United States Patent

[11] 3,626,130

[72] Inventor **Burton L. Siegal**
Skokie, Ill.

[21] Appl. No. **71,460**
[22] Filed **Sept. 11, 1970**
[45] Patented **Dec. 7, 1971**

[73] Assignees **Peter C. Granata, Jr.**
Chicago, ;
Edward P. Andrychowski, Jr.
Franklin Park, Ill. , part interest to each

[54] **MEMORY AND CONTROL DEVICE WITH CAMS WHICH ACT IN BOTH RADIAL AND AXIAL DIRECTIONS**
16 Claims, 7 Drawing Figs.

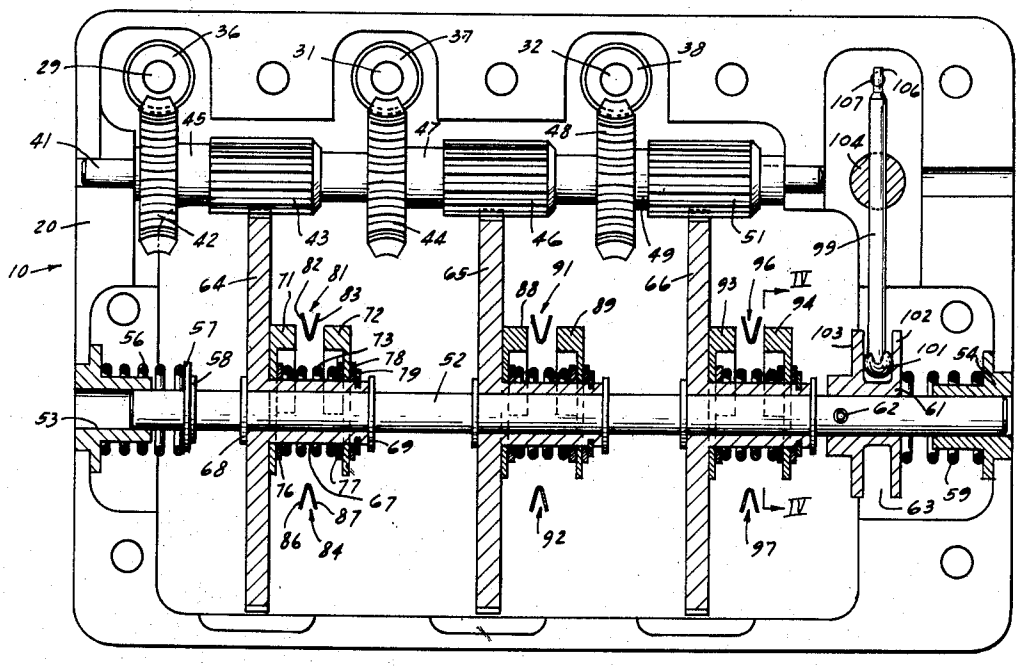
[52] **U.S. Cl.** ..... **200/153 LB,** 200/1 R, 318/466
[51] **Int. Cl.** **H01h 3/42,** H01h 3/54
[50] **Field of Search** ..... 200/153 L, 153 LB, 52 R, 1 R, 38 E, 4; 318/466, 467

[56] **References Cited**
UNITED STATES PATENTS

2,441,634	5/1948	Horman	200/153 LB
2,748,204	5/1956	Woods et al.	200/4
2,720,619	10/1955	James	200/153 LB X
3,183,314	5/1965	Pickles	200/1 R
3,472,978	10/1969	Granata, Jr. et al.	200/1 R X

Primary Examiner—Robert K. Schaefer
Assistant Examiner—Robert A. Vanderhye
Attorney—Hill, Sherman, Meroni, Gross & Simpson

ABSTRACT: A memory and control device for positioning a power seat to preset positions and selectively repositioning it to such preset positions and also providing manual control of the seat to place the seat in any position. The present invention utilizes the same switches for setting different preset positions and utilizes cams on both sides of said switches which may be moved axially to selectively engage the switches to energize the power seat to the selected preset position.

