United States Patent [19]

Martin et al.

[11] **3,746,248**

[45] **July 17, 1973**

[54] **VOTING MACHINE**

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[22] Filed: **Apr. 28, 1972**

[21] Appl. No.: **248,755**

Related U.S. Application Data

[62] Division of Ser. No. 755,688, Aug. 27, 1968.

[52] **U.S. Cl.** ..... **235/51,** 235/54 F

[51] **Int. Cl.** **G07c 13/00**

[58] **Field of Search** ..... 235/51, 54 F, 50 R, 235/50 A, 50 B, 54 R

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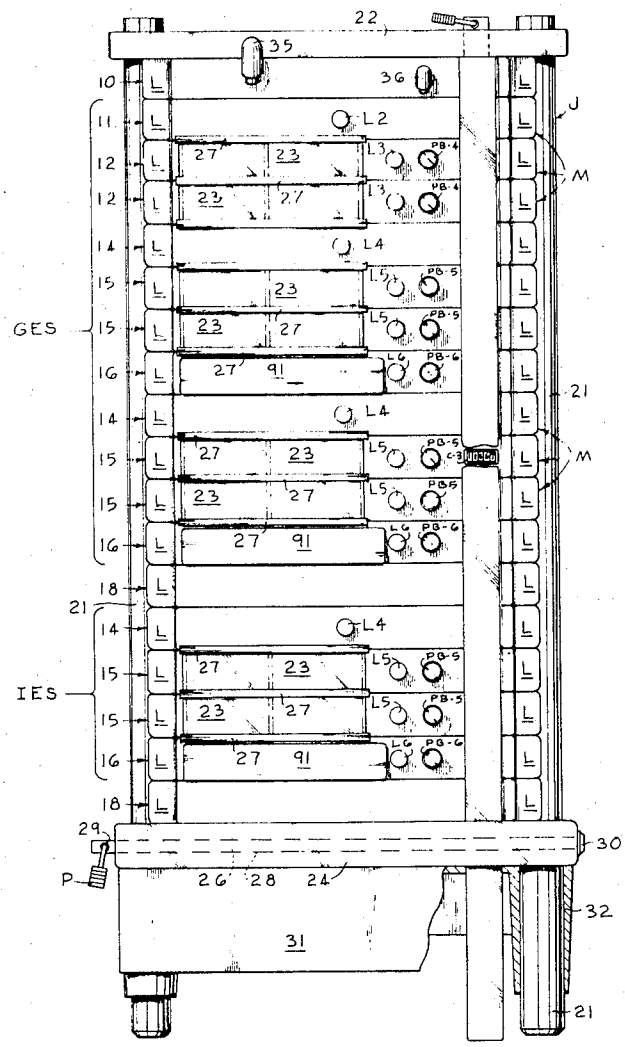
Primary Examiner—Stephen J. Tomsky

Attorney—Newton, Hopkins & Ormsby

[57] **ABSTRACT**

Apparatus for selectively producing electrical pulses representative of a particular selection made by the operator of the apparatus. The apparatus is disclosed in the form of a voting machine built up of modular components which fit together to form any of a plurality of different voting arrangements. The voting machine is substantially tamper-proof and has the following basic components: an input module, a frame assembly, a first control module, a first vote module, a second control module, a second vote module, a terminal module, a write-in module, a slave input module, and a third control module. The modules may be placed together in selected fashion to define a voting machine for voting in any type of political race and which will prevent overvoting. The different modules fit together in such manner that they cannot be separated without a key to unlock the same, thereby reducing the possibility of tampering with the election results. Moreover, each module is constructed in such manner that the module may be checked prior to assembly of the voting machine to insure proper functioning of the module once it is assembled.

3 Claims, 25 Drawing Figures



Patented July 17, 1973 **3,746,248**

12 Sheets-Sheet 1

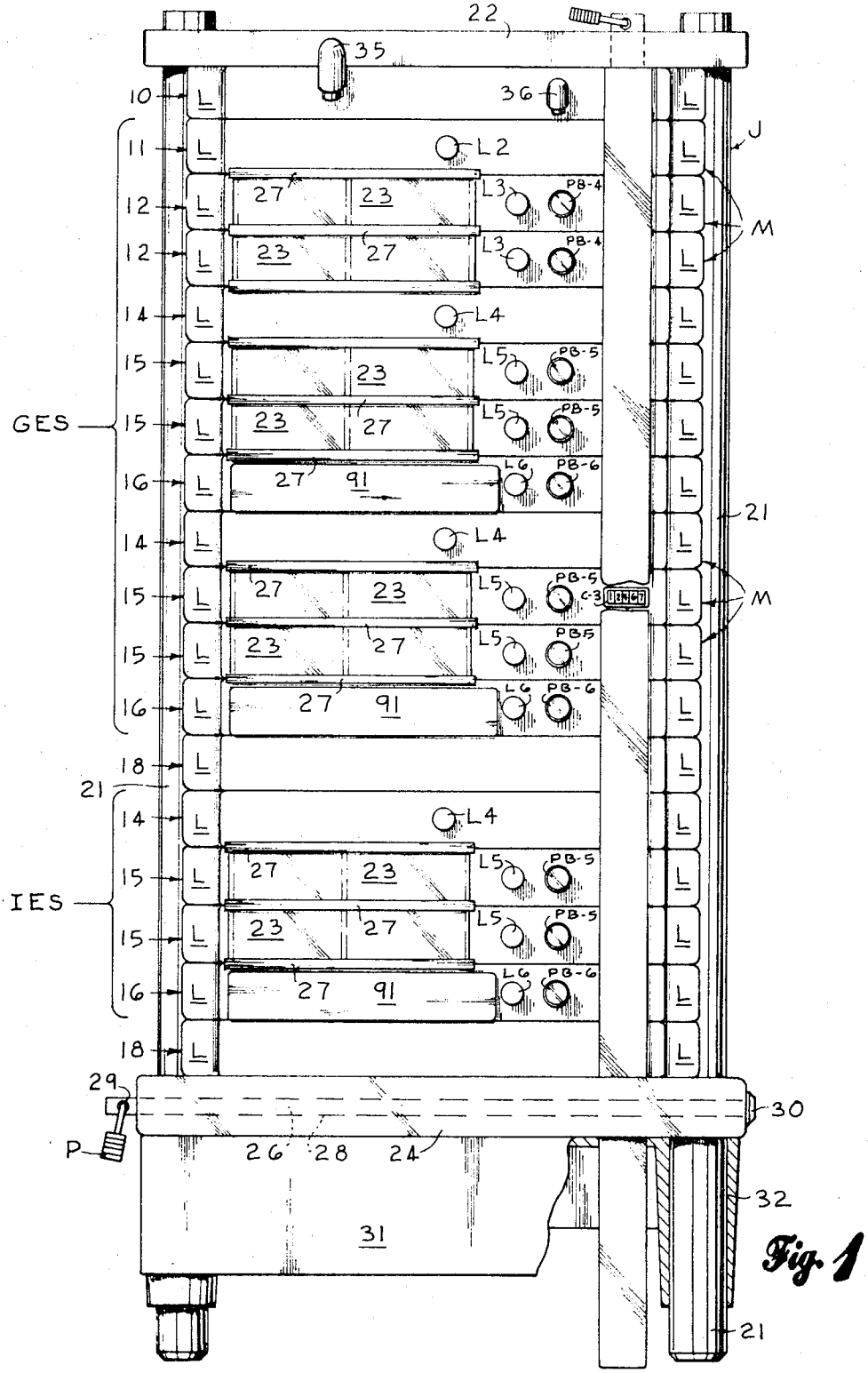


Fig. 1

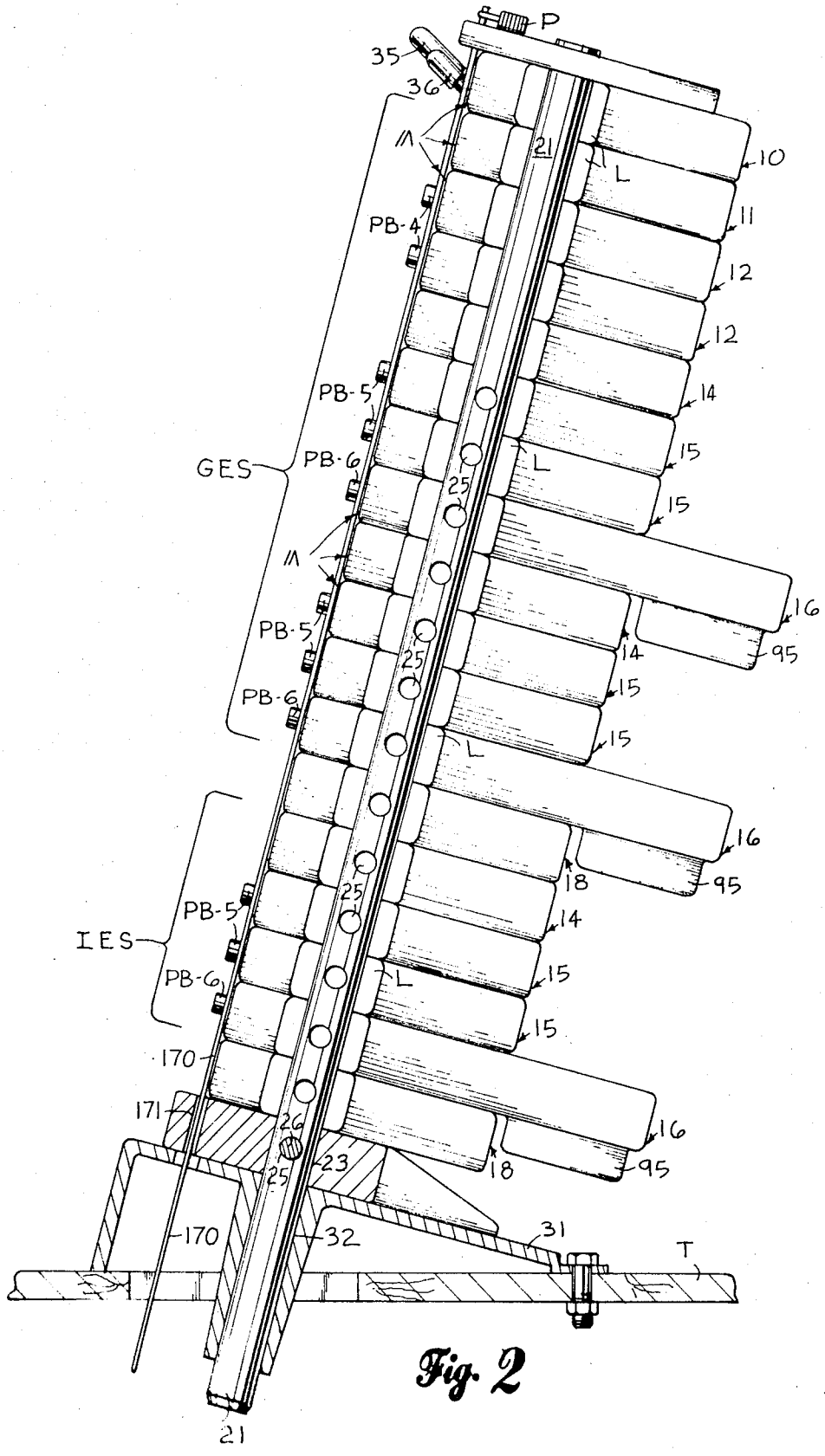

P
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36
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L
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PB-4
PB-5
PB-6
GES
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15
PB-5
PB-6
L
16
95
18
14
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15
IES
PB-5
PB-6
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Fig. 2

Fig. 3

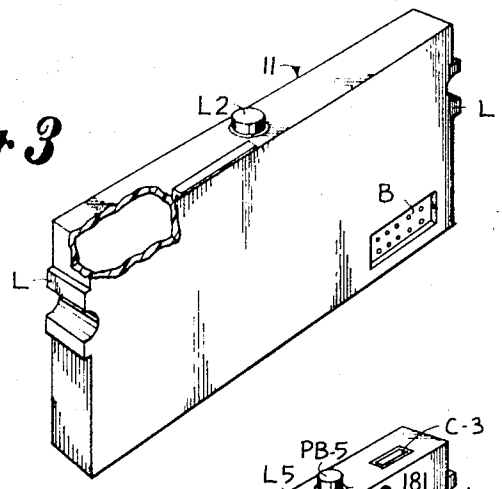


Fig. 5

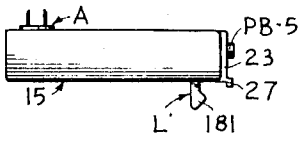


Fig. 4

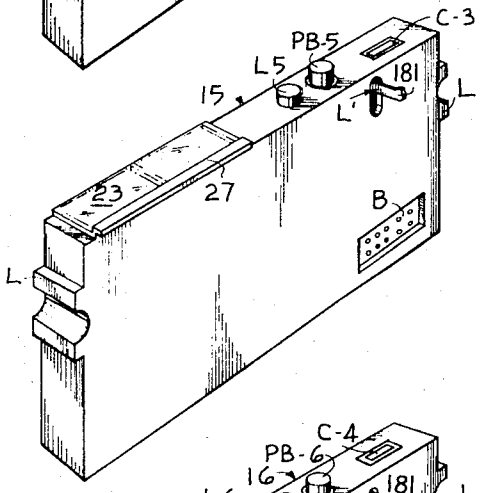


Fig. 6

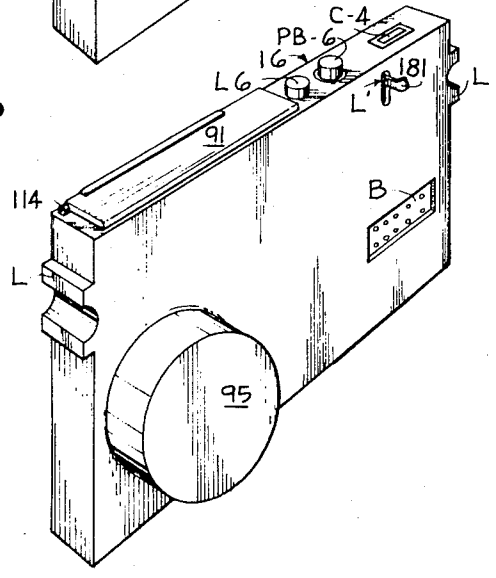
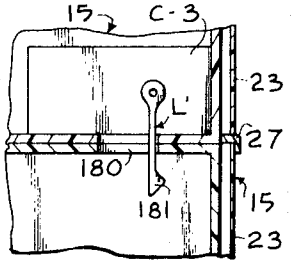


