An electronic voting machine utilizing a video screen upon which the names of candidates or propositions to be voted are projected from an appropriate slide or other transparency, and utilizing actuating means coordinated with the projected names or propositions, and wherein the voting machine may be rendered operable by a voter's identification card, which is programmed to enable each voter to use the machine only in those areas and upon those propositions or candidates where the voter is authorized to cast a ballot. The machine incorporates solid state circuitry with means to indicate a malfunction, including a warning light and an audible beeping. Means are provided for straight voting, split ballot voting, straight voting with one or more cross-over votes, write-in voting, proposition voting, cancellation of a vote, and includes cumulative counting means as well as positive lock means to enable use of the machine only for authorized voting, and a party-selecting locking means for single party voting as in a primary election, whereby candidates may be voted upon in one party and all candidates from other parties are locked out.

7 Claims, 10 Drawing Figures
3,779,453

1

ELECTRONIC VOTING MACHINE

BACKGROUND OF THE INVENTION

Heretofore, electrically operated voting machines have included vote counting devices and some have included a scanning device for reading a ballot that has been marked by a voter, and various tabulating apparatus have been provided but, while certain of these prior disclosures have included push-button voting with means to record and accumulate votes, they have not provided a transparency projecting arrangement, wherein candidates or various voting propositions are shown on a video screen to enable a voter to make a choice, then vote and proceed successively to project other transparencies onto the video screen for all voting selections.

Prior art disclosures reveal the use of individual selector buttons for voting on a candidate or a referendum question, various interlock arrangements to restrict voting in accordance with prescribed conditions, computer type techniques affording rapidly accumulated results, central office recording of vote results, photoelectric scanning means for counting ballots voted, electromechanical equipment for completing and summarizing voting results, data storage cards automatically punched by a machine for tabulation by standard computer equipment, centralized telephone voting systems, and machines which furnish a printed sheet of the voting returns.

Voting machines have been proposed which utilize conventional ballots that are marked by the voter and the vote thus cast is registered in the machine and counted, and various types of counting machines for counting manually marked ballots have also been proposed. Information retrieval systems have been disclosed in combination with a remote control voting system, such as those utilizing a telephone arrangement. Multiple totalizer have been proposed which are capable of counting and recording the output or results of any machine, and mechanical counters have been proposed in combination with electronic counters which check the results of the mechanical counter and total the results of a plurality of such counters. However, none of these prior devices suggests the combination of elements as herein conceived, involving the utilization of a plurality of transparencies, each projected successively on a video screen by the voter, who inserts a programmed registration card into the machine to start the voting operation and which automatically restricts the voter to authorized voting areas only.

OBJECTS OF THE INVENTION

It is a primary object of this invention to provide an electronic voting machine utilizing a video screen, upon which images are projected successively and from which the voter makes his selection.

Another object of the invention is to provide an electronic voting machine utilizing a video screen, upon which images for voter selection are projected from transparencies contained in a cartridge or mounted in a rotary plate or projected from film to show the voting options and to indicate selections.

Another object of the invention is the provision of an electronic voting machine equipped with a video screen, and having a mounting plate or disc containing one or more transparencies which are projected onto the video screen under control of the voter.

Another object of the invention is the provision of an electronic voting machine incorporating a video screen and a mounting plate or disc, containing a plurality of transparencies which are advanced one at a time by the voter for projection onto the video screen.

Another object of the invention is to provide an electronic voting machine including a video screen and a transparency mounting disc, having a drive motor which rotates the disc, together with a series of cams which actuate a related series of microswitches, to energize and deenergize respectively associated relays to render particular voting elements functional or inoperative in accordance with voting selections made by the operation of particular actuating controls by the voter.

Another object of the invention is the provision of an electronic voting machine including a video screen and a plurality of images, which are projected onto the screen to show candidates or propositions for election as the images are projected onto the screen by a voter, and having a master control device for the machine and a selective control device for blocking out one or more operative portions of the machine, both under control of an election official and a machine starting device actuated by the voter through the medium of a voter's identification or registration card.

Another object of the invention is the provision of an electronic voting machine, having a video screen displaying candidates or voting propositions projected from transparencies advance successively under control of a voter, and incorporating means for straight voting, split voting, straight voting with one or more cross-over votes, write-in voting, or voting on propositions, all by selections made from images projected onto the video screen and incorporating control means to prevent unauthorized votes to be cast while voting any of the selections made from the video screen images.

Another object of the invention is the provision of an electronic voting machine having a video screen and a rotatable mounting disc containing one or more transparencies, with a drive motor which rotates the disc, together with a series of cams actuating associated microswitches to energize or deenergize particular circuits controlling related voting elements, and a drive motor actuating a roll of paper for write-in votes, a microswitch deactivating other voting elements when the write-in vote is used, and a microswitch actuating the drive motor to roll up the paper one turn when the write-in vote is cast.