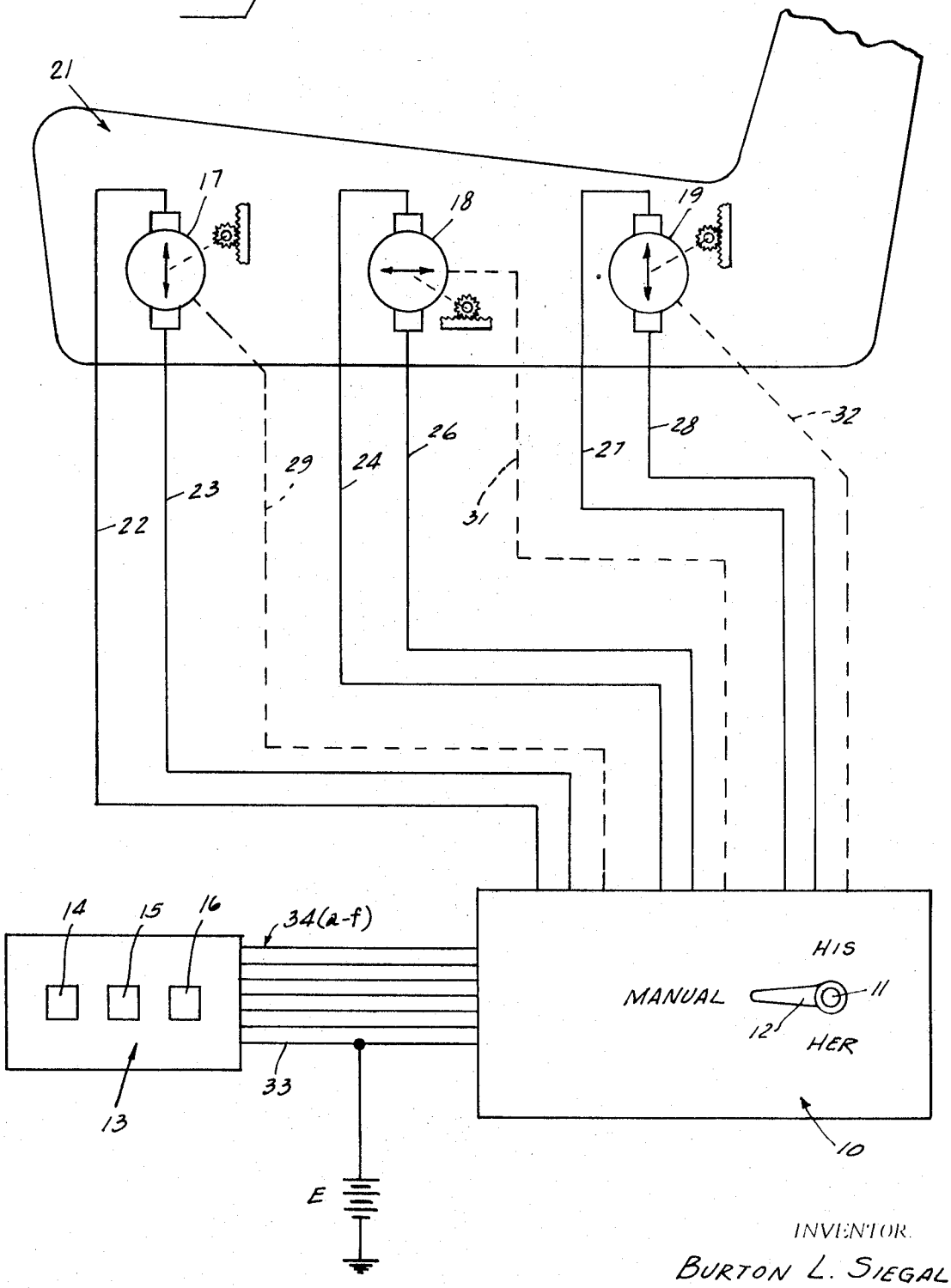


PATENTED DEC 7 1971

3,626,130

SHEET 1 OF 4

Fig. 1



INVENTOR.
BURTON L. SIEGAL

BY Hill, Sherman, Meroni, Gross & Simpson ATTORNEYS

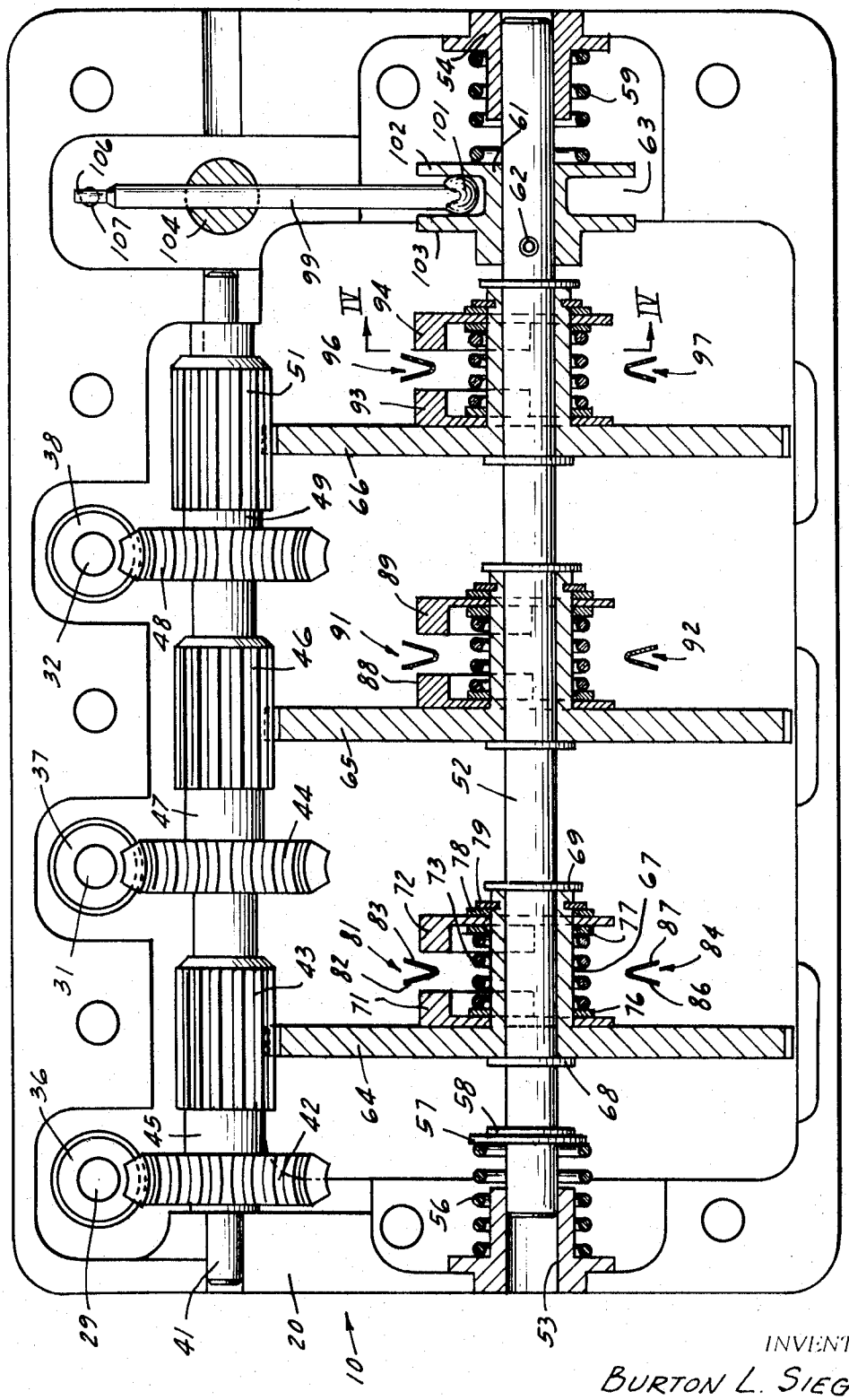