Fig. 7



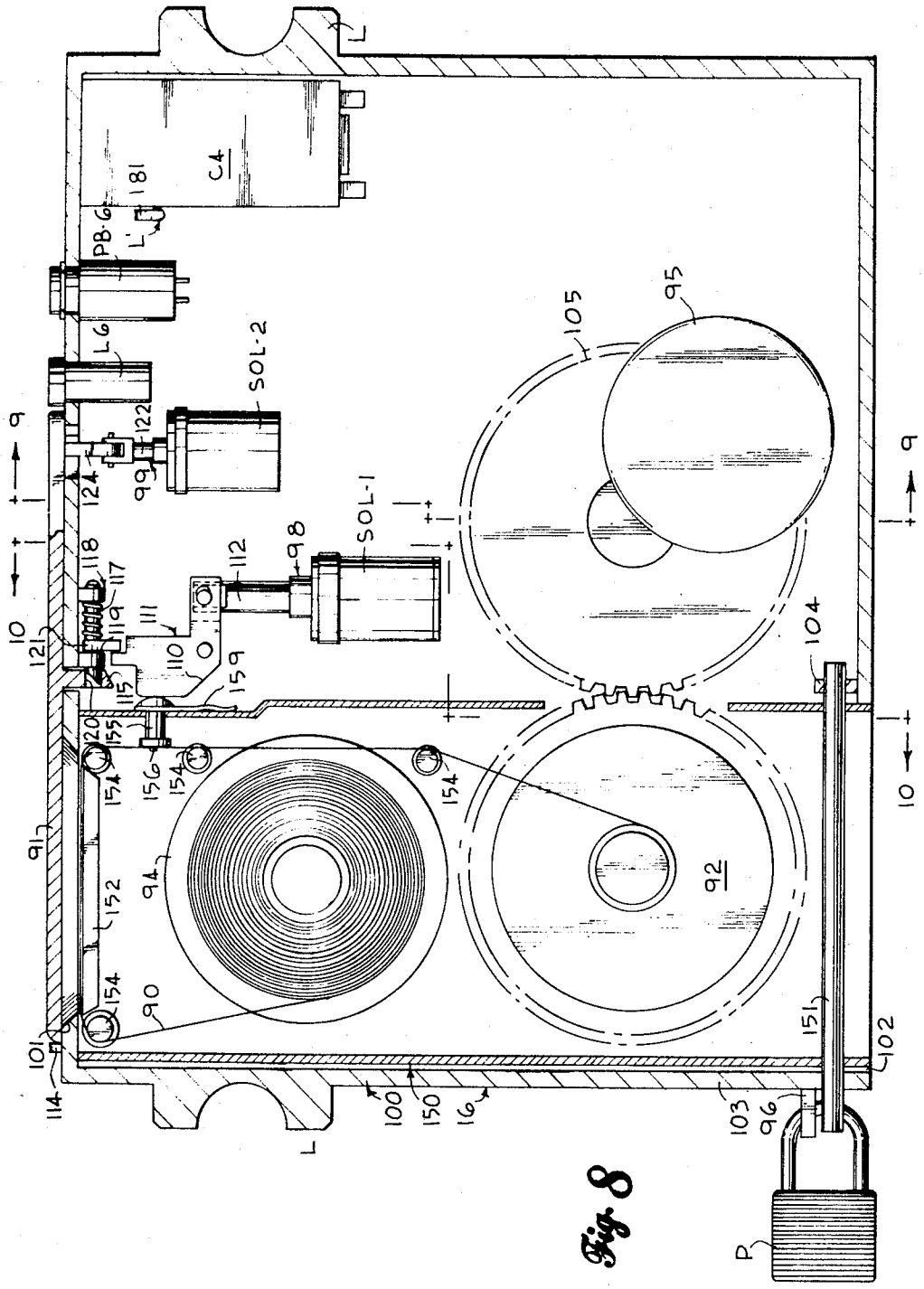

L
C4
181
PB-G
L'
L6
SOL-2
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124
99
SOL-1
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117
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Fig. 8

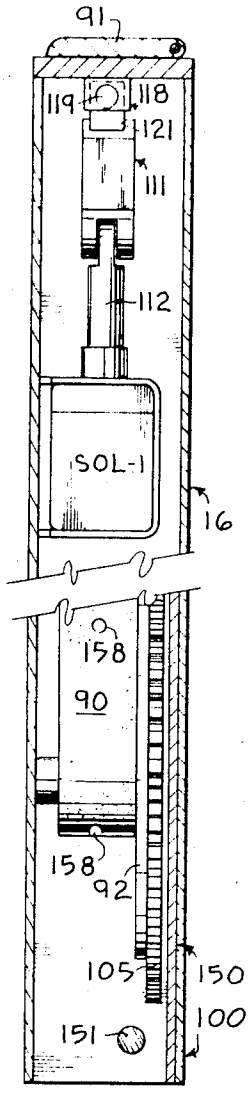


Fig. 10

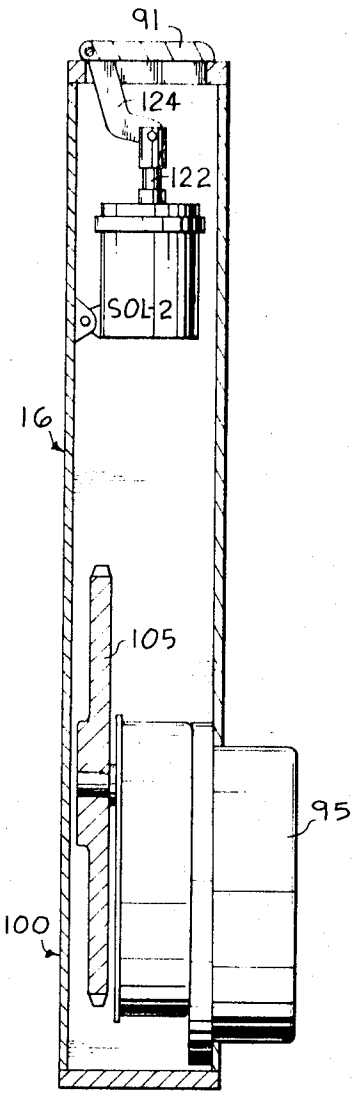


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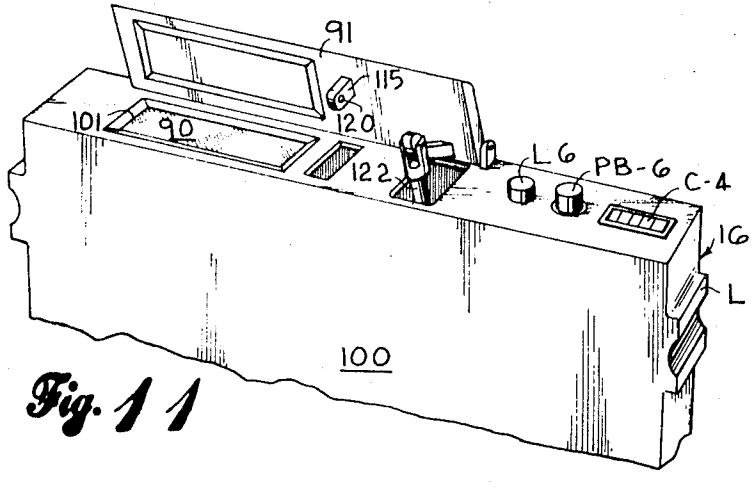


Fig. 11

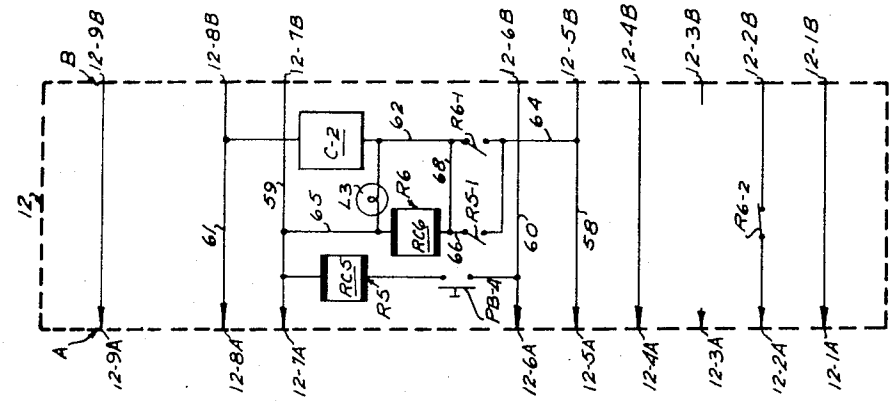


Fig. 14

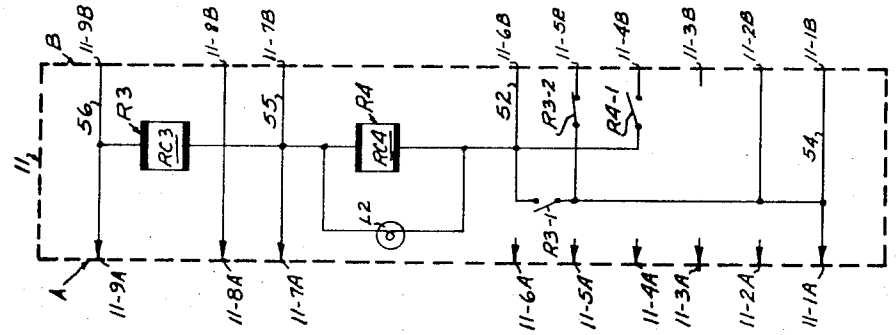


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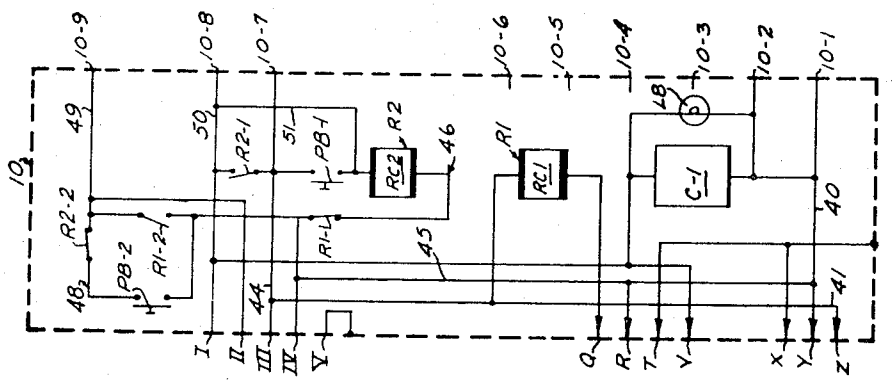


Fig. 12

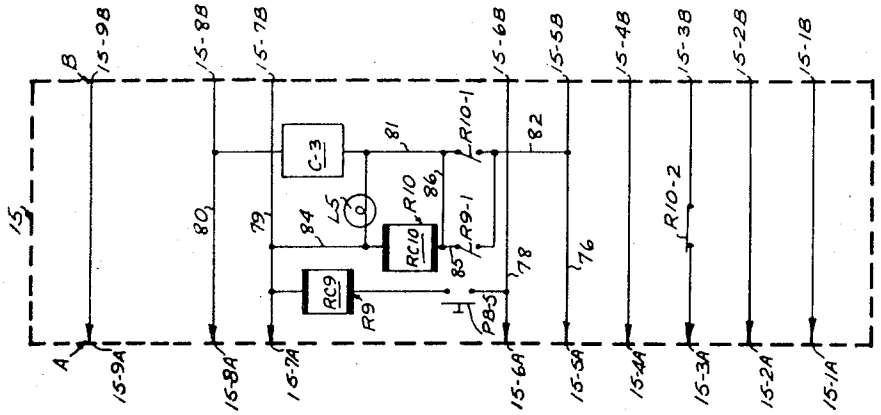


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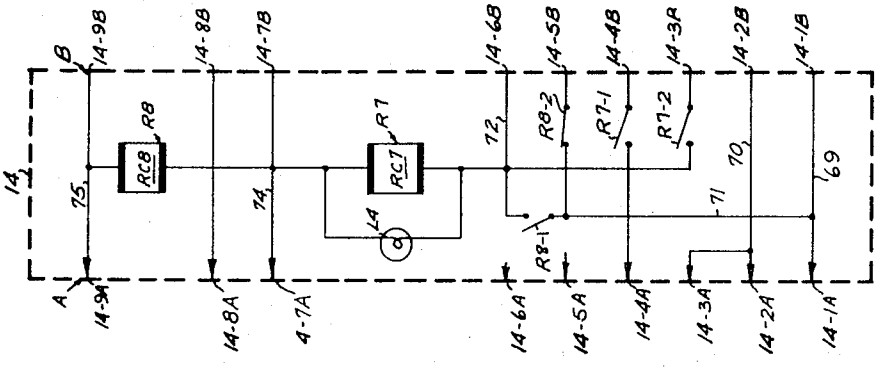


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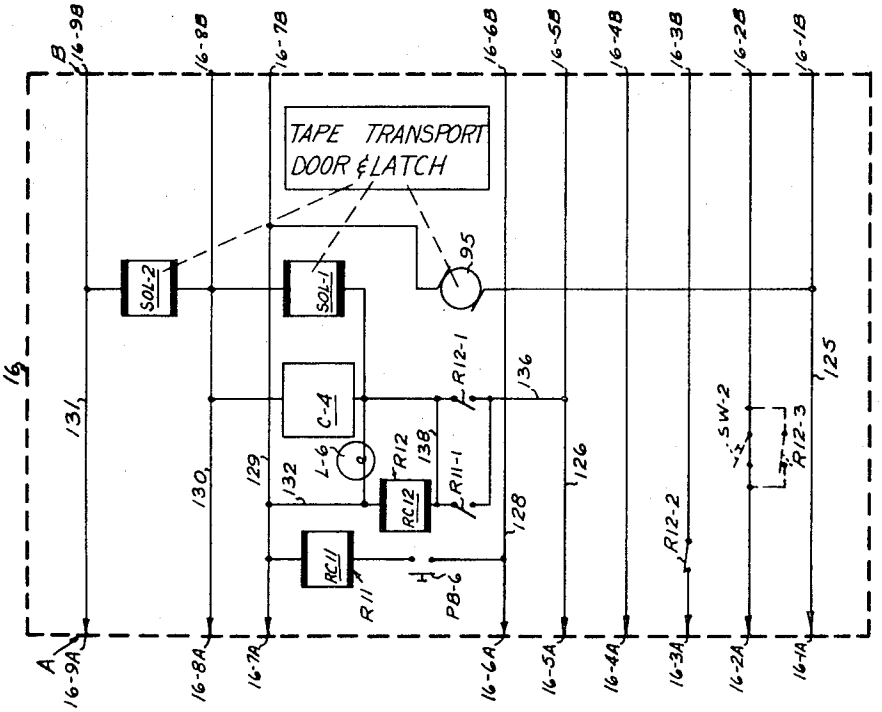