Another object of the invention is to provide an electronic voting machine having a video screen and a rotating disc rotated by mechanism including a drive motor, wherein the disc contains a plurality of transparencies and the mechanism includes a plurality of cams and microswitches corresponding in number respectively to the number of transparencies in the disc, and which microswitches activate a corresponding number of relays and circuits to effect operation of various machine functions.

DESCRIPTION OF THE DRAWINGS

The foregoing and other and more specific objects of the invention are achieved by the construction and arrangement illustrated in the accompanying drawings wherein:

FIG. 1 is a general front elevation view of the electronic voting machine indicating the basic components
of the machine as well as the counter units and the write-in unit;

FIG. 2 is a diagrammatic illustration of a preferred form of the control arrangement, whereby an election official may control one or more voting machines from a remote location;

FIG. 3 is a diagrammatic exploded perspective view of the basic components of the electronic voting machine combined with a general circuit diagram, showing a circuit board for operation of counters and the details of a counting board;

FIG. 4 is a detail drawing of a diagram illustrating the arrangement for regular party candidate voting and for cancellation of a vote, and showing a malfunction circuit board for indicating when a circuit has malfunctioned;

FIG. 5 is a detail illustration of the arrangement and diagram of the circuit board for the operation of voting on a proposition where a yes/no vote is indicated.

FIG. 6 is a detail illustration of the mechanism and diagram for write-in votes;

FIG. 7 is a detail diagram illustrating the arrangement of the master locking device for the machine and the selective locking device for blocking out one or more circuits as well as the voters starting device in the form of a registration card sensing unit;

FIG. 8 is a detail drawing showing the diagram of the split voting system;

FIG. 8a is a detail view to somewhat larger scale, showing a decimal type half vote counter; and

FIG. 9 is a detail illustration showing the diagram for the straight voting system.

SUMMARY OF THE INVENTION

This electronic voting machine is such as to simplify machine voting for the average voter, and provides an apparatus which supplies accurate and rapid results of an election while affording substantially foolproof operation requiring minimum maintenance. The machine may be used for multi-party elections, such as national or presidential elections, or it may be used for single party voting as in primary elections. In a primary election, when a voter indicates a party preference, the machine may be locked by an election official to restrict voting to a single party and block out all voting elements other than those relating to the party indicated by the voter. Thereafter, if the voter attempts to actuate a voting element other than those to which restricted, it will not operate or register.

Ordinarily, when a voter enters a polling place, the first step is to register with an election official. In the use of the present machine the voter is then assigned to a voting machine and an official actuates the master locking device to unlock the machine for voting. This unlocking operation may be performed at the voting machine by means of a key, or it may be performed by the election official at a remote location through suitable controls. The voter then inserts an identification or registration card into the card sensing unit which, if the card is properly programmed for that machine, enables the voter to vote at that location and will turn the machine on for voting. The card is programmed to enable the voter to vote only for such candidates or on referendums upon which a vote may properly be cast from the voter's district. The voter may have to proceed to another precinct where the card is authorized and entitles the voter to the voting privilege only at that location, if he has entered the wrong polling place. After turning the machine on for voting, the voter actuates a screen changing button, or the like, which causes an image to be projected onto the video screen for viewing. This first image comprises a complete set of instructions for operating the machine. After perusing these instructions, the voter again actuates the screen-changing button which advances the next image for projection onto the video screen. This image may contain a group, or groups, of candidates from which the voter will make selections. If a straight party ticket is to be voted, the voter actuates the straight party vote button, and all of the votes of this voter would be cast for all of the candidates in the party of the voter's choice. This would have the effect of completing the voting operation and the voting machine would automatically shut off. However, the voter may vote a straight ballot but cast one or more crossover votes for candidates from another party, in which event controls are provided in the machine to prevent voting for opposing candidates for the same office and to cancel any unauthorized vote.

Where the voter does not vote a straight ticket, but instead chooses to actuate the voting buttons of particular candidates, it is necessary merely to press the buttons according to the voter's choice, and when the allotted voting buttons for the candidates on the screen from the projected image have been actuated, the voter than presses the screen-changing button to advance the next transparency and project the image therefrom onto the video screen for viewing. Upon actuating the screen-changing button at this stage, the voter's selections made from the previous transparency would be cast and registered in the machine.

However, if the list of candidates projected on the video screen had contained the name of one for whom the voter did not wish to cast a vote, a write-in candidate may be substituted. In these circumstances the voter would actuate the write-in button which, through a series of cams, microswitches and solenoids, would expose a write-in slot where the voter would write in the name of the substitute candidate on a roll of paper, which is advanced automatically when the voter again presses the write-in button to cover the write-in slot. When the write-in slot is open, the circuits for the other voting buttons are deactivated so that they cannot be operated and the counters as well cannot be operated at this time.