Fig. 2

INVENTOR.
BURTON L. SIEGAL

BY Kill, Sherman, Morsi, Gross & Simpson ATTORNEYS

Fig. 3

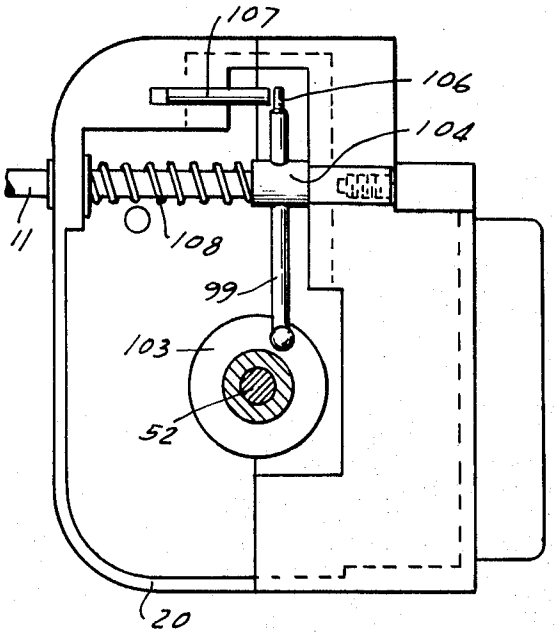


Fig. 4

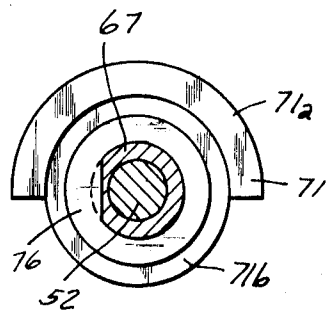
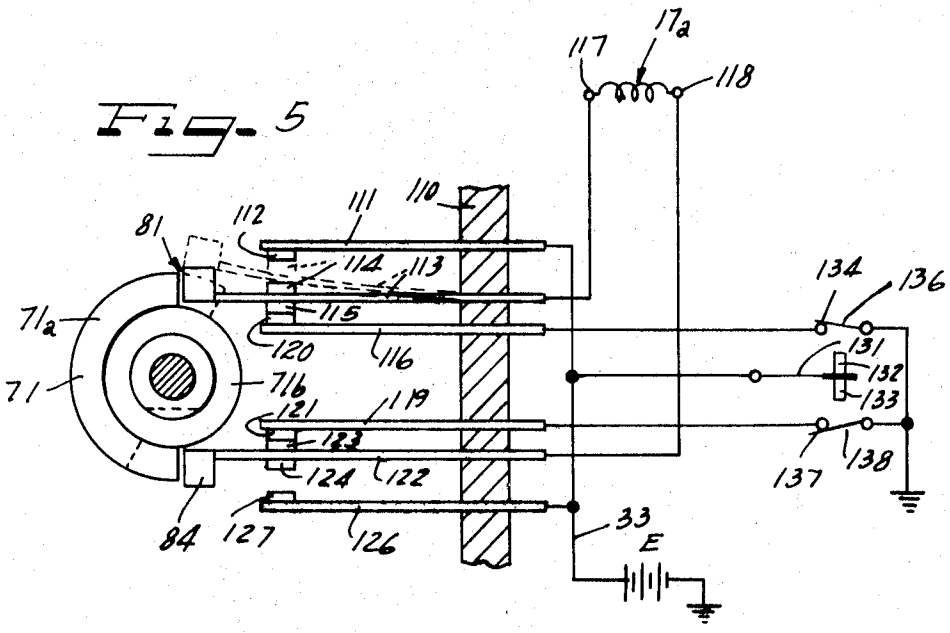