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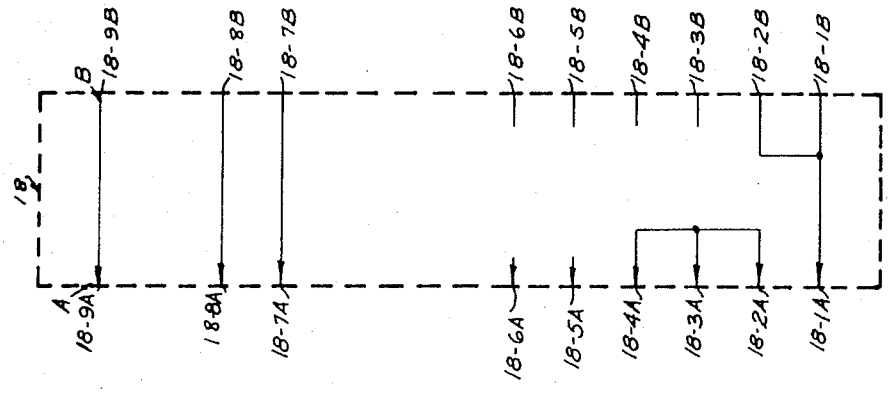


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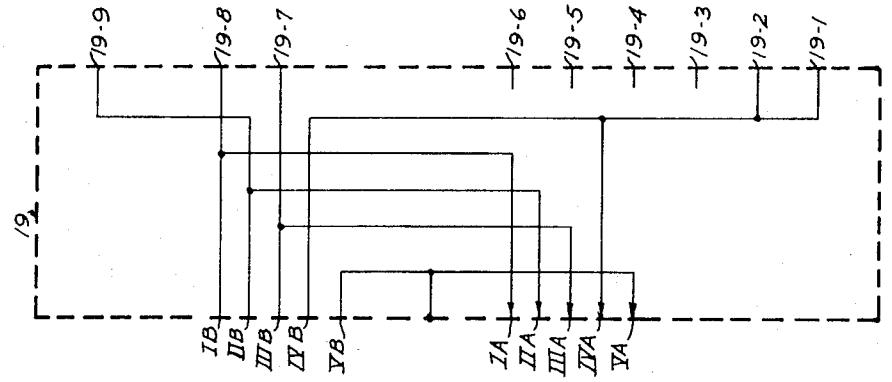


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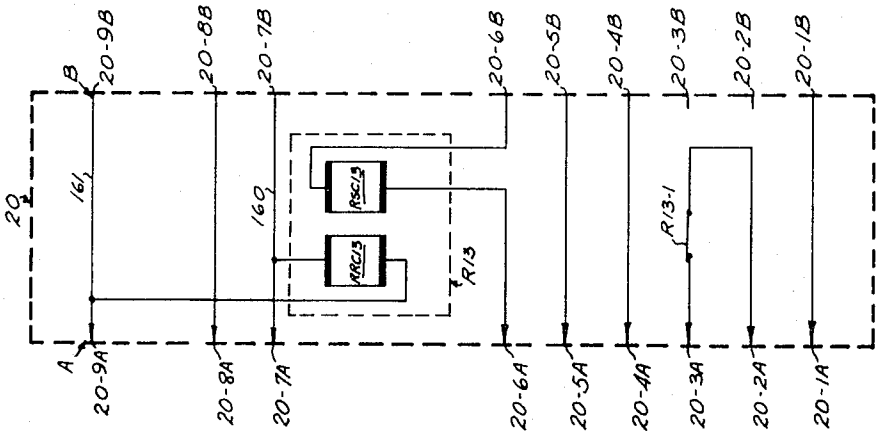


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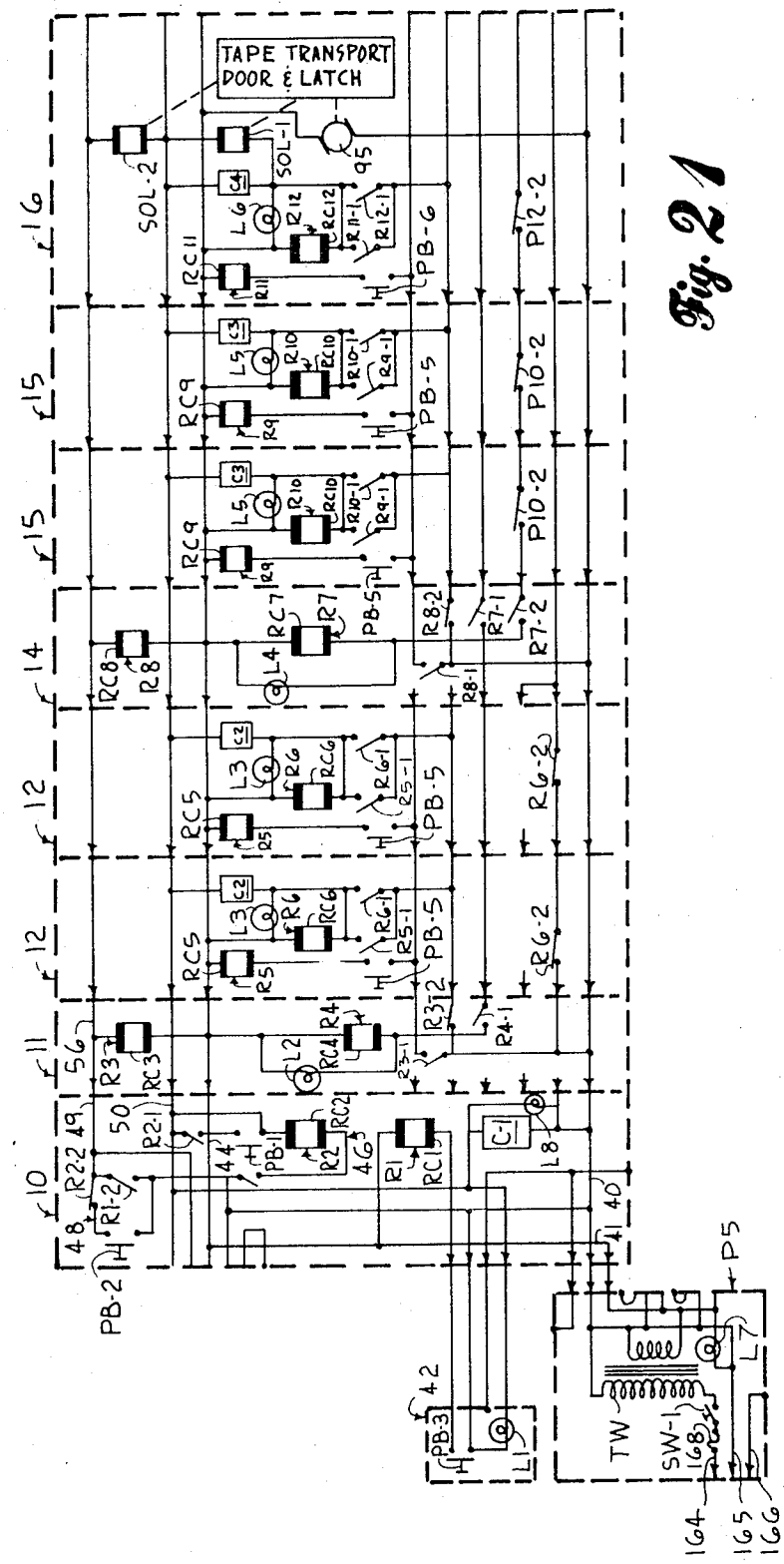

TAPE TRANSPORT DOOR & LATCH
SOL-2
SOL-1
95
L6
C4
R12
RC12
R11-1
R12-1
PB-6
P12-2
RC11
R11
L5
C3
R10
RC10
R10-1
R9-1
PB-5
P10-2
RC9
R9
L4
RC7
R7
PB-5
R8-2
R7-1
R7-2
RC8
R8
R8-1
L3
C2
R6
RC6
R6-1
R5-1
PB-5
R6-2
RC5
R5
R3-2
R4-1
L2
R4
RC4
R3
RC3
R2-1
R2
RC2
PB-1
R1
RC1
C-1
L8
R22
R1-2
PB-2
PB-3
L1
TW
SW-1
L7
P5
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Fig. 21

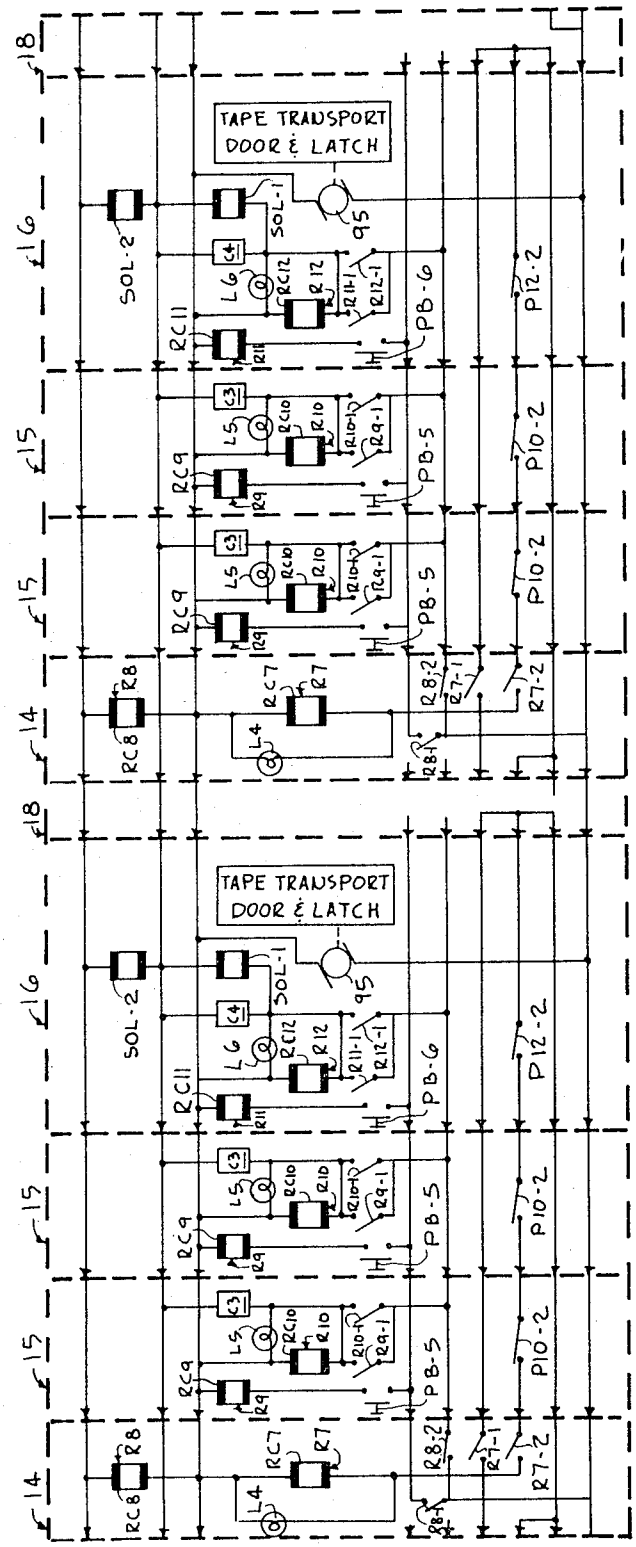

TAPE TRANSPORT DOOR & LATCH
SOL-1
SOL-2
95
L6
RC12
R12
R11-1
R12-1
PB-6
P12-2
RC11
R11
L5
RC10
R10
R10-1
R9-1
PB-5
P10-2
RC9
R9
L4
RC7
R7
R8-2
R7-1
R7-2
RC8
R8
18
16
15
14

Fig. 22

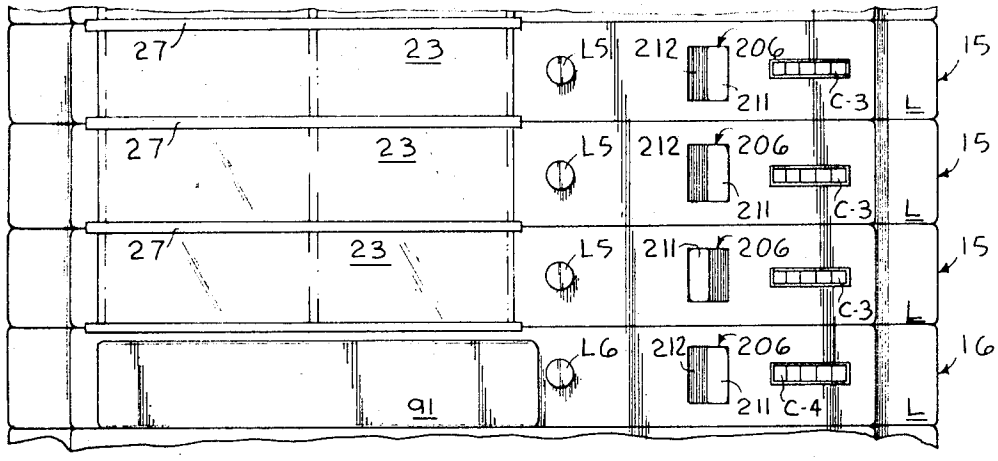

27
23
L5
212
206
211
C-3
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L5
212
206
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C-3
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C-4
L
16
91

