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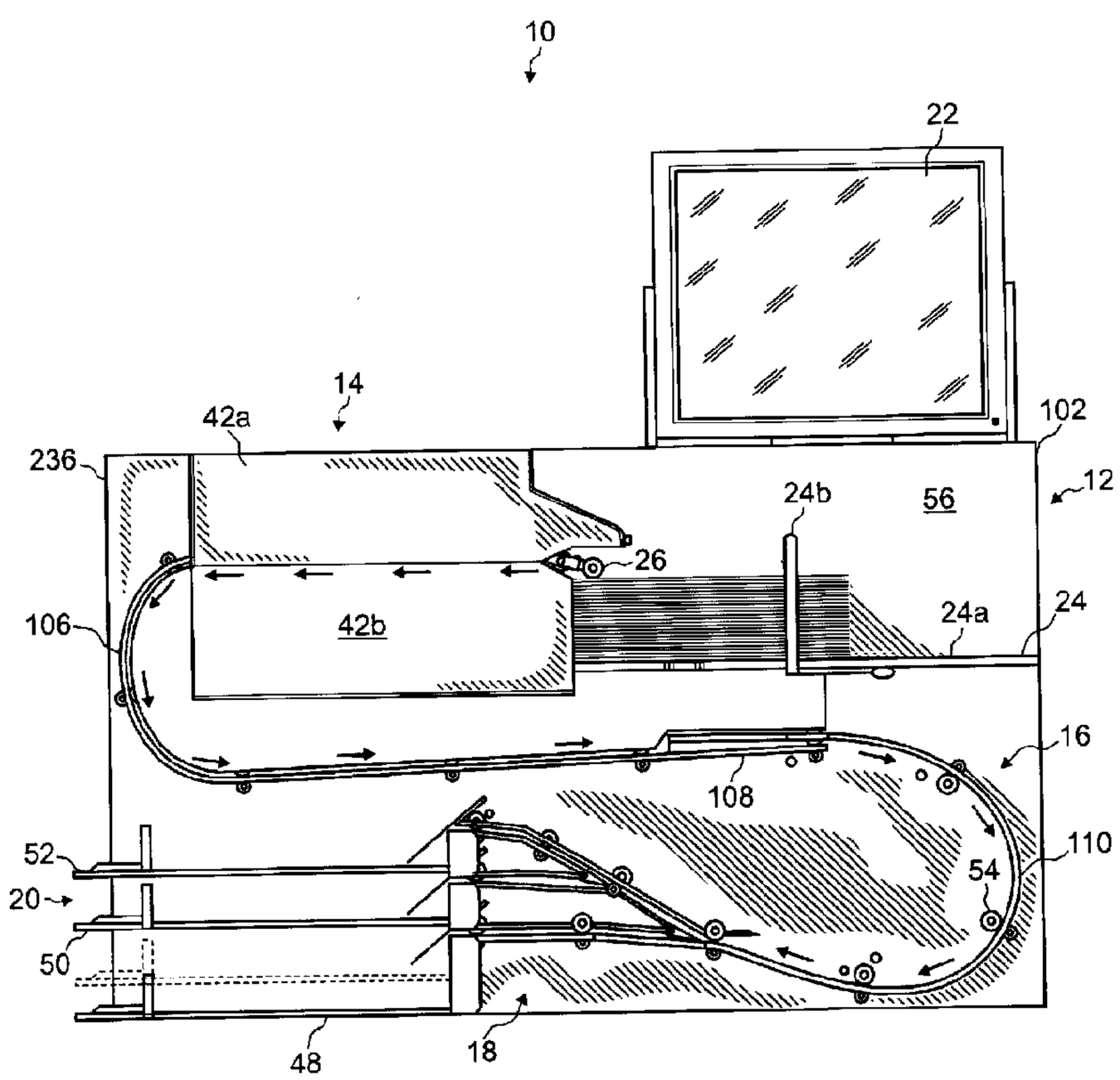


(57) Abrégé/Abstract:
A ballot processing system for processing a plurality of ballots having one or more voting selections marked thereon. The system includes an input area configured to receive a stack of ballots to be processed, an output area configured to store the processed ballots, and a transport path operable to transport each of the ballots from the input area to the output area. In an exemplary embodiment, the transport path comprises a planar section positioned between a first curve section and a second curve section to form a generally S-shaped path. The length of the transport path allows each of the ballots to be processed prior to reaching the output area.

BALLOT PROCESSING SYSTEM

ABSTRACT OF THE DISCLOSURE

A ballot processing system for processing a plurality of ballots having one or more voting selections marked thereon. The system includes an input area configured to receive a stack of ballots to be processed, an output area configured to store the processed ballots, and a transport path operable to transport each of the ballots from the input area to the output area. In an exemplary embodiment, the transport path comprises a planar section positioned between a first curve section and a second curve section to form a generally S-shaped path. The length of the transport path allows each of the ballots to be processed prior to reaching the output area.

BALLOT PROCESSING SYSTEM

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[0002] Not applicable.

BACKGROUND OF THE INVENTION

[0003] **1. FIELD OF THE INVENTION**

[0004] The present invention relates generally to voting systems and, more particularly, to a ballot processing system that tabulates the voting selections marked on paper ballots.

[0005] **2. DESCRIPTION OF RELATED ART**

[0006] A variety of different types of voting equipment are used in the United States and throughout the world. In many jurisdictions, a voter receives a paper ballot on which is printed the various races to be voted on. The voter votes by darkening or otherwise marking the appropriate mark spaces on the paper ballot. The marked paper ballot may then be dropped in a ballot box, whereby the paper ballots accumulated in the ballot box are transferred to a central election office for tabulation. At the central election office, a central ballot counter is used to scan and tabulate the voting selections marked on paper ballots received from various polling locations. Typically, the central ballot counter is relatively large, requires a significant amount of floor space within the central election office, and is difficult to move or transport to a different location.

BRIEF SUMMARY OF THE INVENTION

[0007] The present invention is directed to a ballot processing system that is operable to tabulate the voting selections marked on paper ballots received from various polling locations. The system comprises an input area configured to receive a stack of paper ballots to be processed. The input area preferably includes an imaging device, such as one or more cameras, that produce an image of each ballot. A processor electrically coupled to the imaging device processes the ballot image to determine the voting selections marked on the ballot. The system also comprises a transport path operable to transport each ballot from the input area to an output area. In an exemplary embodiment, the transport path comprises a planar section positioned between a first curve section and a second curve section so as to form a generally S-shaped path. The total length of the transport path is preferably between approximately 40 to 75 inches, which is long enough to allow each of the ballots to be processed prior to reaching the output area. The output area preferably includes a diverter operable to direct each ballot into one of several output bins based on instructions received from the processor. Preferably, the system is relatively compact such that the input area, transport path and output area occupies a space having a height of between approximately 25 to 45 inches, a width of between approximately 30 to 50 inches, and a depth of between approximately 15 to 35 inches. As such, the system does not require a significant amount of floor space within the central election office and may be moved or transported to a different location with relative ease.

[0007a] In accordance with an aspect of the present invention there is provided a system located at a central election office for processing a plurality of ballots having one or more voting selections marked thereon, comprising:

an input area configured to receive a stack of ballots to be processed, wherein the input area comprises an imaging device operable to produce an image of each of the ballots; a processor electrically coupled to the imaging device and operable to process the image of each of the

ballots to determine the voting selections marked thereon; an output area configured to store the processed ballots, wherein the output area comprises a plurality of output bins and a diverter operable to divert each of the ballots into one of the output bins based on instructions received from the processor; a transport path operable to transport each of the ballots from the input area to the output area, wherein the transport path comprises a planar section positioned between a first curve section and a second curve section so as to form a generally S-shaped path, and wherein the length of the transport path allows each of the ballots to be processed prior to reaching the output area; and a plurality of sensors each of which is positioned adjacent to the transport path for tracking each of the ballots between the input area and the output area.

[0007b] In accordance with a further aspect of the present invention there is provided a system located at a central election office for processing a plurality of ballots having one or more voting selections marked thereon, comprising: an input area configured to receive a stack of ballots to be processed; a processor operable to process the ballots by determining the voting selections marked thereon; an output area configured to store the processed ballots; a transport path operable to transport each of the ballots from the input area to the output area, wherein the transport path comprises a planar section positioned between a first curve section and a second curve section so as to form a generally S-shaped path, and wherein the length of the transport path allows each of the ballots to be processed prior to reaching the output area; and a plurality of sensors each of which is positioned adjacent to the transport path for tracking each of the ballots between the input area and the output area.

[0007c] In accordance with a further aspect of the present invention there is provided a system located at a central election office for processing a plurality of ballots having one or more voting selections marked thereon, comprising: an input area configured to receive a stack of ballots to be processed; a processor operable to process the ballots; an output area configured to store the processed ballots; a transport path operable to transport each of the

ballots from the input area to the output area; a plurality of sensors each of which is positioned adjacent to the transport path for tracking each of the ballots between the input area and the output area; and wherein the input area, the transport path and the output area are dimensioned to be placed in a space having a height of between approximately 25 to 45 inches, a width of between approximately 30 to 50 inches, and a depth of between approximately 15 to 35 inches.

[0007d] In accordance with a further aspect of the present invention there is provided a method for processing a plurality of ballots at a central election office, wherein each of the ballots has one or more voting selections marked thereon, comprising: receiving a stack of ballots to be processed in an input area; transporting each of the ballots from the input area to an output area over a transport path comprising a planar section positioned between a first curve section and a second curve section so as to form a generally S-shaped path; processing each of the ballots prior to reaching the output area; and storing each of the processed ballots in the output area.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] Fig. 1 is a front elevational view of an exemplary embodiment of a ballot processing system in accordance with the present invention;

[0009] Fig. 2 is a front elevational view of the system of Fig. 1 with an upper read head housing pivoted to an upper position;

[0010] Fig. 3 is a close-up view of a ballot pick-up mechanism of the system of Fig. 1;

[0011] Fig. 4 is a close-up view of the pick-up mechanism shown in Fig. 3;

[0012] Fig. 5 is a close-up view of an imaging area of the system of Fig. 1;

[0013] Fig. 6 is a close-up view of output bins of the system of Fig. 1;

[0014] Fig. 7 is a close-up view of a ballot diverter of the system of Fig. 1 showing shunts in a first position;

[0015] Fig. 8 is a close-up view of the ballot diverter of the system of Fig. 1 showing shunts in a second position;

[0016] Fig. 9 is a rear elevational view of the system of Fig. 1 with a rear panel of the system removed;

[0017] Fig. 10 is a perspective view of an S-curve ballot transport path of the system of Fig. 1;

[0018] Fig. 11 is an exploded perspective view of the S-curve ballot transport path shown in Fig. 10;

[0019] Fig. 12 is a close-up view of a mount of the S-curve ballot transport path shown in Fig. 10;

[0020] Fig. 13 is a close-up view of a side wall of the system of Fig. 1 showing transparent security doors that cover recesses in the side wall;

[0021] Fig. 14 is a close-up view of one of the transparent security doors shown in Fig. 13;

[0022] Fig. 15 is a close-up view of a power switch covered by one of the transparent security doors shown in Fig. 13;

[0023] Figs. 16A-16D are flow charts of the ballot scanning process for the system of Fig. 1;

[0024] Figs. 17A-17B are flow charts of the process for resolving start error conditions for the system of Fig. 1;

[0025] Figs. 18A-18B are flow charts of the process for resolving scanning error conditions and the process for printing batch bin reports for the system of Fig. 1;

[0026] Figs. 19A-19B are flow charts of the process for resolving the situation when the log/report printer is not available for the system of Fig. 1;

[0027] Fig. 20 is a flow chart of the process for resolving an unknown error for the system of Fig. 1;

[0028] Fig. 21 is a block diagram of computer processors and controllers of the system of Fig. 1;

[0029] Fig. 22 is an exemplary output bin report for ballots properly voted and scanned by the system of Fig. 1;

[0030] Figs. 23A-23B is an exemplary output bin report for ballots with write-in votes scanned by the system of Fig. 1;

[0031] Fig. 24 is an exemplary output bin report for ballots either improperly voted or improperly scanned by the system of Fig. 1; and

[0032] Fig. 25 is an exemplary ballot that can be processed by the system of Fig. 1.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENT

[0033] The present invention is directed to a ballot processing system for tabulating the voting selections marked on paper ballots. While the invention will be described in detail below with reference to an exemplary embodiment, it should be understood that the invention is not limited to the specific system configuration or methodology of this embodiment. In addition, although the exemplary embodiment is described as embodying several different inventive features, one skilled in the art will appreciate that any one of these features could be implemented without the others in accordance with the invention.

[0034] Referring to Fig. 1, an exemplary embodiment of a ballot processing system in accordance with the present invention is designated as reference numeral 10. System 10 is a high-speed, self-contained machine that receives a stack of paper ballots and, for each ballot, scans and stores an image of the ballot, processes the ballot image to determine the voting selections marked on the ballot, tabulates the voting selections marked on the ballot, and sorts the ballot into an appropriate output bin. In one minute, the system is capable of imaging, processing, tabulating and sorting approximately 250 double-sided ballots that are 17 inches long or approximately 360 double-sided ballots that are 11 inches long.

[0035] An exemplary election ballot that may be scanned and processed by system 10 is shown as reference numeral 126 in Fig. 25. Ballot 126 includes printed indicia 128 that includes a description of each contest (e.g., "County Judge") and the names of the candidates associated with each contest (e.g., Candidates 1-4). Ballot 126 also includes mark spaces 130 corresponding to each of the candidates in each contest. As is known in the art, a voter may darken or otherwise mark the mark space corresponding to his/her selection for each of the contests. Alternatively, a voter may utilize a ballot marking device to print a mark in each of the appropriate mark spaces, such as the AutoMARK® ballot marking device sold by the assignee of

the present application. Ballot 126 further includes a series of rectangular timing marks 132 positioned along and down the left side and across the bottom of the ballot. The timing marks 132 permit system 10 to determine the position (i.e., row and column) of each of the mark spaces 130 on the ballot. Ballot 126 further includes a plurality of rectangular code channel marks 134 positioned adjacent the timing marks 132 on the left side of the ballot. The code channel marks 134 are used to identify the ballot style of ballot 126 so that system 10 is able to associate the marked voting selections with the correct contests and candidates printed on the ballot. Of course, other types of ballots may be scanned and processed in accordance with the present invention.

[0036] Referring to Figs. 1 and 2, system 10 has an input area 12 with an input hopper 24 and an imaging area 14, an S-curve ballot transport path 16, and an output area 20 with a ballot diverter 18 and a plurality of output bins 48, 50 and 52. The term "input area" is used herein to refer to all of the system components positioned before the transport path, and the term "output area" is used herein to refer to all of the system components positioned after the transport path. Thus, transport path 16 is positioned between input area 12 and output area 20 of system 10.

[0037] System 10 also includes a user input device 22 comprising a touch screen display mounted above input area 12 on a pivotal mount so that users of varying heights can adjust the screen to a desirable viewing position. Input device 22 receives input for operating and/or diagnosing problems with the system. For example, input device 22 is operable to receive instructions for starting and stopping the ballot scanning process, setting up system parameters (such as the system date and time), and printing reports (such as diagnostic and election results reports). Although input device 22 is preferably a touch screen display, the input device could

alternatively be a computer monitor that is coupled with a keyboard, mouse or other type of input device.

Input Area

[0038] Input area 12 includes an input hopper 24 for supporting a stack of ballots that are ready to be scanned and positioning the ballots so that each ballot may be drawn into the ballot imaging area 14 by a ballot pick-up mechanism 26 (Figs. 2-5). Input hopper 24 can hold between approximately 500 to 600 ballots and includes a horizontal tray 24a and an adjustable paper guide 24b. Horizontal tray 24a is moveable up and down via a screw actuator 182, shown in Fig. 9, so that the top ballot in the ballot stack can be picked up by pick-up mechanism 26. Tray 24a ensures that pick-up mechanism 26 exerts a constant pressure on each ballot being picked from the ballot stack.

[0039] As shown in Figs. 2-4, pick-up mechanism 26 is designed to eliminate the problems of drag, skew, and picking more than one ballot, which are common with conventional ballot processing systems. Further, pick-up mechanism 26 is designed to keep ballots properly aligned in imaging area 14 and along transport path 16. In the exemplary embodiment, pick-up mechanism 26 has five rollers 28, 30, 32, 34, and 36 (Figs. 3 and 4), which rotate simultaneously to pull a ballot into imaging area 14. However, more or less rollers could be used. A main drive shaft 38 connected to rollers 28 and 30 is coupled to a large flywheel 40 (Figs. 4 and 9), which maintains the pick-up mechanism's speed even when the mechanism picks up folded ballots.

[0040] Main drive shaft 38 is connected to a motor 148 via drive belts 146 and 154 (Fig. 9) to rotate main drive shaft 38 in a clockwise direction when the drive shaft is viewed from the front of the ballot processing system 10, as shown in Fig. 4. Main drive shaft 38 extends through and is perpendicular to a back plane 56 that provides a mounting surface for many of the

system's components, as shown in Figs. 1 and 9. A drive pulley 156 is mounted to main drive shaft 38 adjacent to roller 30, and another drive pulley 158 is mounted to main drive shaft 38 adjacent to roller 28.

[0041] Pick-up mechanism 26 also has a second drive shaft 160 (Fig. 4) with a roller 34 and adjacent drive pulley 162 mounted thereon. A drive belt 164 extends around drive pulleys 156 and 162 to transfer power from main drive shaft 38 to drive shaft 160. There is also a third drive shaft 166 (Fig. 4) with a roller 32 and adjacent drive pulley 168 mounted thereon. A drive belt 170 extends around drive pulleys 158 and 168 to transfer power from main drive shaft 38 to drive shaft 166. While main drive shaft 38 and drive shaft 166 are perpendicular to backplane 56, drive shaft 160 (Fig. 4) is positioned at an angle X (Fig. 3), which is preferably approximately 92 degrees, with respect to the back plane so that when roller 34 picks a ballot, the ballot is slightly pulled toward backplane 56. In other words, drive shaft 160 is positioned with respect to backplane 56 at a 2 degree angle more than main drive shaft 38.

[0042] Another drive pulley 162 is connected to drive shaft 160 on the opposite side of roller 34 for transferring power to a fourth drive shaft 172. Roller 36 is mounted on drive shaft 172 along with a drive pulley. A drive belt 174 extends around the drive pulleys on the shafts 160 and 172 for transferring power from drive shaft 160 to drive shaft 172. Drive shaft 172 is positioned at an angle Y (Fig. 3), which is preferably approximately 94 degrees, with respect to back plane 56 so that roller 36 slightly pulls a ballot toward backplane 56 like roller 34. In other words, drive shaft 172 is positioned with respect to back plane 56 at a 4 degree angle more than main drive shaft 38, and at a 2 degree angle more than drive shaft 160. When main drive shaft 38 rotates to pick the next ballot off of a ballot stack in hopper 24, each of drive shafts 160, 166, and 172 also rotate along with rollers 32, 34, and 36 mounted to the drive shafts.

[0043] The angles X and Y are designed so that when rollers 32, 34 and 36 pick a ballot from the top of a ballot stack, the rollers slightly direct the edges of the ballot into the back plane input section 56a (Fig. 4), as described below. The angles of the drive shafts 160 and 172 ensure that the edge of each ballot is pulled into contact with the back plane input section 56a so that each ballot is properly aligned as it enters imaging area 14 and ballot transport path 16.

[0044] Drive shafts 160 and 166 are hinged from main drive shaft 38 so that they are vertically moveable with respect to main drive shaft 38. Likewise, drive shaft 172 is hinged from drive shaft 160 such that it is vertically moveable with respect to drive shaft 160. The hinged design of drive shafts 160, 166 and 172 allows each of them to float freely with respect to main drive shaft 38, and, for drive shaft 172, with respect to drive shaft 160. The main drive shaft 38 is stationary except for rotational movement.

[0045] Because drive shafts 160, 166 and 172 are able to float freely and move vertically with respect to main drive shaft 38, rollers 32, 34 and 36 that are mounted to these drive shafts are not forced downward into the ballot on the top of the ballot stack, like a conventional belt drive or pick roller assembly. Instead, each of rollers 32, 34, and 36 "rests" on the top ballot in the ballot stack so that the only force exerted on the top ballot is the weight of rollers 32, 34 and 36 and the pick-up mechanism components to which the rollers are mounted. This enables rollers 32, 34 and 36 to consistently pick ballots even if there are ballots within input hopper 24 that stack higher or differently than other ballots within the hopper (*e.g.*, folded ballots typically stack higher than flat, unfolded ballots). Because rollers 32, 34 and 36 are able to move vertically, they simply lay on the top ballot in input hopper 24 regardless of whether that ballot is folded or unfolded. This design, along with the motorized input hopper, ensures that the system applies the same pressure to each ballot that is picked up from the ballot stack.

[0046] Referring to Fig. 4, the pick-up mechanism also has two counter rotating retardation belts 176 and 178, which are positioned beneath rollers 28 and 30. There is a distance of approximately the thickness of one and a half ballots between rollers 28 and 30 and belts 176 and 178 for preventing more than one ballot from passing between the rollers and belts at a time. If rollers 32, 34 and 36 accidentally pick more than one ballot from the top of the ballot stack, then the counter rotating retardation belts 176 and 178 only allow the top ballot to pass through to imaging area 14. Belts 176 and 178 constantly rotate in the opposite direction as rollers 28, 30, 32, 34 and 36. If more than one ballot passes between rollers 28 and 30 and belts 176 and 178, then the bottom ballot becomes frictionally engaged with belts 176 and 178. Belts 176 and 178 prevent the bottom ballot from entering imaging area 14 by propelling it back toward the ballot stack, or belts 176 and 178 keep the bottom ballot stationary until the top ballot has a chance to pass out of pick-up mechanism 26 and into imaging area 14. Thus, if pick-up mechanism 26 picks up more than one ballot, it is self-correcting so that a user does not have to intervene and separate the ballots or restart the system.

[0047] As shown in Fig. 9, a single drive motor 148 powers the rollers within pick-up mechanism 26 and imaging area 14. A drive belt 146 (Figs. 5 and 9) extends from drive motor 148 to the shafts 150 and 152 that mount the rollers 144a-f of the imaging area 14. There is another drive belt 154 coupled with the end of shaft 152 and extends from shaft 152 to flywheel 40. Drive belt 154 rotates at the same speed as drive belt 146 to link the rollers of imaging area 14 and pick-up mechanism 26 to ensure that they rotate at the same speed.

[0048] Flywheel 40 is mounted to main drive shaft 38 with an electronically controlled clutch so that drive motor 148 and drive belt 146 can constantly rotate the rollers within imaging area 14 at the same speed while allowing main drive shaft 38 of pick-up mechanism 26 to be

disengaged from drive motor 148. Disengaging main drive shaft 38 of pick-up mechanism 26 from drive motor 148 allows the rollers of pick-up mechanism 26 to turn off and on for controlling the rate at which ballots are picked from the ballot stack.

[0049] Flywheel 40 has a relatively high mass to increase the moment of inertia of main drive shaft 38 when the clutch couples flywheel 40 and drive shaft 38. If flywheel 40 was not present, drive shaft 38 would slow down due to the force required to overcome the forces caused by friction between two adjacent ballots in input hopper 24 and acceleration of a ballot from rest. This slow down would in turn slow down drive belt 146 and imaging area rollers 144a-f. Because drive shaft 38 and flywheel 40 in combination have a higher moment of inertia than drive shaft 38 alone, the combination is better able to maintain the speed of main drive shaft 38, and thus the speed of drive belt 146 and imaging area rollers 144a-f, when the clutch engages flywheel 40 and drive shaft 38. The extra weight of flywheel 40 maintains the momentum and speed of pick-up mechanism rollers 28, 30, 32, 34 and 36 and imaging area rollers 144a-f (Fig. 5) throughout the process of picking up ballots, which is particularly important when the ballots are folded. Because flywheel 40 maintains ballot speed throughout imaging area 14, the cameras 44 and 46 (Figs. 2 and 5) are able to maintain a constant resolution throughout the length of a ballot, and thus obtain clear, consistent ballot images.

[0050] System 10 keeps ballots properly oriented throughout imaging area 14 and transport path 16, while preventing the ballots' edges from fraying. As shown in Fig. 4, backplane 56 has an input section 56a that provides an offset of approximately 1/16 of an inch with respect to the remainder of the backplane 56b. Pick-up mechanism 26 pulls each ballot from the ballot stack so that the edge of the ballot contacts back plane input section 56a. Once the ballot moves past the back plane input section 56a and into imaging area 14, the edge of the

ballot is no longer in contact with backplane 56 because the remainder of backplane 56b is spaced 1/16 of an inch backward from backplane input section 56a. Thus, backplane input section 56a properly orients ballots by guiding the ballot's edges through input section 56a. The offset of backplane input section 56a from the remainder of backplane 56b prevents a ballot from becoming damaged because the ballot is spaced from backplane 56 during transport along transport path 16. One skilled in the art will appreciate that if ballots processed by system 10 need to be recounted, the recount will be more consistent than it would be with other types of high speed ballot scanners because the ballots are not damaged due to constant contact with the back plane.