The voter may cancel a vote cast for a candidate by pressing the cancellation button, whereupon the associated relay drops out without pulsing the solid state circuit, so that the light for the voting button previously actuated goes out and a new voting choice may be made by pressing the desired button. After all of the voting choices have been made by the voter, the screen-changing button is pressed, whereupon the drive motor advances the mounting disc one frame to the next transparency. This registers the votes cast and causes the voter counter to be activated.

Where an image projected onto the video screen contains a proposition or a referendum requiring a yes/no vote, the voter then uses the yes/no buttons for voting. At such time as yes/no questions are projected onto the video screen, the several voting buttons for casting votes for candidates are automatically cut out. After voting on the yes/no propositions, the voter would press the screen-changing button to advance the next
image for projection onto the video screen, and only then would the yes/no vote be registered.

After all of the images have been projected onto the video screen and the voting operation completed, the voting machine automatically shuts off and the voter is unable to vote further. The machine cannot be turned on again by the voter, and only an election official can render the machine operative again.

DESCRIPTION OF PREFERRED EMBODIMENT

As shown in FIG. 1, the voting machine includes a console 10 from which a voter performs all of the voting functions that may be authorized. The console is provided with a master locking arrangement under control of an election official, which includes a key actuated lock 11 for turning the machine on and off, and a switch 12, also key operated, for setting the machine for primary voting to restrict its operation to single party voting. A single key 13 (see FIG. 3) actuates both the master lock 11 and the primary switch 12. This is a double acting key and is retained at all times by an election official, in order to restrict use of the voting machine for authorized purposes only.

PREFERRED SYSTEM OF VOTING MACHINE CONTROL

A preferred arrangement of master control and primary switching of the voting console, to perform these functions from a remote location, is shown in FIG. 2. As illustrated in this Figure, three voting consoles 10, 10a and 10b, are controlled from an election official's desk 14, which contains a control panel 15, connected to the individual consoles by means of cables 16. The control panel includes a warning light 17 for each of the consoles 10, 10a and 10b, which signals the election official when a voter has finished voting. The consoles may each be turned on, then, for the next voters by means of push buttons 18. A series of buttons 19 for each console, enables the election official to set the voting consoles for one of several parties, designated by voters to the official when they desire to vote for the candidates in a single party, as in a primary election. The push buttons 19 may be rocker switches, if desired, whereby they can only be actuated to one position or the other.

VOTING CONSOLE ARRANGEMENT

Each console 10 is provided with a video screen 20 upon which images are projected, one after the other, showing the various voting options from which a voter selects voting choices. The images projected on the screen are changed successively by means of a change-screen button 21, which is pressed to change the image on the screen after making the voting selection therefrom and which also registers the vote thus made. A series of straight party voting push buttons 22 is located just below the change-screen push button, which enable voters to vote a straight party ballot without making individual selections of candidates. However, crossover votes may be cast for particular candidates by pressing the push buttons provided for selecting individual candidates to be voted. This automatically locks out an opposing candidate so that the button selected would cancel out the opposite button whereby opposing votes are prevented from being cast. Thus, when the straight party voting button is pressed, only those candidate buttons in another party may be actuated for individual votes, but not the buttons for directly opposed candidates.

The individual candidate voting buttons 23 are shown to one side of the screen 20. When the voter's choice of candidates is selected from the image on screen 20, these buttons are pressed in, according to such selections, and when pressed, stay in the in position and light up. The buttons stay in and lighted until the change-screen button is pressed to change the image and register the votes thus cast. To show the voter how he is voting the various candidates, the information may be projected onto the video screen. This may take the form of an "X" enclosed in a box similar to the marking a voter would make on the generally familiar paper ballot and would appear on the screen adjacent to each selection made when a selector button is pressed. Pressing the change-screen button causes the projecting apparatus to progress to the next image on the screen 20 so that the voter can then vote selections from that image. However, a cancellation button 24 is located below the candidate voting buttons 23, by means of which the voter may cancel a candidate vote. When this cancellation button is pressed, the candidate voting button to be canceled returns to the unvoted normal position and the light goes out, whereupon the different candidate choice may be made. After the substitute choice is made and all candidate voting choices are completed, the change-screen button is then pressed to advance the next image onto the screen as described.

At the opposite side of the screen 20 from that where the candidate voting buttons 23 are located, a group of yes/no buttons 25 are disposed for actuation when an image is projected on the screen, with respect to a referendum or the like requiring a yes or not vote on one or more issues. The buttons 25 may be rocker type switches whereby they may be voted yes or no but not both. Push buttons could be utilized if desired and arranged so that when a yes button is pressed in, the corresponding no button is returned to normal position and vice versa.

 Provision is made alongside the yes/no buttons for write-in votes. A series of panels 26, normally covering write-in spaces on a paper record, are operable by push buttons 27 to expose a particular write-in space when a voter encounters a candidate projected on the screen 20 in the normal way, but prefers to vote a write-in candidate instead. The write-in panels 26 are numbered and the push buttons 27 are correspondingly numbered. When the voter comes to a candidate listed on the screen 20 and it is preferred not to vote for that candidate, the voter observes the number panel 26 in line with the candidates voting button 23, and presses the corresponding numbered button 27 to expose the write-in space and enable the voter to write in the name of a preferred candidate on the paper record.

