Nov. 5, 1968 B. GHIRELLI 3,408,777

HELIOTROPICALLY ROTATING BUILDING STRUCTURE

Filed Nov. 26, 1965 5 Sheets-Sheet 1

Fig. 4.

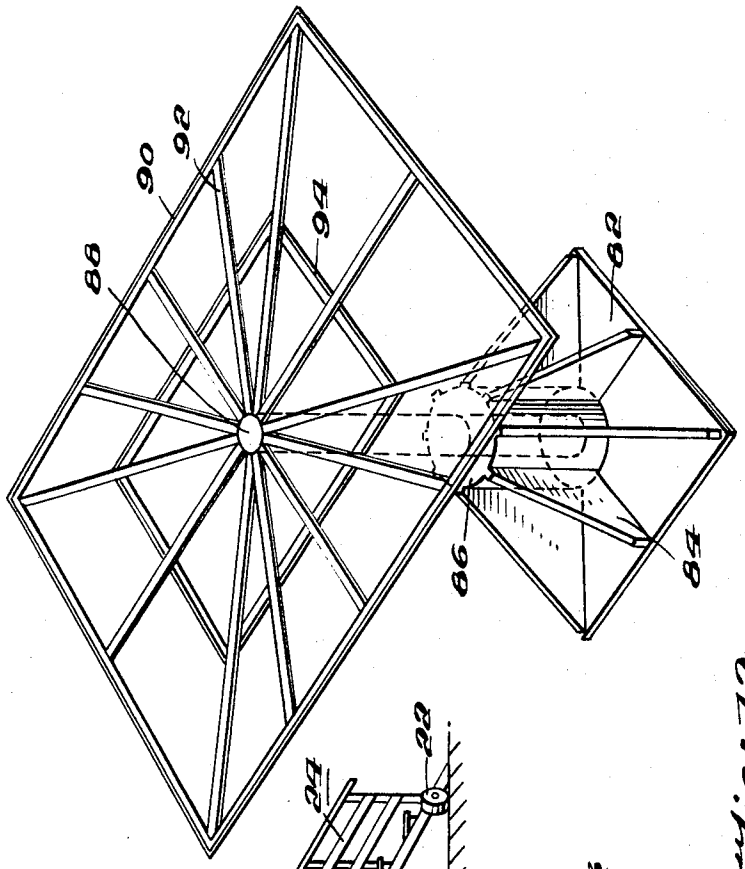


Fig. 1.

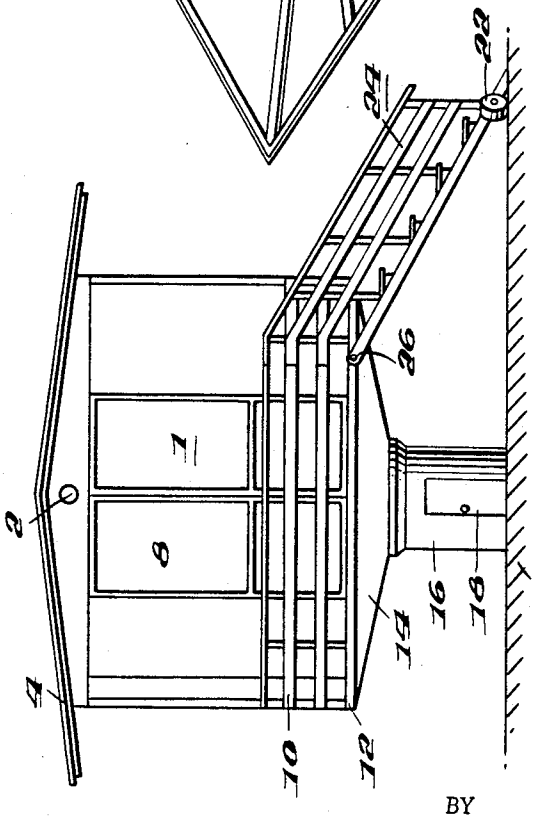
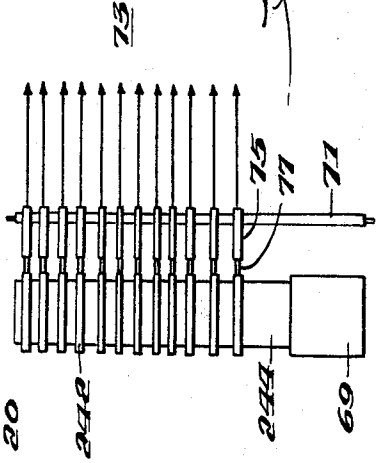


Fig. 12.



