with the next step 1.1 $\times$ . The magnification factor would decrease for each additional step to help avoid zoom overshoot. When zooming has been completed, the user would so indicate to the machine and then would be prompted to define the bounding box. This would be done in part by pointing to the beginning and the end of the area of interest. After this first bounding box is generated, a pixel analysis

routine would be executed in the pixels at the bounding box borders. This would help ensure that no stray or extraneous characters were inadvertently included in the bounding box leading possibly to a spurious result from later analysis of the data contents of the bounding box. Finally, the user would indicate her acceptance or rejection of the final bounding box, which might change color for clarity, by appropriate keystrokes or touch screen entries or the like.

[0025] This technique would avoid problems of lack of bounding box resolution due to a user's finger obscuring a feature of interest during box definition. An alternative bounding box technique would require the user to trace her finger around the region of interest thereby enclosing it rather than simply identifying the beginning and the end of the field.

[0026] In order to assist the user the ATM provides prompts to the user and has buttons or touch screen areas that allow the user to switch back to the menu screen to begin again. In the alternative they would allow the user to undo the current screen and go back one screen to make a revision or the like where appropriate.

[0027] When processing a monetary transaction document for routine bill paying, it is preferred to provide a validation of the bill, the user and the monetary transaction document being used to pay the bill or a portion thereof. With a bill-paying transaction, an operative assumption may be made that where no cash or cash equivalent is being paid out to the user, that user lacks an incentive to misrepresent the pay amount on the checks or the like. In the paying of bills, the user will select the bill payment transaction from a list of transactions. The user will be prompted to make one or more manual entries into machine, like the amount of the bill, the amount being paid by the user which should be equal to or less than the check; and the user's account number on the bill. The machine will scan and interpret the user's account number on the bill, the full amount due, and the date field. If the amount being paid is other than the full amount of the bill, a prompt to enter the tendered amount is provided to user on a screen or the like. When the amount of the check or the like from which the funds are derived is greater than the amount being paid, the user may be prompted to have the remainder of the funds paid in cash or loaded into a balance of a debit or a smart card.

[0028] When paying a bill or making a deposit, the amount field of the document is analyzed on the bill or the deposit slip and compared to the amount manually entered by the machine user. This provides one validation procedure. In some instances, when cashing or depositing a document such as a check, the drawer of the check may have indicated the amount of the check at a MICR line. For example, large employers may issue authorized payroll checks for its enrolled employees. Those payroll checks are issued with a MICR line having the amount of the check thereon. In such instances, the MICR amount line may be read and used to validate the document and the amount to be paid without any comparison of CAR and LAR lines, as is the case for checks that lack a MICR amount thereon.

[0029] In accordance with an important aspect of the invention, the check, money order or the like is scanned and an image therefrom is dissected with extracted image information being obtained for several recognition fields. The recognition fields are processed to provide a list of amount

results ranked by confidence values. The user-entered amount and these confidence values are provided to a processor for transaction arbitration involving cross-validation according to rules. If there is validation of the arbitration using the rules, the transaction is then taken, such as cashing a check, paying a bill, or making a deposit. The usual recognition fields for a check are the LAR and CAR. When a remittance document is also provided to the ATM machine for paying a bill or the like, the remittance document is scanned and its image dissected with one recognition making a deposit field being the amount for the remittance. A list of amount results are ranked by confidence levels and they are provided to the processor for transaction arbitration under the rules. The remittance amount is cross-validated with the check amount results in the transaction arbitration; and, upon validation, the remittance transaction action then proceeds to completion.

#### BRIEF DESCRIPTION OF THE DRAWINGS

- [0030] **FIG. 1** is a front view of an apparatus embodying the invention including a left section, a central section, and a right section;
- [0031] **FIG. 2** is a top plan view of the three sections of the machine shown in **FIG. 1**;
- [0032] **FIGS. 2A and 2B** are views of an imaging station for scanning a document;
- [0033] **FIG. 3** is a left side view of one section of the apparatus shown in **FIG. 1**;
- [0034] **FIG. 4** is a right side view of the central section of the apparatus of **FIG. 1**;
- [0035] **FIG. 5** is a right side view of the right section shown in **FIG. 1**;
- [0036] **FIG. 6** is a enlarged view of the front of the apparatus of **FIG. 1** showing the various insertion slots or receiving slots on the apparatus of **FIG. 1** with identifying indicia thereon;
- [0037] **FIG. 7** is a rear view of the machine shown in **FIG. 1**;
- [0038] **FIG. 8** is a flow chart for showing the operations occurring after insertion of the card and for verification;
- [0039] **FIG. 8A** shows the screen with the instruction to PLEASE INSERT YOUR CARD;
- [0040] **FIG. 8B** shows a screen prompting entry of a user's password;
- [0041] **FIG. 8C** shows the progression of the password verification operation;
- [0042] **FIG. 8D** shows the screen when an incorrect password has been entered;
- [0043] **FIG. 8E** shows that the password is not correct and that the card is being retained;
- [0044] **FIG. 8F** shows a screen display prompting the user to make a touch screen selection of the language in which the transactions are to be processed;
- [0045] **FIG. 9** shows on the screen the money exchange or transactions options available for the user;
- [0046] **FIG. 9A** is a flow chart which shows the initial welcoming and the various options available to the user;
- [0047] **FIG. 10** is a screen prompting a checking or savings step as part of a transaction;
- [0048] **FIG. 11** is a screen showing different amounts for withdrawal from checking;
- [0049] **FIG. 11A** is a flow chart showing the operations for a withdrawal transaction;
- [0050] **FIG. 12** is a view showing the screen of having an amount prompt for a withdrawing from saving transaction;
- [0051] **FIG. 13** is a flow chart with respect to making a deposit;
- [0052] **FIG. 13A** is a screen showing the prompt for the source of a deposit into checking;
- [0053] **FIG. 13B** shows a screen providing for entry of the amount of a check to be deposited;
- [0054] **FIG. 13C** is a screen showing a prompt to endorse or sign the back of the check;
- [0055] **FIG. 13D** shows the screen with a message of showing progress in confirming;
- [0056] **FIG. 13E** shows a screen prompting the user to take a transaction receipt;
- [0057] **FIG. 13F** is a screen with respect to a transaction for a deposit into saving;
- [0058] **FIG. 13G** is a screen requesting the amount of cash to be deposited;
- [0059] **FIG. 13H** is a flow chart showing machine operations with respect to a cash deposit;
- [0060] **FIG. 13I** is a screen showing the amount of cash deposited;
- [0061] **FIG. 13J** shows a request to deposit the cash into the cash acceptor slot;
- [0062] **FIG. 13K** shows a machine verification of completion of the cash deposit;
- [0063] **FIG. 14** is a flow chart with respect to the document scanning and verification operations;
- [0064] **FIG. 15A** is a screen that shows an inquiry to the user requesting a decision as to making a further transaction;
- [0065] **FIG. 15B** is a screen display of a touch screen version of the screen display shown in **FIG. 15A**;
- [0066] **FIG. 16** is a view of the cashing check screen;
- [0067] **FIG. 16A** is a flow chart showing the operations with respect to cashing a check;
- [0068] **FIG. 16B** shows a screen for requesting the manual entry of the amount of the check to be cashed;
- [0069] **FIG. 16C** requests the signing of the back of the check;
- [0070] **FIG. 16D** is a screen showing a request to re-insert the inverted check;
- [0071] **FIG. 16DD** is a screen requesting the user to re-enter the check amount;

[0072] FIG. 16E shows a bar graph of the progress with respect to the reading of the check;

[0073] FIG. 16F shows a check cashing and the amount that is available to be received in cash;

[0074] FIG. 16G shows the completion of the check cashing and the receipt for the amount deposited to the user's account;

[0075] FIG. 16H is a touch screen display version of the screen shown in FIG. 16B;

[0076] FIG. 17 is a flow chart showing the operations with respect to cashing a money order;

[0077] FIG. 17A is a screen shown to the user when cashing a money order;

[0078] FIG. 17B requests the signing of the back of the money order;

[0079] FIG. 17C states that the money order cannot be cashed;

[0080] FIG. 18 shows the screen used when typing in the name of the payee with respect to a money order being purchased;

[0081] FIG. 18A shows the amount of the money order being purchased;

[0082] FIG. 18B is a flow chart showing the various operations being performed when buying a money order;

[0083] FIGS. 18C and 18D show the method of payment and the total transaction at the screen that the money order is being printed and the request to the user to take her receipt;

[0084] FIG. 19 is a screen display for wiring money;

[0085] FIG. 19A shows the account to which the money is to be wired and the name of the bank having the account;

[0086] FIG. 19B shows and requests the entry of the Federal routing code;

[0087] FIG. 19C shows the account number being added;

[0088] FIG. 19D shows a screen requesting the amount and shows a service charge;

[0089] FIG. 19E is a flow chart showing the operations for a wire transfer;

[0090] FIG. 19F shows the total of the transaction and requests a selection of the method of payment;

[0091] FIG. 20 is a screen showing a number of bills that can be paid through the apparatus;

[0092] FIG. 20A shows a telephone bill, service charge and total amount to be charged for payment of the telephone bill;

[0093] FIG. 20B shows a screen requesting entry of the telephone bill into the scanner slot;

[0094] FIG. 20C shows the selection of a gas bill for payment as well as a telephone bill;

[0095] FIG. 20D requests insertion of the gas bill into the scanner slot;

[0096] FIG. 20E shows the payment for a credit card bill;

[0097] FIG. 20F shows the amount of payment with respect to the telephone, gas and credit card bills; and the request for the method of payment;

[0098] FIG. 20G shows the screen when the bill is to be paid by credit card;

[0099] FIG. 20H is a flow chart showing the operations that occur during a bill payment;

[0100] FIG. 20I shows a screen confirming payment of the bills;

[0101] FIG. 20J is a touch screen display version of the screen shown in FIG. 20;

[0102] FIG. 21 shows a screen for purchase of items such as stamps, smart cards or telephone cards;

[0103] FIG. 21A is a flow chart showing the various operations that occur during the purchasing transaction;

[0104] FIG. 21B shows a screen displaying request for a purchase of three smart cards and one telephone card;

[0105] FIG. 21C shows the total transaction and requests a selection of the method of payment;

[0106] FIG. 21D shows a screen showing a \$25.00 transaction and showing how much has been inserted to pay for the transaction;

[0107] FIG. 21E shows that \$20.00 has been paid;

[0108] FIG. 21F shows that \$21.00 has been paid;

[0109] FIG. 21G shows that \$24.00 has been paid;

[0110] FIG. 21H shows that the total of \$25.00 has been paid and shows a message on the screen to take the merchandise;

[0111] FIG. 21I is a touch screen display version of the screen shown in FIG. 21;

[0112] FIG. 22 is a flow chart showing the various operations with respect to cash payment;

[0113] FIG. 23 shows the payment of change either by credit to a card or by a deposit into a bank account;

[0114] FIG. 24 is a block diagram of the apparatus shown in FIG. 1;

[0115] FIG. 25 is a flow chart of a signature verification and character recognition process;

[0116] FIG. 26 is a flow diagram showing details of the overall operation of the processor for generalized document handling;

[0117] FIG. 27 is a flow diagram showing generalized flows for various types of document processing involving checks;

[0118] FIG. 28 is a generalized flow diagram showing steps related to processor operation related to remittance processing or bill payment;

[0119] FIG. 29 is a generalized flow diagram for depositing a check;

[0120] FIG. 30 is a generalized flow diagram for the processor when cashing a payroll check;

[0121] FIG. 31 is a generalized flow diagram for character amount recognition (CAR) and legal amount recognition (LAR) for an instrument being processed; and

[0122] FIG. 32 provides details of processor operation for image character recognition of the type including CAR and LAR;

[0123] FIG. 33 is a flow diagram for generating a bounding box;

[0124] FIG. 34 is a flow diagram for zooming an image in the bounding box;

[0125] FIG. 35 is a flow diagram for the bounding box; and

[0126] FIG. 36 is a generalized flow diagram for check validation using rules.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0127] As shown in the drawings for purposes of illustration, the invention is embodied in an automated banking system that includes an apparatus 10 having a housing 12 for housing the components of the apparatus 10 which are to receive an ATM card which can be inserted through an insert, slot or opening 14 in a front wall 16 of the housing 12. The insert slot 14 will accept the usual ATM card, credit cards, IC cards or smart cards. The card slot 14 is located immediately above an alphanumeric user keyboard 18 and below a user display 20 comprising a touch screen of the type sold by Dyna-Pro under its Model No. DTFP 95633. The user keyboard 18 supplies command signals to a microcomputer 21, in this embodiment a 133 MHz Pentium-based personal computer having a 2.1 gigabyte hard disk drive for storing software, a 32 megabyte random access memory for storing instructions and operands, a 133 MHz Pentium microprocessor, an ISA bus, a PCI bus, a serial interface, and a parallel interface. (FIG. 3). The microcomputer 21 executes application software under Windows 95, which among other things, responds to keystrokes on the user keyboard 18, and signals from other input devices as set forth below. The microcomputer 21 drives the output display 20 in response to the software it is executing and the various signals it receives from the input devices connected to transfer signals to it.

[0128] Located immediately behind the insert card slot 14 is a magnetic card reader 22 (FIG. 4) which will read the ATM card, send signals to the microcomputer 21 through a serial communication card 21a, and immediately cause initialization, via the microcomputer 21, of all hardware and software parameters for an operation. The touch screen 20 is provided to assist the user in identifying for the machine the area of the image occupied by the account number and dollar amount of a bill, as will be explained. The illustrated keyboard 18 is a very tough, vandal-resistant, alphanumeric industrial keyboard, such as the Model 300 manufactured by Everswitch USA of Silver Springs, Md. The preferred display 20 is a flat LCD display panel sold by Sony Corporation. The keyboard and display panels are selected because they are considered to be tough, strong, easy-to-use, and difficult for thieves or criminals to vandalize or to misuse to illicitly obtain funds from the machine. A backup storage device 23 connected to the computer 21 provides further security for the software and data stored on the hard drive.

[0129] As shown in connection with the flow chart of FIG. 8 entitled "insert card and verify screen", the user will see on the screen display 20 the welcome message and a prompt to insert the banking (or ATM) card and to verify a user password with the banking network. The user will be prompted to select English or Spanish as the language for the transactions as shown in FIG. 8F. The user will then touch the screen display to select English or Spanish for the transaction language.

[0130] In a card insert routine 300 a test is made in a step 302 to determine whether the magnetic-striped identification card has been placed in the card reader 22. If it has not, control is transferred to a step 304 prompting the user to insert the card through the card slot 14. The card is then read in a step 306 and the user is prompted and enters a password in a step 308. A test is made in a step 310 to determine whether the password is verifiable by the banking network when communicated over a modem 29. If the password is not, a test is made in a step 312 allowing the password to be entered three more times. Assuming three unsuccessful tries in a step 314, an incorrect password message is displayed and process loops back to the step 308. If the password is found to be correct after step 310 the transaction is proceeded with in a step 316. If as a result of step 308 the transaction is cancelled, control is transferred to a step 320 testing for whether another transaction has been requested. This may be done by screen prompts to be answered by the user as exemplified by the screen displays shown in FIGS. 15A and 15B. The selection may be made by keypads 26 and 27, as shown in FIG. 15A or by touch screen contact with the appropriately labelled portion of the screen display shown in FIG. 15B. If it is, a service option screen 322 is displayed. If it is not, a test is made in a step 324 to determine whether the card is in the card reader 22. If the card reader 22 does not have a card in it the welcome screen is displayed in a step 326. If the card is in the card reader 22 it is ejected back to the customer in a step 328. In the event that the password is entered more than three times control is transferred to a step 330 causing the card to be eaten or retained and placed in a card bin. In a step 332 the message is displayed on the touch screen that the card has been retained and the touch screen after that displays the welcome screen in the step 326.

