US008096471B2

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Cummings et al.

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(45) **Date of Patent: Jan. 17, 2012**

(54) **BALLOT MARKING DEVICE HAVING ATTACHED BALLOT BOX**

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(73) Assignee: **ES&S Automark, LLC**, Omaha, NE (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 547 days.

(21) Appl. No.: **12/337,266**

(22) Filed: **Dec. 17, 2008**

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Related U.S. Application Data

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(51) **Int. Cl.**
G06K 17/00 (2006.01)

(52) **U.S. Cl.** **235/386**; 235/375

(58) **Field of Classification Search** 235/50, 235/375, 386; 705/12

See application file for complete search history.

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Election Systems and Software, brochure, *Model 100 Precinct Ballot Counter,* Mar. 22, 2005, 1 pg.

Election Systems and Software, brochure, *intElect DS200, The Next Generation of Paper-Based Vote Tabulation,* 2 pgs (This brochure describes a product in use prior to the filing date of tis application), before Dec. 18, 2007.

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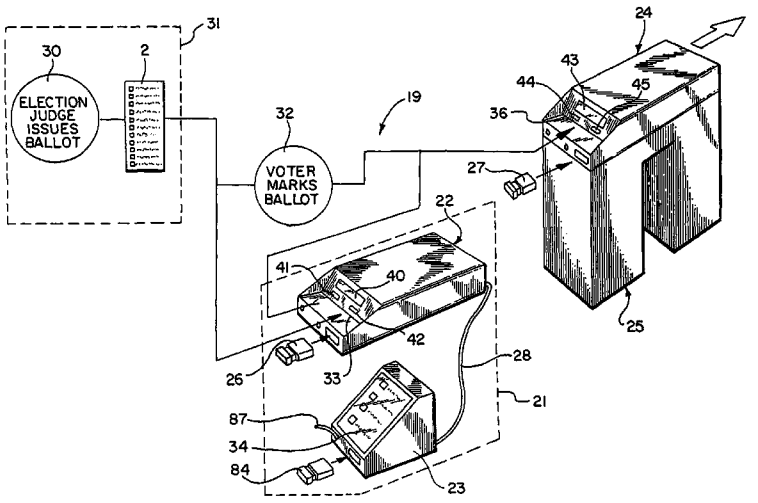
Primary Examiner — Thien M Le

(74) *Attorney, Agent, or Firm* — Stinson Morrison Hecker LLP

(57) **ABSTRACT**

The present invention is generally directed to a ballot marking device adapted to mark a ballot and either return the marked ballot to the voter or automatically deposit the marked ballot into a secure ballot box attached to the marking device. The device includes a presentation device operable to present to the voter a plurality of election choices and ballot handling choices, and an input device operable to receive from the voter at least one selection corresponding to the election choices and at least one instruction corresponding to the ballot handling choices. The device also includes a marking mechanism operable to record the received voter selection on the ballot, a transport mechanism operable to transport the ballot through the device, and a diverter operable to direct the ballot from the transport mechanism into the attached ballot box. An associated method is also disclosed.

20 Claims, 37 Drawing Sheets



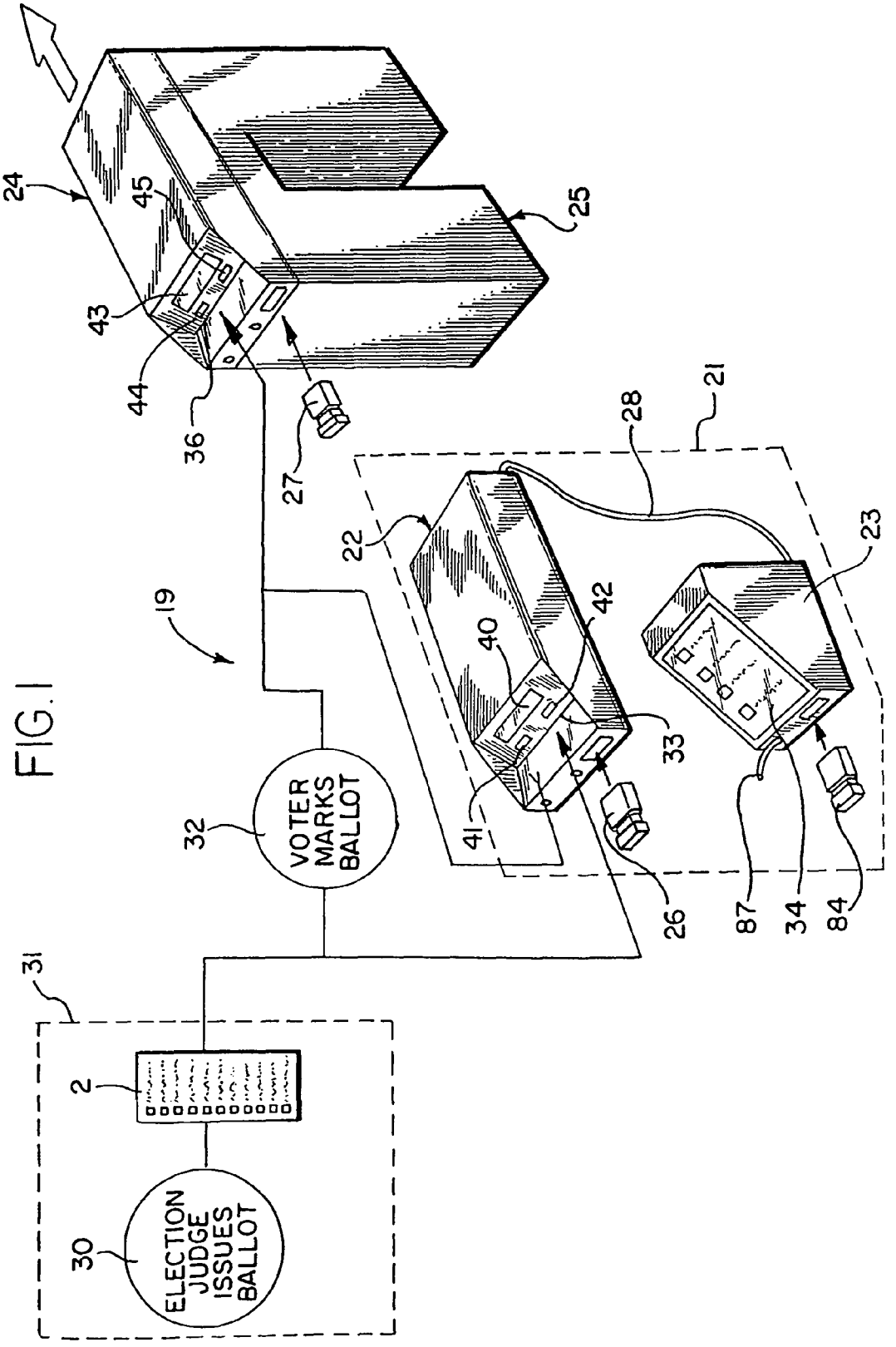

24
45
25
43
44
36
27
28
21
22
23
19
42
40
33
41
26
87
34
84
32
VOTER MARKS BALLOT
31
2
30
ELECTION JUDGE ISSUES BALLOT

FIG. 1

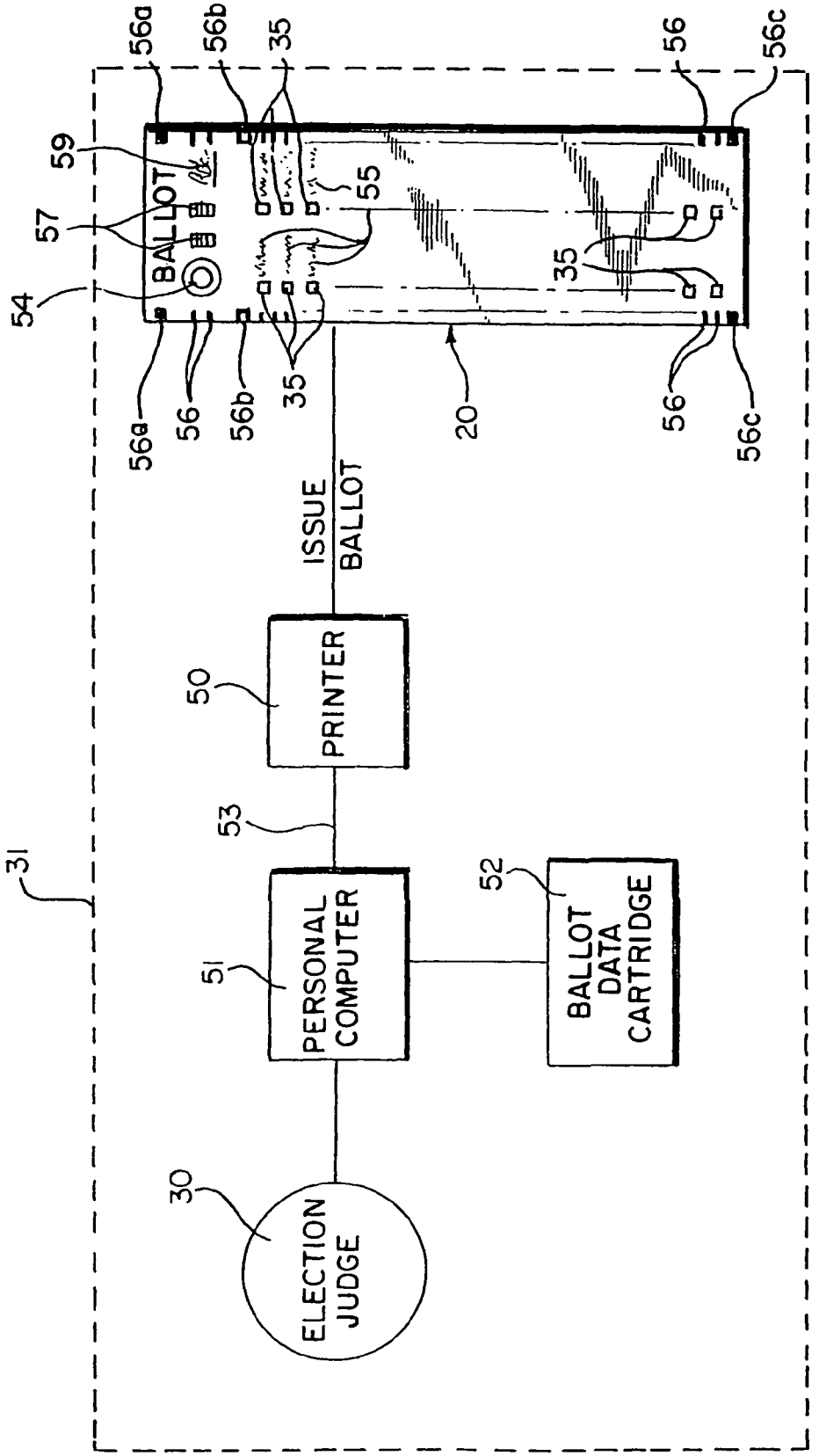

56a
56b
35
56
56c
59
57
54
BALLOT
55
35
56a
56
56b
35
20
56
56c
ISSUE BALLOT
50
PRINTER
53
31
52
51
PERSONAL COMPUTER
BALLOT DATA CARTRIDGE
30
ELECTION JUDGE

FIG.2

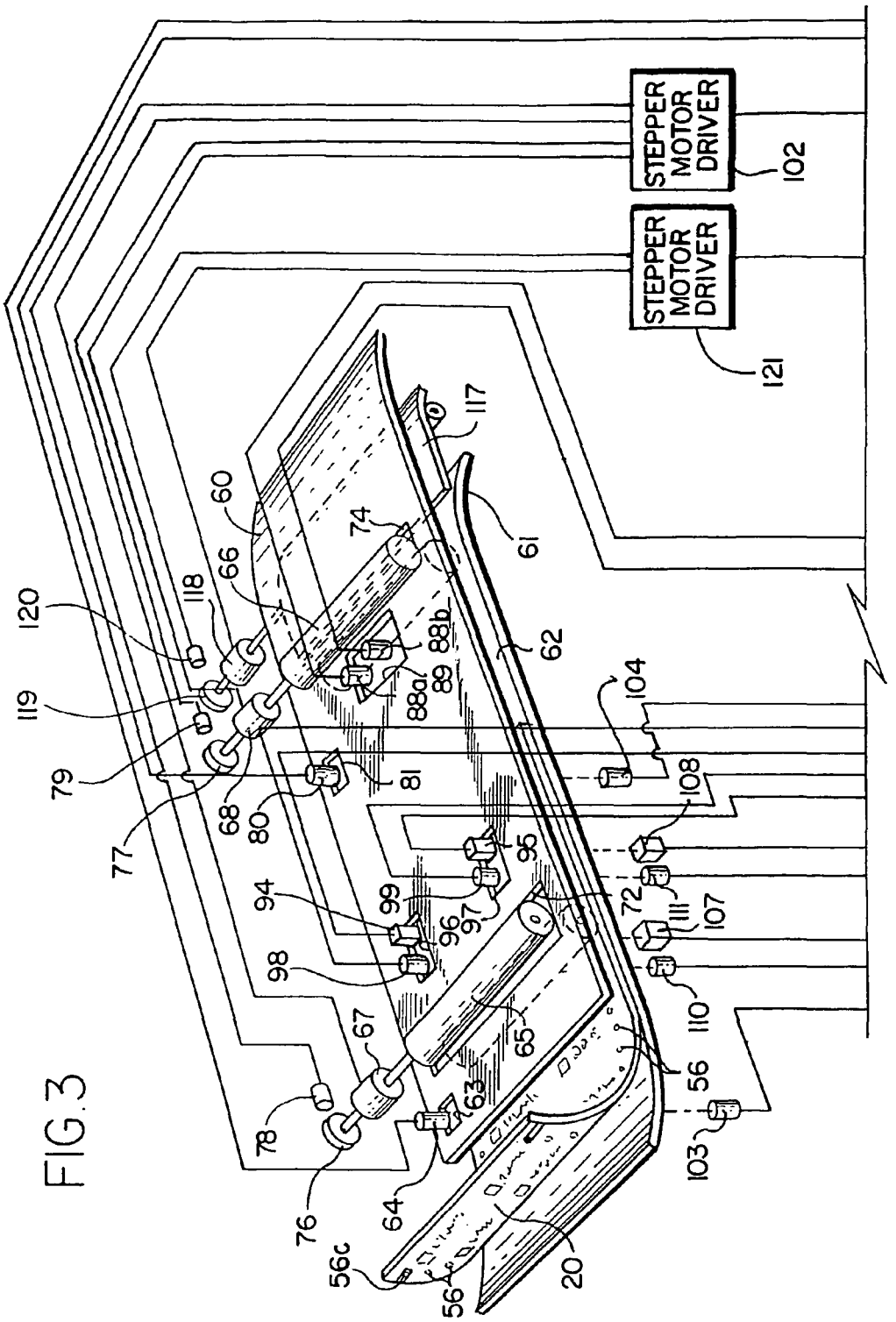

STEPPER MOTOR DRIVER
102
STEPPER MOTOR DRIVER
121
117
60
74
61
118
66
120
88b
62
88a
89
119
104
79
81
108
68
80
77
95
94
99
97
72
111
107
96
98
67
65
110
56
63
78
103
76
64
56c
56
20

FIG. 3

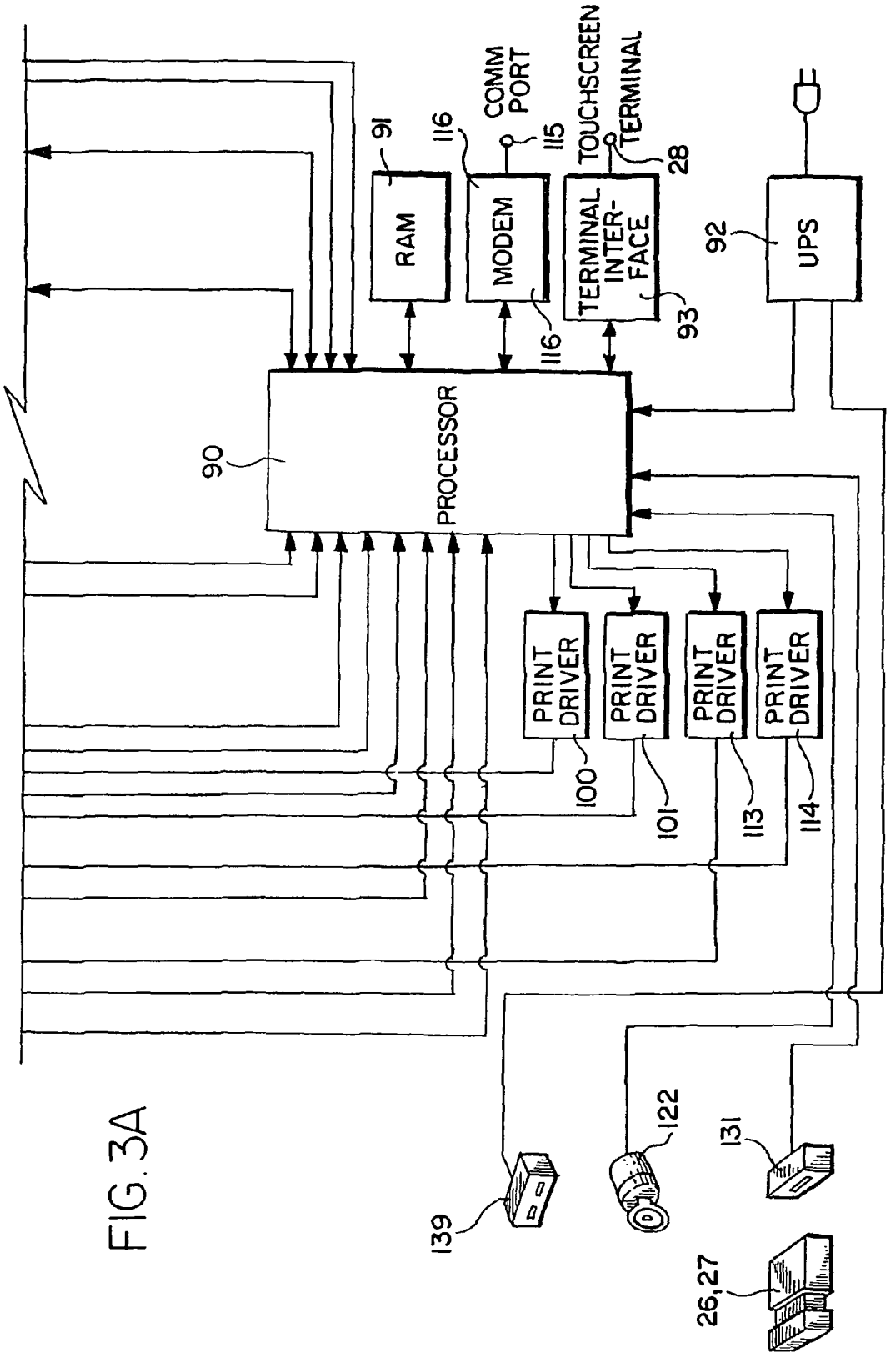

91
RAM
116
MODEM
COMM PORT
115
TOUCHSCREEN TERMINAL
28
TERMINAL INTER-FACE
93
92
UPS
116
90
PROCESSOR
PRINT DRIVER
PRINT DRIVER
PRINT DRIVER
PRINT DRIVER
100
101
113
114
122
131
139
26,27

FIG. 3A

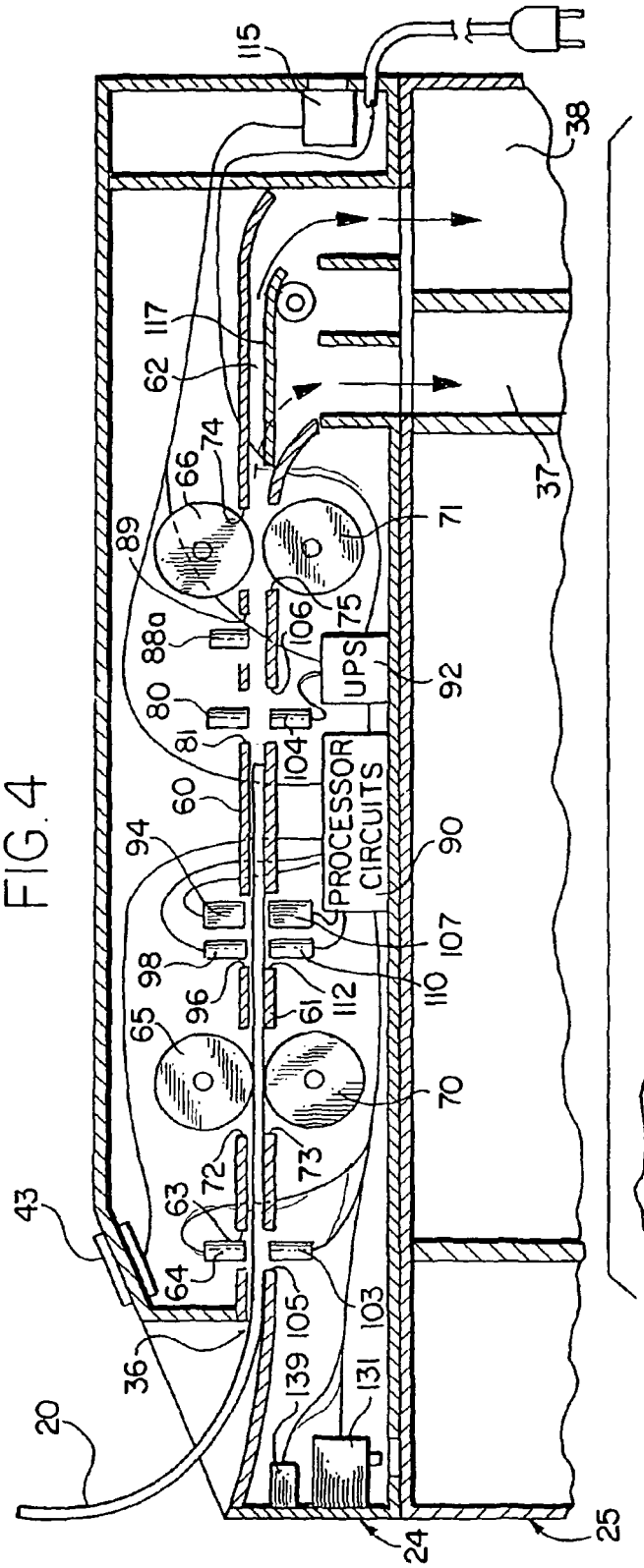

115
38
117
62
74
66
89
37
71
88a
106
75
UPS
92
80
81
104
PROCESSOR CIRCUITS
60
94
90
107
98
110
96
112
61
65
70
73
72
63
43
64
105
103
36
139
131
20
24
25

FIG. 4

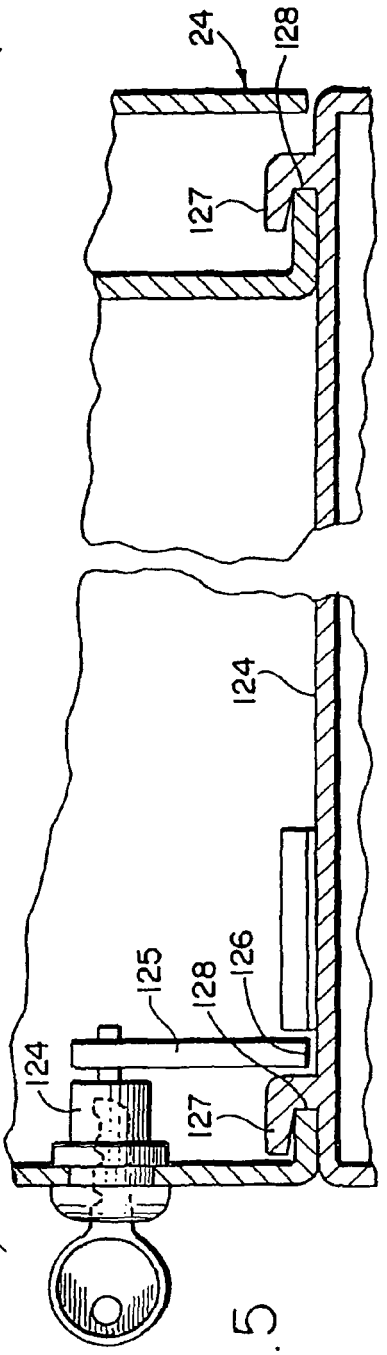

24
128
127
124
125
126

FIG. 5

FIG.6

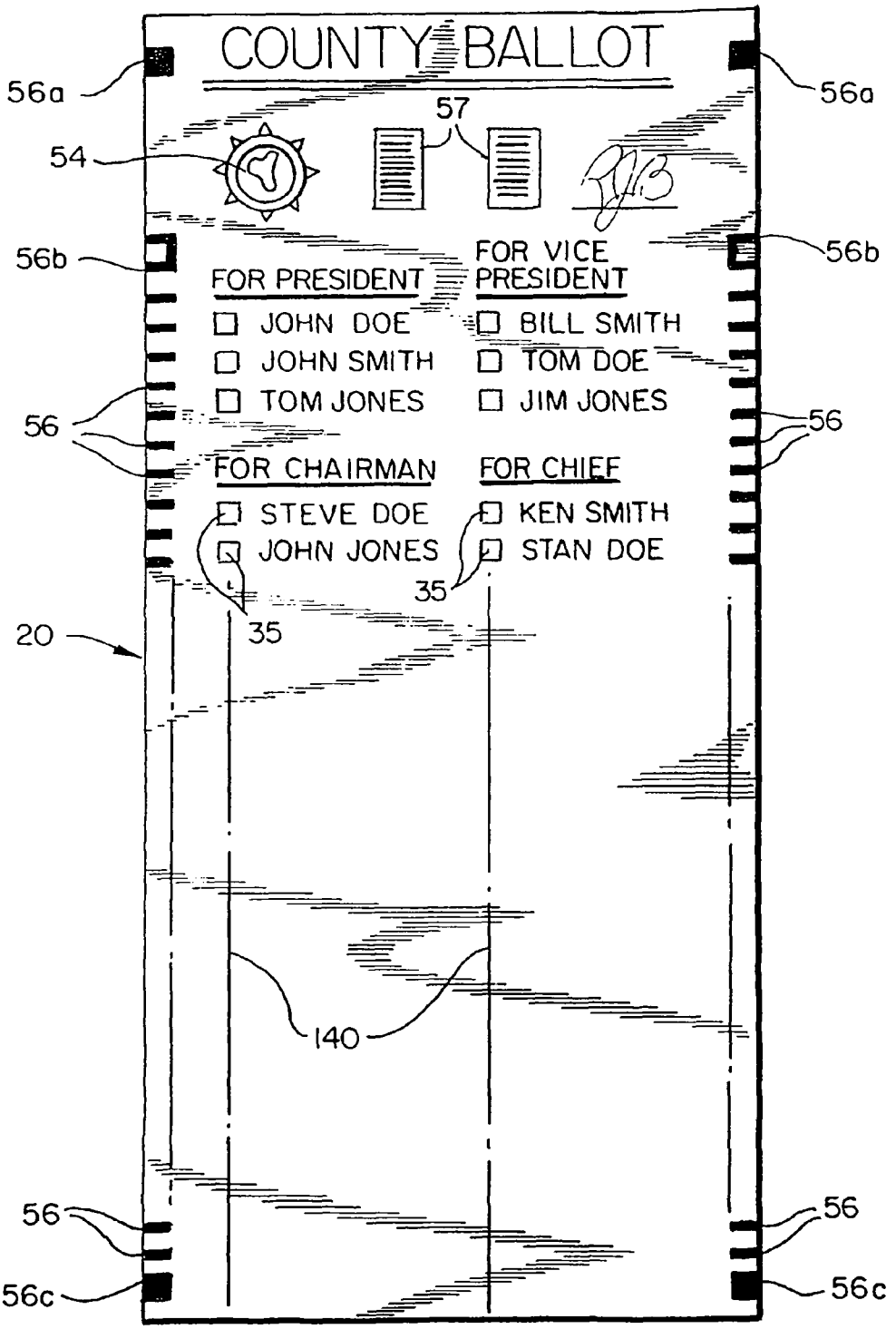

COUNTY BALLOT
56a
56a
57
54
56b
56b
FOR PRESIDENT
FOR VICE PRESIDENT
JOHN DOE
BILL SMITH
JOHN SMITH
TOM DOE
TOM JONES
JIM JONES
56
56
FOR CHAIRMAN
FOR CHIEF
STEVE DOE
KEN SMITH
JOHN JONES
STAN DOE
35
35
20
140
56
56
56c
56c