Fig. 23

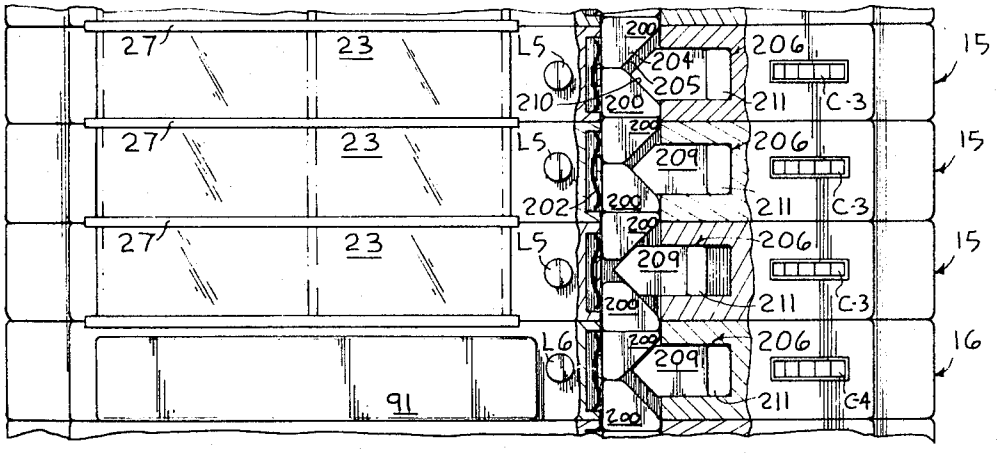

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C-3
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202
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C-3
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C-3
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L6
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211
C-4
16
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Fig. 24

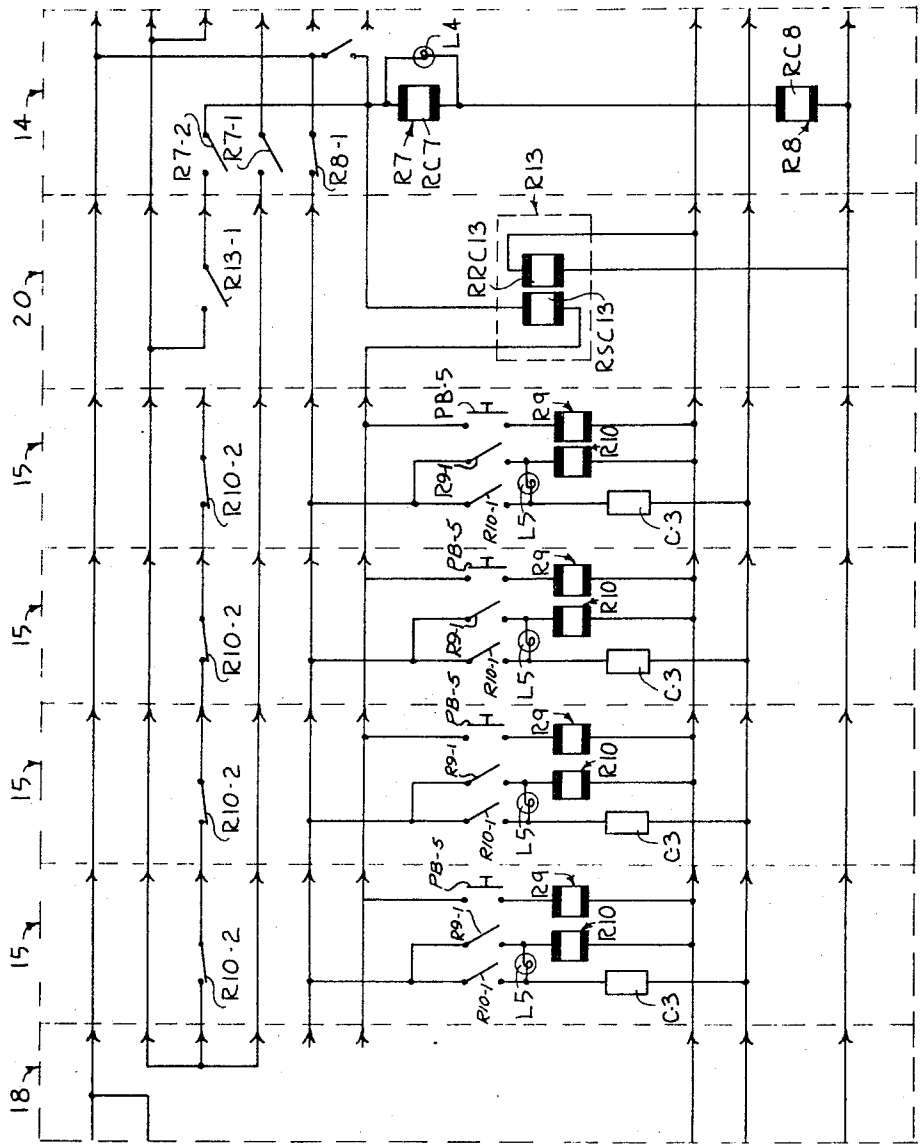

14
20
15
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15
15
18
L4
R7-2
R7-1
R8-1
R7
RC7
R13
RRC13
RSC13
RC8
R8
R13-1
PB-5
R9
R10
R9-1
R10-1
L5
C-3
R10-2

Fig. 25

VOTING MACHINE

This is a division, of application Ser. No. 755,688, filed on Aug. 27, 1968.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to apparatus for producing electrical pulses representative of a particular selection made on the apparatus and more particularly to a built-up type voting machine having modular components which fit together to define the complete machine.

2. Discussion of the Prior Art

There are basically two types of voting machines on the market today. One of these types is the mechanical voting machine such as that manufactured by the Automatic Voting Machine Company of Jamestown, N.Y. and another type is the vote recorder using a computer input card as that manufactured by the I.B.M. Corporation of Armonk, N.Y.

One of the major problems with the mechanical type voting machine is its very high initial cost. Also, the mechanical type voting machine is extremely heavy and requires extensive preventive maintenance to insure that the voting machine operates properly. Moreover, the mechanical type voting machine requires storage in a controlled environment to prevent corrosion of the voting machines during storage. The construction of the mechanical type voting machine allows tampering to change the results of the election. Moreover, set-up for these mechines is very time-consuming and requires a skilled technician.

While the vote recorder type voting machine does not require extensive maintenance or storage in a controlled environment, the results of the election can be very easily changed by placing certain objects in the vote recorder to change the position of the computer card therein as it is being punched. Moreover, the requirement that the computer card be carried to a centralized location to be run through the tabulating computer greatly increases the likelihood of the election results being changed by tampering. While the initial cost of the vote recorder, itself, is relatively low, the cost of a computer to total the results indicated by the computer cards from the vote recorder is very expensive. Moreover, set-up for the election books for use in these recorders is very time-consuming. The time required for correcting errors is prohibitiveand the necessity of repunching the computer cards that do not initially run in the computer introduces a high risk of election fraud.

SUMMARY OF THE INVENTION

These and other problems associated with prior art voting machines are overcome by the invention disclosed herein in that the construction of the modules used to make up the voting machine is such that the assembled voting machine cannot be tampered with to change the election results. Moreover, the use of a minimum number of different types of modules to make up the machine greatly reduces the overall cost of the voting machine. The use of modules to make up the machine allows the machine size to be varied in accordance with the size of the election so that the machine size is kept to a minimum. The modules are electrically connected together so that not only is overvoting prevented, but the results indicated by the machine may be fed to a central location for recording the votes automatically from the precincts. Furthermore, by electrically connecting the modules, the various components may be selectively located remotely of the machine proper, resulting in the best possible machine layout and the most effective use of each component.

Therefore, it is one of the objects of the invention to provide a voting machine which is accurate and which prevents varying of the election results by tampering with the machine.

Another object of the invention is to provide a voting machine which may actuate local and remote computer devices for recording the votes.

Another object of the invention is to provide a voting machine which is inexpensive to manufacture, durable in structure, and efficient in operation.

Another object of the present invention is to provide a voting machine that has few moving parts and which requires substantially no maintenance.

Another object of the invention is to provide a voting machine made up of modular components of minimum cost so that any one of the modular components may be discarded when it functions improperly.

Another object of the invention is to provide a voting machine which can be serviced by inexperienced personnel.

Another object of the invention is to provide a voting machine which lends itself to an infinite variety of arrangements for different sizes and types of elections.

Another object of the invention is to provide a voting machine which is not limited to a predetermined number of issues which can be presented.

Another object of the invention is to provide a voting machine which may be readily and easily operated.

Another object of the invention is to provide a voting machine which requires minimum supervision when in use.

Another object of the invention is to provide a voting machine which provides for write-in votes and which will automatically store such write-in votes.

Another object of the invention is to provide a voting machine in which the vote counters cannot be reset until the machine is disassembled and in which the vote counters will be automatically zeroed upon assembly of the machine.

Another object of the invention is to provide a voting machine which provides verification to the voter of his selection of a candidate or issue and verification of the actual recording thereof.

Another object of the invention is to provide a voting machine which includes a supervisory indication to the poll worker that voting has taken place.

Another object of the invention is to provide a voting machine which, when the votes are to be counted, permits simultaneous observation of the counters by a number of people for verification of the total number of votes recorded for each candidate or issue.

Another object of the invention is to provide a voting machine which requires little space for storage and which is corrosion-free.

Another object of the invention is to provide a voting machine which may be electrically connected to a central location to provide signals thereto for recording the vote at this central location.

Another object of the invention is to provide a voting machine which is complete in itself and which can be

easily transported to a central location for the counting of the votes in a sealed or unsealed condition.

Another object of the invention is to provide a voting machine which verifies the number of voters using the machine.

Another object of the invention is to provide a voting machine which can be operated from batteries.

These and other objects, features and advantages of the invention disclosed herein will become more apparent from consideration of the following specification and accompanying drawings wherein like characters of reference designate corresponding parts throughout the several views and in which:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front elevational view of an assembled voting machine;

FIG. 2 is a side elevational view of the voting machine shown in FIG. 1;

FIG. 3 is a perspective view of one of the control modules of the invention;

FIG. 4 is a perspective view of a vote module of the invention;

FIG. 5 is a side elevational view of the vote module shown in FIG. 4 showing the plug connection therefor;

FIG. 6 is a perspective view of the write-in vote module of the invention;

FIG. 7 is a partial cross-sectional view of two modules showing how the vote recording counters are reset;

FIG. 8 is a bottom view of the write-in module with portions thereof removed to show the internal components thereof;

FIG. 9 is a cross-sectional view taken along line 9—9 in FIG. 8;

FIG. 10 is a cross-sectional view taken along line 10—10 in FIG. 8;

FIG. 11 is an enlarged partial perspective view showing the construction of the cover door of the write-in module;

FIG. 12 is an electrical schematic diagram for the input module of the invention;

FIG. 13 is an electrical schematic diagram for the party control module of the invention;

FIG. 14 is an electrical schematic diagram for the party vote module of the invention;

FIG. 15 is an electrical schematic diagram for the write-in vote module of the invention;

FIG. 16 is an electrical schematic diagram for the individual control module of the invention;

FIG. 17 is an electrical schematic diagram for the individual vote module of the invention;

FIG. 18 is an electrical schematic diagram for the terminal module of the invention;

FIG. 19 is an electrical schematic diagram for the slave input module of the invention;

FIG. 20 is an electrical schematic diagram for the multiple control module of the invention;

FIG. 21 is an electrical schematic diagram for part of an assembled voting machine;

FIG. 22 is an electrical schematic diagram for the rest of the assembled voting machine of FIG. 21.

FIG. 23 is a partial elevational view of a second embodiment of the lockout means to prevent overvoting;

FIG. 24 is a cross-sectional view of the lockout means shown in FIG. 23; and

FIG. 25 is an electrical schematic diagram showing the multiple control module in use.

These figures and the following detailed description disclose specific embodiments of the invention; however, the inventive concept is not limited thereto since it may be embodied in other forms.

DESCRIPTION OF ILLUSTRATIVE EMBODIMENTS

Referring in detail to the figures of the drawings, it will be seen that the apparatus of the invention illustrated is a built-up structure using an assembly of different types of modules, blocks or closures which fit together to form the completed voting machine. It is to be understood, however, that, while one particular arrangement of modules is depicted in the drawings, the voting machine may have a variety of arrangements to suit the particular requiements of a particular plebiscite.

In the embodiment chosen for illustrating our invention, the major components include a plurality of modules M, a power supply PS, and the support frame assembly J. There are, however, basically nine different types of modules M associated with the machine, these being an input module **10**, a party control module **11**, a party vote module **12**, individual control module **14**, an individual vote module **15**, a write-in vote module **16**, a terminal module **18**, a slave input module **19** and a multiple control module **20**. The modules M are illustrated assembled to form a general election section designated by the letters GES and an independent election section designated by the letters IES.

The input module **10** properly connects the other modules to the power supply PS to operate the same. In the disclosed embodiment of the machine, the module **10** also provides the total vote pulse producing function for the machine, the reset function of the machine, and the correct function of the machine. There is one module **10** associated with each voting machine.

The party control module **11** controls the lockout function for all of the vote modules **12, 15** and **18** in the general election section GES. It renders the select portions of the modules **12, 15** and **18** inoperative when one of the vote modules **12** is energized It does not, however, have any effect on the vote modules **15** and **18** in the independent election section IES. There will be one party control module **11** associated with each general election section GES.

The party vote module **12** controls the select function for one party in the general election section GES. There will be one module **12** for each party in the general election. The module **12** also controls the ground return path for the control modules **11** and **14** in the general election section GES to carry out the lockout function.

An individual control module **14** is associated with each individual race in both the general election section GES and the independent election section IES. The modules **14** control the lockout function for each political race. They render the select portion of those modules **15** and **18** in that particular race inoperative to prevent overvoting. When the module **14** is used in the general election section GES, it also controls the ground return path for the party control module **11** to carry out the lockout function.

An individual vote module **15** is associated with each candidate in each political race in both the general election section GES and the independent election section IES. Each module **15** controls the ground return

path of its associated individual control module **14** for that political race to carry out the lockout function thereof.

A write-in vote module **18** is associated with each political race in which write-in votes are expected. Each module **18** performs a select function and controls the ground return path as does the modules **15.** In addition, each module **18** provides an internally carried write-in ballot for the voter to write in his vote. It is also understood that a write-in vote module **18** may be provided for write-in party voting in the party grouping of the general election section GES.