INVENTOR

BRUNO GHIRELLI

BY T. J. Lawrence

ATTORNEY

Nov. 5, 1968 B. GHIRELLI 3,408,777

HELIOTROPICALLY ROTATING BUILDING STRUCTURE

Filed Nov. 26, 1965 5 Sheets-Sheet 2

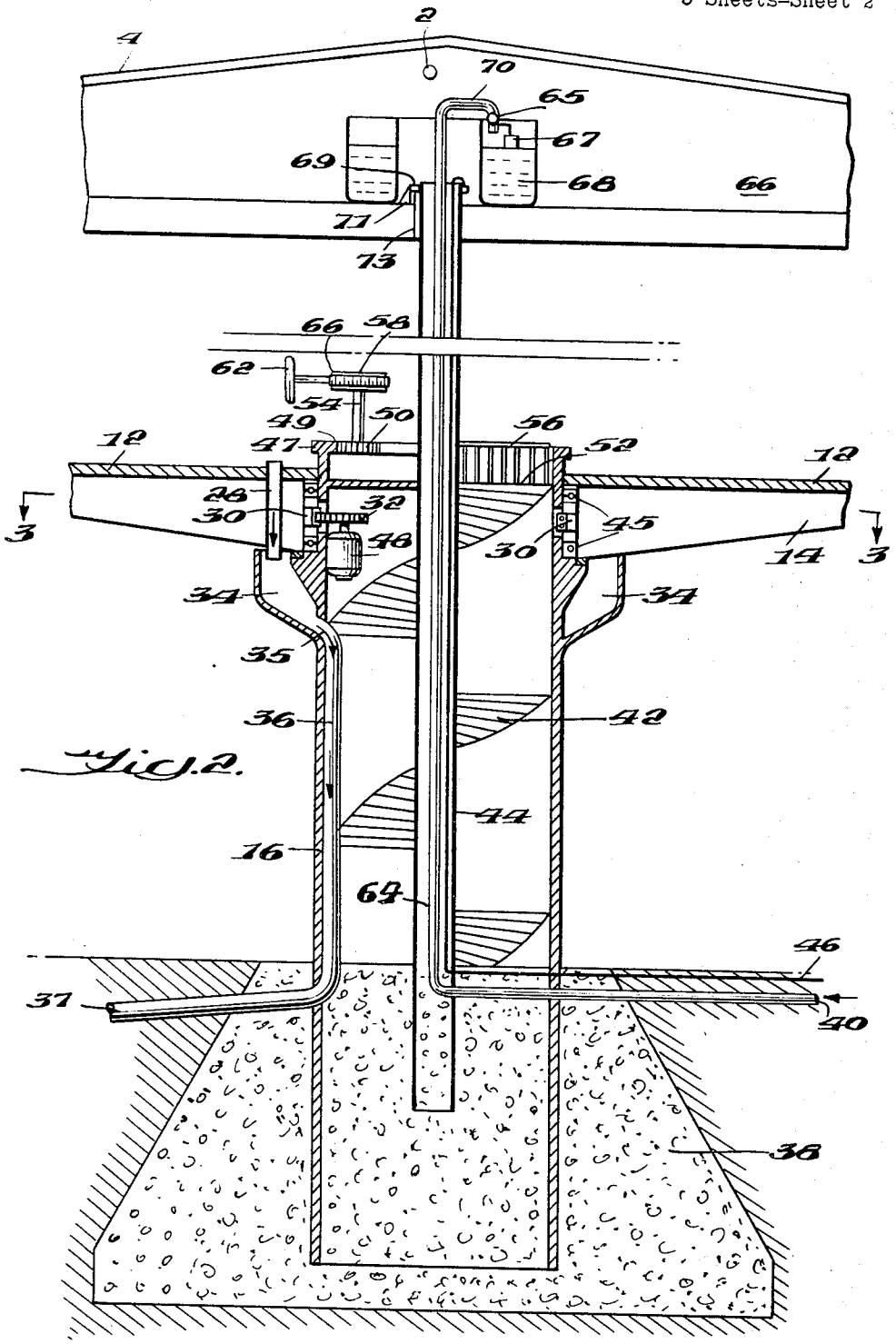


Fig. 2.

Nov. 5, 1968 B. GHIRELLI 3,408,777

HELIOTROPICALLY ROTATING BUILDING STRUCTURE

Filed Nov. 26, 1965 5 Sheets-Sheet 3

Fig. 5.

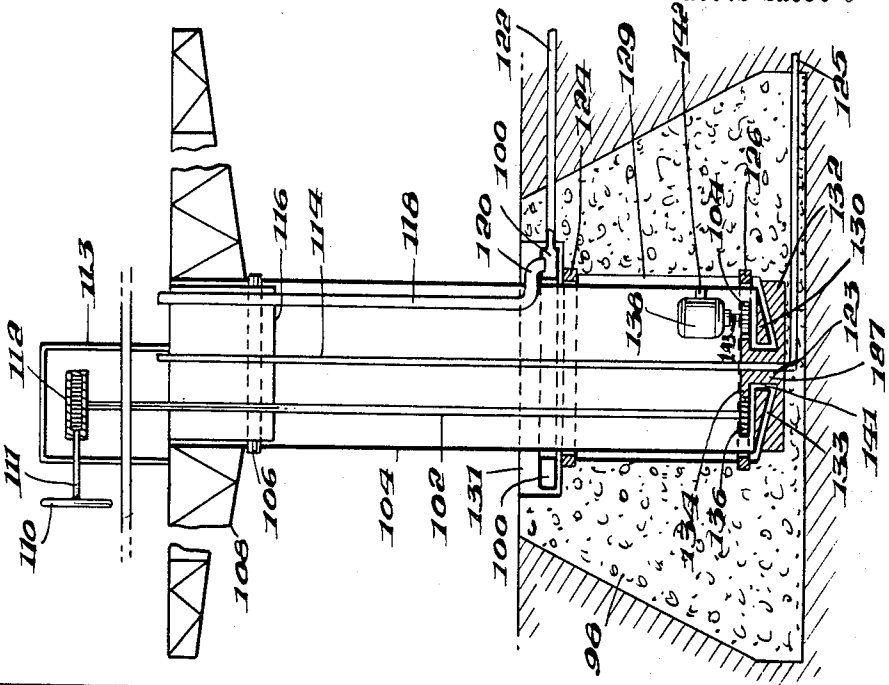
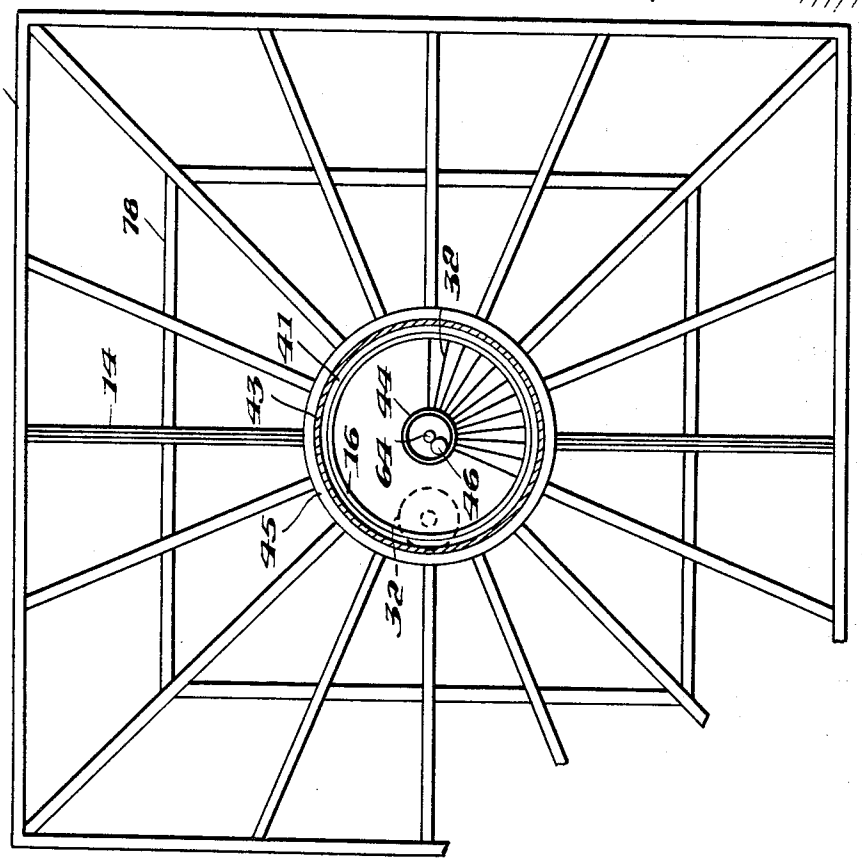


Fig. 3.