[0051] Referring to Figs. 2 and 5, imaging area 14 has upper and lower read head housings 42a and 42b that respectively contain upper and lower high-speed cameras 44 and 46. Cameras 44 and 46 are positioned to image both sides of a double-sided ballot. In the exemplary embodiment, cameras 44 and 46 are 60 megahertz digital electronic CCD cameras. As shown in Fig. 2, upper housing 42a can pivot upward with respect to lower housing 42b so that an operator may access the scanning components of system 10. It is within the scope of the invention for the imaging area 14 to only have one upper or lower high-speed camera if the system is used to scan and process one-sided ballots. As shown in Fig. 2, the length L1 of imaging area 14 is preferably between approximately 15 to 25 inches, and most preferably approximately 19 inches.

[0052] Referring to Fig. 2, an ink cartridge 104 is mounted adjacent to the ballot path in a position such that the cartridge can print an identifying mark on each ballot that passes through imaging area 14. Ink cartridge 104 preferably contains more than one color of ink so that the cartridge is capable of printing a different color on a ballot each time the ballot is processed by the system. As an alternative to providing an ink cartridge with more than one color, a plurality

of ink cartridges each having a different color may be provided to print a different color marking each time that a set of ballots is scanned. One skilled in the art will appreciate that many different types and configurations of color markings may be used in accordance with the present invention.

[0053] Having an ink cartridge with different colors allows the system to identify how many times a ballot has passed through the system based on the color(s) of the identifying mark(s) printed on the ballot. This feature assists in recounting ballots because the system can easily determine whether a ballot has been counted and/or recounted based on whether a particular identifying mark has been printed on the ballot. For example, if a set of ballots is scanned once, and a court subsequently orders a recount of those ballots, then the system can be programmed to analyze the image of each ballot being recounted to ensure that an identifying mark of a certain color is present on the ballot. During the recount, a new color of ink is used to mark the ballot with another identifying mark. This feature may also be used to prevent processing a ballot more than once and thereby double counting the voting selections marked on the ballot. For example, the system can be programmed not to tabulate the voting selections marked on a ballot if an identifying mark of a certain color is detected on the ballot (indicating that the ballot has already been scanned and tabulated).

[0054] In the exemplary embodiment, the first time that the system scans a ballot, the system prints a red identification number on the ballot to indicate that the ballot has been scanned once. This red identification number may consist of, for example, a machine identification number along with an incremental index number so as to provide a unique ballot identification number on each ballot processed by the system. If that same ballot passes through the system a second time, such as during a recount, then the system recognizes that the ballot has

been scanned once due to the detection of the red identification number and instructs ink cartridge 104 to mark the ballot in a different location with a different color, such as green or blue. This process can repeat each time the ballot is scanned by the system until the ballot is marked with as many colors as are present in ink cartridge 104.

Transport Path

[0055] When a ballot leaves imaging area 14, it moves along transport path 16 until it reaches diverter 18. In the exemplary embodiment, transport path 16 includes a first curve section 106, a slightly inclined planar section 108, and a second curve section 110. As shown by the arrows in Fig. 1, once a ballot exits imaging area 14, it enters first curve section 106 where it is turned around to travel in the opposite direction along planar section 108. At the end of planar section 108, the ballot enters second curve section 110 where it is turned around before it reaches the diverter 18. Transport path 16 is designed so that by the time a ballot reaches diverter 18, system 10 has processed the ballot image to determine the voting selections marked on the ballot (described below). As such, the system is able to determine which output bin 48, 50 or 52 (Fig. 1) the ballot should be diverted to before the ballot reaches diverter 18.

[0056] Referring to Figs. 10 and 11, first curve section 106 has a first surface 106a and a second surface 106b, planar section 108 has a first surface 108a and a second surface 108b, and second curve section 110 has a first surface 110a and a second surface 110b. It should be understood that a ballot passes over first surfaces 106a, 108a and 110a as it moves along transport path 16. First and second curved sections 106 and 110 are each configured to change the direction of a ballot's movement by approximately 180 degrees. Preferably, system 10 transports a ballot through transport path 16 at a speed of between approximately 50 to 120

inches per second, more preferably at a speed of between approximately 70 to 100 inches per second, and most preferably at a speed of approximately 85 inches per second.

[0057] The S-shaped configuration of transport path 16 allows the system to be relatively compact. As shown in Fig. 11, the arc section length L2 of first curve section 106 is preferably between approximately 10 to 20 inches, and most preferably approximately 14 inches. The length L3 of planar section 108 is preferably between approximately 15 to 30 inches, and most preferably approximately 23 inches. The arc section length L4 of second curve section 110 is preferably between approximately 15 to 25 inches, and most preferably approximately 22 inches. Thus, the sum of the lengths L2, L3 and L4 is between approximately 40 to 75 inches, more preferably between approximately 50 to 70 inches, and most preferably approximately 60 inches. Also, the height H2 of transport path 16 is preferably between approximately 10 to 20 inches, and most preferably approximately 16 inches.

[0058] First curve section 106, planar section 108 and second curve section 110 each have a plurality of mounting holes, one of which is shown as reference numeral 120 in Fig. 11, that extend from the respective first surfaces 106a, 108a and 110a to the respective second surfaces 106b, 108b and 110b. Each of the mounting holes 120 corresponds with a mount, one of which is shown as reference numeral 122 in Fig. 12, that extends outwardly from backplane 56. The mount 122 has a hole 124 that aligns with one of the mounting holes 120 in first curve section 106, planar section 108 or second curve section 110. To secure first curve section 106, planar section 108 and second curve section 110 to back plane 56, a fastener (not shown) is inserted into the hole 120 from the first surface 106a, 108a and 110a into the hole 124 in the mount 122. Preferably, the fastener and the hole 124 in the mount 122 are threaded, and each of the holes 120 are countersunk on the first surfaces 106a, 108a, and 110a so that the head of the

fastener does not protrude above the surface and interfere with a ballot passing through the transport path. Although first curve section 106, planar section 108 and second curve section 110 are preferably mounted to backplane 56 as described above, it is within the scope of the invention to utilize other mounting devices as is known in the art.

[0059] Referring to Fig. 10, there is a paper guide system 117 that mounts to back plane 56 and that is spaced a distance above the first surface 108a of planar section 108. Paper guide system 117 preferably mounts to backplane 56 in a similar manner as planar section 108. Paper guide system is not shown in Fig. 11 for clarity. Paper guide system 117 ensures that a ballot maintains close contact with surfaces 108a and 110a as the ballot transitions from planar section 108 to second curve section 110.

[0060] Paper guide system 117 consists of a triangular-shaped plate 119, two runners 121a and 121b, and mounting brackets, one of which is shown as reference numeral 123. The mounting brackets attach to backplane 56 and each of runners 121a and 121b to space them apart a desirable distance. Two of the mounting brackets also attach t triangular plate 119 so as to mount it to backplane 56. Each runner 121a and 121b includes a front section 125a and 125b which is angled upward from the main section of the runner in order to facilitate the transition of a ballot from first curve section 106 to planar section 108 and to prevent a ballot from becoming jammed on runners 121a and 121b. Triangular plate 119 has a narrow front section 119a that transitions into a wider rear section 119b adjacent second curve section 110. Rear section 119b of triangular plate 119 has approximately the same width as a ballot passing through transport path 16. Rear section 119b is designed to prevent the outside edge of a ballot from raising up and striking a leading edge 110c of second curve section 110 as the ballot transitions from planar section 108 into second curve section 110.

[0061] A plurality of rollers, one of which is shown as reference numeral 54 in Fig. 1, are spaced along imaging area 14 and transport path 16 to transport a ballot to diverter 18. The rollers are designed so that the edge of each ballot is not in constant contact with backplane 56. Specifically, a ballot transported through the system is spaced approximately 1/16 of an inch from backplane 56, as discussed above, in order to prevent the ballot's edge from fraying.

[0062] Two of the sets of rollers are shown in Fig. 5 as reference numerals 136 and 138. Each set of rollers consists of a top roller 136a, 138a that contacts the top of a ballot, and a bottom roller 136b, 138b that contacts the bottom of the ballot. Bottom rollers 136b and 138b protrude upward through generally rectangular-shaped apertures 140, 142 in housing 42b. Rollers 136 are positioned generally adjacent backplane 56, while rollers 138 are spaced a distance from backplane 56 such that they are positioned generally adjacent the center of a ballot passing through the rollers. As shown in Figs. 10 and 11, there are similar pairs of openings in transport path 16 for receiving rollers having a similar configuration as rollers 136, 138. As shown in Fig. 5, there are sets of triple rollers 144a, 144b, 144c, 144d, 144e, and 144f on each side of camera 46 in imaging area 14. Because at least two sets of dual rollers are in contact with a ballot at all times, the ballot maintains its correct alignment (which is first established by backplane input section 56a) throughout the imaging area 14 and transport path 16. Of course, it is within the scope of the invention to use more or fewer sets of rollers.

[0063] Protective cover mounts 116a and 116b (Fig. 2) are preferably provided on back plane 56 for mounting a protective cover (not shown) over the rollers and sensors beneath planar section 108 and above curved section 110. A protective cover mount 116c that is similar to mounts 116a and 116b is shown in Fig. 12. A protective cover 118, shown in Fig. 2, is mounted to backplane 56 with mounts similar to mounts 116a-c for protecting rollers along transport path

16. There is another protective cover (not shown) that mounts to back plane 56 with mounts similar to mounts 116a-c to the right of second curve section 110 when viewed as in Fig. 2.

[0064] While the exemplary embodiment includes a transport path having an S-shaped configuration, one skilled in the art will understand that other configurations could be used in accordance with the present invention. For example, the transport path could have a configuration consisting of two, four or even six S-shaped paths connected together. Preferably, the transport path contains an even number of curved sections so that the input and output bins are located on opposite sides of the device. This configuration will provide the optimal workflow so that workers loading ballots into the input bin and workers removing processed ballots from the output bins do not cross paths or accidentally grab a stack of ballots from the wrong bin.

Output Area

[0065] Referring to Figs. 7 and 8, output area 14 includes a diverter 18 that includes two shunts 112 and 114 that are pivotable to direct a ballot into one of three output bin 48, 50 or 52. When shunt 112 is in its first position, as shown in Fig. 7, it directs a ballot upward away from the lower output bin 48. When shunt 114 is in its first position, as shown in Fig. 7, it directs a ballot upward away from the middle output bin 50. Thus, when shunts 112 and 114 are in the positions shown in Fig. 7, ballots are directed into the upper output bin 52. If shunt 114 is pivoted upward into its second position, as shown in Fig. 8, and shunt 112 remains as shown in Fig. 7, then a ballot is directed into middle output bin 50. If shunt 112 is pivoted upward into its second position, as shown in Fig.8, then a ballot is directed into the lower output bin 48. As shown in Fig. 2, the length L5 of diverter 18 is preferably between approximately 8 to 15 inches, and most preferably approximately 12 inches.

[0066] System 10 diverts a ballot into output bins 48, 50 or 52 (Fig. 1) based on the processing of the ballot. For example, a ballot that is properly marked by a voter and properly scanned by the system may be defined as a "scanned" ballot and diverted to output bin 48; a ballot that has one or more write-in votes may be defined as a "write-in" ballot and diverted to output bin 50, and a ballot that was improperly marked by a voter (*e.g.*, containing one or more under-votes, over-votes and/or blank contests) or improperly scanned (*e.g.*, unclear image and/or multiple ballots scanned at one time) may be defined as a "not scanned" ballot and diverted to output bin 52. The system is preferably configured so that each of these types of ballots may be diverted into a different output bin 48, 50, or 52. Of course, one skilled in the art will understand that the "scanned," "write-in" and "not scanned" definitions are merely examples, and that the system 10 could be configured to divert ballots into output bins 48, 50, and 52 based on other defined criteria.

[0067] The following is a non-exhaustive list of different ballot types that the system may be programmed to recognize and divert into a specific output bin:

A. Good Scans: ballots that were voted and scanned properly.

B. Write-In Ballots: ballots having a write-in vote for at least one contest.

C. Bad Scans: ballots having an unclear document image and/or that were improperly scanned due to an interruption.

D. Multiple Ballots: ballots that entered the imaging area with another ballot thereby blocking the system's ability to capture simultaneous images of the ballot with the upper and lower cameras.

E. Blank Ballots: ballots having no votes.

F. Over-Voted Ballots: ballots having at least one contest with more than the allowable number of votes.

G. Under-Voted Ballots: ballots having at least one contest with less than the allowable number of votes.

H. Crossover Votes: ballots having votes in contests for more than two political parties where the ballot contains the contests for each political party in a primary election and the voter is only allowed to vote for one of those political parties.

Preferably, in accordance with the descriptions above, "Good Scans" are directed to output bin 48, "Write-In Ballots" are directed to output bin 50, and ballots defined by one of the conditions defined in C-H above are directed to output bin 52.

[0068] The bottom output bin 48 is moveable via a screw actuator 59 (Fig. 9) to facilitate access to the ballots in the bin and to reduce the free fall time of a ballot as it moves from diverter 18 to output bin 48. Preferably, output bin 48 moves downward after a batch of ballots has been scanned for removal of the scanned ballots and upward before the system scans a batch of ballots for reception of the scanned ballots. When output bin 48 is in its upward position (shown in Fig. 1 in dashed lines) it prevents folded ballots from catching on the raised fold lines of the previous ballot deposited in the bin.

[0069] As shown in Fig. 6, each output bin also has an extension tray 48a, 50a and 52a so that the output bins can receive larger ballots. Each output bin also has a ballot deflector 48b, 50b and 52b to prevent the trailing edge of a ballot deposited in one of the bins from catching the prevailing edge of the next ballot being deposited in the bin. The ballot deflectors 48b, 50b and 52b also reduce the free fall time of a ballot as it drops from diverter 18 to its respective output bin 48, 50 and 52 by supporting the ballot as it moves from diverter 18 to output bin 48, 50 and 52.

[0070] As shown in Figs. 22, 23A-23B and 24, system 10 is capable of producing an output bin report that lists the contents of one or more of the output bins. The "Ballots Scanned Report" of Fig. 22 is an exemplary output bin report that contains information relating to the ballots that were voted and scanned properly (which were directed to lower output bin 48). The "Ballots with Write Ins Report" of Figs. 23A-23B is an exemplary output bin report that contains

information relating to the ballots that included one or more write-in votes (which were directed to middle output bin 50). The "Ballots Not Scanned Report" of Fig. 24 is an exemplary output bin report that contains information relating to the ballots that were either improperly voted or improperly scanned (which were directed to upper output bin 52).

[0071] As can be seen, the "Ballots Scanned Report" of Fig. 22 lists the Jurisdiction Name, Election Name, Election Date, Batch #, Total Ballots Scanned, Ballot # Range, and time and date when the batch was started and completed. The report also lists, by precinct, the total number of ballots that were properly voted and scanned. The "Ballots with Write Ins Report" of Figs. 23A-23B also lists the Jurisdiction Name, Election Name, Election Date, Batch #, Ballot # Range, and time and date when the batch was started and completed, as well as the total number of ballots with write-in votes. The report lists by ballot identification number the number of write-ins votes that the ballot contains and which contests on the ballot contain the write-ins votes. For example, the report of Fig. 23A shows that Ballot # 001258 contained a write-in vote for two contests, namely, the Presidential and Mayoral contests.

[0072] The "Ballots Not Scanned Report" of Fig. 24 also lists the Jurisdiction Name, Election Name, Election Date, Batch #, Ballot # Range, and time and date when the batch was started and completed. In addition, the report lists the total number of ballots that were not scanned or voted properly. For each ballot that was improperly scanned or voted, the report lists by ballot identification number the reason why the ballot was rejected and, if applicable, the specific contest containing the error. For example, the report of Fig. 24 shows that Ballot # 001258 was improperly voted because of an "Overvote" in the Presidential contest, while Ballot # 001489 was improperly scanned because of a "Read Error."

[0073] These reports assist an election adjudication team tasked with reviewing the results of an election, because they allow the team to easily determine which ballots need to be reviewed and the reason or reasons why those ballots need to be reviewed. Further, the output bin reports identify by ballot identification number which ballots have write-in votes and errors to assist in locating the particular ballots that need to be reviewed. In the exemplary embodiment, the ballot identification number comprises the unique red identification number printed on the ballot by ink cartridge 104, as described above. As such, the color marking printed by ink cartridge 104 corresponds with the ballot identification number referenced on the output bin reports. The output bin reports may be printed by one of printers 76 and 77, described below.

[0074] Referring to Figs. 2 and 8, ballots moving through the system are tracked through the use of through-beam light sensors 58a-k positioned along the input area 12, transport path 16 and output area 20 so that any particular ballot is able to be sensed by at least one of the sensors. Although Figs. 2 and 8 show eleven sensors 58a-k, it is within the scope of the present invention for the system to incorporate more or fewer sensors than shown in the drawings.

[0075] As shown in Fig. 2, sensors 58a and 58b are mounted to back plane 56 adjacent to pick-up mechanism 26. Preferably, sensor 58a detects when there are no more ballots in input hopper 24. Preferably, sensor 58b detects the trailing edge of a ballot exiting pick-up mechanism 26 so that the system knows when the next ballot can be picked from the ballot stack. Another sensor 180 is mounted in upper housing 42a to detect whether more than one ballot at a time passed between cameras 44 and 46. If sensor 180 detects more than one ballot, then the system tracks those ballots through transport path 16 and diverts them to the output bin designated for improperly scanned ballots, as described above.

[0076] There are also through-beam light sensors positioned adjacent to input hopper 24 for determining when hopper tray 24a is raised to its highest position and lowered to its lowest position. These sensors allow the system to stop movement of screw actuator 182 when hopper tray 24a is raised to its highest position or lowered to its lowest position. Similar light sensors are also positioned adjacent to the bottom output bin 48 for determining when it is in its highest position and its lowest position.

[0077] It should be understood that system 10 described above is relatively compact compared to conventional ballot processing systems. Referring to Fig. 2, system 10 preferably has a height H1 measured from the top to the bottom of backplane 56 of between approximately 25 to 45 inches, and most preferably approximately 36 inches. Also, system 10 preferably has a width W measured from the left to the right side of backplane 56 of between approximately 30 to 50 inches, and most preferably approximately 41 inches. In addition, system 10 preferably has a depth of between approximately 15 to 35 inches, and most preferably approximately 21 inches. As such, system 10 does not occupy much space and can be moved or transported to another location with relative ease.

[0078] Referring to Figs. 13-15, system 10 includes four transparent security doors 184, 186, 188 and 190 so that a user of the system can verify that all of the necessary memory devices are present and the power is turned on. Security doors 184, 186 and 188 are mounted so as to cover recesses 192, 194 and 196 formed in side wall 102 of system 10. Each transparent security door is made from a transparent material that is thick enough to prevent breaking. Preferably, each security door is made from a transparent polymeric material such as Plexiglas; however, the doors may also be made from glass. Security doors 184, 186, 188 and 190 allow election workers to install the memory devices or other items necessary for operation of the election

machine, and allow the operators to verify that the devices are in place, without unlocking the doors and breaking their seals.

[0079] Because the locking mechanisms, hinges, and seal receiving structures of security doors 184, 186, 188 and 190 are substantially similar, only the locking mechanism 198, seal receiving structure 200, and hinges 202a,b of door 184 are described in detail herein. Locking mechanism 198 is mounted within an aperture in door 184. Locking mechanism 198 is operated by a key, which rotates a latch 204 between locked and unlocked positions. Fig. 14 shows latch 204 in its locked position, wherein latch 204 extends behind a portion 206 of side wall 102 preventing door 184 from opening. Door 184 is mounted to a bottom wall 208 with a hinge 202b that is secured to the door with fasteners and that is rotatably attached to bottom wall 208. The door is also mounted to a top wall opposite bottom wall 208 with a hinge 202a that is secured to the door and top wall in the same manner as hinge 202b. Seal receiving structure 200 extends outward from side wall portion 206 and has an opening 210 to receive a wire or ribbon type seal. There is an opening 212 in door 184 to receive seal receiving structure 200 when door 184 is in its closed position, as shown in Fig. 14, such that when door 184 is closed and a seal is received by structure 200, the door cannot be opened without breaking the seal.

[0080] There are two USB ports 214 and 216 mounted to bottom wall 208. There is also a switch 218 mounted to the bottom wall, which may be programmed to have any desirable function. Alternatively, switch 218 may be excluded from system 10 and replaced with additional USB ports or an RJ45 connector. USB ports 214 and 216 may receive removable memory devices, such as memory device 78 (Fig. 21), that contain information necessary for the operation of system 10. For example, one or both of ports 214 and 216 may receive a USB memory device containing the election ballot definition, as is known in the art. USB ports 214

and 216 may also be used to connect other devices to system 10, such as a computer mouse, keyboard, and printer. As shown in Fig. 13, there are two additional USB ports 220 and 222 and a RJ45 connector 224 mounted within recess 194 and two USB ports 226 and 228 and a RJ45 connector 230 mounted within recess 196. USB ports 220, 222, 226 and 228 may receive any of the devices described above for ports 214 and 216, while RJ45 connectors 224 and 230 may be used to connect system 10 to network 75 (Fig. 21), which could be another computer, a network of computers, and/or another ballot processing system that is identical or substantially identical to system 10 described herein. There are three slots 232a, 232b and 232c formed in the top of door 188 to allow cables to pass through the door when in the closed position.

[0081] Referring now to Fig. 15, door 190 is mounted to cover a recess 234 formed in a side wall 236 (Fig. 1) of the system, which is opposite side wall 102. There is a switch 238 and an electrical outlet 240 mounted to the back wall 242 that forms recess 234. Preferably, switch 238 is operable to turn the system on and off, while outlet 240 receives an electrical cord 244 that plugs into an electrical power source for providing power to the system. There are also two USB ports 246 and 248 mounted to back wall 242 that may receive any of the devices described above for ports 214 and 216. There are three slots 250a, 250b and 250c in the bottom of door 190 for allowing cables to pass through the door when in the closed position. The other features of door 190 are identical to those of door 184, which is described in detail above.

[0082] Referring now to Figs. 16A-16D, 17A-17B, 18A-18B, 19A-19B and 20, various flow charts are provided to illustrate the functionality of the application software of system 10 in connection with the processing of ballots as described herein. These flow charts also show the display screens that are displayed on user input device 22 at various times during the processing of a ballot. Specifically, Figs. 16A-16D show a flow chart 60 of the ballot scanning process of

system 10. Figs. 17A-17B show a flow chart 62 of the process for resolving start error conditions for system 10. Figs. 18A-18B show a flow chart 64 of the process for resolving scanning error conditions for system 10. Fig. 18B shows a flow chart 66 of the process for printing output bin reports for system 10. Figs. 19A-19B show a flow chart 68 of the process for resolving the situation when a log printer or report printer is not available for system 10. Fig. 20 shows a flow chart 70 of the process for resolving an unknown error for system 10.

[0083] Referring now to Fig. 21, a block diagram is provided of the hardware incorporated into system 10. As can be seen, system 10 includes a single board computer 70 with a processor 71 connected to a memory device 72, which is preferably random access memory (RAM), and a USB bus 73. The processor 71 is also connected to a hard disk drive 74 and, if desired, may be connected to a network 75 of other computers. The USB bus 73 is connected to a user input device/touch screen 22, a first printer 76, a second printer 77, and a removable memory device 78. The printers 76 and 77 may be used to print a wide variety of system and diagnostic reports, including the output bin reports shown in Figs. 22-24. In the exemplary embodiment, one of the printers is a continuous feed dot matrix printer for printing an audit log, and the other is a cut-sheet laser printer for printing reports. Other devices may also connect to the USB bus 73 if desired. The hard disk drive 74 preferably stores the application software that is executed by processor 71 to perform the various functions of system 10 described herein.

[0084] The single board computer 70 is connected to an image processing board 79 via a USB connection that communicates with two cameras 44 and 46. The image processing board 79 transfers the ballot images to the single board computer 70, which stores them on hard disk drive 74. The memory device 72 may also be used to temporarily store data before it is

transferred to hard disk drive 74. The election ballot definition is preferably transferred to the single board computer 70 via the removable memory device 78 and stored on hard disk drive 74. The removable memory device 78 preferably connects to the USB bus 73 through one of the USB ports described above and shown in Figs. 13-15.