The write-in button 27 also deactivates the row of candidate voting buttons 23 which are in line with the write-in space, so that a vote cannot be registered other than the write-in vote. After writing in the name of the voter's preferred candidate, the correspondingly numbered write-in button 27 is pressed again to close the panel 26 on the write-in vote. The change-screen button 21 is pressed after voting on this image is completed, and this registers the votes cast and advances the paper record one turn. The operating details of the write-in vote mechanism is best shown in FIG. 3, but
reference may also be had to FIG. 6. As illustrated in these figures the opening and closing movements of the write-in space covering panels 26 are actuated by push/pull type solenoids 28 and each of these solenoids is activated by pressing the corresponding numbered write-in button 27 to open the similarly numbered panel. As the panel 26 moves to its full open position, this actuates a micro-switch 29 which deactivates the circuits to the corresponding row of candidate voting buttons 23 in line with the particular write-in space. When the write-in button 27 is pressed the second time, this deactivates the solenoid 28 thus closing the panel 26 over the write-in vote.

The paper record for write-in votes comprises a roll of paper 30, on a drum 31, which moves across the various write-in spaces and winds onto a take-up drum 32. The take-up drum 32 is operated by a motor 33, under control of a microswitch 34, actuated by cam 35, mounted on the shaft of wind-up drum 32. When the change-screen button 21 is pressed to advance the next image onto the screen and register the vote cast, the paper drum motor 33 is caused to be activated and thus roll up the paper record one turn, ready for its possible next use. After all voting operations have been completed, the paper record of all write-in votes cast in the election is removable from the voting machine for counting by proper election officials. The roll of paper may be removed through a suitable door in the back of the console. This door is not shown but may take any suitable form consistent with its being accessible only by the proper election officials.

Provision on the console 10 is also made to indicate any malfunction of the solid state circuitry, in which event the voting machine is shut down and either repaired or replaced by another machine. All votes cast prior to the malfunction may be counted. The malfunction is indicated by an audible beeping through a speaker 36, operating simultaneously with a blinking red light 37. The projection lamp used to project images onto the video screen 20 is turned off when the blinking red light comes on.

VOTER REGISTRATION CARD SENSING SYSTEM

An important feature of the voting machine also included on the console, comprises the apparatus for rendering the machine operative by the voter. As shown in FIGS. 1 and 3, this is accomplished by a coded card reading device 38 which is provided with a slot 38, adapted to receive a voter's identification card 40. This card contains coding related to all taxing bodies encompassing the voter's place of residence such as sanitary districts, school districts and the like, and includes the precinct number of the voter for properly identifying the precinct. The card reading device is programmed to accept any combination of the code numbers related to the taxing bodies within the particular precinct. When the card 40 containing the necessary and proper coding is inserted in the slot 39, the reading device 38 will read the coding and activate the machine, which will be indicated by a green light 41 which lights up only when the machine is operative. If the card is not properly coded the voting machine will remain in the off position. Where all of the coding contained by the card is correctly done, the device 38 will read the coding and not only turn the voting machine on, but also cause the machine to bypass such candidacy dates and referendums as the voter may not be entitled to vote, as determined by the precorded card.

LOWER CONSOLE ARRANGEMENT

The various circuit boards for the voting machine are located in the lower console cabinet 42 which is provided with hinged doors 43, shown in FIG. 1 in the open position, thus revealing the positioning of the circuit boards therein. The circuit boards, identified generally by the reference 44, are indicated only in outline in this figure and total eight in number in accordance with the capacity of this particular machine, but may be incorporated in greater numbers where a voting machine may require greater voting capacity. The lower console cabinet also houses a series of switches 45 for cancellation of straight ballot voting, for use in states where straight party voting may not be permitted. These switches have the effect of deactivating the straight party voting push buttons 22 on the upper console 10 and, in this event, provision may be made to conceal the button 22. A total voter counter 46 may be included in the lower console cabinet together with a reset button 47.

SYSTEM FOR PROJECTING TRANSPARENCIES

The projector means for advancing successive images onto the video screen 20 is best shown in FIG. 3, where it will be seen that a projector lamp housing 48 containing a projector lamp (not shown) which may be of the usual type, is disposed to project the light therefrom through a transparency 49 into a lens 50, and thence focused onto the video screen 20. As shown here, the transparency 49 is but one of a plurality of such transparencies totaling eight in number, in accordance with the voting capacity of this particular machine, and which are secured in a disc 51 in relatively spaced positions around the disc, and such that they may be advanced successively into viewing position as the disc is rotated. The disc 51 is removably mounted on a shaft 52 and is fixed thereon for rotation therewith, and this shaft is driven by a motor 53 which receives its energy from a suitable power source 54. This power source may comprise a self-contained DC power-pack incorporating a rechargeable battery system powered from a plug-in source of AC power. The drive motor 53 and the shaft 52 with the disc 51 mounted thereon, is supported in a suitable base structure 55.