[0131] The display shown in FIG. 8A prompts the user to insert the card. After the insertion of the card, the display will prompt the user to please enter the PIN or password number, as shown in FIG. 8B. The processing of the entered password is shown in FIG. 8C. If an incorrect password has been used with the card, then the screen display will display, as shown in FIG. 8D, the phrase "incorrect password", and prompt the user to "please try again". If the subsequent or second password is incorrect, the machine retains the card and the screen display will show on its face, as shown in FIG. 8E, the statement that there still is an incorrect password, and that the card is being retained. The card has been "eaten" by the machine. The card can be retrieved only by contacting the financial institution owning the machine. Having verified the card and having verified the password or PIN number with the banking network over the modem 29 or the like, the machine 10 is ready to proceed with a transaction. The modem 29 communicates with the computer 21 through the serial interface 21a to which it is connected.

[0132] The user display screen 20 will then display the transaction options available to the user, such as those shown in FIG. 9 which include 1) withdraw; 2) deposit; 3) cash check; 4) cash money order; 5) buy money order; 6) wire transfer; 7) bill payments; 8) purchase (lottery tickets, stamps and telephone cards). The display shown in FIG. 9 will be on the panel display 20 and adjacent the pair of flanking additional keypads 26 and 27 (FIGS. 1 and 6), which have arrow keys which are aligned with these options 1-8. That is, the pressing of the arrow key 26a opposite the number "1)" "WITHDRAW" on the screen 20 will initiate a withdrawal. Whereas, the operation of the second arrow key 27a (27b ?) in the right hand bank of keys will initiate a "BUY MONEY ORDER" operation, to be described hereinafter.

[0133] Assuming the user has selected the "1)" withdrawal option by depressing the arrow key 26a opposite number "1) WITHDRAW", the screen display 20 will then display a request to an account for a withdrawal, i.e., from a checking or savings account. This is shown in FIG. 10 with the display of a "1) CHECKING" and a "2) SAVINGS" on the screen display opposite the arrow keys 26a and 26b. Assuming that the user wishes to withdraw money from a checking account, the user will press the arrow key 26a. The screen display 20 will then show the display of FIG. 11 with the display labeled "WITHDRAW FROM CHECKING" and with the monetary amounts "20", "40", "50", "100", "200" and other listed opposite the selection arrow keys 26a-26c and 27a-27c, respectively. By operating one of the particular arrow keys 26 and 27, i.e., the arrow key \$20.00 for withdrawal from checking, will signal other positions of the apparatus 10 to perform a number of operations shown on the flow chart entitled "WITHDRAW screen" shown in FIG. 11A.

[0134] In a step 340 the withdraw screen is engaged and in a step 342 the user is prompted by the screen to insert the card and a verify screen is displayed. If the card is verified control is transferred to a step 344 allowing the user to choose from a present withdrawal amount. If the user chooses to cancel the transaction control is transferred to a step 346 testing for another transaction. If the user chooses not to choose from a preset withdrawal amount, the user may enter the withdrawal amount in \$5.00 increments in a step 348 or may cancel the transaction and proceed to the other transaction test step 346. Assuming that the withdrawal amount has been entered in \$5.00 increments, the withdrawal transaction is performed in a step 350 by checking over the banking network. In a step 352 a cash dispenser 30 dispenses the withdrawn amount and in a step 354 the receipt is printed by the receipt printed. Control is then transferred to the step 346 testing for additional transaction prompts. If there is, the service option screen is then displayed in a step 360. If not, the card is ejected from the card reader 22 in a step 362 and the welcome screen is displayed in a step 364.

[0135] A connection will then be made by the electronics network and modem 29 via the banking network to access the customer's account in the bank; and then there will be an operation of the cash dispenser 30 (FIGS. 1 and 5) to dispense \$20.00 in cash. The cash dispenser communicates with the computer 21 through the serial communication device 21a to which it is connected, as shown in FIG. 24.

[0136] The cash dispenser 30 herein is a typical cash dispenser unit used in an ATM machine. The illustrated cash dispenser is a G & D America, Inc. Model ACD which is made by Giestecke and Debrief America, Inc. The illustrated cash dispenser 30 has four (4) bins. Each bin can hold four hundred notes. The preferred cash dispenser 30 is loaded with four hundred \$5.00 notes in one bin. The other three bins are each loaded with four hundred \$20.00 notes. Manifestly, more or less bins may be used and also different cash dispensers may be used than that described herein.

[0137] The illustrated and preferred cash dispenser 30, as shown in FIG. 5, is mounted for sliding horizontally to the right for reloading, and is slid back into the position shown in FIG. 5 where it is supported on slide tracks 32 mounted on the housing 12. The cash being dispensed drops through a chute 36 into a hopper 38 having a pivoted axis door 40. The pivoted access door 40 allows the dispensed cash to drop into a dispensed cash bin 42. As shown in FIG. 6, in order to withdraw dispensed cash the user will reach through a cash bin window 46 in the front housing wall 16 and remove the cash from the bin 42. As shown in FIG. 7A, access to the interior of the housing 12 and to the cash dispenser 30 for the replenishing the cash is through a rear housing door 44. The rear housing door 44 has a double security lock 47a and 47b and a handle 48. With the rear housing door 44 open, the cash bins can be accessed and slid along the tracks 32. The double security lock 47a and 47b provides security for the cash sections in the normal manner of an ATM.

[0138] If the user had chosen the "SAVINGS ACCOUNT" on the display 20 for withdrawal transaction (shown in FIG. 10), she would have pressed the arrow key 26b opposite the "SAVINGS ACCOUNT" prompt on the screen display 20. As shown in FIG. 10, the display 20 would then show the withdrawal from savings screen having the prompt "WITHDRAW FROM SAVINGS." The user is requested to enter the amount in \$5.00 increments of the amount to be withdrawn. In this instance, the user operates the keyboard 18 to type in \$500.00, the amount to be withdrawn from savings. In such event, the withdraw screen under the control of the microcomputer 21 executing the steps of the flow chart shown in FIG. 12 used to perform the withdrawal from savings by the modem through the banking network, and the cash dispenser 30 is then operated to dispense the cash into the cash bin 42 for removal by the user.

[0139] For either a withdrawal from savings or a withdrawal from checking, it is preferred to print out a receipt with a receipt printer 50 shown in FIGS. 1 and 3. The receipt printer 50 is connected to the computer 21 through a parallel communication device 51. The receipt printer 50 dispenses a printed paper receipt which is fed therefrom and is issued, in this instance, from a receipt dispensing slot 52 in the front wall 16 of the housing 12. The user will then receive the receipt which shows not only the amount being withdrawn but also the transaction fee. Thus, the total withdrawn from checking or savings for the transaction will include not only the cash dispensed but also the transaction fee, i.e., \$1.00 per transaction.

[0140] The illustrated receipt printer 50 is preferably a Model MP342F, manufactured by Star Micronics America, Inc. of Piscataway, N.J. The receipt printer 50 has an

automatic cutter for cutting the receipt after printing. Manifestly, other printers or receipt generators may be used than the model described herein.

[0141] The welcome screen is displayed in a step 220, as shown in FIG. 9A. In a step 222 all hardware and software parameters are initialized. In a step 224 the service options screen is displayed, allowing a choice to enter. The withdrawal screen 226, the deposit screen 228, the check cashing screen 230, the cashing of money order screen 232, buy money order screen 234, the wire transfer screen 236, the bill payment screen 238 or a make purchase screen 240.

[0142] Assuming now that the user had selected the deposit #2 option as shown in FIG. 9, and wanted to deposit into the checking or savings account, the user would have pressed the arrow key 26b of the keypad 26, which is opposite "DEPOSIT." This action results in a request whether to deposit into a checking account or into a savings account. Assuming the deposit is to be made into the checking account, the flow chart of FIG. 13 shows the steps performed by apparatus 10 which will be described in greater detail hereinafter.

[0143] The deposit screen, which is displayed in a step 380, requests insertion of the card and displays a verify screen in a step 382. If the card is not inserted control is transferred to a step 384 testing for whether any other transaction is to be carried out. If it is, in a step 386 the service option screen is displayed. If not, in a step 388 the card is ejected and the welcome screen is displayed in a step 390. In the event that the card has been verified a prompt is made to the user in the step 392 as to the type of deposit. If the user elects to cancel the transaction, control is transferred to the step 384. If the user selects "Cash", a cash deposit screen is displayed in a step 394. If they select "Checking", a check deposit screen is displayed in a step 396 and if they choose "Money Order," a money order deposit screen is displayed in a step 398. Control is then transferred to a step 400, causing the selected transaction to be performed by the modem 29 through the banking network. In a step 402 the receipt is printed out and control is then transferred to the other transaction test step 384.

[0144] The deposit into checking screen display (FIG. 13A) prompts the user with the statement: "WHAT WOULD YOU LIKE TO DEPOSIT IN YOUR CHECKING ACCOUNT 1) cash; 2) check; or 3) money order". Assuming that the user has elected to deposit a check, the check transaction will be selected by pressing the arrow key 26b of the keypad 26. As shown in FIG. 13B, a request then will appear on the screen display 20 labeled "DEPOSIT CHECK" opposite a window 52 for the amount of the check. In the window 52, the operator will then use the keyboard 18 to enter the deposit amount of \$675.52. In this instance, a service charge in the amount of \$1.00 will also be displayed, as shown in FIG. 13B to the user. If the user has not endorsed the check, the user will see, upon entering the amount, will be that shown in FIG. 13C, which will request the user to "sign the back of the check", and "when ready to insert the check into a scanner slot".

[0145] A scanner slot 54 is located above the user display 20, as shown in FIGS. 1 and 6. In this instance, the check will be inserted vertically. The illustrated scanner slot 54 is approximately 4"x9", and the inserted check will be scanned while it is in this vertical position, as will be described

hereinafter. As the check enters the scanner slot 54, it is gripped by feed rollers and moved along a feeding track 56 (FIG. 2). The check feeds directly into and stops at an imaging station 55 where the check is scanned or images of the front and the back sides of the check are captured. A scanning and confirm flow chart is shown at FIG. 14. It will be described in greater detail hereinafter with respect to the software control and operations of the machine. As shown in this flow chart, an optical character recognition (OCR) scanner scans the document. A magnetic ink (MICR) reader reads the magnetic ink data on the check, which will include the bank's identification number as well as the user's checking account number with the bank.

[0146] Also, while the check is in this stopped position, its legal line (LAR) will be scanned, and the CAR line will be scanned to verify that the check is for the correct amount, in this instance \$675.52. Also, while in the vertical stopped position, it is preferred to have a camera unit 58 and 60 (FIG. 2) disposed on opposite sides to capture images of both sides of the check and connected through a SCSI device 59 to the computer 21. The images are stored on a magnetic recording medium in TIFF format and are provided with a tag so that the image file, as shown in FIG. 14, can be later accessed if so desired.

[0147] At the beginning of the scanning operation, the check image is processed to ascertain if the check has been inserted correctly. In the scanning operation 420 the document is inserted in the scanner slot in a step 422. The scanner using the camera 58 and 60 scans both sides of the documents and reads the magnetic ink via a magnetic transducer in a step 424. The document is placed in the holding area in a step 426 and a determination is made in a step 428 as to whether the document is a check or money order on the basis of the presence or absence of the magnetic ink data. A check is also made in a step 430 to determine whether the document is inserted correctly. If it is not, the document is ejected from the document slot 54 in a step 432 and the touch screen 20 displays if the document is inserted incorrectly in a step 434 following which control is transferred back to the step 422.

[0148] If the document is not a check or money order as determined in a step 428, control is transferred to a step 440 causing both sides of the document to be saved in a tagged image file format. If the document was inserted correctly as tested for in step 430, both sides of the document are saved in a step 440. In a step 442, the images are analyzed by amount recognition software of the types supplied by Mitek of San Diego, Calif., in particular its Quickstrokes Version 2.5 software. Control is transferred to that software from step 442 and as may best be seen in FIG. 25, in a step 450 the software is run. In a step 452, the software recognition device is created and initialized. The form files are read in a step 454, which form files include the positions where the courtesy amount recognition (CAR) and where the signature is likely stored in the fields within the document. In a step 456 the scanned image file is read and in a step 458 the neural network contained within the Quickstrokes software recognizes the characters written in the signature line as well as the characters written in the courtesy amount recognition (CAR) space and in the amount recognition (LAR) line. The recognized characters are then evaluated from the standpoint of a confidence level in a step 460, and character strings representative of those characters are returned to the soft-

ware set forth in **FIG. 14** for further evaluation. Referring now to **FIG. 14** in a step **470**, the strings representing the signature verification as well as the amount on the document are forwarded to the bank network by the modem **29** for confirmation for payout. If there is no confirmation control is transferred to a step **472** causing the document to be ejected from the document slot and in a step **424** a document rejection message is displayed. In a step **476** the current transaction is denied. In the event that the documents are confirmed in a step **470**, the check or money order is stacked in an accepted documents bin in a step **478** and confirmation of the current transaction is sent to the banking network in a step **480**.

[0149] If the images are not stored, the check is carried around the U-shaped feed path **61** back to an eject slot **61a** in the housing wall **14** for retrieval by the user. The eject slot **61a** is parallel with and to the left of the insert slot **54**. Assuming that the check has been re-inserted correctly and images of both the front and back have been captured, then the check is sent to an escrow or holding area **64** in the check feed track. The holding area **64** communicates through the serial communication device **21a** with the computer **21**, as shown in **FIG. 24**.

[0150] As best seen in **FIG. 4** at the escrow area **64**, the check is held for either depositing into a store bin **66** if the check has been qualified and accepted, or the check depositing transaction, the check will be fed from the escrow area back to the eject slot **61a** for removal by the user if failure to verify the signature causes the check to be rejected for deposit. Assuming that the banking network has been connected by the modem **29** to other portions of the apparatus **10** and that the check has been verified, the amount deposited is sent over the banking network to the identified bank and identified account of the user for deposit. The receipt printer **50** is then operated to provide a written receipt to the user showing the amount deposited minus the transaction charge of \$1.00.

[0151] Referring now to **FIGS. 2A and 2B**, the document handling of a money order or a check will now be described in greater detail. The check is inserted vertically through the scanner slot **54** and passes in front of a pair of first infrared sensors **101** and **102**, which sense that the check has been inserted. These sensors are on opposite sides of a guide or feed track **100** which includes a pair of spaced parallel plates **103** and **103a** extending inwardly to the imaging station **55**. Immediately beyond the infrared sensors **101** and **102**, which detect the insertion of the document, is a pressure roller **105** to push the check against the plate **103**. The check is pushed forwardly past a set of infrared sensors **110** and **112**, which will detect when the check is fully inserted into the scanner slot and is gripped by a feeding belt **112** that runs through an entry slot **114** between the image scanners **58** and **60** at the imaging station **54**. The feeding belt **112** extends through imaging station to a large diameter roller **121** (**FIG. 2B**). The check pauses in its travel at the imaging station **54**, where the image taking video or other scanners **58** and **60** take images of the front and back of the check. Optical character recognition readers read the magnetic ink recognition characters for the bank and for the customer's account. Electronic signals from the image takers **58** and **60** provide information concerning the signature for the check, the legal line and the amount written thereon, and the CAR

line and the amount written thereon, all of which are stored magnetically, in this instance, and provided with tag number for later recapture.

[0152] As best seen in **FIG. 2B**, a U-shaped track **120** is provided around the large diameter roller **121** to guide the check to reverse its direction of travel and to move it into a slot between plates **122** and **123** of the check guide track **100** to a pair of inlet infrared sensors **125** and **126**, which sense the check coming into the inlet of the escrow area **64**. The feeding belt **112** is a cogged timing belt which carries the checks about the drum **121** and between the plates **122** and **123** to the inlet to the escrow area. The cogged feeding belt is driven by a stepper motor and travels about guide rollers **127**.

[0153] At the escrow or holding area **64**, there is provided a large belt driving drum **130** which drives a cogged feeding belt **131** for conveying the check first upwardly and to the left into the holding area and from the latter into the deposit bin **66** above the holding area **64**. If the check is to be rejected, the feeding belt **131** reverses its direction of travel to eject the check through the eject slot **62**. The driving roller **130** includes a stepper motor **132**, which is mounted on the top of the roller **130**. The stepper motor **132** is reversible in its rotation for rotating a drum **130** and the feeding belt **131** in opposite directions and through a controlled distance.

[0154] Infrared sensors **125** and **126** sense the passage of the check from the imaging station **55** into the escrow area **64**. The feeding belt **131** is guided along and travels past a series of guide rollers **134a**, **134b**, **134c** and **134d** to the top of the holding area. The endless timing belt **131** turns about the top guide roller **134d** and travels downwardly and to the right past a roller **136** to return to a side of the drum **130**, as seen in **FIG. 2A**.