Nov. 5, 1968 B. GHIRELLI 3,408,777

HELIOTROPICALLY ROTATING BUILDING STRUCTURE

Filed Nov. 26, 1965 5 Sheets-Sheet 4

Fig. 6.

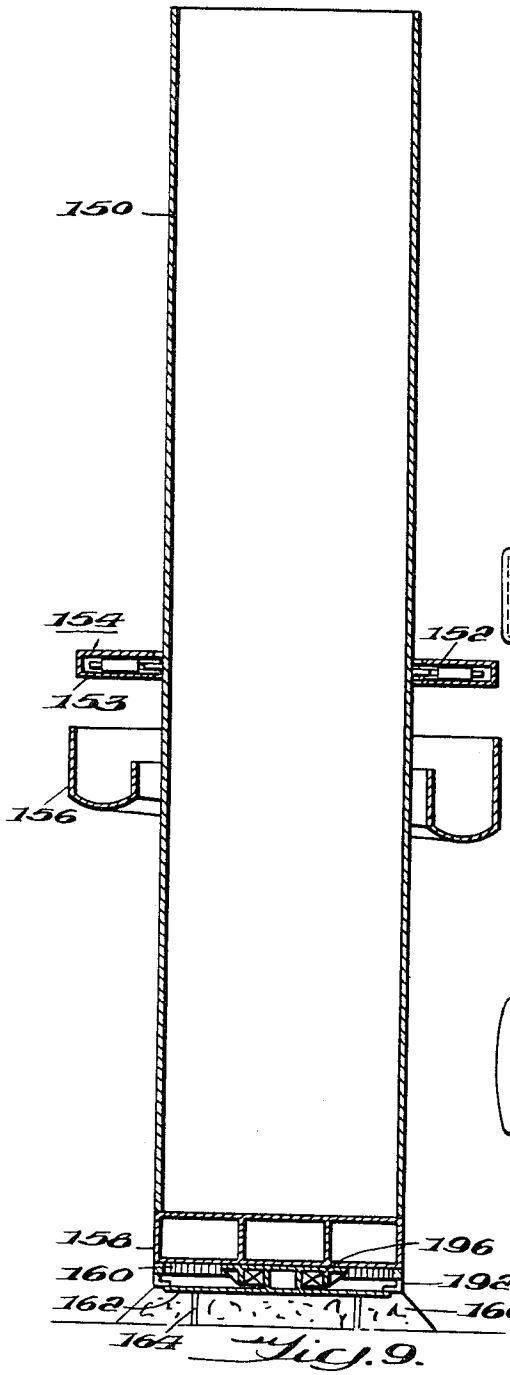


Fig. 9.

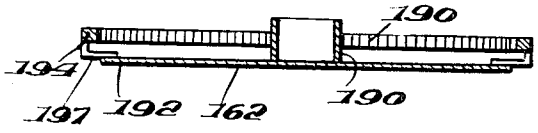


Fig. 7.

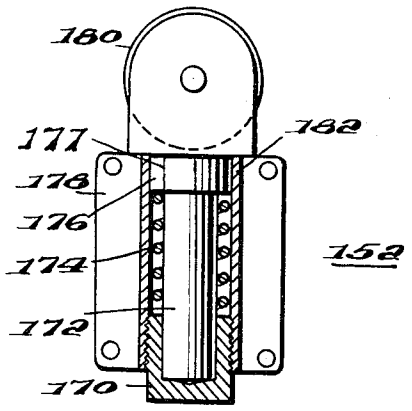


Fig. 8.

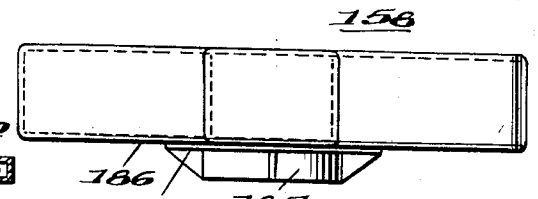
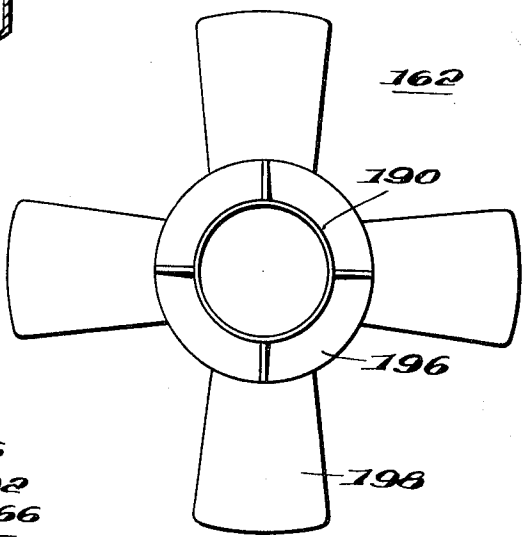


Fig. 10.