The operating shaft 52 carries a plurality of cams thereon, identified by the reference 56 and again totaling eight in number in accordance with the voting capacity of this machine, as shown. These cams actuate microswitches 57 mounted on the supporting base structure 55 and associated respectively with each of the cams, and which pulse the vote counters through a relay board 58 in the operation of the voting machine. The relays on the board 58 are indicated at 68. FIG. 3 illustrates basic components of the complete voting machine, including basic wiring indications, and shows the circuit board for operation of the straight vote counters, but the details of only one counter board are shown as relating to a particular voting image appearing on the video screen 20. The number of such circuit boards to be used corresponds with the number of voting frames or transparencies 49 incorporated in the revolving projection disc 51 and since, as shown, eight transparencies are utilized in the revolving disc provided in this machine, there will be eight respectively
associated circuit, relay and counting boards. The projection disc 51 is provided with a plurality of stops 69 located around the periphery thereof, one of each frame or transparency 49, and these cooperate with microswitch 70 to activate the vote counter relays 68.

The split vote solid state counting circuit board 59 is generally indicated by outline in FIG. 3 and the operating circuit for operation of the vote counters is shown on the circuit board 60. Circuit board 61 incorporates the counters 62 as well as on-and-off switches 63 and includes the transistors 64 in the circuit. Each of the counters 62 includes a reset button 67 for setting the counters to zero. Yes and no vote counters 78 and 79, respectively, are also shown in FIG. 3 and these, too, have associated on-and-off switches 80 and reset buttons 81 for setting the counters at zero. The beeper circuit board 65 also incorporates transistors 66, and incites a malfunction of any of the counter circuits audibly and visually by means of the speaker 36 and light 37.

**SYSTEM FOR REGULAR VOTING**

The operation of the regular vote casting system is illustrated in FIG. 4. Here, when the voter makes a choice from the image projected on the video screen 20, the corresponding selector button 23 is pressed and this button lights up and stays in through the action of the corresponding relay 92 on the relay board 91, which holds in until the screen-change button 21 is pressed to change the image or until the cancellation button 24 is pressed to cancel the vote. As previously described, an indication may be projected onto the video screen clearly showing the voter how he is voting for the various candidates and this may take the form of the familiar "X" in a box, similar to that universally used in marking paper ballots and which would appear on the screen adjacent each vote selection as the voter pushes the selector button. When the projection disc 51 is rotated by pressing the screen-change button to bring the next image into view, a pulse is sent through the solid state circuit when the microswitch 80 is activated upon engaging a stop 69, thus activating the relays 92 on relay board 91, which hold the pulses sent through the circuit by the microswitches 57, as actuated by the cam 56 on the motor shaft 52. When the relays 92 release the pulses, the solid state circuit causes the corresponding vote counters to be activated.

As shown in FIG. 4, the circuit board 71 illustrates but one set of five circuits 72 for one row of the vote selector buttons 23, but there would be a set of such circuits for each row of buttons on the voting panel. Each of these circuits may be in the form of a plug-in type of printed circuit board if desired, as indicated in dotted lines at 73. If the cancellation button 24 is pressed to cancel a selection, the appropriate relay 68 drops out and no pulse is sent through the solid state circuit. The selector button 23 returns to its normal unvoted position and the light goes out, thus restoring the circuit for subsequent revoting and enabling the voter to make a new selection in this row according to a choice to be substituted for the cancelled selection. The counter circuit board 74 is shown with the full complement of vote counters 75 for seven rows of vote selector buttons 23, but only the one row of the circuits 72 for selector buttons 23 is shown as operatively in circuit with the counters 75. However, there is one row of selector button circuits 72 provided for each corresponding row of vote counters 75. Solid state transistors 76 are incorporated in the vote counter circuit on board 74, and each counter is provided with a reset button 77 for setting the counters at zero. The beep circuit board 65 is indicated below the vote counter circuit board 74, and includes the solid state transistor circuits 66 which signal a malfunction in any of the vote counter circuits 76, and indicate the malfunction audibly as well as visually by means of the buzzer or speaker 36 and red light 37.

The beep circuit can also be set to shut off the projector lamp 48 when a malfunction occurs, if desired.