[0085] The image processing board 79 is connected to a main control board 80 via an internal bus 81. The main control board 80 is connected to the following controllers via an internal bus 92: a motor controller 84, a first sensor/light barrier controller 85, a second sensor/light barrier controller 86, an input hopper controller 87, an output tray controller 88, a gate controller 89, and a printer controller 90. The main control board 80 also monitors the full sensors of output trays 50 and 52. The motor controller 84 is connected to a main motor 148 (Fig. 9), which provides power to the rollers and to a pinwheel sensor that detects whether main motor 148 is operating correctly. The first and second sensor/light barrier controllers 85 and 86 are each connected to one or more of sensors 58a-k. The input hopper controller 87 is connected to screw actuator 182 (Fig. 9) for moving input hopper 24 as described above, and also monitors the maximum up and down position sensors for this tray. The output tray controller 88 is connected to screw actuator 59 (Fig. 9) for moving the lower output tray 48, and also monitors the maximum up and down position sensors for this tray. The gate controller 89 is connected to the clutch on flywheel 40 for controlling the rate at which ballots are picked from the ballot stack by pick-up mechanism 26. The gate controller 89 is connected to shunts 112 and 114 of diverter 18 (Fig. 8) for directing ballots into the appropriate output bin 48, 50 or 52. The printer controller 90 is connected to ink cartridge 104 (Fig. 2) for printing identifying marks on ballots scanned by system 10. To isolate system noise, system 10 uses three separate power supplies. A first power supply is used to power the transport mechanical controls board, input and output tray

motors, and the cameras. A second power supply is used to power only the main motor. A third power supply is used to power the computer motherboard, the hard drive, and the display.

[0086] The main control board 80 is connected to a security sensor 82 that is positioned within the transport path to detect copied or counterfeit ballots. Upon detection of a copied or counterfeit ballot, the main control board 80 instructs the image processing board 79 and single board computer 70 to flag that particular ballot. An ultrasonic sensor 83 is also connected to the main control board 80. The ultrasonic sensor 83 is used to detect whether more than one ballot is passing through imaging area 14. If more than one ballot passes through imaging area 14, the main control board 80 can instruct the image processing board 79 and single board computer 70 to flag those particular ballots and route them to output bin 52 (i.e., the output bin designated for improperly scanned ballots).

Operation of the System

[0087] In operation, a stack of ballots are placed in input hopper 24 whereby pick-up mechanism 26 picks the top ballot from the stack and transfers it to imaging area 14. Cameras 44 and 46 image both sides of the ballot and send the ballot image to the image processing board 79 (Fig. 21). As the ballot is transported from imaging area 14 to diverter 18 through transport path 16, the image processing board 79 sends the ballot image to the single board computer 70, which temporarily stores the ballot image in memory device 72 or on hard disk drive 74. The processor 71 utilizes the election ballot definition to process the ballot image and determine the voting selections marked on the ballot, preferably as described in U.S. Patent No. 6,854,644, which is incorporated herein by reference. The processor 71 then creates a ballot record that contains the processing results and stores the file in either memory device 72 or hard disk drive 74 along with the ballot image. After a batch of ballots is processed, all of the ballot records and

ballot images are permanently stored on hard disk drive 74 and digitally signed to ensure authenticity.

[0088] Based on the processing results for the ballot, the processor 71 determines which position the shunts 112 and 114 of diverter 18 need to be moved in order to divert the ballot into the appropriate output bin 48, 50 or 52. The processor 71 sends instructions to the gate controller 89 to move the shunts 112 and 114 into the appropriate position. The sensors 58a-k (Figs. 2 and 8) positioned along the ballot transport path are connected to the main control board 80, image processing board 79, and single board computer 70 via sensor/light barrier controllers 85 and 86 in order to track each ballot through transport path 16 and ensure that each ballot is diverted into the correct output bin 48, 50 or 52.

[0089] This process repeats for each ballot in input hopper 24 as the processor 71 sends instructions through the main control board 80 to the gate controller 89, causing the electronically controlled clutch to rapidly engage and disengage flywheel 40 from drive shaft 38 to pick up ballots at the desired speed. Preferably, the ballots are transported from input hopper 24 to diverter 18 at a speed of between approximately 50 to 120 inches per second. Preferably, up to four ballots may be positioned within imaging area 14 and transport path 16 at any given time.

[0090] Finally, system 10 automatically determines whether the results of newly scanned ballots should be added to a preexisting election results database, or, whether the results of the newly scanned ballots should replace the results in the preexisting database. This determination is made based on date/time stamps that are added to every ballot record and ballot image. For every batch of scanned ballots, the system saves a date/time stamp of when the first ballot was scanned and when the last ballot was scanned to establish a session window for that batch of

ballots. The date/time stamps are saved along with the machine identification in a results collection file, which is encrypted and signed to prevent tampering.

[0091] For example, if the date/time stamp of the first ballot in the newly scanned ballots is the same as the date/time stamp of the first ballot of the original results and the date/time stamp of the last ballot in the newly scanned ballots is later than the date/time stamp of the last ballot of the original results, then system 10 will replace the original results with the results of the newly scanned ballots. However, if the date/time stamp of the first ballot in the newly scanned ballots is later than the date/time stamp of the last ballot of the original results, then system 10 will add the results of the newly scanned ballots to the original results. System 10 is also able to determine what cause of action to take if the date/time stamps of the various files are different than in the two scenarios described above. Thus, system 10 eliminates the requirement for an "add to" or "replace" prompt associated with the election results database, and, eliminates the possibility of user error.

[0092] While the present invention has been described and illustrated hereinabove with reference to an exemplary embodiment, it should be understood that various modifications could be made to this embodiment without departing from the scope of the invention. In addition, it should be understood that the exemplary embodiment embodies different inventive features. One skilled in the art will appreciate that any one of these inventive features could be implemented without the others. Therefore, the present invention is not to be limited to the specific configuration or methodology of the exemplary embodiment, except insofar as such limitations are included in the following claims.

CLAIMS

1. A system located at a central election office for processing a plurality of ballots having one or more voting selections marked thereon, comprising:

an input area configured to receive a stack of ballots to be processed, wherein the input area comprises an imaging device operable to produce an image of each of the ballots;

a processor electrically coupled to the imaging device and operable to process the image of each of the ballots to determine the voting selections marked thereon;

an output area configured to store the processed ballots, wherein the output area comprises a plurality of output bins and a diverter operable to divert each of the ballots into one of the output bins based on instructions received from the processor;

a transport path operable to transport each of the ballots from the input area to the output area, wherein the transport path comprises a planar section positioned between a first curve section and a second curve section so as to form a generally S-shaped path, and wherein the length of the transport path allows each of the ballots to be processed prior to reaching the output area; and

a plurality of sensors each of which is positioned adjacent to the transport path for tracking each of the ballots between the input area and the output area.

2. The system of claim 1, wherein the imaging device comprises a camera.

3. The system of claim 1, further comprising a memory device electrically coupled to the processor and configured to store an election ballot definition, wherein the processor is operable to use the election ballot definition to determine the voting selections marked on each of the ballots.

4. The system of claim 1, wherein the diverter comprises at least one shunt moveable between a first position in which a ballot is diverted from the transport path into one of the

output bins and a second position in which a ballot is diverted from the transport path into another of the output bins.

5. The system of claim 1, wherein each of the first and second curve sections of the transport path is configured to change a direction of movement of a ballot by approximately 180 degrees.

6. The system of claim 1, wherein the first curve section has a first arc section length, the planar section has a planar section length, and the second curve section has a second arc section length, and wherein the sum of the first arc section length, the planar section length and the second arc section length is between approximately 40 to 75 inches.

7. The system of claim 1, wherein the input area, the transport path and the output area are dimensioned to be placed in a space having a height of between approximately 25 to 45 inches, a width of between approximately 30 to 50 inches, and a depth of between approximately 15 to 35 inches.

8. A system located at a central election office for processing a plurality of ballots having one or more voting selections marked thereon, comprising:

an input area configured to receive a stack of ballots to be processed;

a processor operable to process the ballots by determining the voting selections marked thereon;

an output area configured to store the processed ballots;

a transport path operable to transport each of the ballots from the input area to the output area, wherein the transport path comprises a planar section positioned between a first curve section and a second curve section so as to form a generally S-shaped path, and wherein the length of the transport path allows each of the ballots to be processed prior to reaching the output area; and

a plurality of sensors each of which is positioned adjacent to the transport path for tracking each of the ballots between the input area and the output area.

9. The system of claim 8, wherein the input area comprises an imaging device operable to produce an image of each of the ballots.

10. The system of claim 9, wherein the imaging device comprises a camera.

11. The system of claim 9, wherein the processor is electrically coupled to the imaging device and operable to process the image of each of the ballots to determine the voting selections marked thereon.

12. The system of claim 11, further comprising a memory device electrically coupled to the processor and configured to store an election ballot definition, wherein the processor is operable to use the election ballot definition to determine the voting selections marked on each of the ballots.

13. The system of claim 11, wherein the output area comprises a plurality of output bins.

14. The system of claim 13, wherein the output area comprises a diverter electrically coupled to the processor and operable to divert each of the ballots into one of the output bins based on instructions received from the processor.

15. The system of claim 14, wherein the diverter comprises at least one shunt moveable between a first position in which a ballot is diverted from the transport path into one of the output bins and a second position in which a ballot is diverted from the transport path into another of the output bins.

16. The system of claim 8, wherein each of the first and second curve sections of the transport path is configured to change a direction of movement of a ballot by approximately 180 degrees.

17. The system of claim 8, wherein the transport path is operable to transport the ballots from the input area to the output area at a rate of between approximately 250 to 360 ballots per minute.

18. The system of claim 8, wherein the first curve section has a first arc section length, the planar section has a planar section length, and the second curve section has a second arc section length, and wherein the sum of the first arc section length, the planar section length and the second arc section length is between approximately 40 to 75 inches.

19. The system of claim 8, wherein the input area, the transport path and the output area are dimensioned to be placed in a space having a height of between approximately 25 to 45 inches, a width of between approximately 30 to 50 inches, and a depth of between approximately 15 to 35 inches.

20. A system located at a central election office for processing a plurality of ballots having one or more voting selections marked thereon, comprising:

an input area configured to receive a stack of ballots to be processed;

a processor operable to process the ballots;

an output area configured to store the processed ballots;

a transport path operable to transport each of the ballots from the input area to the output area;

a plurality of sensors each of which is positioned adjacent to the transport path for tracking each of the ballots between the input area and the output area; and

wherein the input area, the transport path and the output area are dimensioned to be placed in a space having a height of between approximately 25 to 45 inches, a width of between approximately 30 to 50 inches, and a depth of between approximately 15 to 35 inches.

21. The system of claim 20, wherein the transport path comprises a planar section positioned between a first curve section and a second curve section so as to form a generally S-shaped path, and wherein the length of the transport path allows each of the ballots to be processed prior to reaching the output area.

22. The system of claim 21, wherein each of the first and second curve sections of the transport path is configured to change a direction of movement of a ballot by approximately 180 degrees.

23. The system of claim 21, wherein the first curve section has a first arc section length, the planar section has a planar section length, and the second curve section has a second arc section length, and wherein the sum of the first arc section length, the planar section length and the second arc section length is between approximately 40 to 75 inches.

24. The system of claim 20, wherein the input area comprises an imaging device operable to produce an image of each of the ballots.

25. The system of claim 24, wherein the imaging device comprises a camera.

26. The system of claim 24, wherein the processor is electrically coupled to the imaging device and operable to process the image of each of the ballots to determine the voting selections marked thereon.

27. The system of claim 26, further comprising a memory device electrically coupled to the processor and configured to store an election ballot definition, wherein the processor is operable to use the election ballot definition to determine the voting selections marked on each of the ballots.

28. The system of claim 26, wherein the output area comprises a plurality of output bins.

29. The system of claim 28, wherein the output area comprises a diverter electrically coupled to the processor and operable to divert each of the ballots into one of the output bins based on instructions received from the processor.

30. The system of claim 29, wherein the diverter comprises at least one shunt moveable between a first position in which a ballot is diverted from the transport path into one of the output bins and a second position in which a ballot is diverted from the transport path into another of the output bins.

31. A method for processing a plurality of ballots at a central election office, wherein each of the ballots has one or more voting selections marked thereon, comprising:

receiving a stack of ballots to be processed in an input area;

transporting each of the ballots from the input area to an output area over a transport path comprising a planar section positioned between a first curve section and a second curve section so as to form a generally S-shaped path;

processing each of the ballots prior to reaching the output area; and

storing each of the processed ballots in the output area.

32. The method of claim 31, wherein the processing step comprises producing an image of each of the ballots.

33. The method of claim 32, wherein the processing step further comprises processing the image of each of the ballots to determine the voting selections marked thereon.

34. The method of claim 33, wherein the processing step further comprises accessing an election ballot definition in order to determine the voting selections marked on each of the ballots.

35. The method of claim 31, wherein the output area comprises a plurality of output bins, and wherein the method further comprises diverting each of the ballots into one of the output bins in response to the processing step.

36. The method of claim 31, further comprising tracking each of the ballots between the input area and the output area.

37. The method of claim 31, wherein the ballots are transported from the input area to the output area at a speed of between approximately 50 to 120 inches per second.

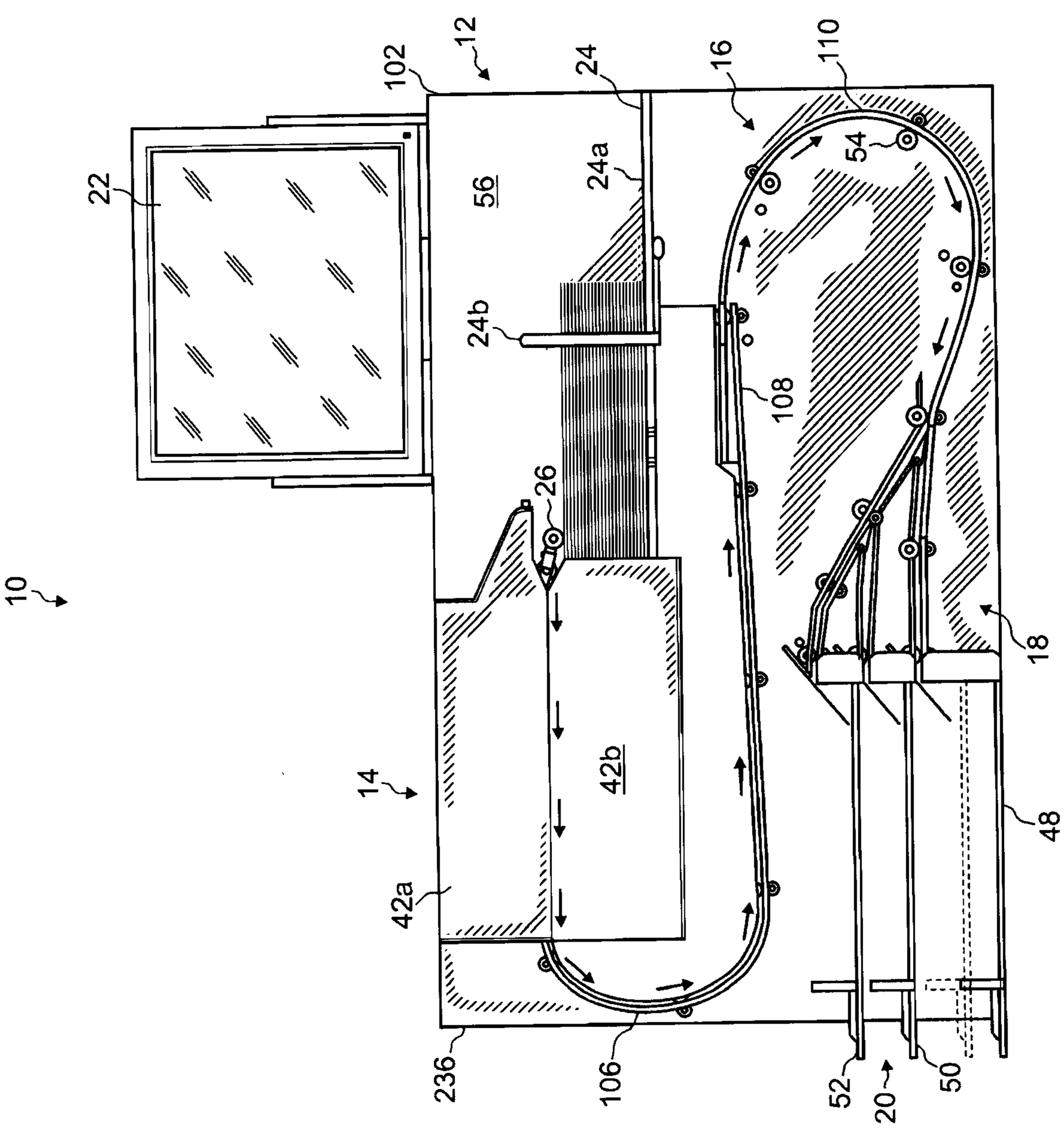

10
12
102
24
16
11
22
56
24a
54
24b
108
26
18
14
42b
42a
48
236
106
52
20
50

Fig. 1

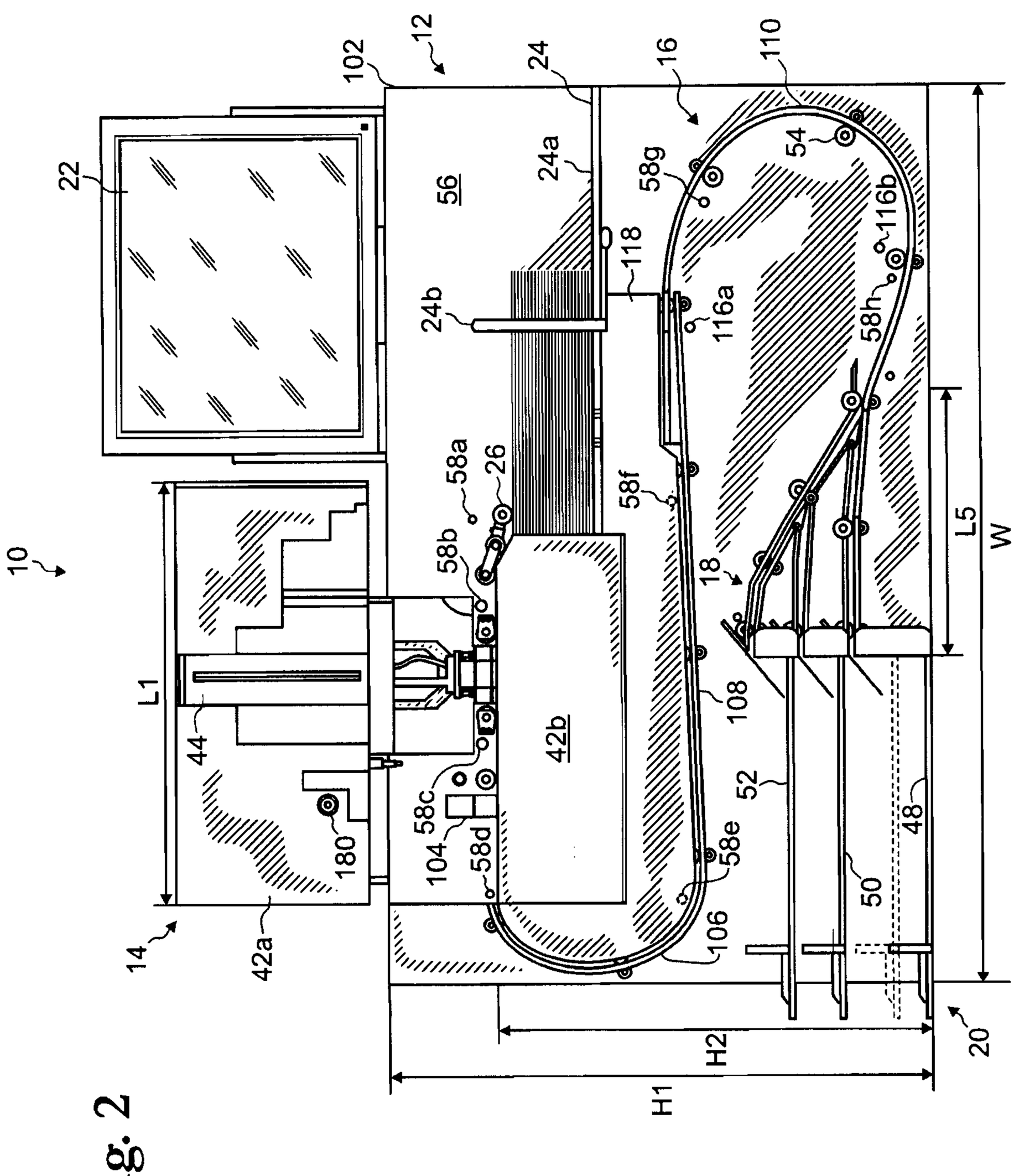

10
102
12
24
16
11
22
56
24a
58g
54
116b
118
24b
116a
58h
58a
26
58f
58b
18
L5
W
L1
44
42b
108
52
48
58c
104
58d
180
58e
50
106
14
42a
H2
H1
20