Fig. 5



INVENTOR.
BURTON L. SIEGAL

BY Hill, Sherman, Meroni, Gross & Simpson ATTORNEYS

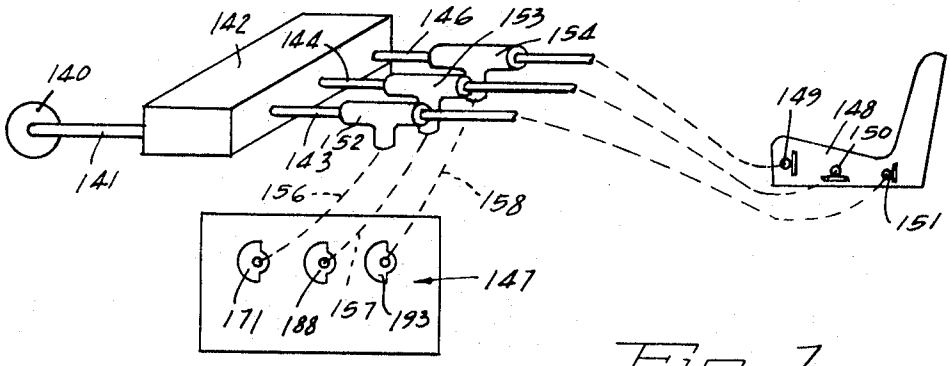


Fig-7

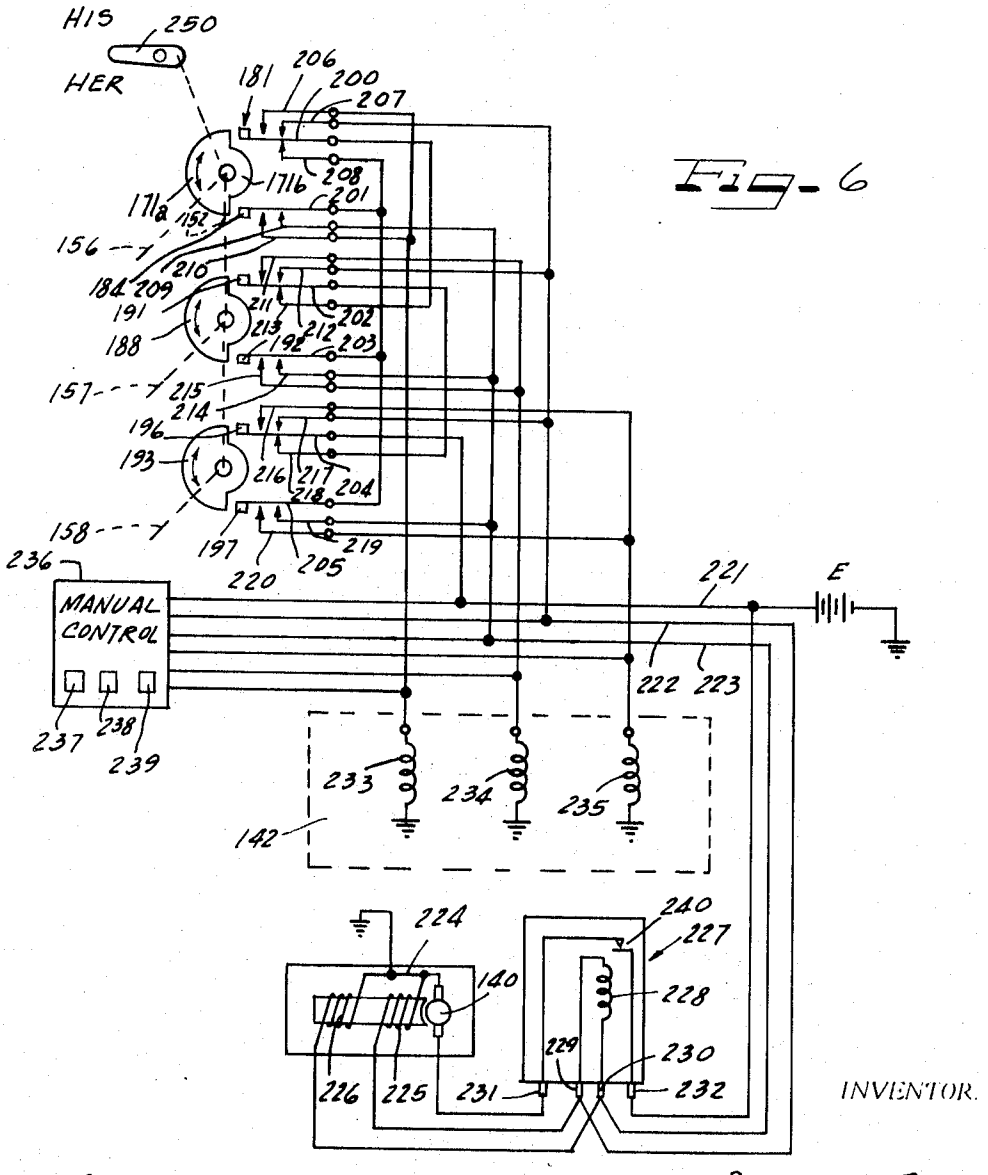


Fig-6

INVENTOR.

BURTON L. SIEGAL

BY Hill, Sherman, Meroni, Gross & Simpson ATTORNEYS

MEMORY AND CONTROL DEVICE WITH CAMS WHICH ACT IN BOTH RADIAL AND AXIAL DIRECTIONS

CROSS-REFERENCES TO RELATED APPLICATIONS AND PATENTS

This application is related to the application entitled "Memory and Control Device," Ser. No. 850,157, filed Aug. 14, 1969 by Burton L. Siegal, and to U.S. Pat. No. 3,472,978, which issued on Oct. 14, 1969, entitled "Memory and Control Device With Disc Contract Plates On A Linearly Movable Shaft That Are Adjustable With Respect To The Shaft," filed by Peter C. Granata, Jr., Burton L. Siegal and Edward J. Zeissler.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates in general to automatic positioning devices and in particular to means for automatically positioning a seat to predetermined positions.

2. Description of the Prior Art

Six-way position power seats have previously been accomplished manually by adjusting the position of three control switches to a selected position. Since automobiles are often used by more than one person and particularly by two people such as a husband and wife, it is desirable to have a memory control system for automatically repositioning a seat to the preferred setting of a different driver which can be accomplished automatically.

SUMMARY OF THE INVENTION

The present invention comprises an electromechanical memory positioning system that allows a power seat to be automatically positioned to a preset position each time the driver enters the vehicle. The present invention utilizes a single set of motor control switches in combination with a pair of cams such that when the cams are moved in a first direction, one of the pair of cams will energize the switches to move the power seat to a first position and when the cams are moved in a second direction the second cam will energize the switches to move the seat to a second position.

Position feedback is provided so that the seat will stop at the preset position. The present control system provides a simple and reliable structure which substantially reduces the number of components and switches required in prior devices.

Other objects, features and advantages of the invention will be readily apparent from the following description of preferred embodiments thereof taken in conjunction with the accompanying drawings, although various modifications may be effected without departing from the spirit and scope of the novel concept of the disclosure and in which:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic view of an automobile seat-positioning apparatus according to the invention;

FIG. 2 is a sectional view of the memory and control device illustrated in FIG. 1;

FIG. 3 is a sectional view taken on line III—III of FIG. 2;

FIG. 4 is a sectional view taken on line IV—IV of FIG. 2;

FIG. 5 is a schematic view illustrating the electrical control circuitry for a single control of the invention;

FIG. 6 is a schematic diagram of a modified form of the invention; and

FIG. 7 illustrates the modified form of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 illustrates in partial cutaway an automobile seat **21** which for illustrative purposes has three motors **17, 18** and **19** to control the position of the seat. The motor **17** moves the front portion of the seat up and down, the motor **18** moves the seat backward and forward, and the motor **19** moves the rear portion of the seat up and down. Thus, by adjustment of the three motors **17, 18** and **19**, the seat may be moved backward and forward and tilted and raised and lowered. The memory and control device **10** of this invention is connected respectively to the motors **17, 18** and **19** by electrical leads **22,23,24,25,27** and **28**, and receives position feedback from the motors by shafts **29, 31** and **32** which are respectively connected to the motors **17, 18** and **19**. The seat may also be controlled by manual control **13** which has switches **14, 15** and **16** that are connected to the memory and control device of the invention **10** by leads **34***a* through **34***f*. A battery E has one side connected to ground and the other side connected by a lead **33** to the manual control switch assembly **13** and to the memory and control device **10** of the invention.

The control **10** has an actuating shaft **11** rotatably and slidably mounted therein and has a pointer **12** which may be positioned in the his, manual or her positions.