**SYSTEM FOR REFERENDUM VOTING**

A circuit board 82 for the yes/no selector buttons 25 is illustrated in FIG. 5 as well as a relay circuit board 83 containing the relays 84. The circuit board 82 contains the solid state circuits 85 for the operation of the yes/no counters 86 and 87, respectively. Each of these counters is provided with a reset button 88, by means of which the respective counters may be set to zero. When the projection disc 51 is rotated to the position advancing the transparency 49, containing yes/no referendum for projection onto the video screen 20, the circuit boards 82 and 83 may be brought into play. A set of cams 89 (refer to FIG. 3) is mounted on motor shaft 52 and driven by motor 53. This set of cams serves to activate microswitches 90 (see FIG. 5), which cut out the relays 92 on relay circuit board 91, that activate the voting buttons 23 and, at the same time, activate the yes/no buttons 25 corresponding to the yes or no questions appearing on the video screen 20. When the yes or no buttons 25 are pressed by a voter according to a choice made from a selection appearing on the image projected on the video screen 20, this activates the solid state circuit to pulse the appropriate yes/no counter relay 84, which holds the vote thus indicated until the change-screen button 21 is pressed to advance the next image onto the screen. Pressing the change-screen button activates the microswitch 76, which closes out the relays 84 corresponding to the buttons 25 voted, thus sending the votes to the proper counters 86 or 87 as indicated by the selections made by the voter.

**SYSTEM FOR WRITE-IN VOTING**

The arrangement for effecting write-in votes is shown in FIG. 6 which enables the voter to cast a vote for a candidate when it is wished to substitute such a candidate for one appearing on the image projected on the video screen 20. When this situation is encountered by the voter at the machine, and it is thought a more suitable candidate can be written in, instead of voting for the candidate for that office as projected on the screen, it is merely necessary to press the button 27 indicated for that office to open the proper write-in space in order that the vote may be cast in this manner. To locate the proper write-in button 27 for the write-in space 26 corresponding to the office being voted, the voter merely is required to observe the number on the write-in space aligned with the candidate's name appearing on the screen 20 for the office, and then activate the correspondingly numbered write-in button 27.

Pressing the write-in button 27 activates the solenoid 28 that opens the proper write-in space and after the name of the substitute candidate is written in, the voter again presses the button 27 to close the write-in space.
As hereinbefore described, when the write-in space opens, the related microswitch 29 deactivates the solid state circuit for the row of voting buttons 23 by operation of the associated cam 89 and microswitch 90 thereby to prevent other than the write-in vote to be cast for that office. The relays and relay circuit board and the solid state circuit board associated with the write-in voting mechanism is not indicated in FIG. 6, but would be typical of the similar circuit board shown in association with the other voting operations. When the change-screen button 21 is pressed to close the write-in space, this also causes the paper drum motor 33 to be activated by the action of the microswitch 29 through the relay board and proper relay to pulse the solid state circuit, whereby to roll up the write-in paper one turn as controlled by the microswitch 34 and drum disc 35.

SYSTEM FOR CONTROL OF MACHINE OPERATION

A system for initiating the functional operation of the voting machine is diagrammatically illustrated in FIG. 7. This system is based on the inclusion of the master lock 11 and primary voting switch 12 at the console, in combination with the programmed voter's identification card 40 for insertion through the slot 39 into the coded sensor 38, to turn the console on for voting. The primary switch 12 and the master lock 11 are both actuated by means of the double acting key 13, as best shown in FIG. 3. The system shown in FIG. 7 comprises an alternate to the system for initiating the operability of the machine for voting as shown in FIG. 2, which also is utilized in combination with the programmed voter's identification or registration card to turn the voting machine on and which enables the election official from a remote location to render one or more machines ready for a voter to complete the operation of turning the machine on by insertion of a properly programmed card 40 into the sensor 38 on the console 10.

SYSTEM FOR SPLIT BALLOT VOTING

The details of the split voting systems are illustrated in FIG. 8, which shows this system broken down to its basic components. It should be pointed out that when a voter wishes to vote a split ballot on this voting machine, the voting procedure is the same as for casting a straight vote in that only one set of push-buttons can be pressed at one time, and two opposing buttons disposed side by side cannot be pressed simultaneously, since one of such buttons would cancel out the other. This operation is similar to the operation of the yes/no voting system and the write-in voting system, both as previously described. When an image appears on the video screen 20 containing a situation where a split vote may be indicated, one of the cams 89 on motor shaft 52 actuates a microswitch 90, and this activates the split vote counter circuit board 94 which contains the solid state pulse circuits 95. These circuits are preset prior to use of the machine in an election. The preset pulse screws are indicated at 96, and by turning the individual screws to their on or off positions, the various pulse circuits may be pre-set as desired.

SYSTEM FOR CUMULATIVE VOTE COUNTING

When the voter encounters a particular office on the image appearing on the video screen 20, where there may be six candidates running for election but a maximum of three may be voted, the voter would select one, two, or three candidates, according to choice by pressing the appropriate buttons 23. This would pulse the solid state circuits 95, and the pulse time sequence circuit holds these pulses until the change-screen button 21 is pressed to rotate the disc 51, for the purpose of advancing another image from the transparencies 49 onto the screen 20. When the change-screen button is thus actuated, the pulses are released to activate relays 98 on relay board 97, which then activate the counters 101 on the counter circuit board 99. The cumulative counting circuit board 99 is pre-set before the election for the right number of candidates for the office so that the pulses, depending upon the vote selecting buttons 23 pressed by the voter, serve to split the vote properly according to the correct number of candidates for the particular office. If only one selector button 23 has been pressed, the pulse sequence circuit holds the vote, and releases three votes to the one candidate selected in accordance with the pre-set total of three votes required for the office. If two selector buttons 23 are pressed, then each candidate will accordingly receive one and half votes. If more than the allotted three votes are cast, none of the votes will be counted for this particular office.