Nov. 5, 1968 B. GHIRELLI 3,408,777

HELIOTROPICALLY ROTATING BUILDING STRUCTURE

Filed Nov. 26, 1965 5 Sheets-Sheet 5

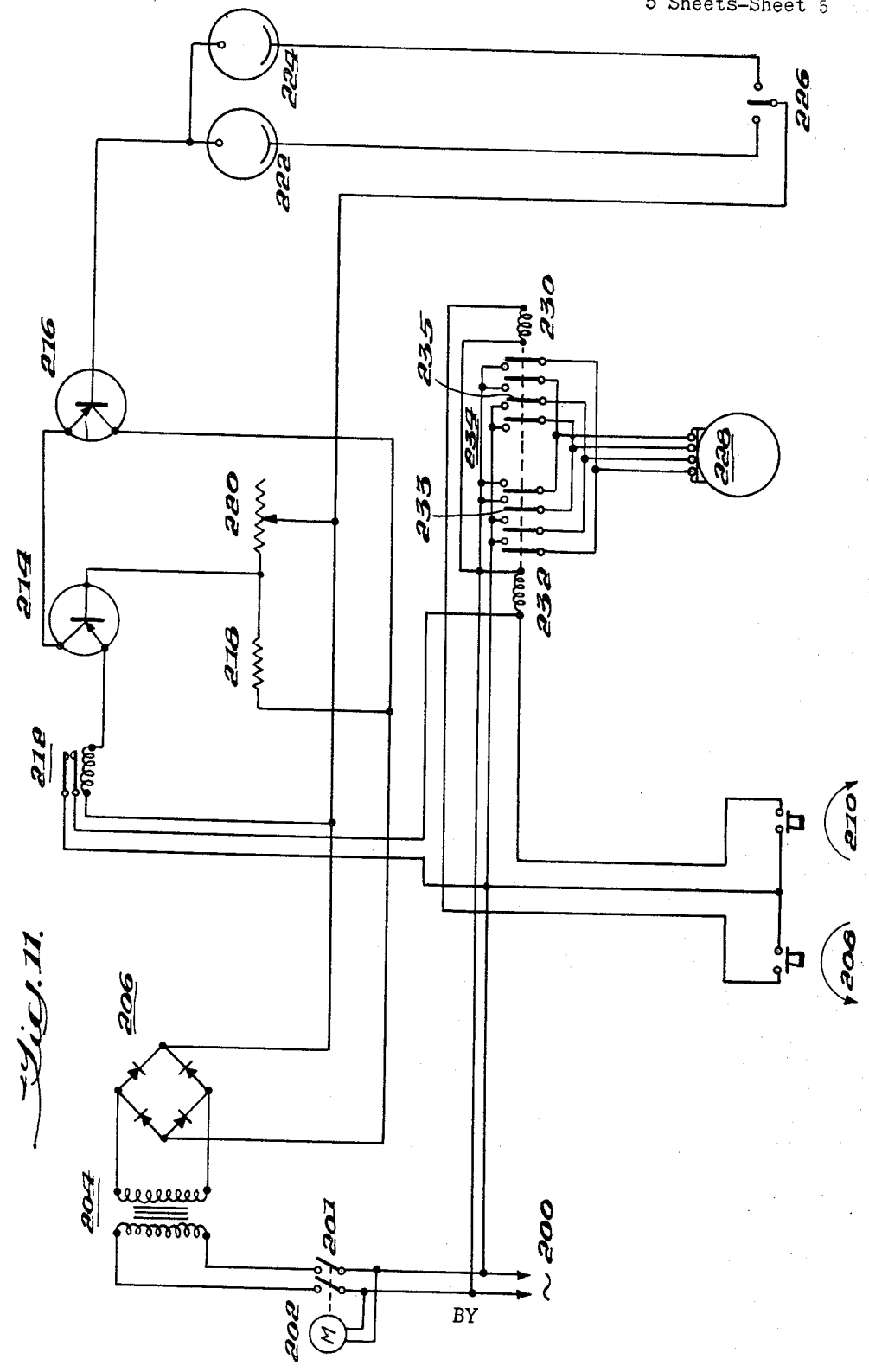


Fig. 11.

United States Patent Office

3,408,777

Patented Nov. 5, 1968

3,408,777

HELIOTROPICALLY ROTATING BUILDING STRUCTURE

Bruno Ghirelli, Noceto Parma, Italy, assignor of one-third to Emile M. Croci, Washington, D.C.

Filed Nov. 26, 1965, Ser. No. 509,729
10 Claims. (Cl. 52—1)

ABSTRACT OF THE DISCLOSURE

A heliotropically rotating structure comprising a rotatably mounted support platform carried by a center vertical support column means. The platform is rotated by manually operated means and by electric motor means. The electric motor means has a manual switch control and a heliotropic control. The heliotropic control comprises a photoelectric device secured to the structure and is responsive to a predetermined low level of sunshine to energize the electric motor means to rotate the platform. As soon as the platform is rotated and the photoelectric device is moved to be exposed to the full light effect of sunshine, rotation is terminated until the sun's effect on the photoelectric device again diminishes and the electric motor means is again energized to rotate the structure. Thus, the structure is rotated to follow the sun.

This invention relates to a static structure which can be rotated by a combination of mechanical, electrical and light sensitive control devices.

Heretofore it has been known to rotate a static structure such as a building structure by means of an electric motor or building attachment such as window louvers, awning or door structures by a combined electric motor and light sensitive or timing devices.

Generally the rotatable building structures of the prior art are mounted on a platform rotatably supported by a track and wheel or bearing means subject to adverse environmental conditions such as rust due to the humidity. The wheels, gears and bearings are complex, numerous and employ heavy structural elements which require a large power source to rotate.

It is a general object of this invention to rotate a static structure by means of a combined mechanical, electrical and light sensitive control.

It is a further object to rotate the static structure about a central vertical axis.

It is also an object to rotatably support the static structure on a rotating central axis.

Another object is the design of bearings used so as to facilitate the rotation control by reducing the number, complexity and size of the bearings, gears and motor.

It is a general object of this invention to avoid and overcome the foregoing and other difficulties of earlier rotatable structures by providing a control arrangement which uses a light-sensing device to operate an electrical system which in turn rotates a building structure.