[0155] The check is pushed against the timing belt **131** to travel with the timing belt by four sets of pressure rollers **140a**, **140b**, **140c** and **140d**. At the top of the holding area is another pair of infrared sensors **141** and **142**, which sense the arrival of the upper edge of the check and they signal that the check has been moved completely into the holding area with the lower end of the check being at or above the rollers **140a** and **134a** at the bottom of the holding area and aligned with the eject slot **62**. Once the check has been accepted, the stepper motor **132** is turned to drive the drum **130** and the feeding belt **131** to cause the check to travel upwardly into the overhead deposit bin **66**. On the other hand if the check is rejected as being unacceptable, the feeding belt **131** travels in the opposite downward direction to push the lower edge of the check through the eject slot **62** and return it to the user. A lower end of the guide plate and a spring guide finger **147** guide the outgoing ejected check to slide and travel along a short guide plate **148** to the aligned eject slot **62**. Infrared sensors **150** and **151** (**FIG. 2A**) at the bottom of the holding track sense when the check has been removed from the eject slot by the machine user.

[0156] During the deposit transaction, the screen display **20** will show a confirming message, such as shown in **FIG. 13D**, in the form of a bar that progresses from left to right in window **69** being viewed by the user. As the receipt is generated by receipt printer **50**, the screen display **20** (**FIG. 13E**) will show that \$674.52 "WILL BE DEPOSITED INTO YOUR ACCOUNT. PLEASE TAKE THE RECEIPT WITH YOU."

[0157] If, rather than depositing the check into a checking account, the user had selected the option to deposit into a savings account, the screen would display the deposit into savings account shown in FIG. 13F. Then, the user would press the arrow key 26b for the "CHECK"; and the check would have been deposited in the same manner as described above with respect to a deposit into a checking account. A cash receipt would have been provided to the user, as was the cash receipt generated for the deposit into the checking account.

[0158] Assuming that the user had decided to deposit cash into checking and had pushed the #1 cash button 26a of the keypad for the display screen of FIG. 13A or had pressed the same button for a cash deposit into savings (FIG. 13F), the processor would follow the steps of the cash deposit flow chart shown in FIG. 13H.

[0159] In the cash deposit process 500 as set forth in FIG. 13H a cash acceptor 62 is initialized in a step 502. Currency is inserted in the cash acceptor 62 in a step 504 and is accepted thereby. The bills are read and are transferred to a deposited cash bin in a step 506 and the total of the bills presented added up in a step 508. If the user elects to deposit more bills in the cash deposit in a step 510 control is transferred back to step 504. If not, control is transferred to a step 512 where the deposit transaction is proceeded with.

[0160] The user display 20 as shown in FIG. 13G for deposit cash would display the prompt "PLEASE INSERT YOUR BILLS INTO THE ACCEPTOR SLOT 60, WHICH IS SHOWN IN THE RIGHTHAND SECTION ABOVE THE CASH DISPENSER." As may best be seen in FIG. 5, the cash dispenser accepting slot 60 leads into a cash acceptor module 62, which accepts cash, specifically bills in denominations of \$1.00, \$5.00, \$10.00 or \$20.00. As shown in FIG. 24, the cash acceptor module 62 is electronically connected to the computer 21 via a resistor network 62a having a plurality of current limiting resistors. The resistor network 62a is connected to a digital I/O board 62b, in this embodiment a National Instruments PC-DIO-96. The digital I/O board 62b is coupled to the computer 21. The cash acceptor module 62 counts the deposited bills and has a bin in a hopper 64 to receive the counted bills. The cash acceptor module 62 is pivotally mounted at 66 to be swung to a dotted line position for emptying deposited bills therefrom. The preferred cash acceptor module 62 merely stacks the inserted bills and counts the same. The cash acceptor module 62 is preferably a Mars Electronics?

[0161] International Cash Acceptor Model AL4-L1-U1M, which is one of several available cash acceptors. It will not only stack the bills and retain them in the machine 10, but will add up the total amount of cash. The cash flow chart shown in FIG. 13H will be described in greater detail hereinafter in connection with the software and overall control of the machine. The deposit transaction proceeds from the flow chart of FIG. 13H back to the flow chart of FIG. 13 to proceed through the modem and banking methods to make the deposit into the user's checking or savings account. The machine 10 will operate the receipt printer 50 to print a receipt to be dispensed to the user through the receipt slot 52, showing the amount deposited less the transaction fee, which is illustrated as \$1.00 in this instance.

[0162] When depositing cash, the illustrated cash acceptor 62 will total the cash received and show this cash being

deposited, as shown on the screen 20 which shows that the \$20.00 has been deposited after \$45.00 more dollars have been deposited, making for a total deposit of \$65.00, as shown in FIG. 13J. A receipt will then be printed by the receipt printer 50, and the user will be notified that \$65.00 will be deposited in the user's account (FIG. 13K).

[0163] Assuming that the user, when prompted by the options screen of FIGS. 3 and 9, has elected to press the arrow key 26c to initiate the check cashing transaction, the user display 20 will prompt the user to enter the amount of the check into the window 68 (FIG. 16). The flow chart, with respect to cashing a check, is shown in FIG. 16A.

[0164] The cash check process is entered at a point 520 and as a result, the magnetic card reader 22 accepts the magnetic identification card in a step 522 and displays a verify screen. The user can exit the transaction by transferring to a step 524 where he or she is prompted for another transaction. If not, the amount of the check is entered in a step 526 and the check is scanned and confirmed in a step 528 as set forth previously. The user then enters an amount in a step 530 to be received in cash and the banking network is accessed in a step 532 to determine whether their is a balance from which the check may be cashed. If so, in a step 534 the cash dispenser dispenses cash in the cash amount and in a step 536 the receipt is printed by the receipt printer. Control is then transferred to a step 524 and if another transaction is desired, the service option screen is accessed in a step 526. If another transaction is not wanted, control is transferred to a step 528 causing the card to be ejected from the card reader and in a step 530 the welcome screen is displayed.

[0165] The user enters through the keyboard 18 the amount, such as \$90.00, shown in FIG. 16B, the amount will be scanned and confirmed, and the service charge of \$1.00 is shown on the screen display of FIG. 16. The user may select to continue the transaction or to cancel it by pressing the appropriate button of keypads 26 or 27. The touch screen display shown in FIG. 16H allows the user to make the selection by touching the portions of the display labelled either CONTINUE or CANCEL. If the user has not signed the back of the check, the user will be requested to do so (FIG. 16C). If the check was inserted backwards, as it is viewed by the scanner, the check will be returned through the rejected material outlet slot 62. The user will invert the check and insert it now in the correct vertical position into the insert slot 54. From there the check will be carried into the scanning imaging station where cameras 58 and 60 will capture the images of opposite sides of the check. The processor 21 by executing document verification software will then analyze the signature image and compare it with the profile signature of the user. Likewise, the processor, by using the verification software, will also read the cursive legal amount (LAR) line and the written numerical amount at the CAR line, as will be described hereinafter in connection with the document verification software in greater detail.

[0166] After re-insertion of the check, the user will be requested to re-enter the amount of \$90.00 (FIG. 16D). The check image will again be processed and if the amounts match the keyed-in amount the user display will show an "OK" for the amount (FIG. 16D). During the scanning and the verification operations with communication to the user's

account, through the banking modem, the screen will display "OCR" with a movable bar, as shown in **FIG. 16E**. The next prompt shown on this screen will be to enter the portion of the check amount that the user wants to receive in cash. The cash is selected in \$5.00 increments. The machine then informs the user that any remaining amount of the check will be received in cash (**FIG. 16F**). With reference to the specific example given herein as shown in **FIG. 16F**, the user's screen display **20** will show that there has been a \$90.00 check scan with a service charge of \$1.00, leaving a balance of \$89.00. The operator will have used the keyboard **18** to enter the request for \$40.00 cash, in \$5.00 increments, as shown in window **70**. As will be explained in greater detail in connection with check cashing flow chart of **FIG. 16A**, the cash dispenser **30** will then be operated to dispense \$40.00 into the cash bin **56**, which the user will then remove. As shown in **FIG. 16G**, the amount of \$40.00 will be deposited in the user's account through the banking network; and the receipt printer **50** will print a receipt for the deposit of \$40.00.

[0167] The cashing of the money order is much like cashing a check. It will be described hereinafter in connection with the flow chart shown in **FIG. 17**, and in connection with the screen of **FIG. 17A**.

[0168] The cash money order process is accessed in a step **570**. The magnetic card is prompted to be inserted in a step **522** and a verify screen is raised. If the user decides to exit the transaction, she may so signal and control is transferred to a step **574**, testing for whether another transaction is desired. Assuming that the card is verified and that the transaction is to proceed, the amount of the money order to be paid out is entered in a step **576**. In a step **578** the money order is inserted and scanned and confirmed, and in a step **580**, assuming the confirmation occurs, the user enters the amount for the money order to receive in cash. In a step **580** a query is generated by the modem **29** to the banking network to determine whether the amount of the money order is backed by funds. Assuming that it is, in a step **584** the cash dispenser dispenses the cash amount and a receipt is printed in a step **586**. Control is then transferred to the other transaction test step. If another transaction is desired the service option screen is displayed in a step **588**. If not, the card reader is ejected in a step **590** and the welcome screen is displayed in a step **592**.

[0169] Assuming that the user, when viewing the options available (**FIG. 9**), had pressed the arrow **26d** opposite "cash money order" to institute this transaction, the user is then prompted, as shown in **FIG. 17A**, to operate the keyboard **18** to enter the amount of the money order, which, in this instance, is \$750.00. The screen will also show the transaction service charge of \$1.00 and the available amount of \$100.00 in cash.

[0170] The cash money order screen displays \$100.00 in a window **71** and prompts the operator to enter from the keyboard **18** the amount of cash that the user would like to receive in \$5.00 increments. In this instance, the user has entered \$100.00 into the window **71**. In a manner similar to that used for the scanning of the check, the cameras **58** and **60** photograph both sides of the cash money order and locate the indicia showing the amount of the money order and read the amount indicia. The magnetic ink indicia identifying the issuer and the account of the issuer are read; and the

signature on the back of the money order is scanned and confirmed. Then a communications network via a modem is connected to the issuer's account, indicating that the authenticity of the money order is being checked. When the machine **10** receives signals that the money order is authentic, the cash dispenser **30** is then operated to transfer \$100.00 cash into the cash bin **46** (**56**?) for removal by the user. If the user had not signed the back of the money order, he would have been informed to reinsert the money order, as shown in **FIG. 17B**. If the money order could not be processed, it would be returned through the reject slot **62**. The user display **20** would state that the money order could not be processed and that the user should check with her financial institution, as shown in **FIG. 17C**.

[0171] Assuming the user had selected, in **FIG. 9**, the #5 option of buying a money order by pressing the right hand button **27a** on the keypad, then the buy money order screens and flow chart would have been operative, as will now be described. The first prompt shown on the purchase money order display **20** (**FIG. 18**), requests the name of the person to whom the money order is to be paid. In this instance, the name is John Doe, as shown in **FIGS. 18 and 18A**. Having operated the user keyboard **18** to enter the payee's name, i.e., "John Doe," the user will next enter the amount of \$500.00, as shown in window **72** in **FIG. 18A**. The service charge of \$0.50 is shown so that the total amount needed for the purchase of the money is \$500.50. As may best be seen in **FIG. 18B**, it is preferred to provide the purchaser of the money order with a number of options for payment including by cash, by credit card withdrawal from an account of the user, and by a smart card. Or the user may return to the money order, if he so desires. The flow chart for buying a money order is shown in **FIG. 18B**.

[0172] In a buy money order transaction, the process is entered via step **600** and the money order recipient's name is entered in a step **602** or if cancellation is desired, control is transferred to another transaction test step **604**. Assuming that the recipient's name has been entered, the amount of the money order is entered in a step **606** and in a step **608** a method of payment is chosen causing prompts to occur via a cash payment screen **610**, a credit card screen **612**, a smart card payment screen **614** or a balance withdrawal screen **616**. The particular transaction for payment is then processed in a step **618** and the money order is printed out in a step **620**. A receipt is printed in a step **622** and the transaction test **604** is then made. If further transactions are to occur, the service option screen is displayed in a step **624**. If not, a test is done in a step **626** to determine if the card is in the card reader. If it is, the card is ejected in a step **628** and the welcome screen is displayed in a step **630**.

[0173] The buy money order transaction will be tagged and, through the banking network, a money order printer **76** (**FIG. 1**) will print the money order. The money order printer **76** is disposed, in this instance, side-by-side with the receipt printer **50**, as is shown in **FIGS. 1 and 3** and is connected to the computer **21** through the parallel communication device **51**, as shown in **FIG. 24**. The printed money order is dispensed from a money order dispensing slot **78**, which is adjacent to the receipt printing slot **72** in the front housing wall **16** of the apparatus **10**. The illustrated money order printer may be similar to the receipt printer **50** and is available from Star Micronics America, Inc., Model MP3342F. It includes an automatic cutter.

[0174] As shown in FIG. 18C, the user screen display 20 will then display that \$500.50 has been withdrawn from the user's account, and that the money order is being printed. Both a money order and a receipt will be issued from the money order slot 78 and the receipt slot 52, respectively.

[0175] If the user had selected the wire transfer option in FIG. 9 and had depressed the arrow key 27a for wire transfer, the screen of FIG. 19 would be displayed on the user's display 20 prompting the user to use the keyboard 18 to enter the name of the person to whom the money is to be wired. Then the screen display 20 would request the name of the bank, as shown in FIG. 19A, which will be entered, such as First American. The next request of the user is shown in FIG. 19B and that is for the Federal routing code or the routing for the bank for the transfer. The routing is to be typed in by the user using the keyboard. The number "7896654" has been typed in as the federal routing code in FIG. 19B. The account number of the receiver is then requested, as shown in FIG. 19C. The account number in this instance is shown as "987-87654" and has been typed in by the user using the keyboard 18.

[0176] Having entered the information for the wire transfer to a specific account, the screen display 20 requests the amount to be sent, which in this instance, as shown in window 78 is \$850.00. A service charge of 10%, or \$85.00 of the \$850.00 amount charged is shown to the user bringing the transaction total to \$935.00, as shown in window 78a. The flow chart for a wire transfer of money is shown in FIG. 19E.

[0177] The wire transfer process 640 is started with a step 642 for entering information related to the transfer related to the bank the transfer is to be made to as well as the account. In a step 644 the amount to be transferred is entered. In a step 646 the method of paying for the wire transfer is selected, causing control to transfer to a cash payment screen 648, to a credit card screen 650, to a smart card payment screen 652 or to a withdrawal screen 654. Following that, in a step 656 the selected payment transfer occurs and the wire transfer occurs via the modem 29 over the banking network. In a step 658 a receipt is printed and in a step 660 a test is made for whether another transaction is to occur. If it is, a service option screen is displayed in a step 662. If it is not, a test is made in a step 664 to determine if the card is in the reader. If so, the card is ejected in a step 666 and the welcome screen is displayed in a step 668.

[0178] A request for the method of payment which can be any of four different payment methods, is shown in FIG. 19F. In this instance, the options of cash, credit card, withdrawal from my account, or smart card may be selected by operating the appropriate keypads 26 and 27 positioned alongside the display 20, shown in FIG. 19F. After selecting the appropriate method of payment, the machine is then connected over the banking network (FIG. 19E) to the bank to deposit \$850.00 in John Doe's account no. 987-87654. The receipt printer 50 will cause a printout of the receipt showing a payment and wire transfer to John Doe of \$850.00 and a total transaction fee of \$935.00, the latter may be charged by credit card, smart card, or withdrawal from my account, as shown in FIG. 19E. On the other hand, the user could have deposited cash of \$935.00 in the cash acceptor slot 60. The machine 10 would then count the cash and hold

it in the cash acceptor 34. Having finished the transaction, the credit card (if used for payment) would be ejected, as shown in FIG. 19E.