The counters 101 each have a reset button 102 for setting the counters to zero, and each set of counters for the several parties are each provided with a sliding type switch 103 on the cumulative counting circuit board 99, which enables the counters to be cut out of operation as when one or more of the parties may not be involved in an election. The cumulative counting circuit board 99 contains the solid state circuits 104, for the operation of the cumulative counters 101 and which it will be noted, are indicated in accordance with the number of counters illustrated but which may vary from the number of counters and corresponding circuits shown in this figure.

SYSTEM FOR HALF-VOTE COUNTING

An alternative counter device for one half votes may be used, if desired, which utilizes a decimal point inserted between the third and fourth digits of the dial on the counter. Thus the counters then would register half votes by the decimal 0.5, and two pulses would be required to register a full vote-one for the half count and the second pulse for the full count. This modified form of the counter is illustrated in FIG. 8a, where it will be seen that the cumulative vote counter 101 is provided with a four digit dial similar to the other counters, but includes a decimal point 105 located between the third and fourth digits. The counter is equipped with the reset button 102 for setting the dial at zero, and the sliding type switch 103 may also be included for turning the counter on or off.

SYSTEM FOR STRAIGHT VOTING

With this electronic voting machine the voter may vote a straight party ballot by pressing the straight vote button and progress successively through all of the images projected onto the video screen 20 from the several transparencies 49, making selections from each according to choice, with the option of splitting the vote or casting a crossover vote, if desired. The straight vote button must be pressed but once, so that it is not necessary again with respect to voting from each image projected from successive transparencies onto the video.
The voter may progress through the several images without splitting the vote, while the straight vote pulses are tabulated as each successive image is advanced. The vote pulses are released to the cumulative counters as the screen-change button 21 is pressed to advance each transparency for projection onto the video screen 20. It is unnecessary for the voter to press additional straight party buttons on succeeding images projected onto the video screen unless splitting the vote, and if a vote is cast for a candidate in another party this would have the effect of voting the straight vote only in respect to the particular opposing candidate of the party for which the straight vote was cast, and cause the video pulse to go to the split candidate choice, and in a cumulative voting category this might amount to one vote, one and a half votes or as much as three votes.

The system of straight voting circuitry is diagrammed in FIG. 9 and after the electronic voting machine is turned on, the operation of straight voting merely requires that the voter press the straight voting button 22, selected as a matter of the voter’s party choice, and this activates the appropriate relays 106 located on relay circuit board 107, and the total vote count is placed on the counters 108 at the time that the vote pulses are released. Where the voter has pressed the straight vote button 22 but wishes to cross vote for a candidate in another party, this is accomplished in the way of normal voting, by pressing the button 23 for the selected candidate and, as previously pointed out; this voids the opposing candidate for that office so that opposing votes cannot be cast. This procedure can be effected on each succeeding frame viewed on the video screen. After the vote count has been completed in sequence, the voter progresses through the various images projected onto the video screen, which may include referendums to be voted on other candidates to be voted until the final transparency is projected and the voting operation is finished, at which time the last of the relays 106 drops out and this causes a line relay to drop out and turn off the machine.

When the voting machine is used in a state where straight party voting may not be permitted, the switches 45, which are located in the lower console 42 for accessibility to an election official, may be used to deactivate the straight party voting buttons 22. The party buttons under such circumstances may be covered by any means suitable for the purpose, to conceal them from the voter’s view.

The cumulative vote counters 108 include reset buttons 109 for setting the counter dials to zero, and are also provided with on and off switches 110 which are of the sliding type for turning the counters on or off when one or more groups of the counters may not be necessary to a particular election. Transistors 111 are included in the circuitry for the counters 108, as well as solid state circuits indicated at 112. The solid state straight vote counting circuit board is generally indicated at 113 in FIG. 9, and is shown only in outline.

The video screen 20 may be mounted in the console 10, at an angle such as to meet the convenience of the average voter for reading the image thereon and, as described hereinbefore, the solid state circuitry may include provision for means projected onto the screen, clearly showing the voter how he is voting the various candidates or options of each image. This might be a familiar box enclosing an “X,” similar to the marking made on a printed ballot, and would appear on the screen adjacent to each selection made by the voter when a selector button is pressed.