A terminal module **16** is associated at the end of each general election section GES and at the end of each unit of the voting machine carried by the frame assembly J. The modules **16** provide ground return paths for the modules **11–16** between it and the input module **10** as well as a transfer of the total vote pulse producing function, the reset function, and the correction function to the other modules **14–16** in that unit of the voting machine carried by each frame assembly J.

The slave input module **19** allows a voting machine to be made up of several units, each unit being carried by a separate frame assembly J. This makes provision for the voting machine to be expanded to encompass any size election while controlling the election with one input module **10.** The slave input module **19** is placed in the same position in each of the additional units of the voting machine as is the input module **10** in the first unit of the machine. It is connected to the module **10** directly or indirectly through other modules **19** and transfers the total vote pulse producing function, the reset function, and the correct function from the module **10** to the modules **11–18** in that unit associated with the slave input module **19.**

The multiple control module **20** makes provision for voting for more than one candidate in a political race such as is usually the case for county commissioners. The multiple control module **20** is placed between the control module **14** and the vote modules **15** and **18** in the multiple vote race. The module **20** serves to bypass the lockout function of its associated modules **14, 15** and **16** until the voter has selected the prescribed number of candidates in that particular race.

In the embodiment of the invention illustrated, the vote counter for each party or candidate is carried in the particular vote module **12, 15** or **18** associated with that candidate. Until the voter makes his selection, none of the counters are connected to ground or to the hot wire. When the select switch of a module **12, 15** or **18** is depressed by the voter to select the candidate for which he wants to vote, the associated counter is connected to ground. When the input module **10** is actuated to perform the vote pulse producing function, it connects all of the counters to a hot wire. This actuates these counters connected to ground to record the votes. In this manner, no voltage can be imposed across the counters until the vote lever is pulled.

While the vote lever to initiate the total vote producing function is located in the input module **10,** it is understood that it may be remotely located and still operate properly. While the correct lever to initiate the correct function of the machine is located in the input module **10,** it likewise may be remotely located and still operate properly. The vote counters are illustrated located in each vote module **12, 15** or **18;** however, it is understood that these counters may be easily located remotely of the machine and still operate properly simply by their connection to the pulse producing circuitry of the invention. Likewise, it is understood that a central computer vote counting station may be connected to the vote pulse producing circuitry of the invention to cumulatively record the votes from several remote voting locations.

FRAME ASSEMBLY

The frame assembly J supports the various modules **10–20** when they are assembled and presents them at a convenient height and angle for voting. The frame assembly J includes a pair of spaced apart parallel support rods **21** which are generally vertically oriented when the voting machine is in use. The upper ends of the support rods **21** are joined by an upper end cap **22** which is fixed with respect to the support rods **21.** The lower ends of the support rods **21** extend through a lower end cap **24** through appropriate apertures **23** therein with the modules **10–20** being selectively carried in different numbers between the upper end cap **22** and the lower end cap **24.** For selectively locking the modules **10–20** between the end caps **22** and **24,** a plurality of apertures **25** are provided through each of the support rods **21** with the apertures **25** of one support rod **21** being aligned with the apertures **25** in the other support rod **21.** A locking pin **26** is selectively extendable through a passage **28** through the lower end cap **24** and through appropriate apertures **25** through the support rods **21** to affix the selective number of modules **10–20** between the end caps **22** and **24.** An appropriate passage **29** is provided through one end of the locking pin **26** and a head **30** is provided on the other end of the locking pin **26** so that a conventional padlock P may be inserted through passage **28** to lock the pin **26** in position and prevent the diassembly of the voting machine until the padlock P is removed.

The frame assembly J also includes a support stand which may be mounted on a conventional table T and includes a support plate **31** defining appropriate passages **32** therethrough which receive the support rods **21** therethrough and position the voting machine at the desired angle. The height of the table T determines the vertical position of the voting machine when it is placed on the support plate **31.** Therefore, it will be seen that the modules **10–20** are selected to properly construct the voting machine for the desired number of political races and are slidably positioned between the support rods **21.** After the desired number of modules **10–19** are placed between the support rods **21,** the bottom end cap **24** is slipped thereon and the locking pin **26** is placed therethrough. The padlock P is placed through the passage **28** to lock the voting machine together. It will be seen that the apertures **25** through the support pins **21** are so arranged that the modules **10–20** will always be tightly locked between the end caps **22** and **24** and cannot be disassembled until the padlock is removed from the locking pin **26.** In this manner, the voting machine can be assembled at one location, then transported to the polling station, and placed in the support plate **31** for the voting to take place. After the voting is completed, the voting machine is removed from the support plate **31** and taken to a central tabulating station so that the total vote may be tabulated from the counters indicating the vote on the voting machine.

Each of the illustrated modules **10–20** are of standard thin wall construction and are provided with a positioning lug L at each end thereof as best seen in FIGS. **1–6** which position the modules between the support rods **21** in a stacked relationship. It is understood that the modules **10–20** may be a molded unit with the components positioned therein prior to molding. This type construction is ideally suited for the modules since the cost thereof is so low that a module can be discarded rather than repaired when it functions improperly. Also, the components may be first encapsulated and then placed in the module.

The fronts of modules **12** and **15** are provided with windows **23** which have spaces for candidate and party cards. Modules **11–15** and **20** are provided with overhanging lips **27** which close the top of the window **23** of the next lower module when the machine is assembled to prevent the cards from being changed during the election or before disassembly.

INPUT MODULE

The input module **10** controls the overall operation of the voting machine. It is connected to the power supply PS and to each of the other modules **11–18** and **20** through male and female plug connections A and B. The module **10** is best seen in FIGS. **1** and **2** and in the electrical schematic of FIGS. **12** and **21.**

The illustrated input module **10** carries the vote lever **35** which causes the vote selected for each race to be recorded. A correct lever **36** is also provided which allows correction prior to the time vote lever **35** is pulled to record the votes.

Referring more particularly to FIGS. **12** and **21,** the module **10** is connected to the power supply PS through terminals X, Y and Z. Common ground wire **40** is connected to terminal Y, and common hot wire **41** is connected to terminal Z. A reset unit **42** which resets the voting machine for the next voter is connected to the module **10** through terminals Q, R, T and V. The module **10** is provided with a plug connection A with a number of connections designated **10–1** to **10–9.**

Each side of each of the modules **11–18** and **20** is provided with corresponding plug connections, the female portion B located on one side and the male portion A on the opposite side. In this manner the modules can be stacked between the guide rods **21** and connections made therebetween. Each connection of each module will be referenced by the module designation with a connection number suffix and a letter suffix to indicate male or female portion. For example, the first male portion of the module **11** connection will be designated **11–1A.** These connections mate with each other and with connections **10–1** to **10–9** of the module **10.** The connections **1A** and **1B** are associated with the common ground wirefor the circuit and the connections **7A** and **7B** are associated with the common hot wire for the circuit. Connections **8A** and **8B** a are associated with the vote pulse producing function of the circuit while connections **9A** and **9B** are associated with the reset and correct function of the circuit. Connections **2A** and **2B, 3A** and **3B, 4A** and **4B, 5A** and **5B,** and **6A** and **6B** serve as ground controls for the select portions of the circuit and are therefore associated with the lockout function of the circuit to prevent overvoting.

Common hot wire **41** is connected to hot wire **44** which is in turn connected to the connection **10-7.** Common ground wire **40** is connected directly to connection **10-1.** Wire **45** connects ground wire **40** with the voting circuit **46** and correct circuit **48.** Vote circuit **46** is connected between wire **45** and wire **44** and comprises the normally closed contacts **R1-1,** the coil RC2 of relay R2 and the vote pushbutton switch PB-1 in series. Therefore, it will be seen that closing switch PB-1 energizes coil RC2. Correct circuit **48** is connected between secondary ground wire **49** and wire **45,** the wire **49** being connected to connection **10-9.** Correct circuit **48** includes correct pushbutton switch PB-2 and normally closed contacts R2-2 of relay R2 in series with each other and in parallel with normally open contacts R1-2. Therefore, it will be seen that closing switch PB-1 or contacts R1-2 will connect wire **49** to common ground wire **40.** If relay R2 is energized, switch PB-2 becomes ineffective. Connecting secondary ground wire **49** to common ground wire **40** resets all of the modules **10–16** and **18.**

Secondary hot wire **50** is connected to connection **10-8** and to hot wire **44** through normally open contacts R2-1 of relay R2. Therefore, it will be seen that wire **50** will have a voltage applied thereto when relay R2 is energized by closing switch PB-1 or the vote switch. This serves to activate the vote counters associated with each of the activated vote modules **12, 15** and **16,** as will be explained hereinafter, to record votes for the selected candidates. Coil RC2 of relay R2 is maintained energized after switch PB-1 is opened by wire **51** which connects one side of coil RC2 with secondary hot wire **50.** Coil RC2 is de-energized when contacts R1-1 are opened by energizing relay R1.

Coil RC1 of relay R1 is connected between hot wire **41** and ground wire **45** through connection Q, reset pushbutton switch PB-3 of reset unit **42,** and connection R. Therefore, it will be seen that closing switch PB-3 will close contacts R1-2 to connect wire **49** to ground and open contacts R1-1 to de-energize relay R2 and reset the machine.

Reset unit also includes an indicator light L1 connected between ground wire **45** and secondary hot wire **50** through connection R and connection V. Thus, when voltage is applied to wire **50,** light L1 will be illuminated to indicate to the poll worker that voting has taken place. When switch PB-3 is closed by the poll worker, voltage is removed from wire **50** because contacts R2-1 are opened and light L1 goes out.

To indicate the total number of people who have voted on the voting machine and for verifying the vote cards kept by the poll worker, a counter C-1 is provided in the input module **10.** The counter C-1 is electrically operated and is connected between ground wire **40** and a secondary hot wire **50.** Therefore, when switch PB-1 is closed, counter C-1 will be activated to record that one person has voted. The counter C-1 will be covered until the voting machine is transported to the central tabulating station as will be explained hereinafter.

Connection **10-2** is connected to ground wire **40** for connection with the individual control module **14** as described hereinafter. Connections I through V are provided for connection to the slave input module **19.** Connection I is connected to secondary hot wire **50,** connection II is connected with secondary ground wire **49,** connection III is connected to hot wire **44** and connection IV is connected to common ground wire **40** through wire **45.** In this manner, more than one stack

of modules 11–18 may be controlled by the control module 10 as will be explained hereinafter.

PARTY CONTROL MODULE

The party control module 11 controls the party vote modules 12 connected thereto and is best seen in FIGS. 3, 4 and 13. The module 11 includes a ready light L2 which indicates when the party vote section is ready to operate, a reset relay R3 and an operational relay R4 which controls overvoting in the party and individual candidate voting sections.

Ground connection 11-1A is connected directly to connection 11-1B through wire 54 and wire 54 is connected to connection 11-2B. Wire 54 is also connected to control connection 11-5B through normally closed contacts R3-2 of relay R3 and to connection 11-6B through normally open contacts R3-1 of relay R3 and wire 52. Wire 52 is also connected to control connection 11-4B through normally open contacts R4-1 of relay R4.

Hot connection 11-7A is connected directly to connection 11-7B through wire 55 and secondary hot connection 11-8A is connected directly to connection 11-8B. Secondary ground connection 11-9A is connected directly to connection 11-9B through wire 56. Coil RC3 of relay R3 is connected between wire 56 and 55 and coil RC4 of relay R4 is connected between wires 55 and 52. Light L2 is connected across coil RC4 in parallel therewith.

When coil RC3 is momentarily energized, contacts R3-1 are closed and contacts R3-2 are opened. This connects coil RC4 to ground and disconnects the counters of the modules 12 from ground so that coil RC4 will be energized and held in that condition for the modules 12 to operate as will be explained. It will also be seen that relay R3 is energized both to reset the machine and to correct the machine prior to the time the vote lever 35 is pulled. This feature will be more fully explained in the operation section.

PARTY VOTE MODULE

The party vote module 12 is best seen in FIGS. 5 and 14. It includes a select pushbutton switch PB-4 for selecting a particular party in the election, there being one module 12 for each party in the race. When the switch PB-4 is momentarily closed, a counter C-2 associated with the module 12 will be connected for activation when vote lever 35 is pulled and a select light L3 will be illuminated.

Referring specifically to FIG. 14, ground connection 12-1A is connected directly to connection 12-1B, control connection 12-2A is connected to connection 12-2B through normally closed contacts R6-2 and control connection 12-4A is connected directly to connection 12-4B. Control connection 12-5A is connected to connection 12-5B through wire 58 and control connection 12-6A is connected to connection 12-6B through wire 60. Hot connection 12-7A is connected to connection 12-7B through wire 59. Secondary hot connection 12-8A is connected to connection 12-8B. through wire 61, and secondary ground connection 12-9A is connected directly to connection 12-9B.

Coil RC5 of relay R5 is connected between wires 59 and 60 in series with select pushbutton switch PB-4. Relay R5 serves to initiate the connection of the counter to ground.

Counter C-2 is connected to wire 61 and to normally open contacts R6-1 of relay R6 through wire 62 and contacts R6-1 are in turn connected to wire 58 through wire 64. Wire 65 connectes one side of coil RC6 of relay R6 to wire 59 and wire 66 connects the other side of coil RC6 to normally open contacts R5-1 of relay R5. Contacts R5-1 are in turn connected to wire 64. Wire 68 connects wires 66 and 62 and select light L3 is connected between wires 65 and 62. Relay R6 serves to hold counter C-2 connected to ground until de-energized when the machine is reset.

The party vote module 12 always follows a party control module 11 or another vote module 12 which is in turn connected to the party control module 11. In this manner wire 59 will always be connected directly to common hot wire 41, wire 61 will always be connected directly to secondary hot wire 50. Wire 58 will be connected to common ground wire 40 through normally closed contacts R3-2. Wire 60 will be connected to ground wire 40 through contacts R4-1, the modules 12-16 and 20 between the module 12 and the terminal module 18, and back through each of the contacts R6-2 in the party vote modules 12.

When contacts R4-1 are closed and there is a ground path available through the modules 12-16 and 20 as will be explained later, relay R5 will be energized to close contacts R5-1. This energizes relay R6 by connecting coil RC6 to ground wire 40 through contacts R3-2. Energizing relay R6 opens contacts R6-2 and closes contacts R6-1 associated with the energized relay R6. Closing contacts R6-1 maintains coil RC6 and counter C-2 connected to ground wire 40 through contacts R3-2. Opening contacts R6-2 interrupts the ground path for wire 60 and relays R5 so that relay R5 is not only de-energized, but cannot be re-energized when switch PB-5 is closed. This condition is maintained until relay R3 is energized to open contacts R3-2 and interrupt the ground path of relay R6 and counter C-2.