For a better understanding of the invention reference should be had to the accompanying drawings, wherein:

FIGURE 1 is a front elevation view of one embodiment of the invention;

FIGURE 2 is a vertical section of one embodiment showing a fixed cylindrical support and rotatable platform;

FIGURE 3 is a plan view of the radial rib floor support framework and central staircase of the FIGURE 2 embodiment;

FIGURE 4 is an isometric view of another embodiment of the radial rib floor support and its vertical central axis which is rotatably mounted in a fixed cylindrical bearing support;

FIGURE 5 is a vertical section of another embodiment showing the rotating floor support mounted on a hollow cylinder which rotates about the fixed bearing supports;

FIGURE 6 is a vertical section of the rotatable vertical hollow cylinder axis and another embodiment of the bearing structures;

FIGURE 7 is an enlarged view of the bearings adjacent the vertical sides of the FIGURE 6 cylinder;

FIGURES 8, 9, and 10 are enlarged views of the combined lower support bearing structure of FIGURE 6;

FIGURE 11 is an electric circuit diagram of the push-button and photoelectric automatic motor control system; and

FIGURE 12 is a view of the incoming electrical and telephone distributor system.

With specific reference to the form illustrated in the drawings the invention comprises in general a static structure **1** which is demonstrated in FIGURE 1 as a single floor prefabricated house but not in any way limited thereto which is rotatably supported on a rotatable metal platform **14**. The platform **14**, which supports the house flooring **12** is shown supported above the ground by means of a vertical metal central structure **16** which the various following embodiments show as being either solid or hollow, fixed or rotatable. If the vertical structure **16** is a fixed hollow cylinder it may have a door **18** leading to an internal stairway. In addition to or in lieu of the internal stairway as in the case of rotating hollow vertical cylinder, an external stairway **24** is provided. The stairway **24** can be fixedly attached to the house as represented here by a porch **10** or it may have hinges **26** or other pivotal means about which the stairway can be raised or lowered either mechanically or automatically by standard gears or motor control means not shown. The lower part of the stairway **24** is preferably supported on a pair of wheels **22** which roll on a cement floor base **20** located under the house. The space beneath the house can be conveniently used for many desirable purposes an example of which is storage space for an automobile. The outside stairway **24** leads to an upper level entrance door **8**. Also shown in FIGURE 1 is the location of one of a plurality of light sensitive devices, an example of which may be a photocell **2**, which in combination with the overhang roof structure **4** or other adjacent shade producing structure not shown, will cause that side of the house to automatically follow the sun if so desired, the operation of which will be more fully explained later.

FIGURE 2 is illustrative of one of the embodiments wherein a hollow metal vertical cylinder **16** is fixedly supported in a cement base **38** located beneath the ground. The metal cylinder **16** which may be of steel rises above the ground to an approximate height of seven feet. The upper outer periphery of the cylinder **16** rotatably supports the floor **12** on the prefabricated horizontal support metal ribs **14** by means of sealed bearings **45**. This embodiment permits the use of a spiral staircase **42** within the cylinder **16**. Entrance would be through the doorway **18** shown in FIGURE 1. The stairway **42** is supported by a hollow metal cylinder **44** which

is also fixedly supported in the cement base **38**. The stairway rises vertically to a trap door **52** which is on the same horizontal plane with the floor **12**. A hand rail **56** which is supported by the stairway **42** is used to facilitate the entrance onto the rotating floor **12**. Clear water is fed through pipe **40** which is also fixed in the cement base **38**. Pipe **40** rises vertically internally of pipe **44** as indicated at **64** up to the discharge level **70** located under the upper roof **4**. Clear water is discharged from **70** into a rotating water tank reservoir **68** which is also supported just under the roof **4** in attic space **66**. Water being fed from discharge **70** is automatically controlled by means of a valve **65** which is operated by any means responsive to the rising water in the tank **68**, for example a float control **67**. Water stored in the rotating tank **68** can be fed by pipes, not shown, to the various plumbing facilities, not shown. Water is returned to the sewer from the various plumbing facilities by way of discharge tube **28** mounted in the rotating floor **12**. Sewer water is discharged from the end of tube **28** as it rotates within the sewer collector ring **34** which is attached to the outer periphery of the cylinder **16**. A vertical sewer pipe **36**, which can be located either outside of the cylinder **16** or as in this case inside the cylinder **16**, receives the sewer water at **35** and discharges it at **37** to appropriate sewer disposal means, such as a septic tank or municipal sewer lines. Electric power and telephone lines enter through a conduit **46** which is embedded in the concrete base **38**. The conduit **46** rises vertically within central pipe **44** and connects with a fixed slip ring structure **69** mounted on the outer periphery of the upper end of central pipe **44** in the attic area **66**. Brushes **77**, shown better in FIGURE 12, are held by brush holder **75** which in turn is supported by element **71** mounted on the rotating house structure. Telephone and current carrying wires **73** lead from the rotating brushes **77** to the various required outlets not shown. Three means of rotating the platform **14** are functionally combined to form a mechanical, electrical and light sensitive control. The mechanical means consists of a wheel **62** mounted on a wall and is turned by hand to rotate a large lead, reversible worm gear drive **66** within casing **58**, which worm gear drive is connected to shaft **54** to rotate the same. Such reversible worm gear drives are well known gear elements, and may be of the type illustrated by gear elements *c* and *f* in Patent No. 871,227. Gear **50** is fixedly attached to the rotatable shaft **54** and meshes with the internal teeth of ring gear **49** which is fixedly attached to the upper fixed cylinder structure **16** at **47**. The gears **49** and **50** may be located below the floor **12** if so desired. Therefore, it can be readily seen that upon rotation of the shaft **54**, the platform **14** to which it is attached will also rotate due to the gear **50** rotating around the ring gear **49**. The second and dominating control means is the electrical pushbutton control of the reversible motor **48**. The motor **48** is mounted on the inside top wall of the cylinder **16** so that the gear **32** attached to the motor shaft will mesh with the internal teeth of ring gear **30** mounted on the rotatable platform **14**. A more detailed explanation of the pushbutton electrical control will be given in connection with the wiring diagram shown in FIGURE 11; however, it can be readily understood that when the clockwise rotation pushbutton is activated and the motor **48** is so activated, then the gear **32** attached to the motor shaft will drive the ring gear **30** which is attached to the rotatable platform **14**, thereby to rotate the platform **14** clockwise; the platform **14** is reversibly driven when the counterclockwise button is pushed. This operation will be better understood when the wiring diagram shown in FIGURE 11 is described. The third control means is a light sensitive device which by way of example is described as a photocell **2** mounted under the roof overhang on one or more sides as desired. The photocell is so located beneath the roof overhang so that when the sun's position changes sufficiently to cast a roof shadow across the photocell **2** it will be energized so as to activate the motor **48** and thereby cause the house mounted photocell **2** to rotate searching for the sunlight. When the platform **14** is repositioned so that the sunlight falls upon the photocell **2**, the motor control circuit will be de-energized and rotation stopped. Light responsive devices such as photocells or heat sensitive devices may be placed on each of the exterior walls with circuit control means to permit any one side of the house to follow the sun or if the reverse is desired then to be in the shade. This invention is not limited to a light sensitive device cooperating with the roof overhang but may include standard shading elements not shown constructed adjacent the photocell so as to cooperate therewith to give the desired result.