Fig. 2

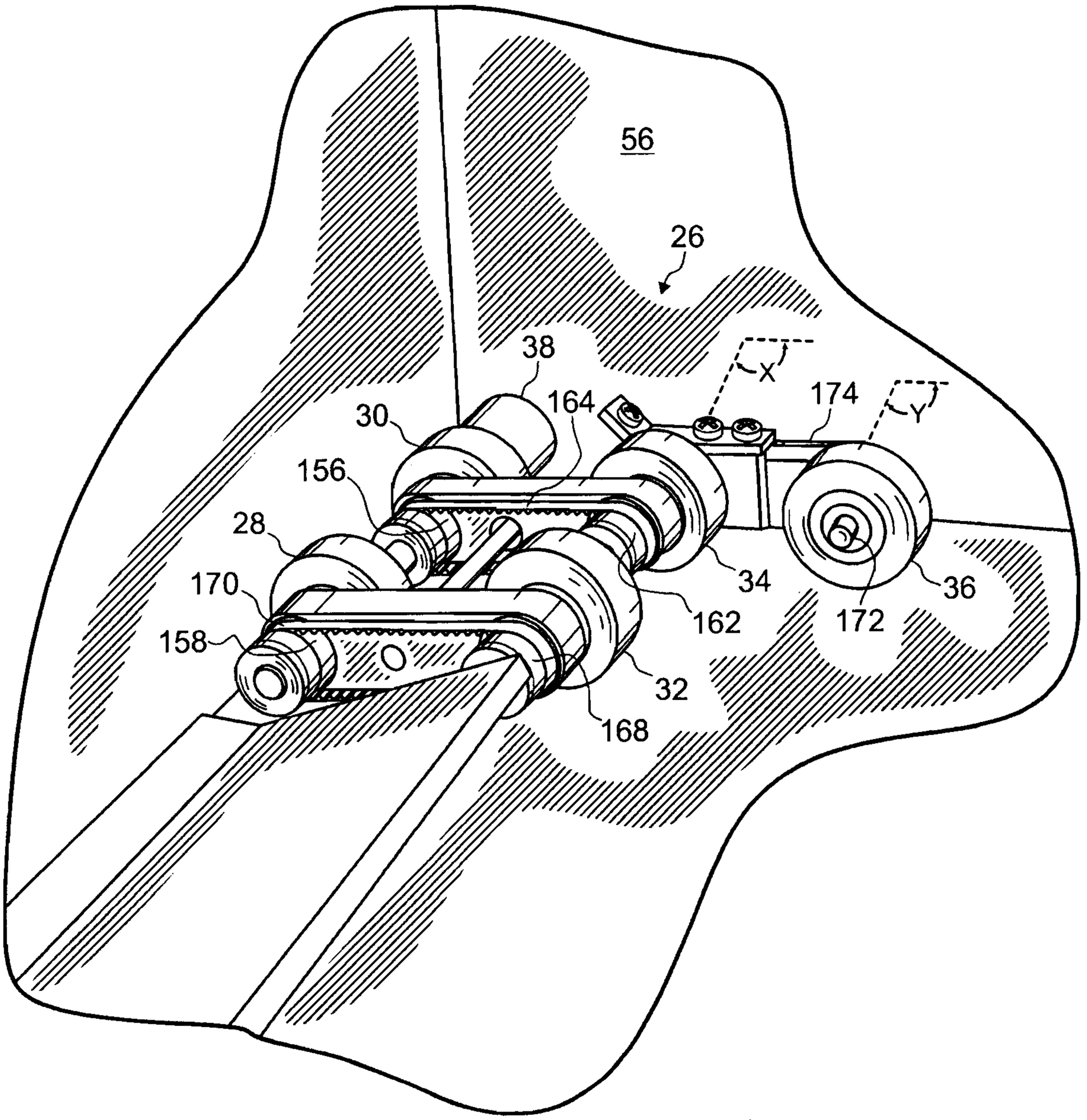


Fig. 3

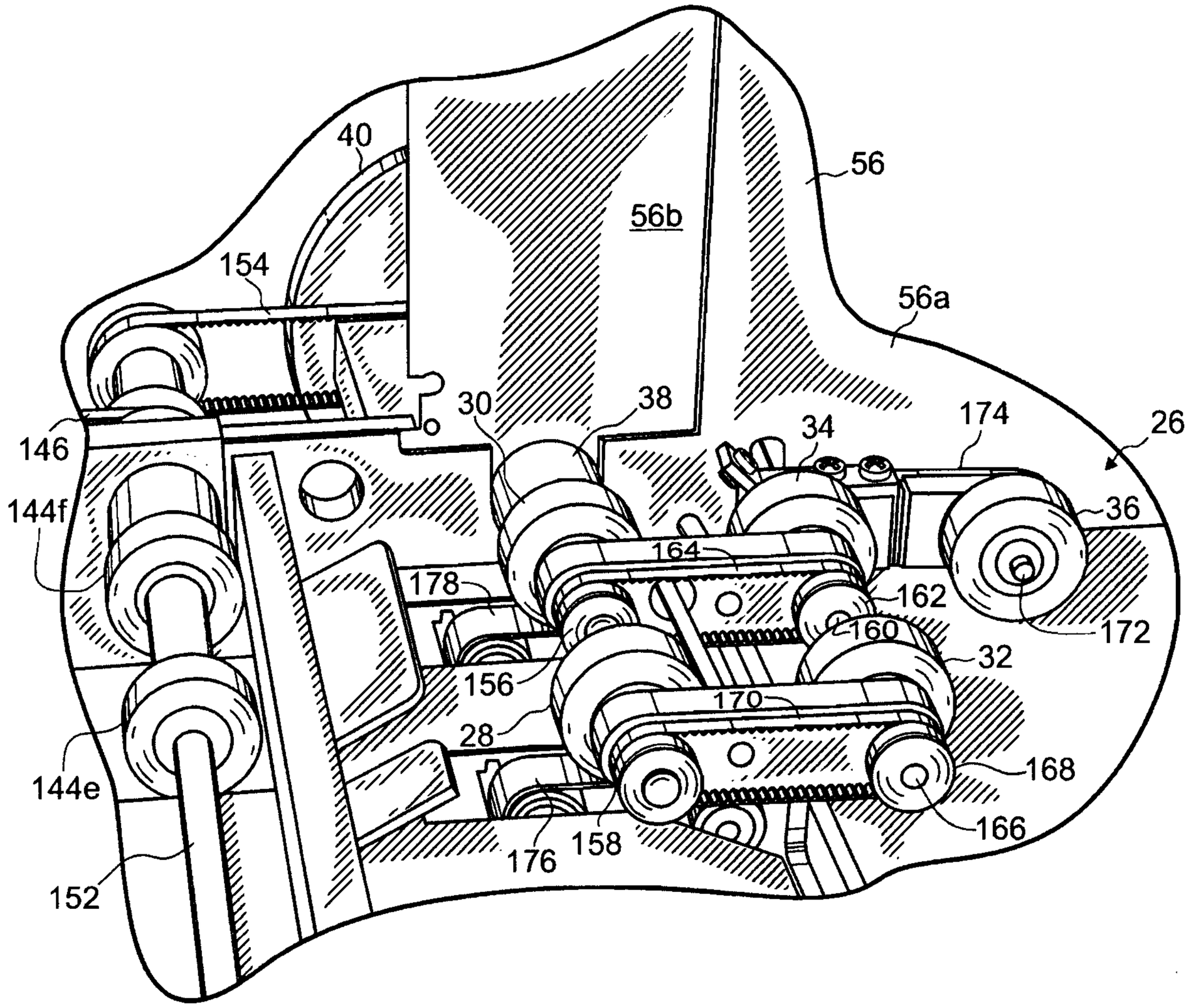

40
56
56b
154
56a
146
30
38
34
174
26
144f
36
164
178
162
160
172
32
156
170
28
168
144e
166
176
158
152

Fig. 4

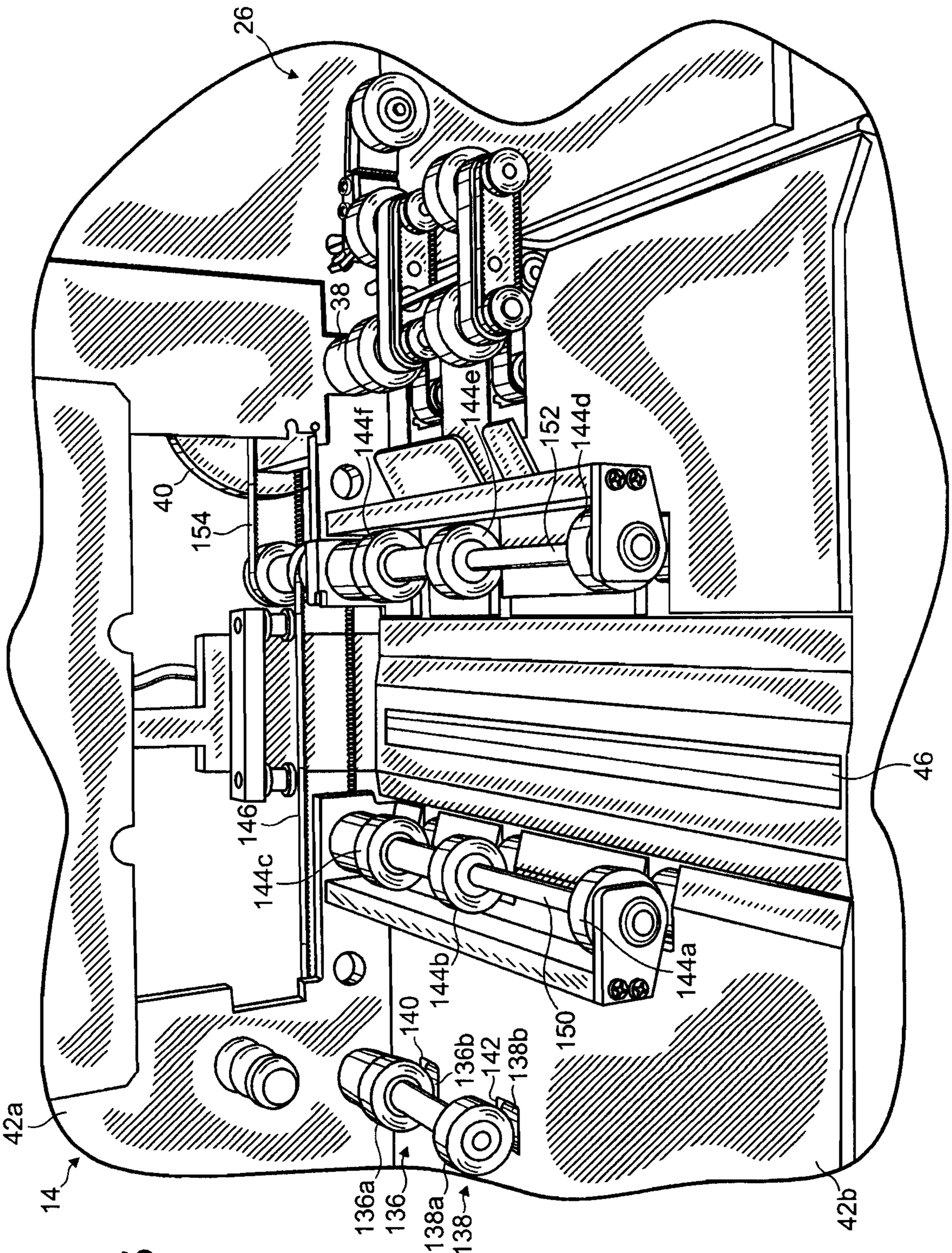

26
38
144f
144e
152
144d
40
154
146
144c
144b
144a
150
140
136b
142
138b
42a
14
136a
136
138a
138
46
42b

Fig. 5

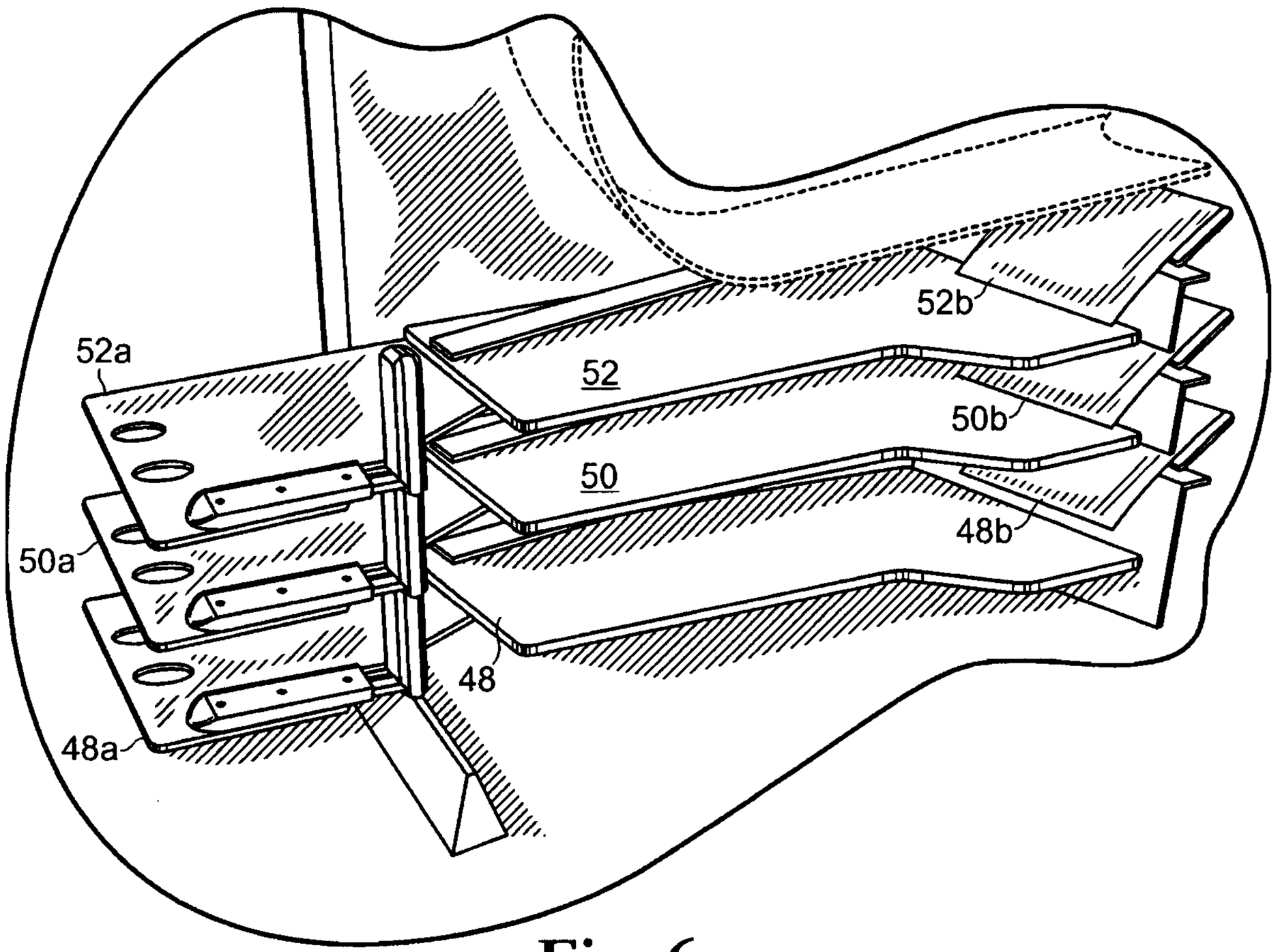


Fig. 6

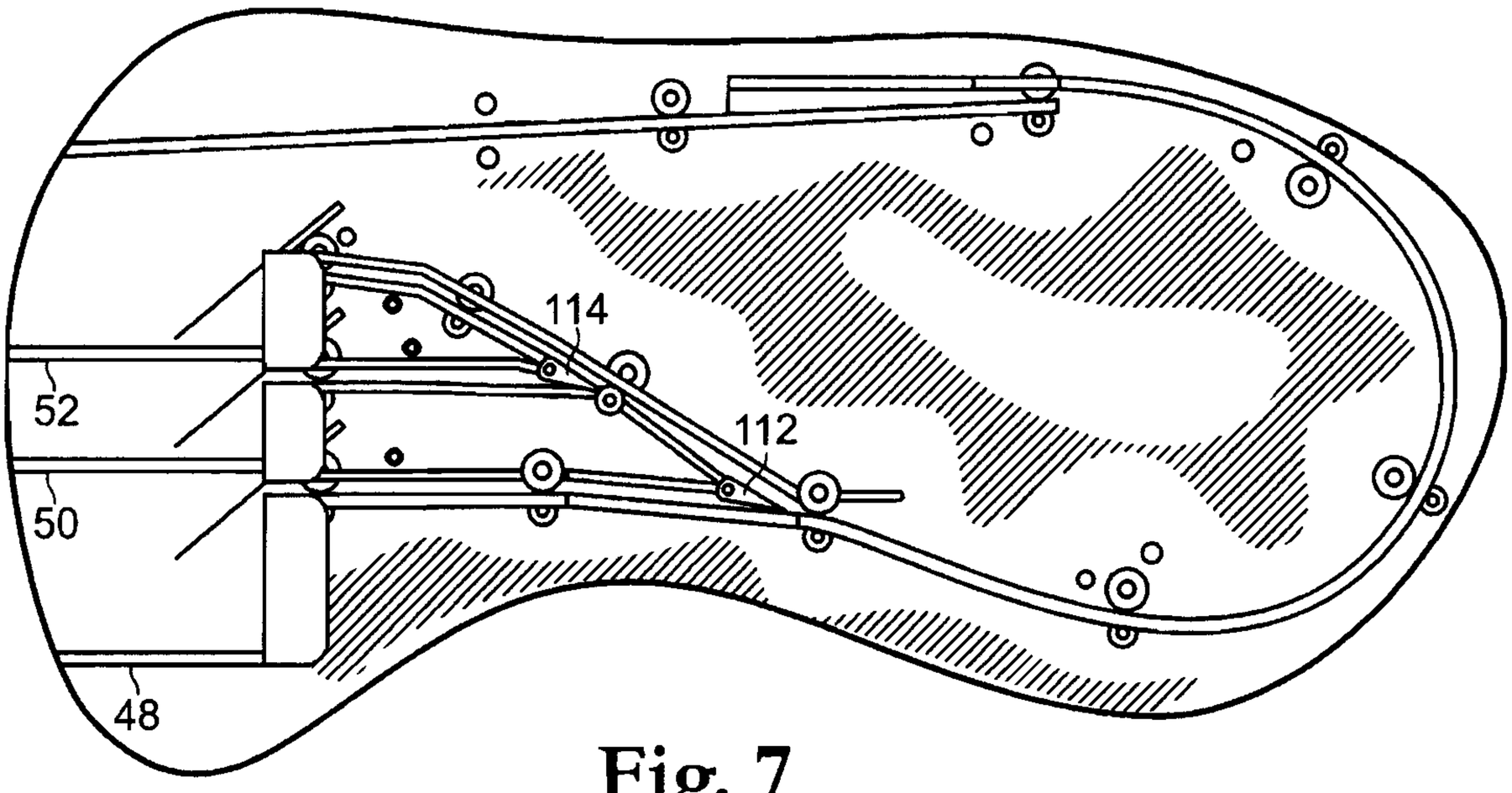


Fig. 7

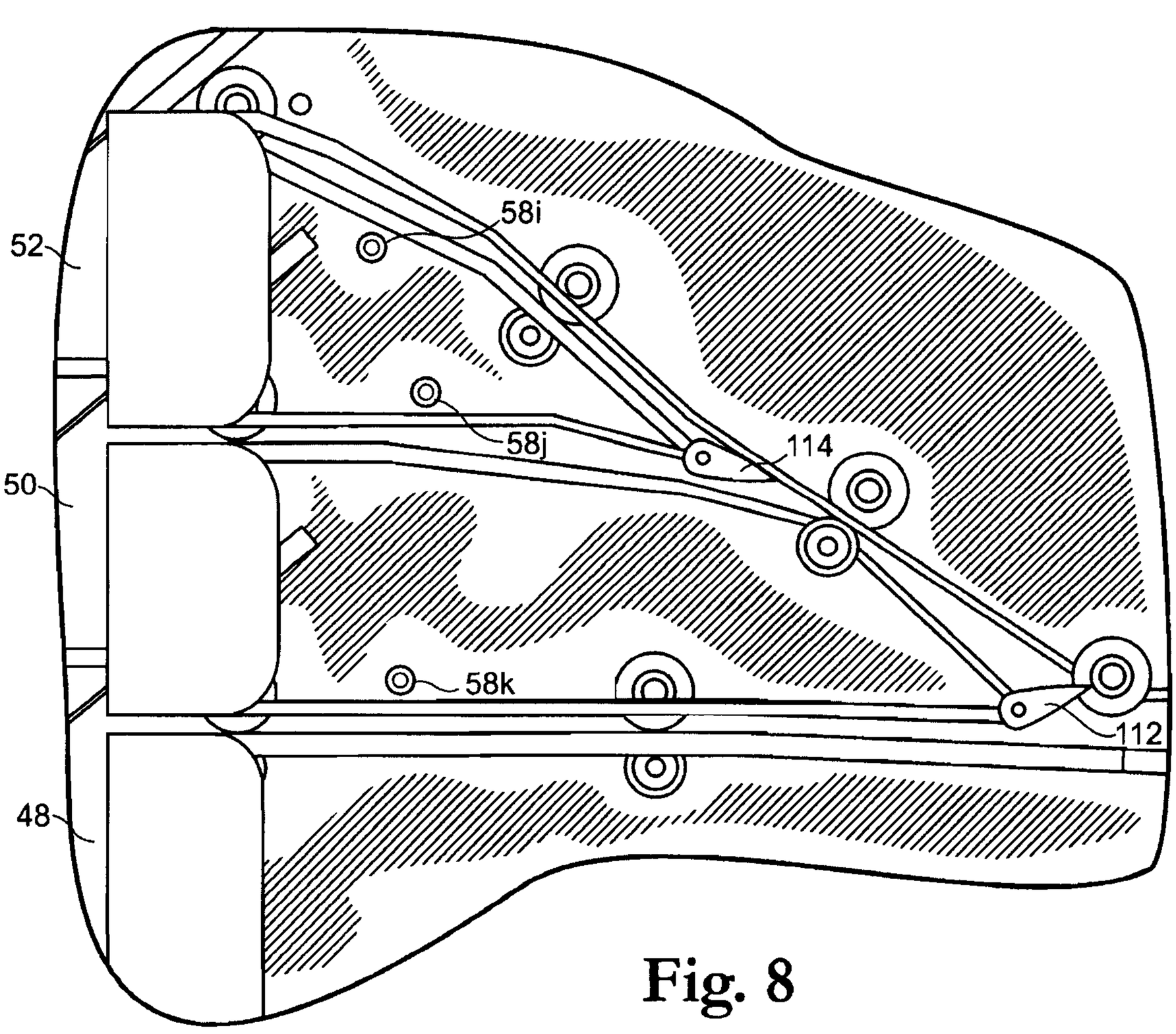


Fig. 8

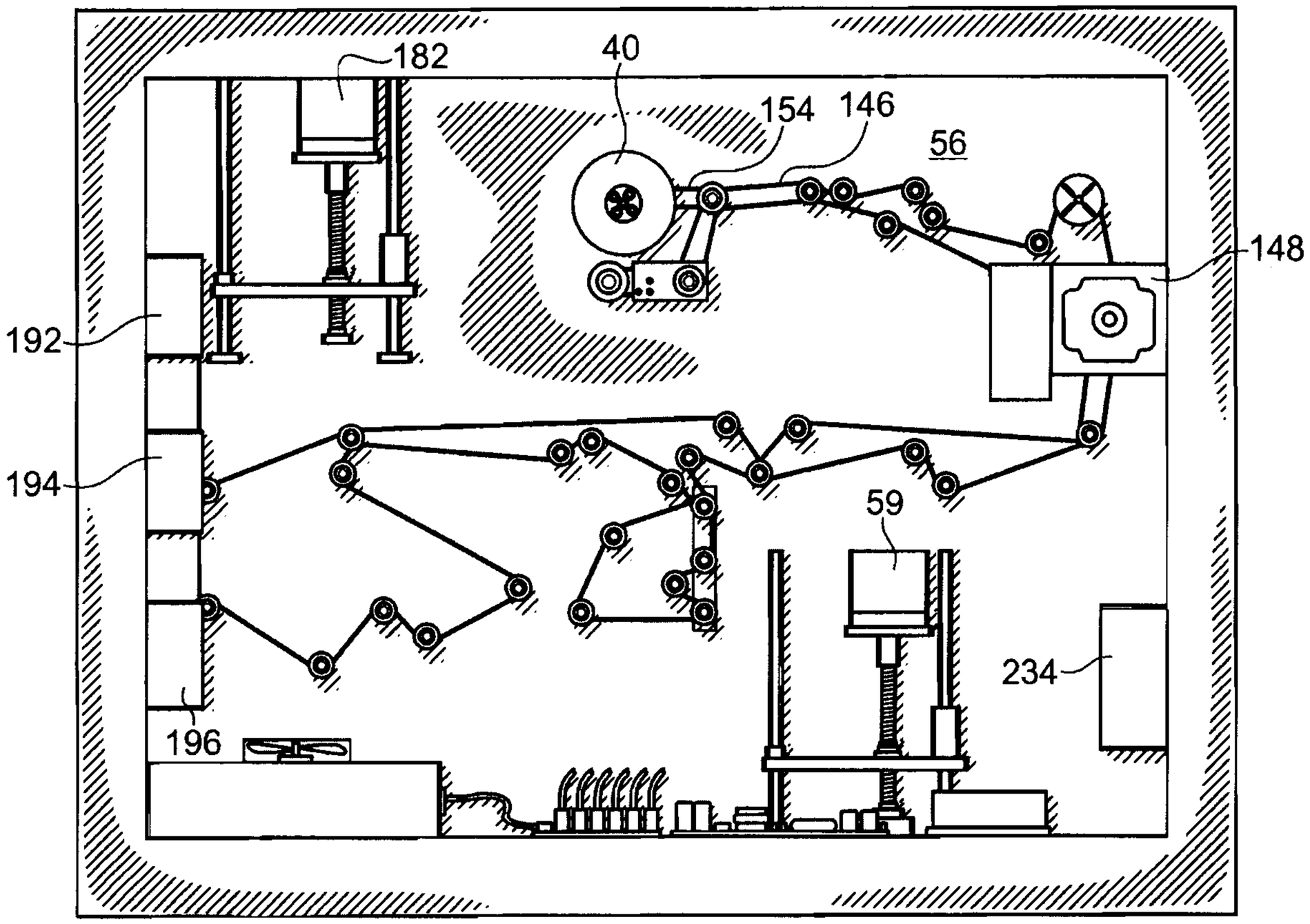


Fig. 9

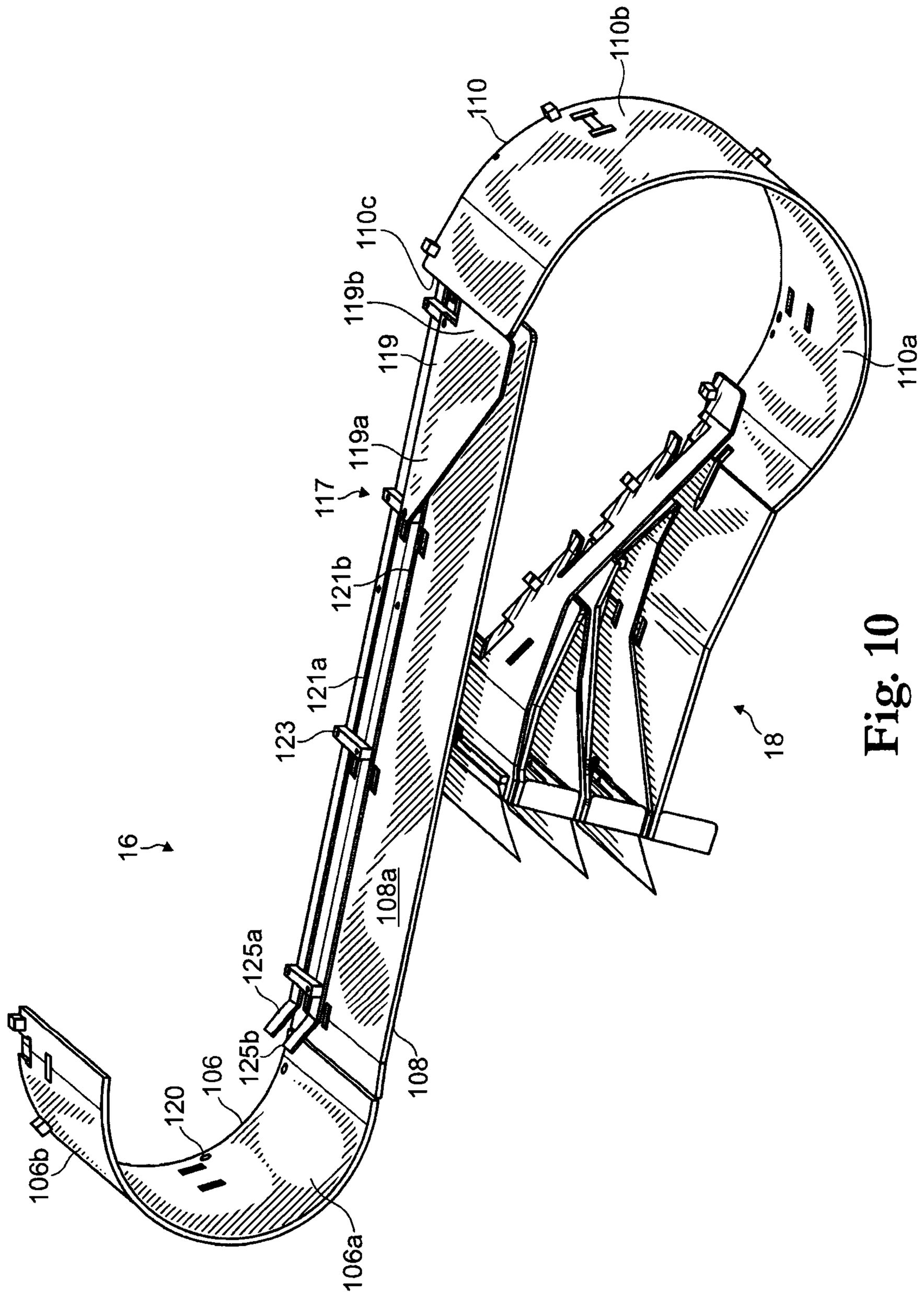

110b
110
110c
119b
119
119a
117
121b
121a
123
125a
125b
108a
108
16
18
120
106
106b
106a
110a