The transparencies 49 have been illustrated as mounted in the disc 51, for rotation into position for projection onto the video screen 20 as they are advanced, one after the other, for viewing on the screen, but it can readily be understood that projection apparatus might be utilized in combination with motor driven cams and microswitches, such as a cartridge type holder for the transparencies where the cartridge would rotate either in a vertical plane or in a horizontal plane, to position the transparencies for projection onto the video screen. This would retain the flexibility of the present system and enable one or more cartridges to be used for an election similarly to the use of the present discs 51, and the desired number of transparencies for an election might be used in either the disc 51 or the cartridge type holder.

**SETTING UP VOTING MACHINE**

In setting up this electronic voting machine for an election the following procedure is followed:

1. The transparency holder 51 is installed on the motor shaft 52 in the projection apparatus. The number of transparencies 49 must be in accordance with the requirements of the particular election.
2. The microswitch actuating cams 56 must be set so their operation corresponds with the individual transparencies.
3. The cumulative voting circuitry must be set in accordance with the number of candidates for election, as related to the number of votes to be cast.
5. If straight voting is not permissible, the straight voting buttons 22 must be switched off and all buttons not in use must be covered.
6. The party rows of buttons must be identified with respect to the parties, and the identifications secured against removal or substitution.
7. The write-in vote roll of paper 30 must be installed.
8. And finally check over machine and lock the machine until election time.

The machine is thus made ready for use, so that at election time an official merely has to turn the machine on from the control panel 15, or by means of the key 13 to operate the lock 11 and set the primary voting switch 12 for the party chosen by the voter if it is a primary election. The voter may then insert the registration card 40 into the slot 39 of the sensing device 38 to render the voting machine fully operative for voting, as hereinbefore described.

From the foregoing it will be seen that there has been provided an electronic voting machine, wherein a video screen is provided which displays all of the voting options for the voter’s observation, as projected from transparencies advanced successively under control of the voter, to display each of the voting categories from which the voter makes voting selections and votes before advancing the next category. The voting machine is rendered operative by the voter’s programmed registration card, which is coded to enable the voter to vote only for those candidates or on propositions or referendums where the card authorizes the casting of a ballot. The voting machine also is locked against unauthorized
use under control of election officials, and includes party selecting switch means also under control of election officials, to set the machine for voting only in the category of one party as in a primary election. The electronic voting machine incorporates solid state circuitry with means to vote a straight ballot, to split a ballot or enter one or more cross-over votes, to vote for one or more write-in candidates, cancel a vote to vote on propositions or referendums, all as projected on the video screen in the various categories, and includes cumulative counting means that is pulsed as the voter casts various votes in the several categories, and registered as each succeeding category is advanced. The solid state circuitry also includes means to indicate any malfunction, with visual and audible signals, and which may incorporate means to shut the voting machine down. The solid state circuitry is such as to prevent multiple votes from being cast or the casting of unauthorized votes, or voting in multiple categories when splitting a ballot, cross-over voting, write-in voting or inadvertent voting for opposing candidates.

What is claimed is:

1. An electronic voting machine having a video screen, a member containing one or more transparencies comprising images for projection onto the video screen, projector means projecting said images onto said screen, a plurality of voting selectors adjacent to the screen containing said projected images, a screen change control to change the image projected onto the screen, a plurality of vote counters, said vote counters being actuated through a logic circuit system activated by said screen change control, said member containing the transparencies comprising a rotary disc rotating in a plane between said projector and said screen, a plurality of microswitches which activate the circuitry for the voting selectors and said logic circuit system relative to said transparencies, and a plurality of cam devices operable with said rotary disc actuating said microswitches, said rotary disc and said cam devices being operated by a drive motor having a drive shaft operatively connected with the cams and disc.

2. An electronic voting machine as set forth in claim 1 wherein a card sensing unit is provided, and a removable card for insertion into said card sensing unit, said card being programmed to render said machine operable for prescribed vote casting.

3. An electronic voting machine as set forth in claim 1 wherein said cams and microswitches correspond in number to the number of said transparencies and activate a corresponding number of circuits for said voting selectors.

4. An electronic voting machine as set forth in claim 6 wherein a roll of paper is provided for a write-in vote having a drive motor for actuating the roll of paper, a microswitch actuated by the opening of a write-in space to deactivate the circuitry to the voting selectors in the category of said write-in vote, and a microswitch actuated by said screen change control for actuating said drive motor for the roll of paper.

5. An electronic voting machine as set forth in claim 1 wherein said voting selectors including a plurality of selectors for straight party votes and a plurality of selectors to vote for individual candidates.

6. An electronic voting machine as set forth in claim 5 wherein a master control device is provided for turning the voting machine on, and a selective control device is provided for locking out certain operative portions of the machine, said master control device and said selective control device being located remote from said machine.

7. An electronic voting machine as set forth in claim 5 wherein said image includes candidates or voting referendums, said machine including means for straight voting, split voting, straight voting with cross-over, write-in voting, or proposition voting by selections made from images, and means to prevent casting of unauthorized votes while voting any of said selections.