The radial rib supports **14** are better shown in the plan view of FIGURE 3 which is a view taken along lines **3—3** of FIGURE 2. The radial ribs **14** extend inward from the outer frame struts **80** and are attached to the rotatable bearing ring **45**. The bearing ring **45** rotates about the fixed bearing ring **41** by means of sealed bearing **43**. The additional rib structure **78** extends between the radial ribs **14** so as to provide additional strength to the ribs **14**. Although the plan view shown in this FIGURE 3 takes the form of a square, it is no limitation because a rectangular or other configuration can equally as well be constructed. It should also be noted that all of the parts can be prefabricated and easily assembled to form the desired structure which makes a more practical and economical structure.

FIGURE 4 is an isometric view of another embodiment of the radial rib floor support and its vertical central axis. The radial ribs **92** extend inward from the outer frame struts **90** and terminate on the central solid cylinder **88**. Struts **94** are strengthening supports between the radial ribs **92**. The vertical solid cylinder **88** is rotatably supported on the internal bearing surface of the fixed cylinder **86** which is mounted on the platform **82** and strengthened thereon by radial ribs **84**. The fixed cylindrical bearing support comprising elements **82**, **84** and **86** may be moulded into one piece if so desired. The fixed cylindrical bearing structure is of course to be located beneath the ground and if necessary can be supported in a cement base as is shown in FIGURE 2. The structure shown in FIGURE 5 is another embodiment wherein the vertical hollow cylinder is rotated instead of being fixed as in FIGURE 2.

Referring to FIGURE 5, a frustrum pyramid shaped cement base **98** is located below the ground. A cylindrical hollow area **129** is centrally provided in the cement base **98** to rotatably support approximately the lower one half of the hollow vertical cylinder **104**. The cylinder **104** is horizontally supported and positioned by two bearing rings **124** and **126**. The bearing ring **124** is mounted about the internal periphery in the upper part of the hollow cement base area **129** and the bearing ring **126** in the lower part of the same hollow area **129**. The lower end of the hollow cylinder **104** is closed by an inverted conical shaped metal bearing plate **130** which has a central aperture **141**. The bearing plate **130** is rotatably supported vertically on a metal bearing plate **132** fixed in the cement base **98** at the lower part of the hollow area **129**. The fixed bearing plate **132** is shaped to conform to the shape of the rotatable bearing plate **130** which it rotatably supports vertically by means of a thrust or sliding means **133** which may be a lubricant. The central aperture **141** of the end bearing plate **130** receives a fixed cylindrical part **127** which part is integrally formed with the bearing plate **132**. The cylinder **127** extends upward through the bearing plate aperture **141** inside of the cylinder **104**. Either mounted on top of or formed integral with the upper part **127** is a fixed gear **134** about which the drive gears **136** and **140** rotate when activated by any one of a combined mechanical, electrical or light sensitive control means. The drive gears **136** and **140** obviously are mounted so as to rotate with the cylinder

structure **104** as will now be discussed further. The mechanical power is supplied by rotating a wheel **110** by hand. The wheel **110** is preferably in the form of a ship's steering wheel and is mounted on one of the internal walls **113** of the rotating supported structure. Upon rotation of the wheel **110** the horizontal shaft **111** to which it is attached rotates and thereby rotates the large lead, reversible worm gear drive **112** connecting shafts **111** and **102**. Worm gear drive **112** is similar to drive **66** described above. Thus, rotation of wheel **110** rotates the vertical shaft **102** which extends down inside the cylinder **104** until it reaches the level of fixed gear **134**. A gear **136** is mounted on the end of the shaft **102** so as to mesh with fixed gear **134** about which the drive gear **136** will rotate when the wheel **110** is rotated. A second power source **138** which is a small reversible electric motor is mounted, either directly or by means of a bracket support **142**, to the inside of cylinder **104** in such a position to enable the drive gear **140** mounted on the end of the motor shaft **143** to mesh with fixed gear **134** about which drive gear **140** rotates. It is obvious that the cylinder **104**, on which the motor **138** is mounted, will rotate upon energization of the motor **138** by either the clockwise or counterclockwise push button control mounted on the wall preferably adjacent the wheel **110** or the light sensitive control which may be in the form of one or more photocells strategically located on the outside of the supported structure which may be a house. These electric controls will be described in more detail in connection with the wiring circuit diagram shown in FIGURE 11. If one of the plurality of photocells are activated then the side of the supported structure on which it is mounted will follow the light source which in this case is the sun. The light sensitive control device is not limited to photocells but may include other well known light sensitive devices. The necessary water pipes and other cables are all fed to the rotating structure through a single conduit **114** and enter the horizontal section at **125**. The horizontal section of the conduit **114** is supported in the cement base **98** and at the point directly below the aperture **123** in the fixed bearing plate **132**, the conduit **114** makes a 90 degree bend and extends vertically up through the aperture **123** and through the cylinder **104** to the rotatable cooperative receptacle for each, similar to those already described in connection with FIGURE 2. The sewerage is disposed of through pipe **118** which is vertically attached to the inside wall of rotatable cylinder **104**. The pipe **118** terminates at the spout **120** which extends through the cylinder **104** which is positioned just below the ground level. The sewerage is discharged from the spout **120** into cylindrical closed fixed receptacle **100** which encircles the cylinder **104** and is supported in a recess **131** provided in the cement base **98**. Standard seals would be provided between the rotatable spout **120** and the fixed receptacle **100**. A discharge sewer pipe **122** leads from the receptacle **100** to the appropriate sewer disposal facility available. Inside the upper metal cylinder **104** and extending for about one fourth of its length is a metal cylinder support **116** which is welded and bolted to the cylinder **104** inner top wall. The metal cylinder **116** gives additional support for the radial metal girder ribs **108** which are welded and bolted to the outside top surface of the cylinder **104**. The radial ribs **108** are additionally reinforced by a metal ring **106** welded to the outside of the cylinder **104** at a joint just below and adjacent to the radial rib **108**. The size of the metal ring **106** would vary in accordance with the size of the static structure being rotatably supported. The radial ribs **108** which will support the floor of the static structure may assume a design framework such as that shown in FIGURE 3. The radial ribs **108** being of the girder and support strut design shown in FIGURE 5 are especially conducive to preforming which prefabricated rib part **108** can be easily welded and bolted at the building location which is time saving and economical.