FIG. 7

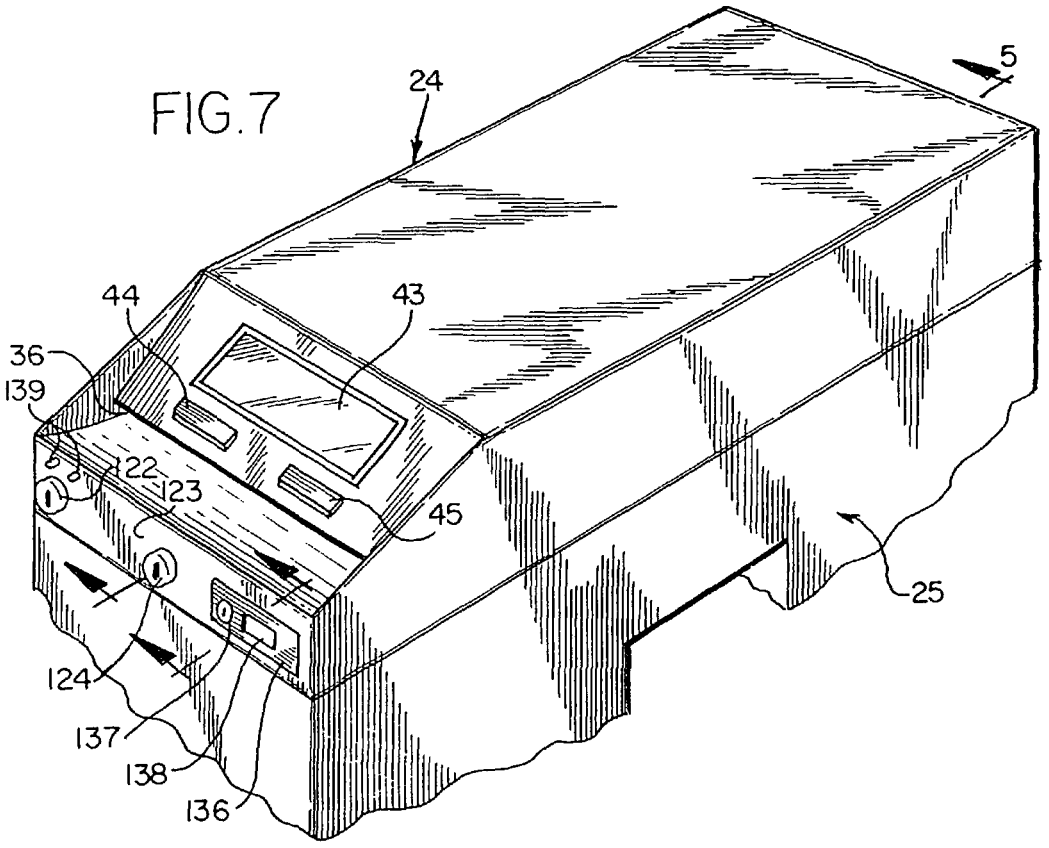

24
5
44
43
36
139
122
123
45
25
124
137
138
136

FIG. 8

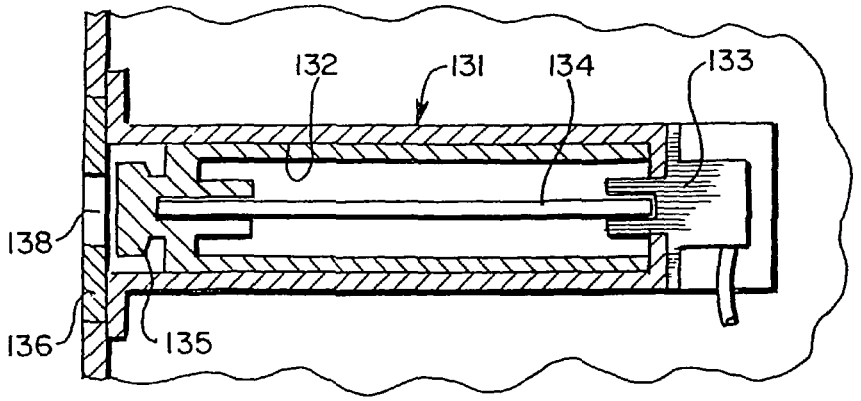

132
131
134
133
138
136
135

FIG. 9

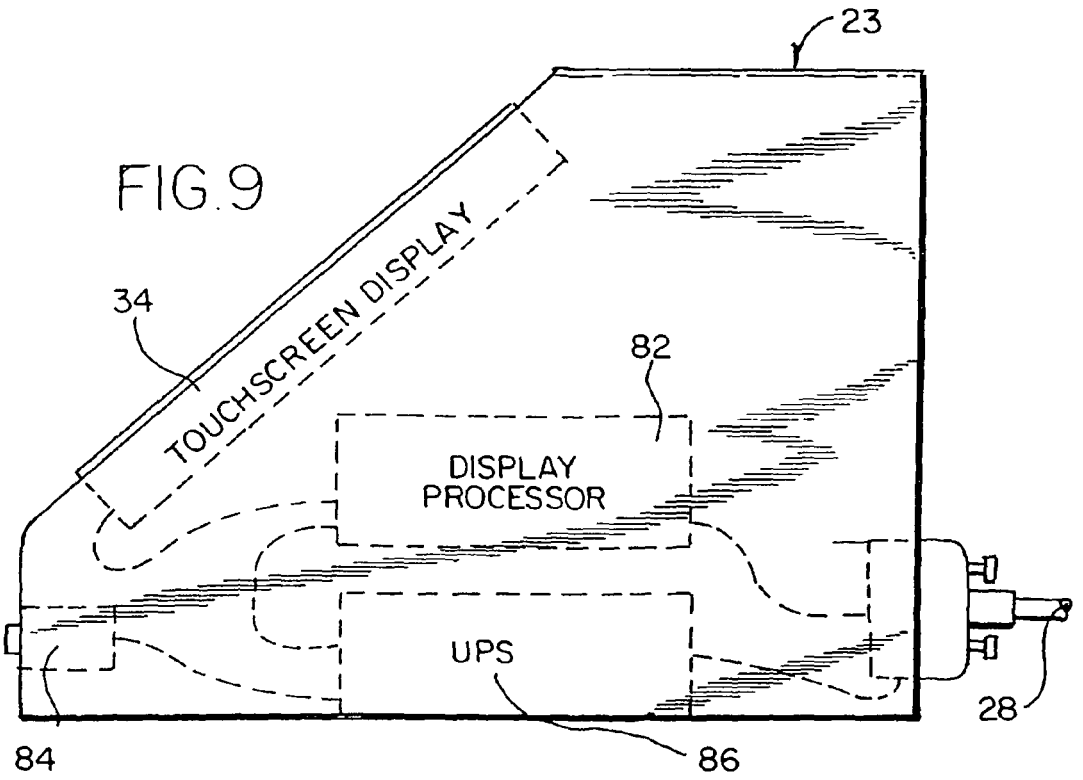
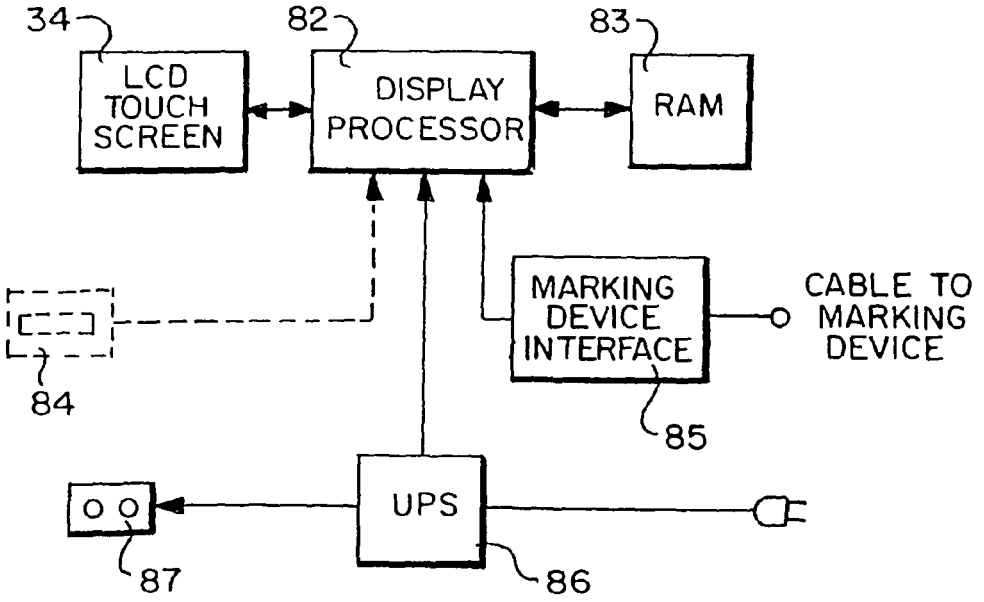

23
34
TOUCHSCREEN DISPLAY
82
DISPLAY PROCESSOR
UPS
28
84
86

FIG. 10


34
LCD TOUCH SCREEN
82
DISPLAY PROCESSOR
83
RAM
MARKING DEVICE INTERFACE
CABLE TO MARKING DEVICE
84
85
UPS
87
86

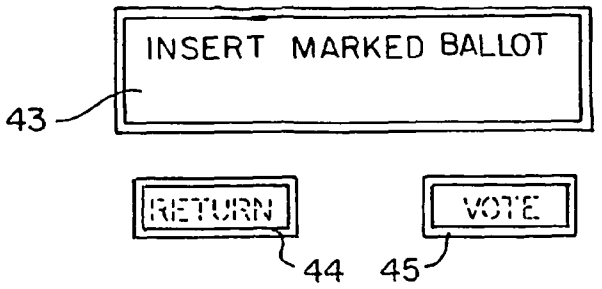


FIG.11A

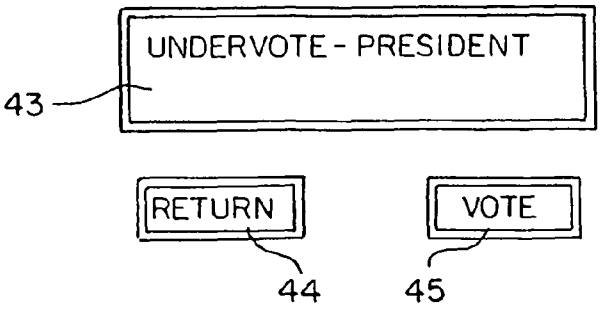


FIG.11B

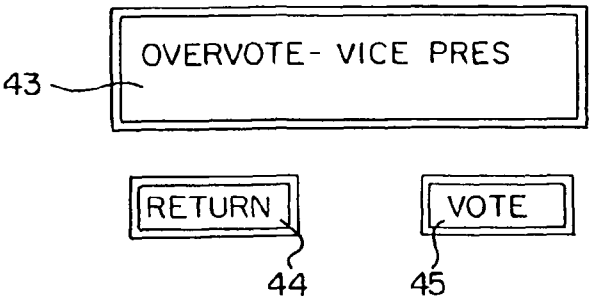


FIG.11C

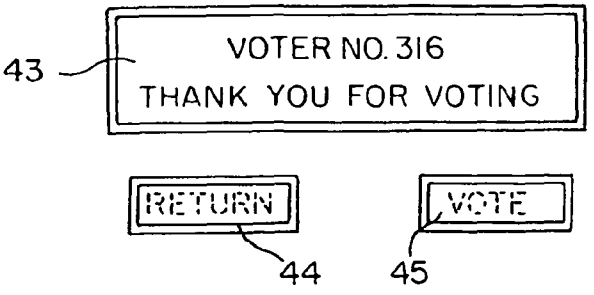


FIG.11D

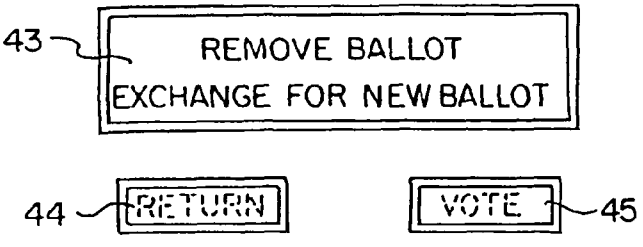


FIG.11E

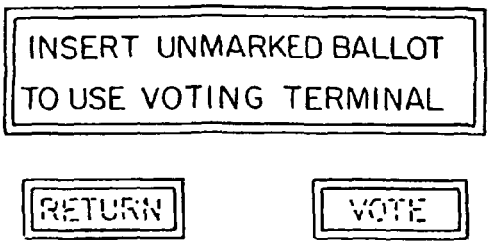


FIG.12A

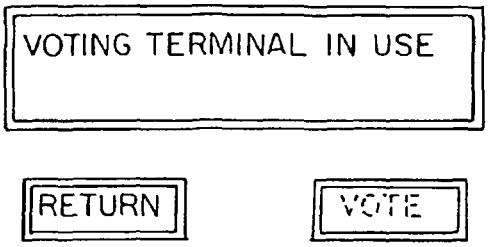


FIG.12B

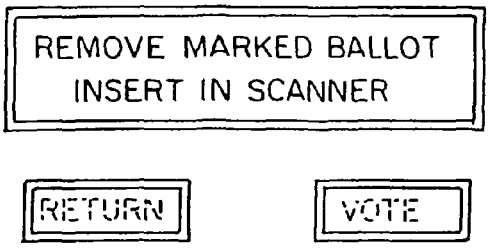


FIG.12C

FIG.13

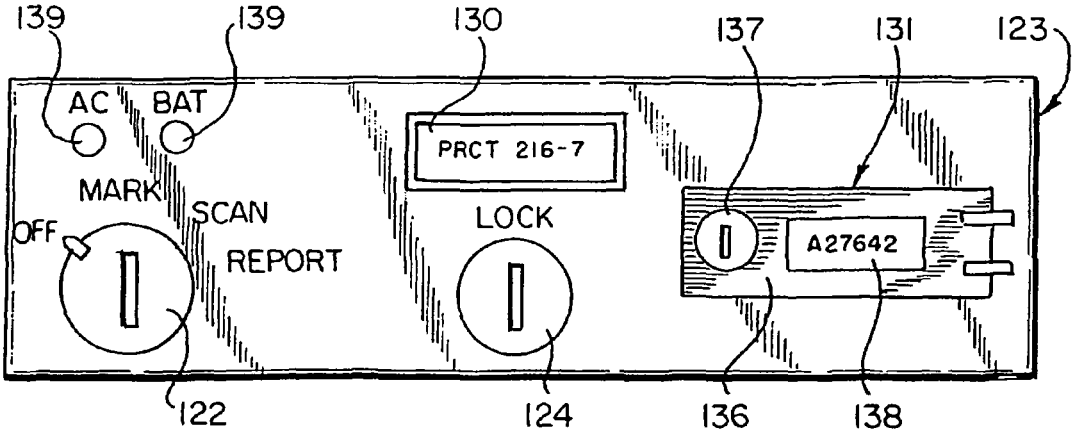


FIG. 14A

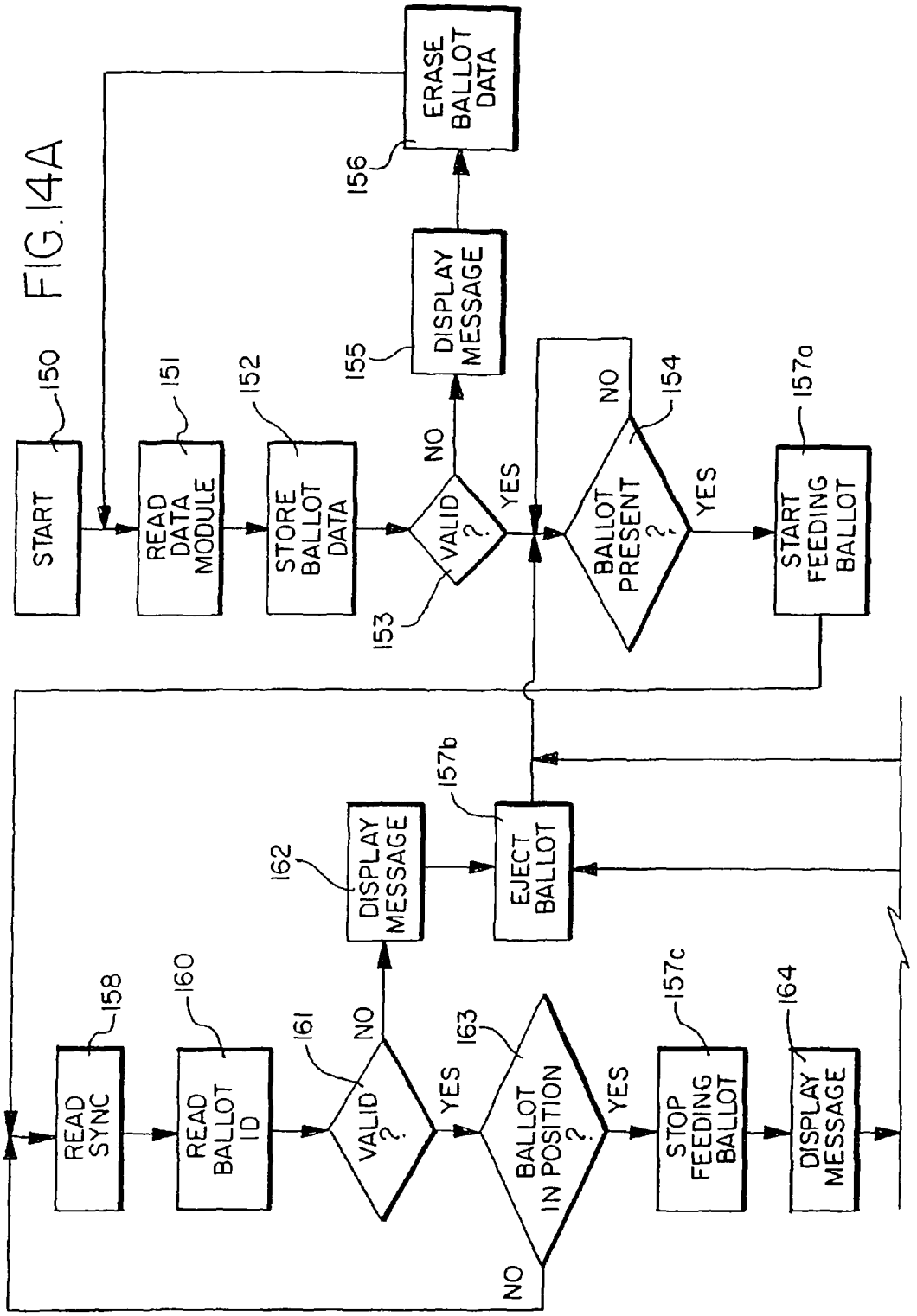

START
150
READ DATA MODULE
151
STORE BALLOT DATA
152
VALID ?
153
NO
YES
DISPLAY MESSAGE
155
ERASE BALLOT DATA
156
BALLOT PRESENT ?
154
NO
YES
START FEEDING BALLOT
157a
EJECT BALLOT
157b
DISPLAY MESSAGE
162
READ SYNC
158
READ BALLOT ID
160
VALID ?
161
NO
YES
BALLOT IN POSITION ?
163
NO
YES
STOP FEEDING BALLOT
157c
DISPLAY MESSAGE
164

FIG. 14B

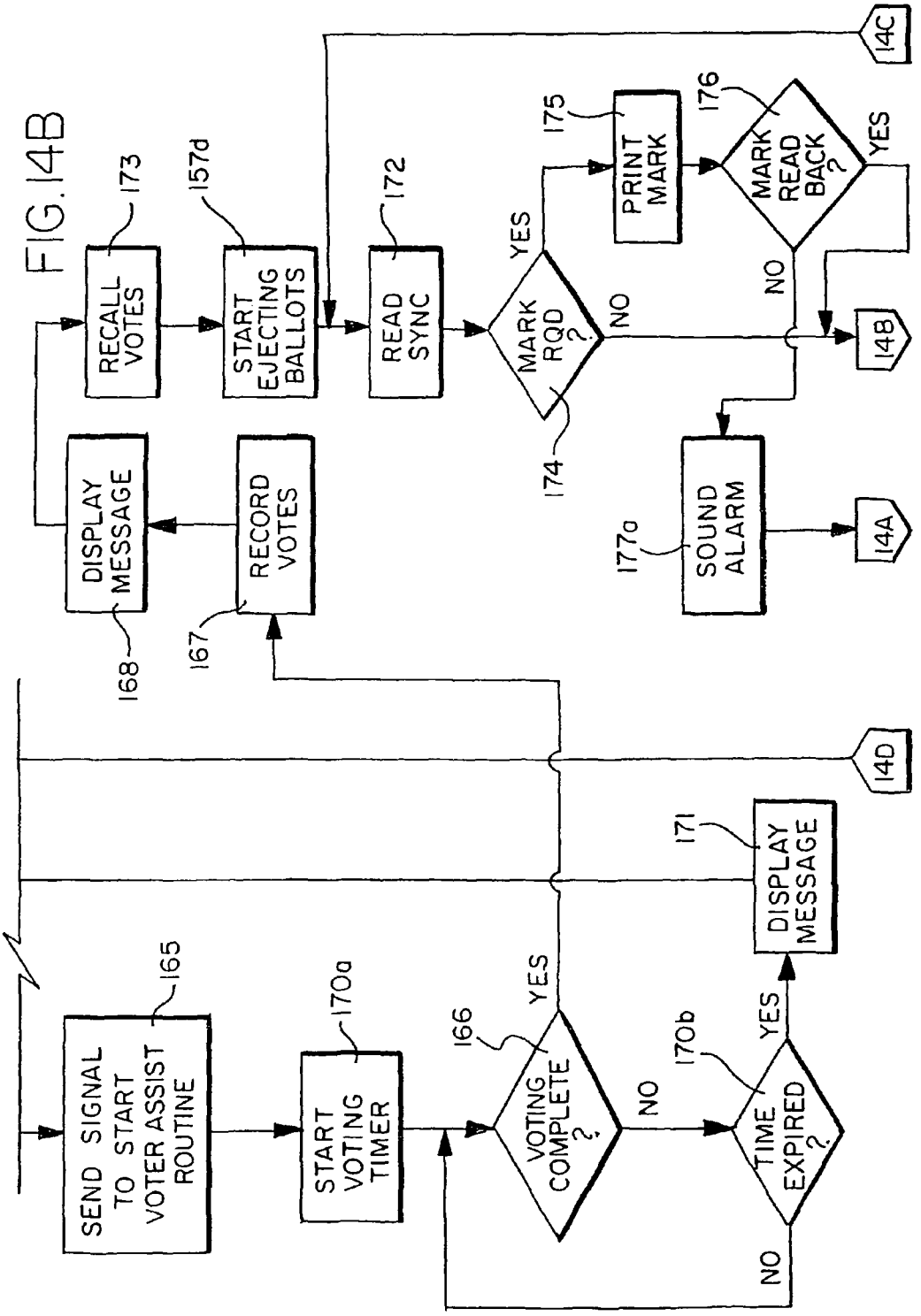

SEND SIGNAL TO START VOTER ASSIST ROUTINE
165
START VOTING TIMER
170a
VOTING COMPLETE ?
166
YES
NO
TIME EXPIRED ?
170b
YES
NO
DISPLAY MESSAGE
171
14D
DISPLAY MESSAGE
168
RECORD VOTES
167
RECALL VOTES
173
START EJECTING BALLOTS
157d
READ SYNC
172
MARK RQD ?
174
YES
NO
PRINT MARK
175
MARK READ BACK ?
176
YES
NO
14C
14B
SOUND ALARM
177a
14A