Fig. 10

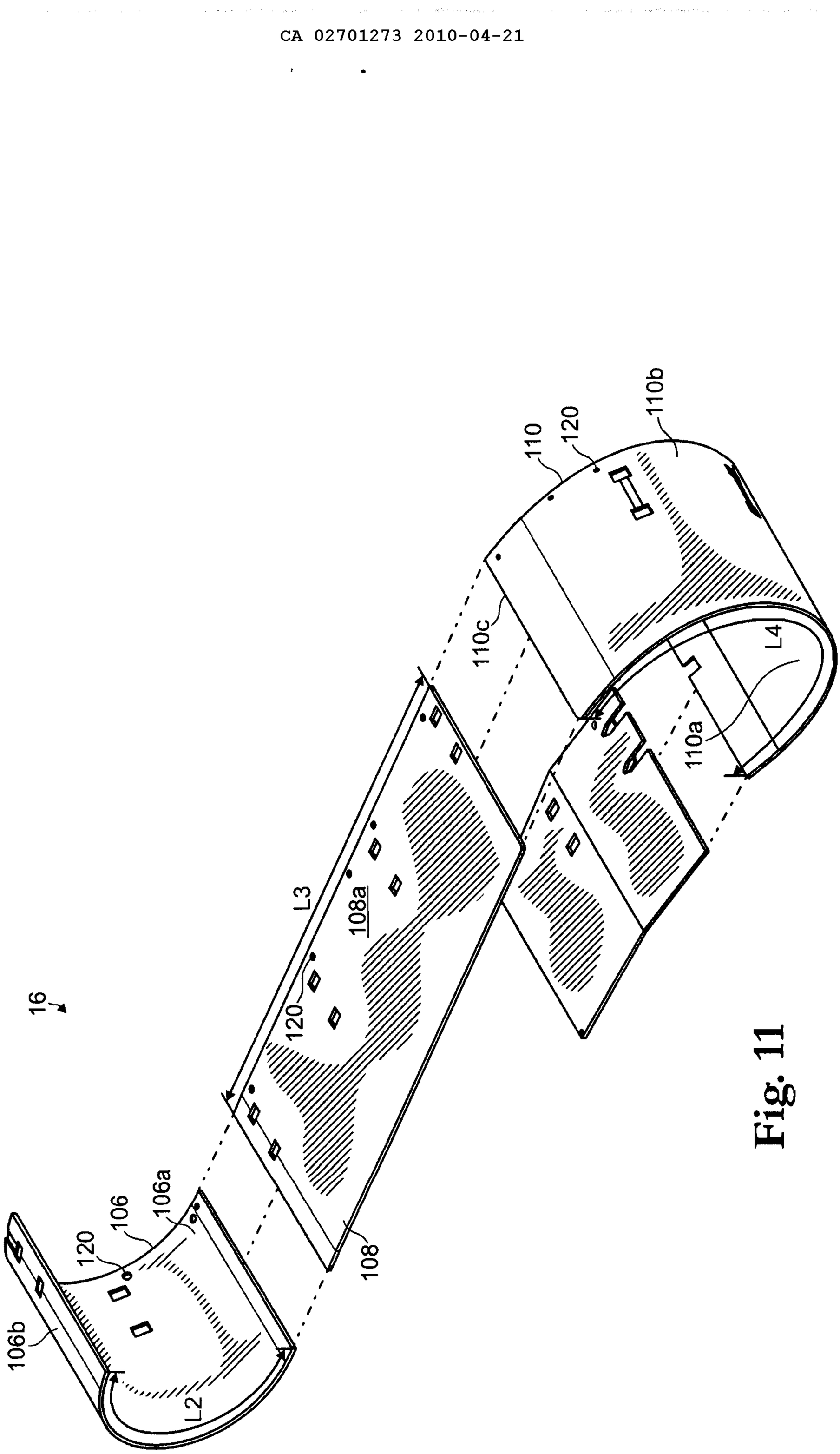


Fig. 11

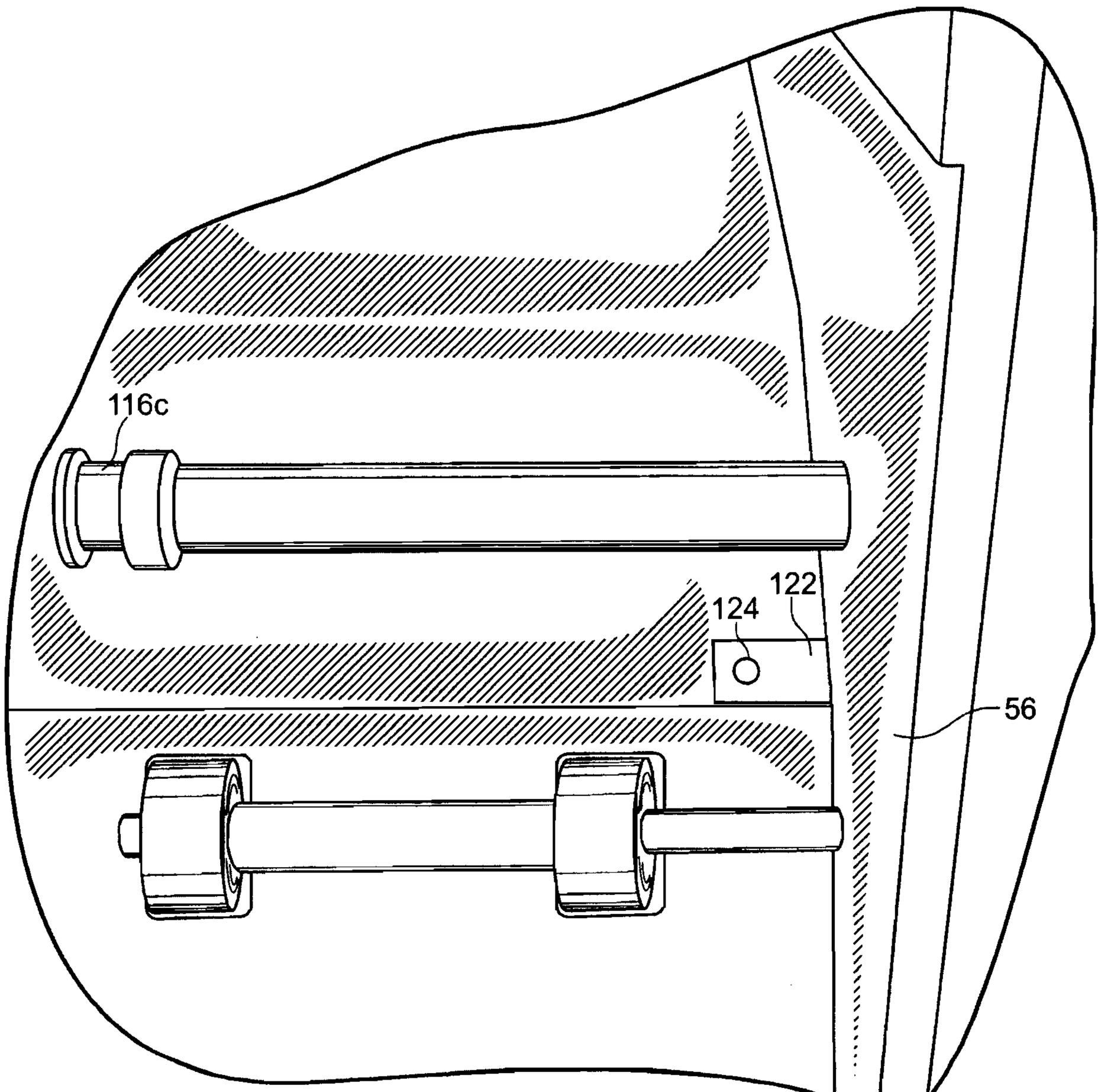


Fig. 12

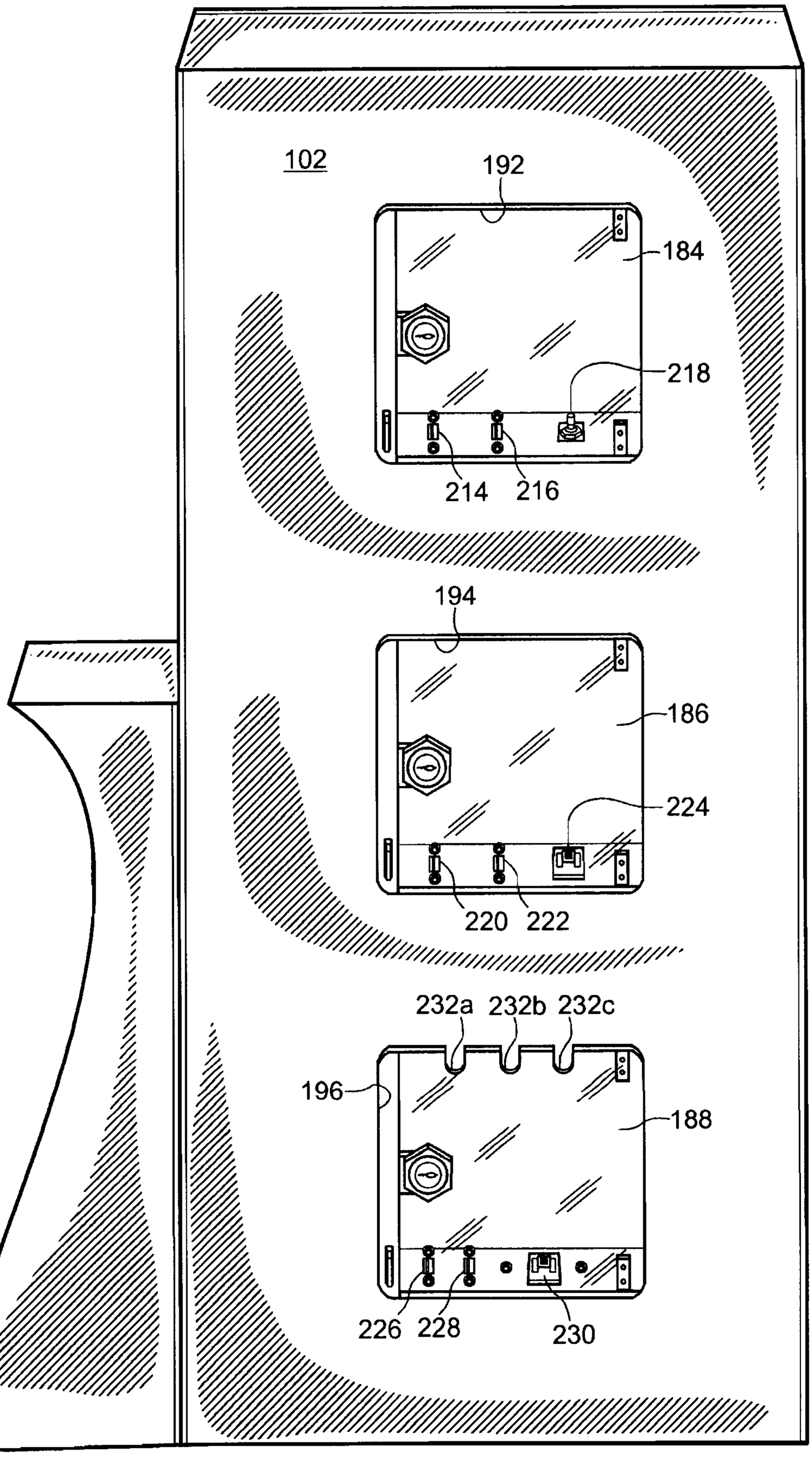

102
192
184
218
214
216
194
186
224
220
222
232a
232b
232c
196
188
226
228
230

Fig. 13

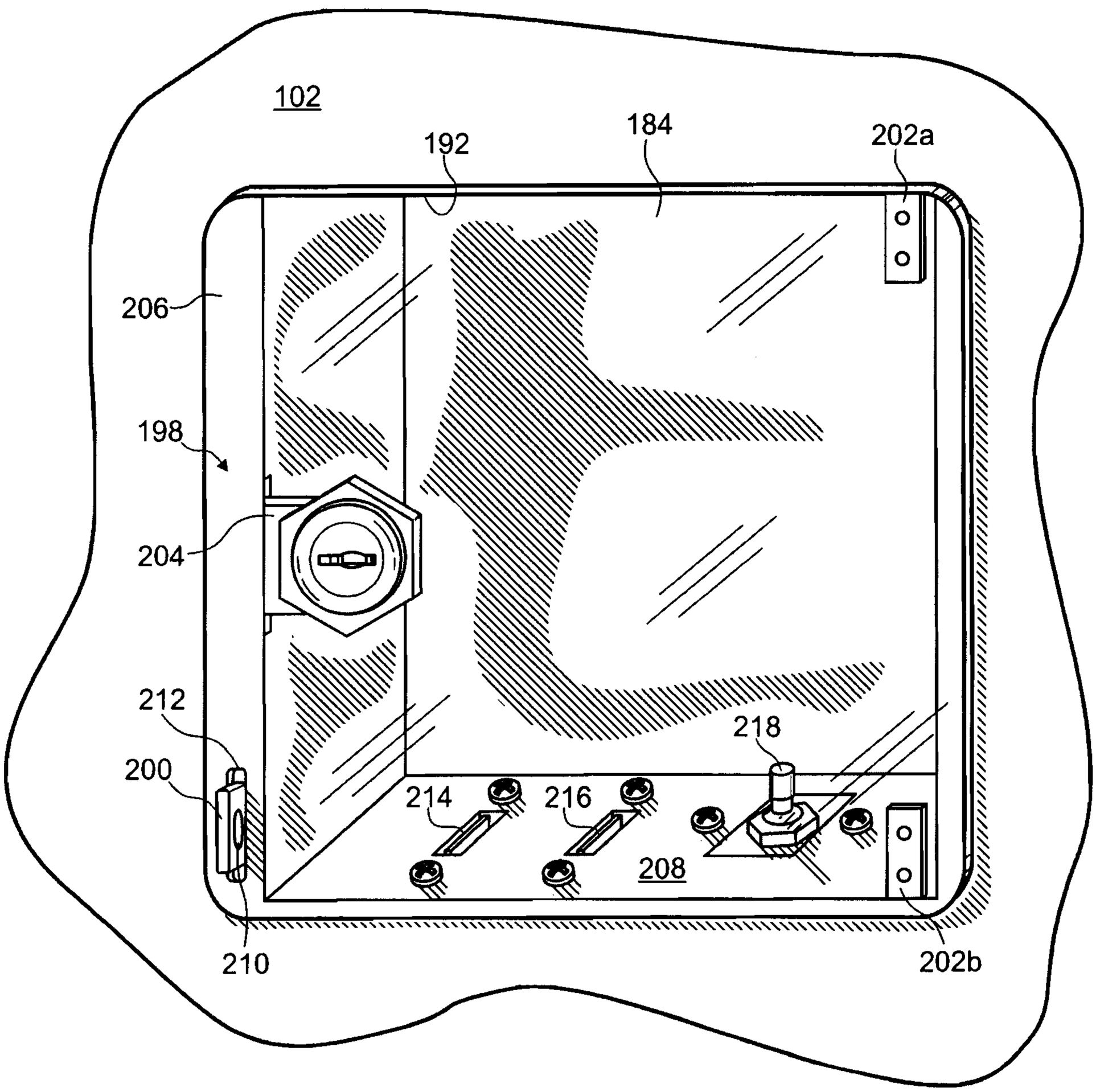


Fig. 14

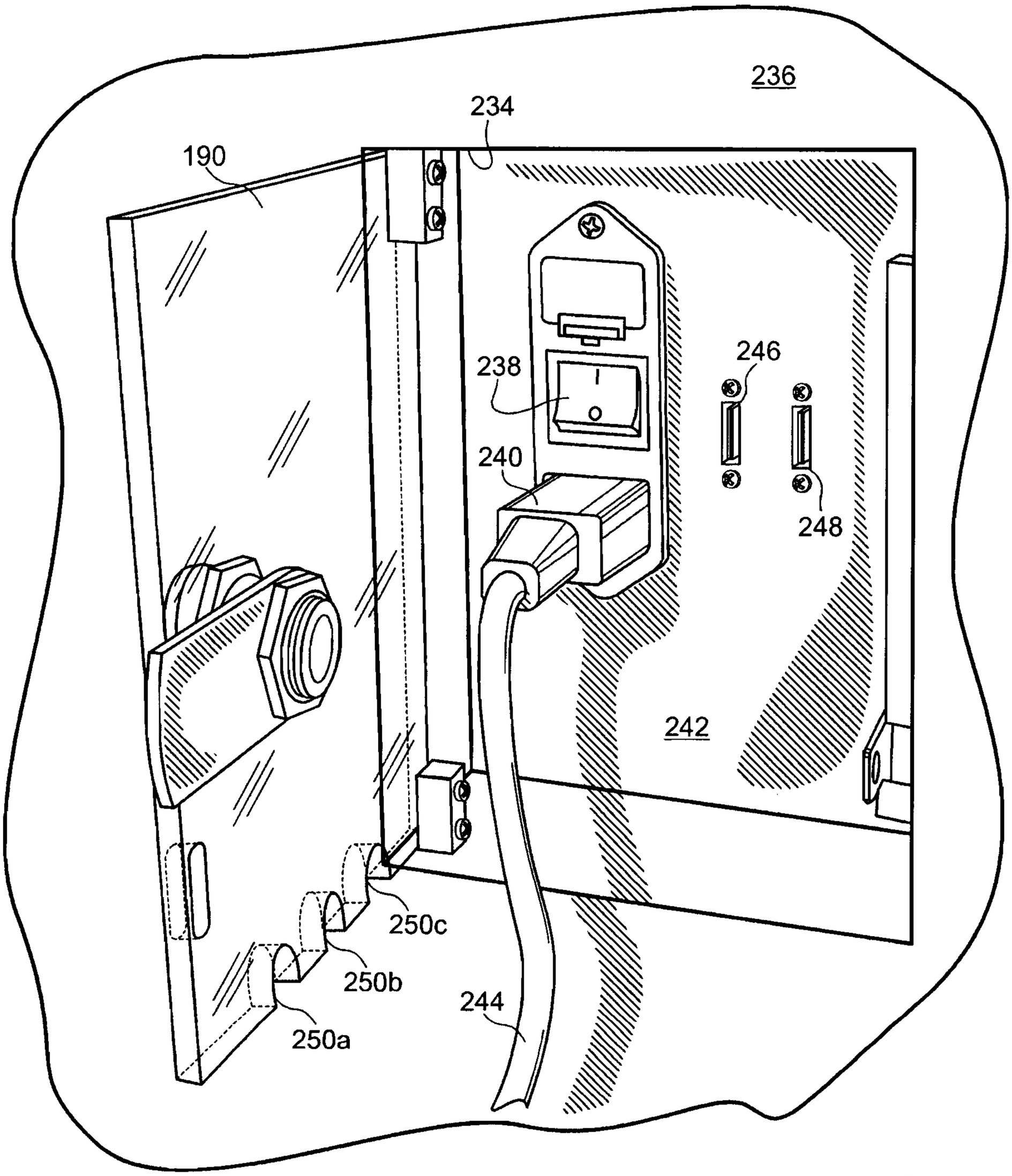


Fig. 15

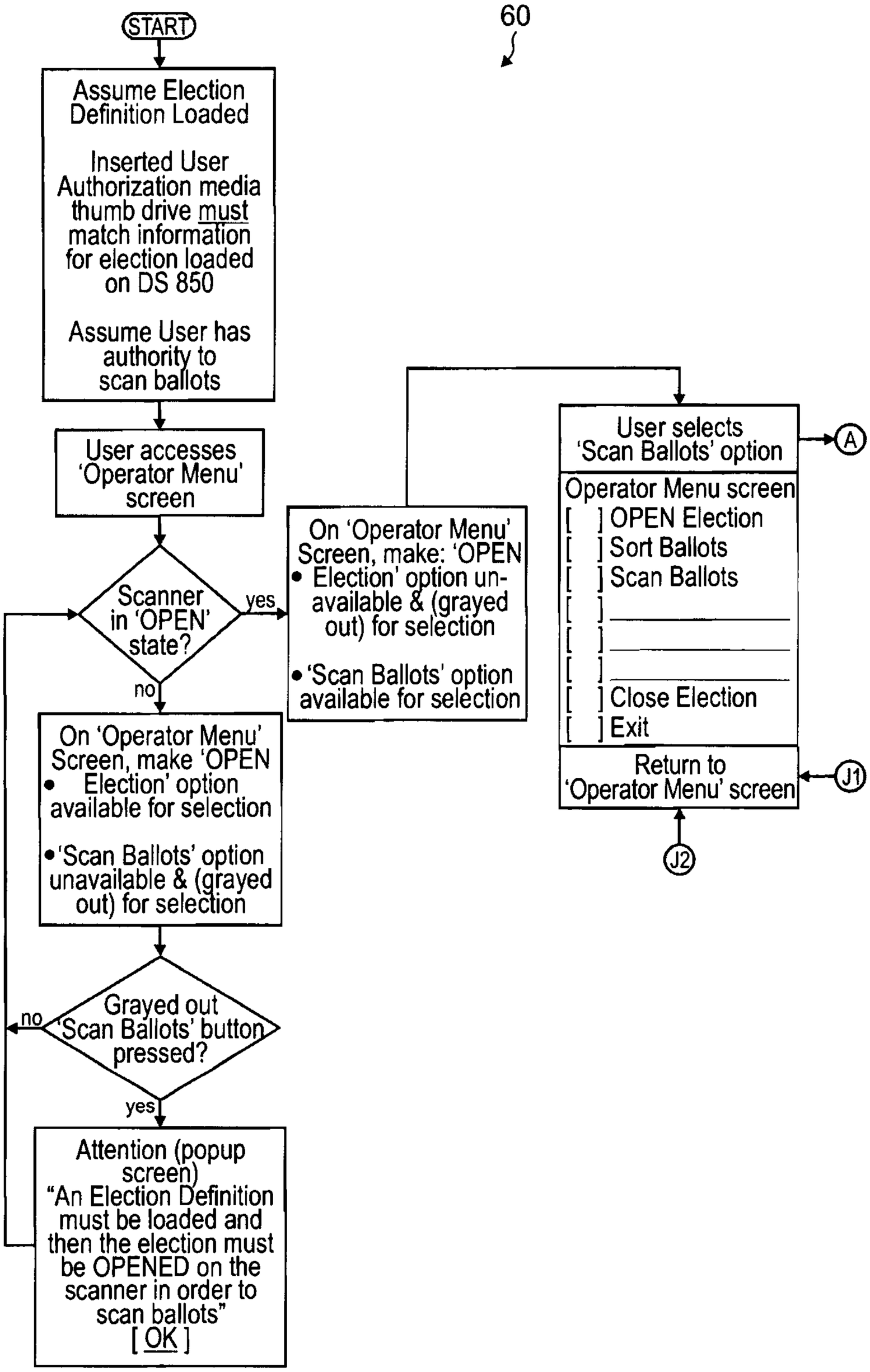

60
START
Assume Election Definition Loaded
Inserted User Authorization media thumb drive must match information for election loaded on DS 850
Assume User has authority to scan ballots
User accesses 'Operator Menu' screen
Scanner in 'OPEN' state?
yes
no
On 'Operator Menu' Screen, make: 'OPEN Election' option un-available & (grayed out) for selection
'Scan Ballots' option available for selection
On 'Operator Menu' Screen, make 'OPEN Election' option available for selection
'Scan Ballots' option unavailable & (grayed out) for selection
Grayed out 'Scan Ballots' button pressed?
no
yes
Attention (popup screen) "An Election Definition must be loaded and then the election must be OPENED on the scanner in order to scan ballots" [OK]
User selects 'Scan Ballots' option
A
Operator Menu screen
[ ] OPEN Election
[ ] Sort Ballots
[ ] Scan Ballots
[ ] _____
[ ] _____
[ ] _____
[ ] Close Election
[ ] Exit
Return to 'Operator Menu' screen
J1
J2