FIGS, **2** through **5** illustrate the control system of the invention. For example, FIG. **2** is a sectional view of the memory and control device **10**. The device **10** is substantially hollow and is formed with outer walls **20** which rotatably support a shaft **41** that carries a first gear **42** which meshes with a drive gear **36** which is supported on the position feedback shaft **29** from the motor **17**. The gear **42** has a hub **45** which carries a gear **43** that meshes with a gear **64** rotatably supported on a shaft **52**. Shaft **31** is rotatably supported in the housing **20** and carries a gear **37** which meshes with a gear **44** mounted on shaft **41** and which is connected by hub **47** to a gear **46**. Gear **46** meshes with a gear **65** rotatably mounted on shaft **52**. Shaft **32** for the motor **19** is rotatably supported by the housing **20** and carries a gear **38** which meshes with a gear **48** that has a hub **49** that supports gear **51**. Gear **51** engages gear **66** which is rotatably supported on the shaft **52**.

The shaft **52** is supported for rotational and longitudinal motion relative to the housing by sleeves **53** and **54** mounted in opposite end walls of the housing **20**. A spring **56** is mounted between a shoulder formed on the sleeve **53** and a disc **57** which is locked to shaft **52** by a snapring **58**. A spring **59** is mounted between the shoulder formed on the sleeve **54** and a shifting collar **63** which is pinned to shaft **52** by a pin **62**. A shifting lever **99** is rotatably supported in a collar **104** which is mounted on shaft **11** and has an engaging portion **101** which fits between sidewalls **102** and **103** of the shifting member **61** to position the shaft **52** longitudinally relative to the housing **10**. Retaining rings **68** and **69** are mounted on shaft **52**.

Each of the gears **64, 65** and **66** supports cams which cooperate with switch assemblies for positioning the seat **21**. The gear **64**, for example, has a hub **67** that rotatably supports cams **71** and **72**. As best shown in FIG. **4**, the hub **67** is formed with a flattened side and a first friction disc **76** is formed with a D-shaped opening and is received on the hub so that it does not rotate relative to the hub. The friction disc **76** bears against the cam **71** which has a round opening through which the hub **67** extends so that the cam **71** may be rotatably adjusted relative to the hub **67**. A spring **73** is mounted between the friction disc **76** and a second friction disc **77** which is also formed with a D-shaped opening so that it does not rotate relative to the hub **67**. A second cam **72** formed with a round opening is mounted on the hub **67** adjacent the disc **77**, and a third friction disc **78** is mounted on the hub adjacent the other side of the cam **72**. The friction disc **78** is also formed with a D-shaped opening so that it does not rotate relative to the hub **67**. A snapring **79** is receivable in a groove formed in the hub adjacent the friction disc **78** to lock the cam assembly to the hub. The gear, hub and cam assembly thus formed allows the cams **71** and **72** to be rotated relative to the hub for allowing them to be preset to a desired position. However, the cams **71** and **72** when not held relative to the hub **67** will rotate with the hub **67** to remember preset positions.

A pair of cam-shaped members which are generally V-shaped **81** and **84** and formed with cam-engaging portions **82** and **83**, and **86** and **87**, respectively, are supported between the cams **71** and **72** and are supported as shown in FIG. **5** from an insulating frame member **110** which is connected to the housing **20**.

V-shaped cam switching means 91 and 92 are supported between cams 88 and 89 and V-shaped switching means 96 and 97 are supported between the cams 93 and 94.

As seen in FIGS. 2, 4, and 5, each of the cams 71, 72 88, 89, 93 and 94, are formed with portions which extend approximately 180° around the shaft 52 which are thicker and larger in diameter than the remaining portion of the cams. For example, cam 71 as illustrated in FIG. 4 has a first portion 71*a* which extends substantially 180° about the cam and which has a substantially larger radius than the remaining portion 71*b* of the cam. Also as seen in FIG. 2, the portion 71*a* is substantially thicker than the portion 71*b*, such that when the shaft 52 is moved longitudinally relative to FIG. 2 the portion 71*a* will engage one of the switch-actuating cams 81 or 84 if the enlarged portion 71*l* is adjacent either of the switch-actuating means 81 or 84. Thus, the cams and switches provide means for controlling a control circuit by moving the shaft 52 longitudinally relative to FIG. 2. For example, if the shaft 52 is moved to the left relative to FIG. 2 the cams 72, 89 and 94 may engage either of the switches 81, 84, 91, 92 or 96, 97, unless they are in the home position illustrated in solid line in FIG. 5. On the other hand, if the shaft 52 is moved longitudinally to the right relative to FIG. 2, the cams 71, 88 and 93 may engage the switches 81, 84, 91, 92, 96, 97 unless they are in the home position such as illustrated in FIG. 5. Thus, the position of the two cams on either side of the switches allows a single set of switches to be utilized to operate the memory and control system and the invention results in a substantial reduction in the number of switches required in a memory system.

FIG. 5 illustrates the electrical schematic for control of the seat in one dimension. The armature 17*a* of the motor 17 has one terminal 117 connected to a flexible conductor 113 which carries the switch actuator 81. The contact 114 is mounted in a supporting insulating plate 110 which is mounted in the housing 20 and the conductor 113 has a pair of contacts 114 and 115 on opposite sides thereof and the contact 115 engages a contact 117 when the switch actuator 81 is out of engagement with the high portion of cams 71 and 72. Contact 120 is connected to conductor 116 which is also mounted in the insulating plate 110. A conductor 111 is also mounted in insulating plate 110 and has a contact 112 which is engaged by contact 114 when the switch actuator 81 is in engagement with the high portion 71*a* of cam 71 or the corresponding high portion of the cam 72. The other terminal 118 of armature 17*a* is connected to a conductor 122 which is mounted in the supporting plate 110 and carries the switch actuator 84. Contacts 123 and 124 are mounted on opposite sides of conductor 122 and contact 123 engages contact 121 supported by conductor 119 when the switch actuator 84 does not engage a high portion of cams 71 or 72. Conductor 126 is mounted in insulating plate 110 and carries a contact 127 which engages contact 124 when the switch actuator 84 is in engagement with a high portion of cams 71 or 72. The battery E has one side connected to ground and the other side is connected by lead 33 to conductors 111 and 126. Contact 116 is connected to ground through a switch 136 and contact 119 is connected to ground through a switch 138. Lead 33 is also connected to manual switch 131 which is movable to engage contact 134 or 137. Manual switch 131 also carries switch-actuator portions 132 and 133 for respectively opening switches 136 or 138 when the manual switch is moved respectively to an engagement with contacts 134 or 137.