[0179] Returning again to the options available as shown in FIG. 9, if the operator had pressed the key 27c on the keypad 27 to select the "bill payments" option, then a bill option screen (FIG. 20) would have been shown on the user display 20. The bills which may be paid are listed on the display 20, viz., telephone, electric, gas, cable, water and credit cards. The operator will use one of the keypad buttons on keypads 26 and 27 to select from the screen of FIG. 4 the particular bill to be paid. In the alternative the bill payment selection may be made by touching the appropriately labelled region of the menu display on the touch screen display shown in FIG. 20J. It will be requested on the user display, as shown in FIG. 20A, to enter the amount for the bill selected, such as \$129.67 for the telephone bill. Then, the telephone bill may be inserted into the scanning material insert slot 54 where the images of both sides of the bill will be captured. The particular bill payments have to be qualified with the user's account beforehand, and the particular bill has to be recognized so that the amount of the bill and the field specifying money owed can be located as well as the identity of the creditor company—the telephone company, in this instance. The verifier will read the customer's account number, the payee's account number, and the amount of the bill. The position of this data on the bill as well as the script, font, etc. will vary greatly. To aid in reading the bill, a keypad may be provided for operation by the user. Having manually identified for the processor 21 all of the fields on the image of bill, the interpretation of the field image is done in the same manner as analyzing a check or money order. The bill is verified, and if OK, the request is then stated as to the total amount to be paid for the transaction. The user then will receive the request to enter the amount to pay on the telephone bill, as shown in FIG. 20A, which in this instance, is \$129.67. The service charge of \$0.60 will be also displayed to the user on the user display 20 along with the total, which is shown in the window at the bottom of the screen 20. For instance, the total charge of \$130.27 (FIG. 20A) to pay the particular telephone bill.

[0180] When paying a telephone bill the screen 20 will then interrogate the user as to whether she wishes to pay another bill via an inquiry, such as the inquiry shown in FIG. 20C wherein it is desired to pay a gas bill of \$45.22. The sum of \$45.22 is entered by the user using the keyboard 18. As shown in FIG. 20D, the user is then prompted to load the gas bill into the scanner slot 54. The gas bill will be read in the same manner as the telephone bill was read by the cameras 58 and 60. The magnetic or the other optical character recognition information on the bill will be analyzed to associate the payment of \$45.22 to the appropriate account to the bill paying network. If the user also decides to pay a gas bill, the user will press "continue". Herein, the user decided to pay a credit card bill of \$96.82 as shown in FIG. 20E for a third service charge of \$0.60, which will bring the total service charges to \$1.80. The total amount of the three bills, the telephone bill, the gas bill and the credit card bill plus the service charge will be \$273.51.

[0181] Next, the method of payment is requested (FIG. 20F); and if the user elects to pay with a credit card, she will press the keypad button 26b and cause the screen (FIG. 20G) to be shown on the user panel 20, requesting that the

user insert the credit card bill into the slot **54**. The bill payments have been made over the bills payment network and the bills will have been collected in the receiver bin. This process is set forth as shown in **FIG. 20H**.

[**0182**] The bill payment process **720** is entered by selecting the type of bill such as telephone bill or electric bill, to be paid in a step **722**. The bill is scanned and verified in a step **724** and the amount to be paid is entered manually in a step **726**. A test is made in a step **728** to determine whether other bills are to be paid. If so, control is transferred back to step **722**. If not, control is transferred to a step **730**, testing for other transactions. A method of payment inquiry is made in a step **732** and in response thereto, a cash screen is displayed in a step **734**, or a credit card payment screen is displayed in a step **736**, or a smart card payment screen is displayed in a step **738**, or a withdrawal screen is displayed in a step **740**. After selecting the payment method, the funds are then transferred so that the bill is paid via modem connection in a step **742** and a receipt is printed out in a step **744**. If another transaction is desired from step **730**, the service option screen is displayed in a step **746**. Otherwise, a test is made to determine if the card is in the card reader **22** in a step **748**. The card is ejected in a step **750** and the welcome screen is displayed in a step **752**.

[**0183**] When finished with the bill payment, the screen display **20** shows that \$273.51 has been withdrawn from the account in **FIG. 20H** with a notation that "your bills are paid." As the flow chart for the bill payment shows in **FIG. 20H**, the receipt is printed by the receipt printer **50** which then ejects the receipt through the slot **52** to the user. The ATM card is then ejected from the card reader **22** back to the user.

[**0184**] If the user had elected in **FIG. 9** to buy lottery tickets, stamps or telephone calling cards, the purchase option would be selected by depressing the keypad button **27d** to cause the purchase display screen of **FIG. 21** to be present on the user display **20**, which shows the option of buying stamps at \$6.50 a booklet, a smart card at \$5.00 a card, or a telephone card at \$10.00 a card. Obviously, the number of items to be purchased could be enlarged to include lottery tickets or other end user items, which could be dispensed easily through purchasing goods dispensing slots **84**, **85** and **86** shown in **FIGS. 1 and 6** below three goods dispenser units comprising a lottery ticket dispenser **87**, a stamp dispenser **88**, a telephone calling card dispenser **89** and a smart card transaction vendor or handler **89a**, all connected to the digital I/O board **62b** via the resistor network **62a** for communication with the computer **21**. The disposed goods receiving slots **84**, **85** and **86** are located in the front wall **16** of the housing **12**, and the dispensers for the lottery tickets, stamps, telephone cards or smart card are mounted on dispenser support rails **90**, as best seen in **FIG. 3**. The dispenser support rails **90** allow for sliding movement of the dispensers so that they can be accessed through a rear service door **94** (**FIG. 7**). The rear service door **94** has its own security lock **96** for denying unauthorized access to the interior of the housing **12** and to the goods dispensers **87**, **88**, **89** and **89a**. A central door **97** having a security lock **98** can be opened to access the central portion of the machine **10** having the checks and the bills **66**, the cameras **58** and **60**, etc. While a variety of good dispensers could be used, the illustrated dispensers are card dispensers which are made by Asahi Seiko USA, Inc., Model CD1000. Manifestly, good

dispensers may be used other than those card dispensers herein described by way of example.

[**0185**] As shown in **FIG. 21**, the user may select one or more of the various items to be purchased. A telephone card may be selected by pushing the key **26c** to select one \$10.00 card. By pressing the "continue" button, the user is then provided with a screen display, as shown in **FIG. 21B** for buying smart cards or stamps. In the alternative the touch screen display shown in **FIG. 21I** can be used to make the selection by touching the appropriately labelled region of the screen display. In this instance, a three (five?) telephone calling card at \$10.00 a card and three smart cards at \$5.00 per card; have been selected by operating keypad button **26b** to result in a grand total of \$25.00 in purchases. The next screen to be shown on the display **20** prompts the user to select the method of payment for the \$25.00 purchase. The user will then operate one of the keypads to select by cash, credit, withdrawal from account or smart card as a payment mode, as shown in **FIG. 21C**.

[**0186**] In this instance, the operator has decided to pay with cash and has punched the arrow key **26a** on the keypad **26**. The screen shown in **FIG. 21D** will then be provided on the display **20** requesting the insertion of the cash into the cash acceptor slot **60**. The cash is then verified as counted, **FIG. 21E** shows that the user has inserted only \$20.00, which has been accepted by the cash acceptor **64** and counted. The screen will then show to the user in **FIG. 21F** that the payment of \$21.00 is insufficient for the total transaction of \$25.00. If the user only inserts another \$3.00, the transaction screen will show that the payment is still \$1.00 short, as shown in **FIG. 21G** wherein the transaction is \$25.00. If another dollar bill is inserted into the machine **10**, then the user will see the screen shown in **FIG. 21H**, which will inform the user to take his merchandise with him. Dispensing of the merchandise occurs as shown in the flow chart of **FIG. 21A**, and the machine control **21** operates the receipt printer **50** to print a receipt for the user which will be dispensed at the dispensing receipt slot **52**.

[**0187**] In order to make a purchase, the purchase process is entered in a step **770**. The item to be purchased, such as smart card balance, telephone calling card, stamps or lottery tickets are selected in a step **772**, or if desired, the transaction can be cancelled, causing control to be transferred to another transaction test step **774**. When an item is chosen to be purchased such as a lottery ticket, the quantity of the item is prompted for in a step **776** and entered, and a test is made in a step **778** as to whether another purchase is to be made. If it is, control is transferred back to step **772**.

[**0188**] If not, in a step **780** the method of payment is selected, causing a cash payment screen to be displayed in a step **782** or a credit card screen to be displayed in a step **784**, or a smart card payment screen to be displayed in a step **786** or a withdrawal screen to be displayed in a step **788**, following which the funds are accepted and the merchandise, such as the lottery ticket, is dispensed, in a step **790**. The receipt is printed in a step **792** and another transaction is tested for in the step **774**. If another transaction is desired, the service options display screen is displayed in a step **794**. If it is not, a test is made to determine if the card is in the card reader **22** in a step **796**. The card is ejected in a step **798** and the welcome screen is displayed in a step **800**.

[**0189**] As above described herein, it is preferred not to have any coins or coin changers in the machine; and to

provide \$5.00 bills as the lowest denomination bills that will be paid out in change. Usually, the cash payment process will follow the flow chart shown in **FIG. 22**.

[0190] In order to effect a cash payment for one of the transactions, such as the purchase of lottery tickets, transfer of a balance into the smart card or into a checking account or the like, the process is entered in a step **810** and the cash acceptor is initialized in a step **812**. The currency is accepted in a step **814** and is totaled in a step **816**. The accepted bills are stacked in the holding area in a step **818** and a test is made to determine whether the total covers the transaction amount in a step **820**. If it does not, more money is accepted in a step **814**. If the transaction is covered a determination is made in a step **822** whether change is due. If change is due, it is given in \$5.00 increments with the remainder credited to the smart card in a step **824** and the transaction proceeds in a step **826**.

[0191] The \$5.00 and \$20.00 dollar bills available for change are stacked in the four cash bins. If the payment calculation shows that the cash tendered is sufficient for the transaction and that change is due, the change will be in cash in \$5.00 increments by operation of the cash dispenser. Alternatively, any remaining change of less than \$5.00 will be credited to a smart card or to a bank account to avoid the necessity of storing and handling small denomination bills and coins. The option will be exercised by the user with respect to change as shown on the screen display (**FIG. 23**). The user can insert a smart card into the card slot **14**, and the smart card writer **89a** (**FIG. 1**) will write the change by increasing the balance on the smart card, and then return the smart card to the user. If the user wants to deposit the change into her account, the user will operate arrow key **26b** to cause the deposit transaction to occur over the banking network.

[0192] Referring now to **FIG. 26**, in general, the system architecture as far as the document processing is set forth therein. An invoice image is captured in a step **1000** and a check image may be captured in a step **1002**. The images are dissected in a step **1006** and a test is made to determine whether the fields within the image, such as the courtesy amount field or the legal amount field in a check or other image character recognition fields, for instance on bills, are valid, that is, can be interpreted as representing valid amount information or the like. Validation may proceed by selection from a variety of recognition engines, such as a numeric image character recognition engine in a step **1014**, an alphabetical image character recognition engine in a step **1016**, a courtesy amount recognition engine in a step **1018**, a numeric optical character recognition engine in a step **1020**, an alphabetic optical character recognition engine in a step **1022**, a legal amount recognition engine in a step **1024**, an optical magnetic ink character engine in a step **1026**, or a magnetic ink character engine in a step **1028**. The various recognition engines that have thus been selected pass their results, for instance, in terms of confidence levels, to the field validation step **1006**. The field validation step then inputs information to a transaction arbitration step **1030**. The transaction arbitration step **1030** may also receive entered field information from the step **1008** or other user-entered information such as user configuration information. Such user configuration information might include an ATM card number, an account number, a PIN number, or biometric data which is supplied to the transaction arbitration

engine. The information is acted upon in accordance with rules in a rules DLL in a step **1032**. An action, such as payment of a bill or dispensing of cash, takes place in a step **1034**.

[0193] Neural-network ICR engines trained from scratch by exposing the engine to a character training set consisting of thousands of discreet images of characters that point to their ASCII values. The ICR engine is then required to recognize a new set of characters that are not part of the new training set. Character images that are incorrectly recognized by the engine are assimilated into the original training set and the engine is retrained on the new set. This process is repeated until the accuracy of the engine meets certain predefined standards on arbitrary collections of real world image data, which standards are based upon comparable performance by professional data entry personnel.

[0194] There are a number of character recognition engines that could be employed by CIRS. The ICR engines that could currently be used by CIRS include FieldScript and CheckScript, v2.2, by Parascript (Colorado Springs, Colo.) for LAR; Quickstrokes v2.4, by Mitek (San Diego, Calif.); OrboCAR v2.13, by OrboGraph (Israel) for CAR, and Wordscan Plus, 1998 edition, by Caere for OCR of machine print.

[0195] Referring now to **FIG. 27**, in general, the types of transactions that may be performed by the apparatus **10** are set forth therein. All of these transactions relate to check processing. Remittance processing involving automated payment of a bill can occur in step **1036**. The remittance processing is followed by check processing in a step **1042**. Arbitration and validation follows check processing in a step **1044**. An action such as payment of the bill occurs in a step **1046**. Proof of deposit may occur in a step **1038**. Following which, check processing occurs in step **1042**. The arbitration and validation step **1044**, and the action step **1046** are then performed. Likewise, a payroll check may be cashed in a step **1040** involving check processing in step **1042**. The arbitration and validation of the check processing information occurs in step **1044**. The payroll in action step **1046** next takes place.

[0196] Remittance processing details are more specifically shown in **FIG. 28** wherein, in a step **1050**, a user would be prompted to manually enter a full invoice amount, an amount to be paid and an account number at the apparatus **10**. That information would be passed to a transaction arbitration step **1076**. In addition, the check would be optically and magnetically scanned in a step **1052** to produce imaging of the front and back of the check as well as magnetic MICR information. The images from the check and the magnetic information would be dissected in a step **1054**. Date amount recognition takes place in a step **1056**. Legal amount recognition occurs in a step **1060**. Courtesy amount recognition occurs in a step **1062**. Each of those last three steps would then pass their results in terms of a confidence level or an output to the transaction arbitration step **1076**. If an invoice is to be processed as part of the remittance, the invoice document is optically scanned in a step **1064** and the image is dissected in a step **1066**. The image character recognition amount paid field is interpreted in a step **1068**. The optical character recognition date field is interpreted in a step **1070**. The account number, as sensed by optical character recognition in a step **1072**, has its infor-

mation passed to the transaction arbitration step 1076. In addition, the full invoice amount field is optical character recognized in step 1074, and that information is passed to the transaction arbitration step which then acts upon it and pays the bill in step 1078.

[0197] Proof of deposit processing is performed as shown in FIG. 29. In a step 1080 the user is prompted to enter manually the amount of a check at the apparatus 10. The check is image scanned in a step 1082. The check image is dissected in a step 1084. Legal amount recognition takes place in a step 1086. Courtesy amount recognition takes place in a step 1088. Date recognition would take place in a step 1090. The results of steps 1086-1090 are passed to a transaction arbitration step 1092. The transaction arbitration step 1092 would then act in accordance with rules set forth in the rules module 1094. Action such as depositing funds and issuing a proof of deposit occur in a step 1096.

[0198] As shown in FIG. 30, a payroll check may be cashed. In a step 1100, the user is prompted to enter the check amount into the apparatus 10. The entered amount is passed to a transaction arbitrator step 1112. In a step 1102, the check is optically scanned and in step 1104 an image of the check is dissected. In a step 1106 there is a magnetic recognition of the MICR line, for instance, to determine the bank number, the account number, and even in some instances the amount of the check. There is also optical recognition of the MICR line in a step 1108 and a date amount recognition in a step 1110. However, that information is passed to the transaction arbitration step 1112. Following step 1112, action, for instance, payment of funds, is taken in a step 1114.

[0199] As shown in FIG. 31, details are set forth for the legal amount recognition and courtesy amount recognition arbitration procedures. A user enters the check amount in a step 1120. There is a cross-validation in a transaction arbitration step 1134.

[0200] A check is optically scanned in a step 1122 and its image is dissected in a step 1124. The portion of the check image related to the courtesy amount is extracted in a step 1126 by way of bounding box recognition techniques set forth below. In a step 1127 the image is processed, including by way of character segmentation in a step 1128, and courtesy amount recognition values and associated confidence levels in output in a step 1130. The multiple courtesy amount recognition values may be output in step 1132 ranked according to their respective confidence levels. That information is passed to the transaction arbitration step 1134.