FIG.14C

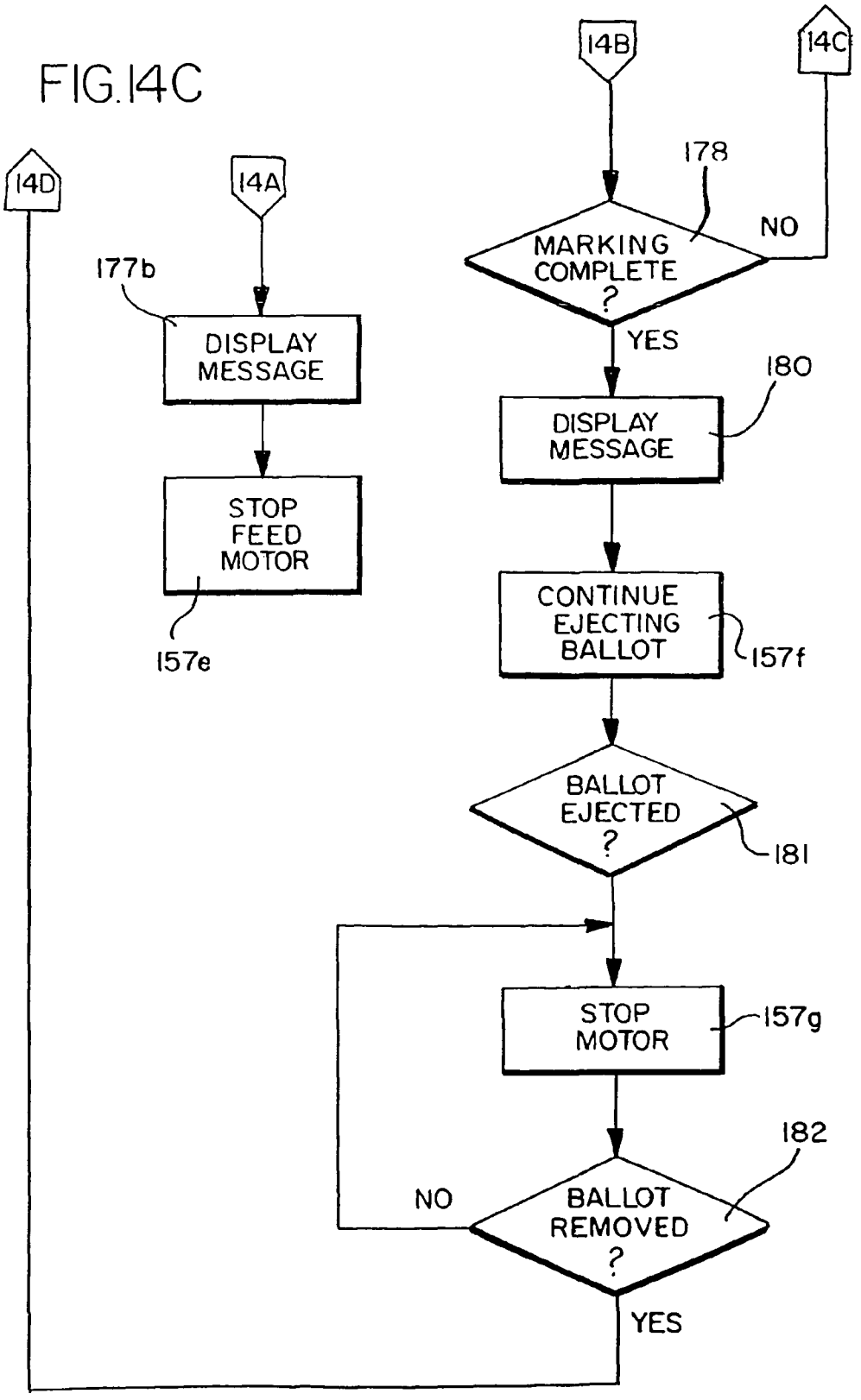
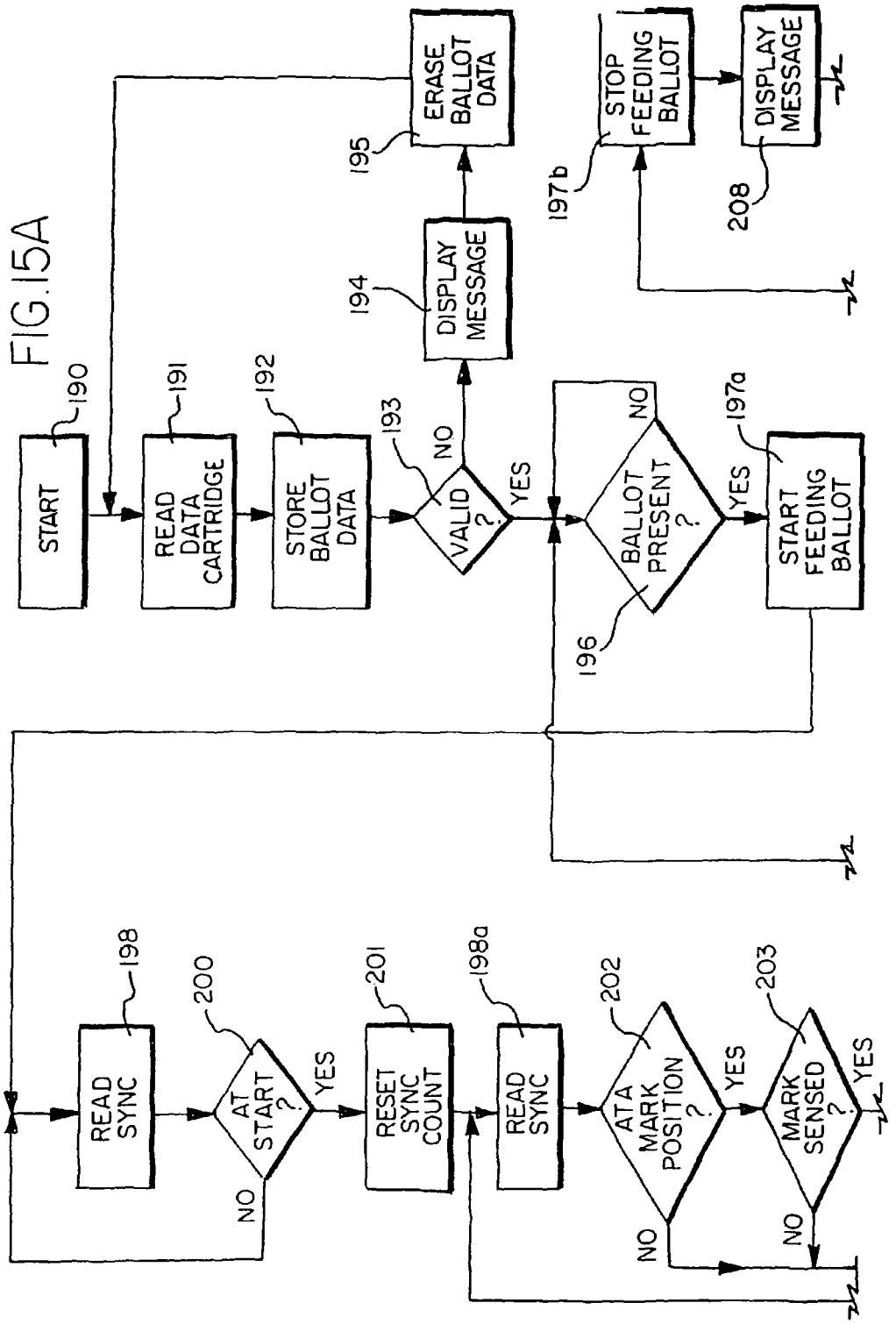

14B
14C
14D
14A
178
MARKING COMPLETE ?
NO
YES
177b
DISPLAY MESSAGE
180
DISPLAY MESSAGE
STOP FEED MOTOR
157e
CONTINUE EJECTING BALLOT
157f
BALLOT EJECTED ?
181
STOP MOTOR
157g
182
NO
BALLOT REMOVED ?
YES

FIG. 15A


START
190
READ DATA CARTRIDGE
191
STORE BALLOT DATA
192
VALID ?
193
NO
YES
DISPLAY MESSAGE
194
ERASE BALLOT DATA
195
BALLOT PRESENT ?
196
NO
YES
START FEEDING BALLOT
197a
STOP FEEDING BALLOT
197b
DISPLAY MESSAGE
208
READ SYNC
198
AT START ?
200
NO
YES
RESET SYNC COUNT
201
READ SYNC
198a
ATA MARK POSITION ?
202
NO
YES
MARK SENSED ?
203
NO
YES

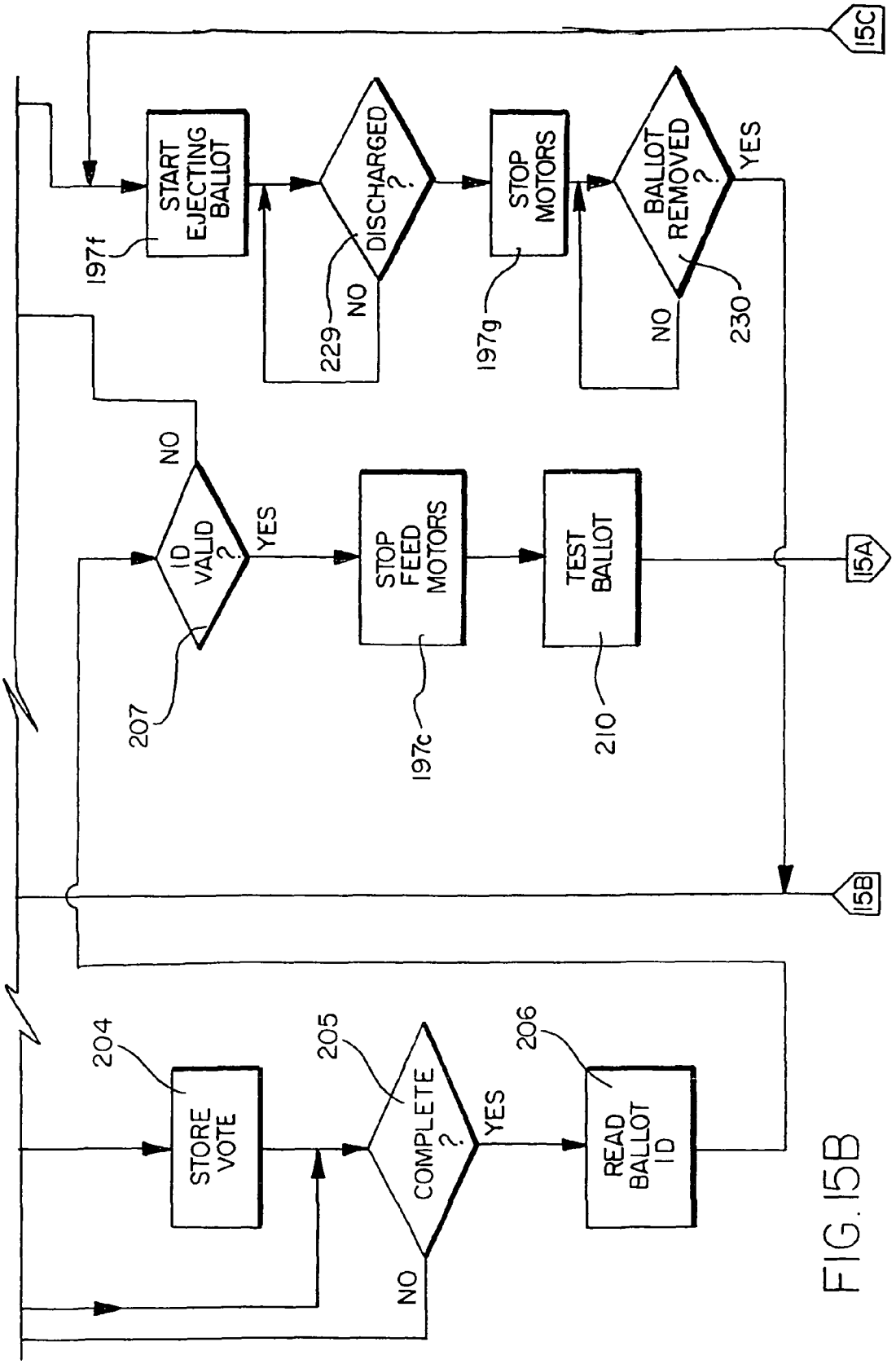
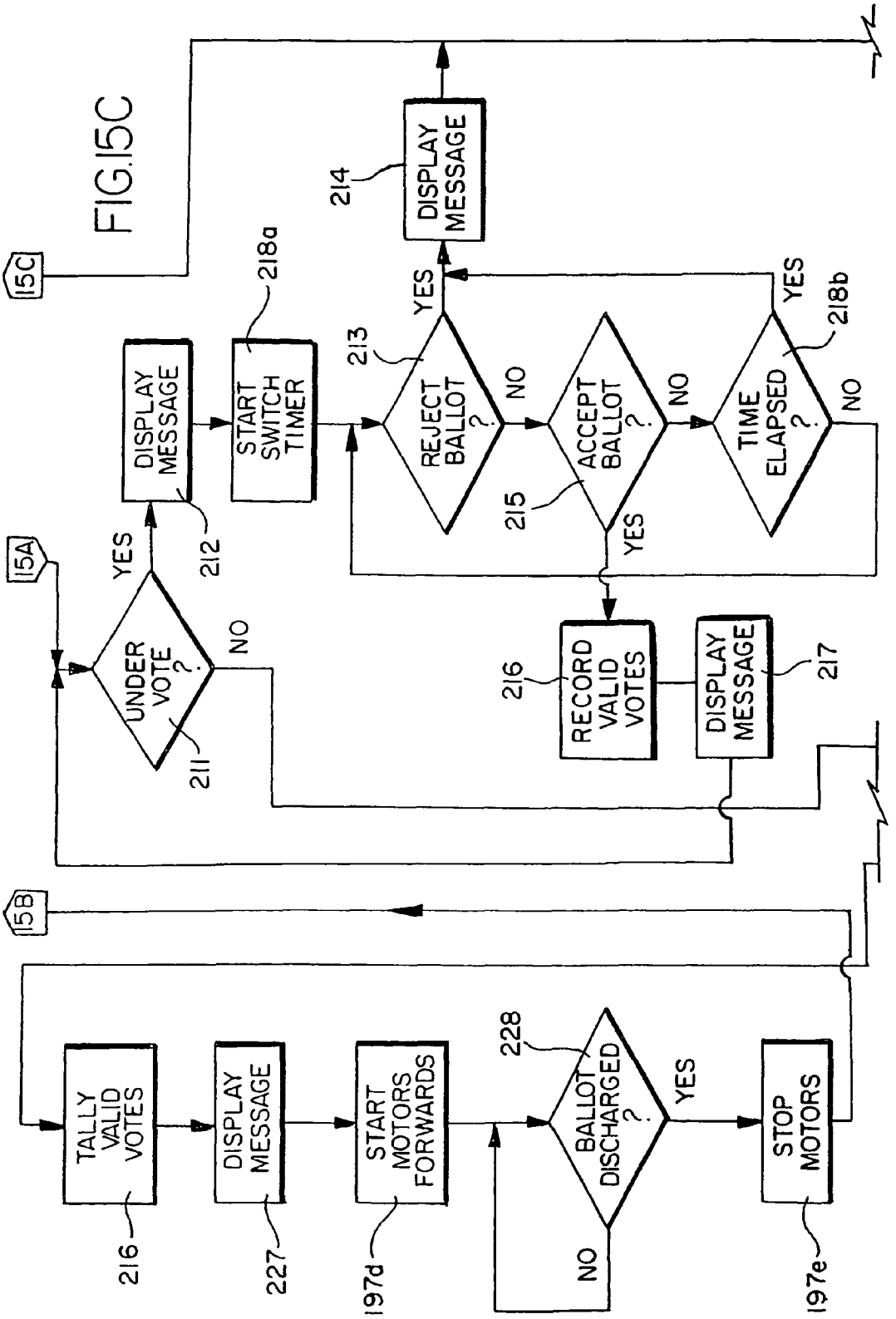

15C
START EJECTING BALLOT
197f
DISCHARGED ?
NO
229
STOP MOTORS
197g
BALLOT REMOVED ?
YES
NO
230
NO
ID VALID ?
YES
207
STOP FEED MOTORS
197c
TEST BALLOT
210
15A
15B
204
STORE VOTE
205
COMPLETE ?
YES
NO
206
READ BALLOT ID

FIG. 15B

FIG.15C


15C
DISPLAY MESSAGE
214
218a
YES
213
REJECT BALLOT ?
NO
ACCEPT BALLOT ?
NO
TIME ELAPSED ?
NO
YES
218b
DISPLAY MESSAGE
START SWITCH TIMER
212
215
YES
15A
YES
UNDER VOTE ?
NO
211
216
RECORD VALID VOTES
DISPLAY MESSAGE
217
15B
TALLY VALID VOTES
216
DISPLAY MESSAGE
227
START MOTORS FORWARDS
197d
228
BALLOT DISCHARGED ?
YES
NO
STOP MOTORS
197e

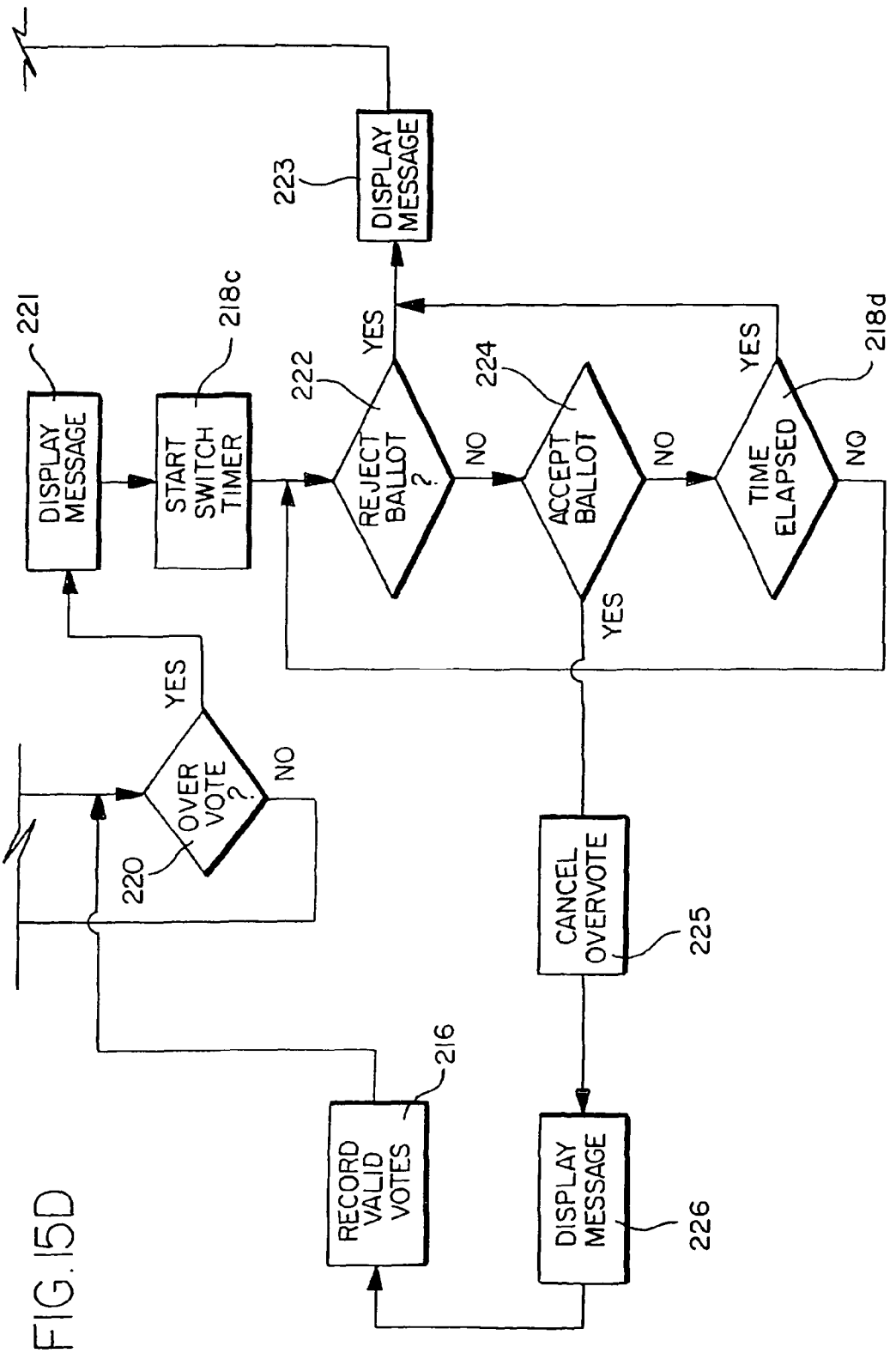

DISPLAY MESSAGE
223
DISPLAY MESSAGE
221
START SWITCH TIMER
218c
REJECT BALLOT ?
222
YES
NO
ACCEPT BALLOT
224
NO
YES
TIME ELAPSED
218d
NO
YES
YES
OVER VOTE ?
220
NO
CANCEL OVERVOTE
225
RECORD VALID VOTES
216
DISPLAY MESSAGE
226

FIG. 15D

FIG.16

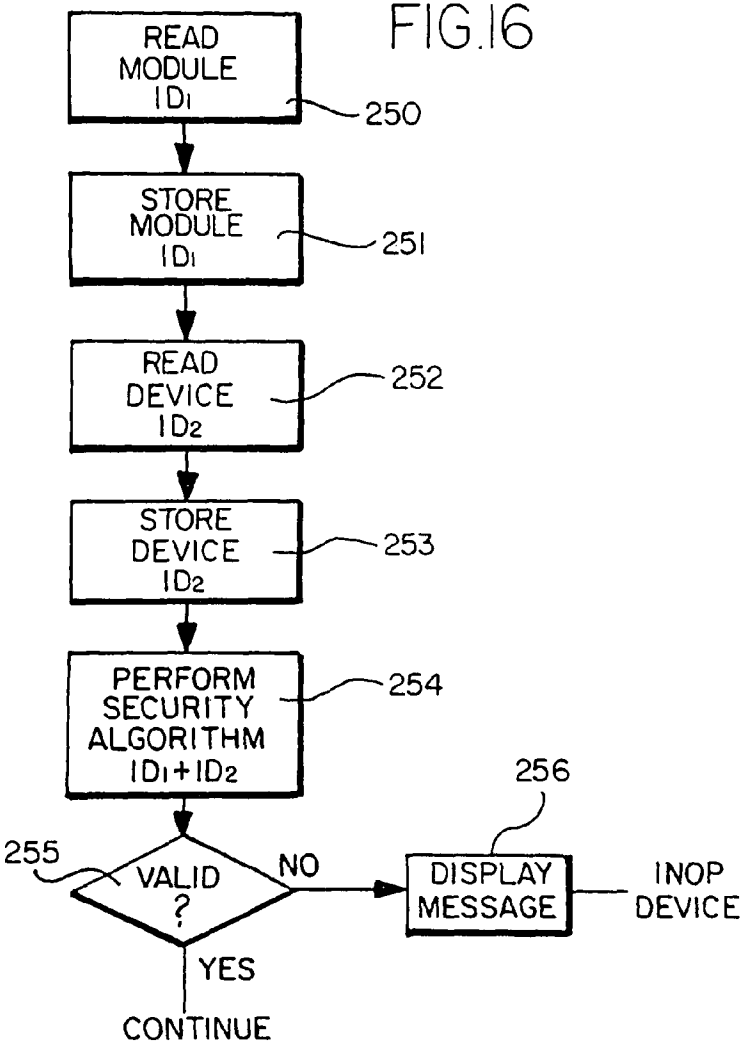
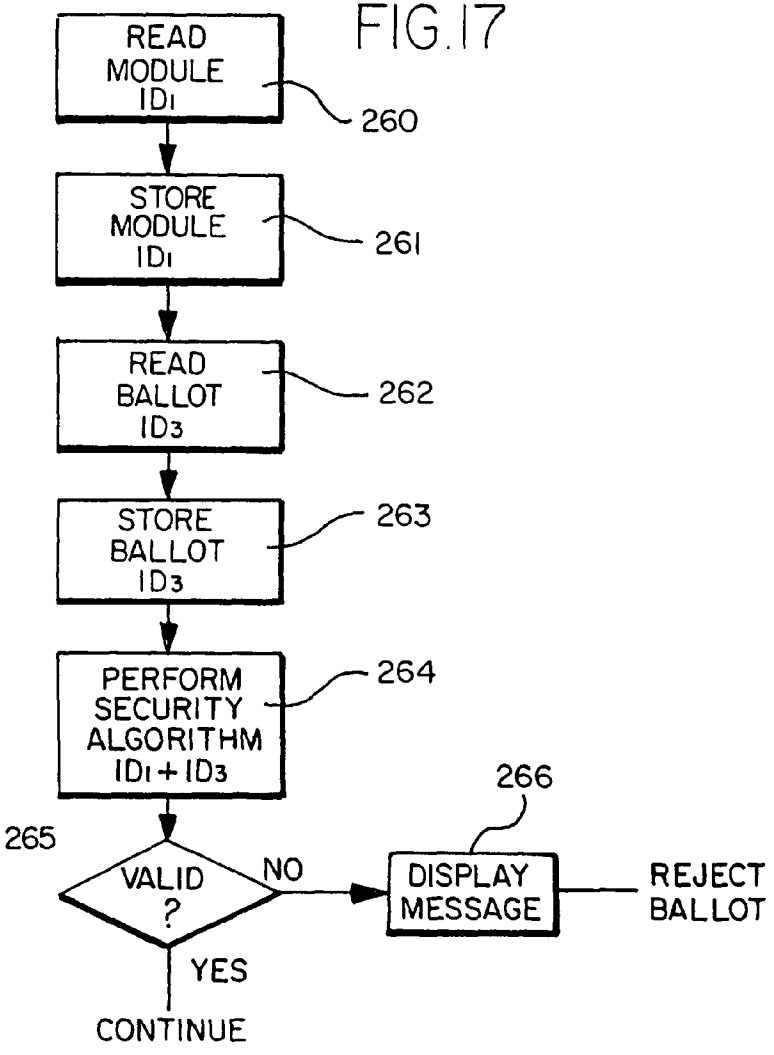

READ MODULE ID1
250
STORE MODULE ID1
251
READ DEVICE ID2
252
STORE DEVICE ID2
253
PERFORM SECURITY ALGORITHM ID1+ID2
254
255
VALID ?
NO
256
DISPLAY MESSAGE
INOP DEVICE
YES
CONTINUE

FIG.17


READ MODULE ID1
260
STORE MODULE ID1
261
READ BALLOT ID3
262
STORE BALLOT ID3
263
PERFORM SECURITY ALGORITHM ID1+ID3
264
265
VALID ?
NO
266
DISPLAY MESSAGE
REJECT BALLOT
YES
CONTINUE

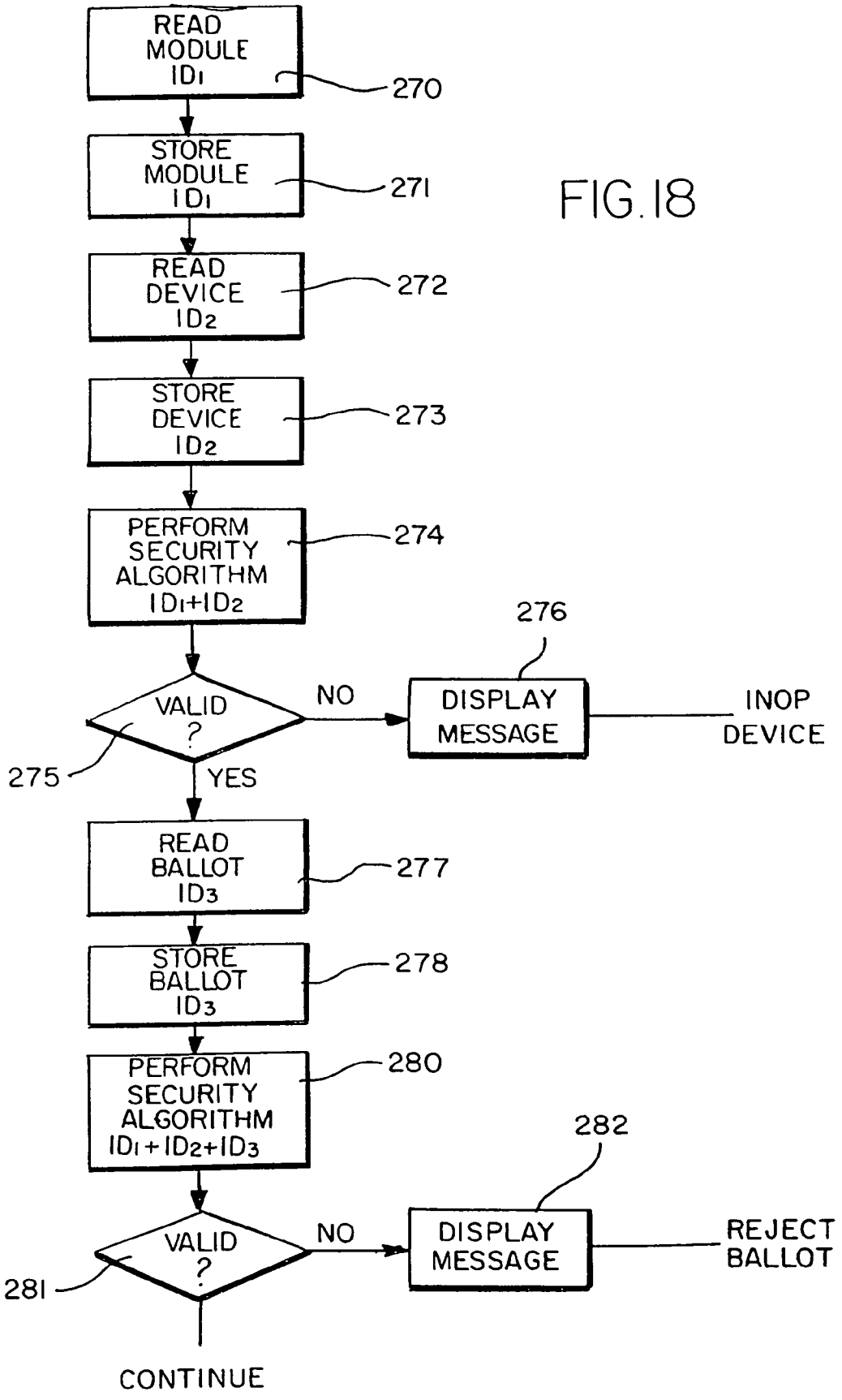

READ MODULE ID1
270
STORE MODULE ID1
271
READ DEVICE ID2
272
STORE DEVICE ID2
273
PERFORM SECURITY ALGORITHM ID1+ID2
274
276
VALID ?
NO
DISPLAY MESSAGE
INOP DEVICE
275
YES
READ BALLOT ID3
277
STORE BALLOT ID3
278
PERFORM SECURITY ALGORITHM ID1+ID2+ID3
280
282
VALID ?
NO
DISPLAY MESSAGE
REJECT BALLOT
281
CONTINUE