FIGURE 6 is another structural modification of a vertical rotatable cylinder and its support bearings. Referring to the structural details of FIGURE 6, a vertical rotatable cylinder **150**, similar to that of the cylinder **104** shown in FIGURE 5, is horizontally positioned and supported by two similar bearing assemblies **152** and **154**. The bearing assembly **152** is detailed in FIGURE 7 wherein a cup like bearing **170** is mounted on a solid cylindrical support rod **172** which is slidably assembled within the aperture **177** of stationary disc **176** which in turn is mounted within the rear end of hollow cylinder **182**. The hollow cylinder **182** is mounted on a bracket support **178** which in turn can be supported by any suitable structure **180**. A coiled spring **174** is assembled within the cylinder **182** around the rod **172**. One end of the spring **174** rests against the stationary disc **176** and the opposite end against the inner shoulder of the slidable bearing cup **170**. The bearing cup **170** can therefore provide a resilient support for the cylinder **150**. The entire bearing assembly **152** can be protected by a housing **153** if it is located below ground. The sewer discharge basin **156** is another structural modification of previous sewer discharge basins already described. The rotatable cylinder **150** is attached to a metal frame support **158** which is shown in better detail in FIGURE 8. Fixedly secured to the lower part of the frame **186** is a cup shaped metal member **184** which has an external flange piece **185** integrally formed and surrounding it to give the cup member **184** additional support. The inner surface of the cup member **184** acts as a bearing surface when assembled with the segmental bearings **196**, best seen in FIGURE 10 and the lower supporting fixed bearing surface **190** best seen in FIGURE 9. The lowermost stationary support **162** is best shown in the plan view of FIGURE 10. The radial metal support members **198** are integrally joined at the hub center cup **190**. Two or more of these radial members **198** may have metal support rods **164** extending downwardly from the bottom of the members **198** and fixedly embedded in a cement base **166**. A gear ring **194** with internal teeth is attached to a support arm **197** as best seen in FIGURE 9 and the support arm **197** is fixedly secured to the stationary support **162** at its outer periphery **192**. The gear ring **194** thereby provides a means about which the power gears can rotate together with the cylinder **150** on which they are supported as was similarly shown in connection with FIGURE 5.

The electrical wiring system for the combined electrical rotation controls is shown in FIGURE 11. In order to activate the reversible motor **228** so as to rotate the static structure clockwise, pushbutton switch **210** is closed drawing current from the A.C. power source **200** through the inductor coil **232** of the stack relay **234**, thereby closing relay contacts **233** energizing the motor in a clockwise direction. To reverse the direction of rotation of the motor **228**, pushbutton switch **208** is closed thereby drawing the line current from the A.C. power source **200** through the inductor coil **230** of the stack relay **234** thereby closing contacts **235** and energizing the motor in a counterclockwise direction. It should be stated here that the pushbutton switch control dominates all other of the combined controls both mechanical and light sensitive. If the push button switch control is not to be used but the automatic photocell circuit has been activated then the photocell control is dominant over the mechanical control means. Before the photocells, which normally send out too weak a signal, can function properly, two standard amplifier stages, consisting of transistor **216** in the first stage and transistor **214** in the second, are used to amplify the signal to energize the relay **212** which is set to trip at a set level and thereby draw current from the A.C. power source **200** through the inductor coil **232** which will close contacts **233** of the stack relay **234** to energize the motor **228** in a clockwise direction. The photocell control can only control the rotation of the motor **228** in a clockwise direction. Before the tran-

sistors **214** and **216** can function a bias must be placed on each and this is done by closing the line switch **201** to draw current from the A.C. power source **200** to the transformer **204** and then to the rectifier bridge **206**. D.C. current is taken off the rectifier bridge to provide the necessary bias voltage for the transistors **214** and **216**. In order to better understand the operation of the photocell control it should be remembered that any number of photocells can be used, such as one on each side of the rotating structure. However, only two photocells are shown in FIGURE 11 at **222** and **224**. When the switch **226** is closed to activate either of these two photocells and the sun rays across the cell is shaded by the roof of the house or other shade structure, a small signal is transmitted to the first stage transistor **216** and fixed resistor **218** and adjustable resistor **220**. The purpose of the adjustable resistor is to set the light level trip release in connection with the trip level of the relay **212**. In effect the two resistors **218** and **220** act as a voltage divider regulating the input to the second stage transistor **214**. The output from the second stage amplifier signals the relay **212** to trip when the relay trip level voltage is reached. During the daylight hours the timer switch **201** is in closed position to provide a D.C. bias to the transistors; however, at night the timer switch **201** is set to be opened by the electric clock **202**, at a set time, thereby completely cutting off all power to the amplifier circuit thus shutting off the motor.

The electrical distributor system shown in FIGURE 12 has already been briefly described in connection with FIGURE 2. Referring to FIGURE 12, a fixed support **69** is attached to the fixed structural element in any of the various modifications. A cylindrical rod **244**, attached to the fixed support **69**, has a plurality of slip rings **242** mounted thereon. The rod **71** is mounted on the rotating upper structure adjacent to the slip rings **242**. A plurality of brush holders **75** are mounted on the rod **71** and each holds a brush contact **77** which slidingly contacts the cooperating slip rings **242** to thereby bring the electric line current, to various appliances **73** as well as bringing in the telephone service.