INDIVIDUAL CONTROL MODULE

The individual control module 14 is similar in design to the control module 11 as seen in FIG. 1, 2 and 16 and controls the individual candidate or issue section of the voting machine. It is provided with a ready light L4 to indicate when the individual voting section is operational and includes a reset relay R8 for resetting or correcting the individual vote section. An operational relay R7 is also provided for maintaining the individual vote section operational.

Referring more specifically to FIG. 16, ground connection 14-1A is connected to connection 14-1B by wire 69 while control connection 14-2A is connected to connection 14-2B by wire 70. Control connection 14-3A is connected to wire 70 and control connection 14-4A is connected to connection 14-4B through normally open contacts R7-1 of relay R7. Wire 71 connects normally open contacts R8-1 with wire 69 and wire 72 connects contacts R7-1 with connection 14-6B. Wire 71 is connected to connection 14-5B through normally closed contacts R8-2 and wire 72 is connected to connection 14-3B through normally open contacts R7-2 of relay R7.

Wire 74 connects hot connection 14-7A with connection 14-7B, secondary hot connection 14-8A is connected directly to connection 14-8B, and wire 75 connects secondary ground connection 14-9A with con-

nection 14-9B. Coil RC8 of relay R8 is connected between wires 74 and 75 and coil RC7 of relay R7 is connected between wires 72 and 74. Ready light L4 is connected across coil RC7 in parallel therewith.

Relay R8 performs the same function as relay R3 when wire 75 is momentarily connected to ground by closing contacts R8-1 and opening contacts R8-2. This connects coil RC7 to ground and disconnects the counters of the vote modules 15 associated therewith from ground. This energizes relay R7 and holds it in that condition for the module 15 associated therewith to operate as will be further explained in the operation section.

INDIVIDUAL VOTE MODULE

The individual vote module 15, as best seen in FIGS. 1, 2 and 17, is similar in construction to the vote module 12 and is provided with a select pushbutton switch PB-5 for selecting a particular candidate or issue. A plurality of modules 15 are connected to the control module 14 and operate in a manner similar to the party vote section. There is one module 15 for each candidate and issue in the election.

As seen in FIG. 17, ground connection 15-1A is connected directly to connection 15-1B, control connection 15-2A is connected directly to connection 15-2B, control connection 15-4A is connected directly to connection 15-4B, and secondary ground connection 15-9A is connected directly to connection 15-9B. Control connection 15-3A is connected to connection 15-3B through normally closed contacts R10-2 of relay R10, and wire 76 connects control connection 15-5A with connection 15-5B. Control connection 15-6A is connected to connection 15-6B by wire 78, wire 79 connects hot connection 15-7A with connection 15-7B and secondary hot connection 15-8A is connected to connection 15-8B by wire 80.

Coil RC9 is connected between wires 78 and 79 in series with select pushbutton switch PB-5. One side of vote counter C-3 is connected to wire 80 and the other side of counter C-3 is connected to normally open contacts R10-1 of relay R10 by wire 81. Normally open contacts R10-1 are in turn connected to wire 76 by wire 82. One side of coil RC10 of relay R10 is connected to wire 79 by wire 84 and the other side thereof is connected to normally open contacts R9-1 of relay R9 by wire 85. The contacts R9-1 are also connected to wire 82. Wire 85 is connected to wire 81 by wire 86 and lamp L5 is connected between wires 84 and 81. Relay R9 serves to initiate the connection of the counter C-3 to ground and relay R6 serves to hold counter C-3 connected to ground until deenergized when the machine is reset. When a voltage is imposed on wire 80, counter C-3 will record one vote for the selected candidate or issue.

WRITE-IN VOTE MODULE

The write-in vote module 16 is best seen in FIGS. 6, 8–11, and 15. It presents a section of blank paper tape 90 to the voter if he decides to write in his vote. The tape 90 is hidden by a cover door 91 until the vote lever 35 is pulled. The tape 90 is carried within a cartridge 150 by a driven spool 92 and an idler spool 94 with the driven spool 92. A tape and door release mechanism 98 releases the tape 90 and opens the door 91 so that a predetermined amount of blank tape 90 is presented to the voter. The door 91 is closed by a closure mechanism 99 when the voting machine is reset. Therefore, the tape 90 is presented for voting and then stored internally in the machine.

Referring more specifically to FIGS. 8–11, the module 16 includes a housing 100 defining an opening 101 in the front wall thereof. An opening 102 is provided in the rear wall of the housing 100 for the insertion therethrough of the cartridge 150 which carries the spools 92 and 94 and the tape 90. When the cartridge 150 is fully seated in the housing 100, a locking pin 151 is passed through the side wall 103 and lug 104 of the housing 100 and through appropriate apertures through the cartridge 150 to lock the same in the housing 100. A padlock P is passed through the end of the pin 151 and a lug 96 affixed to the housing 100 to keep the cartridge 150 in place until the votes are ready to be counted.

The spools 92 and 94 are rotatably mounted in the cartridge 150 and the idler spool 94 is equipped with a resistance device of conventional design to maintain a tension on the tape 90 as it is transferred from the spool 94 to the spool 92. A support table 152 is provided in the forward end of the cartridge 150. The tape 90 passes over the table 152 as it passes from the spool 94 to the spool 92. When the cartridge 150 is in position in the housing 100, the support table 152 presents the tape 90 directly behind the opening 101 for the voter to write thereon. Idler rolls 154 direct the tape 90 over the table 152 and between spools 92 and 94.

A hysteresis electric motor 95 carried by the housing 100 is drivingly connected to the spool 92, when the cartridge 150 is in position, by a gearing arrangement 105. The motor 95 is constantly energized but the movement of the tape 90 is intermittently stopped by a check pin 155.

The check pin 155 is slidably carried by one of the side walls of the cartridge 150 adjacent the tape 90 as it passes from the spool 94 to the spool 92. The pin 155 has a projection 156 which engages one of a series of pre-punched holes 158 (FIG. 10) through the tape 90 when the pin 155 is pressed toward the tape 90. The holes 158 are punched a predetermined distance apart so that a blank piece of the tape 90 will be presented over the table 152 each time the pin 155 releases the tape 90 and re-engages the next hole 158. A leaf spring 159 constantly urges the pin 155 away from the tape 90 and a release mechanism 98 intermittently urges the pin 155 toward the tape 90 to arrest the movement thereof.

The tape 90 may be of any of a number of materials. The tape 90 shown is a paper tape commercially available on the market today and has sufficient strength to prevent it from tearing when the projection 156 engages the holes 158.

The release mechanism 98 is carried by the housing 100 adjacent the pin 155 when the cartridge 150 is in position. A bellcrank 111 connected to a solenoid SOL-1 urges the pin 155 toward the tape 90 in its normal unenergized position. When the solenoid SOL-1 is energized, the plunger 112 thereof is retracted to release pin 155 and allow spring 159 to move projection 156 out of hole 158. This permits the tape 90 to advance. Solenoid SOL-1 is only momentarily energized so that pin 155 will again be urged toward tape 90 and projection 156 will engage the next hole 158 to arrest movement of tape 90. A blank piece of tape 90 is now positioned under opening 101. A cam 110 on the bell

crank 111 allows the cartridge 150 to be inserted in the housing 100 without interference with pin 156.

At the same time the tape 90 is released, the mechanism 98 also releases the cover door 91 so that it may be opened for the write-in vote. The door 91 is pivoted to the housing 100 at 114 and is provided with a catch lug 115 which extends into the housing 100 through slot 116 when the door 91 is closed. A bolt assembly 118 carried within the housing 100 engages the catch lug 115 and holds the door closed.

The bolt assembly 118 includes a bolt 119 slidably carried within the housing and arranged for extension into a passage 120 through the lug 115 when the door is closed. The bolt 119 is urged by spring 117 toward the lug 115 and both the bolt and lug are complementarily beveled to cause the bolt 119 to retract as the door 91 is closed and then extend into the passage 120 when the door is fully closed. This locks the door in a closed position.

An extension 121 affixed to the bolt 119 is engaged by the bell crank 111 as the plunger 112 is retracted to retract the bolt 119. This allows the door 91 to open and expose the tape 90 under the opening 101. As soon as solenoid SOL-1 is de-energized, the bolt 119 is returned to its extended position by spring 117.

The assembly 99 opens and closes the door 91 once it is unlatched. The assembly 99 includes a solenoid SOL-2 which has its plunger 122 pinned to arm 124 attached to door 91. The solenoid SOL-2 is pivotally mounted in housing 100 so that extension of plunger 122 opens door 91 and retraction thereof closes door 91.

In its normal de-energized position, the plunger 122 is urged toward extension. Therefore, when the door 91 is unlatched, it is automatically opened. When solenoid SOL-2 is energized, plunger 122 is retracted and the door 91 closed. Since the bolt 119 is extended when the door 91 is closed, the door will be latched in its closed position.

As will be further explained in the operation section, the solenoid SOL-1 will be energized when vote lever 35 is pulled to open door 91. Solenoid SOL-2 will be energized when reset switch PB-3 is closed to close door 91.

Referring more particularly to FIG. 15, ground connection 18-1A is connected to connection 18-1B by wire 125, control connection 18-5A is connected to connection 18-5B by wire 126, and wire 128 connects control connection 18-6A with connection 18-6B. Wire 129 connects hot connection 18-7A with connection 18-7B, secondary hot connection 18-8A is connected to connection 18-8B by wire 130, and wire 131 connects secondary ground connection 18-9A with connection 18-9B. Control connection 18-2A is connected directly to connection 18-2B, control connection 18-4A is connected directly to connection 18-4B, and control connection 18-3A is connected to connection 18-3B through normally closed contacts R12-2 of relay R12.

The motor 95 is connected between wires 129 and 125. Coil RC11 of relay R11 is connected between wires 128 and 129 in series with select pushbutton switch PB-6 for selecting a write-in vote to be made. One side of counter C-4 is connected to wire 130 while wire 135 connects the other side of counter C-4 to normally open contacts R12-1 of relay R12. Wire 136 connects contacts R12-1 to wire 126. Wire 132 connects one side of coil RC12 of relay R12 to wire 129 while the other side of coil RC12 is connected to normally open contacts R11-1 of relay R11 by wire 134. Contacts R11-1 are in turn connected to wire 136. Wire 138 connects wires 134 and 135 and select light L6 is connected between wires 132 and 135.

Therefore, it will be seen that the above described portion of the circuit associated with relays R11 and R12 and counter C-4 operates in a manner similar to the corresponding portions of the vote modules 12 and 15. Moreover, the motor 95 is constantly energized as will be further explained hereinafter.

Solenoid SOL-1 is connected between wires 130 and 135 and solenoid SOL-2 is connected between wires 130 and 131. When counter C-4 is energized, solenoid SOL-1 will also be energized to open the door 91. When the machine is reset, solenoid DOL-2 is energized to close the door 91 as set forth in the operation section.

TERMINAL MODULE

The terminal module 18 is best seen in FIGS. 1, 2 and 18 and is placed at the end of each unit carried by the frame assembly J as well as between a general election section GES and an independent election section IES. The terminal module 18 serves two functions: first, it provides a ground return path for the lockout and selection portions of the modules associated therewith and secondly, transfers the vote pulse producing function, the correction function, and the reset function to those modules following it.

As best seen in FIG. 18, ground connection 18-1A is connected to connection 18-1B, hot connection 18-7A to connection 18-7B, secondary hot connection 18-8A to connection 18-8B, and secondary ground connection 18-9A to connection 18-9B. Control connection 18-2B is also connected to ground connections 18-1A and 18-1B. Control connections 18-2A, 18-3A and 18-4A are all connected to each other.

SLAVE INPUT MODULE

The slave input module 19 as best seen in FIG. 19 has the same type housing as the terminal module 18. It is used when several module stacks carried by different frame assemblies are necessary for each voting machine and serves to transfer the functions of the input module 10 so that one vote lever 35 and correct lever 36 control the entire machine. The module 19 is placed in the same position in the stack as the module 10.

Module 19 is provided with connections IA-VA which correspond to connections I-V of the input module 10. These corresponding connections are connected to each other via a coaxial cable (not shown) so that the functions of the module 10 will be transferred to that stack of modules associated with the slave module 19.

Module 19 is also provided with connections IB-VB which are connected to corresponding connections IA-VA so that other modules 19 may be connected thereto. This allows further expansion of the voting machine.

The module 19 is also provided with connections 19-1 through 19-9 which correspond to connections 10-1 through 10-9 of module 10. Connection IVA is connected to connections 19-1 and 19-2, connection IIIA to connection 19-7, connection IIA to connection 19-9 and IA to connection 19-8. This causes the mod-

ules associated with the slave module 19 to operate in the same manner as those associated with the input module 10 and be controlled by the module 10.

MULTIPLE CONTROL MODULE

The multiple control module 20 allows more than one candidate or issue in a political race to be selected for voting. It cooperates with the control module 14 associated therewith to control the lockout function for that particular race associated therewith. The construction of the housing of the module 20 is the same as that for the party control module 11 shown in FIG. 3.

Referring specifically to FIG. 20, ground connection 20-1A is connected directly to connection 20-1B, control connection 20-4A to connection 20-4B, control connection 20-5A to connection 20-5B and secondary hot connection 20-8A to connection 20-8B. Control connection 20-2A is connected to connection 20-3A through normally closed contacts R13-1 of stepping relay R13. The stepping coil RSC13 of relay is connected between control connections 20-6A and 20-6B. Wire 160 connects hot connections 20-7A and 20-7B while wire 161 connects secondary ground connections 20-9A and 20-9B. The reset coil RRC13 of relay 13 is connected between wires 160 and 161.

The module 20 is always connected between the individual control module 14 associated with a race in which more than one vote is made and the vote modules 15 and 16 for each candidate or issue in that race. The module 20 overrides the lockout function of the modules 14–16 until a prescribed number of selections has been made.