FIG. 18

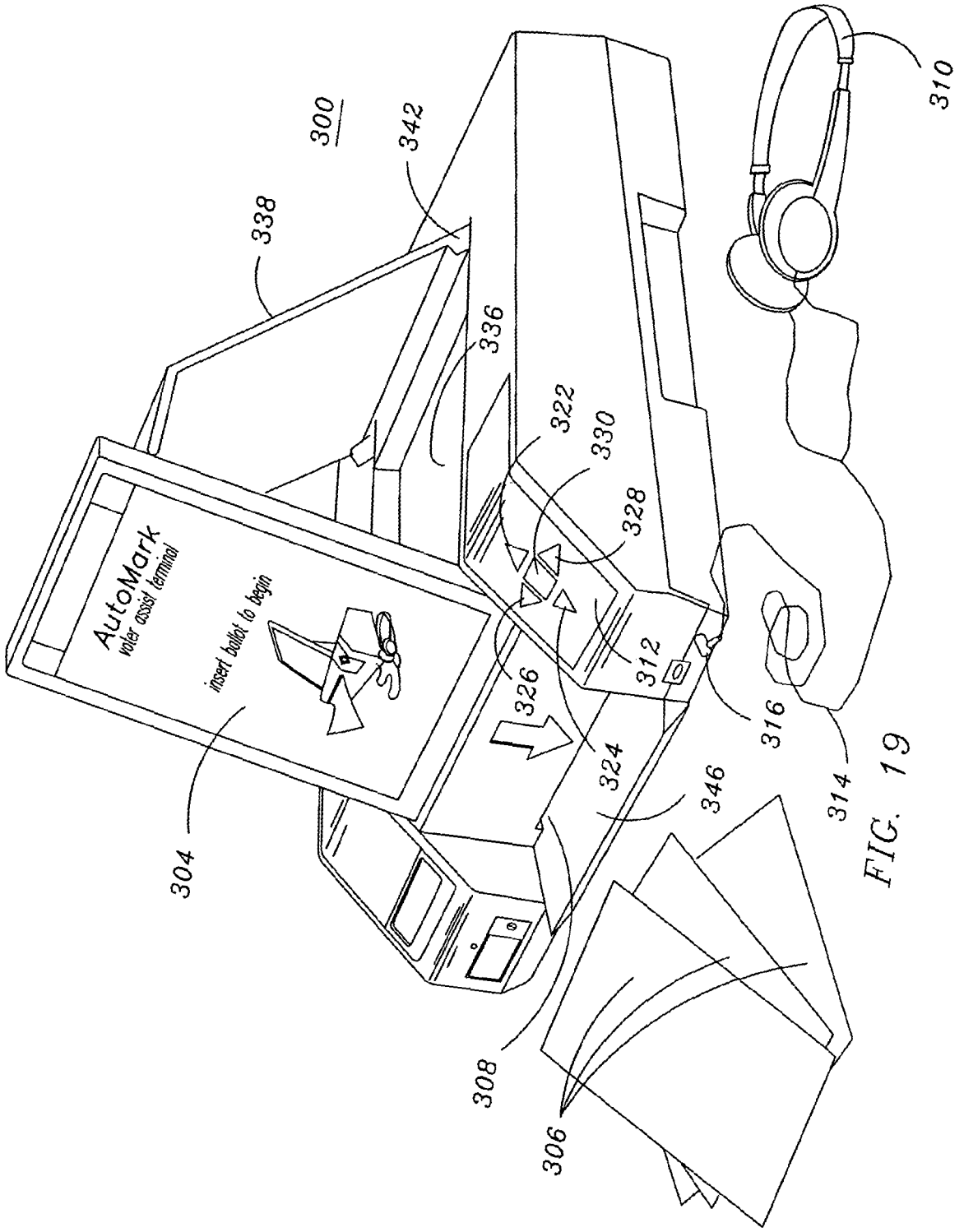

300
342
338
336
322
330
328
310
AutoMark
voter assist terminal
insert ballot to begin
326
312
316
324
346
314
304
308
306

FIG. 19

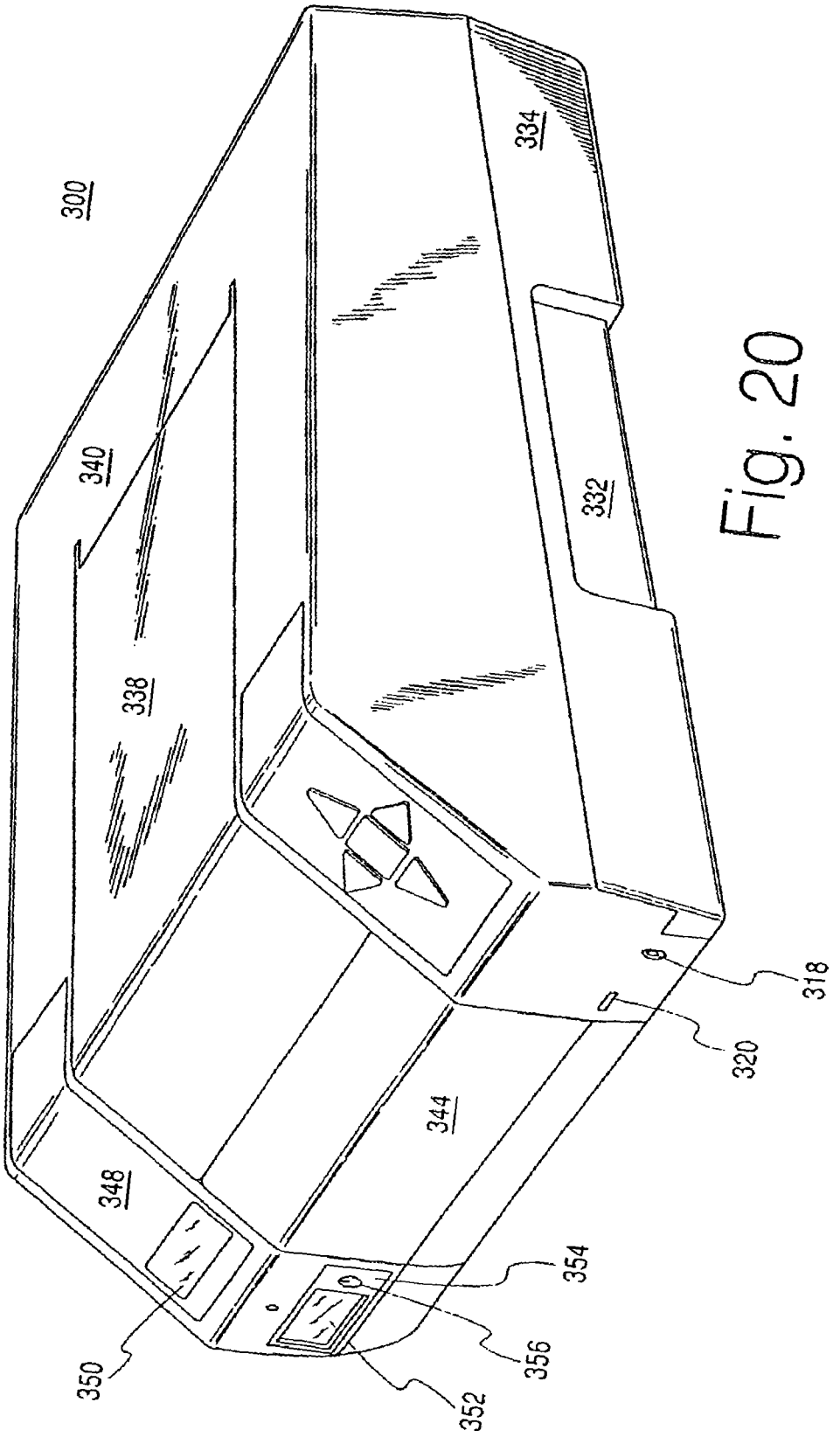
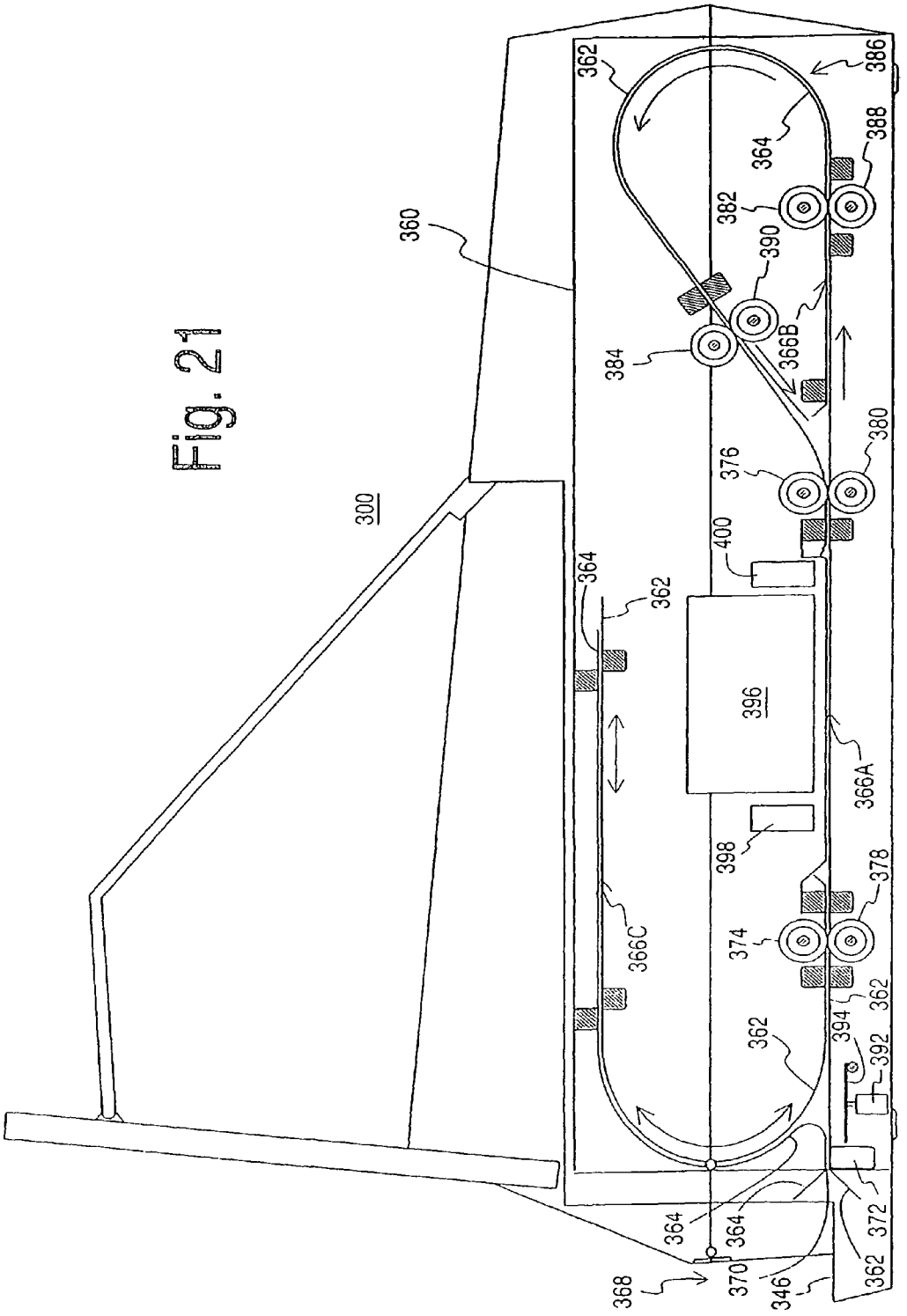


Fig. 20

Fig. 21


300
360
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366A
366B
366C
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394
396
398
400
346

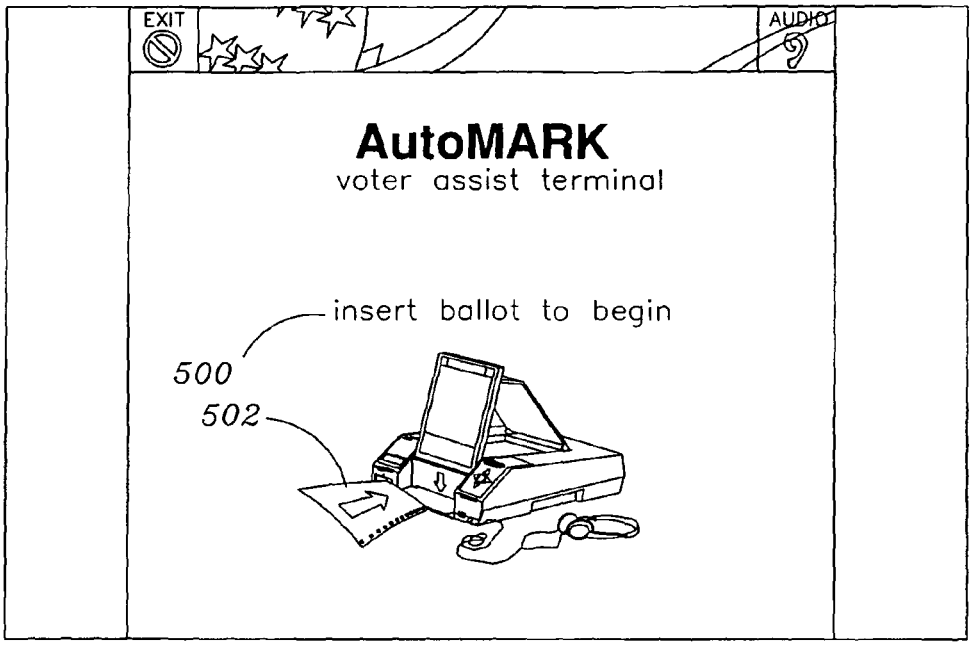

FIG. 22A

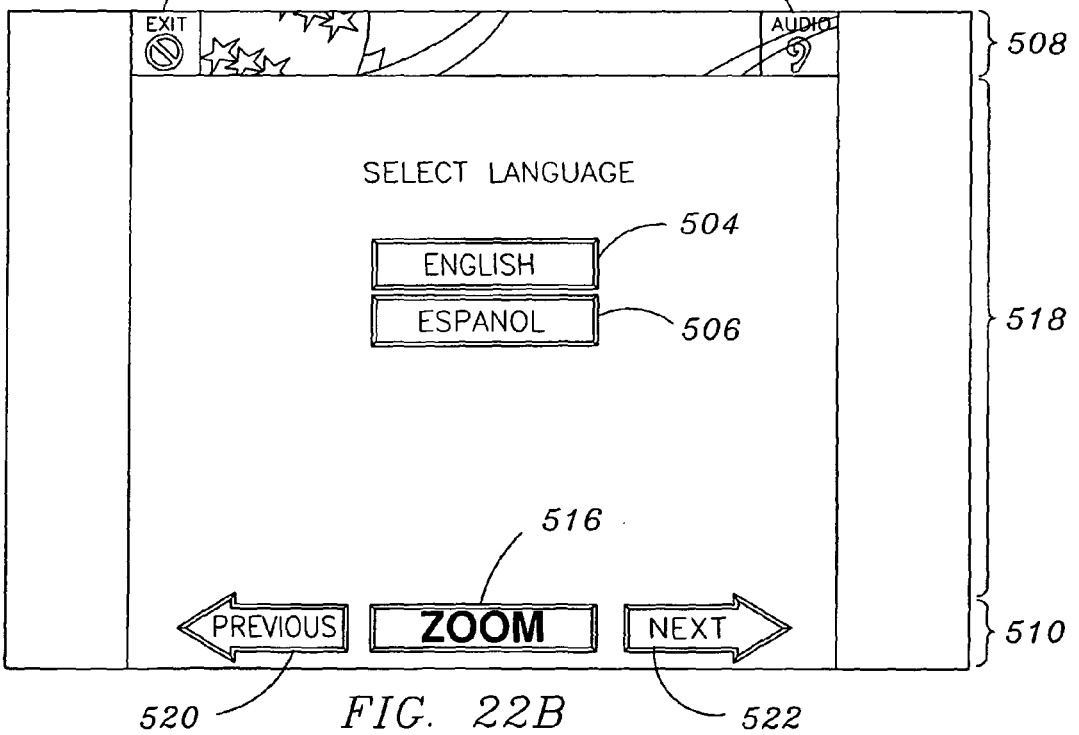

FIG. 22B

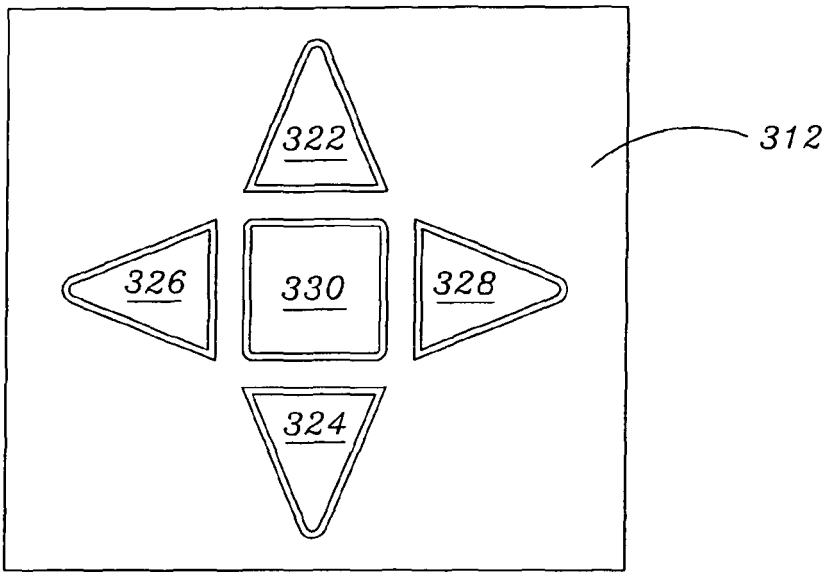
322
312
326
330
328
324

FIG. 23

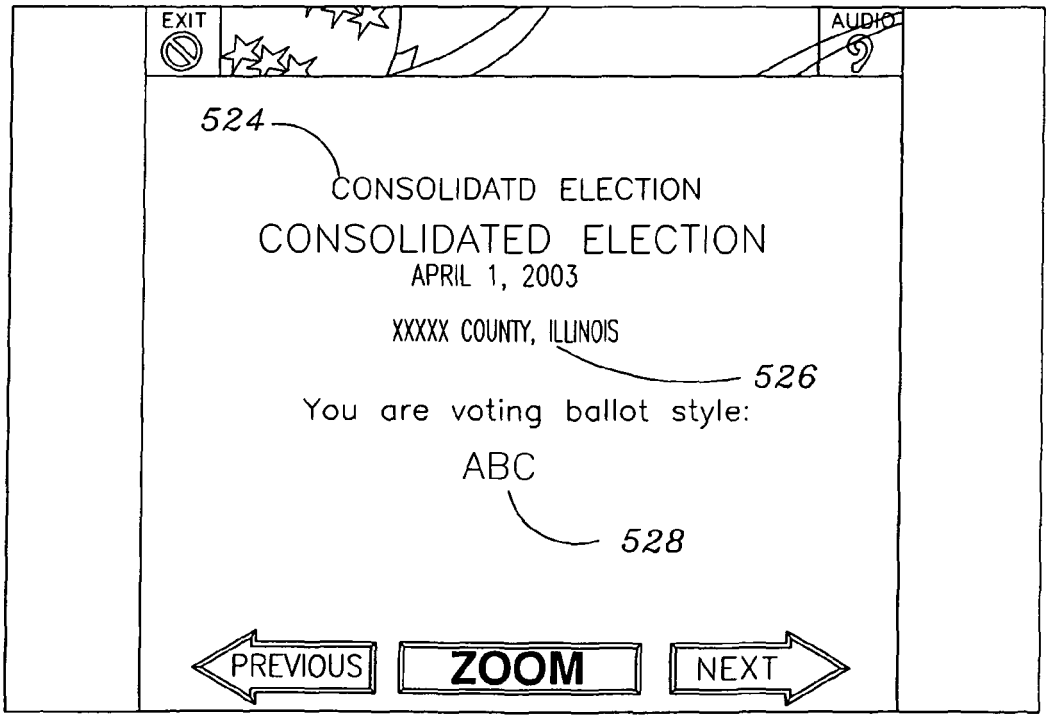
EXIT
AUDIO
524
CONSOLIDATD ELECTION
CONSOLIDATED ELECTION
APRIL 1, 2003
XXXXX COUNTY, ILLINOIS
526
You are voting ballot style:
ABC
528
PREVIOUS
ZOOM
NEXT