While the invention has been particularly shown and described with reference to preferred embodiments thereof, it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the spirit and scope of the invention.

What is claimed is:

1. A static structure mounted on a platform, support means to mount said platform in a cantilever fashion for full rotation relative to a ground supported bearing means, manually operated means to rotate said platform, electric motor means to rotate said platform, manual control means for controlling the operation of said electric motor means, sunshine responsive control means to control said electric motor means to heliotropically rotate said platform, said support means comprising a ground supported bearing plate, a rotary hollow cylinder having a bottom bearing member supported on the plate and forming therewith a thrust bearing, said bearing plate having a projection extending through an aperture in the bearing member and extending within the hollow cylinder, means securing said platform to said hollow cylinder, said manually operated means comprising a gear train between a manually operated member and the projection, and said electric motor means interconnecting the hollow cylinder and projection to cause relative rotative motion therebetween.

2. The apparatus of claim **1**, wherein ring bearing means is secured to the ground and embraces the outside surface of said hollow cylinder at a point intermediate the platform and the thrust bearing means.

3. The apparatus of claim **2**, wherein the ring bearing means comprise a plurality of devices circumferentially spaced around the hollow cylinder, each device comprising a fixed housing, a bearing plunger slidable in said housing, and a spring acting on said plunger to bias it against the cylinder surface, and a casing encompassing said devices.

4. A static structure mounted on a platform, support means to mount said platform in a cantilever fashion for full rotation relative to a ground supported bearing means, manually operated means to rotate said platform, electric motor means to rotate said platform, manual control means for controlling the operation of said electric motor means, sunshine responsive control means to control said electric motor means to heliotropically rotate said platform, said sunshine control means comprising photoelectric means secured for positive movement with the rotating structure, a circuit connected between the photoelectric means and the electric motor means effective to cause actuation of the electric motor means in response to a predetermined low level effect of the sunshine and thereby cause rotation of the structure by the electric motor means, said circuit terminating actuation of the electric motor means upon movement of the photoelectric means and exposure thereof to the full effect of sunshine, said support means comprising a ground supported bearing plate, a rotary hollow cylinder having a bottom bearing member supported on the plate and forming therewith a thrust bearing, said bearing plate having a projection extending through an aperture in the bearing member and extending within the hollow cylinder, means securing said platform to said hollow cylinder, said manually operated means comprising a gear train between a manually operated member and the projection, and said electric motor means interconnecting the hollow cylinder and projection to cause relative rotative motion therebetween.

5. The apparatus of claim **4**, wherein ring bearing means is secured to the ground and embraces the outside surface of said hollow cylinder at a point intermediate the platform and the thrust bearing means.

6. The apparatus of claim **5**, wherein the ring bearing means comprises a plurality of devices circumferentially spaced around the hollow cylinder, each device comprising a fixed housing, a bearing plunger slidable in said housing, and a spring acting on said plunger to bias it against the cylinder surface, and a casing encompassing said devices.

7. A static structure mounted on a platform, support means to mount said platform in a cantilever fashion for full rotation relative to a ground supported bearing means, manually operated means to rotate said platform, electric motor means to rotate said platform, manual control means for controlling the operation of said electric motor means, sunshine responsive control means to control said electric motor means to heliotropically rotate said platform, said sunshine responsive control means comprising photoelectric means secured for positive movement with the rotating structure, a circuit connected between the photoelectric means and the electric motor means effective to cause actuation of the electric motor means in response to a predetermined low level effect of the sunshine and thereby cause rotation of the structure by the electric motor means, said circuit terminating actuation of the electric motor means upon movement of the photoelectric means and exposure thereof to the full effect of sunshine, said photoelectric means comprising a plurality of photoelectric devices, each located at different points of the structure, and switch means for selectively connecting one of said devices to said control circuit.

8. The apparatus of claim **7**, wherein the support means comprise a fixed vertical structure, bearing means between said platform and said vertical structure, said manually operated means comprise gearing interconnecting gear means secured to said vertical structure and a manually operated member secured on the platform, and said electrical motor means comprise a gear means secured to

said platform in operative engagement with the electric motor.

9. A static structure mounted on a platform, support means to mount said platform in a cantilever fashion for full rotation relative to a ground supported bearing means, electric motor means to rotate said platform, manual control means for controlling the operation of said electric motor means, sunshine responsive control means to control said electric motor means to heliotropically rotate said platform, said support means comprising a fixed hollow vertical structure, means to rotatably mount said platform upon said vertical structure at an elevated point above the ground, comprising an opening in the platform to receive the vertical structure and a shoulder means to support said platform, a gear secured to and below said platform adjacent the vertical structure, an electric motor secured within the vertical structure and geared to said gear, a second gear secured to said vertical structure, and a manually operated gear means secured to and housed within the static structures and geared to said second gear.

10. The apparatus of claim **9**, wherein said sunshine responsive control means comprising photoelectric means secured for positive movement with the rotating structure, a circuit connected between the photoelectric means and the electric motor means effective to cause actuation of the electric motor means in response to a predetermined low level effect of the sunshine and thereby cause rotation of the structure by the electric motor means, said circuit terminating actuation of the electric motor means upon movement of the photoelectric means and exposure thereof to the full effect of sunshine.

References Cited

UNITED STATES PATENTS

407,877	7/1889	Rowe	52—65
895,176	8/1908	Gaynor	272—2
1,153,292	9/1915	Downey	52—65
1,343,794	6/1920	Sevczov	52—65
1,381,202	6/1921	King	52—31
2,563,531	8/1951	Kirkman	52—65
2,815,539	12/1957	Schneider	52—31
2,846,962	8/1958	Morgan	52—65
2,962,647	11/1960	Borenstein	160—5
3,093,869	6/1963	Ranney	52—65
3,015,249	1/1962	Taylor	350—26 XR

FOREIGN PATENTS

592,577	1960	Canada.
1,242,847	1960	France.
702,639	1954	Great Britain.
478,510	1953	Italy.
554,831	1957	Italy.
599,862	1959	Italy.

OTHER REFERENCES

Washington Star Magazine, May 14, 1961, p. 4.
Mechanix Illustrated, May 1964, p. 74.

FRANK L. ABBOTT, *Primary Examiner.*
PRICE C. FAW, *Assistant Examiner.*