Each time one of the select switches PB-5 or PB-6 is closed, the stepping relay R13 steps one position. When relay R13 has stepped, the prescribed number of positions, contacts R13-1 open to disconnect coil RC7 from ground to lockout the select switches of that race and prevent overvoting. When the machine is corrected or reset, coil RRC13 returns the relay R13 to its normal position closing contacts R13-1 again.

POWER SUPPLY

The power supply PS shown in FIG. 21 is effective to supply sufficient power to the voting machine through the input module 10 to operate the same. By appropriately varying the capacities of the components of the machine, a number of different types of power supplies may be used. For example, the machine may be connected directly to a 110 volt AC power source. Also the power supply may be a step-down transformer arrangement to give a low alternating voltage source or a step-down transformer and rectifier arrangement to give a low direct voltage source. The supply may also consist of a battery pack for use where electricity is not available. For purposes of illustration, the power supply PS shown is a step-down transformer arrangement.

The power supply PS is plugged into a 110 volt AC outlet through wires 164, 165, and 166. Wires 164 and 165 are connected to the primary coil of a transformer TW in series with a fuse 168 and power switch SW-1. Secondary coil of transformer TW is connected between ground wire 40 and hot wire 41 through terminals G and H. Provision is also made for connecting the secondary coil to additional voting machines in parallel with the one set forth above.

ALTERNATIVE EMBODIMENTS

While the voting machine is disclosed in modular form with all of the components positioned in the modules, the electrical circuitry of the machine readily lends itself to other types of arrangements. For example, the select switches PB-4, PB-5 and PB-6 may be carried on a single display board as well as the switches PB-1 and PB-2 and the other components mounted remotely thereof. Also, the vote pulse producing portion of the circuit may be connected to a local or remote counting means. In using a remote counting means, the vote pulses produced may be scanned to record the votes or stored in a memory unit and subsequently scanning for recording the votes. This will permit the use of a single conductor connection between the voting machine and the remote counting means.

As best seen in FIGS. 23 and 24, a mechanical equivalent of the electrical lockout portion of the circuit of the machine is illustrated. This arrangement will permit the elimination of the electrical circuitry for the lockout portion of the electrical circuitry of the modules 15 and 16. The arrangement will also allow only one select switch for that race to be closed at once and will open any other select switch that has been previously closed.

Each vote module 15 and 16 is provided with a pair of cams 200 which have a combined length equal to the width of the module 15 or 16 in which it is placed. The cams 200 are slidably received in a passage 201 which extends vertically through the module. A spring 202 retards movement of the cams 200 to prevent them from dropping out of the module when the machine is disassembled.

Each of the cams 200 is provided with a beveled corner 204 so that a camming surface 205 is formed. The cams 200 are positioned in the passage 201 so that the corners 204 face each other and the surfaces 205 form a V-shaped notch.

A slide member 206 is slidably carried in a passage 208 in each module so that the member 206 can be moved into the passage 201 along a line of motion substantially perpendicular to the line of motion of the cams 200. The slide member 206 is provided with a V-shaped wedge portion 209 which extends into the notch formed by the cams 200 as the slide member 206 is moved toward the passage 201. The camming surfaces 210 of the portion 209 engage the surfaces 205 and force the cams 200 apart. This causes the outer ends of the cams 200 to extend from opposite sides of the module.

When the cams 200 are extended from the module, they cause the cams 200 of the adjacent module to shift and force the other slide members 206 away from the cams 200. When another slide member 206 is moved toward the cams 200 it forces the other members 206 away from the cams 200. The switches PB-5 and PB-6 are mechanically connected to the slide members 206 so that only one of the switches PB-5 or PB-6 will be closed at once. The slide members 206 are reset by a solenoid arrangement (not shown) which manipulates the cams 200 when the reset or correct switches are closed.

Each of the slide members 206 are provided with a manipulating extension 211 which extends out through an opening 212 in the front of the module. The voter manipulates the extension 211 to select the candidate for whom he wishes to vote.

The embodiments of the invention illustrated herein disclose a voting machine in which the party votes are recorded on party vote counters C-2 carried in the party vote modules **12.** Also, once the voter selects and depresses one of the party select switches PB-4 on the party vote modules **12,** he cannot cancel his vote for any of the candidates of that party in the general election section GES. Since the particular election laws vary from state to state and from election to election, it may be necessary to add additional circuitry from time to time co comply with different election laws.

For example, at least one state requires that a voter be able to vote a straight party ticket and, at the same time, vote for a candidate of another party in any race in the general election. This can easily be accomplished by using more secondary hot wires and a switching circuit in each of the party vote modules **12.**

The lockout circuit will be arranged so that the individual vote modules will not disconnect the select portions of the individual vote modules upon closure of the select switches PB-4 of the modules **12** but will be disconnected when one of the select switches PB-5 for that particular race in the general election is closed. In this manner, the individual candidate of a different party may be voted for by the voter. Using this arrangement, the counters C-2 could be eliminated and only the counters C-3 and C-4 be used. Therefore, it will be seen that, even though additional circuitry may be used, the basic circuit arrangement will be retained.

ASSEMBLY

Any type or size of election can be accommodated by the voting machine herein disclosed simply by selecting the appropriate modules **10–20** and assembling them in a selected manner. The modules may be color coded to assist an unskilled workman in assembling the machine. The particular voting machine illustrated in FIGS. **1** and **2** is set up for a two party general election having two separate races with two candidates in each, and an additional independent election on a separate issue such as constitutional amendments. The assembly of this machine will be described in detail, it being understood that the inventive concept is by no means limited to this particular arrangement.

Each of the counters C-1 through C-4 is provided with a reset lever L′ which extends from the bottom of its corresponding module as seen in FIGS. **3-7.** When the lever L′ is pivoted, it resets the counter connected thereto. An appropriate slot **180** is provided in the top of each of the modules **11-18** through which the lever L′ passes when the next module is stacked thereagainst. A cam **181,** as best seen in FIG. **4,** is provided on each lever L′ which engages one of the slots **180** and automatically resets the counter associated therewith as the machine is assembled. Therefore, the counters C-1 through C-4 are automatically reset to zero when the machine is assembled. This substantially eliminates all tampering with the machine by presetting the counters to commit election fraud.

Once the type and size of the election is known, the worker assembling the machine simply selects the appropriate number of different types of modules **10–18,** checks each, and starts assembly. For the machine shown in FIGS. **1** and **2,** the worker selects one input module **10,** one party control module **11,** two party vote modules **12,** three individual control modules **14,** six individual vote modules **15,** three write-in vote modules **18** and two terminal modules **16.** The worker then checks each of the modules on a checking unit that can be designed by anyone skilled in the electrical art or on sub-assemblies of the machine to see if it functions properly. If one of the modules does not function properly, the worker simply discards it and gets another one because the cost thereof is so low.

The input module **10** is always the first module in the frame assembly J. It may be followed by a party control module **11** or an individual control module **14.** The party control module **11** is always followed by a plurality of party vote modules **12,** there being one module **12** corresponding to each party in the general election. A write-in vote module **16** may follow the last vote module **12** in the party race.

When there is a general election, an individual control module **14** always follows the modules of the party race. It is in turn followed by a plurality of individual vote modules **15,** there being one vote module **15** corresponding to each candidate in that particular race. A write-in vote module **16** may follow the last vote module **15.**

There will be an individual control module **14** for each separate race in the general election and for each separate race in the independent election. It will be followed by a vote module **15** for each candidate in that particular race. The last module **15** may be followed by a write-in module **16** in each race.

The end of each general election section GES and the end of each independent election section will always be followed by a terminal module **18.** This provides a ground return to accomplish the lockout function.

Once the modules have been checked for the particular embodiment shown, the worker removes the bottom end cap **24** from the frame assembly J and slides the input module **10** between the support rods **21** until the top of the module **10** rests against the underside of the upper end cap **22.** This places the vote lever **35** and the correct lever **36** at the front of the machine. The worker then places the appropriate name cards in the windows **23** and slides the rest of the modules up between the rods **21** in the following order: first, the party control module **11,** then the two party vote modules **12,** then one of the individual control modules **14,** then two of the individual vote modules **15,** then one of the write-in vote modules **18,** another of the individual control modules **14,** then two of the individual vote modules **15,** then one of the write-in vote modules **16,** then one of the terminal modules **16,** then the other individual control module **14,** then the other two individual vote modules **15,** then the other write-in module **18,** and finally the other terminal module **16.** It will be noted that the connections **1–9** of each module contact the connections **1–9** of the next adjacent module and that the lips **27** close the windows **23** so that the cards inserted therein cannot be removed until the machine is disassembled.

The worker then places the bottom end cap **24** on the rods **21** and presses the same toward the upper end cap **22** to insure that the modules **10–18** are tightly stacked together. This also lines the passage **28** up with two of the passages **25** through the support rods **21.** The workman then passes the locking pin **26** through the apertures **25** and passage **28** and places the padlock P therethrough to lock the same in place.

To prevent the voters from seeing the counters C-1 through C-4 and reading the results thereon, a cover

strip 170 is passed through aligned slots 171 in the end caps 22 and 24. This positions the strip 170 over the faces of the counters. The strip 170 is locked in place over the counters by a padlock P. The voting machine is now ready for use as soon as it is plugged into the power supply PS.

OPERATION

Referring also to FIGS. 1 and 2, that portion of the voting machine located between the input module 10 and the first terminal module 16 as you move down the machine covers a general election while that portion of the machine located between the two terminal modules 16 covers an independent election such as for a city election, amendments, etc. The modules 11 and 12 of the general election section GES are used when the voter votes a straight party ticket while the modules 14 and 15 are used when the voter votes for the individual candidates in each separate race of the general election section GES. There will always be one party control module 11 in each general election section GES followed by a party vote module 12 for each party in the general election.

There will be an individual control module 14 for each separate race in the general election section GES followed by an individual vote module 15 for each candidate in the particular race governed by that control module 14. If there are to be any write-in votes, then a write-in vote module 18 will follow the last individual vote module 15 in that particular race.

If the voter selects and depresses one of the party select switches PB-4 on the modules 12, all of the rest of the modules 12, 15 and 18 in the general election section GES are rendered inoperative to prevent overvoting. If, however, the voter selects and depresses one of the candidate selection switches PB-5 on one of the modules 15 in a particular race in the general election section GES, then only those modules 15 and 18 in that particular race and the party vote modules 12 become inoperative to prevent overvoting. The modules 15 and 18 in the other races are still operative so that the voter can vote in the other races.

When the voter selects and depresses one of the write-in vote switches PB-6 of the module 18 in a particular race, the modules 15 for that race and the modules 12 are rendered inoperative to prevent overvoting as set forth above for the operation when the switch PB-5 is closed. When the vote lever 35 is pulled to record the votes, the door 91 of the selected module 18 opens and the voter writes in his vote for that race. The door 91 is closed when the machine is reset.

If the voter makes a mistake, he can reset the machine by pulling the correct lever 36. This clears the machine and the voter starts his selection of candidates or parties all over again.

The selection of party or candidate in the general election section GES does not affect the operation of the independent election section IES between the terminal modules 16. The voter makes his selections in the section IES by depressing appropriate switches PB-5 or BP-6. Closing these switches causes the section IES to operate in a manner similar to the modules 15 and 18 of the general election section GES.

Referring more specifically to FIGS. 21 and 22, the operation of the voting machine is started by closing the power switch SW-1 to activate the power supply PS and impose a voltage across common ground wire 40 and common hot wire 41. It will be noted that this causes a power indicator light L7 to be illuminated, since it is connected across the secondary coil of the transformer TW. Since all of the wires of the modules 10–18 and 20 connect through the connections 7 of each of the modules are connected to the common hot wire 41, it will be seen that each of these wires becomes and is maintained a common hot wire. Likewise, it will be seen that each of the wires of modules 10–18 and 20 that are connected to the connections 1 of each of the modules is connected to the common ground wire 40 and thereby becomes a common ground wire. It will also be noted that each of the wires of the modules 10–18 connected between the connections 8 of the modules is connected to the secondary hot wire 50 and thereby becomes a secondary hot wire. Likewise, it will be seen that each of the wires of the modules 11-18 connected between the connections 9 thereof is connected to the secondary ground wire 49 and thereby becomes a secondary ground wire.

To start the operation of the machine, the poll worker closes reset switch PB-3 to energize relay R1 in module 10. This opens normally closed contacts R1-1 and closes normally open contacts R1-2. The opening of contacts R1-1 prevents the vote circuit 46 in module 10 from operating, and the closing of contacts R1-2 connects secondary ground wire 49 and the wires associated therewith to common ground wire 40. This energizes the relay R3 of module 11 and the relays R8 of the modules 14, since they are now connected between the ground wire 40 and the hot wire 41.

Energizing relays R3 and R8 close contacts R3-1 in the control module 11 and contacts R8-1 in the control modules 14 while opening contacts R3-2 in the control module 11 and contacts R8-2 in the control modules 14. This energizes relay R4 in the control module 11 and the relay R7 of each of the control modules 14 to place the voting machine in an operative condition ready for voting. The operational condition of the machine is indicated by light L2 on the control module 11 and by light L4 on each of the control modules 14.

Energizing relays R4 and R8 closes contacts R4-1 in the control module 11 and contacts R8-1 in each of the control modules 14. When relay R3 is de-energized by releasing the reset switch PB-3, the relay R4 is maintained energized. This is because relay coil RC4 in control module 11 is connected to ground wire 40 through the closed contacts R4-1 in the control module 11, the closed contacts R7-1 in each of the control modules 14, the ground return in the terminal module 18, and the normally closed contacts R6-2 in each of the party vote modules 12. Therefore, relay R4 is maintained energized until contacts R7-1 or contacts R6-2 are opened. Likewise, when relays R8 are de-energized by opening reset switch PB-3, relay R7 is maintained energized since it is connected to ground wire 40 through closed contacts R7-2 in the module 14, normally closed contacts R10-2 in each of the vote modules 15 for that particular race following the control module 14, and normally closed contacts R6-2. Therefore, it will be seen that relay coil RC7 in each of the control modules 14 is maintained energized until contacts R10-2 associated with that relay coil RC7 or contacts R6-2 are opened. The machine is now ready for voting.