FIG. 3 illustrates a linkage for moving shaft 52 axially to the left or to the right relative to FIG. 2 so that the cams 71, 88 and 93 or cams 72, 89 and 94 can engage the energizing switch contacts. If the knob 12 is moved to the his position, for example, the shaft 11 will cause sleeve 104 to move clockwise relative to FIG. 2, thus pushing member 103 to the left relative to FIG. 2 which, in turn, moves shaft 52 to the left relative to FIG. 2. This moves cams 72, 89 and 94 toward their respective switches 81, 84, 91, 92 and 96, 97. If the switch actuators of any of these switches engage the high portions of their respective cams a circuit will be closed to energize the motor in either the clockwise or counterclockwise directions. The motors will run until all of the cams are positioned so that they are out of engagement with the energizing switches 81, 84, 91, 92 and 96, 97. This corresponds to the preset "his" position. When another person enters the vehicle, she may move the control knob 12 to the "her" position which will cause shaft 11 to rotate the member 104 counterclockwise relative to FIG. 2, thus causing the shaft 99 to move the collar 61 to the right relative to FIG. 2 such that the cams 71, 88 and 93 engage the switches 81, 84, 91 92 and 96, 97, respectively. For example, relative to FIG. 5, when the cam 71 is moved toward the switch actuators 81 and 84 unless it is in the position shown in solid line it will close either switch 81 or 84 to energize the motor 17. It will be noted, for example, that if the high portion 71*a* of the cam 71 engages the switch actuator 81, power will be applied to the armature 17*a* through the lead 33, the conductor 111, contacts 112, 114, conductor 113 to terminal 117 through the armature 17*a* and to ground through terminal 118, contact 122, 123, 121, 119. The motor will then run in a direction so as to move the high portion of the cam 71*a* counterclockwise relative to FIG. 5 until the high portion of the cam 71*a* is in the solid line position relative to the switch actuators 81 and 84 which corresponds to the preset "her" position. If the high portion of the cam 71*a* were in the position such that it engaged the switch actuator 84, power would be applied from lead 33 through contact 126, 127 and 124, conductor 122 to terminal 118 through the armature and to ground through conductor 113, contact 115, 117 and conductor 116. It is to be noted that the direction of current through the armature 17*a* flows in opposite directions when the high portion of the cam 71*a* engages switch actuator 81 or 84. When the high portion of the cam 71*a* moves to the solid line position relative to FIG. 5, the cam will no longer engage the switch actuators 81 and 84 and power will be disconnected to the armature 17*a* and both ends of the armature will be connected to ground through conductors 116 and 119 so as to apply dynamic braking to the motor. A spring 108 is mounted on shaft 104.

To set the memory control system of this invention to a different preset position, the knob 11 is first rotated to the "his" or "her" position without pulling out the knob so that the motor will have positioned the seat to the home position indicated in solid line in FIG. 5 such that the switch actuators 81 and 84 no longer engage the high portion 71*a*. The shaft 11 may then be pulled out since the end 106 of shaft 99 is out of alignment with the stop 107 when in the "his" or "her" position. The stop 107 holds the shaft 52 in the "his" or "her" position in that the shaft 99 must be rotated clockwise or counterclockwise relative to FIG. 2 to allow the end 106 of shaft 99 to miss the stop 107. The seat may then be positioned manually by using the manual switches and the ends of the switch actuators 81 and 84 will hold the cam 71 such that it rotates relative to shaft 52 as the manual position is set. After the desired position is obtained, the shaft 11 may be pushed in to disengage the end 106 of shaft 99 from the stop 107 and the new preset position will be remembered by the control unit. It is to be realized that position of the cams 71, 72, 88, 89, 93 and 94 are held relative to the shaft 52 when in the "setting" position by the ends of the switch actuator 81, 84, 91, 92 and 96, 97, which prevent their associated cams from rotating relative to the shaft 52 as the manual adjustment is made. As soon as the manual adjustment has been made and the shaft 11 is pushed in, the memory and control system may be operated manually or to the "his" or "her" positions which have been set into the unit.

Although a mechanical linkage has been illustrated for moving the shaft 52 relative to the housing 20, it is to be realized that the shaft 52 could be moved with a flexible push-pull cable which is linked to a switch knob so as to move the shaft 52 to the left or right relative to FIG. 2 as the switch is moved to the "his" or "her" position, respectively. Alternatively, one or two solenoids could be connected to the shaft 52 to move it when the control switch is moved to the "his" or "her" position.

FIGS. 6 and 7 illustrate a modification of the invention which utilizes cams and switching means such as illustrated in the embodiment disclosed in FIGS. 1–5, but wherein the electrical circuitry is adapted for operation with a single motor which operates through a transmission and clutch arrangement such that a single motor positions the seat along three axes. U.S. Pat. No. 3,472,978, for example, illustrates a single motor system which operates through a plurality of clutches to position a seat in a plurality of directions.

The system of FIGS. 6 and 7 of the present invention utilizes a single motor in combination with clutches and switching arrangement such that a single motor positions a seat in three directions and utilizes a switch and cam arrangement as shown in the embodiment illustrated in FIG. 2. The switches are interconnected with clutches in the embodiment illustrated in FIGS. 6 and 7 and the motor runs in a first direction as, for example, clockwise, until all the functions in that direction are satisfied before reversing and running counterclockwise until the functions in the second direction are satisfied. The mechanism for moving the double cams axially relative to the switch-actuating means are similar to those illustrated in FIG. 2 and the description is not repeated herein.