FIG. 24

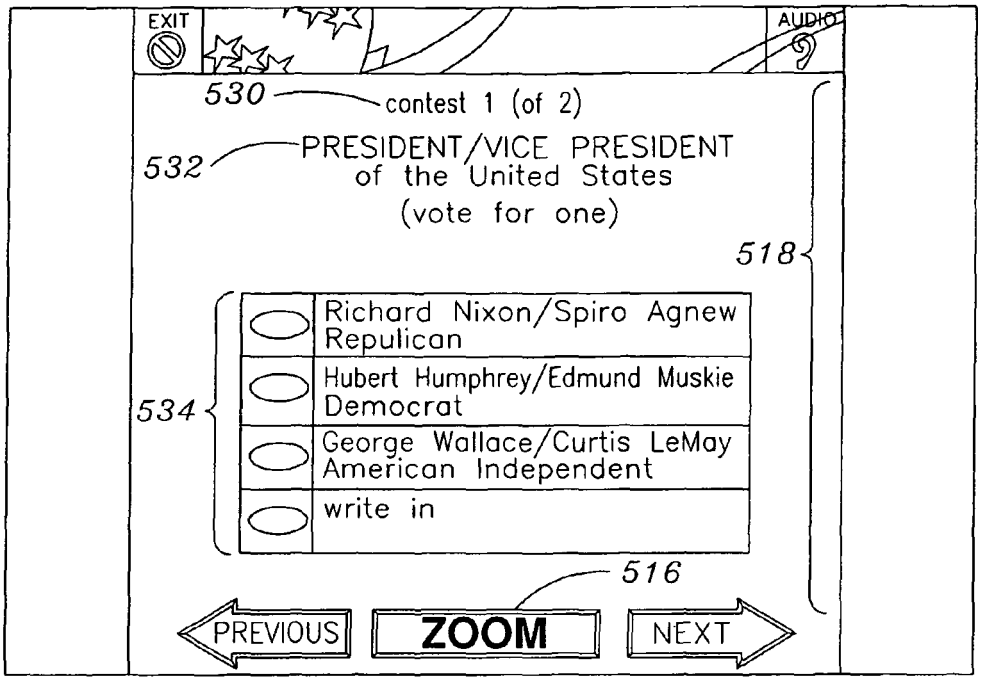

FIG. 25A

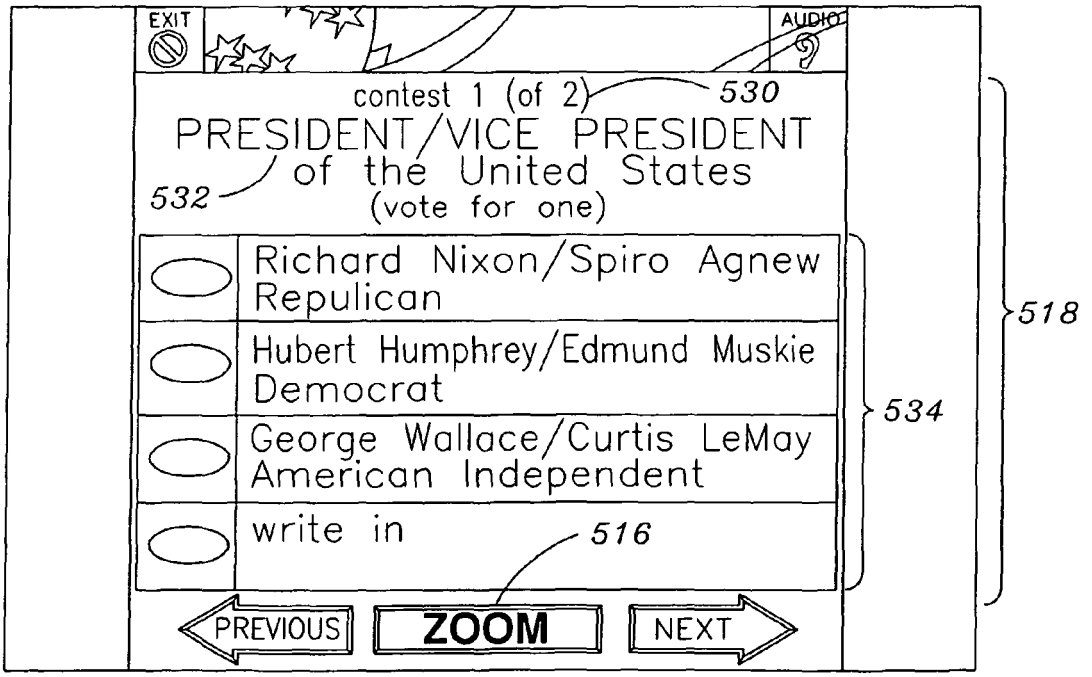

FIG. 25B

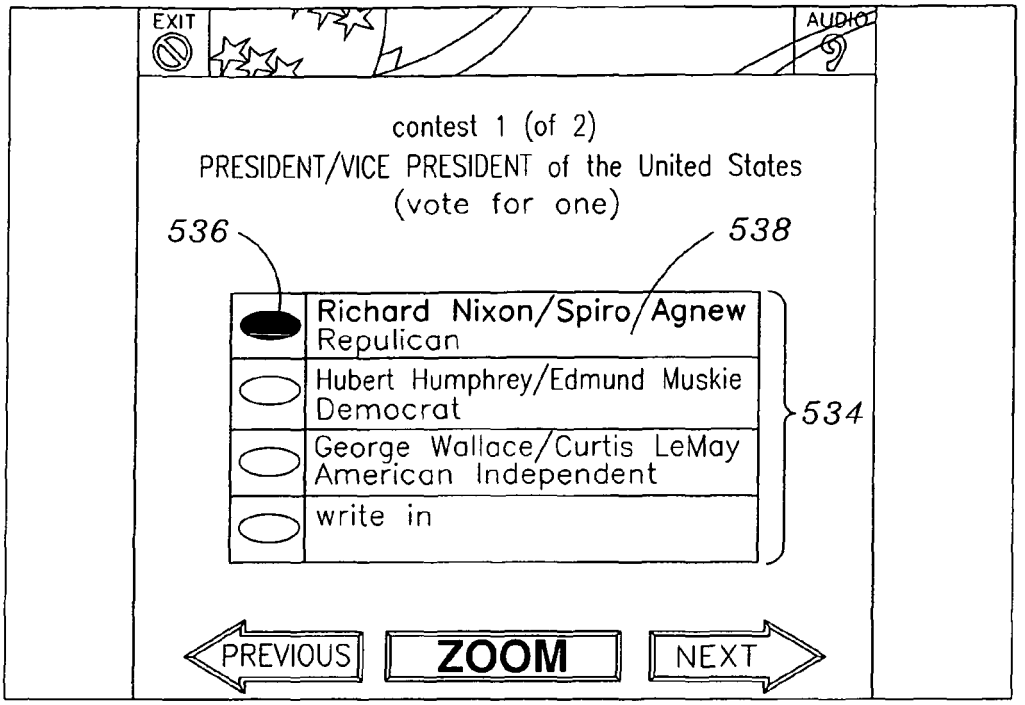

FIG. 25C

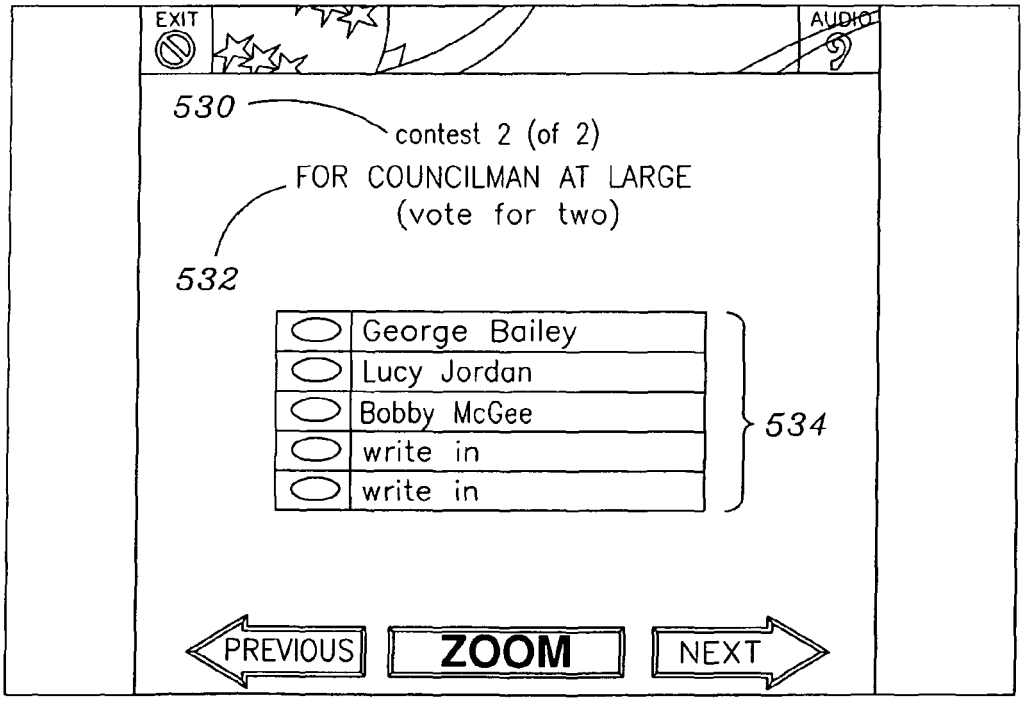

FIG. 25D

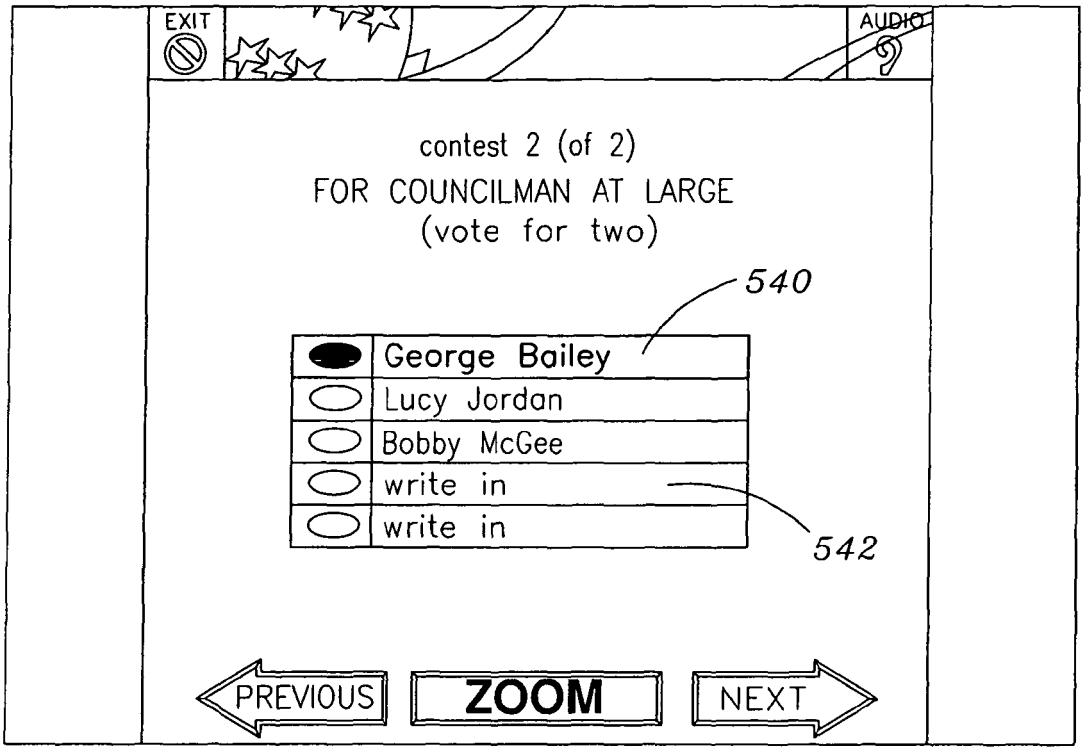

FIG. 25E

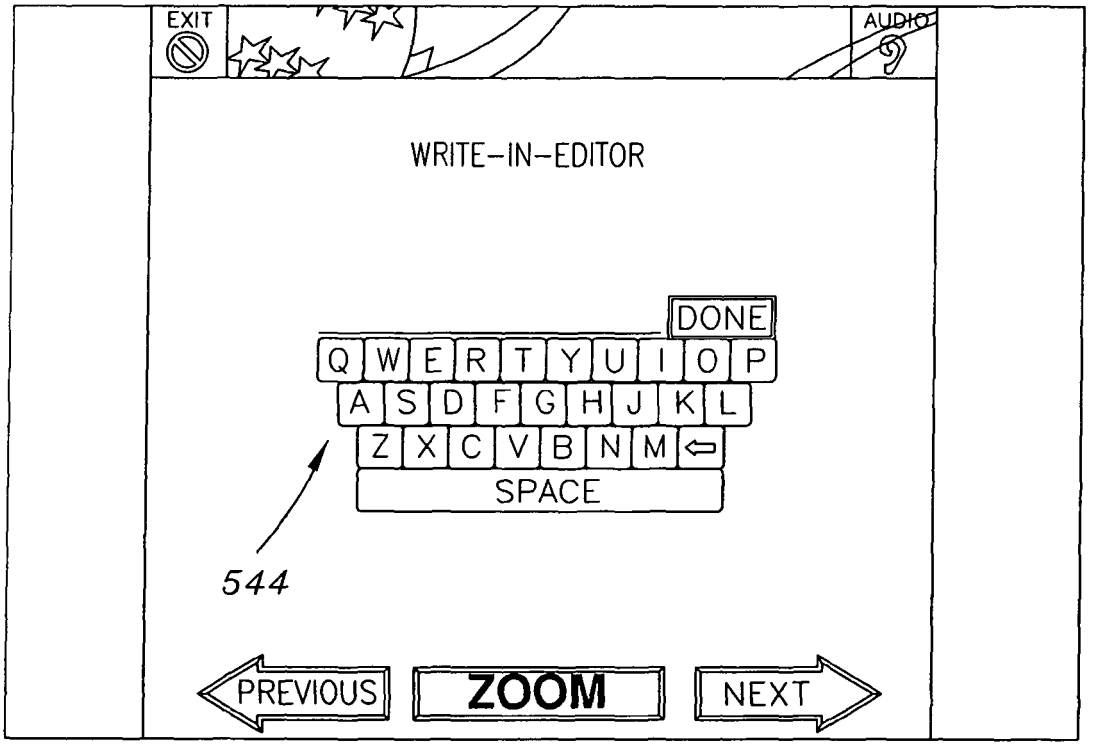

FIG. 25F

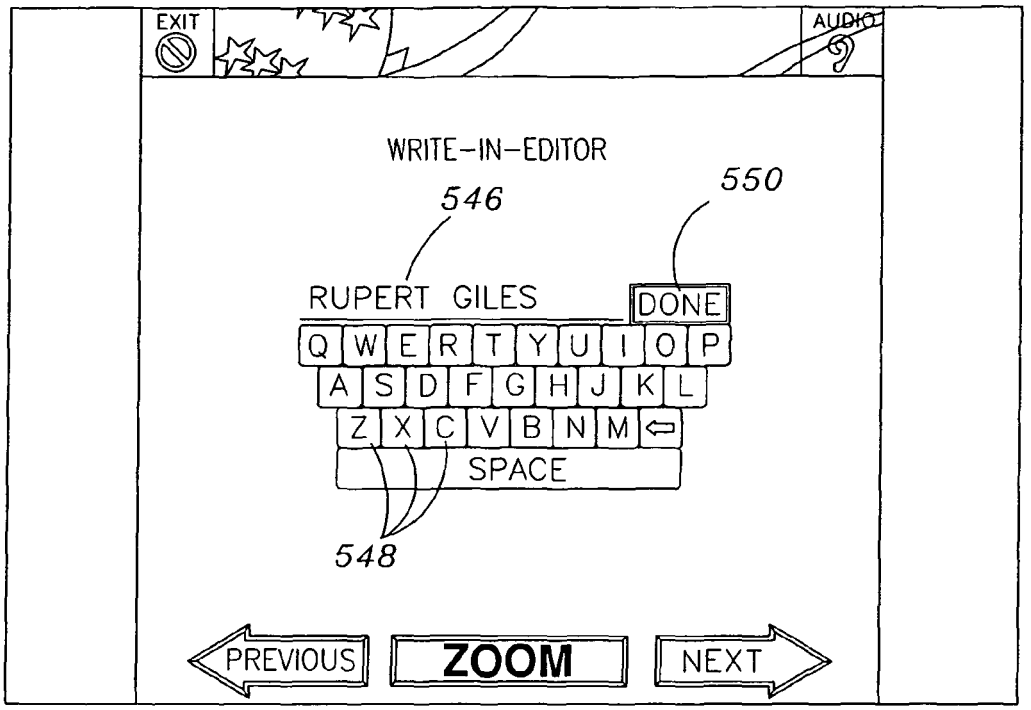

FIG. 25G

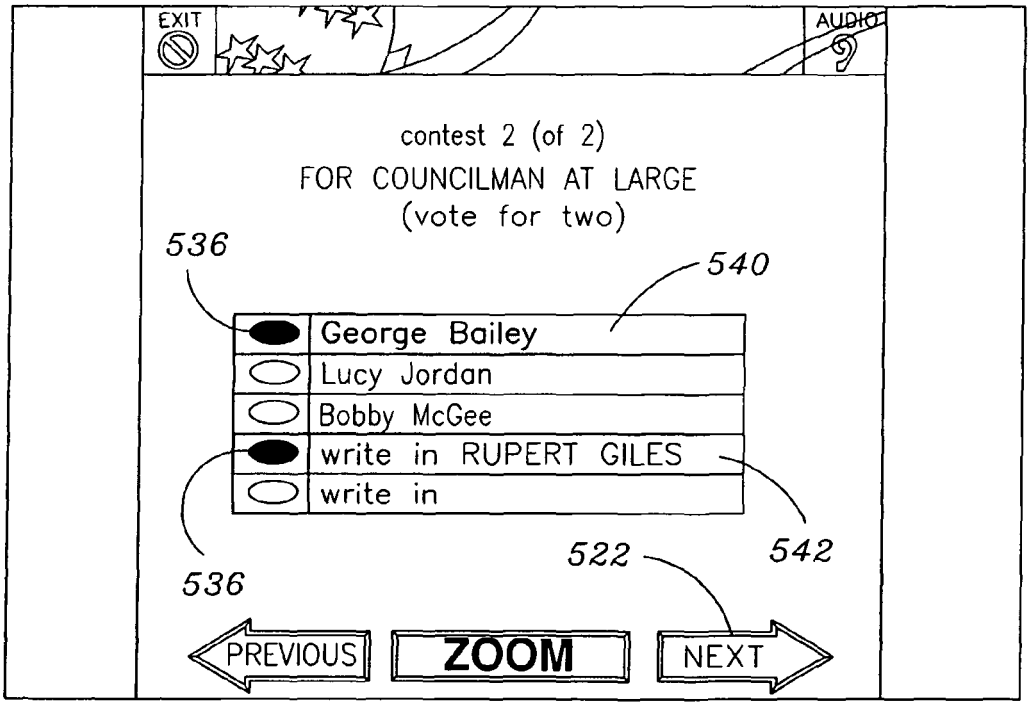

FIG. 25H

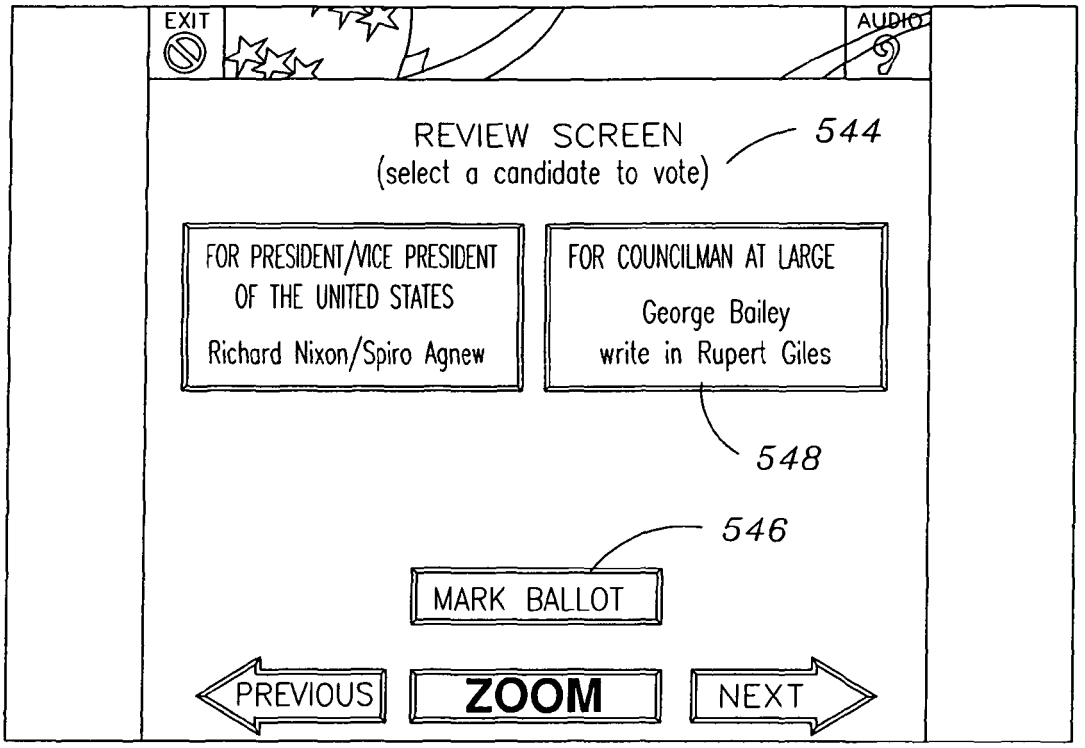

FIG. 25I

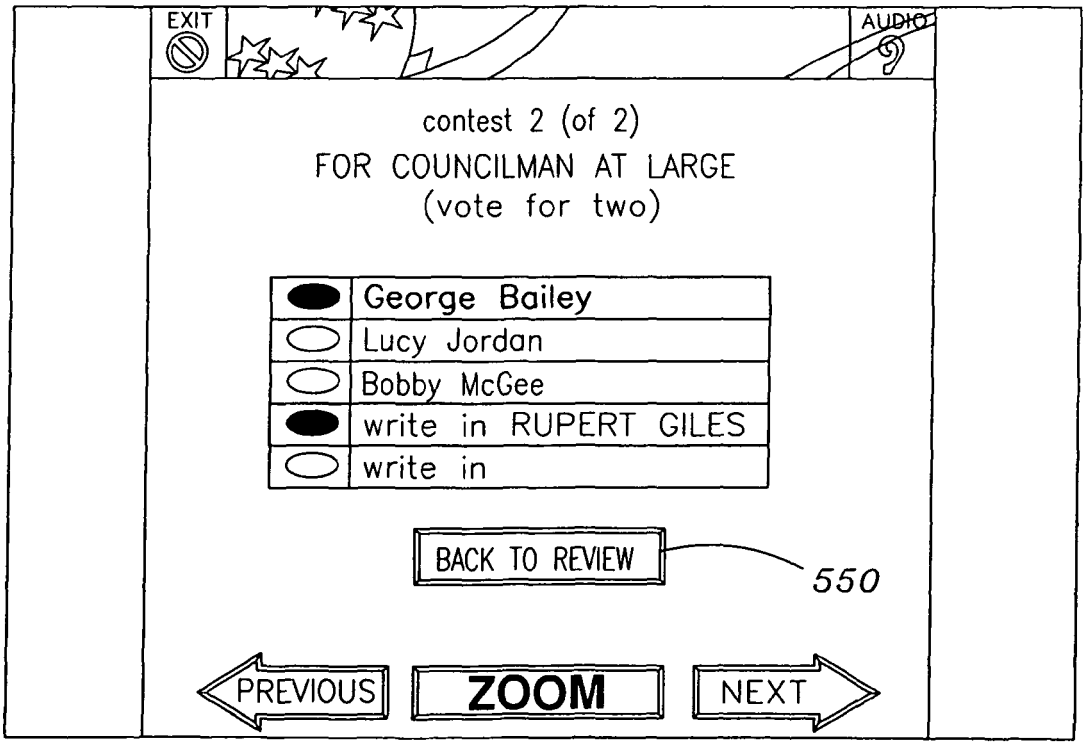

FIG. 25J

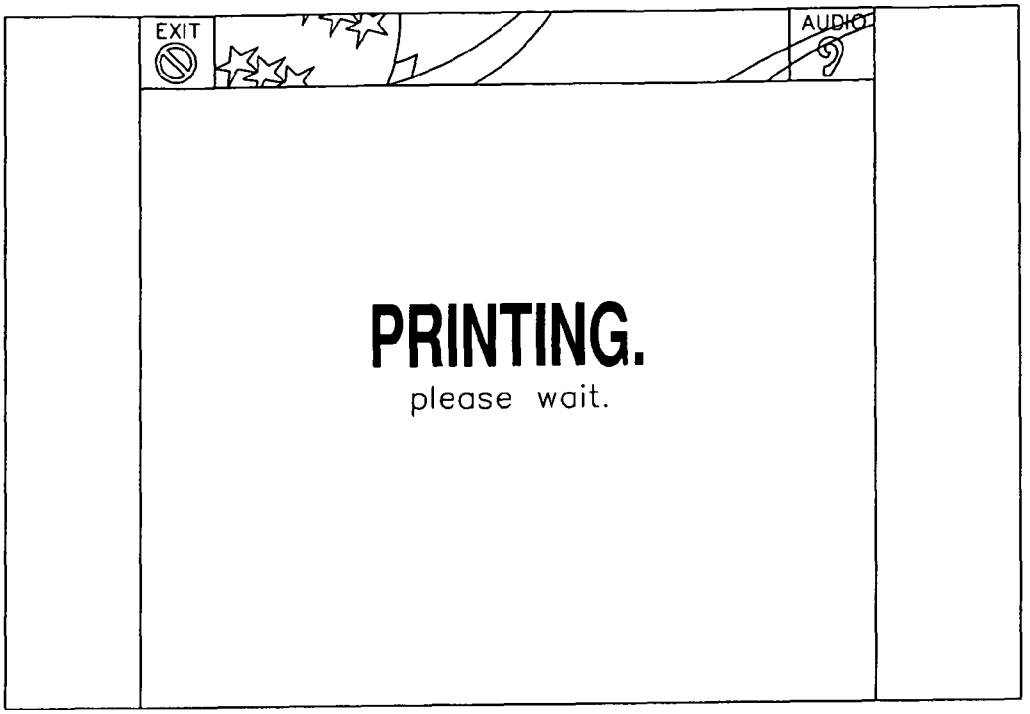

FIG. 25K

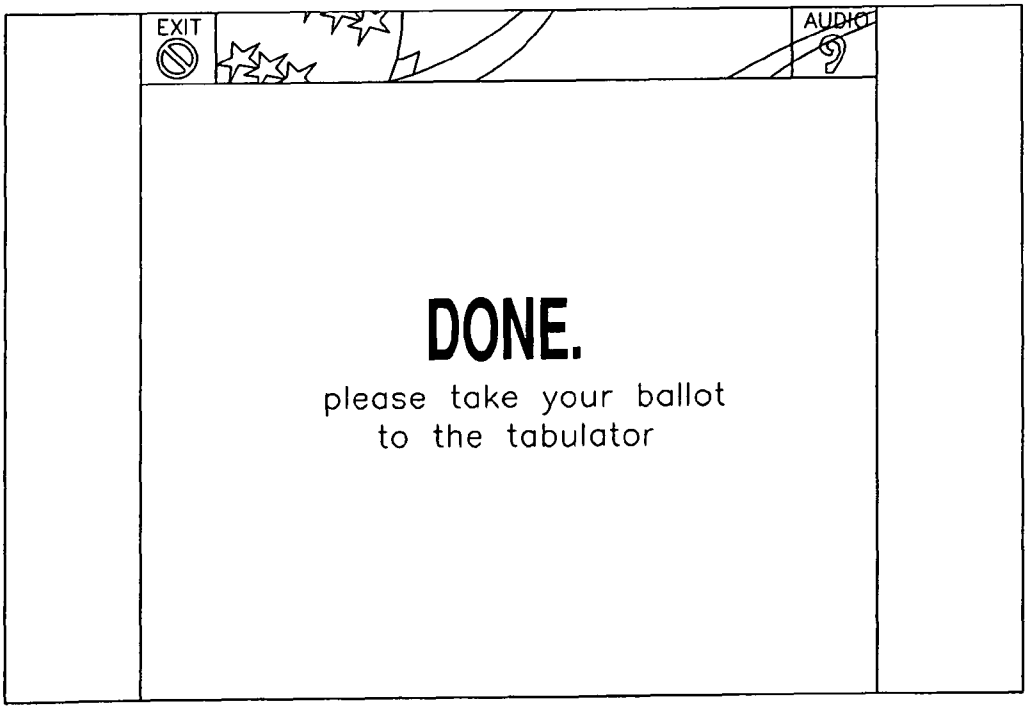

FIG. 25L

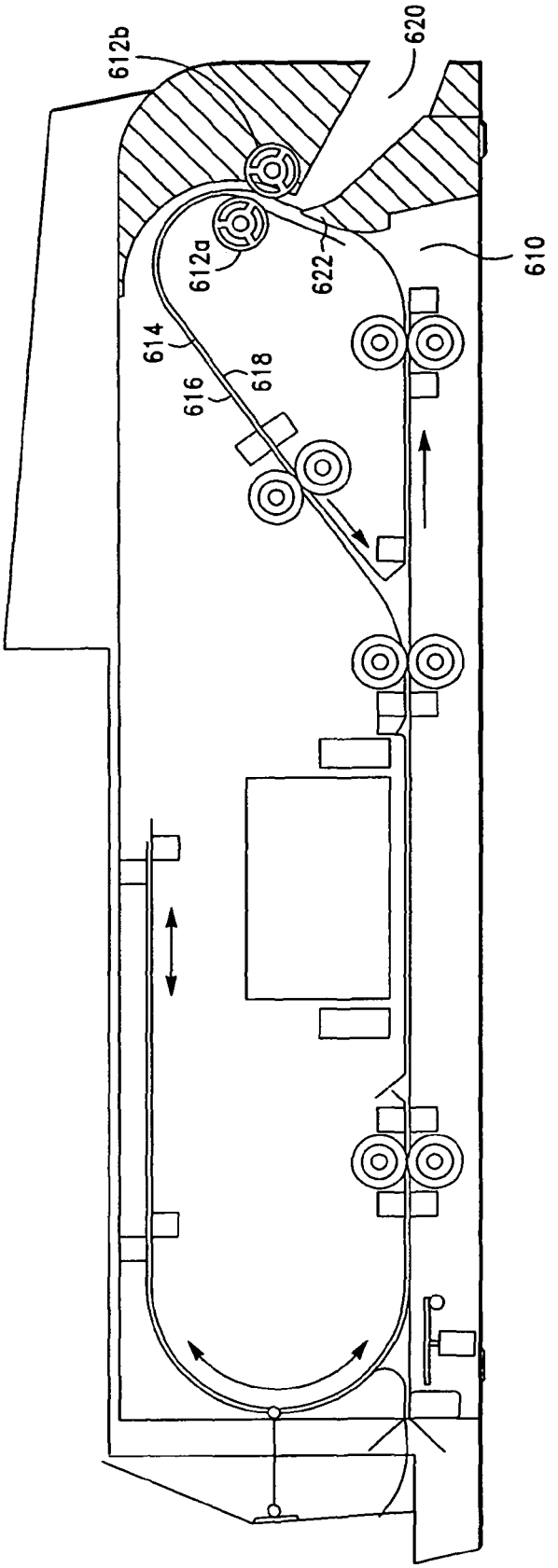

FIG. 26

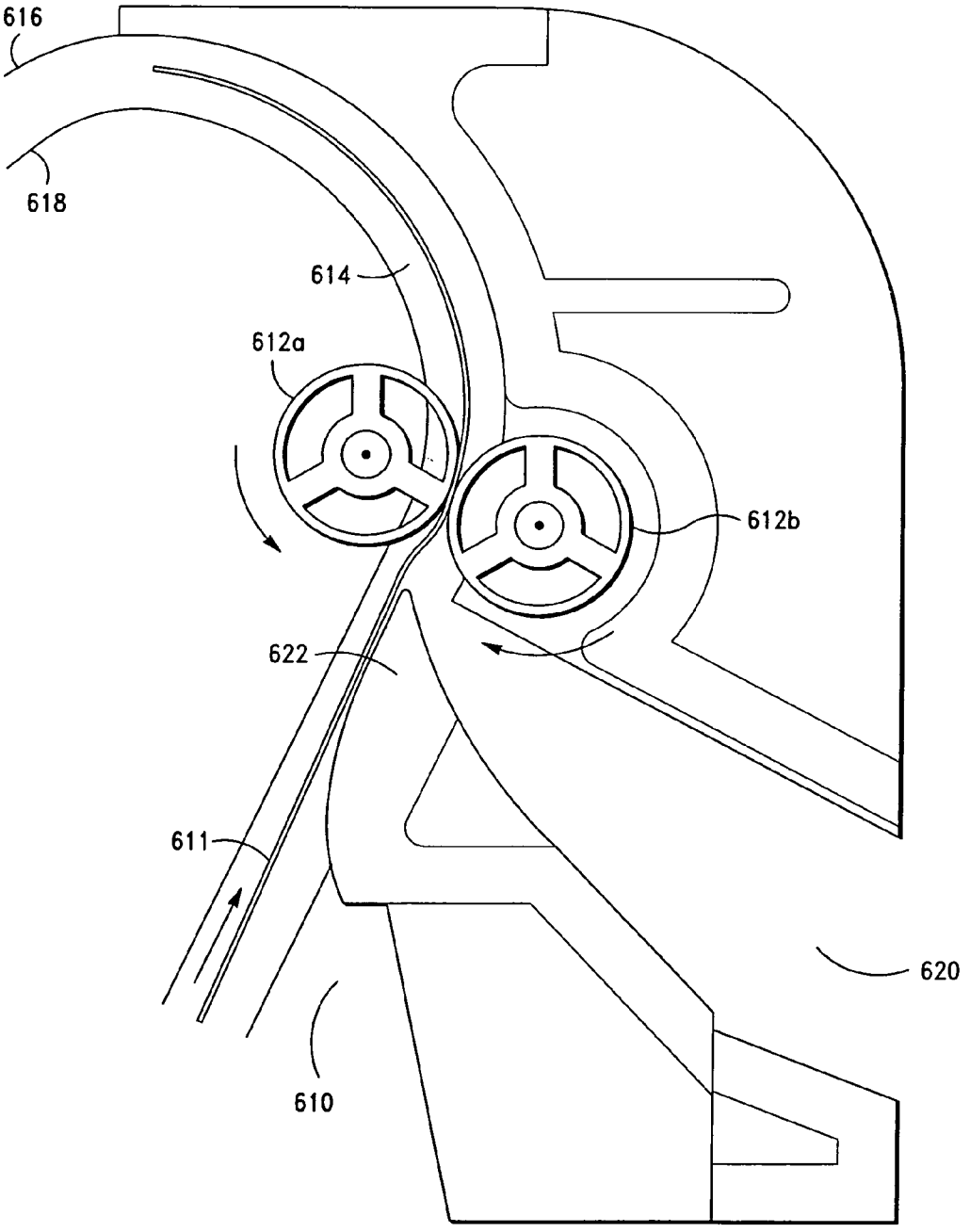

FIG. 27

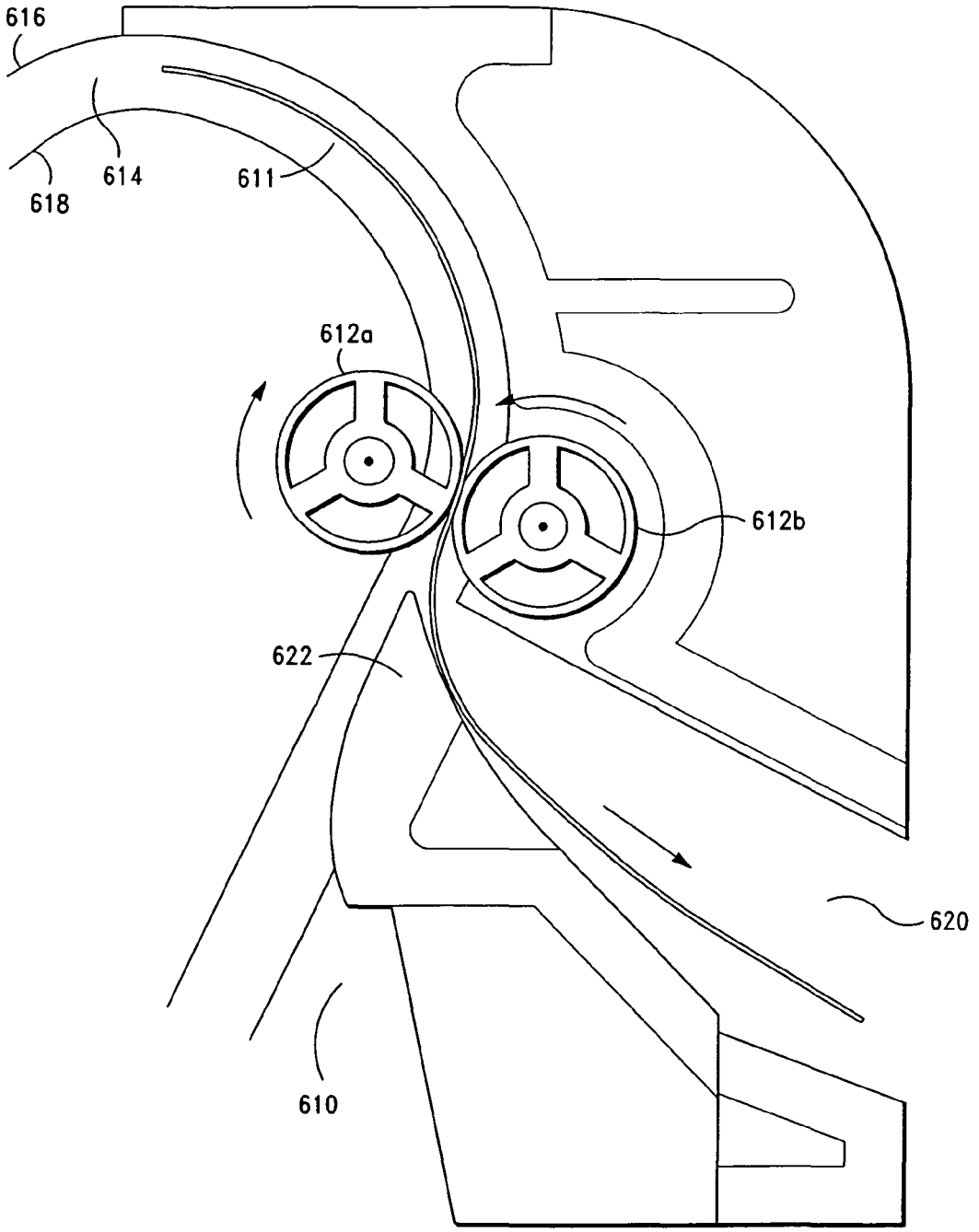

FIG. 28

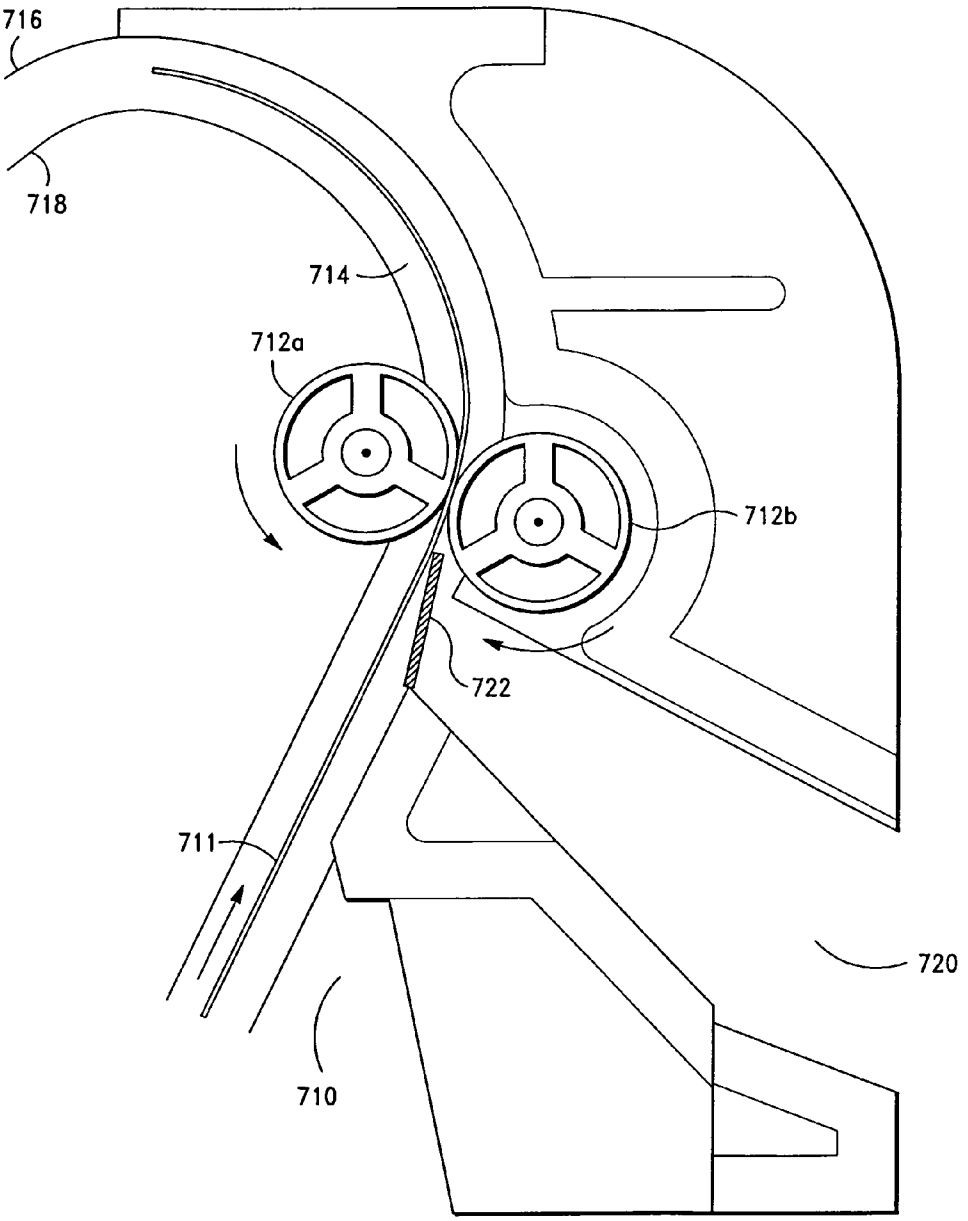

FIG. 29

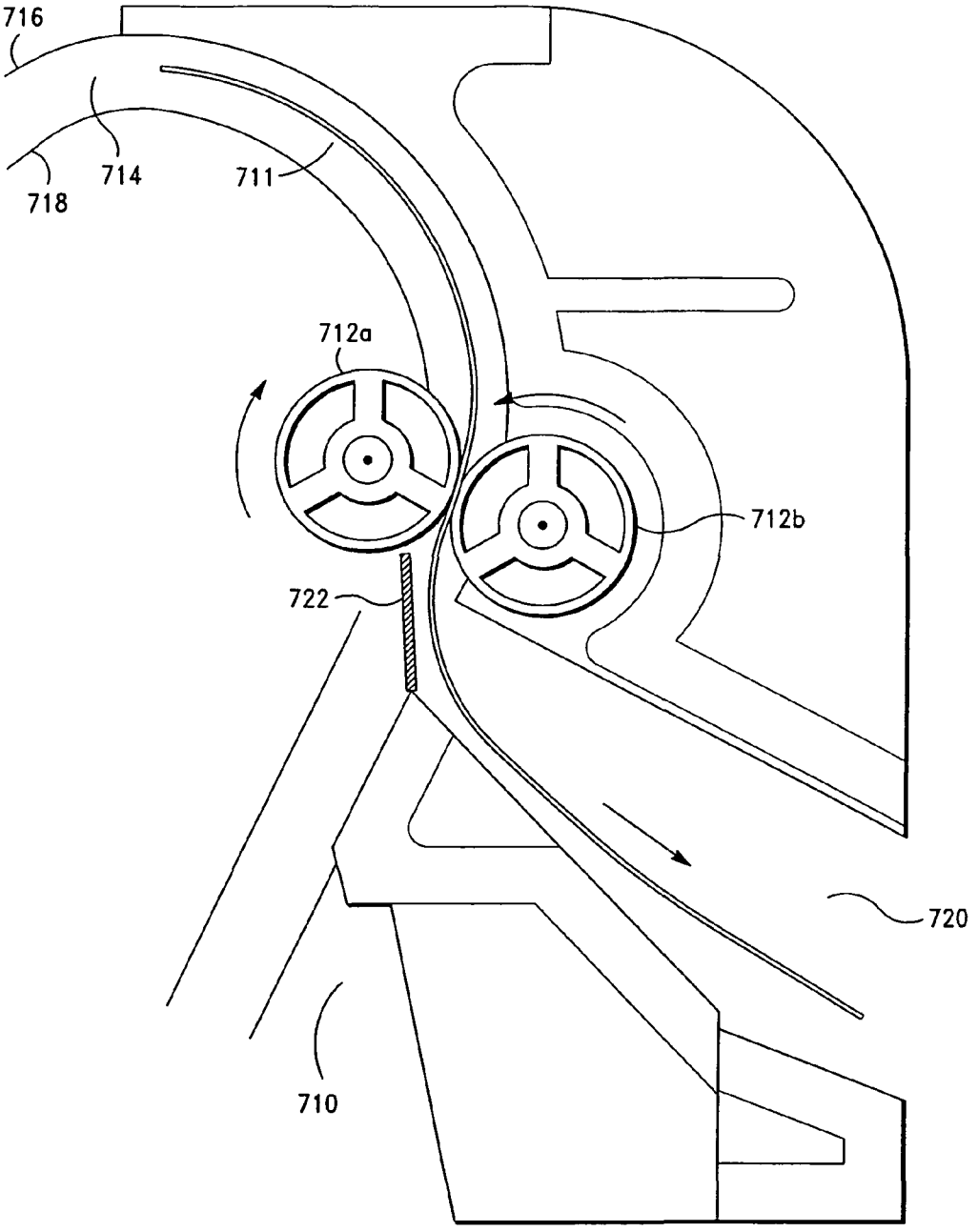

FIG. 30

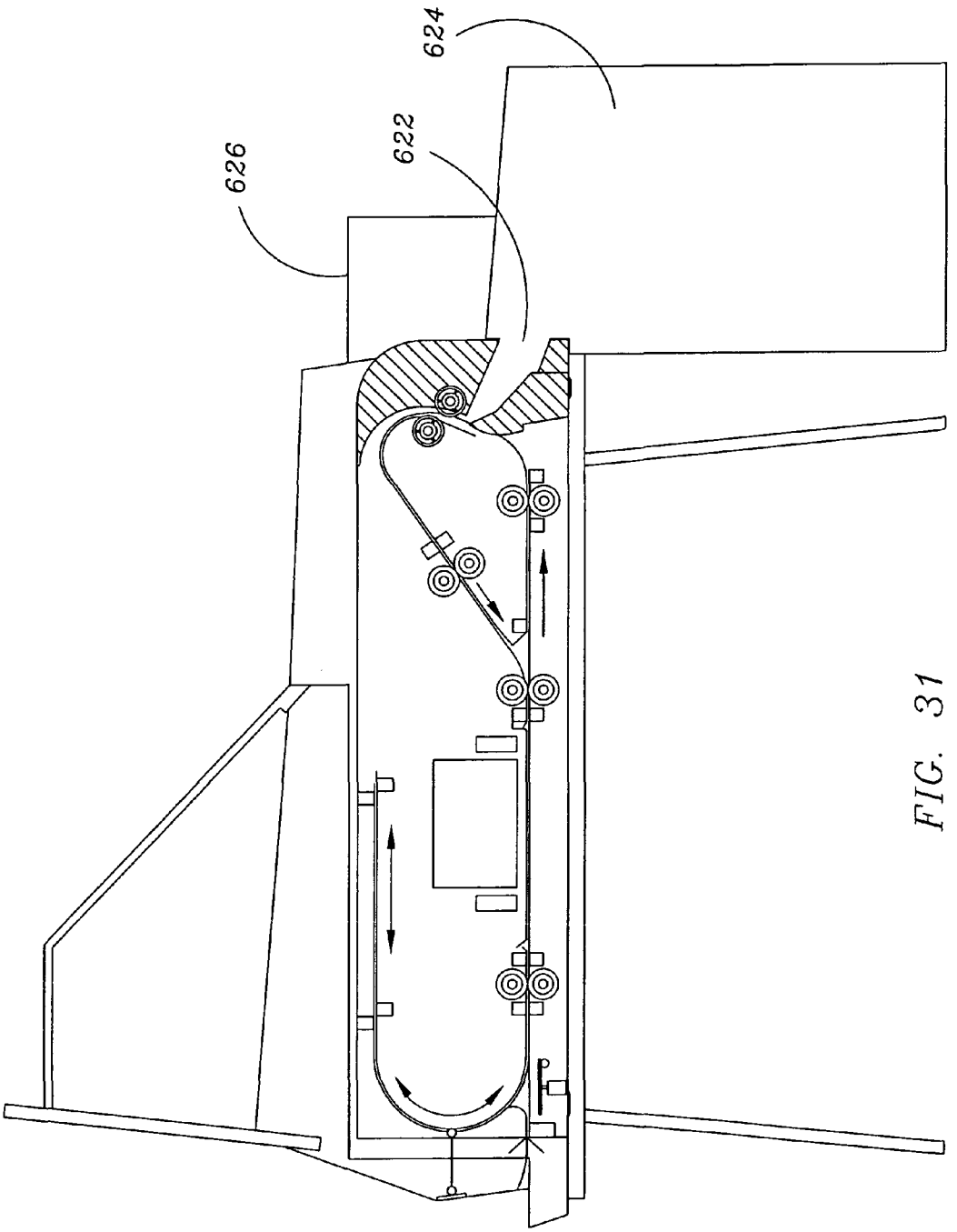

FIG. 31

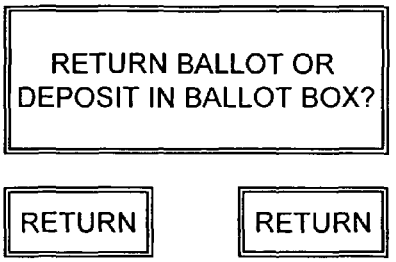
RETURN BALLOT OR DEPOSIT IN BALLOT BOX?
RETURN
RETURN

FIG. 33

VOTER MAKES CONTEST SELECTIONS
810
SUMMARY OF SELECTIONS How Ballet Will be marked
812
814
MARK BALLOT
816
REMOVE MARKED BALLOT
VISUALLY INSPECT
818
822
VERIFY MARKEDBALLOT (AUDIO & TEXT)
VOTER OPTIONS
830
MANUAL BALLOT BOX
820
VOID BALLOT
832
VOTER OPTIONS
824
828
MARKED BALLOT WILL BE PLACED INTO A SECURE CONTAINER FOR SUBSEQUENT COUNTING
826

FIG. 32

BALLOT MARKING DEVICE HAVING ATTACHED BALLOT BOX

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is based on and claims priority to U.S. Provisional Application Ser. No. 61/008,089, filed on Dec. 18, 2007, which is hereby incorporated herein by reference.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

Not applicable.

BACKGROUND OF THE INVENTION

Traditionally, elections for public office in the United States have been conducted with voting systems utilizing hand-marked paper ballots. In such systems, a paper ballot is typically issued to a verified voter by an election judge. The voter takes the ballot to a voting booth, where he manually marks his selections by placing marks or punch holes in marking spaces associated with the candidates he selects. The marked ballot is then taken by the voter to a ballot box where it is inserted and stored for subsequent hand or machine counting.

In recent years, the traditional system has been improved with the use of a ballot scanner to tally the hand-marked ballots as they are inserted into the ballot box. This has the advantage of making vote tallies immediately available at the close of polling, and, with scanners so-equipped, of preventing unintentional under-votes and over-votes. However, one drawback of the traditional system remains in that there is no provision for assisting voters who have a physical impairment, which would interfere with the manual marking of a ballot. Previous attempts at assisting such impaired voters have utilized electronic voting terminals wherein, instead of presenting candidate choices on a paper ballot, candidate choices are serially presented to the voter on large, easily viewable touch-screen displays. When the voter has made his selections, the results are tallied within the voting terminal, the total votes for each candidate being read from the terminal electronically or by means of a paper tape at the close of the polling place.

One drawback of electronic voting terminals is that there is no satisfactory means for auditing the voting process (i.e., confirming that each vote is tallied as voted, and that no votes are tallied which were not voted). Furthermore, there is no means for an individual voter to confirm for himself that his vote has actually been counted. Attempts at addressing these deficiencies have centered on the use of a paper tape or slip printed concurrently with each voter's voting. Such tapes and slips, which bear little or no resemblance to a ballot, have proven difficult to interpret by the voter and do not confirm that the vote has been actually tallied.

Another drawback of the use of electronic voting terminals is that they are inherently less efficient since voters require more time to electronically vote their ballot than is required to mark or punch a paper ballot providing the same candidate choices. Consequently, to avoid long lines at a polling place, a large number of electronic voting stations must be provided, if such stations are utilized as the sole means of voting. This imposes an undesirable cost and space burden on voting jurisdictions, since the electronic voting stations are expensive to own and maintain and require additional space in use and in storage.

SUMMARY OF THE INVENTION

The present invention is generally directed to a ballot marking device adapted to mark a ballot and either return the marked ballot to the voter or automatically deposit the marked ballot into a secure ballot box attached to the marking device. The device includes a presentation device (e.g., display screen, audio menu, etc.) operable to present to the voter a plurality of election choices and ballot handling choices. The ballot handling choices may comprise returning the ballot to the voter and depositing the ballot into the attached ballot box. The device also includes an input device (e.g., touch sensitive screen, push buttons, puff-and-blow device, foot pedal, etc.) operable to receive from the voter at least one selection corresponding to the election choices and at least one instruction corresponding to the ballot handling choices.

The device also includes a marking mechanism operable to record on the ballot the received voter selection corresponding to the election choices. The ballot may comprise a ballot that has been pre-printed with the election choices, in which case only the received voter selection is printed on the ballot (e.g., by marking the mark space corresponding to the received voter selection). Alternatively, both the election choices and the received voter selection corresponding to the election choices may be printed on the ballot simultaneously.

The device further includes a transport mechanism operable to transport the ballot through the device in accordance with the received voter instruction corresponding to the ballot handling choices. If the voter instruction is to return the ballot to the voter, the transport mechanism ejects the ballot from the device. However, if the voter instruction is to deposit the ballot into the attached ballot box, the transport mechanism directs the ballot to a diverter which diverts the ballot out a rear chute of the device and into the attached ballot box.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a simplified perspective view of a voting system utilizing hand-marked and machine-marked paper ballots, a ballot issuing station, a ballot marking station comprising a ballot marking device and an electronic voting terminal, a ballot scanner device and a ballot box in accordance with a first exemplary embodiment of the present invention.

FIG. **2** is a simplified block diagram showing an alternative ballot issuing station for use in the voting system of FIG. **1**.

FIGS. **3** and **3A** provide a simplified perspective view of a ballot handling, sensing and marking apparatus, and the principal electronic circuits and components utilized therein, for use in the voting system of FIG. **1**.

FIG. **4** is an enlarged cross-sectional view of the apparatus depicted in FIG. **3** taken along lines **4-4** of FIG. **7** showing the apparatus operating as a ballot scanning device.

FIG. **5** is an enlarged cross-sectional view taken along line **5-5** of FIG. **7** showing a locking arrangement for preventing unauthorized removal of the scanning device from a ballot box.