Fig. 16A

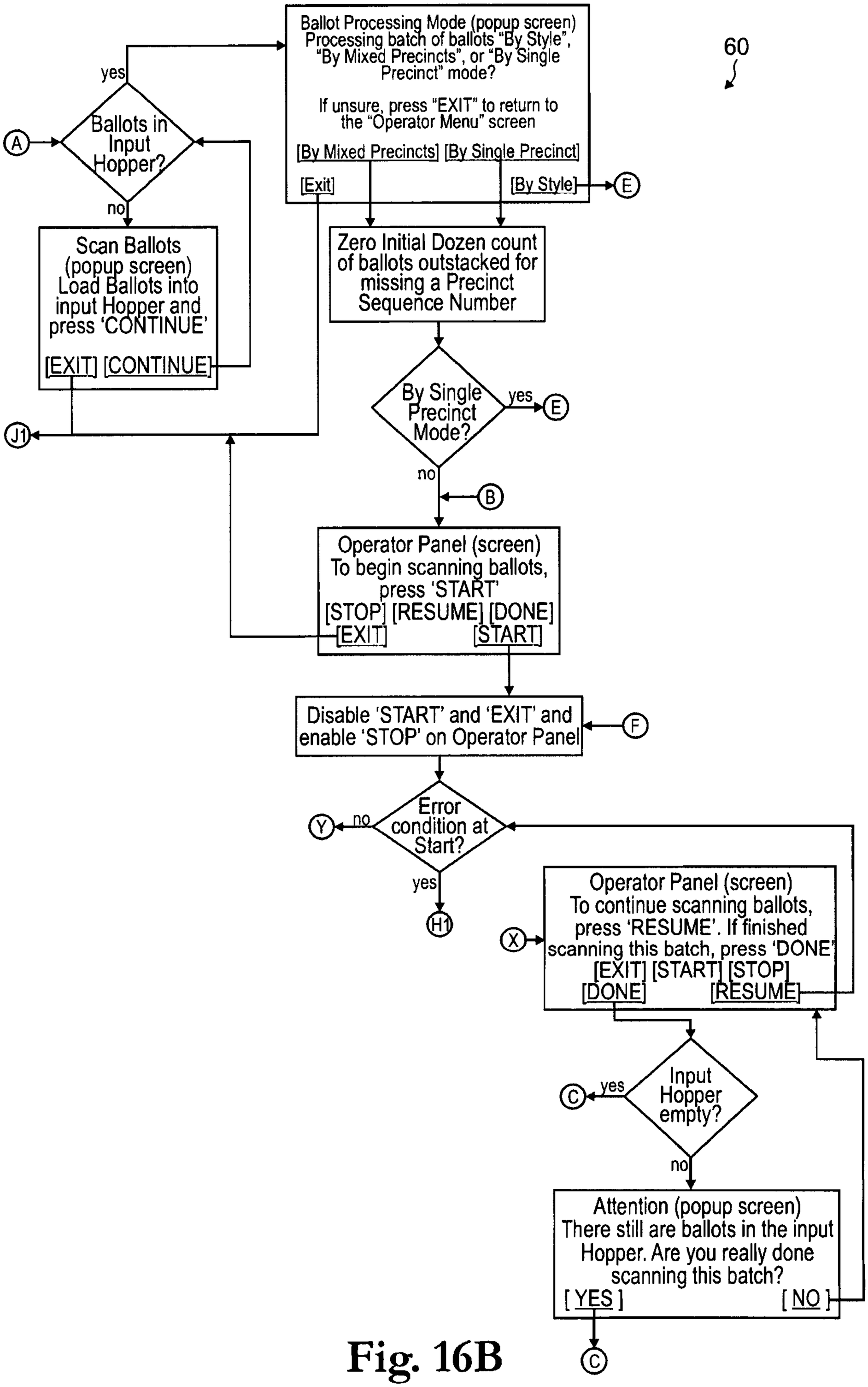

60
Ballot Processing Mode (popup screen)
Processing batch of ballots "By Style", "By Mixed Precincts", or "By Single Precinct" mode?
If unsure, press "EXIT" to return to the "Operator Menu" screen
[By Mixed Precincts] [By Single Precinct]
[Exit]
[By Style]
E
yes
Ballots in Input Hopper?
A
no
Scan Ballots (popup screen) Load Ballots into input Hopper and press 'CONTINUE'
[EXIT] [CONTINUE]
J1
Zero Initial Dozen count of ballots outstacked for missing a Precinct Sequence Number
By Single Precinct Mode?
yes
E
no
B
Operator Panel (screen) To begin scanning ballots, press 'START'
[STOP] [RESUME] [DONE]
[EXIT] [START]
Disable 'START' and 'EXIT' and enable 'STOP' on Operator Panel
F
Error condition at Start?
no
Y
yes
H1
X
Operator Panel (screen) To continue scanning ballots, press 'RESUME'. If finished scanning this batch, press 'DONE'
[EXIT] [START] [STOP]
[DONE] [RESUME]
Input Hopper empty?
yes
C
no
Attention (popup screen) There still are ballots in the input Hopper. Are you really done scanning this batch?
[YES] [NO]
C

Fig. 16B

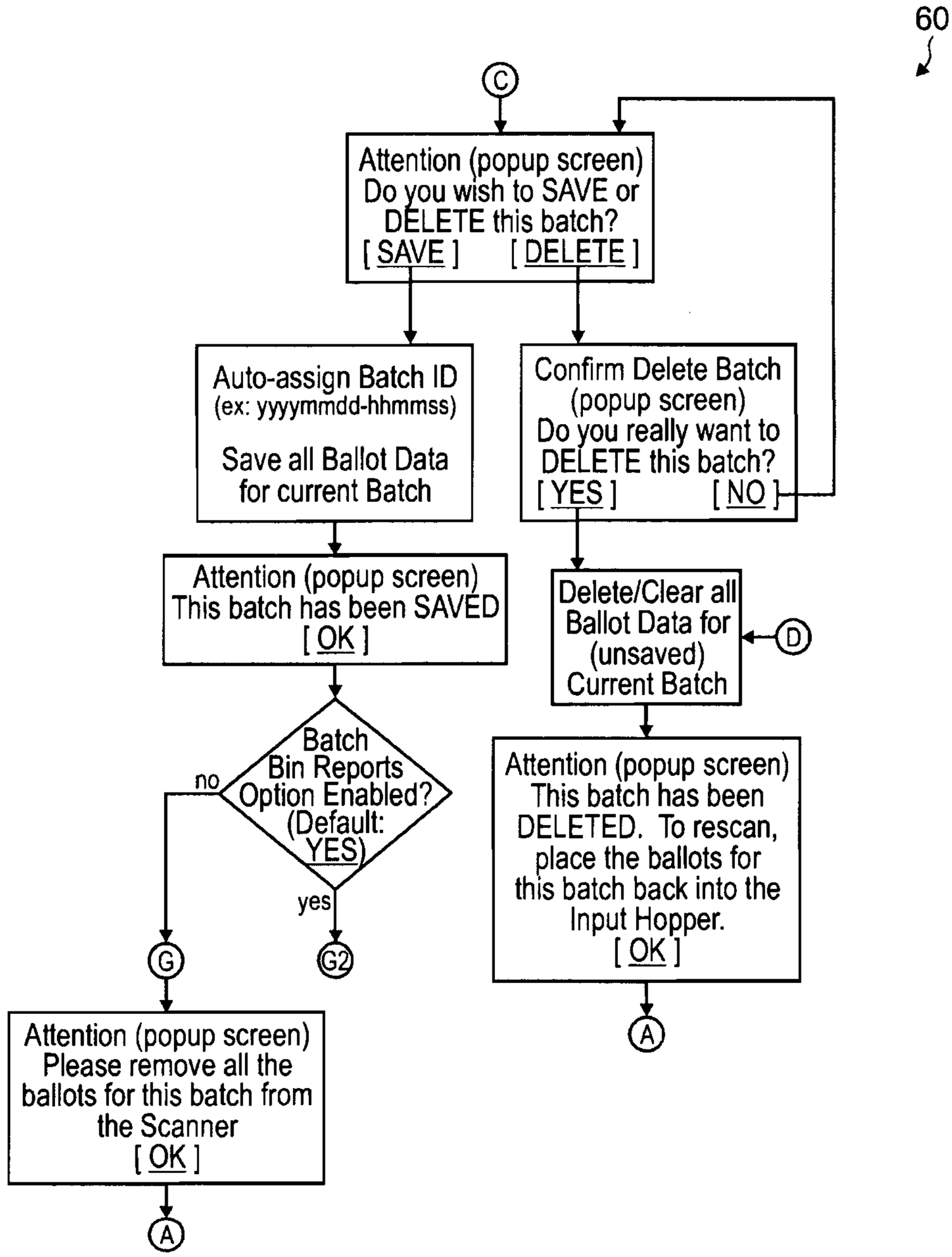

60
C
Attention (popup screen)
Do you wish to SAVE or
DELETE this batch?
[SAVE] [DELETE]
Auto-assign Batch ID
(ex: yyyymmdd-hhmmss)
Save all Ballot Data
for current Batch
Confirm Delete Batch
(popup screen)
Do you really want to
DELETE this batch?
[YES] [NO]
Attention (popup screen)
This batch has been SAVED
[OK]
Delete/Clear all
Ballot Data for
(unsaved)
Current Batch
D
Batch
Bin Reports
Option Enabled?
(Default:
YES)
no
yes
Attention (popup screen)
This batch has been
DELETED. To rescan,
place the ballots for
this batch back into the
Input Hopper.
[OK]
G
G2
A
Attention (popup screen)
Please remove all the
ballots for this batch from
the Scanner
[OK]
A

Fig. 16C

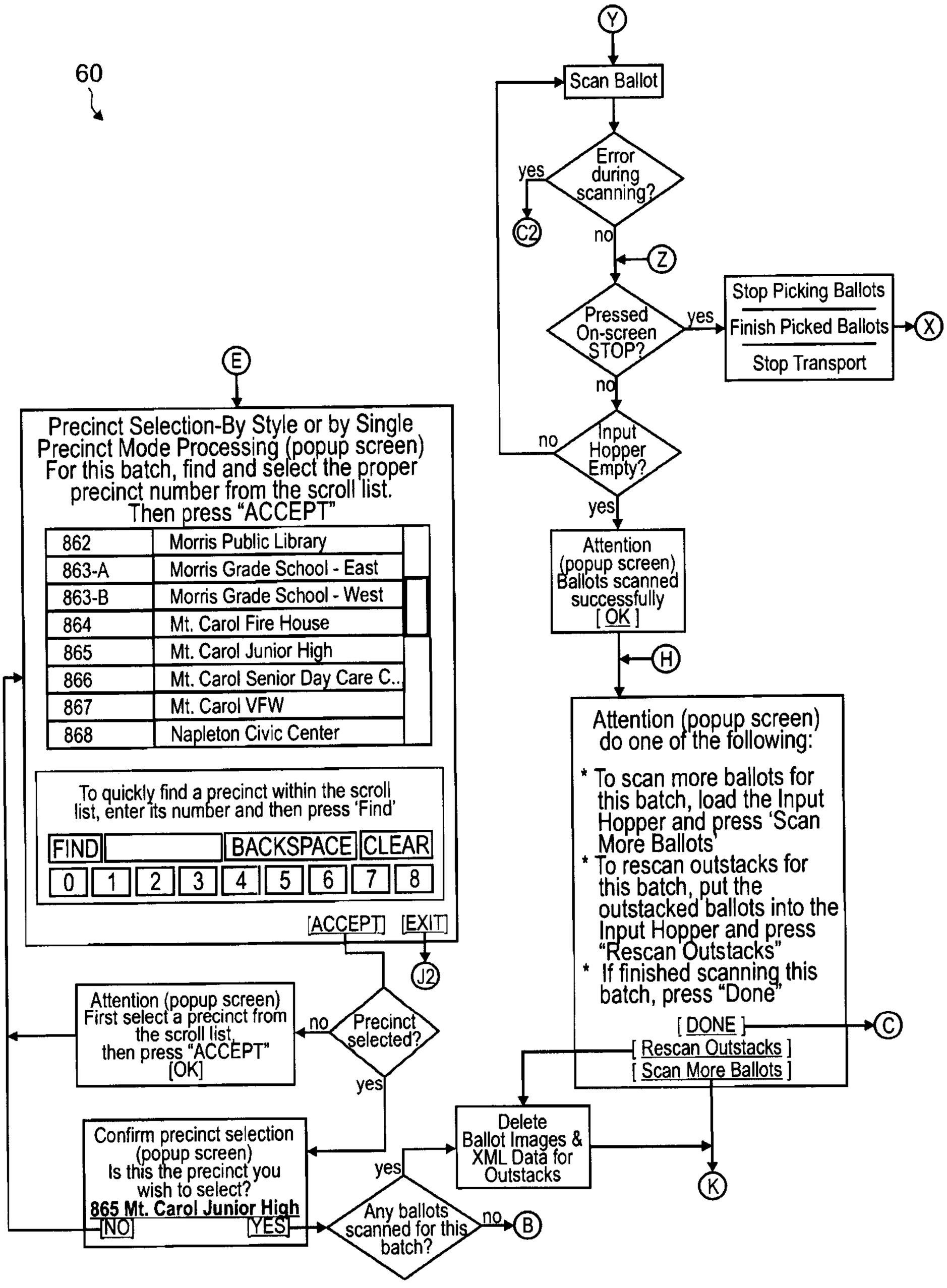

60
Y
Scan Ballot
Error during scanning?
yes
C2
no
Z
Pressed On-screen STOP?
yes
Stop Picking Ballots
Finish Picked Ballots
Stop Transport
X
no
Input Hopper Empty?
no
yes
Attention (popup screen) Ballots scanned successfully [OK]
H
Attention (popup screen) do one of the following:
* To scan more ballots for this batch, load the Input Hopper and press 'Scan More Ballots'
* To rescan outstacks for this batch, put the outstacked ballots into the Input Hopper and press "Rescan Outstacks"
* If finished scanning this batch, press "Done"
[DONE]
C
[Rescan Outstacks]
[Scan More Ballots]
E
Precinct Selection-By Style or by Single Precinct Mode Processing (popup screen) For this batch, find and select the proper precinct number from the scroll list. Then press "ACCEPT"
862 Morris Public Library
863-A Morris Grade School - East
863-B Morris Grade School - West
864 Mt. Carol Fire House
865 Mt. Carol Junior High
866 Mt. Carol Senior Day Care C..
867 Mt. Carol VFW
868 Napleton Civic Center
To quickly find a precinct within the scroll list, enter its number and then press 'Find'
FIND
BACKSPACE
CLEAR
0 1 2 3 4 5 6 7 8
[ACCEPT] [EXIT]
J2
Attention (popup screen) First select a precinct from the scroll list, then press "ACCEPT" [OK]
no
Precinct selected?
yes
Confirm precinct selection (popup screen) Is this the precinct you wish to select?
865 Mt. Carol Junior High
[NO] [YES]
Delete Ballot Images & XML Data for Outstacks
yes
Any ballots scanned for this batch?
no
B
K

Fig. 16D

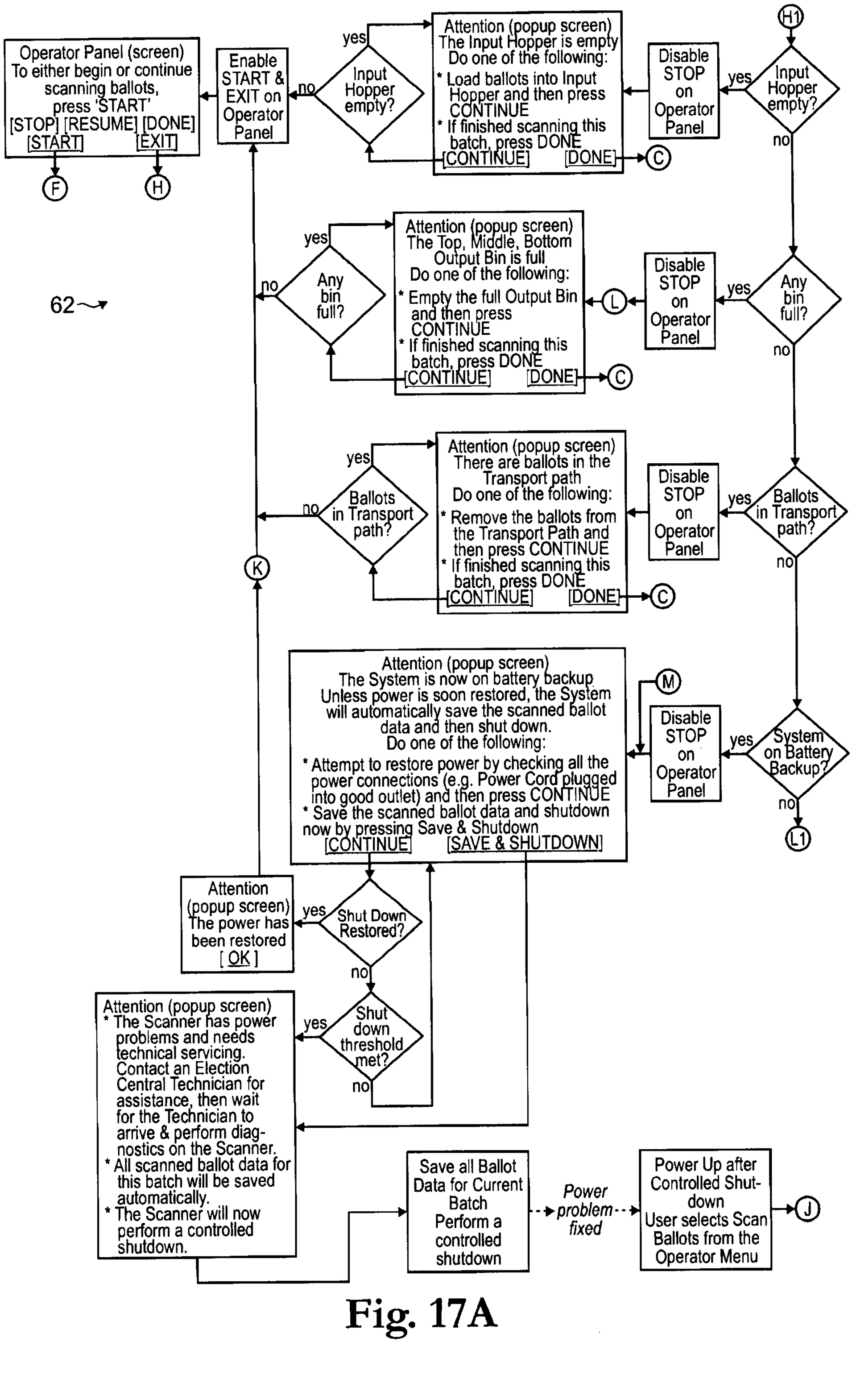

62
Operator Panel (screen)
To either begin or continue scanning ballots, press 'START'
[STOP] [RESUME] [DONE]
[START] [EXIT]
F
H
Enable START & EXIT on Operator Panel
yes
Input Hopper empty?
no
Attention (popup screen)
The Input Hopper is empty
Do one of the following:
* Load ballots into Input Hopper and then press CONTINUE
* If finished scanning this batch, press DONE
[CONTINUE] [DONE]
C
Disable STOP on Operator Panel
yes
Input Hopper empty?
H1
no
Attention (popup screen)
The Top, Middle, Bottom Output Bin is full
Do one of the following:
* Empty the full Output Bin and then press CONTINUE
* If finished scanning this batch, press DONE
[CONTINUE] [DONE]
L
Disable STOP on Operator Panel
yes
Any bin full?
no
Attention (popup screen)
There are ballots in the Transport path
Do one of the following:
* Remove the ballots from the Transport Path and then press CONTINUE
* If finished scanning this batch, press DONE
[CONTINUE] [DONE]
Disable STOP on Operator Panel
yes
Ballots in Transport path?
no
K
Attention (popup screen)
The System is now on battery backup
Unless power is soon restored, the System will automatically save the scanned ballot data and then shut down.
Do one of the following:
* Attempt to restore power by checking all the power connections (e.g. Power Cord plugged into good outlet) and then press CONTINUE
* Save the scanned ballot data and shutdown now by pressing Save & Shutdown
[CONTINUE] [SAVE & SHUTDOWN]
M
Disable STOP on Operator Panel
yes
System on Battery Backup?
no
L1
Attention (popup screen)
The power has been restored
[OK]
yes
Shut Down Restored?
no
Attention (popup screen)
* The Scanner has power problems and needs technical servicing. Contact an Election Central Technician for assistance, then wait for the Technician to arrive & perform diagnostics on the Scanner.
* All scanned ballot data for this batch will be saved automatically.
* The Scanner will now perform a controlled shutdown.
yes
Shut down threshold met?
no
Save all Ballot Data for Current Batch
Perform a controlled shutdown
Power problem fixed
Power Up after Controlled Shut-down
User selects Scan Ballots from the Operator Menu
J