When the voter enters the voting booth, he decides whether he wants to vote the straight party ticket or for the candidates individually in the general election sec-

tion GES. If the voter wants to vote the straight party ticket, he depresses the switch PB-4 of the modules 12 corresponding to the party for which he wants to vote. When he closes the contacts of the switch PB-4, he connects its associated relay R5 to ground wire 40 through closed contacts R4-1, R7-1 and R6-2, so that relay R5, being connected to common hot wire 41 on the other side thereof, is energized. This closes normally open contacts R5-1 to connect relay coil RC6 of relay R6 between common hot wire 41 and common ground wire 40 through normally closed contacts R3-2. When relay R6 is energized, contacts R6-1 are closed and contacts R6-2 are opened.

Closing contacts R6-1 holds relay R6 energized after switch PB-4 is released to open contacts R5-1. This connects one side of the counter C-2 associated with the energized relay R6 to ground wire 41 through closed contacts R6-1 and normally closed contacts R3-2 as well as causing light L2 to be illuminated to indicate to the voter that he has selected a particular party in the general election. Counter C-2 will remain connected to ground wire 40 until contacts R6-1 or contacts R3-2 are opened. This takes place when the machine is reset, as will be explained later.

Opening contacts R6-2 disconnects all of the select circuits of the modules 12, 15 and 16 of the section GES from common ground wire 40 by de-energizing relays R4 and R7 so that overvoting is prevented. In this condition, closing the switches PB-4, PB-5, or PB-6 of the section GES is ineffective. Therefore, it will be seen that those vote modules 12, 15 and 16 in the general election section GES are now ineffective until the machine has been reset or cleared with correct lever 36.

It will also be seen that those modules 14, 15 and 16 located in the independent election section IES are not rendered inoperative upon the opening of the contacts R6-2 of the section GES since they are connected directly to common hot wire 40 through the terminal module 18, thereby bypassing the contacts R6-2. This allows the voter to select one of the select switches PB-5 or PB-6 associated with the modules 15 or 18 in the section IES and close the same to select the candidate or issue for which he wants to vote. Closing switch PB-5 or PB-6 energizes its associated relay R9 or R11 by connecting the relay coil RC9 to ground wire 40 through closed contacts R7-2 and normally closed contacts R10-2 or connecting coil RC11 to ground wire 40 through closed contacts R7-2, normally closed contacts R10-2, and normally closed contacts R12-2. This energizes relay R9 or relay R11, since they are connected through the modules to common hot wire 41 on the other side thereof.

If relay R5 is energized, contacts R5-1 are closed to connect relay coil RC10 of relay R10 between common hot wire 41 and common ground wire 40 through normally closed contacts R8-2. This energizes relay R10, thereby closing contacts R10-1 associated therewith and opening contacts R10-2 associated therewith. Opening contacts R10-2 interrupts the ground path to the relay R7 in the module 14 to de-energize the same. This prevents any of the other select switches PB-5 or PB-6 from being operable since the relays R9 are disconnected from ground wire 41.

Closing contacts R10-1 maintains relay R10 energized since relay coil RC10 is connected to ground wire 40 through closed contacts R10-1 and normally closed contacts R8-2. This also connects counter C-3 to ground wire 40 and illuminates select light L5 to indicate to the voter that he has selected a particular candidate for his vote. Counter C-3 will remain connected to ground wire 40 until the machine is reset or corrected to open contacts R8-2.

If relay R11 is energized, the circuitry operates in substantially the same manner as set forth for the relay R9 to de-energize relay R7 and disconnect the select portions of the modules associated with that particular race from ground so that they become inoperative. Further, counter C-4 is connected to ground wire 40 through closed contacts R12-1 and normally closed contacts R8-2 until the machine is reset or corrected to open contacts R8-2. In addition, solenoid SOL-1 of the module 16 is connected to ground wire 40 through closed contacts R12-1 and normally closed contacts R3-2 so that the cover door 91 will be opened when the voter pulls vote lever 35.

After the voter has made all of his selections, the machine is ready for the voter to pull the vote lever 35 and record the votes he has selected. The voter depresses lever 35 to close the vote switch PB-1 and energize relay R2 in the input module 10. This also illuminates light L8 to tell the voter he has recorded his votes. Energizing relay R2 closes contacts R2-1 to connect secondary hot wire 50 and the wires connected thereto to common hot wire 41. This initiates an electrical pulse along secondary hot wire 50 and the wires connected thereto. Since one side of each of the counters C-2, C-3 or C-4 is always connected to secondary hot wire 50 and the wires connected thereto, those counters C-2, C-3 or C-4 that have been connected to common ground wire 40 through the appropriate closed contacts will be energized to record one vote for each selected candidate.

When contacts R2-1 are closed, counter C-1 in the input module 10 is also energized by an electrical pulse to record that the person has voted, and the light L1 on the reset unit 42 is illuminated to indicate to the poll worker that the person has voted. In addition, the solenoids SOL-1 that have been connected to ground wire 40 will also be energized to open the appropriate cover door 91 on the write-in vote module 16 associated therewith so that the voter may write in his vote for that particular race.

Relay R2 is maintained energized after the voter releases the vote lever 35 to open switch PB-1 by the holding circuit formed of the wire 51 connecting the relay coil RC2 to the secondary hot wire 50. After the voter has left the booth, the poll worker depresses the reset switch PB-3 to energize coil R1 and open normally closed contacts R1-1 and close normally open contacts R1-2. Opening contacts R1-1 de-energizes relay R2 thereby disconnecting secondary hot wire 50 from the common hot wire 41 and terminating the electrical pulse supplied to the secondary hot wire 50. Closing contacts R1-2 connects secondary ground wire 49 to common ground wire 40 to energize all of the relays R3 and R8.

Energizing relay R3 serves to reset the party section of the voting machine by closing normally open contacts R3-1 and opening normally closed contacts R3-2. Closing contacts R3-1 connects relay R4 to ground wire 40 and energizes the same to place that portion of the circuitry associated therewith in an operative condition. At the same time, opening contacts R3-2 serves

to interrupt the ground path to relay R6 and counter C-2 so that contacts R6-1 are opened and the ground path to the relay R6 and the counter C-2 maintained interrupted after the switch PB-3 is opened to reset the machine.

Energizing relay R8 serves to reset the individual race sections by closing contacts R8-1 and opening normally closed contacts R8-2. This serves to energize relay R7 and interrupt the ground path to the relays R10 and R12, as well as the counters C-3 and C-4.

The machine is now reset and ready for the next voter to vote. If the voter had, instead of voting the straight party ticket from the general election section GES of the voting machine, decided to vote for the individual candidates, he would have pressed one of the pushbutton switches PB-5 associated with the vote modules 15 in each race. This would have energized coil RC9 of relay R9 by connecting it between hot wire 41 and common ground wire 40 through closed contacts R7-2, R10-2 and R6-2. Energizing relay R9 would have closed normally open contacts R9-1 associated with the energized coil RC9 to connect relay R10 between common hot wire 41 and common ground wire 40 through normally closed contacts R8-2. Energizing relay R10 would have energized contacts R10-1 to hold relay R10 energized after switch PB-5 was released. Also, contacts R10-2 associated with energized relay R10 would have been opened to de-energize relay R7 of that particular race and opened contacts R7-1 and R7-2 to disconnect relay R4 from common ground wire 40 to de-energize the same. This renders all of the switches PB-4 for the party selection and those switches PB-5 and PB-6 associated with the particular race ineffective.

Those modules 14 and 15 in the other races with their associated switches PB-5 and PB-6 would still be operative so that the voter could select candidates in the other races of the general election. The section IES of the voting machine would still operate in the manner set forth herein above so that the voter could again select his desired vote from that voting section. The vote would again be recorded in the same manner by pulling the vote lever 35 and the machine would be reset in the same manner.

If the voter had desired to vote for a write-in candidate instead of one of the individual candidates displayed on the vote modules 15, he would have depressed switch PB-6 instead of switch PB-5 of that group of modules relating to the political race in which he desired to write in his vote. Depressing switch PB-6 would connect relay R11 between common hot wire 41 and common ground wire 40 through normally closed contacts R7-2 R10-2 and R12-2 if the switch PB-6 of the write-in module 18 was located in section IES or would pass additionally through the contacts R6-2 to ground wire 40 if he had depressed the switch PB-6 in section GES. In either case, energizing relay R11 would close contacts R11-1 to connect relay R12 between hot wire 41 and ground wire 40 through normally closed contacts R8-2. This would close normally open contacts R12-1 to hold relay R12 energized and connect counter C-4 to common ground wire 40. Also, contacts R12-2 would be opened to disconnect the select portion of the associated modules in that particular race so that overvoting would be prevented. When the vote lever 35 was pulled to connect secondary hot wire 50 and its associated wires to common hot wire 41, counter C-4 would be energized to record that one write-in vote had been made and, at the same time, solenoid SOL-1 would be energized to unlatch the cover door 91 and also withdraw the pin 155 so that the door 91 would be opened and the tape 90 would advance until a blank piece of tape 90 was displayed behind the opening 101 in the module 18. After the voter had written in his vote, the poll worker would reset the machine which would in turn energize solenoid SOL-2 to close the door 91 and cause it to be latched in place.

At any time before the vote lever 35 is pulled, the machine may be corrected by pulling correct lever 36. This clears and resets the machine by closing switch PB-2 and connecting relays R3 and R8 to ground to reset the entire machine. The voter then selects his candidates or parties all over again and votes in the above set forth manner. When the voter pulls lever 35 to close switch PB-1 and record his votes, contacts R2-2 are opened to prevent correcting the machine.

While the specific embodiment of the write-in vote module 16 is shown for use only with each particular race and not with the party selection section, it may be easily converted for use therein by putting a manually operated switch SW-2 as shown in dashed lines in FIG. 15 in the wire connecting ground connection 16-2A with the connection 16-2B. An additional set of contacts R12-3 of relay R12 would be connected across switch SW-2 as shown in dashed lines in FIG. 15 in parallel therewith. When the module 16 is used as shown in FIGS. 21 and 22, switch SW-2 will be closed and the module 16 will operate in the aforementioned manner. When the module 16 is to be used in the party selection section, switch SW-2 will be opened so that contacts R12-3 will operate in the same manner as the normally closed contacts R6-2 in the party vote modules 12 to retain the lockout function.

Referring more particularly to FIG. 25, it will be seen that the multiple control module 20 is always placed between an individual control module 14 and the vote modules 15 and 16 associated with that particular race. In this situation, the voter is allowed to vote for more than one candidate in the political race. The module 20 serves to connect the relay R7 to ground wire 40 through relay contacts R7-2 and the normally closed contacts R13-1. This bypasses the normally closed contacts R10-2 and R12-2 which normally connect the relay R7 to ground wire 41. Therefore, once relay R7 is energized as the machine is reset, opening contacts R10-2 or R12-2 will not interrupt the ground path to the select circuitry associated with the select switches PB-5 or PB-6. When contacts R10-2 or R12-2 are opened upon closure of switches PB-5 or PB-6, then relay R7 will not be de-energized to render the select switches PB-5 and PB-6 inoperative. It is only when contacts R13-1 are opened that switches PB-5 and PB-6 are rendered inoperative.

Each time one of the switches PB-5 or PB-6 is closed by the voter to select the candidate for which he wishes to vote, the stepping coil RSC 13 will be momentarily energized by the electrical pulse generated upon the closing of the switch. The relay R13 is pre-programmed to open contacts R13-1 when a selected number of pulses has been received by the stepping coil RSC13. Therefore, the coil RSC13 is stepped one time upon the closing on one of the switches PB-5 or PB-6, but does not open contacts R13-2 to interrupt the ground path of the relay R7 and de-energize the same until a prede-

termined number of electrical pulses has been received.

Relays R10 and R12, as well as the counter C-3 and C-4 associated with the switches PB-5 and PB-6 operate in the manner set forth hereinabove to connect the counters C-3 or C-4 to ground wire 40.

From the foregoing description, it will be seen that any number of arrangements may be built up using the modules 10–20, and all that is necessary to accommodate a larger election is the use of more of the modules 11–19.

While the electrical pulse generated in the wire 50 and the wires connected thereto is started upon the closing of the vote switch PB-1 and terminated upon the closing of the reset switch PB-3, an appropriate pulse generating circuit may be designed so that the pulse in the wire 50 and its associated wires will be generated for a predetermined amount of time. In this manner, remote counters may be used and simply connected into the modules 12, 15, and 16 to record the votes selected. Likewise, a memory and a scanning circuit may be provided with the machine so that the activated counters can be scanned using a single wire and transmitted to a central tabulating location or may be stored and subsequently transmitted to a central tabulating location for the recording of the votes.

The reset switch PB-3 may be located in the voting booth so that the machine is automatically reset as the voter leaves the voting booth. This would prevent the poll worker from determining how the voter has voted.

While specific embodiments of the invention have been set forth hereinabove, it is to be understood that modifications, substitutions and equivalents may be used without departing from the scope of the invention as set forth by the appended claims.

We claim:

1. A vote counting module for use in a voting machine having a power supply means comprising; a power operable vote counting means contained in said module, said vote counting means detailed for serially accumulating individual votes cast for a candidate in an election, said counting means including selectively operable control means movable between an operable counting input condition and an inoperative condition and wherein a count of one is registered in said counting means when said counting control means is in said operative input condition and in response to a power input pulse delivered from said power supply means and wherein said vote counting module includes first and second group of operative and releasable connecting elements detailed for operatively connecting said module to a second module having complementary connecting elements, said releasable connecting elements detailed for transmitting power to said counting control means and for transmitting power from one group of said connecting elements to said other group of connecting elements.

2. A vote counting module as described in claim 1 further characterized in that said vote counting module includes an operative interlock means operatively associated with said counting means, said interlock means including means detailed for rendering said counting means inoperative in response to an interlock pulse transmitted thereto from one of said groups of releasable connecting elements.

3. A vote counting module for use in an assembly of a plurality of such modules comprising:

a. a housing having opposed sides and a front surface;

b. said front surface of said housing providing an area for displaying a name of a candiate;

c. control means on said front surface of said housing adjacent said area, said control means being actuatable by a voter to indicate his selection of said candidate;

d. connection means in at least one side of said housing for interconnection with a connection means of a next adjacent module when such next adjacent module is nested therewith and being readily disconnectable with such connection means of said next adjacent module when the individual module is removed from its nested condition;

e. counter means in said housing for serially counting the number of votes for such candidate; and

f. circuit means within said housing for electrically connecting said control means, said counter means, and said connection means, the circuit being so arranged that when said control means is actuated, it conditions said counter means for counting a unit receipt of a pulse through said connection means.

* * * * *