FIG. **6** is a plan view of a voter- and machine-markable, voter- and machine-readable paper ballot adapted for use in the voting system of FIG. **1**.

FIG. **7** is a perspective view of the ballot scanning device utilized in the voting system of FIG. **1** showing the scanning device installed on a ballot box.

FIG. **8** is an enlarged cross-sectional view taken along line **8-8** of FIG. **7** showing the receptacle provided in the housing of the ballot scanning device of FIG. **7** for receiving a ballot data module.

FIG. **9** is a side elevational view of the voting terminal utilized in the voting system of FIG. **1** showing the touch-screen display and other major components utilized therein.

FIG. **10** is a simplified block diagram showing the major components of the voting terminal of FIG. **9**.

FIGS. **11**A-**11**E are a series of views of the message display provided on the ballot scanner device utilized in the voting system of FIG. **1** showing various messages displayed to the voter during operation of the scanning device.

FIGS. **12**A-**12**C are a series of views of the message display provided on the ballot marking device utilized in the voting system of FIG. **1** showing various messages displayed to the voter during operation of the marking device.

FIG. **13** is an enlarged front elevational view of the control panel provided on the ballot marking and scanning devices utilized in the voting system of FIG. **1**.

FIGS. **14**A-**14**C provide a simplified flow chart illustrating the principal operating steps which occur during operation of the ballot marking device utilized in the voting system of FIG. **1**.

FIGS. **15**A-**15**D provide a simplified flow chart illustrating the principal operating steps which occur during operation of the ballot scanning device utilized in the voting system of FIG. **1**.

FIG. **16** provides a simplified flow chart illustrating the principal operating steps which occur in the implementation of a security system in the voting system of FIG. **1** to assure that only an authorized ballot data module is used in conjunction with a particular marking or scanning device.

FIG. **17** provides a simplified flow chart illustrating the principal operating steps which occur in the implementation of a security system in the voting system of FIG. **1** to assure that only authorized ballots are processed by a marking or scanning device in which a particular ballot data module is installed.

FIG. **18** provides a simplified flow chart illustrating the principal operating steps which occur in the implementation of a security system in the voting system of FIG. **1** to assure that only an authorized ballot data module is utilized with a particular scanning or marking device, and that only authorized ballots are processed by the authorized devices and ballot data modules.

FIG. **19** is a perspective view of an alternate embodiment of the voter assistance terminal for use according to the voting system of the present invention shown in its open and ready to use position.

FIG. **20** is a perspective view of the voter assistance terminal of FIG. **19** shown in its closed position.

FIG. **21** is a cross-sectional side view of the voter assistance terminal of FIG. **19** showing the principal components utilized for the ballot path.

FIGS. **22***a*-**22***b* are sample start-up touchscreen menus for navigation through the voter selection process according to the present invention.

FIG. **23** is an enlarged top view of the sub-panel of the voter assistance terminal of FIG. **19** showing the preferred key button arrangement thereof.

FIG. **24** is a sample touchscreen election description screen according to the present invention.

FIGS. **25***a*-**25***l* are sample touchscreen menus showing the navigation through a complete voter election process according to the present invention.

FIG. **26** is a side cross-sectional view of a ballot marking device in accordance with a second exemplary embodiment of the present invention having a diverter to optionally divert a marked ballot into an attached ballot box.

FIG. **27** is an enlarged view of a portion of the ballot path of the ballot marking apparatus of FIG. **26** showing a ballot transported upwardly past the diverter.

FIG. **28** is an enlarged view of a portion of the rear ballot path of the ballot marking apparatus of FIG. **26** showing a ballot diverted out the rear paper exit of the device.

FIG. **29** is an enlarged view of a portion of an alternative embodiment of a ballot path of the ballot marking apparatus of FIG. **26** showing a ballot transported upwardly past the diverter.

FIG. **30** is an enlarged view of a portion of an alternative embodiment of a ballot path of the ballot marking apparatus of FIG. **26** showing a ballot diverted out the rear paper exit of the device.

FIG. **31** is a side view of the ballot marking device of FIG. **26** showing an attached ballot box.

FIG. **32** is a flow diagram illustrating an exemplary method for optionally depositing a ballot marked by a marking device into an attached ballot box.

FIG. **33** is a view of a message screen of the ballot marking device of FIG. **26** presenting a voter the option of having the ballot diverted and deposited into an attached ballot box.

DESCRIPTION OF EXEMPLARY EMBODIMENTS

Referring to the drawings, and particularly to FIG. **1**, a voting system **19** constructed in accordance with a first exemplary embodiment of the present invention is seen to include a paper ballot **20**, an electronic voter-assistance station **21** comprising a ballot marking device **22** and voting terminal **23**, a ballot scanning device **24** and a ballot box **25**. A first removable ballot data module **26** is preferably provided for configuring marking device **22**, and a second removable ballot data module **27** is preferably provided for configuring scanning device **24** to a particular ballot format. Marking device **22** is connected to voting terminal **23** by a flexible cable **28** which may have conventional connectors (not shown) at one or both ends to facilitate disassembly and transport of the voting system.

In use, an election judge at **30**, after confirming the identity and registration of a voter, issues a paper ballot **20** at a ballot issuing station **31**. The voter, after physically receiving the ballot, has the option either of manually marking the ballot at a conventional voting booth **32**, or of inserting the ballot into a ballot receiving slot **33** at the front of marking device **22** of voter-assistance station **21** for electronic marking. In the later event, the ballot is received and positioned within the marking device, and voting choices appropriate to the ballot are presented to the voter on successive viewing screens on voting terminal **23**. In particular, the voting selections are preferably presented on a color liquid crystal touch-screen display panel **34**, one slate of candidates for an office at a time, under control of processors contained within marking device **22** and voting terminal **23**. With each office voted, a check is automatically made to determine if the voter has under-voted (failed to vote for a candidate in that office) or over-voted (voted for two or more candidates for that office). In the event of such an under-vote or over-vote, additional choices are presented to the voter on touch-screen **34** to give the voter an opportunity to correct the voting error. In the event the error is not corrected within a predetermined period of time, or in the event the voter fails to vote within a predetermined period of time, the voting process is terminated and the ballot held in marking device **22** is rejected and returned to the voter through slot **33**.