FIG. 7 illustrates a motor **140** which has an output shaft **141** that supplies an input to the transmission and clutch arrangements **142**. Clutch energizing means **233**, **234** and **235** illustrated in FIG. **6**, selectively engage the clutches and output shafts **143**, **144** and **146** and are driven through the clutches by shaft **141**. Shafts **143**, **144** and **146** are connected to gears **149**, **150** and **151**, respectively, which mesh with racks on a seat **148** to position it. The shafts **156**, **157** and **158** are driven by the shafts **143**, **144** and **146** through the couplings **152**, **153** and **154**, respectively. The shafts **156**, **157** and **158** provide position feedback to control the position of the cams in the control unit **147**. The cams are illustrated diagrammatically as **171**, **188** and **193** and it is to be realized that each of these cams represents a double cam similar to the cams **71** and **72** in FIG. **2** which may be moved axially relative to switch means so as to energize switches to drive the seat to a "his" or "her" position. FIG. **6**, for example, illustrates diagrammatically cams **171**, **188**, and **193** which are mounted on a shaft **152**. Each of the cams **171**, **188** and **193** is associated with a companion cam. Cam **171** and its associated cam can engage switching means **181** and **184** mounted adjacent the cam. Cam **188** and its associated cam can engage switching means **191** and **192** mounted on opposite sides thereof and cam **193** and its associated cam can engage switching means **196** and **197** mounted on opposite sides thereof.

Switch **181** is mounted on an arm **200** which engages a contact **208** when not moved by the cam **171** or its associated cam. Contact **208** is connected to a contact **201** which supports switch actuator **184** adjacent cam **171** and is also connected to a contact **203** which supports switch actuator **192** adjacent cam **188**. Contact **208** is further connected to contact **205** which supports switch actuator **197** mounted adjacent cam **193**. A pair of contacts **206** and **207** are mounted adjacent the contact **200** and the contact **200** engages these contacts when moved out of engagement with the contact **208** when the cam associated with the switch actuator **181** engages it. Contact **201** is adjacent a pair of contacts **209** and **210** which it engages when the switch actuator **184** engages an associated cam. Contact **202** is normally in contact with contact **213** but may be moved by the switch actuator **191** when engaged by a cam to engage contacts **211** and **212**. Contact **203** may be moved by the switch actuator **192** to engage contacts **214** and **215**. Contact **204** is normally in engagement with contact **218** but when moved by the switch actuator **196** engages contacts **216** and **217**. Contact **205** may be moved to engage contacts **219** and **220**.

A battery E has one side connected to ground and the other side is connected by lead **221** to contact **204**. The energizing winding **233** of the first clutch has one side connected to ground and the other side connected to contacts **206** and **210**. A second energizing winding **234** for the second clutch is connected to contacts **211** and **215**. The third energizing winding **235** for the third clutch is connected to contact **220** and **216**. The windings **233** and **234** and **235** are also connected to a manual control **236**. A motor **140** has one side of its armature connected to ground by lead **224** and has a first field winding **225** for driving it in a first direction and a second field winding **226** for driving it in a second direction. One side of these windings are connected to ground and the other sides are connected to contacts **229** and **230** of a motor relay **227** which has a motor relay coil **228**. A motor start switch **240** has one contact connected to contact **232** which is in turn connected to the positive terminal of the battery E. The other contact of the motor start switch **240** is connected to a contact **231** which is connected to the second side of the armature of the motor **140**. Terminal **229** is connected to the manual control and to contacts **217**, **212** and **207** through lead **222**. Contact **230** is connected to the manual control and to the contacts **219**, **214** and **209** through lead **223**.

The manual control has manual control buttons **237**, **238**, **239** for manually positioning the seat to a desired position. A "his" or "her" control knob **250** may be moved to move the cam assembly of the control unit so that the shaft **152** moves the cam assembly upwardly or downwardly relative to FIG. **6** so that the cams engage the switch actuators **181**, **184**, **191**, **196** and **197** in the manner that the cams **71**, **72**, **88**, **89**, **93**, **94** engage the switch actuators **81**, **84**, **91**, **92**, **96** and **97**. For example, the cams **171**, **188** and **193** might be the "his" positioning cams and when the lever **250** is moved to the "his" position the cams **171**, **188** and **193** will energize the switch contacts **181**, **184**, **191** **192**, **196** and **197** such that the motor **140** runs to position the seat **148** to the preset "his" position. On the other hand, if the control **250** is moved to the "her" position the shaft **152** will be moved in the opposite direction so that the cams associated with the "her" position engage the switch actuators **181**, **184**, **191** and **192**, **196** and **197**, and the motor will be energized to move the seat to the preset "her" position.

Since the double cams and switch actuator structure are similar to that illustrated with the control system of FIG. **2**, their description is not repeated relative to FIG. **6**. However, the switches energized by the switch actuators associated with these cams are connected in different manner as shown in FIG. **6**. The motor will run in opposite directions by respectively energizing the windings **225** and **226** of the motor through the motor relay **227**.

In the particular circuit disclosed, all of the clockwise functions must be satisfied before the motor will reverse and run counterclockwise and the motor will then run counterclockwise to position any of the functions that require a counterclockwise location. When a particular shaft **143**, **144** and **146** has been properly positioned its respective clutch will be deenergized.

When contacts **208**, **213**, **218** are normally closed and in series such that if any one is held open the field winding **226** cannot be energized and that winding **225** is energized.

Thus, direction dictated by winding **225** will first be satisfied until a home position is reached by whichever cam structure is demanding it. Then, if the others are demanding the opposite direction, winding **226** can be energized until such others are satisfied by being driven to the correct position.

It is seen that this invention provides an improved memory and control system for a power seat and although it has been described with respect to preferred embodiments it is not to be so limited as changes and modifications may be made therein which would fall within the scope as defined by the appended claims.

I claim:

1. An electromechanical memory-positioning system comprising,

an electrically energizable drive means mechanically connectable to a positionable device to move the device to a predetermined position when the device is displaced therefrom,

a movable member mechanically connected to said drive means for movement in response to movement of the positionable device,

said movable member comprising a pair of cams mounted side by side for rotation about their axes and for selective movement longitudinal of their axes.

a pair of switch actuators mounted between said pair of cams,

a pair of switch means mechanically connected to said switch actuators and electrically connected to said drive means, and

means for moving said pair of cams longitudinally of their axes such that when moved in a first direction one of said cams engages one of said switch actuators to cause said drive means to move said positionable device in a first direction to a first predetermined position or said cam engages the other switch actuator to cause said drive means to move said positionable device in a second direction to said first predetermined position.