[0201] In a similar fashion, the legal amount is extracted after image dissection in a step 1136. The image is processed in a step 1138, including via word segmentation in a step 1140, and the legal amount recognition conclusion is generated in step 1142. Multiple legal amount recognition values, together with their respective confidence levels, are transmitted in a step 1144 to the transaction arbitration step 1134. In a step 1150 an associated document, which may be a bill or invoice to be paid, will be optically scanned. The bill or invoice image will be dissected in a step 1152, and the image of the document amount is indicated possibly by a bounding box and extracted in step 1154. The document amount would be processed, including by character segmentation in a step 1158 and optical character recognition of the document amount in the step 1160. Document amount results are ranked by confidence level and transferred in a step 1162 to the transaction arbitration step 1134.

[0202] In addition, after the associated document has been scanned, other amounts might be extracted required by the transaction and passed to the arbitration step 1134. The image would be extracted in step 1163a. The image would be processed in step 1163b. Character recognition would occur in step 1163c. Optical character recognition of other fields would occur in step 1163d. The resulting amounts or character strings would be ranked by confidence value in step 1163e. The arbitration step would act in accordance with various rules as to confidence levels and the like in step 1166 and take action, for instance, related to payment of an amount in a step 1168.

[0203] As shown in FIG. 32, the image character recognition process occurs at a step 1170 in which the document is scanned, its image is processed in a step 1172, and relevant fields are located in a step 1174. Characters are segmented in a step 1176 and characters are classified in a step 1178. The document is scanned in the step 1170 by digitizing the image in a step 1180. During the image processing step 1172, the image is registered and deskewed in a step 1184. Extraneous lines are removed in step 1186 and noise is removed in step 1188. In order to determine the field location, whether by bounding boxes or the like, the field is matched in some instances with a predefined image character recognition template in a step 1190. In order to perform the character segmentation step 1176, features are extracted in a step 1194, a character string analysis is made in step 1196 and a best fit to a predefined number of characters is determined in step 1198. In order to perform character classification, context analysis is performed in step 1200, including by the use of dictionaries in step 1202 and look-up tables in a step 1204, which information is then relied upon by validation routines in step 1206.

[0204] In order to generate a bounding box a bounding box procedure 1300 causes the processor, through the touch screen, to prompt the user to point to the beginning of a field such as a character amount field, a legal amount field, or some other field in a step 1302. Pointing at the touch screen causes the touch screen to signal the processor as to the X and Y coordinates of the point in a step 1304. In a step 1306 the processor is prompted to point to the end of the particular field. In a step 1308 the system records the X and Y coordinates of the end field point identified. In a step 1310 the X and Y coordinates of the initial point and the end point are used to define a region for an initial bounding box. In the step 1312 a pixel analysis routine to be described hereinafter determines whether significant portions of characters, strokes or the like extend outside the preliminary bounding box region. In a step 1314 the bounding box is then drawn on the screen and the user is prompted by the processor with a query as to whether they are satisfied with the bounds of the bounding box in a step 1316. If they are not, control is transferred back to step 1302 if they are, the bounding box is adopted in a step 1318 to define the region of interest to be operated upon by a recognition engine or recognition software which preforms optical character recognition, image character recognition, car recognition or the right.

[0205] The bounding box may also be adjusted by a zooming procedure, as set forth in a zooming procedure 1330 shown in FIG. 34, in that procedure a document image is displayed on the touch screen in a step 1332. In a step 1334 the user is prompted to locate the field of interest by touching the screen. In a step 1336 the X and Y coordinates of the point touch are recorded in RAM. In a step 1338 the displayed image zooms in on the area around the point magnifying it. A test is made in a step 1340 to determine

whether the zoom level is OK. If the user touches the screen further the process loops back to a step **1334** causing further zooming to take place. For instance the first zoom might magnify 1.8 times, the next zoom by 1.1, and successive zooms by smaller amounts so that there is a quasi-asymptotic approach without significant overshoot. Following completion of the zoom the bounding box procedure **1300** is entered by a step **1342**.

[**0206**] In order to preform the pixel analysis step **1312**, as is shown in **FIG. 35**, the initial bounding box is generated on the basis of the user input as represented by a step **1360**. In a step **1362** the area immediately surrounding the bounding box within half a character height is analyzed to determine whether portions of characters, cursive strokes or the like extend outside the bounding box region. If so, the bounding box borders are adjusted in a step **1364** to include the extraneous stroke portions within a somewhat larger bounding box. If there is a characteristic of characters which would be from a different field, as detected in a step **1366**, the bounding box borders would be shifted to preclude inclusion of those characters within the field of interest. A test is made in a step **1368** to determine if field characters are not fully enclosed by the bounding box and then the borders would be moved so as to fully enclose all character in the field of interest in that step. The new bounding box would then be generated in the step **1370** and control would be transferred to step **1314** on **FIG. 33** to draw the bounding box on the screen.

[**0207**] Transaction arbitration for any of the above steps takes place as a result of the rules DLL which was provided and is depended thereon. Although variety of transaction arbitration sets of rules can be created for various environments, in one embodiment of the instant application, as is best shown in **FIG. 36**, the courtesy address recognition result in a step **1400** is passed to a rate of confidence algorithm in step **1402** which operates on it. The courtesy amount recognition threshold value for the confidence from the step **1404** is passed to a step to determine whether the rate of confidence is greater than threshold value in a step **1406**. If it is not, the transaction is rejected in step **1408** and no further action is taken. If it is, control is passed to a step **1410** where rate of confidence algorithm is applied which receives the CAR recognition and CAR threshold as well as the numeric LAR recognition result related to the confidence level in the step **1412**. If the overall confidence value is greater than the threshold in the step **1414** when taking into account the legal amount recognition threshold from step **1416**, the transaction is accepted in a step **1418**. If not, it is rejected in a step **1420**.

#### Description of Payroll Check Cashing Routine

```
CIRS_ACTION CIRS_Rules_Payroll (
    CIRS_ENTERED    *pEntered; // Fields entered by
                        the user.
    CIRS_CHECK       *pCheck;   // Check image
                        recognition.
    CIRS_CONFIG      *pConfig)  // Application
                        specific parameters.
{
    CIRS_RESULT      MagMICR, OptMICR,
                    CheckDate;
    int               i, found;
    int               Dollars, Cents;
    // Establish the list of candidates which pass
    // threshold, for each field.
    CIRS_FilterByConf (&MagMICR, pCheck->MagMICR,
```

-continued

```
pConfig->Check.MagMICR.Thresh);
    CIRS_FilterByConf (&OptMICR, pCheck->OptMICR,
pConfig->Check.OptMICR.Thresh);
    CIRS_FilterByConf (&CheckDate, pCheck->Date,
pConfig->Check.Date.Thresh);
    // Reject the transaction if there isn't at least one
    // candidate for each field.
    if (MagMICR.CandidateCount <= 0) return
(CIRS_ACTION_BAD_CHECK_IMAGE);
    if (OptMICR.CandidateCount <= 0) return
(CIRS_ACTION_BAD_CHECK_IMAGE);
    if (CheckDate.CandidateCount <= 0) return
(CIRS_ACTION_BAD_CHECK_IMAGE
    // At least one good date candidate must be within the
    // last 30 days.
    found = FALSE;
    for (i = 0; i < CheckDate.CandidateCount; i++) {
        if ((CheckDate.Candidates(i).Value.Date.Date
    < time (NULL) &&
        (CheckDate.Candidates(i).Value.Date.Date
    > (time (NULL) - 60*60*24*30))) {
            found = TRUE;
            break;
        }
    }
    if (! found) return (CIRS_ACTION_BAD_CHECK_DATE);
    // At least one good candidate from the Optical MICR
    // result must match the Magnetic MICR.
    Dollars =
MagMICR.Candidates(0).Value.Amount.Dollars;
    Cents = MagMICR.Candidates(0).Value.Amount.Cents;
    found = FALSE;
    for (i = 0; i < OptMICR.CandidateCount; i++) {
        if
        ((OptMICR.Candidates(i).Value.Amount.Dollars ==
        Dollars) &&
        (OptMICR.Candidates(i).Value.Amount.Cents ==
        Cents)) {
            found = TRUE;
            break;
        }
    }
    if (! found) return (CIRS_ACTION_BAD_CHECK_MICR);
    // Check the MICR amount and account against the
    // database.
    if (! CIRS_ValidateMICR (MagMICR.Candidates(0),
pEntered->Cash.Dollars))
        return (CIRS_ACTION_BAD_CHECK_MICR);
    // Transaction is acceptable.
    return (CIRS_ACTION_ACCEPT);
}
```

[**0208**] Description of Remittance Processing Routine for Bill Payment

[**0209**] The Rules DLL complies to the following API definition:

```
// Confidence level for a char, word or field result.
typedef U16 CIRS_CONF; // 0-1000.
// Dollar amount field.
typedef struct {
    U16 Dollars; // 0-9, 999.
    U8 Cents; // 0-99.
    CIRS_CONF Conf; // Amount confidence.
} CIRS_AMOUNT;
// Generic account field. May contain any application-specific
// characters, but would typically be digits.
typedef char CIRS_ACCOUNT[20];
// CIRS specific date field.
```

-continued

```

typedef struct {
    time_t          Date;
    CIRS_CONF       Conf;      // Date confidence.
} CIRS_DATE;
// Image location coordinates for a char, word or field result.
// Measured in pixels. Coordinate systems
// interpolation between devices is performed in the Field
// Validation Module.
typedef struct {
    U16             x, y, dx, dy;    // Device specific.
} CIRS_SEGMENT;
// A single character returned from a recognition engine.
typedef struct {
    char            Value;           // [0-9A-Za-z{punct}].
    CIRS_SEGMENT    Segment;         // Character location.
    CIRS_CONF       Conf;           // Character
                                    // confidence.
} CIRS_CHAR;
// A single word returned from a recognition engine.
typedef struct {
    CIRS_CHAR       *Chars;         // List of characters.
    U8              CharCount;      // Number of chars in
                                    // word.
    CIRS_SEGMENT    Segment;         // Word location.
    CIRS_CONF       Conf;           // Word confidence.
} CIRS_WORD;
// A single recognition candidate for a field.
typedef struct {
    CIRS_WORD       *Words;         // List of words.
    U8              WordCount;      // Number of words in
                                    // field.
    CIRS_SEGMENT    Segment;         // Field location.
    CIRS_CONF       Conf;           // Field confidence.
    union {
        // Alternate
        // representations.
        // Only one of these
        // will exist,
        // determined by the
        // data type
        // of the field.
        CIRS_AMOUNT Amount;
        CIRS_ACCOUNT Account;
        CIRS_DATE    Date;
    } Value;
} CIRS_CANDIDATE;
// A complete recognition result for a field.
typedef struct {
    CIRS_CANDIDATE *Candidates;     // List of candidates.
    U16            CandidateCount;  // Number of
                                    // candidates.
} CIRS_REC_RESULT;
// Complete set of fields entered by the user at the system
// console.
typedef struct {
    CIRS_AMOUNT    Invoice;         // Entered Invoice
                                    // Amount.
    CIRS_AMOUNT    Paid;           // Entered Paid
                                    // Amount.
    CIRS_ACCOUNT   Account;        // Entered Account.
} CIRS_ENTERED;
// Complete set of fields recognized from a check image.
typedef struct {
    CIRS_REC_RESULT CAR;           // Check CAR.
    CIRS_REC_RESULT LAR;           // Check LAR.
    CIRS_REC_RESULT Date;          // Check Date.
    CIRS_REC_RESULT Account;       // Check Account.
} CIRS_CHECK;
// Complete set of fields recognized from an invoice image.
typedef struct {
    CIRS_REC_RESULT Amount;        // Invoice Amount.
    CIRS_REC_RESULT Paid;          // Invoice Paid
                                    // Amount.
    CIRS_REC_RESULT Date;          // Invoice Date.
    CIRS_REC_RESULT Account;       // Invoice Account.
} CIRS_INVOICE;
// All actions which can be returned from the Rules DLL.
typedef CIRS_ACTION int;

```

-continued

```

typedef enum {
    CIRS_ACTION_ACCEPT,           // Good transaction.
    CIRS_ACTION_REJECT,           // Generic failed
                                    // transaction.
    CIRS_ACTION_BAD_CHECK_IMAGE,  // Check image is
                                    // poor.
    CIRS_ACTION_BAD_CHECK_CAR,    // CAR can't be
                                    // validated.
    CIRS_ACTION_BAD_CHECK_LAR,    // LAR can't be
                                    // validated.
    CIRS_ACTION_BAD_CHECK_DATE,   // Check Date can't be
                                    // validated.
    CIRS_ACTION_BAD_CHECK_ACCT,   // Check Acct can't be
                                    // validated.
    CIRS_ACTION_BAD_INVOICE_     // Invoice image
    IMAGE,                         // is poor.
    CIRS_ACTION_BAD_INVOICE_     // Invoice Amt can't be
    AMOUNT,                       // validated.
    CIRS_ACTION_BAD_INVOICE_PAID, // Invoice Paid can't be
                                    // validated.
    CIRS_ACTION_BAD_INVOICE_DATE, // Invoice Date can't
                                    // be validated.
    CIRS_ACTION_BAD_INVOICE_ACCT // Invoice Acct can't
                                    // be
} CIRS_ACTIONS;
// Confidence threshold used for validating fields. Threshold
// values are determined experimentally,
// based on a large set of sample images. Threshold values are
// customized for each application.
typedef struct {
    CIRS_CONF       Thresh;        // 0-1000.
} CIRS_CONF_CONFIG;
// Set of thresholds for all fields on a check image.
typedef struct {
    CIRS_CONF_CONFIG CAR;
    CIRS_CONF_CONFIG LAR;
    CIRS_CONF_CONFIG Date;
    CIRS_CONF_CONFIG Account;
} CIRS_CHECK_CONFIG;
// Set of thresholds for all fields on an invoice image.
typedef struct {
    CIRS_CONF_CONFIG Amount;
    CIRS_CONF_CONFIG Paid;
    CIRS_CONF_CONFIG Date;
    CIRS_CONF_CONFIG Account;
} CIRS_INVOICE_CONFIG;
// Complete set of application specific thresholds.
typedef struct {
    CIRS_CHECK_CONFIG Check;
    CIRS_INVOICE_CONFIG Invoice;
} CIRS_CONFIG;
// Single Rules DLL entry-point.
extern CIRS_ACTION CIRS_Rules (
    CIRS_ENTERED *pEntered;      // Fields entered by the
                                    // user.
    CIRS_CHECK *pCheck;          // Check image recognition.
    CIRS_INVOICE *pInvoice;      // Invoice image
                                    // recognition.
    CIRS_CONFIG *pConfig;        // Application specific
                                    // parameters.
)

```

**[0210]** To facilitate the implementation of the Rules DLL, an API is provided which supports a basic set of CIRS related functions. The definition of the CIRS Support API follows:

```

void CIRS_FilterByConf (
    CIRS_REC_RESULT *pOutResult,
    CIRS_REC_RESULT InResult,
    CIRS_CONF       Thresh);