Fig. 17A

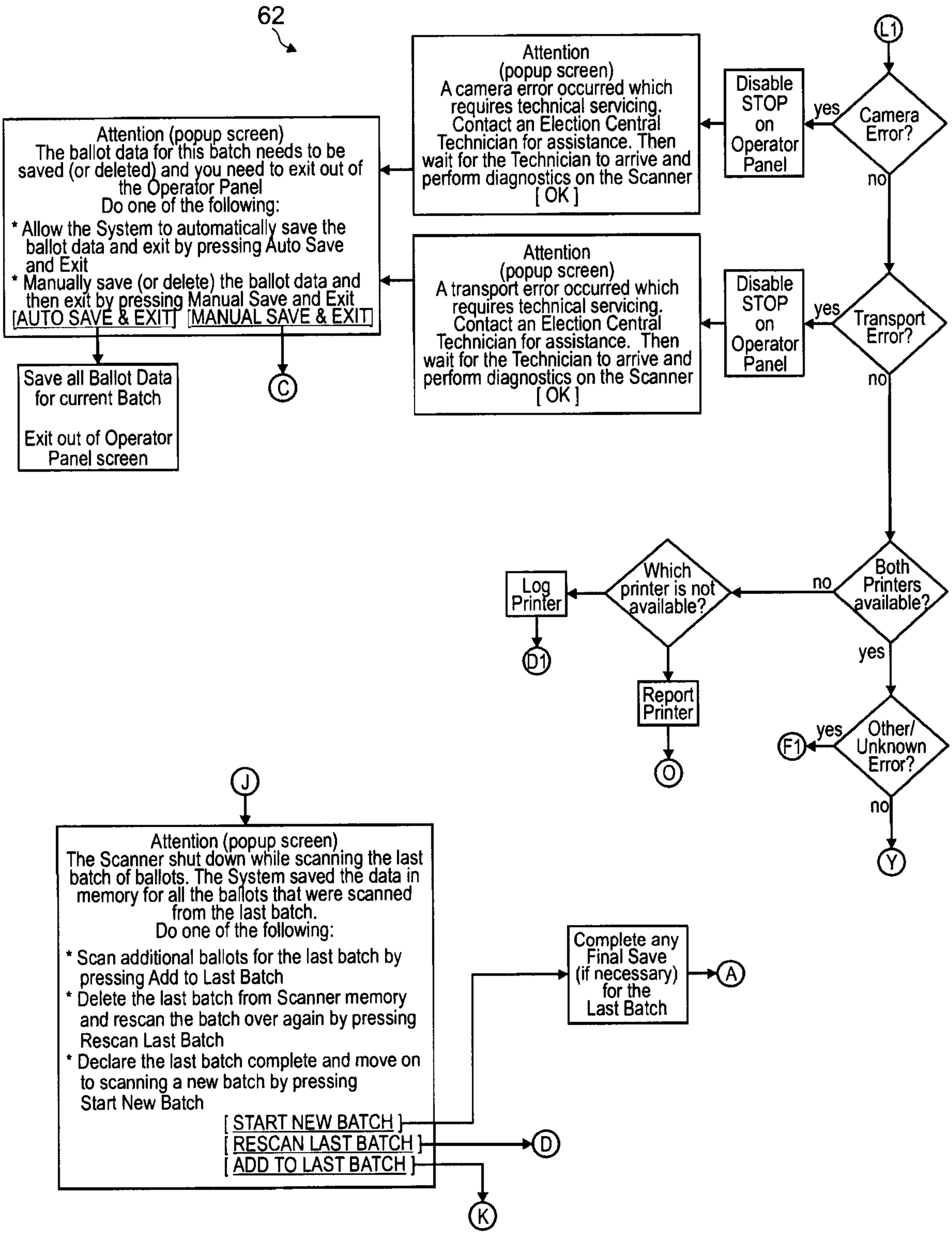

62
Attention (popup screen)
The ballot data for this batch needs to be saved (or deleted) and you need to exit out of the Operator Panel
Do one of the following:
* Allow the System to automatically save the ballot data and exit by pressing Auto Save and Exit
* Manually save (or delete) the ballot data and then exit by pressing Manual Save and Exit
[AUTO SAVE & EXIT] [MANUAL SAVE & EXIT]
Save all Ballot Data for current Batch
Exit out of Operator Panel screen
C
Attention (popup screen)
A camera error occurred which requires technical servicing. Contact an Election Central Technician for assistance. Then wait for the Technician to arrive and perform diagnostics on the Scanner
[OK]
Attention (popup screen)
A transport error occurred which requires technical servicing. Contact an Election Central Technician for assistance. Then wait for the Technician to arrive and perform diagnostics on the Scanner
[OK]
Disable STOP on Operator Panel
Disable STOP on Operator Panel
L1
Camera Error?
yes
no
Transport Error?
yes
no
Both Printers available?
no
yes
Which printer is not available?
Log Printer
D1
Report Printer
O
Other/ Unknown Error?
yes
F1
no
Y
J
Attention (popup screen)
The Scanner shut down while scanning the last batch of ballots. The System saved the data in memory for all the ballots that were scanned from the last batch.
Do one of the following:
* Scan additional ballots for the last batch by pressing Add to Last Batch
* Delete the last batch from Scanner memory and rescan the batch over again by pressing Rescan Last Batch
* Declare the last batch complete and move on to scanning a new batch by pressing Start New Batch
[START NEW BATCH]
[RESCAN LAST BATCH]
[ADD TO LAST BATCH]
Complete any Final Save (if necessary) for the Last Batch
A
D
K

Fig. 17B

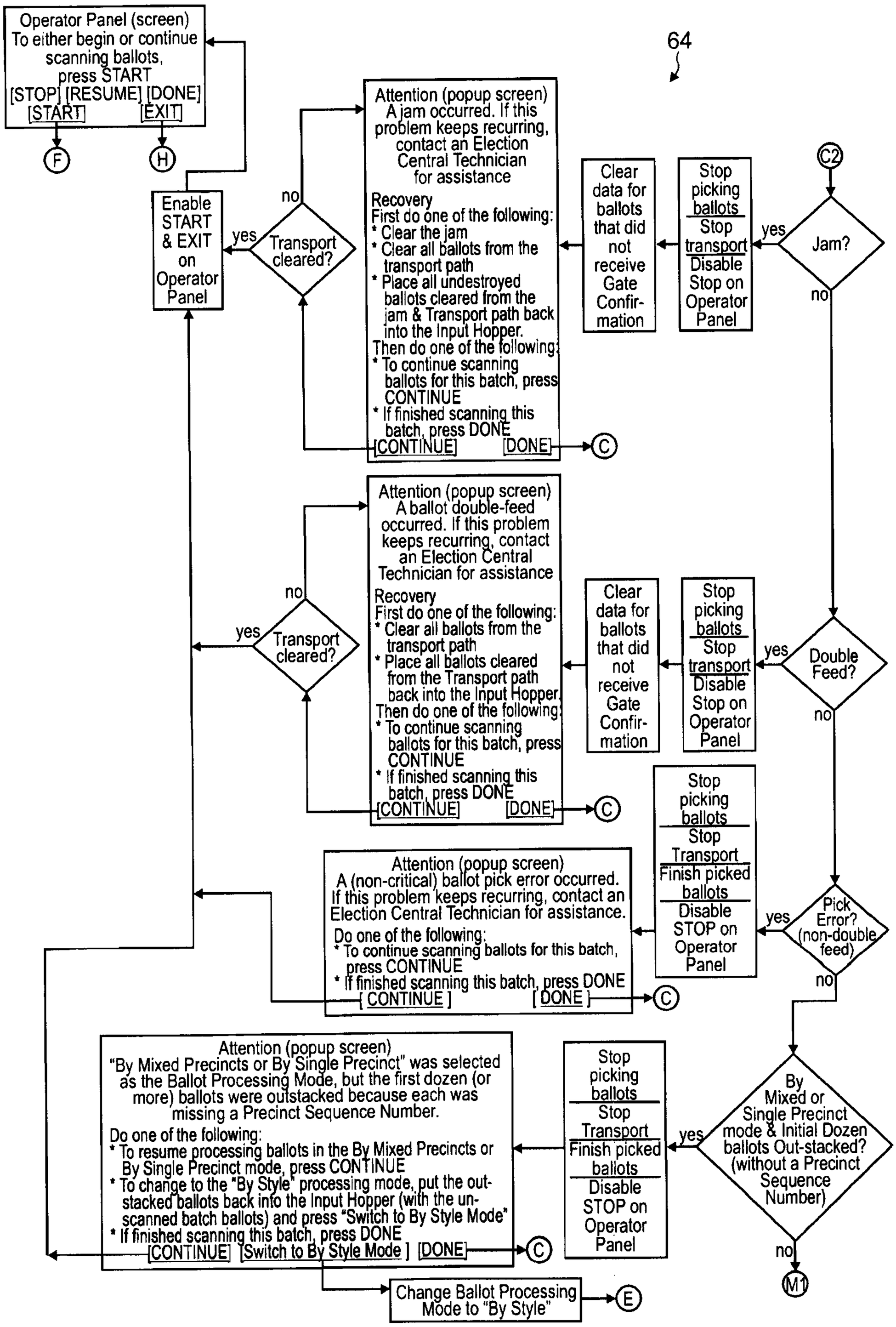

Operator Panel (screen)
To either begin or continue scanning ballots, press START
[STOP] [RESUME] [DONE]
[START] [EXIT]
F
H
64
Attention (popup screen)
A jam occurred. If this problem keeps recurring, contact an Election Central Technician for assistance
Recovery
First do one of the following:
* Clear the jam
* Clear all ballots from the transport path
* Place all undestroyed ballots cleared from the jam & Transport path back into the Input Hopper.
Then do one of the following:
* To continue scanning ballots for this batch, press CONTINUE
* If finished scanning this batch, press DONE
[CONTINUE] [DONE]
C
Clear data for ballots that did not receive Gate Confir-mation
Stop picking ballots
Stop transport
Disable Stop on Operator Panel
C2
Jam?
yes
no
Enable START & EXIT on Operator Panel
Transport cleared?
no
yes
Attention (popup screen)
A ballot double-feed occurred. If this problem keeps recurring, contact an Election Central Technician for assistance
Recovery
First do one of the following:
* Clear all ballots from the transport path
* Place all ballots cleared from the Transport path back into the Input Hopper.
Then do one of the following:
* To continue scanning ballots for this batch, press CONTINUE
* If finished scanning this batch, press DONE
[CONTINUE] [DONE]
C
Clear data for ballots that did not receive Gate Confir-mation
Stop picking ballots
Stop transport
Disable Stop on Operator Panel
Double Feed?
yes
no
Transport cleared?
no
yes
Attention (popup screen)
A (non-critical) ballot pick error occurred. If this problem keeps recurring, contact an Election Central Technician for assistance.
Do one of the following:
* To continue scanning ballots for this batch, press CONTINUE
* If finished scanning this batch, press DONE
[CONTINUE] [DONE]
C
Stop picking ballots
Stop Transport
Finish picked ballots
Disable STOP on Operator Panel
Pick Error? (non-double feed)
yes
no
Attention (popup screen)
"By Mixed Precincts or By Single Precinct" was selected as the Ballot Processing Mode, but the first dozen (or more) ballots were outstacked because each was missing a Precinct Sequence Number.
Do one of the following:
* To resume processing ballots in the By Mixed Precincts or By Single Precinct mode, press CONTINUE
* To change to the "By Style" processing mode, put the out-stacked ballots back into the Input Hopper (with the un-scanned batch ballots) and press "Switch to By Style Mode"
* If finished scanning this batch, press DONE
[CONTINUE] [Switch to By Style Mode] [DONE]
C
Stop picking ballots
Stop Transport
Finish picked ballots
Disable STOP on Operator Panel
By Mixed or Single Precinct mode & Initial Dozen ballots Out-stacked? (without a Precinct Sequence Number)
yes
no
M1
Change Ballot Processing Mode to "By Style"
E

Fig. 18A

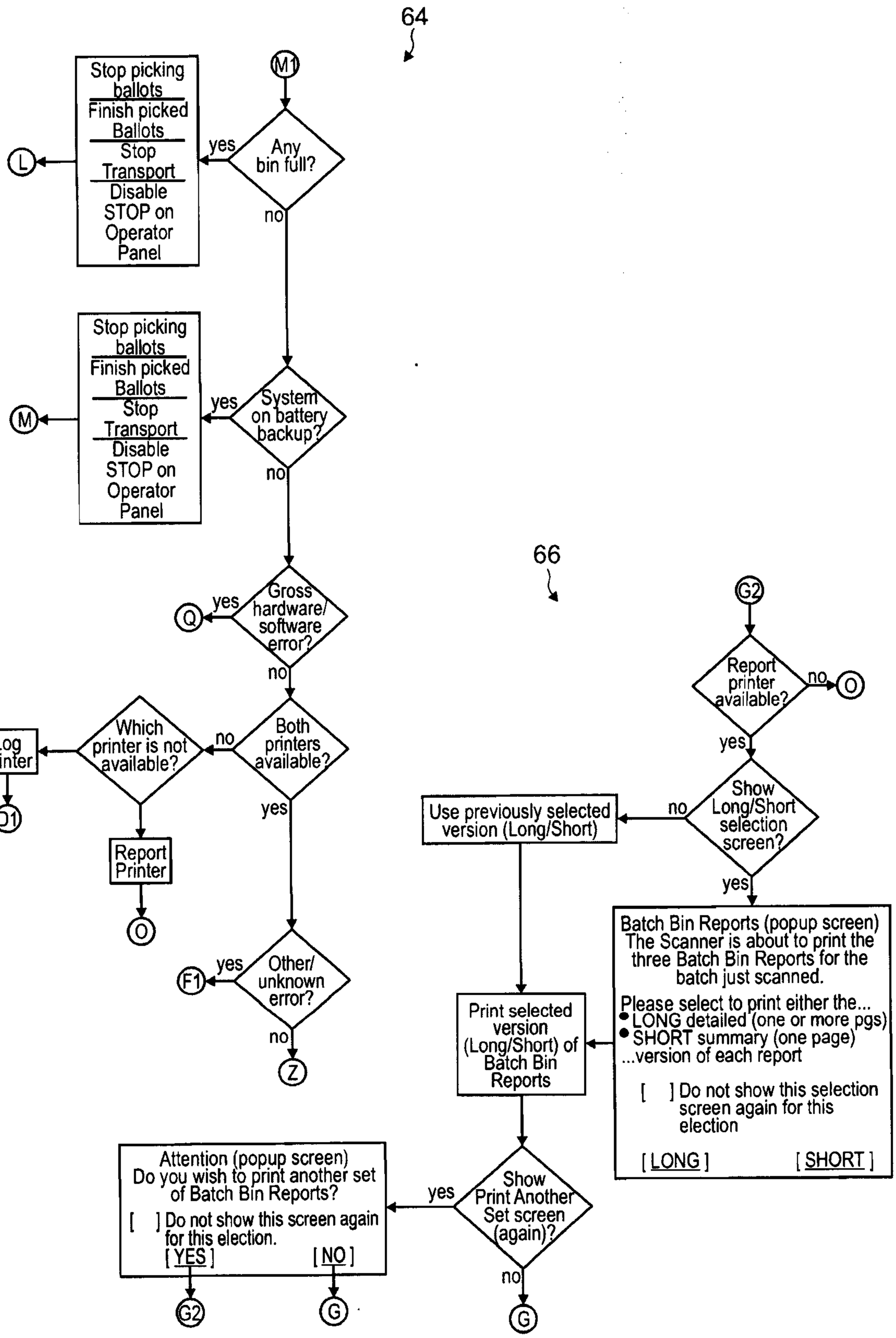

64
M1
Stop picking ballots
Finish picked Ballots
Stop Transport
Disable STOP on Operator Panel
L
yes
Any bin full?
no
Stop picking ballots
Finish picked Ballots
Stop Transport
Disable STOP on Operator Panel
M
yes
System on battery backup?
no
Q
yes
Gross hardware/ software error?
no
Log Printer
Which printer is not available?
no
Both printers available?
yes
D1
Report Printer
O
F1
yes
Other/ unknown error?
no
Z
66
G2
Report printer available?
no
O
yes
Use previously selected version (Long/Short)
no
Show Long/Short selection screen?
yes
Print selected version (Long/Short) of Batch Bin Reports
Batch Bin Reports (popup screen)
The Scanner is about to print the three Batch Bin Reports for the batch just scanned.
Please select to print either the...
• LONG detailed (one or more pgs)
• SHORT summary (one page)
...version of each report
[ ] Do not show this selection screen again for this election
[LONG]
[SHORT]
Attention (popup screen)
Do you wish to print another set of Batch Bin Reports?
[ ] Do not show this screen again for this election.
[YES]
[NO]
G2
G
yes
Show Print Another Set screen (again)?
no
G

Fig. 18B

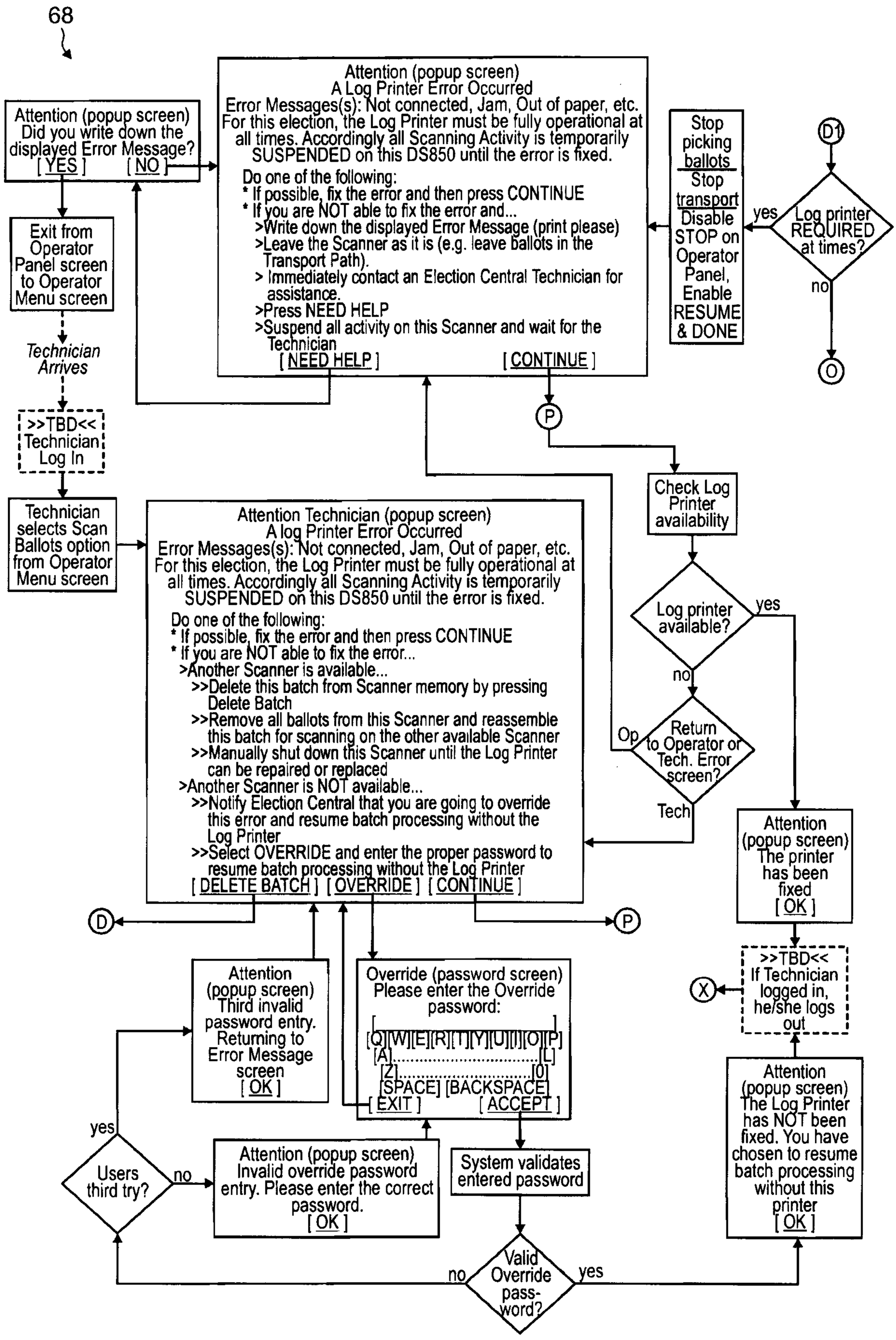

68
Attention (popup screen)
Did you write down the displayed Error Message?
[YES] [NO]
Attention (popup screen)
A Log Printer Error Occurred
Error Messages(s): Not connected, Jam, Out of paper, etc.
For this election, the Log Printer must be fully operational at all times. Accordingly all Scanning Activity is temporarily SUSPENDED on this DS850 until the error is fixed.
Do one of the following:
* If possible, fix the error and then press CONTINUE
* If you are NOT able to fix the error and...
>Write down the displayed Error Message (print please)
>Leave the Scanner as it is (e.g. leave ballots in the Transport Path).
> Immediately contact an Election Central Technician for assistance.
>Press NEED HELP
>Suspend all activity on this Scanner and wait for the Technician
[NEED HELP] [CONTINUE]
Stop picking ballots
Stop transport
Disable STOP on Operator Panel, Enable RESUME & DONE
yes
Log printer REQUIRED at times?
no
D1
O
Exit from Operator Panel screen to Operator Menu screen
Technician Arrives
>>TBD<<
Technician Log In
Technician selects Scan Ballots option from Operator Menu screen
Attention Technician (popup screen)
A log Printer Error Occurred
Error Messages(s): Not connected, Jam, Out of paper, etc.
For this election, the Log Printer must be fully operational at all times. Accordingly all Scanning Activity is temporarily SUSPENDED on this DS850 until the error is fixed.
Do one of the following:
* If possible, fix the error and then press CONTINUE
* If you are NOT able to fix the error...
>Another Scanner is available...
>>Delete this batch from Scanner memory by pressing Delete Batch
>>Remove all ballots from this Scanner and reassemble this batch for scanning on the other available Scanner
>>Manually shut down this Scanner until the Log Printer can be repaired or replaced
>Another Scanner is NOT available...
>>Notify Election Central that you are going to override this error and resume batch processing without the Log Printer
>>Select OVERRIDE and enter the proper password to resume batch processing without the Log Printer
[DELETE BATCH] [OVERRIDE] [CONTINUE]
P
Check Log Printer availability
Log printer available?
yes
no
Op
Return to Operator or Tech. Error screen?
Tech
Attention (popup screen)
The printer has been fixed
[OK]
>>TBD<<
If Technician logged in, he/she logs out
X
Attention (popup screen)
The Log Printer has NOT been fixed. You have chosen to resume batch processing without this printer
[OK]
D
Attention (popup screen)
Third invalid password entry.
Returning to Error Message screen
[OK]
Override (password screen)
Please enter the Override password:
[Q][W][E][R][T][Y][U][I][O][P]
[A].....[L]
[Z].....[0]
[SPACE] [BACKSPACE]
[EXIT] [ACCEPT]
yes
Users third try?
no
Attention (popup screen)
Invalid override password entry. Please enter the correct password.
[OK]
System validates entered password
no
Valid Override pass-word?
yes

Fig. 19A

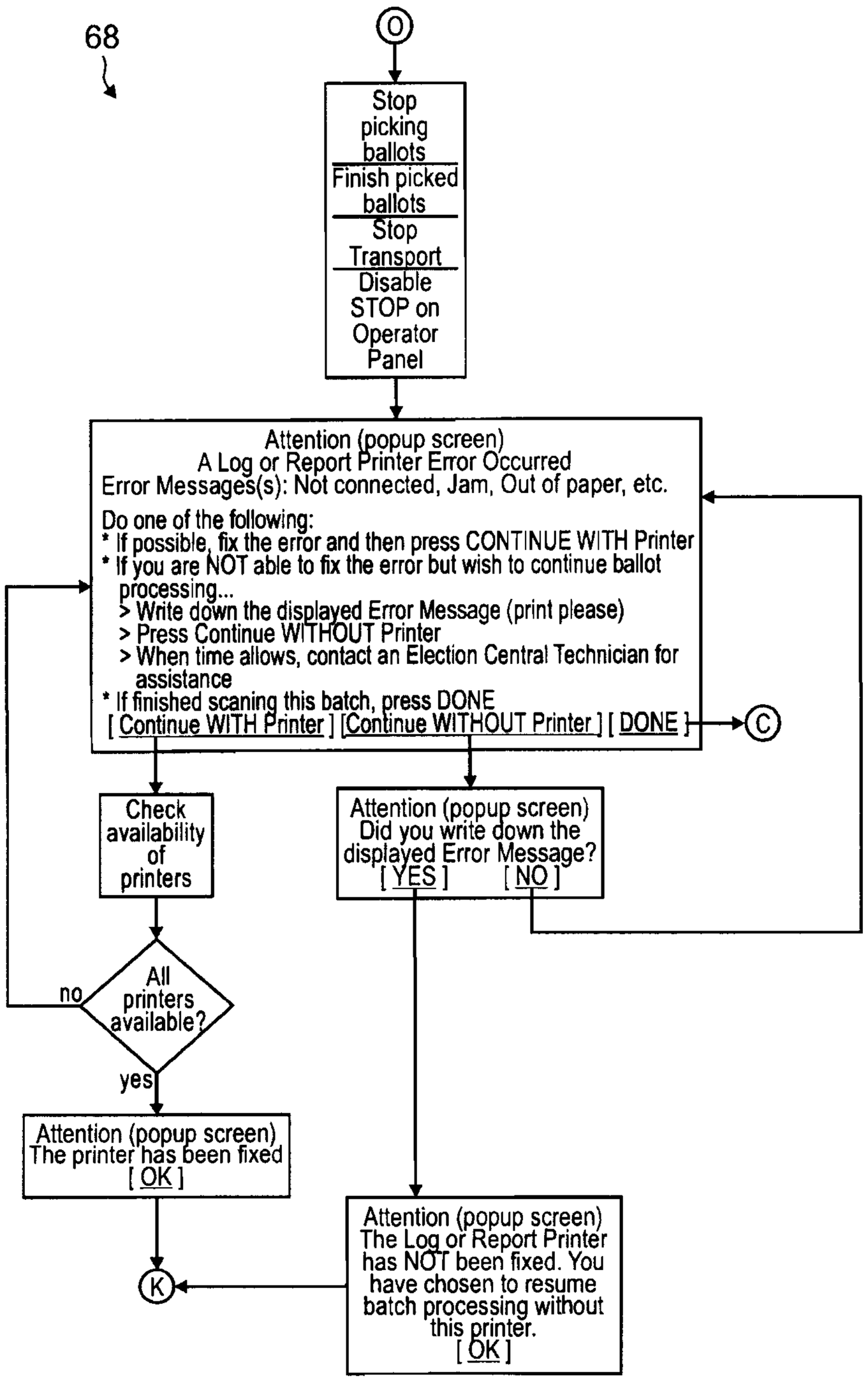

68
Stop picking ballots
Finish picked ballots
Stop Transport
Disable STOP on Operator Panel
Attention (popup screen)
A Log or Report Printer Error Occurred
Error Messages(s): Not connected, Jam, Out of paper, etc.
Do one of the following:
* If possible, fix the error and then press CONTINUE WITH Printer
* If you are NOT able to fix the error but wish to continue ballot processing...
> Write down the displayed Error Message (print please)
> Press Continue WITHOUT Printer
> When time allows, contact an Election Central Technician for assistance
* If finished scaning this batch, press DONE
[Continue WITH Printer] [Continue WITHOUT Printer] [DONE]
C
Check availability of printers
All printers available?
no
yes
Attention (popup screen) The printer has been fixed
[OK]
Attention (popup screen) Did you write down the displayed Error Message?
[YES] [NO]
Attention (popup screen) The Log or Report Printer has NOT been fixed. You have chosen to resume batch processing without this printer.
[OK]
K