2. An electromechanical memory-positioning system according to claim 1 wherein the other of said cams engages one of said switch actuators to cause said drive means to move said positionable device in the first direction to a second predetermined position when said pair of cams are moved longitudinally in a second direction or said other cam engages the other switch actuator to cause said drive means to move said positionable device in the second direction to the second predetermined position.

3. An electromechanical memory system according to claim 2 wherein said cams are generally disc-shaped and formed with thick and thin peripheral portions.

4. An electromechanical memory system according to claim 3 wherein said cams are formed such that the thick portion is further from the center of the cam than said thin portion.

5. An electromechanical memory system according to claim 1 wherein said pair of cams are supported on a shaft driven by said drive means.

6. An electromechanical memory system according to claim 1 comprising a support shaft, a driven gear rotatably supported by said support shaft and formed with hub on which said pair of cams are supported.

7. An electromechanical memory system according to claim 1 wherein said pair of cams are mounted on said hub such that they normally turn with said hub, and said pair of switch actuators engage one of said cams to prevent its rotation when in a predetermined position and said pair of cams are moved in the first or second longitudinal direction, and means for energizing said driving means to move the device to a new predetermined position.

8. An electromechanical memory system according to claim 7 wherein said means for energizing said driving means comprises a manual switch.

9. An electromechanical memory system according to claim 7 wherein said switch actuators extend between said cams parallel to their surfaces and have cam-engaging portions attached to free ends thereof.

10. An electromechanical memory system according to claim 9 wherein said engaging portions are generally V-shaped such that when the cams are moved longitudinally the engaging portions will be moved outwardly from the support axis of said cams until a predetermined position is reached.

11. An electromechanical memory system according to claim 9 wherein said switch actuators are mounted on opposite sides of the support axis of said cams.

12. An electromechanical memory system according to claim 5 wherein said means for moving said pair of cams longitudinally comprises a command shaft movable for a central "off" position to a pair of "on" positions on either side of the off position and said command shaft linked to said shaft which supports said cams to move it longitudinally.

13. An electromechanical memory system according to claim 12 comprising a detent means for locking said command shaft in either of said "on" positions.

14. An electromechanical memory-positioning system according to claim 1 further including a second electrically energizable drive means mechanically connectable to a second positionable device to move it to a predetermined position when displaced therefrom, a second movable member mechanically connected to said second drive means for movement in response to movement of said second positionable device, said second movable member comprising, a second pair of cams mounted side by side for rotation about their axes and for selective movement longitudinal of their axes, a second pair of switch actuators mounted between said second pair of cams, a second pair of switch means mechanically connected to said second pair of switch actuators and electrically connected to said second drive means and means for moving said second pair of cams longitudinally of their axes such that said cams selectively energize said second drive means through said second pair of switch actuators and said second pair of switch means to position said second positionable device to a selected one of two predetermined positions.

15. An electromechanical memory-positioning system comprising,

a first clutch,

an electrically energizable drive means mechanically connectable through said clutch to a positionable device to move the device to a predetermined position when the device is displaced therefrom,

a movable member mechanically connected to said drive means for movement in response to movement of the positionable device,

said movable member comprising a pair of cams mounted side by side for rotation about their axes and for selective movement longitudinal of their axes,

a pair of switch actuators mounted between said pair of cams,

a pair of switch means mechanically connected to said switch actuators and electrically connected to said drive means and said clutch,

means for moving said pair of cams longitudinally of their axes such that when moved in a first direction one of said cams engages one of said switch actuators to cause said drive means to move said positionable device in a first direction to a first predetermined position or said cam engages the other switch actuator to cause said drive means to move said positionable device in a second direction to said first predetermined position,

a second clutch,

said drive means mechanically connectable through said second clutch to a second positionable device to move it to a predetermined position when displaced therefrom,

a second movable member mechanically connected to said second positionable device for movement in response to movement of said second positionable device, said second movable member comprising,

a second pair of cams mounted side by side for rotation about their axes and for selective movement longitudinal of their axes,

a second pair of switch actuators mounted between said second pair of cams,

a second pair of switch means mechanically connected to said second pair of switch actuators and electrically connected to said second clutch and said drive means, and

means for moving said second pair of cams longitudinally of their axes such that said cams selectively energize said drive means through said second pair of switch actuators and said second pair of switch means to position said second positionable device to a selected one of two predetermined positions.

16. An electromechanical memory-positioning system according to claim 15 wherein said drive means rotates in a first direction to satisfy all of the first, second and third positionable devices required to be moved in said first direction before rotating in another direction to satisfy any of the first, second and third positionable devices required to be moved in said other direction.

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,626,130 Dated December 7, 1971

Inventor(s) BURTON L. SIEGAL

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 2, line 4, should read --26-- rather than "25".

Column 2, line 7, after "has" insert the word --manual--.

Column 3, line 15, "711" should read --71a--.

Column 3, line 34, "114" should read --113--.

Column 6, line 24, after "191" insert the number --192--.

Column 7, line 41, after "with" insert the word --a--.

Column 7, line 69, change the word "for" to --from--.

Signed and sealed this 6th day of March 1973.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents

FORM PO-1050 (10-69)

USCOMM-DC 60376-P69
* U.S. GOVERNMENT PRINTING OFFICE : 1969 O—366-334

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,626,130 Dated December 7, 1971

Inventor(s) BURTON L. SIEGAL

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 2, line 4, should read --26-- rather than "25".

Column 2, line 7, after "has" insert the word --manual--.

Column 3, line 15, "711" should read --71a--.

Column 3, line 34, "114" should read --113--.

Column 6, line 24, after "191" insert the number --192--.

Column 7, line 41, after "with" insert the word --a--.

Column 7, line 69, change the word "for" to --from--.

Signed and sealed this 6th day of March 1973.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents

FORM PO-1050 (10-69)

USCOMM-DC 60376-P69
* U.S. GOVERNMENT PRINTING OFFICE : 1969 O—366-334