```

-continued

```

Remittance Processing
CIRS_ACTION CIRS_Rules (
    CIRS_ENTERED      *pEntered;    // Fields entered by the
                                user.
    CIRS_CHECK         *pCheck;      // Check image recognition.
    CIRS_INVOICE       *pInvoice;    // Invoice image
                                recognition.
    CIRS_CONFIG        *pConfig)    // Application specific
                                parameters.
{
    CIRS_RESULT        CAR, LAR, CheckDate,
                                CheckAcct, InvPaid,
                                InvAcct;
    int                i, found;
    // Establish the list of candidates which pass threshold, for each
    field.
    CIRS_FilterByConf (&CAR, pCheck->CAR,
    pConfig->Check.CAR.Thresh);
    CIRS_FilterByConf (&LAR, pCheck->LAR,
    pConfig->Check.LAR.Thresh);
    CIRS_FilterByConf (&CheckDate, pCheck->Date,
    pConfig->Check.Date.Thresh);
    CIRS_FilterByConf (&CheckAcct, pCheck->Account,
    pConfig->Check.Account.Thresh);
    CIRS_FilterByConf (&InvPaid, pInvoice->Paid,
    pConfig->Invoice.Paid.Thresh);
    CIRS_FilterByConf (&InvAcct, pInvoice->Account,
    pConfig->Invoice.Account.Thresh);
    // Reject the transaction if there isn't at least one candidate
    for each field.
    if (CAR.CandidateCount <= 0) return
    (CIRS_ACTION_BAD_CHECK_IMAGE);
    if (LAR.CandidateCount <= 0) return
    (CIRS_ACTION_BAD_CHECK_IMAGE);
    if (CheckDate.CandidateCount <= 0) return
    (CIRS_ACTION_BAD_CHECK_IMAGE);
    if (CheckAcct.CandidateCount <= 0) return
    (CIRS_ACTION_BAD_CHECK_IMAGE);
    if (InvPaid.CandidateCount <= 0) return (CIRS_ACTION_BAD_
    INVOICE_IMAGE);
    if (InvAcct.CandidateCount <= 0) return (CIRS_ACTION_BAD_
    INVOICE_IMAGE);
    // At least one good date candidate must be within the last
    15-days.
    found = FALSE;
    for (i = 0; i < CheckDate.CandidateCount; i++) {
        if ((CheckDate.Candidates(i).Value.Date.Date < time
    (NULL) &&
        (CheckDate.Candidates(i).Value.Date.Date > (time
    (NULL) ^ 60*60*24*15))) {
            found = TRUE;
            break;
        }
    }
    if (! found) return (CIRS_ACTION_BAD_CHECK_DATE);
    // At least one good candidate from the CAR field must match the
    Entered Paid Amount.
    found = FALSE;
    for (i = 0; i < CAR.CandidateCount; i++) {
        if (CAR.Candidates(i).Value.Amount.Dollars ==
    Entered.Dollars) {
            found = TRUE;
            break;
        }
    }
    if (! found) return (CIRS_ACTION_BAD_CHECK_CAR);
    // At least one good candidate from the LAR field must match the
    Entered Paid Amount.
    found = FALSE;
    for (i = 0; i < LAR.CandidateCount; i++) {
        if (LAR.Candidates(i).Value.Amount.Dollars ==
    Entered.Dollars) {
            found = TRUE;
            break;
        }
    }
}

```

-continued

```

}
    if (! found) return (CIRS_ACTION_BAD_CHECK_LAR);
    // At least one good candidate from the Invoice Paid field must
    match the Entered Paid Amount.
    found = FALSE;
    for (i = 0; i < InvPaid.CandidateCount; i++) {
        if (InvPaid.Candidates(i).Value.Amount.Dollars ==
    Entered.Dollars) {
            found = TRUE;
            break;
        }
    }
    if (! found) return (CIRS_ACTION_BAD_INVOICE_PAID);
    // Transaction is acceptable.
    return (CIRS_ACTION_ACCEPT);
}
// Confidence level for a Char, word or field result.
typedef U16      CIRS_CONF;    // 0-1000.
// Dollar amount field.
typedef struct {
    U16          Dollars;      // 0-9,999.
    U8           Cents;        // 0-99.54.
} CIRS_AMOUNT;
The Rules DLL Complies to the following API definition:
// Confidence level for a Char, word or field result.
typedef U16      CIRS_CONF;    // 0-1000.
// Dollar amount field.
typedef struct {
    U16          Dollars;      // 0-9,999.
    U8           Cents;        // 0-99.
    CIRS_CONF     Conf;        // Amount
    confidence.
} CIRS_AMOUNT;
// Generic account field. May contain any
application-specific characters, but would typically be
digits.
typedef char      CIRS_ACCOUNT[20];
// CIRS specific date field.
typedef struct {
    time_t        Date;
    CIRS_CONF     Conf;        // Date
    confidence.
} CIRS_DATE;
// Image location coordinates for a char, word or field
result. Measured in pixels. Coordinate systems
// interpolation between devices is performed in the
Field Validation Module.
typedef struct {
    U16           x, y, dx, dy; // Device specific.
} CIRS_SEGMENT;
// A single character returned from a recognition
engine.
typedef struct {
    char          Value;        //
    [0-9A-Za-z{punct}].
    CIRS_SEGMENT  Segment;      // Character
    location.
    CIRS_CONF     Conf;        // Character
    confidence.
} CIRS_CHAR;
// A single word returned from a recognition engine.
typedef struct {
    CIRS_CHAR     *Chars;       // List of
    characters.
    U8            CharCount;     // Number of
    chars in
                                word.
    CIRS_SEGMENT  Segment;      // Word
    location.
    CIRS_CONF     Conf;        // Word
    confidence.
} CIRS_WORD;
// A single recognition candidate for a field.
typedef struct {
    CIRS_WORD     *Words;       // List of words.
    U8            WordCount;    // Number of
}

```

-continued

```

words in
    CIRS_SEGMENT    Segment;    // Field
location.
    CIRS_CONF       Conf;       // Field
confidence.
    union {
        // Alternate
        // representations.
    CIRS_AMOUNT     Amount;     // Only
one of these
    CIRS_ACCOUNT    Account;    // will exist,
by the              // determined
                    data type
    CIRS_DATE       Date;       // of the
field.
    } Value;
} CIRS_CANDIDATE;
// A complete recognition result for a field.
typedef struct {
    CIRS_CANDIDATE  *Candidates; // List of
candidates.
    U16              CandidateCount; // Number of
candidates.
} CIRS_REC_RESULT;
// Complete set of fields entered by the user at the
system console.
typedef struct {
    CIRS_AMOUNT     Invoice;     // Entered
Invoice
                    Amount.
    CIRS_AMOUNT     Paid;       //
Entered Paid Amount.
    CIRS_AMOUNT     Cash;       //
Entered Check Amount.
    CIRS_ACCOUNT    Account;    // Entered
Account.
} CIRS_ENTERED;
// Complete set of fields recognized from a check
image.
typedef struct {
    CIRS_REC_RESULT CAR;       //
Check CAR.
    CIRS_REC_RESULT LAR;       //
Check LAR.
    CIRS_REC_RESULT Date;      //
Check Date.
    CIRS_REC_RESULT Account;    //
Check Account.
    CIRS_REC_RESULT MagMICR;    //
Check Amount.
    CIRS_REC_RESULT OptMICR;    //
Check Amount.
} CIRS_CHECK;
// Complete set of fields recognized from an invoice
image.
typedef struct {
    CIRS_REC_RESULT Amount;    //
Invoice Amount.
    CIRS_REC_RESULT Paid;      //
Invoice Paid Amount.
    CIRS_REC_RESULT Date;      //
Invoice Date.
    CIRS_REC_RESULT Account;    //
Invoice Account.
} CIRS_INVOICE;
// All actions which can be returned from the Rules
DLL.
typedef CIRS_ACTION int;
typedef enum {
    CIRS_ACTION_ACCEPT,        // Good transaction.
    CIRS_ACTION_REJECT,        // Generic failed
                                transaction.
    CIRS_ACTION_BAD_CHECK_IMAGE, // Check image
is poor.
    CIRS_ACTION_BAD_CHECK_CAR, // CAR

```

-continued

```

can't be
                    validated.
    CIRS_ACTION_BAD_CHECK_LAR, // LAR
can't be
                    validated.
    CIRS_ACTION_BAD_CHECK_DATE, // Check
Date can't be
                    validated.
    CIRS_ACTION_BAD_CHECK_ACCT, // Check
Acct can't be
                    validated.
    CIRS_ACTION_BAD_CHECK_MICR, // Check
MICR can't be
                    validated.
    CIRS_ACTION_BAD_CHECK_FRAUD, // Possibly
fraudulent
                    check.
    CIRS_ACTION_BAD_INVOICE_IMAGE, // Invoice
image is
                    poor.
    CIRS_ACTION_BAD_INVOICE_AMOUNT, // Invoice Amt
can't be
                    validated.
    CIRS_ACTION_BAD_INVOICE_PAID, // Invoice Paid
can't be
                    validated.
    CIRS_ACTION_BAD_INVOICE_DATE, // Invoice Date
can't be
                    validated.
    CIRS_ACTION_BAD_INVOICE_ACCT // Invoice Acct
can't be
                    validated.
} CIRS_ACTIONS;
// Confidence threshold used for validating fields.
Threshold values are determined experimentally,
// based on a large set of sample images. Threshold
values are customized for each application.
typedef struct {
    CIRS_CONF       Thresh;     // 0-1000.
} CIRS_CONF_CONFIG;
// Set of thresholds for all fields on a check image.
typedef struct {
    CIRS_CONF_CONFIG CAR;
    CIRS_CONF_CONFIG LAR;
    CIRS_CONF_CONFIG Date;
    CIRS_CONF_CONFIG Account;
    CIRS_CONF_CONFIG MagMICR;
    CIRS_CONF_CONFIG OptMICR;
    CIRS_AMOUNT      MaxCash;
} CIRS_CHECK_CONFIG;
// Set of thresholds for all fields on an invoice
image.
typedef struct {
    CIRS_CONF_CONFIG Amount;
    CIRS_CONF_CONFIG Paid;
    CIRS_CONF_CONFIG Date;
    CIRS_CONF_CONFIG Account;
} CIRS_INVOICE_CONFIG;
// Complete set of application and user-specific
parameters.
typedef struct {
    CIRS_CHECK_CONFIG Check;
    CIRS_INVOICE_CONFIG Invoice;
} CIRS_CONFIG;
// Entry point for rules related to remittance
processing.
extern CIRS_ACTION CIRS_Rules_Remittance (
    CIRS_ENTERED *pEntered; // Fields entered by
the user.
    CIRS_CHECK *pCheck;     // Check image
recognition.
    CIRS_INVOICE *pInvoice; // Invoice image
recognition.
    CIRS_CONFIG *pConfig;   // Application
specific
                                parameters.

```

-continued

---

```
// Entry point for rules related to payroll check
cashing..
extern CIRS_ACTION CIRS_Rules_payroll (
    CIRS_ENTERED      *pEntered;    // Fields entered by
the user.
    CIRS_CHECK         *pCheck;      // Check image
recognition.
    CIRS_CONFIG        *pConfig);    // Application
specific
                                parameters.
// Entry point for rules related to proof of deposit..
extern CIRS_ACTION CIRS_Rules_POD (
    CIRS_ENTERED      *pEntered;    // Fields entered by
the user.
    CIRS_CHECK         *pCheck;      // Check image
recognition.
    CIRS_CONFIG        *pConfig);    // Application
specific
                                parameters.
```

---

[0211] To facilitate the implementation of the Rules DLL, an API is provided which supports a basic set of CIRS related functions. The definition of the CIRS Support API follows:

---

```
void CIRS_FilterByConf (
    CIRS_REC_RESULT   *pOutResult,
    CIRS_REC_RESULT   InResult,
    CIRS_CONF          Thresh);
void CIRS_SortByConf (
    CIRS_REC_RESULT   *pOutResult,
    CIRS_REC_RESULT   InResult);
int CIRS_ValidateMICR (
    CIRS_CANDIDATE     MICR,
    CIRS_AMOUNT        Amount);
Remittance Processing
CIRS_ACTION CIRS_Rules_Remittance (
    CIRS_ENTERED      *pEntered;    // Fields entered by the user.
    CIRS_CHECK         *pCheck;      // Check image recognition.
    CIRS_INVOICE       *pInvoice;    // Invoice image recognition.
    CIRS_CONFIG        *pConfig)    // Application specific
                                parameters.
{
    CIRS_RESULT        CAR, LAR, CheckDate,
                                CheckAcct, InvPaid, InvAcct;
    int                i, found;
    // Establish the list of candidates which pass threshold, for each
    field.
    CIRS_FilterByConf (&CAR, pCheck->CAR,
pConfig->Check.CAR.Thresh);
    CIRS_FilterByConf (&LAR, pCheck->LAR,
pConfig->Check.LAR.Thresh);
    CIRS_FilterByConf (&CheckDate, pCheck->Date,
pConfig->Check.Date.Thresh);
    CIRS_FilterByConf (&CheckAcct, pCheck->Account,
pConfig->Check.Account.Thresh);
    CIRS_FilterByConf (&InvPaid, pInvoice->Paid,
pConfig->Invoice.Paid.Thresh);
    CIRS_FilterByConf (&InvAcct, pInvoice->Account,
pConfig->Invoice.Account.Thresh);
    // Reject the transaction if there isn't at least one candidate
    for each field.
    if (CAR.CandidateCount <= 0) return
(CIRS_ACTION_BAD_CHECK_IMAGE);
    if (LAR.CandidateCount <= 0) return
(CIRS_ACTION_BAD_CHECK_IMAGE);
    if (CheckDate.CandidateCount <= 0) return
(CIRS_ACTION_BAD_CHECK_IMAGE);
    if (CheckAcct.CandidateCount <= 0) return
```

-continued

---

```
(CIRS_ACTION_BAD_CHECK_IMAGE);
    if (InvPaid.CandidateCount <= 0) return (CIRS_ACTION_BAD_
INVOICE_IMAGE);
    if (InvAcct.CandidateCount <= 0) return (CIRS_ACTION_BAD_
INVOICE_IMAGE);
    // At least one good date candidate must be within the last
    15-days.
    found = FALSE;
    for (i = 0; i < CheckDate.CandidateCount; i++) {
        if ((CheckDate.Candidates(i).Value.Date.Date < time
(NULL) &&
(CheckDate.Candidates(i).Value.Date.Date > (time
(NULL) ^ 60*60*24*15))) {
            found = TRUE;
            break;
        }
    }
    if (! found) return (CIRS_ACTION_BAD_CHECK_DATE);
    // At least one good candidate from the CAR field must match the
    Entered Paid Amount.
    found = FALSE;
    for (i = 0; i < CAR.CandidateCount; i++) {
        if (CAR.Candidates(i).Value.Amount.Dollars ==
pEntered->Paid.Dollars) {
            found = TRUE;
            break;
        }
    }
    if (! found) return (CIRS_ACTION_BAD_CHECK_CAR);
    // At least one good candidate from the LAR field must match the
    Entered Paid Amount.
    found = FALSE;
    for (i = 0; i < LAR.CandidateCount; i++) {
        if (LAR.Candidates(i).Value.Amount.Dollars ==
pEntered->Paid.Dollars) {
            found = TRUE;
            break;
        }
    }
    if (! found) return (CIRS_ACTION_BAD_CHECK_LAR);
    // At least one good candidate from the Invoice Paid field must
    match the Entered Paid Amount.
    found = FALSE;
    for (i = 0; i < InvPaid.CandidateCount; i++) {
        if (InvPaid.Candidates(i).Value.Amount.Dollars ==
pEntered->Paid.Dollars) {
            found = TRUE;
            break;
        }
    }
    if (! found) return (CIRS_ACTION_BAD_INVOICE_PAID);
    // Transaction is acceptable.
    return (CIRS_ACTION_ACCEPT);
}
Payroll Check Cashing
CIRS_ACTION CIRS_Rules_Payroll (
    CIRS_ENTERED      *pEntered;    // Fields entered by the user.
    CIRS_CHECK         *pCheck;      // Check image recognition.
    CIRS_CONFIG        *pConfig)    // Application specific
                                parameters.
{
    CIRS_RESULT        MagMICR, OptMICR,
                                CheckDate;
    int                i, found;
    int                Dollars, Cents;
    // Establish the list of candidates which pass threshold, for each
    field.
    CIRS_FilterByConf (&MagMICR, pCheck->MagMICR,
pConfig->Check.MagMICR.Thresh);
    CIRS_FilterByConf (&OptMICR, pCheck->OptMICR,
pConfig->Check.OptMICR.Thresh);
    CIRS_FilterByConf (&CheckDate, pCheck->Date,
pConfig->Check.Date.Thresh);
```