Once the voter has made a selection for each candidate on the ballot, the voter indicates his satisfaction with his choices by actuating a vote option on touch-screen **34**, causing marking device **22** to mark ballot **20** with voter-detectable marks in appropriate marking spaces **35** (FIG. **6**) associated with the respective candidates listed on the ballot. In accordance with one aspect of the invention, the marking is done such that the same marking spaces **35** are marked as would have been marked by the voter had the voter manually marked the ballot at voting booth **32**.

As ballot **20** is being marked, it is discharged from marking device **22** through slot **33**. The discharged ballot is physically removed by the voter, visually checked for accuracy, and carried to scanner device **24** wherein it is inserted in a slot **36** provided at the front of the device. In the event that ballot **20** has instead been manually marked at voting booth **32**, the ballot is similarly inserted into slot **36**. The scanning device, after receiving ballot **20**, checks the ballot for under-vote or over-votes. In the event none are detected, the ballot is automatically deposited in ballot box **25**, which is preferably constructed as described in U.S. Pat. No. 6,648,144 entitled Collapsible Ballot Box. Ballot box **25** preferably includes separate compartments **37** and **38** (FIG. **4**) for non-write-in and write-in ballots, respectively.

To assist the voter, marking device **22** may include a message display window **40** utilizing liquid crystal or other known color display technology for displaying marking device status and issuing prompts and instructions to the voter, and a pair of push-button switches **41** and **42** for receiving instructions from the voter. Similarly, scanner device **24** may include a message display window **43** for displaying scanner device status and voter instructions, and a pair of push-button switches **44** and **45** for receiving voter instructions.

Referring to FIG. **2**, the voter registration station **31** may alternatively utilize a printer **50** for printing ballots **20**. In particular, printer **50**, which is preferably a laser-type printer, is driven by a personal computer **51**. Computer **51**, which may be either a desktop or a laptop, is preferably provided with an input adapted to read a ballot data module **52** containing ballot format data for one or more voting jurisdictions being processed at a polling place. For example, ballot data module **52** may contain formats for each ward in a multiple-ward precinct. Then, once this data has been transferred from data module **52** to computer **51**, upon identification of the voter and his or her ward, it is only necessary for the election judge to input the ward identification. Computer **51** refers to the stored ballot format data from ballot data module **52** to print a ballot **20** of correct format, i.e., having the correct candidate choices, for that voter. A further optional function of computer **51** is to store the names of all of the registered voters for each ward, thereby enabling the election judge to merely input a voter's name. The computer then would automatically verify the registration of that voter and print a ballot in a format appropriate for the voter.

Appropriate security provisions in the form of a PIN (personal identification number) entered into computer **51** by the election judge prior to printing the ballot may be provided to prevent voter fraud. Computer **51** may be connected by a cable **53** to laser printer **50**, which is preferably pre-loaded with a supply of paper compatible with the ballot format. The paper stock may be preprinted with an official seal **54** and/or with a watermark for additional security. However, it is anticipated that at least the candidates names, generally designated **55** in FIG. **2**, sync marks **56**, and associated marking spaces **35**, would ordinarily be printed by laser printer **50**.

Sync marks **56** may be provided along one or more edges of ballot **20** to assist ballot marking device **22** and ballot scanning device **24** in generating and reading marks in ballot marking spaces **35**. In addition, the ballot type, i.e. the particular ward or voting jurisdiction for which the ballot is intended, together with an optional ballot security ID number, may be indicated by one or more printed bar codes **57** at a predetermined location on the ballot. As will be explained, these bar codes are read by marking device **22** and scanning device **24** in processing ballot **20** to identify the type, and hence the format, of the ballot being processed.

The pattern of sync markings **56** may be modified to provide index points along the ballot. In particular, such index marks may include, for example, a start mark **56***a* at the top of the ballot, a header mark **56***b* between the ballot header portion and the ballot candidate selection portion of the ballot, and an end mark **56***c* at the bottom of the ballot. The index marks preferably differ from each other and from non-index sync marks **56** in thickness and/or spacing to enable the index marks to be sensed by the same sensors in marking device **22** and scanning device **24** which read the sync marks.

Referring to FIG. **3**, the mechanism within marking device **22** for receiving, marking, sensing and discharging ballot **20** may comprise a pair of generally parallel-spaced thin metal plates **60** and **61** which define between their co-facing surfaces a paper channel **62**. The plates diverge toward the front end of the printer to define ballot receiving slot **33**, the bottom plate **61** providing a surface on which the voter places the ballot prior to sliding ballot **20** into the slot. A slot **63** in top plate **60** allows a first sync detector **64**, preferably in the form of a light source and photocell focused on the underlying ballot surface, to detect the presence of index mark **56***a* (FIG. **6**) on the edge of the ballot, thus determining that a ballot has been inserted through slot **33**. This causes a pair of ballot-positioning feed rollers **65** and **66**, rotatably driven by a pair of ballot feed drive motors **67** and **68**, respectively, to advance ballot **20** along paper channel **62**. To this end, feed rollers **65** and **66** are paired with opposing feed rollers **70** and **71** (FIG. **4**), respectively. Feed rollers **65** and **70** contact the top and bottom surfaces of the ballot through apertures **72** and **73** (FIG. **4**), respectively, and feed rollers **66** and **71** contact the top and bottom surfaces of the ballot through apertures **74** and **75**, respectively. Feed rollers **65**, **66**, **70** and **71** may be conventional in design and construction, having a rubber ballot engaging surface and being spring-biased into contact with the ballot in a conventional manner. For reliable paper handling, conventional rotation sensing means in the form of circumferentially segmented discs **76** and **77** (FIG. **3**) and optical segment detectors **78** and **79** may be provided to generate signals confirming rotation of feed motors **67** and **68**, and hence paper-positioning feed rollers **65** and **66**, respectively.

As feed motors **67** and **68** rotate, ballot **20** advances until a second sync detector **80** senses through an aperture **81** the passage of index mark **56***b* (FIG. **6**), signifying that the ballot has advanced to a predetermined stop position between plates **60** and **61**. At this point, feed motors **67** and **68** are stopped and the ballot remains stationary.

Referring to FIGS. **9** and **10**, the voter is now presented with successive interactive displays on touch-screen **34** of voter terminal **23** which enable him or her to record his or her candidate choices. Communication between marking device **22** and voting terminal **23** coordinates the ballot presentation, the screens being generated by a display processor **82** utilizing data derived from either ballot data module **26** or an optional ballot data module **84**, and stored in a Random Access Memory (RAM) **83** associated with display processor

82. Voter selections made by the voter on touch-screen **34** are stored in RAM **83** for subsequent use in marking the ballot. A marking device interface circuit **85** provides communication with marking device **22** to coordinate the voting protocol with the handling of ballot **20** by the marking device. An uninterruptible battery back-up power supply (UPS) **86** within voter terminal **23** assures that the voting process can continue even during an AC line interruption. A pair of status lights **87**, indicating AC or battery operation, are provided to confirm the power-up status of the terminal.

To determine which ballot format is to be presented to the voter on touch-screen **34**, bar-code readers in the form of optical mark sensors **88***a* and **88***b* read ballot bar codes **57** (FIG. **6**) through an aperture **89** in top plate **60**. Ballot information provided by the bar codes is utilized by appropriate software in a processor **90** (FIG. **3**) to select the correct ballot format from multiple formats stored in a RAM **91** associated with processor **90** utilizing data obtained from ballot data module **26**. As will be explained, for protection against voter fraud, the bar codes may also provide a ballot ID which is matched with an identification code associated with each ballot format in data module **26** prior to presenting the ballot choices to the voter. In the event there is no match, the ballot is rejected by marking device **22** and returned to the voter without voting terminal **23** being functional. Ballot marking device **22** preferably includes an uninterruptible battery back-up power supply (UPS) **92** for supplying power to processor **90**, drive roller motors **67** and **68** and the other components of the marking device to enable the voting process to continue in the event of power interruption.

A voting station interface circuit **93** cooperates with marking device interface circuit **85** to establish communication between processor **82** and processor **90** to coordinate operation of voting terminal **23** with operation of marking device **22**, including conveying ballot format data from ballot data module **26** to RAM **83** in the event such data is not provided by a separate data module **84**.

To provide voter-detectable marks in appropriate marking spaces **35** (FIG. **6**) on ballot **20** following completion of the voter's selection on voting terminal **23**, marking device **22** includes a pair of marking heads **94** and **95** (FIGS. **3** and **4**) which engage the top surface of the ballot through apertures **96** and **97**, respectively. Various types of marking heads may be employed for this purpose, including, for example, ink jet-type and impact-type print heads for producing a visually-detectable mark, or punch-type heads for producing an embossment, dimple or perforation tactilely detectable mark. A pair of mark sensors **98** and **99** are paired with marking heads **94** and **95**, respectively, to confirm that each has marked ballot **20** in response to marking signals provided by processor **90** through marking head drive circuits **100** and **101** (FIG. **3**), respectively.

When the voter completes his voting session on terminal **23** by providing an appropriate input on touch-screen **34**, ballot feed motors **67** and **68** are caused to operate in reverse to back ballot **20** out of the marking device. As the ballot backs out, processor **90**, in response to the ballot position-identifying sync marks **56** on the ballot, causes marking heads **94** and **95** to be actuated as required to mark candidate selection spaces **35** on the ballot in accordance with the voter's selections on touch-screen **34**. Mark detectors **98** and **99** independently verify that the print heads have functioned, signaling processor **90** to stop the ballot in position and sound an alarm in the event of a malfunction. The marks made by marking heads **94** and **95** on ballot **20** are user-detectable as well as machine-detectable, allowing the voter to independently verify that the ballot has been marked in accordance with his selections on touch-screen **34**.

Ballot feed motors **67** and **68** may in practice be stepper motors driven by a conventional stepper motor drive circuit **102** (FIG. **3**). The feedback signals generated by rotation sensing detectors **78** and **79** are applied to drive circuit **102** to verify motor rotation in a manner well known to the art.

A similar arrangement of ballot marking heads and mark detectors may be provided for the bottom surface of the ballot, allowing both sides of a double-sided ballot to be processed simultaneously. In the present embodiment, additional sync detectors **103** and **104** (FIG. **3**) detect sync marks along a bottom edge of the ballot through apertures **105** and **106** in bottom plate **61** (FIG. **4**), respectively. A pair of marking heads **107** and **108** (FIG. **3**) are paired with mark detectors **110** and **111** to mark and sense marks on the bottom of ballot **20** through aperture **112** (FIG. **4**). Conventional marking head driver circuits **113** and **114** (FIG. **3**A) provide drive signals to marking heads **107** and **108**, respectively.

The ballot processing mechanism functioning in FIGS. **1**-**3**A as marking device **22** may also function as ballot scanning device **24**. When functioning as a scanning device no voting terminal is connected and alternate operating software is provided for processor **90**. In operation as ballot scanning device **24**, an initial message **11**A may be provided on display screen **43** prompting the voter to insert the marked ballot. Upon sync sensor **64** sensing insertion of a ballot, processor **90** causes ballot feed motors **67** and **68** to advance ballot **20** through paper channel **62**. As the ballot advances, mark sensors **98** and **99** sense marks in respective columns of marking positions **35** on the ballot as sync marks **56** are read by sync detectors **64** and **80**, the sensed mark locations being stored in RAM **91**.

When the ballot has been read, as sensed by the passage of index mark **56***c* (FIG. **6**) at sync detector **64**, feed motors **67** and **68** are stopped and the ballot is held in position. The sensed mark locations are then compared with the ballot format provided by ballot data module **27** in RAM **91** for the ballot type read by bar-code readers **88***a* and **88***b*. In the event of an under-vote or an over-vote, a message is provided on bar-code display **43** (FIG. **7**) indicating the under-vote or over-vote, and push-button switches **44** and **45** are illuminated to allow an interactive selection by the voter. Preferably, in the event of an under-vote, a red flashing display may read as shown in FIG. **11**B, requiring either 1) the actuation of vote switch **45**, which will cause the under-vote to be erased in RAM **91** and, provided no other under-votes or over-votes are present, the ballot to be discharged into ballot box **25**, or 2) the actuation of return switch **44**, which will cause all votes on that ballot to be deleted in RAM **91**, feed motors **67** and **68** to operate in reverse, and the ballot to be returned to the voter for further voting. Print heads **94**, **95**, **107** and **108** may be optionally operated during the return of the ballot to void the ballot, as by printing over all marking spaces, or by printing over the ballot ID **57** by means of an additional marking head (not shown), requiring the voter to request a new ballot. In the event of a returned ballot, display **11**E may appear, prompting the voter to remove and re-mark the ballot.

In the event of an over-vote, a red flashing message **11**C prompts the voter to either 1) actuate put-button VOTE switch **45**, in which event the over-vote is deleted from RAM **91**, and, provided no other under votes or over votes are present, the ballot is discharged into ballot box **25**, or 2) actuate push-button RETURN switch **44**, in which event the ballot is returned for correction by the voter and message **11**E is displayed. The ballot may be optionally voided as previously

described, requiring the voter to obtain a new ballot. In the event of an accepted ballot, a steady green display **11**D is provided. When no action is required by the voter, push-button switches **44** and **45** remain unlit and preferably display no indicia.

Similar interactive color display messages may be provided on display **40** of ballot marking device **22**. Initially, an amber display (FIG. **12**A) may prompt the voter to insert an unmarked ballot. When the ballot is in place and while the voter is using terminal **23**, a steady red message (FIG. **12**B) may be displayed. When voting is complete, a flashing red message may be displayed to prompt the voter to remove the machine-marked ballot and take the ballot to scanner device **24**. When the mechanism is functioning as a ballot marking device, push-button switches **44** and **45** are preferably inoperative, unlit and display no indicia.

To enable vote tallies to be transmitted to a central processing location upon poll closing, a communication port **115** (FIG. **3**) and modern **116** may be provided which, under control of processor **90**, causes an appropriate signal to be transmitted indicative of the tallies. Various security provisions are possible, including encryption through the use of an embedded electronic serial number (ESN) in processor **90** and ballot data module **26**, which serial numbers are required to be transmitted and received at the central processing location before ballot tallies, preferably encrypted, are received as authentic election results.

An additional function which may be required of ballot scanning device **24**, but not of ballot marking device **22**, is that the ballot, after processing, is selectively discharged into one or two compartments **37** and **38** within ballot box **25**, depending on whether the ballot contains write-in votes. To this end, when a mark is sensed in a marking space on a write-in vote line, as indicated by the data provided by data module **27** and stored in RAM **91**, a ballot routing gate **117** (FIGS. **3** and **4**) is positioned by an actuator motor **118** to a position which will discharge the ballot into the appropriate compartment. A rotation sensor in the form of a circumferentially segmented disc **119** and optical rotation sensor **120**, provide a feedback signal to a conventional stepper motor drive circuit **121**, which causes gate **117** to be positioned as determined by processor **90**.

The operating mode of the marking and scanning devices is controlled by a key-operated mode switch **122** on the front panel **123** (FIG. **13**) of the devices. The switch selects one of four operating modes: OFF, MARK, SCAN and REPORT. In the MARK mode, the apparatus functions as a marking device to mark the ballot in accordance with vote selections read at voting terminal **23**. In the SCAN mode, the apparatus functions as a scanning device to check marked ballots for under-votes and over-votes and then tally and deposit the ballots in a ballot box. In the REPORT mode, which is normally used following closing of the polls, vote tallies are transmitted as an encrypted message to a central vote-counting location.

Other features provided on front panel **123** include a key-operated locking mechanism **124** for locking the device to a supporting surface, in the case of marking device **22**, or to a ballot box, in the case of scanning device **24**. As shown in FIG. **5**, the locking mechanism **124** may consist of a cylinder-type key lock, having a locking arm **125** which engages a slot **126** in the underlying surface. One or more tabs **127** engage the housing of the printer or scanner through appropriately located slots **128**.

The front panel may further include an identification plate **130** (FIG. **13**) which may contain a permanent device serial number or other identifying indicia, and/or a user-removable identification card by which the scanning device is identified as the property of a particular jurisdiction. Also, a lockable module receiving receptacle **131** may be provided for receiving ballot data modules **26** or **27**.

Preferably, as shown in FIG. **8**, receptacle **131** comprises a compartment **132** within which the module is slidably received. A connector **133** at the rear end of the compartment provides connections with a printed circuit board **134** within the module. A handle **135** may be provided integral with the module housing to assist in removing the module. A hinged door **136** (FIGS. **7** and **13**) secured by a key lock **137** may be provided to prevent tampering with the data module. A window **138** in door **136** may be provided to enable viewing of a module identification number on the handle of the module. A pair of LED pilot lights **139** (FIGS. **7** and **13**) provide a steady indication to indicate whether the unit is operating on AC or battery power, and a blinking indication in the battery mode to indicate a low-battery condition.

As best shown in FIG. **6**, the ballot voting spaces **35** are preferably arranged in columns **140** on ballot **20** so as to be in alignment with the optical marking sensors and marking heads of marking device **22** and scanning device **24**. While two columns are shown in FIG. **6**, it will be appreciated that a greater or lesser number of columns may be provided to accommodate a greater or lesser number of candidate selections on the ballot. In such cases a like number of mark sensors and marking heads would be provided within the marking and scanning devices.

The basic operation of marking device **22** is illustrated by the simplified flow chart of FIGS. **14**A and **14**B. Initially, upon power up of the printer, a start sequence **150** results in data being read from data module **26** at **151**. This data is stored at **152** in RAM **91** within marking device **22**. Provided the data from data module **26** tests valid at **153**, an inquiry is made at **154** whether a ballot has been inserted into ballot receiving slot **33**. In the event the data from data module **26** tests invalid at **153**, a message is generated at **155** for display on display screen **40** and the stored data is erased from RAM **91** at **156**.

Upon a ballot being sensed at **154**, ballot feed motors **67** and **68** are caused to turn in a forward direction at **157***a* to receive the ballot and ballot sync marks **56** are read at **158** to monitor the movement of the ballot through paper channel **62**. As sync pulses are read, the ballot ID is read by bar code readers **88***a* and **88***b* at **160**. The sensed bar code is tested at **161** for validity against a ballot ID received into memory from data module **26**. In the event of an invalid ID, a message is generated at **162** for display on message display **40** and the ballot feed motors are initially stopped and then reversed at **157***b* to reject the ballot.

If the ballot tests valid at **161** and sync marks **56** indicate at **163** the ballot has reached an initial position for marking, the ballot feed motors are stopped at **157***c* and a message is generated at **164** for display on message display **40**. The voter assistance routine is then performed by voting terminal **23** at **165**, in accordance with ballot format stored in RAM **91** and communicated to the voting terminal through cable **28**. Upon completion of the voter assistance routine at **166**, the voter's candidate selections are recorded in RAM **91** at **166**, a message is generated at **168** for display on display **40**, and the ballot feed motors are caused to turn in a reverse direction at **157***d*. In the event that voting is not complete after a period of time starting at **170***a* and ending at **170***b*, a message at **171** is displayed on display **40** and the ballot feed motors are caused to turn in a reverse direction at **157***b* to discharge the ballot.

As ballot **20** backs out of marking device **22** from its initial printing position, sync markings are read at **172**, stored user

candidate selections are recalled from memory at **173** and, where at **174** a mark is required by the stored selection, marking heads **94**, **95**, **107** and **108** are actuated at **175** to place voter-readable and machine-readable marks at the marking spaces **35** associated with the voter-selected candidates. Following each marking, the associated one of mark sensors **98**, **99**, **110** and **111**, respectively, test for proper printing at **176**. In the event a printing malfunction is sensed, an alarm is sounded at **177***a*, a message is generated at **177***b* for display on message display **40** and the ballot feed motors are stopped at **157**.

If all print marks check valid and the printing tests complete at **178**, a message is generated at **180** on message display **40** and reverse operation of the ballot drive motors continues at **157***f* until the ballot is sensed at **181** to be discharged through slot **33**. If printing is not complete, then sync marks continue to be read at **172** and the previously described print cycle continues. Once the ballot feed motors have been stopped, further movement of the feed motors is prevented at **157***g* until the ballot has been removed at **182** by the voter.

The operation of scanning device **24** is described by the simplified block diagram of FIGS. **15**A and **15**B. Upon initiation of the operation sequence at **190**, data from ballot data module **27** is read at **191** and stored in RAM **91** at **192**. The data supplied by data module **27** is tested for validity at **193**. In the event the data module is found to be invalid, a message is displayed at **194** for display on message display **43** and the stored data is erased at **195** from RAM **91**.

In the event the data from data module **27** is valid, a determination is made at **196** whether a ballot is present at ballot-receiving slot **36**. If a ballot is present, the ballot feed motors **67** and **68** are caused to operate at **197***a* to advance the ballot through ballot channel **62** and sync marks **56** are read at **198** as the ballot advances. Upon detection at **200** of the ballot having reached an initial reading position, a counter within processor **90** is reset at **201** to track the progress of the ballot. With each incremental movement of the ballot reference is made at **202** to the data stored in RAM **91** to determine whether the ballot is in a position wherein a valid marking space is positioned under one of the mark sensors. In the event a marking space is so situated and a mark is sensed at **203**, an input is provided to RAM **91** at **204** of the sensed mark and marking space to record a vote for the candidate associated with that marking space. The process continues until all valid marking spaces have been sensed at **205**, at which time the ballot ID code **57** is read at **206** by bar code reading heads **88***a* and **88***b*. In the event the ballot ID is not valid at **207**, i.e., the ballot is not appropriate to this scanning device in this voting jurisdiction, the forward progress of the ballot is stopped by stopping the ballot feed motors at **197***h* and a message is generated at **208** for display on message display **43**.

If the ballot ID tests valid at **207**, the ballot feed motors are stopped at **197***c* and the ballot format is read from memory at **210** to determine whether the ballot has been properly marked for the particular candidate selections presented to the voter. If an under-vote is detected at **211**, a display message is generated at **212**. Push-button switches **44** and **45** are now enabled. If switch **44** is actuated by the voter signaling rejection of the ballot at **213**, a message is generated at **214** for display on message display **43** and the ballot feed motors are caused to operate in reverse at **197***f* to return the ballot to the voter. If the voter actuates switch **45** indicating acceptance of the under-vote at **215**, the valid votes contained on the ballot are recorded into a cumulative vote tally memory at **216** and a message is generated at **217** for display on message display **43**. In the event the voter fails to actuate either switch **44** or **45** following generation of the under-vote message at **212**, the inaction is treated as a rejection after a predetermined time period starting at **218***a* and ending at **218***b*.

In the event an over-vote is sensed at **220**, a message is generated at **221** for display on message display **43**. Push-button switches **44** and **45** are illuminated and enabled. If the voter chooses to reject the over-vote by actuation of RETURN switch **44** at **222**, a message is generated at **223** for display on message display **43** and the ballot feed motors are caused to operate in reverse at **197***f* to return the ballot to the voter. In the event VOTE switch **45** is actuated at **224** to accept the over-vote, the votes constituting the over-vote, i.e., multiple votes cast for a single office, are cancelled from RAM **91** at **225** and the balance of the ballot is entered into the cumulative vote tally AT **216**. A message is generated at **226** for display on message display **43**. In the event that the voter fails to actuate either push-button switch **44** or **45** following the generation of the over-vote message at **221**, the inaction is treated as a rejection after a predetermined period of time starting at **218***c* and ending at **218***d*.

In the event no under-votes or over-votes are present, a message is generated at **227** for display on message display **43** and the movement of ballot **20** is continued at **197***d* through paper channel **62** until discharge of the ballot has been sensed at **228**, at which time the ballot feed motors are stopped at **197**.

When the ballot feed motors have been caused at **197***f* to return the ballot to the voter, the feed motors continue to operate until the ballot has been discharged through slot **36** as sensed by index mark **56***a* at **229**, at which time the feed motors are stopped at **197***g*. Forward operation of the ballot feed motors is prevented at **197** by sensor **64** at **230** to prevent the returned ballot prior to pick up by the voter from being sensed as a newly-inserted ballot.

Various security protocols may be provided in marking device **22** and scanning device **24** to prevent voter fraud. In FIG. **16**, a system is shown for allowing only authorized data modules **26** or **27** to be used with a particular marking device or scanning device. In this system each device is provided with an identification number, ID**1**, which is preferably embedded within a chip associated with processor **90**. ID**1** may, for instance, comprise a unique 8, 16 or 32 bit number. A ballot data module intended for use with the particular printer or scanner is similarly provided with an embedded identification number, ID**2**. Upon insertion and reading of the data module at **250**, ID**1** is stored in RAM **91** at **251**. At the same time, ID**2** is read at **252** and stored in RAM **91** at **253**. A security algorithm receives ID**1** and ID**2** at **254**, validates the numbers at **255**, and generates an enabling signal which enables operation of the device. In the event the IDs do not validate, a message is generated at **256** for display on the device message display and further operation of the device is prevented.

A further security protocol may be provided to prevent a data module **26** or **27** from being used with an inappropriate ballot **20**. In this instance, as shown in FIG. **17**, the module ID**1** is read at **260** and stored in RAM **91** at **261**. In subsequent operation, ID**3** is read from ballot bar code ID **57** at **262** and stored in RAM **91** at **263**. A security algorithm is performed at **264** whereby ID**1** and ID**3** are compared to determine whether their combination is valid at **265**. In the event the ballot ID is not appropriate to the module ID, a message is generated at **266** for display on the device message display, and the ballot is rejected. In the event the combination is appropriate, operation of the device continues.

A further security protocol is possible wherein a valid combination of ballot data module, marking or scanning device and ballot is verified. In this routine, as shown in FIG.

18, the data module ID1 is read at 270 and stored in RAM 91 at 271. The device ID2 is read at 272 and stored in RAM 91 at 273. A security algorithm is performed at 274 to verify at 275 that a valid combination of data module and device exists. In the event the module is not appropriate, a message is generated at 276 for display on the device message display and further operation of the device is prevented.

If the ballot data module and device are a valid combination, in subsequent operation the ballot ID3 is read from the ballot at 277 and stored in RAM 91 at 278. A further security algorithm is performed at 280 which verifies that the ID1 of the data module, the ID2 of the device and the ID3 of the ballot are all valid at 281 for processing of the ballot. In the event that the ballot is inappropriate to the combination, a message is generated at 282 for display on the device message display and the ballot is rejected.

Thus, by controlling the imbedded ID numbers of the ballot data module and the device and the ID number of the ballot, the introduction of an inappropriate element into the voting system is prevented. It is anticipated that the ID'S of the data module and marking and scanning devices would be concealed to prevent someone from easily substituting another module or device into the system and thereby achieving erroneous vote tallies.

While a form of marking and scanning apparatus has been described for use with the voting system of the embodiments of the invention described herein, it will be appreciated that such marking and scanning devices may take various forms. For example, a greater or lesser number of rollers may be employed to position the ballot within the device and a greater or lesser number of marking and mark sensing heads may be employed to provide for a greater or lesser number of columns of marking spaces on the ballot. Furthermore, instead of moving the ballot past stationary marking and sensing heads, it would be possible to move the ballot to a stationary position, and then move the marking and sensing heads, preferably arranged horizontally side-by-side on a stepper motor driven carriage, vertically from one end to the other of the ballot, thereby vertically scanning the ballot for markings and marking locations as required.