Fig. 19B

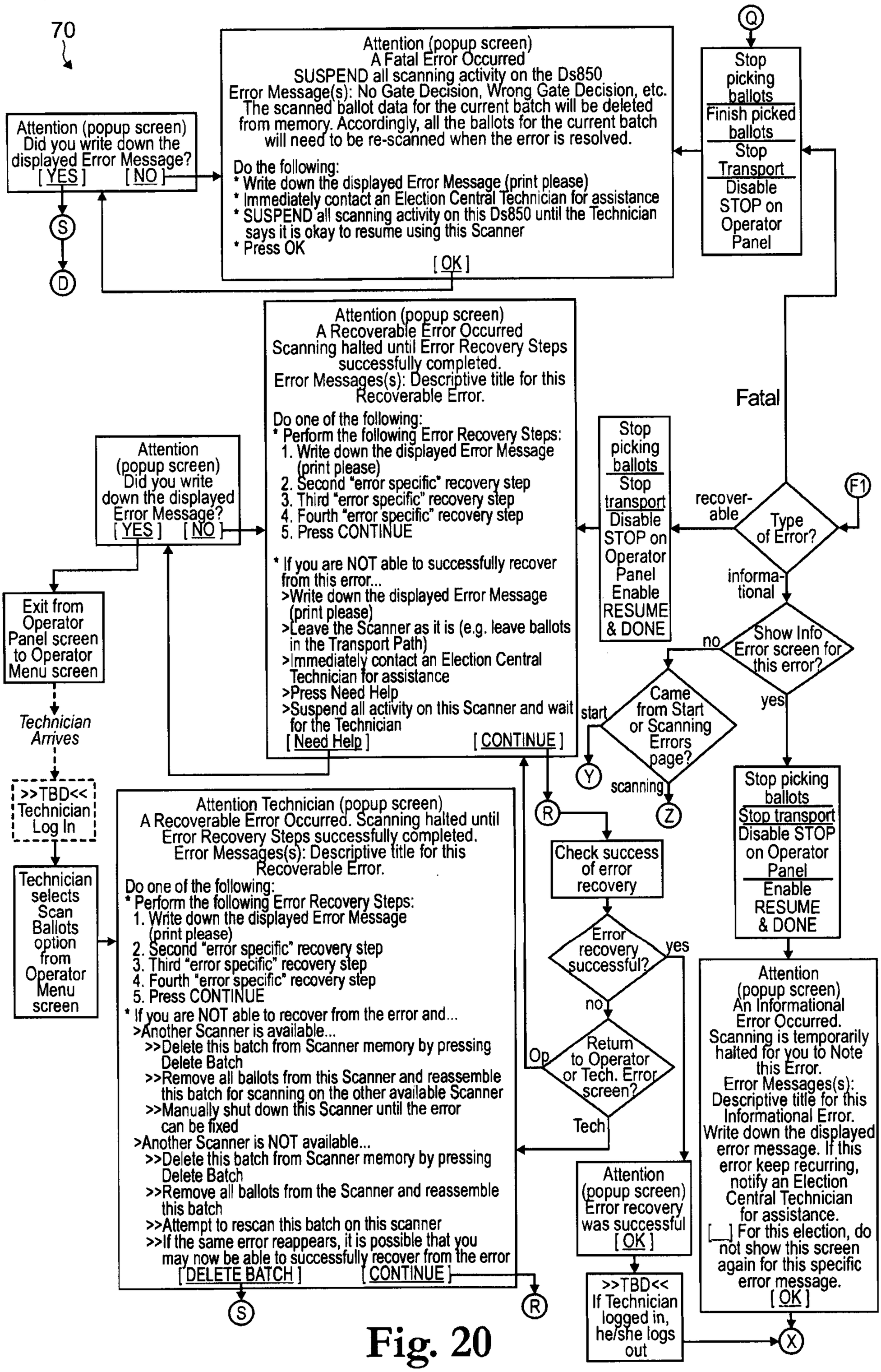

70
Attention (popup screen)
Did you write down the displayed Error Message?
[YES] [NO]
S
D
Attention (popup screen)
A Fatal Error Occurred
SUSPEND all scanning activity on the Ds850
Error Message(s): No Gate Decision, Wrong Gate Decision, etc.
The scanned ballot data for the current batch will be deleted from memory. Accordingly, all the ballots for the current batch will need to be re-scanned when the error is resolved.
Do the following:
* Write down the displayed Error Message (print please)
* Immediately contact an Election Central Technician for assistance
* SUSPEND all scanning activity on this Ds850 until the Technician says it is okay to resume using this Scanner
* Press OK
[OK]
Q
Stop picking ballots
Finish picked ballots
Stop Transport
Disable STOP on Operator Panel
Attention (popup screen)
A Recoverable Error Occurred
Scanning halted until Error Recovery Steps successfully completed.
Error Messages(s): Descriptive title for this Recoverable Error.
Do one of the following:
* Perform the following Error Recovery Steps:
1. Write down the displayed Error Message (print please)
2. Second "error specific" recovery step
3. Third "error specific" recovery step
4. Fourth "error specific" recovery step
5. Press CONTINUE
* If you are NOT able to successfully recover from this error...
>Write down the displayed Error Message (print please)
>Leave the Scanner as it is (e.g. leave ballots in the Transport Path)
>Immediately contact an Election Central Technician for assistance
>Press Need Help
>Suspend all activity on this Scanner and wait for the Technician
[Need Help] [CONTINUE]
Fatal
Attention (popup screen)
Did you write down the displayed Error Message?
[YES] [NO]
Stop picking ballots
Stop transport
Disable STOP on Operator Panel
Enable RESUME & DONE
recover-able
Type of Error?
F1
informa-tional
Exit from Operator Panel screen to Operator Menu screen
Technician Arrives
>>TBD<< Technician Log In
Technician selects Scan Ballots option from Operator Menu screen
Show Info Error screen for this error?
no
yes
Came from Start or Scanning Errors page?
start
scanning
Y
Z
R
Stop picking ballots
Stop transport
Disable STOP on Operator Panel
Enable RESUME & DONE
Check success of error recovery
Error recovery successful?
yes
no
Return to Operator or Tech. Error screen?
Op
Tech
Attention Technician (popup screen)
A Recoverable Error Occurred. Scanning halted until Error Recovery Steps successfully completed.
Error Messages(s): Descriptive title for this Recoverable Error.
Do one of the following:
* Perform the following Error Recovery Steps:
1. Write down the displayed Error Message (print please)
2. Second "error specific" recovery step
3. Third "error specific" recovery step
4. Fourth "error specific" recovery step
5. Press CONTINUE
* If you are NOT able to recover from the error and...
>Another Scanner is available...
>>Delete this batch from Scanner memory by pressing Delete Batch
>>Remove all ballots from this Scanner and reassemble this batch for scanning on the other available Scanner
>>Manually shut down this Scanner until the error can be fixed
>Another Scanner is NOT available...
>>Delete this batch from Scanner memory by pressing Delete Batch
>>Remove all ballots from the Scanner and reassemble this batch
>>Attempt to rescan this batch on this scanner
>>If the same error reappears, it is possible that you may now be able to successfully recover from the error
[DELETE BATCH] [CONTINUE]
S
R
Attention (popup screen)
Error recovery was successful
[OK]
>>TBD<< If Technician logged in, he/she logs out
X
Attention (popup screen)
An Informational Error Occurred.
Scanning is temporarily halted for you to Note this Error.
Error Messages(s): Descriptive title for this Informational Error.
Write down the displayed error message. If this error keep recurring, notify an Election Central Technician for assistance.
[__] For this election, do not show this screen again for this specific error message.
[OK]

Fig. 20

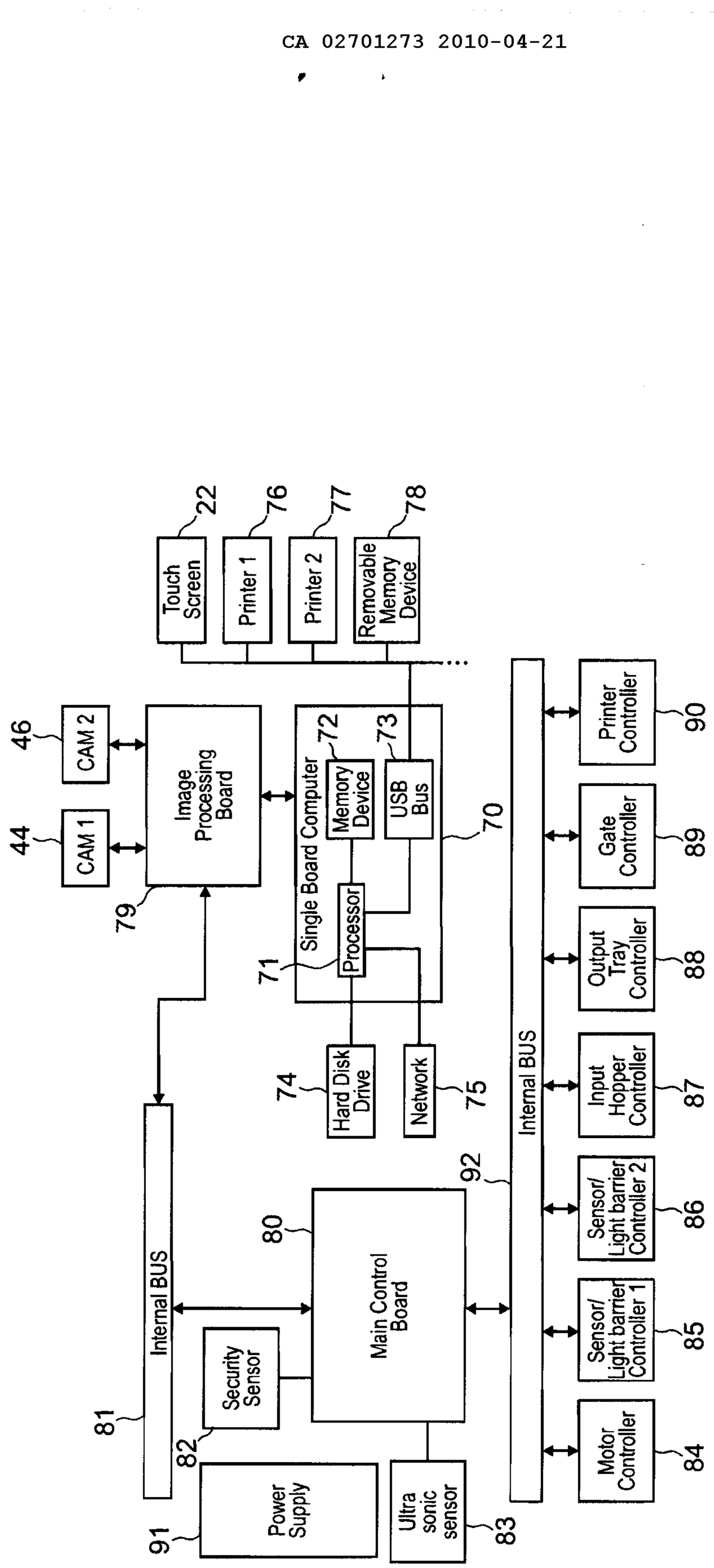

Touch Screen
Printer 1
Printer 2
Removable Memory Device
CAM 2
CAM 1
Image Processing Board
Single Board Computer
Memory Device
USB Bus
Processor
Hard Disk Drive
Network
Printer Controller
Gate Controller
Output Tray Controller
Input Hopper Controller
Sensor/ Light barrier Controller 2
Sensor/ Light barrier Controller 1
Motor Controller
Internal BUS
Main Control Board
Security Sensor
Power Supply
Ultra sonic sensor
Internal BUS
46
44
79
72
73
70
71
74
75
92
80
81
82
91
83
90
89
88
87
86
85
84

Fig. 21

Ballots Scanned Report

Report Run Date and Time

Jurisdiction Name
Election Name
Election Date

Batch #: 0035
Operator: Jennifer Q. Operator
Total Ballots Scanned: 930

Ballot # Range: 001258-002287
Batch Started: 11/04/08 22:14:37

Batch Completed: 11/04/08 22:30:00

Total Ballots Scanned by Precinct:

Precinct #0001: 10
Precinct #0002: 26
Precinct #0003: 37
Precinct #0004: 21
Precinct #0005: 44
Precinct #0006: 76
Precinct #0007: 16
Precinct #0008: 22
Precinct #0009: 17
Precinct #0010: 14
Precinct #0011: 25
Precinct #0012: 20
Precinct #0013: 21
Precinct #0014: 29
Precinct #0015: 32
Precinct #0016: 18
Precinct #0017: 15
Precinct #0018: 35
Precinct #0019: 29
Precinct #0020: 21
Precinct #0022: 28
Precinct #0023: 20
Precinct #0024: 38
Precinct #0025: 22
Precinct #0026: 45
Precinct #0027: 77
Precinct #0028: 23
Precinct #0029: 18
Precinct #0030: 15
Precinct #0031: 26
Precinct #0032: 21
Precinct #0033: 22
Precinct #0034: 30

END OF REPORT

Fig. 22

Ballots with Write Ins Report

Jurisdiction Name
Election Name
Election Date

Report Run Date and Time

Batch #: 0035
Operator: Jennifer Q. Operator
Total Ballots with Write Ins: 27

Ballot # Range: 001258-002287
Batch Started: 11/04/08 22:14:37 Batch Completed: 11/04/08 22:30:00

Ballots with Write Ins:

Ballot #	# of Write Ins on Ballot	Contest(s) with Write Ins
001258	2	Presidential
		Mayor
001302	1	Senate
001478	2	Presidential
		Senate
001489	2	House Dist 1
		Mayor
001526	1	Presidential
001527	1	Senate
001544	2	Presidential
		Senate
001601	2	House Dist 1
		Mayor
001625	1	Presidential
001647	1	Senate
001695	2	Presidential
		Senate
001703	2	House Dist 1
		Mayor
001752	1	Presidential

Fig. 23A

Ballots with Write Ins Report

Jurisdiction Name
Election Name
Election Date

Report Run Date and Time

001757 1 Senate

Ballots with Write Ins: Continued

Ballot #	# of Write Ins on Ballot	Contest(s) with Write Ins
001785	2	Presidential
		Senate
001858	2	Presidential
		Mayor
001882	1	Senate
001883	2	Presidential
		Senate
001901	2	House Dist 1
		Mayor
001921	1	Senate
001925	2	Presidential
		Mayor
001932	1	Senate
001951	2	Presidential
		Senate
001987	2	House Dist 1
		Mayor
002001	1	Presidential
002002	1	Senate
002254	2	Presidential
		Senate

END OF REPORT

Fig. 23B

Ballots Not Scanned Report

Jurisdiction Name
Election Name
Election Date

Report Run Date and Time

Batch #: 0035
Operator: Jennifer Q. Operator
Total Ballots Not Scanned: 15

Ballot # Range: 001258-002287
Batch Started: 11/04/08 22:14:37 Batch Completed: 11/04/08 22:30:00

Ballots Not Scanned Detail:

Ballot #	Reason	Contest(s)
001258	Overvote	Presidential
001302	Blank	All
001478	Overvote	Presidential
	Write In	Senate
001489	Read Error	
001526	Invalid Ballot ID	
001527	Double Feed	
001544	Overvote	Presidential
001601	Overvote	House Dist 1
	Write In	Mayor
001625	Read Error	
001647	Invalid Ballot ID	
001695	Double Feed	
	Read Error	
001703	Invalid Ballot ID	
	Double Feed	

END OF REPORT

Fig. 24

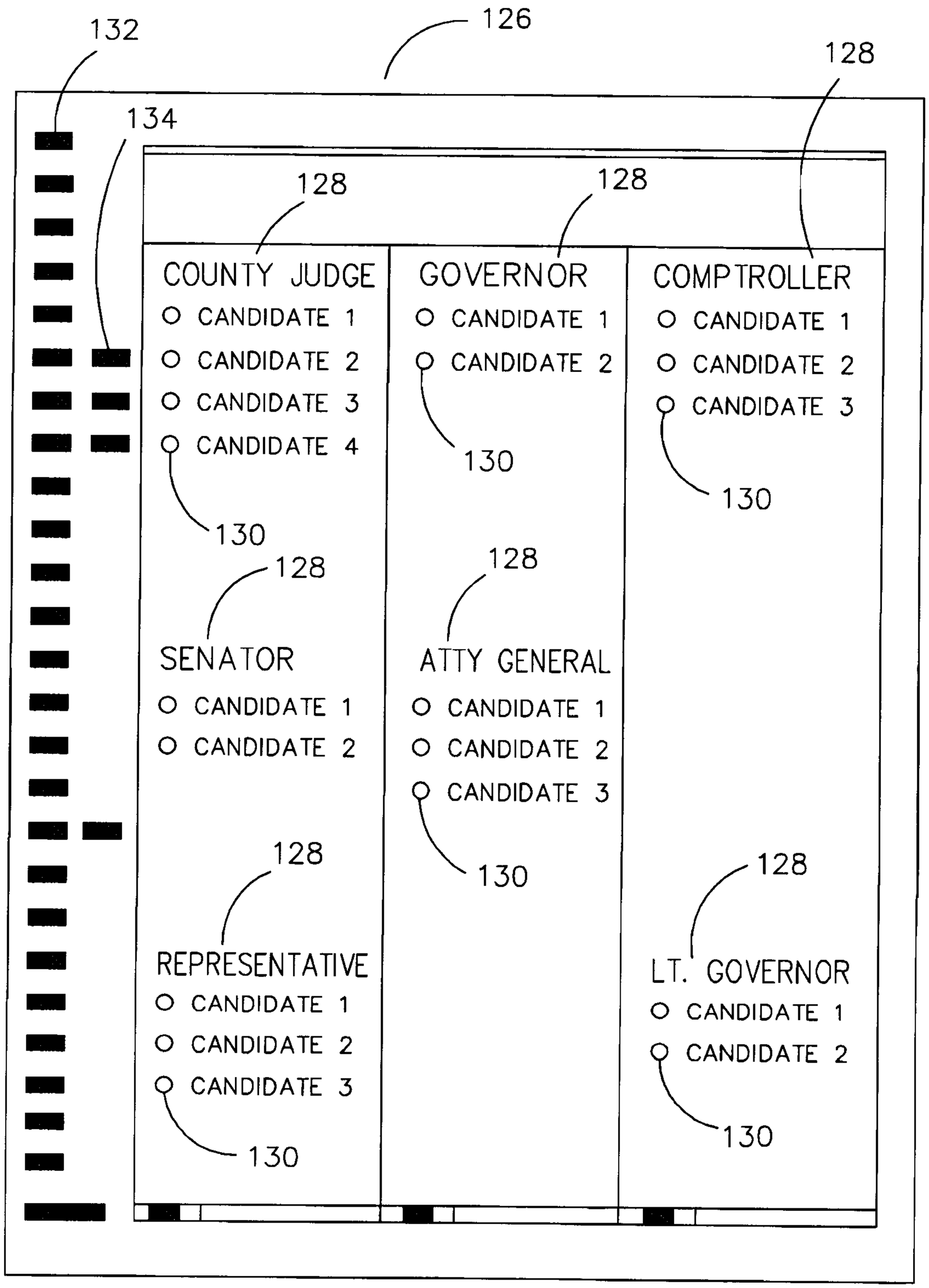
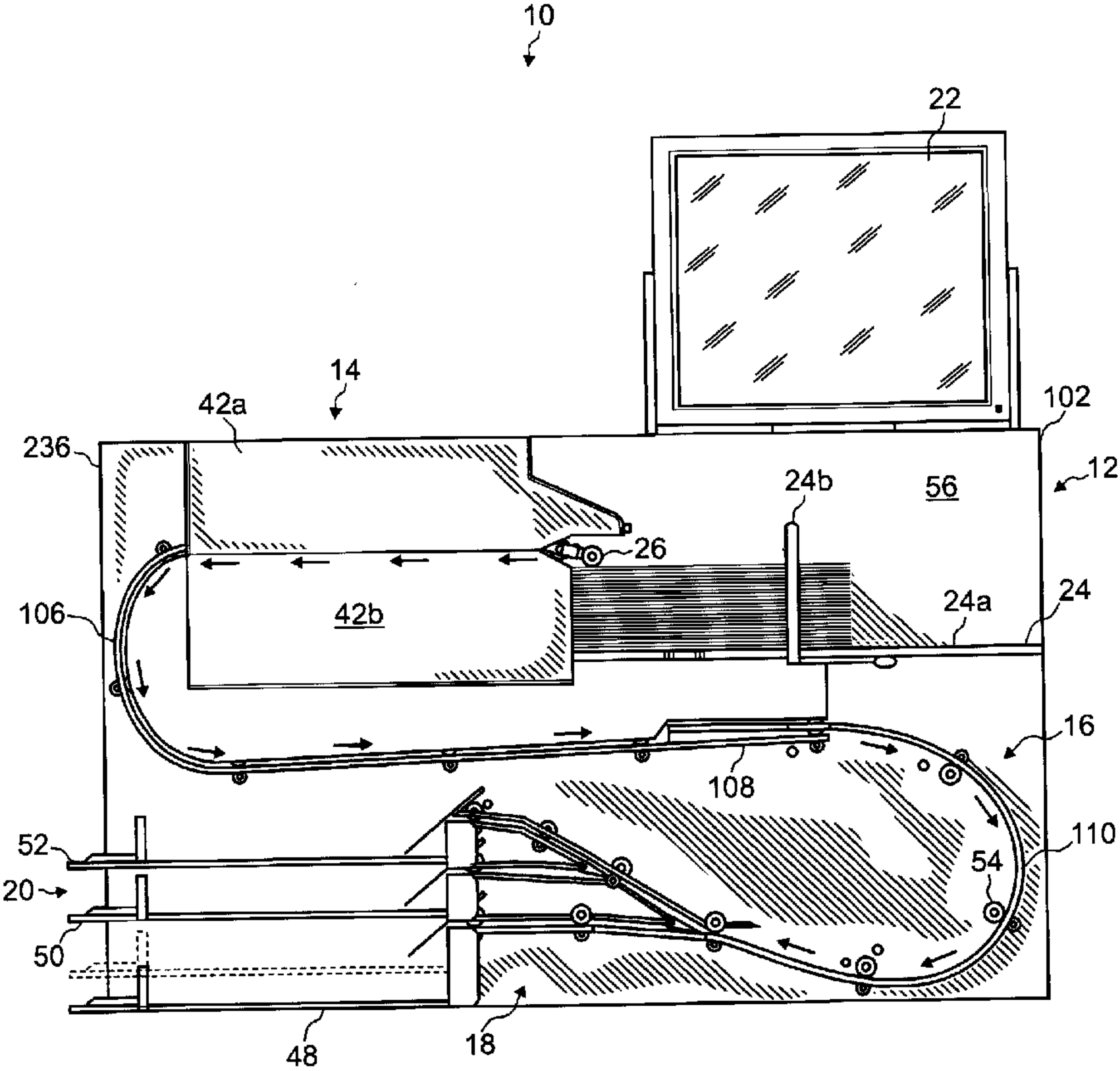

132
126
128
134
128
128
COUNTY JUDGE
CANDIDATE 1
CANDIDATE 2
CANDIDATE 3
CANDIDATE 4
130
GOVERNOR
CANDIDATE 1
CANDIDATE 2
130
COMPTROLLER
CANDIDATE 1
CANDIDATE 2
CANDIDATE 3
130
128
SENATOR
CANDIDATE 1
CANDIDATE 2
128
ATTY GENERAL
CANDIDATE 1
CANDIDATE 2
CANDIDATE 3
130
128
REPRESENTATIVE
CANDIDATE 1
CANDIDATE 2
CANDIDATE 3
130
128
LT. GOVERNOR
CANDIDATE 1
CANDIDATE 2
130

FIG. 25


10
22
14
42a
102
236
12
24b
56
26
106
42b
24a
24
16
108
110
52
54
20
50
48
18