-continued

---

```

// Reject the transaction if there isn't at least one candidate
for each field.
    if (MagMICR.CandidateCount <= 0) return
(CIRS_ACTION_BAD_CHECK_IMAGE);
    if (OptMICR.CandidateCount <= 0) return
(CIRS_ACTION_BAD_CHECK_IMAGE);
    if (CheckDate.CandidateCount <= 0) return
(CIRS_ACTION_BAD_CHECK_IMAGE)
// At least one good date candidate must be within the last 30
days.
    found = FALSE;
    for (i = 0; i < CheckDate.CandidateCount; i++) {
        if ((CheckDate.Candidates(i).Value.Date.Date < time
(NULL) &&
            (CheckDate.Candidates(i).Value.Date.Date > (time
(NULL) u 60*60*24*30))) {
            found = TRUE;
            break;
        }
    }
    if (! found) return (CIRS_ACTION_BAD_CHECK_DATE);
// At least one good candidate from the Optical MICR result must
match the Magnetic MICR.
    Dollars = MagMICR.Candidates(0).Value.Amount.Dollars;
    Cents = MagMICR.Candidates(0).Value.Amount.Cents;
    found = FALSE;
    for (i = 0; i < OptMICR.CandidateCount; i++) {
        if ((OptMICR.Candidates(i).Value.Amount.Dollars ==
Dollars) &&
            (OptMICR.Candidates(i).Value.Amount.Cents == Cents)) {
            found = TRUE;
            break;
        }
    }
    if (! found) return (CIRS_ACTION_BAD_CHECK_MICR);
// Check the MICR amount and account against the database.
    if (! CIRS_ValidateMICR (MagMICR.Candidates(0),
pEntered->Cash.Dollars))
        return (CIRS_ACTION_BAD_CHECK_MICR);
// Transaction is acceptable.
    return (CIRS_ACTION_ACCEPT);
}

```

---

**[0212]** Proof of Deposit

---

```

CIRS_ACTION CIRS_Rules_POD (
    CIRS_ENTERED    *pEntered;    // Fields entered by the user.
    CIRS_CHECK       *pCheck;      // Check image recognition.
    CIRS_CONFIG      *pConfig)     // Application specific
parameters.
{
    CIRS_RESULT      CAR, LAR, CheckDate;
    int              i, found;
    int              BestCAR, BestLAR;
// Establish the list of candidates which pass threshold, for each
field.
    CIRS_FilterByConf (&CAR, pCheck->CAR,
pConfig->Check.CAR.Thresh);
    CIRS_FilterByConf (&LAR, pCheck->LAR,
pConfig->Check.LAR.Thresh);
    CIRS_FilterByConf (&CheckDate, pCheck->Date,
pConfig->Check.Date.Thresh);
// Reject the transaction if there isn't at least one candidate
for each field.
    if (CAR.CandidateCount <= 0) return
(CIRS_ACTION_BAD_CHECK_IMAGE);
    if (LAR.CandidateCount <= 0) return
(CIRS_ACTION_BAD_CHECK_IMAGE);
    if (CheckDate.CandidateCount <= 0) return

```

-continued

---

```

(CIRS_ACTION_BAD_CHECK_IMAGE)
// At least one good date candidate must be within the last 30
days.
    found = FALSE;
    for (i = 0; i < CheckDate.CandidateCount; i++) {
        if ((CheckDate.Candidates(i).Value.Date.Date < time
(NULL) &&
            (CheckDate.Candidates(i).Value.Date.Date > (time
(NULL) u 60*60*24*30))) {
            found = TRUE;
            break;
        }
    }
    if (! found) return (CIRS_ACTION_BAD_CHECK_DATE);
// At least one good candidate from the CAR field must match the
Entered Amount.
    found = FALSE;
    for (i = 0; i < CAR.CandidateCount; i++) {
        if (CAR.Candidates(i).Value.Amount.Dollars ==
pEntered->Paid.Dollars) {
            found = TRUE;
            BestCAR = i;
            break;
        }
    }
    if (! found) return (CIRS_ACTION_BAD_CHECK_CAR);
// At least one good candidate from the LAR field must match the
Entered Amount.
    found = FALSE;
    for (i = 0; i < LAR.CandidateCount; i++) {
        if (LAR.Candidates(i).Value.Amount.Dollars ==
pEntered->Paid.Dollars) {
            found = TRUE;
            BestLAR = i;
            break;
        }
    }
    if (! found) return (CIRS_ACTION_BAD_CHECK_LAR);
// Detect possible check tampering.
    if ((CAR.Candidates(BestCAR).Conf > CarFraudMin) &&
        (LAR.Candidates(BestLAR).Conf >
LAR.Candidates(BestLAR).Words(0).Conf >
LarFraudSpread))
        return (CIRS_ACTION_BAD_CHECK_FRAUD);
// Transaction is acceptable.
    return (CIRS_ACTION_ACCEPT);
}

```

---

**[0213]** Proof of Deposit

---

```

CIRS_ACTION CIRS_Rules_Payroll (
    CIRS_ENTERED    *pEntered;    // Fields entered by the user.
    CIRS_CHECK       *pCheck;      // Check image recognition.
    CIRS_CONFIG      *pConfig)     // Application specific
parameters.
{
    CIRS_RESULT      MagMICR, OptMICR, CheckDate;
    int              i, found;
    int              Dollars, Cents;
// Establish the list of candidates which pass threshold, for each
field.
    CIRS_FilterByConf (&MagMICR, pCheck->MagMICR,
pConfig->Check.MagMICR.Thresh);
    CIRS_FilterByConf (&OptMICR, pCheck->OptMICR,
pConfig->Check.OptMICR.Thresh);
    CIRS_FilterByConf (&CheckDate, pCheck->Date,
pConfig->Check.Date.Thresh);
// Reject the transaction if there isn't at least one candidate
for each field.
    if (MagMICR.CandidateCount <= 0) return
(CIRS_ACTION_BAD_CHECK_IMAGE);
    if (OptMICR.CandidateCount <= 0) return

```

-continued

```
(CIRS_ACTION_BAD_CHECK_IMAGE);
    if (CheckDate.CandidateCount <= 0) return
(CIRS_ACTION_BAD_CHECK_IMAGE
// At least one good date candidate must be within the last 30
days.
    found = FALSE;
    for (i = 0; i < CheckDate.CandidateCount; i++) {
        if ((CheckDate.Candidates(i).Value.Date.Date < time
(NULL) &&
            (CheckDate.Candidates(i).Value.Date.Date > (time
(NULL) - 60*60*24*30))) {
                found = TRUE;
                break;
            }
        }
    if (! found) return (CIRS_ACTION_BAD_CHECK_DATE);
// At least one good candidate from the Optical MICR result must
match the Magnetic MICR.
    Dollars = MagMICR.Candidates(0).Value.Amount.Dollars;
    Cents = MagMICR.Candidates(0).Value.Amount.Cents;
    found = FALSE;
    for (i = 0; i < OptMICR.CandidateCount; i++) {
        if ((OptMICR.Candidates(i).Value.Amount.Dollars ==
Dollars) &&
            (OptMICR.Candidates(i).Value.Amount.Cents == Cents)) {
                found = TRUE;
                break;
            }
        }
    if (! found) return (CIRS_ACTION_BAD_CHECK_MICR);
// Check the MICR amount and account against the database.
    if (! CIRS_ValidateMICR (MagMICR.Candidates(0),
pEntered->Cash.Dollars))
        return (CIRS_ACTION_BAD_CHECK_MICR);
// Transaction is acceptable.
    return (CIRS_ACTION_ACCEPT);
```

**[0214]** It will be appreciated that although various aspects of the invention have been described with respect to specific embodiments, alternatives and modifications will be apparent from the present disclosure, which are within the spirit and scope of the present invention as set forth in the following claims.

What is claimed is:

1. An automated machine for an automated document handling system for dispensing cash to a system user comprising:

- a card receiver for receiving a card having an identification password associated therewith for identifying the user as a qualified user;
- a document receiver in the machine for receiving a document inserted by the system user into the machine for which cash is expected to be dispensed;
- a document scanner for scanning the received document;
- a processor for receiving the document scanner input and generating an image thereof;
- a display device coupled to the processor for displaying an image from the scanned document to the system user;
- an entering device coupled to the processor for the system user to enter an amount relative to the amount on the document;

wherein the processor ascertains if an apparent signature from the document image is on the signature line of the document image in order to validate the document; and

a cash dispenser coupled to the processor operable after the user has been qualified and the document has been validated by the processor to dispense cash automatically to the system user.

2. A machine in accordance with claim 1 further comprising:

a MICR reader for reading a MICR amount line on the document and comparing the amount entered by the user to the amount read by the MICR reader.

3. A machine in accordance with claim 1 further comprising:

an endorsement validator for interpreting an endorsement area of the stored image of the document to ascertain if an endorsement is present for validation of the document prior to completing the transaction.

4. A machine in accordance with claim 3 wherein the display device comprises a touch screen coupled to the processor, a bounding device operable by a touch on the screen to cause a magnification of the portion of the displayed document image being read to fill a larger area of the touch screen.

5. A machine in accordance with claim 4 further comprising:

a manually operable acceptor coupled to the processor for the system user to signify acceptance by the user of the data identified as associated with the displayed bounding box.

6. A machine in accordance with claim 1 wherein the processor identifies a courtesy amount recognition (CAR) line and legal amount recognition (LAR) line of the document image; and

based upon the likelihood of a match of the CAR amount relative to the LAR amount provides a validation of the document.

7. A machine in accordance with claim 1 wherein the document is a check and wherein a magnetic ink character recognition line (MICR) is on the check; said machine further comprising:

a magnetic ink character reader coupled to the processor for magnetically reading that the MICR line region, the processor determining whether a genuine MICR is on the check, the processor further verifying that an account number and a bank number from the MICR line are valid prior to dispensing cash to the system user.

8. A machine in accordance with claim 7 wherein

the processor causes the machine to prompt the system user to perform manipulations on the machine relative to the document being processed.

9. A machine in accordance with claim 8 wherein

the evaluator of the processor is operated in a different mode in response to the user selecting a kind of document being processed from a list of several documents.

10. A machine in accordance with claim 8 wherein

the processor responds to prompted user inputs is operable to locate data fields on the document image.

**11.** A machine in accordance with claim 10 wherein the document image is an image of a bill for payment.

**12.** A machine in accordance with claim 11 wherein the user is prompted to enter into the entry device the amount of the bill and amount to be paid from a check with a remainder of the check amount being dispensed to the user in cash; and

a change device puts at least a portion of the remainder on a card of the user.

**13.** A machine in accordance with claim 12 wherein the image from the document includes:

a user account number printed on the bill; the amount due; and the date of the bill.

**14.** An automated machine for an automated document handling system for dispensing cash to a system user comprising:

a card receiver for receiving a card having an identification password associated therewith for identifying the user as a qualified user;

a document receiver for receiving a document inserted by user into the machine for which cash is expected to be dispensed;

a document scanner for scanning the document;

a processor coupled to the document scanner for generating a document image;

a display device coupled to the processor to display a scanned image from the document to the machine user;

an entering device coupled to the processor for the system user to enter an amount relative to the document;

wherein the processor interprets a courtesy amount recognition line (CAR) and a legal amount recognition line (LAR) on the document image;

wherein the processor compares the CAR relative to the LAR and the amount entered by the system user relative to the LAR and CAR and provides a confidence level, the confidence level being compared to a threshold to validate the document and to cause a dispensing of cash; and

a cash dispenser coupled to the processor operable after the processor qualifies the user and after the processor validates the document to dispense cash automatically to the system user.

**15.** A system in accordance with claim 14 wherein the system user provides a biometric input device coupled to the processor and a biometric identifier; and

the processor evaluates the biometric identification from the user against stored biometric data relative to the user to qualify the user prior to dispensing cash to the user.

**16.** A method for automatic banking for dispensing cash to a system user without a teller, the method comprising the steps of:

providing an automated machine having a card receiver;

inserting a card having an identification password associated therewith identifying the user as a qualified user into the machine;

inserting a document into the machine and scanning the document to produce a second document image;

displaying an image from the scanned document to the machine user;

entering by the user into the machine an amount relative to the amount on the document;

reviewing the signature line of the document for the presence of a signature in order to validate the document; and

dispensing from a cash dispenser in the machine after qualifying the user and validation of document.

**17.** A method in accordance with claim 16 wherein a MICR amount line appears on the document and including:

reading the MICR amount line and comparing the amount entered by the user to the MICR amount read.

**18.** A method in accordance with claim 16 including:

interpreting an endorsement area of the signature document image to ascertain if an endorsement is present for validation of the document prior to completing the transaction.

**19.** A method in accordance with claim 18 including:

bounding data on the displayed document image and magnifying the displayed data being bounded to fill a display boundary area.

**20.** A method in accordance with claim 19 including:

accepting from the user the bounded data to be processed.

**21.** A method in accordance with claim 16 including:

interpreting a courtesy amount recognition (CAR) line and legal amount recognition (LAR) line from the second document image; and

comparing the CAR relative to the LAR to provide a validation of the document.

**22.** A method in accordance with claim 16 wherein the document is a check and wherein a magnetic ink character recognition line (MICR) is on the check; further comprising:

reading and verifying that the MICR line is written in magnetic ink;

reading and verifying an account number and a bank number from the MICR; and

verifying that the read bank and account numbers are valid prior to dispensing cash to the user.

**23.** A method in accordance with claim 22 including:

prompting the user to perform manipulations on the machine relative to the document being processed.

**24.** A method in accordance with claim 23 including:

selecting the kind of document being processed from a list of several documents being displayed to the user.

**25.** A method in accordance with claim 23 including:

prompting the user to locate data fields on a document image; and

bounding a data field on the document image for interpretation.

**26.** A method in accordance with claim 25 including paying a bill from the machine and an inserted check.

**27.** A method in accordance with claim 26 including:

prompting the user to enter the amount of the bill and amount to be paid from a check with a remainder of the check amount being dispensed to the user in cash.

**28.** A method in accordance with claim 27 including:

interpreting a user's account number printed on the bill; the amount due; and the date of the bill.

**29.** A method in accordance with claim 16 including the step of:

writing change onto a card in addition to dispensing cash.

**30.** A method for handling documents and for dispensing cash to a user from a machine without a teller, said method comprising:

inserting a card having an identification password associated therewith for identifying the user as a qualified user into the machine;

receiving a document inserted by user into the machine in exchange for which cash is expected to be dispensed;

scanning the inserted document;

displaying a scanned image from the document to the machine user;

manually entering by the user into the machine an amount relative to the document;

machine interpreting a courtesy amount recognition line (CAR) and a legal amount recognition line (LAR) from the second document image;

and matching the amount entered by the machine user to the interpreted LAR and CAR amounts;

determining a confidence level; comparing the confidence level to a threshold to determine if it is sufficient to validate the document and to cause a dispensing of cash; and

dispensing cash from the machine after qualifying the user and after validating the document.

**31.** A method in accordance with claim 30 including:

taking biometric data from the user at the machine; and

evaluating the biometric data from the user against stored biometric data relative to the user for qualifying the user prior to dispensing cash to the user.

**32.** An automated machine for an automated document handling system for making bank deposits with a monetary document comprising:

a card receiver for receiving a card having an intelligence associated therewith for identifying the user as a qualified user;

a document receiver in the machine for receiving the monetary document inserted by the system user into the machine from which a deposit is being made;

a document scanner for scanning the received document;

a processor for receiving the document scanner input and generating an image thereof;

a display device coupled to the processor for displaying an image from the scanned monetary document to the system user;

an entering device coupled to the processor for the system user to enter an amount to be deposited;

the processor reviewing images from a legal amount recognition line and a courtesy amount recognition line for a confidence level for acceptance of the user-entered amount;

the processor ascertaining if an apparent signature from the document image is on the signature line of the document image in order to validate the document; and

an acceptance of deposit indicator operable by the processor after qualification of the user and validity of the document to indicate proof of deposit to the system user.

**33.** A machine in accordance with claim 32 further comprising:

a MICR reader for reading a MICR amount line on the document and comparing the amount entered by the user to the amount read by the MICR reader.

**34.** A machine in accordance with claim 32 wherein a locating device is provided to define coordinates on the image and the device is operable by the user to locate areas on the document image for the processor to review.

**35.** A machine in accordance with claim 32 wherein the device comprises a touch screen and the user touches the screen at areas on the document image for one or more of the CAR line, LAR line, date line, MICR line, name line and address line.

**36.** A machine in accordance with claim 35 wherein the processor comprises an arbitrator for comparing results from an analysis of the CAR line, LAR line, and the user-entered amount.