Furthermore, while data modules have been shown that plug directly into a receptacle in the personal computer, marking device, or scanning device, it will be appreciated that such modules could instead be connected through a cable using a serial data interface, such as, for example, a universal serial bus (USB). Furthermore, while the foregoing description provides that voting data will be stored in RAM memory, it will be appreciated that EEPROM (electrically erasable programmable read-only memory) or flash memory could be used instead.

Furthermore, various types of mark sensing devices can be used in the marking and scanning devices, including one utilizing, a focused light source reflecting from the ballot surface onto a focused detector, and that various known circuits and optical devices can be incorporated to enhance the performance of such mark sensing devices. Furthermore, various forms of print heads can be used as marking heads to mark the marking spaces of the ballot. One form of print head believed advantageous for this purpose and readily available is an impact type involving a single hammer and a replaceable carbon or mylar film ribbon cartridge. However, print heads employing bubble jet or ink jet technology could also be utilized.

It will also be appreciated that various types of alternative media may be used for the physical ballot, including, for example, a thin plastic material, and marking may be accomplished by punching or deforming the material by means of heat, or a mechanical, electrical or magnetic force, it only being necessary for the voter to be able to detect the mark to ascertain that his or her votes have been correctly marked.

Furthermore, while it is recognized that the particular construction illustrated for the apparatus of the marking and scanning devices is advantageous in that it allows the same apparatus to be used for either device, and that the function of the apparatus can be readily changed by selecting different operating systems in processor 90 by a means of a single mode-selecting switch, in practice the construction of the marking and scanning devices need not be identical and can instead be optimized for use in each device.

For example, an alternate embodiment for the construction of a device optimized for marking is illustrated in FIGS. 19-21. Referring to FIG. 19, this voter assistance terminal 300 comprises a ballot marking device 302 and touchscreen or voting terminal 304. The preferred embodiment of this voter assistance terminal 300 provides for the marking device 302 to be connected to the touchscreen 304 via a flexible cable (not shown) which may have conventional connectors to facilitate the closing and transport of the voter assistance terminal 300. (See FIG. 20)

The voter assistance terminal 300 constructed in accordance with this alternate embodiment of the present invention is used as previously discussed. In short, an election judge, after confirming the identity and registration of the voter, issues a preprinted paper ballot 306. The voter has the option of manually marking the ballot 306 in the conventional way, or of inserting it into a ballot receiving slot 308 at the front of the marking device 302 of the voter assistance terminal 300 for electronic marking. The terminal 300 draws in the ballot 306 and scans a preprinted code to determine which form or style of ballot has been inserted. It then presents a series of menu-driven voting choices on its preferably color touchscreen 304 corresponding to that particular ballot style.

In the event that the voter is in need of language support, for example he or she cannot read the English language, the voting menus on the touchscreen 304 can be presented in any number of different languages and then the voter can more readily navigate through these menus. Additionally, in the event that the voter has diminished motor skills, is somewhat visually impaired, or is in some other way physically handicapped and cannot vote in the conventional manner, he or she simply navigates through these touchscreen menus. Furthermore, in the event that the voter cannot use the touchscreen 304 due to the severe physical impairment, blindness or any other reason, he or she can navigate through these menus via a headphone 310 and sub-panel 312 combination. More particularly, a blind voter (for example) would wear the headphones 310 which are connected to the marking device 302 via headphone wire 314 and jack 316 into plug 318.

Although the headphones may be used in conjunction with the touchscreen display, the display preferably shuts down (turns black) when the jack 316 is inserted into plug 318 in order to preserve the voter's privacy as he or she navigates through these menus. As such, the sub-panel comprises, preferably four arrow keys, up 322, down 324, left 326, right 328 and an enter key 330, although it has been contemplated that this particular sub-panel 312 be interchangeable with a future sub-panel having a different key configuration. The blind voter then navigates through the menus using these keys in conjunction with pre-recorded, digitized audio prompts heard through headphones 310.

It will be understood that additional means of voter menu navigation have been contemplated, for example, a USB port 320 may be provided that would allow voters to bring in their own input devices, such as a puff-blow or foot pedal. In this

implementation, the interface provides single switch access which takes place in the same general manner as the touch screen or sub-panel, but voter responses are limited to YES and NO.

In any event, the voter assistance terminal **300** accumulates the voters choices in its internal memory during this menu driven (visual, audio, or both) navigation. When the voter is finished with his or her choices, he or she is prompted to mark his or her ballot. The preprinted ballot is then marked according to these choices using its internal print mechanism. The ballot is then fed back to the voter through slot **308** for confirmation and insertion into the scanner, where it is validated and tallied.

Referring now to FIG. **20**, the voter assistance terminal **300** is shown in its closed or transport state. In this state, it can be easily carried via handles **332** located on both sides of its lower housing **334**. The touchscreen is safely located within recess **336** and beneath the protective cover **338** hinged to the top housing **340** via hinges **342** (FIG. **19**). The ballot slot **308** is also safely located behind the lower cover **344** which forms the ramp **346** to aid in the ballot insertion when the voter assist terminal **300** is in the open position.

An additional sub-panel **348** preferably comprises a message display window **350** utilizing liquid crystal or other known color display technology for displaying voter assistance terminal status and issuing prompts and instructions to the voter. As with sub-panel **312**, it has been contemplated that sub-panel **348** be interchangeable within a future sub-panel having a different message display window, or an additional sub-panel utilizing a key configuration.

Other features provided on the voter assist terminal **300** include a lockable module receiving receptacle **352** for receiving ballot data modules (as previously discussed). A hinged door **354** secured by a key lock **356** may be provided to prevent tampering with the data module. An LED pilot light **358** provides a steady green indication to indicate AC power, a steady yellow indication to indicate battery power and a blinking red to indicate a low-battery condition.

The assembly **360** illustrating the ballot path within the voter assist terminal **300** for receiving, marking, sensing and discharging the ballot is shown within the cross-sectional side view of FIG. **21**.

The mechanism within the voter assist terminal **300** for receiving, marking, sensing and discharging ballot **306** may comprise of a pair of generally parallel-spaced thin metal plates **362** and **364** which define between their co-facing surfaces a ballot channel **366**. The plates diverge toward the front end **368** of the terminal **360** to define a ballot receiving slot **370**, the bottom plate extending with the ramp **346** to provide a surface on which the voter places the ballot **306** prior to sliding the ballot into the slot **370**. A small slot in the plates enables a first optical detector **372**, preferably in the form of a light source and photocell, to determine whether a ballot has been inserted through slot **370**. Upon such detection, a pair of ballot-positioning feed rollers **374** and **376** driven by a first drive motor (not shown) advance the ballot along ballot channel **366**. To this end, feed rollers **374** and **376** are paired with opposing feed rollers **378** and **380**, respectively. Feed rollers **374**, **376**, **378** and **380** may be conventional in design and construction, having a rubber ballot engaging surface and being spring-biased into contact with the ballot in a conventional manner through slots in plate **362**. Furthermore, as the ballot needs to travel in both directions within the channel **366***a*, either towards the front of the assembly or towards the back of the assembly, feed rollers **374**, **376**, **378** and **380** need to be capable of rotating in both directions.

Conversely, the pair of feed rollers **382** and **384** within the ballot reversal loop **386** of channel **366***b* need only rotate in one direction to advance the ballot. To this end, feed rollers **382** and **384** are driven by a second drive motor (not shown) paired with opposing feed rollers **388** and **390**, respectively. Feed rollers **382**, **384**, **388** and **390** may also be conventional in design and construction, having a rubber ballot engaging surface and being spring-biased into contact with the ballot in a conventional manner through slots in plates **362** and **364** of reversal loop **386**.

A solenoid **392** actuated routing gate **394** urges the ballot either towards the receiving slot **380** and ramp **346** when in the down position, in the event marking of the ballot by the print mechanism **396** is complete, or towards the holding channel **366***c*, when in the up position, in the event the ballot marking process is not complete. In any event, and as previously discussed in greater detail, all ballot routing positioning and marking is controlled by appropriate software in a processor that ensures correct mark positioning from ballot type and position information continuously obtained by optical detectors **372**, **398** and **400**.

As previously discussed, the voter assistance terminal **300** accumulates the voters choices in its internal memory during a menu-driven navigation scheme. This user-interface can be accomplished through touchscreen navigation only, through key button/touchscreen navigation, through key button/headphone navigation or through any other viable combination thereof.

For example, FIGS. **22***a* and **22***b* illustrate a preferred start-up touchscreen scheme. FIG. **22***a* is prompting the voter to insert his or her ballot into the voter assistance terminal using both a written prompt **500** (multiple languages may be shown here) and an illustrational prompt **502**. Once the ballot is inserted, FIG. **22***b* prompts the voter to select an appropriate language to navigate through the voting selection process. When the voter touches the ENGLISH prompt **504** or the SPANISH (ESPAOL) prompt **506**, the remainder of the selection process will either be presented in English or Spanish, respectively. Prompts common to most menus and/or screens in the selection process are included on the top **508** and the bottom **510** of each screen. In the preferred embodiment, the top **508** of the screen includes an EXIT prompt **512** which ends the selection process and an AUDIO prompt **514** which toggles the digitized audio voting sequence on and off. The bottom **510** of the screen may include a ZOOM prompt **516** which enlarges the touchscreen's main display area **518**, as well as a PREVIOUS **520** and a NEXT prompt **522** which reverses or advances navigation to the previous or next screens, respectively.

The present invention has been designed such that the voter can not only navigate through the selection process via the touchscreen interface, but can also navigate through the process using the key buttons in combination with the digitized audio voting sequence heard through the headphones.

More particularly, and referring to FIG. **23**, the preferred sub-panel **312** key button engagement is shown. These key buttons allow the voter to navigate through the menus either while watching the touchscreen display or while listening to the audio sequence or both in the same manner that the voter can solely use the touchscreen. For example, referring to the language selection screen (FIG. **22***b*), the voter may highlight the ENGLISH **504** or SPANISH (ESPAOL) prompt **506** by using the up key **322** and/or the down key **324**. When the proper prompt is highlighted, the voter makes his or her selection by using the select or enter key **330**. If the voter is not using the touchscreen display, but is rather using the audio sequence, the key buttons allow for similar navigation

thereof. In other words, upon insertion of the ballot the audio sequence may say, for example, "Select Language", and when the voter uses the up key **322** and/or the down key **324**, the audio sequence will switch to English or Spanish in real-time. When the proper language is heard, the voter uses the select or enter key **330** and proceeds with the rest of the selection process.

The remaining start-up screen may be, for example, an election description screen informing the voter of the type of election **524**, precinct **526**, ballot style **528**, etc., see FIG. **24**.

A sample election selection process is shown and described in FIGS. **25***a*-**25***l*. It will be understood that all of the control options accomplished through the illustrated touchscreen user interface can also be accomplished through the sub-panel **312** key buttons (FIG. **23**) and touch screen display and/or audio sequence. For example, the up **322** and down key buttons **324** allow the voter to scroll between candidates in a race such that they are highlighted on the touchscreen display and/or heard through the headphones on a real-time basis. Similarly, the left **326** and right key buttons **328** allow the voter to scroll between contests or races such that the previous or next screen is displayed and/or heard on a real-time basis.

That said, the first screen of the sample election is shown in FIG. **25***a*. The main display area **518** of this screen informs the voter of the contest **530**, the position **532** and the candidates area **534**. If the voter has difficulty reading the screen, or any other screen, a touch of the ZOOM prompt **516** enlarges the print of the main display area **518**, as shown in FIG. **25***b*. Another subsequent touch of the ZOOM prompt **516** reduces the print in the main display area **518** back to standard size (FIG. **25***a*).

FIG. **25***c* indicates by the darkening of the oval **536** next to the candidates name **538** that the voter has selected the first candidate in the candidates area **534**. This was either accomplished by touching the first candidates name **538** and/or oval **536** or by depressing the select/enter key **330** on the sub-panel **312** during the representative audio sequence. The selected candidate can be unselected by touching the name **538** and/or oval **536** or by selecting a different candidate. Similarly, the sub-panel **312** allows the voter to unselect the candidate by depressing the select/center key **330** or scrolling up and down the candidates names with the up **322** and down **324** keys to select a different candidate with the enter/select key **330** during the representative audio sequence.

After the voter is finished with the first race, the NEXT prompt **522** (or the right arrow key **328** on sub-panel **312**) is pressed to move to the next race. The next race is illustrated in FIG. **25***d* and again displays the contest **530**, the position **532** and the candidates area **534**. Here again, the first candidate **540** was selected either via touchscreen or key buttons. Because this particular race is a so-called "vote for two" race, the voter may select another candidate, and in this case, the write in candidate **542** was selected and the display shows the write in editor **544** of FIGS. **25***f* and **25***g*.

In the case of straight touchscreen navigation, the write in editor allows the voter to simply enter the write in candidates name **546** by touching the appropriate letters **548** on the editor **544** and touching the DONE prompt **550** when finished. In the case of sub-panel navigation, the up **322** and down **324** key buttons navigate the voter through the displayed (touchscreen display) or audio (headphones) alphabet until the desired letter is highlighted (display) or heard (headphones) and then the select/enter key button **330** is depressed until the name is completed.

Upon the DONE prompt **550** being selected, either by touchscreen or key button navigation, both the first candidate **540** and the write in candidate **542** are shown as selected in FIG. **25***h* by the darkening of the ovals **536** next to their respective names. These selected candidates can be unselected as previously discussed with respect to the previous race.

When the voter selects the NEXT prompt **522** or the right arrow key **328** when finished with the last race, the selection review screen of FIG. **25***i* is presented. This screen summarizes the voter's selections and prompts the voter to either select a race to edit **544** or to mark the ballot **546**. If the second race **548** is selected to be edited, the screen illustrated by FIG. **25***j* would be presented. This gives the voter another opportunity to edit his or her selections, as previously discussed, or go back to the review screen by touching the BACK TO REVIEW prompt **550**, which brings the voter back to the screen illustrated by FIG. **25***i*. If the MARK BALLOT prompt **546** is selected, the PRINTING screen and the DONE screen of FIGS. **25***k* and **25***l* will be presented respectively. The voter can now take the marked ballot to the appropriate scanning device for tabulation.

In yet another exemplary embodiment, a ballot marking device as described hereinabove having a variety of user interfaces to accommodate voters with a wide spectrum of physical disabilities, additionally presents a voter with the options of either depositing the marked ballot directly into an attached ballot box having the ballot ejected to return to the voter, with a diverter in the ballot path operable to divert and transport the marked ballot into the attached ballot box responsive to the voter's instructions.

Looking to FIG. **26**, a ballot marking device in accordance with an exemplary embodiment of the present invention includes most of the structure and features as described above with respect to the exemplary embodiment depicted in FIG. **21**, with the structure and features operating in a manner similar to that as described above as will be apparent to those skilled in the art. In this embodiment, looking to the rear portion of the marking device of FIG. **26**, structure in the ballot reversal loop **610** portion of the device includes two feed rollers **612***a*, **612***b*. In a manner similar to that previously described for the embodiment of FIG. **21**, a ballot channel **614** is defined between a pair of closely spaced plates **616**, **618**, with feed rollers **612***a*, **612***b* operable to transport a ballot through the ballot channel **614**. Feed rollers **612***a*, **612***b* are preferably conventional in design and construction, having a rubber ballot engaging surface and being spring-biased into contact with the ballot as is known in the art. Feed rollers **612***a*, **612***b* are capable of rotating in both directions, and are rotatably driven by one or more reversible drive motors or mechanisms (not shown) so that a ballot may be transported either upwardly or downwardly through the ballot reversal loop portion **610** of the device.

A rear discharge chute **620** provides an opening and a transport path through which ballots may be directed out the rear of the device. Discharge chute **620** is in flow communication with the ballot channel **614** such that a ballot may be diverted from the ballot channel and into the discharge chute. Diverter **622** is preferably a passive portion of the lower structure of the ballot marking device, projecting outwardly into the ballot channel **614** from the lower portion of rear discharge chute **620**.

As best seen in FIG. **27**, a ballot **611** being transported through the marking device is transported upwardly in ballot channel **614**, past diverter **622** which projects outwardly into the ballot channel from the structure of the lower rear portion of the device. The upper surface of diverter **622** preferably flows integrally into the lower surface of rear discharge chute **620**. When the upwardly transported ballot engages the projecting diverter, the ballot is directed towards the innermost

plate **618** of the ballot channel **614** so that the ballot continues up the ballot channel and engages feed wheel **612***a*. Feed wheels **612***a*, **612***b* continue to transport the ballot upwardly through the ballot path.

Looking to FIG. **28**, in the case where a voter has provided a response or instructions to have the ballot deposited into the attached ballot box, when the ballot has passed diverter **622**, the transport direction of the device is reversed, with feed wheels **612***a*, **612***b* transporting the ballot downwardly in the ballot channel **614**. As the ballot travels downwardly past feed wheels **612***a*, **612***b*, the leading edge of the ballot engages the outwardly projecting diverter **622**, which directs the ballot from the ballot channel and into the rear the rear discharge chute **620** such that the ballot exits the marking device through the chute and into an attached ballot box.

In an alternative embodiment of the rear portion of the ballot path as depicted in FIGS. **29** and **30**, the diverter is a movable element operable to pass a ballot transported upwardly in the ballot channel and to block the ballot channel to divert a downwardly traveling ballot. As best seen in FIG. **29**, a ballot **711** being transported upwardly in ballot channel **714** engages diverter **722** which preferably is spring biased outwardly, projecting into the channel. When the upwardly transported ballot engages the diverter, the spring bias of the diverter is overcome, and the ballot pushes diverter **722** aside so that the ballot continues up ballot channel **714** to engage feed wheels **712***a*, **712***b* which continue to transport the ballot through the path. Alternatively, diverter **722** could be a mechanically operated gate, switched between an open and closed position (to open and close the entrance to the rear discharge chute) using a solenoid, stepper motor or other methods known in the art.

In this embodiment, diverter **722** is a preferably a thin metal plate attached to the structure of the device that operates as a gateway in the ballot channel **714**, allowing a ballot to pass through the ballot channel when the ballot is traveling in one direction (i.e., upwardly), and diverting the ballot from the ballot channel **714** and into the rear discharge chute **720** when the ballot is traveling in the opposite direction (i.e., downwardly).

Looking to FIG. **30**, in this alternative embodiment, when the ballot has passed diverter **722**, the spring bias of the diverter projects the diverter back outwardly into the ballot channel **714**. Thus, when the transport direction of the ballot is reversed, feed wheels **712***a*, **712***b* transport the ballot downwardly in the path where the ballot engages the outwardly projecting diverter **722** which directs the ballot into the rear discharge chute **720** such that the ballot exits the marking device through the chute.

As seen in FIG. **31**, with the ballot marking device of FIGS. **26-28** attached to a secure ballot box **624**, ballots exiting rear discharge chute **620** of the marking device as described above are directed into a deposit slot **622** in the upper portion of the ballot box **624** for collection in the ballot box. Preferably, a privacy shield **626** is attached to the ballot box in order to shield and protect the transitional area between the marking device and the ballot box to thereby ensure that the ballot is secure in its transport between the device and the ballot box. Preferably, ballot box **624** and privacy shield are attached to the ballot marking device with secure fasteners, tamper indicators, and other security features known in the art. Most preferably, privacy shield **626** is integral to ballot box **624**.

Turning to FIG. **32**, a flow diagram of an exemplary method of allowing a voter to optionally deposit a marked ballot directly into an attached ballot box is depicted. The method will be explained in conjunction with the exemplary marking device and attached ballot box of FIGS. **26-29** as just described.

In operation, in a manner similar to that described above for the marking device of FIG. **21**, a voter inserts an unmarked preprinted ballot into the ballot marking device. The device scans the ballot, determines the ballot format and presents to the voter an appropriate corresponding virtual ballot either visually on the touch screen or aurally using a synthesized speech menu. The voter enters candidate selections using the touch screen menu or audio menu. Those selections are marked on the front and back sides of the unmarked preprinted ballot by filling in preprinted marking spaces corresponding to the selected candidates.

At block **810** a voter makes contest selections using the touch screen of the ballot marking device and is presented with a summary of selections at block **812**. If the voter wants to change any selections, he or she is returned to voter selection block **810** via path **814** for correction or reselection of candidates. If the voter does not want to change any selections, the ballot is marked at block **816**.

With the ballot thus marked, the voter is presented with the option of having the ballot returned to him for visual inspection at block **818**, with the voter then manually depositing the ballot in a ballot box at block **820**. Alternatively, the voter may choose to have the ballot marking device verify the marked ballot (block **822**) by scanning the marked information using the mark detection circuitry as described above and presenting the detected voter selections either visually on the touch screen of the device, or aurally using the aural menu capabilities of the device discussed above.

With the ballot verified, the voter is presented with the options at block **824** of either depositing the ballot directly into the attached ballot box at block **826**, or of returning the ballot to the voter at **828**. Preferably the voter is presented with a choice on the touch screen and/or aural menu of the device similar to the menu depicted in FIG. **33**, allowing the voter to choose between "Deposit" to automatically deposit the marked ballot into the attached ballot box and "Return" to return the ballot to the voter. If the voter chooses "Deposit," the marked ballot is transported through the ballot loop portion of the marking device and directed out of the rear chute by the diverter and into the attached ballot box as previously described.

If the voter chooses to have the ballot returned to him (at path **828**), he then has the option (at block **830**) of either manually depositing the ballot into a ballot box (block **820**), or of re-inserting the ballot into the marking device for verification at block **822** as just described. If the ballot marking device detects an error (such as an over vote or under vote as previously described) during the verification process, at block **824** the ballot is then either captured by the device (block **830**), or the ballot is voided as previously described and returned to the voter.

In the case of diverting the marked ballot into the attached ballot box, the ballot marking device does not record, count or tally any of the voting selections. The marked ballots are simply diverted to and collected in the attached secure ballot box for later collection and counting by authorized election officials.

As can be seen, the ballot marking device of this exemplary embodiment of the present invention provides the voter with another opportunity to visually confirm the accuracy of selections on the marked ballot. In addition, because not every voter who uses a ballot marking device may be physically able to perform the step of carrying the marked ballot to a separate ballot scanner and/or ballot box, the ballot marking

device as just described allows those voters who lack sufficient manual dexterity or motor skills to directly deposit their marked ballots into the attached ballot box without the assistance of any third parties. Thus, the ballot marking device is not only more convenient to the voter, it is more efficient for the election process.

Since many possible embodiments may be made of the invention without departing from the scope thereof, it is to be understood that all matters herein set forth or shown in the accompanying drawings are to be interpreted as illustrative, and not in a limiting sense. For example, the ballot marking device has been described as marking a ballot that has been pre-printed with the election choices, in which case only the received voter selections are printed on the ballot (e.g., by marking the mark space corresponding to the received voter selections). However, one skilled in the art will understand that both the election choices and the received voter selection corresponding to the election choices may be printed on the ballot simultaneously. This embodiment is also within the scope of the present invention.

While specific embodiments have been shown and discussed, various modifications may of course be made, and the invention is not limited to the specific forms or arrangement of parts and steps described herein, except insofar as such limitations are included in the following claims. Further, it will be understood that certain features and subcombinations are of utility and may be employed without reference to other features and subcombinations. This is contemplated by and is within the scope of the claims.

What is claimed and desired to be secured by Letters Patent is as follows:

1. A ballot marking device adapted to mark a ballot in accordance with selections made by a voter and to either directly deposit the marked ballot into an attached ballot box or return the marked ballot to the voter, the device comprising:

a presentation device operable to present to the voter a plurality of election choices and a plurality of ballot handling choices;

an input device operable to receive from the voter at least one selection corresponding to the election choices and at least one instruction corresponding to the ballot handling choices;

a marking mechanism operable to record the received voter selection on the ballot;

a transport mechanism operable to transport the ballot through a ballot channel of the device;

a diverter operable to direct the ballot from the transport mechanism into the attached ballot box; and

wherein the presentation device, the input device, the marking mechanism, the transport mechanism, and the diverter are integrated in a single unit.

2. The ballot marking device of claim **1**, wherein the presentation device is selected from the group comprising a display screen, an audio menu, and combinations thereof.

3. The ballot marking device of claim **1**, wherein the input device is selected from the group comprising a touch sensitive screen, push buttons, a puff-and-blow device, a foot pedal, and combinations thereof.

4. The ballot marking device of claim **1**, wherein the ballot handling choices comprise returning the ballot to the voter and depositing the ballot into the attached ballot box.

5. The ballot marking device of claim **4**, wherein the transport mechanism is operable to transport the ballot to the diverter based upon the received voter instruction to deposit the ballot into the attached ballot box.

6. The ballot marking device of claim **4**, wherein the transport mechanism is operable to eject the ballot based upon the received voter instruction to return the ballot to the voter.

7. The ballot marking device of claim **1**, wherein the diverter is configured such that the ballot pushes past the diverter during transport in one direction through the ballot channel, and wherein the diverter directs the ballot to an ejection chute during transport in an opposite direction through the ballot channel.

8. The ballot marking device of claim **1**, wherein the diverter is a passive structure projecting into the ballot channel.

9. The ballot marking device of claim **1**, wherein the diverter is a movable element spring-biased to project into the ballot channel.

10. A method of marking a ballot using a ballot marking device having an attached ballot box, the method comprising:

presenting to a voter a plurality of election choices;

receiving from the voter at least one selection corresponding to the election choices;

marking the ballot in accordance with the received voter selection;

presenting to the voter a plurality of ballot handling choices;

receiving from the voter at least one instruction corresponding to the ballot handling choices; and

transporting the marked ballot through the ballot marking device in accordance with the received voter instruction.

11. The ballot marking device of claim **1**, wherein the ballot handling choices comprise returning the ballot to the voter and depositing the ballot into the attached ballot box.

12. The method of claim **11**, wherein the transporting step comprises diverting the ballot into the attached ballot box in response to the received voter instruction to deposit the ballot into the attached ballot box.

13. The method of claim **11**, wherein the transporting step comprises ejecting the ballot in response to the received voter instruction to return the ballot to the voter.

14. The method of claim **10**, wherein the ballot comprises a ballot that has been pre-printed with the election choices, and wherein the marking step comprises printing the received voter selection corresponding to the election choices on the ballot.

15. The method of claim **10**, wherein the marking step comprises printing both the election choices and the received voter selection corresponding to the election choices on the ballot.

16. A voter assistance terminal, comprising:

a presentation device operable to present to a voter a plurality of election choices and a plurality of ballot handling choices, wherein the ballot handling choices comprise returning a ballot to the voter and depositing the ballot into a ballot box;

an input device operable to receive from the voter at least one selection corresponding to the election choices and an instruction corresponding to the ballot handling choices;

a print mechanism operable to record the received voter selection on the ballot;

a transport mechanism operable to transport the ballot through a ballot channel in accordance with the received voter instruction, wherein the transport mechanism causes ejection of the ballot if the received voter instruction is to return the ballot to the voter, and wherein the transport mechanism causes deposit of the ballot into the ballot box if the received voter instruction is to deposit the ballot into the ballot box; and

wherein the presentation device, the input device, the print mechanism, and the transport mechanism are integrated in a single unit.

17. The ballot marking device of claim **16**, wherein the transport mechanism is operable to transport the ballot to a diverter if the received voter instruction is to deposit the ballot into the ballot box.

18. The ballot marking device of claim **17**, wherein the diverter is configured such that the ballot pushes past the diverter during transport in one direction through the ballot channel, and wherein the diverter directs the ballot to an ejection chute during transport in an opposite direction through the ballot channel.

19. The ballot marking device of claim **17**, wherein the diverter is a passive structure projecting into the ballot channel.

20. The ballot marking device of claim **17**, wherein the diverter is a movable element spring-biased to project into the ballot channel.

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