**37.** A machine in accordance with claim 32 comprising ICR engines that specialize in recognition of a particular portion of the document image;

a CAR engine that provides confidence levels with respect to the CAR line; and

a LAR engine that provides confidence levels with respect to the CAR line.

**38.** A method of making bank deposits with a monetary transaction document in an automated system without the use of a teller, the method comprising the steps of:

providing an automated machine having a card receiver for receiving a card having an intelligence associated therewith for identifying the user as a qualified user;

inserting a monetary transaction document into the automated machine;

scanning the received document and generating an image therefrom;

displaying an image from the scanned monetary transaction document to the system user;

entering an amount by the user into the machine, which amount is to be deposited;

reviewing images from a legal amount recognition line and from a courtesy amount recognition line and reviewing the user-entered amount in a processor to provide a confidence level;

ascertaining if an apparent signature from the document image is on the signature line of the document image in order to validate the document; and

providing an acceptance of deposit to the user operable by the processor after qualification of the user and an acceptable confidence level with respect to the document.

**39.** A method in accordance with claim 38 further comprising the further step of:

reading a MICR amount line on the document and reviewing the amounts entered by the user and read by a MICR reader to ascertain if a sufficient confidence level is present.

**40.** A method in accordance with claim 38 including the further step of:

defining coordinates on the image by user and locating areas on the document image for the processor to review.

**41.** A method in accordance with claim 38 including the further step of:

providing a touch screen, touching the screen at areas on the document image for one or more of the CAR line, LAR line, date line, MICR line, name line and address line.

**42.** A method in accordance with claim 41 including the further step of arbitrating results from an analysis of the CAR line, LAR line, and the user-entered amount.

**43.** A method in accordance with claim 38 including the step of:

using ICR engines that specialize in recognition of a particular portion of the document image;

using a CAR engine that provides confidence levels with respect to the CAR line; and

using a LAR engine that provides confidence levels with respect to the LAR line.

**44.** A method in accordance with claim 38 including the step of:

reviewing a MICR line on the monetary transaction document; and

reviewing a date on the transaction for meeting rules with respect to antedating or post-dating.

**45.** A method in accordance with claim 38 including the step of:

dispensing in cash a portion of the amount to the user from the amount being deposited; and

writing any change from the portion being dispensed onto a card of the user.

**46.** An automated banking system for receiving cash from a user and for dispensing cash to a user comprising:

an automated machine having a card receiver for receiving a card which assists in identifying a user as being qualified to perform transactions with the machine;

a document receiver for receiving a monetary transaction document to be cashed;

a device for interpreting the amount on the monetary transaction document;

a signature analyzer for analyzing that a signature is present at the desired position on the monetary transaction document;

a cash dispenser in the automated machine for dispensing cash to the user;

an entering device for the user to enter the amount of the monetary transactional document;

a cash receiver for receiving cash and a cash analyzer for analyzing the amount of cash received from the user;

a cash storage device associated with the machine for receiving the cash being deposited by the user; and

a transactional operator for operation by the user to cause a dispensing of cash to the user or to perform a transaction upon deposit of sufficient cash by user for the requested transaction.

**47.** A system in accordance with claim 46 wherein:

the document being cashed is a money order.

**48.** A system in accordance with claim 46 wherein:

the transaction is payment of a bill from a provider;

the device for interpreting the amount includes a scanner to scan the provider's account number and the user's identification from the bill.

**49.** A system in accordance with claim 48 wherein:

the cash receiver adds the cash bills received and forwards signals representing the total cash being deposited; and

a comparator compares the cash being deposited relative to the amount scanned from the bill by the scanner to ascertain if the total cash covers the bills and a transaction fee.

**50.** A method of automated banking for receiving cash from a user or for dispensing cash from the machine to the user comprising:

providing an automated machine having a card receiver for receiving a card, which assists in identifying the user as being qualified to use the machine;

inserting a signed monetary transactional document into the machine;

providing a cash dispenser for dispensing cash to the user operable if needed;

depositing cash into the machine and automatically calculating the amount of cash which is being deposited into the machine;

analyzing the monetary transaction document for the presence of a signature;

entering manually by the user the amount of the monetary transaction document;

inquiring of the user what transaction is to be performed with the deposited cash or from the signed monetary transaction document; and

automatically deducting a fee for the transaction and displaying to the user the amount of the transaction fee.

**51.** A method in accordance with claim 46 further comprising:

inserting a document to be cashed into the document receiver;

reading the cursive signature on the document;

verifying the signature as a qualified signature; and

dispensing cash to the user.

**52.** A method in accordance with claim 50 further comprising:

paying a bill by inserting the bill into the machine;  
ascertaining the bill provider's account number and user's identification account number from the bill; and  
sending signals over a network to cause a transfer of funds to the account of the bill provider.

**53.** A method in accordance with claim 50 further comprising:

recording the transaction on a storage medium; and  
issuing a receipt to the user with a receipt printer.

**54.** A method in accordance with claim 50 further comprising:

generating change between the amount of transaction and the amount of cash or the amount written on through the medium; and

further comprising writing change onto a card for the user.

**55.** A method of operating an unattended banking machine for performing a number of banking transactions and other transactions by a user, comprising:

providing an automated machine having a card receiver for receiving a card which identifies the user as being qualified to use the machine;

displaying to the user a list of selected, transactional options including withdrawal of cash option, a deposit of cash option, a cashing check option, a cashing money order option, a buying money order option, a wire transfer screen option, a bill payment option and purchasing option;

receiving a card and verifying the user as being qualified; depositing a monetary transaction document in the machine,

and scanning the monetary transaction document being deposited with respect to the amount on the document and for the presence of a signature on the document;

dispensing cash to the user if the user is entitled to cash and if the document and the user meet sufficient security confidence levels; and

printing a document showing the transaction, and fees for the transaction, and the amount of cash or being dispensed or deposited in the machine.

**56.** A method in accordance with claim 55 wherein the user selects a dispensing and purchasing option and further comprising:

reviewing the amount of cash deposited by the user with respect to the item being purchased; and

dispensing the item to the user through the machine upon verification of sufficient payment by the qualified user of the machine.

**57.** A method in accordance with claim 55 including the step of:

displaying on a display screen various transactional options; and

manually selecting one transaction to be performed from the list of transactional options available to the user.

**58.** A method in accordance with claim 55 wherein the document is a check and further comprising:

reading the magnetic ink character recognition data with respect to the bank issuing the check; and

communicating through the communication network to the identified bank.

**59.** A method in accordance with claim 55 wherein the document being received is a money order, and further comprising examining a cursive signature on the back of the money order prior to validation and dispensing of any cash to the user.

**60.** A method in accordance with claim 55 wherein the user has selected a bill paying operation further comprising:

receiving the bill document;

scanning the bill document for the amount due to the provider;

communicating the modem to the bill issuer's bank account the amount of payment being made by the user;

generating a receipt showing an amount paid for the bill to the user;

storing the bill in a storage device; and

providing a transactional tag with respect to the bill so that the transaction can be later reviewed, if necessary.

**61.** A method in accordance with claim 55 further comprising:

storing money order blanks in the machine;

generating signals to cause a printer to print the amount to be paid on the money order; and

dispensing the printed money order to the machine user.

**62.** A method in accordance with claim 55 including the step of:

performing a biometric analysis of a biometric characteristic of the user relative to a previously stored biometric characteristic of the user for qualifying the user.

**63.** A method in accordance with claim 55 including the step of:

prompting the user to provide a bounding box about a scanned portion of the monetary transaction document.

**64.** A method in accordance with claim 63 including the step of:

touching a touch screen in response to a prompting.

**65.** A method in accordance with claim 64 including the step of:

magnifying data within the boundary box to aid in elimination of unwanted data.

**66.** A system for automatic cashing of checks or making remittance transactions without the aid of bank teller or the like, comprising:

an automated machine for receiving a document having data thereon for the transaction;

a scanning device in the machine for scanning the document and providing an image from the document to the user;

- a user validator for validating the user with a security confidence level;
  - a document validator for validating the document with a security confidence level;
  - a manual entry device operable by the user to enter an amount with respect to the document and the transaction to be performed;
  - a cash dispenser associated with the machine for dispensing cash when the user and document have sufficient security confidence levels; and
  - a boundary device operable by the user to locate data on the transaction document for automatic analysis.
- 67.** A system in accordance with claim 66 wherein:
- the boundary device includes a user operated magnification to magnify the data in a bounding box.
- 68.** A method in accordance with claim 67 wherein:
- a touch screen is touched by the user to create the bounding box and to magnify the data in the bounding box.
- 69.** A system for automatic cashing of checks or making remittance transactions without the aid of bank teller or the like, comprising:
- an automated machine for receiving a document having data thereon for the transaction;
  - a scanning device in the machine for scanning the document and providing an image from the document to the user;
  - a user validator for validating the user with a security confidence level;
  - a document validator for validating the document with a security confidence level;
  - a manual entry device operable by the user to enter an amount with respect to the document and the transaction to be performed;
  - a cash dispenser associated with the machine for dispensing cash when the user and document have sufficient security confidence levels; and
  - a card writing device for adding a change amount onto a card to complete the transaction.
- 70.** An apparatus in accordance with claim 69 wherein the cash dispenser comprises bins for holding only cash of certain large denominations; and
- a processor in the system causes the dispensing of large denominations of cash from the bins and a dispensing of the card after writing the smaller change amount on the card.
- 71.** A system for automatic cashing of checks or making remittance transactions without the aid of bank teller or the like, comprising:
- an automated machine for receiving a document having data thereon for the transaction;
  - a scanning device in the machine for scanning the document and providing an image from the document to the user;
  - a user validator for validating the user with a security confidence level;
  - a document validator for validating the document with a security confidence level;
  - a manual entry device operable by the user to enter an amount with respect to the document and the transaction to be performed;
  - a cash dispenser associated with the machine for dispensing cash when the user and document have sufficient security confidence levels; and
  - a MICR device for analysis of a MICR line with respect to the amount of a payroll check being cashed; and
  - a document validator comprises a device for analysis of the check issuer's account number as authorized account.
- 72.** An apparatus in accordance with claim 71 wherein the validator for the document includes an engine for extraction of data at a legal amount recognition line (LAR) and an engine for extraction of data at a courtesy amount recognition line (CAR) to provide security confidence levels that CAR and LAR match one another.
- 73.** A system for automatic cashing of checks or making remittance transactions without the aid of bank teller or the like, comprising:
- an automated machine for receiving a document having data thereon for the transaction;
  - a scanning device in the machine for scanning the document and providing an image from the document to the user;
  - a user validator for validating the user with a security confidence level;
  - a document validator for validating the document with a security confidence level;
  - a manual entry device operable by the user to enter an amount with respect to the document and the transaction to be performed;
  - a cash dispenser associated with the machine for dispensing cash when the user and document have sufficient security confidence levels; and
  - a MICR device for analysis of a MICR line with respect to the amount of a payroll check being cashed; and
  - a document validator comprises a device for analysis of the check issuer's account number as authorized account.
- 74.** A system in accordance with claim 73 wherein the document validator comprises a MICR reader to detect that the MICR line is written with magnetic material.
- 75.** A method for automatic cashing of checks or making remittance transactions without the aid of bank teller or the like, comprising the steps of:
- providing an automated machine for receiving a document having data thereon for the transaction and a processor for the system;
  - scanning the document and providing an image from the document to the user;
  - validating with the processor that the user has a sufficient security confidence level;
  - validating with the processor the document as having a sufficient security confidence level;

operating a manual entry device at the machine to enter an amount with respect to the document and the transaction to be performed; and

bounding data on the transaction document by operations of the user to locate data for the processor for an automatic analysis by the processor; and

dispensing cash when the user and document have validated security confidence levels.

**76.** A method in accordance with claim 75 including the step of:

magnifying the data in the bounding box.

**77.** A method in accordance with claim 76 including the step of:

touching a touch screen to create the bounding box and to magnify the data in the bounding box.

**78.** A method for automatic cashing of checks or making remittance transactions without the aid of bank teller or the like, comprising the steps of:

providing an automated machine for receiving a document having data thereon for the transaction and a processor for the system;

scanning the document and providing an image from the document to the user;

validating with the processor that the user has a sufficient security confidence level;

validating with the processor the document as having a sufficient security confidence level;

operating a manual entry device at the machine to enter an amount with respect to the document and the transaction to be performed; and

dispensing cash when the user and document have validated security confidence levels in bills of certain denominations; and

writing change on a card of the user to complete the cash transaction.

**79.** A method in accordance with claim 78 wherein the cash dispenser comprises bins for holding only cash of certain large denominations; and including the step of:

operating the processor to cause a dispensing of the large denominations of cash from the bins; and

dispensing of the card from the machine after writing the smaller change amount on the card.

**80.** A method for automatic cashing of checks or making remittance transactions without the aid of bank teller or the like, comprising the steps of:

providing an automated machine for receiving a document having data thereon for the transaction and a processor for the system;

scanning the document and providing an image from the document to the user;

validating with the processor that the user has a sufficient security confidence level;

validating with the processor the document as having a sufficient security confidence level;

operating a manual entry device at the machine to enter an amount with respect to the document and the transaction to be performed; and

analyzing a biometric characteristic of the user as part of the validation of the user; and

dispensing cash when the user and document have validated security confidence levels.

**81.** A method in accordance with claim 80 including the steps of:

using an engine for extraction of data at a legal amount recognition line (LAR) and using an engine for extraction of data at a courtesy amount recognition line (CAR) to provide security confidence levels that CAR and LAR match one another.

**82.** A method for automatic cashing of checks issued by a previously authorized issuer entity without the aid of bank teller or the like, comprising the steps of:

providing an automated machine for receiving a document having data thereon for the transaction and a processor for the system;

scanning the document and providing an image from the document to the user;

validating with the processor that the user has a sufficient security confidence level;

validating with the processor the document as having a sufficient security confidence level;

operating a manual entry device at the machine to enter an amount with respect to the document and the transaction to be performed; and

reading a MICR line to establish the cash amount of the monetary transaction document generated by the authorized issuer;

analyzing the issuer's account number as being an authorized account for the issuer entity; and

dispensing cash when the user and document have validated security confidence levels.

**83.** A method in accordance with claim 82 comprising:

detecting that the MICR line is written with magnetic material.

**84.** A method for automatic handling of checks without the aid of bank teller or the like, comprising:

providing an automated machine for receiving a document having data thereon for the transaction and a processor for the system;

scanning the document to produce a document image and dissecting the image;

entering the check amount by the user;

validating with a processor that the user has a sufficient security confidence level;

performing several field evaluations from the dissected image with respect to the amount of the check;

making a list of amount results ranked by confidence level from a plurality of field evaluations;

providing rules for arbitration of the check transaction;  
arbitrating a transaction in response to the user-entered  
check amount and the respective field amount results  
using the rules; and

performing the transaction when the transaction arbitra-  
tion has been satisfied.

**85.** A method in accordance with claim 84 wherein  
performing several field evaluations includes:

extracting a dissected image of a legal amount recognition  
line (LAR) and

extracting a dissected image of a courtesy amount recog-  
nition line (CAR).

**86.** A method in accordance with claim 84 further com-  
prising:

making a remittance transaction with the check;

dissecting an image of an associated remittance docu-  
ment;

making a list of amount results ranked by confidence level  
with respect to the amount on the associated remittance  
document; and

providing the amount results of the associated remittance  
document for arbitration prior to making the remittance  
transaction.

**87.** A method in accordance with claim 85 wherein  
performing the transaction comprises the step of:

making a deposit in the user's account.

**88.** A method in accordance with claim 84 wherein  
making several field evaluations comprises:

optically recognizing a MICR line amount; and

extracting a dissected image of a date amount recognition  
line.

**89.** A method in accordance with claim 85 wherein the  
arbitration step comprises:

inputting a CAR recognition result into a weighted con-  
fidence algorithm for the CAR;

comparing the result of the weighted confidence algo-  
rithm with a CAR threshold value;

inputting a LAR recognition result into a weighted con-  
fidence algorithm for the LAR; and

comparing the result of the weighted confidence algo-  
rithm for the LAR with a CAR threshold value.

**90.** A method in accordance with claim 84 comprising:

magnetically recognizing a MICR line on the check to  
establish that the MICR line is written with magnetic  
material; and

performing a date amount recognition.

\* \* \* \* \*