United States Patent

[11] 3,633,904

[72] Inventor **Masayoshi Kojima**
Toyonaka-shi, Japan

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[73] Assignee **Sanseiyusoki Co., Ltd.**
Osaka City, Japan

[54] **ROTARY ELEVATOR OBSERVATION TOWER**
8 Claims, 7 Drawing Figs.

[52] **U.S. Cl.** **272/7,** 272/51, 52/31, 52/65
[51] **Int. Cl.** **A63g 1/00**
[50] **Field of Search** 272/6, 7, 16, 17, 42, 43, 46, 48, 50, 51; 182/141, 148; 187/12; 104/53, 56, 57; 52/31, 65, 116

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Primary Examiner—Richard C. Pinkham
Assistant Examiner—R. T. Stouffer
Attorney—Wenderoth, Lind and Ponack

ABSTRACT: A rotary elevator observation tower. A tower body has an elevator body mounted on the outside thereof for vertical movement on the tower body. An annular observation room is mounted on the elevator body and rotatable therearound at an inclination to the horizon. An annular platform is provided at the bottom of the tower which is also inclined at the same angle, and surrounds the observation room when the observation room is at its lowest position.

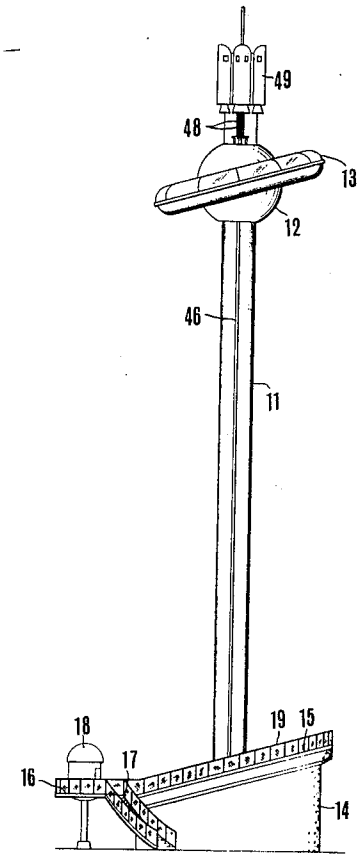

FIG.1.

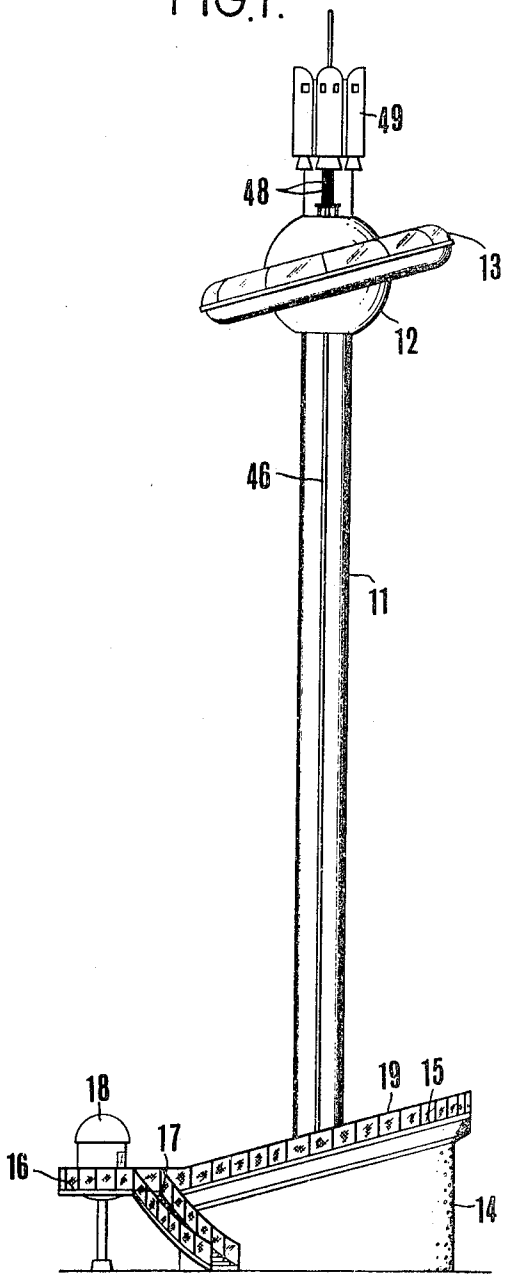

FIG. 2.

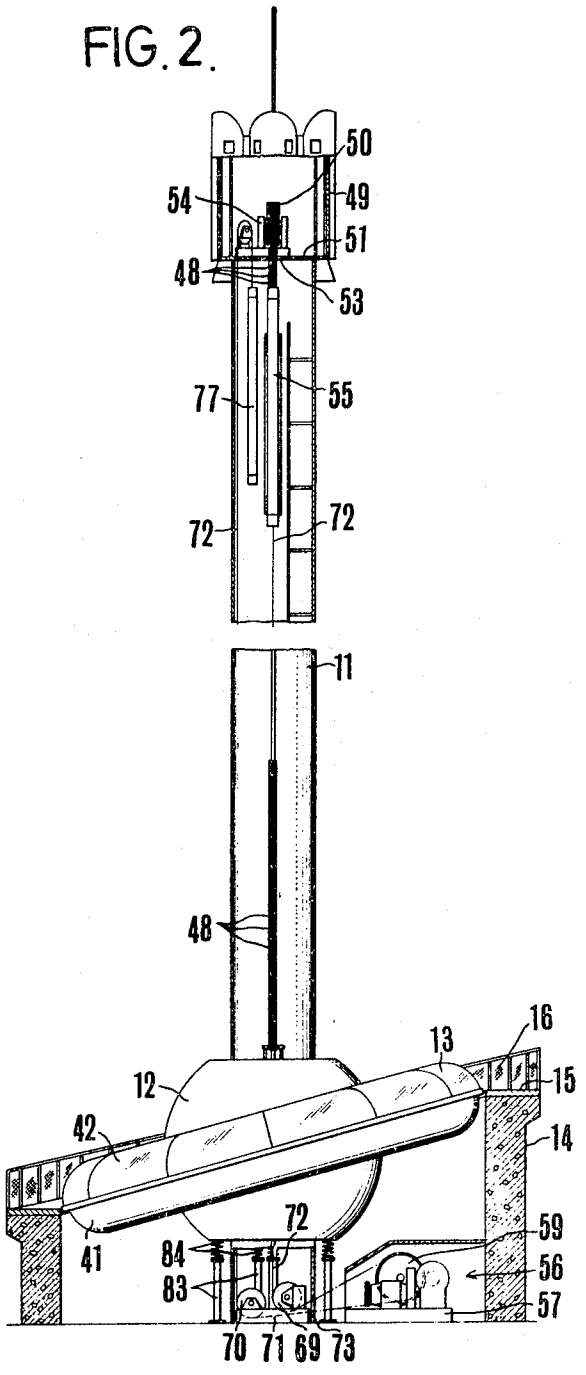
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FIG. 3.

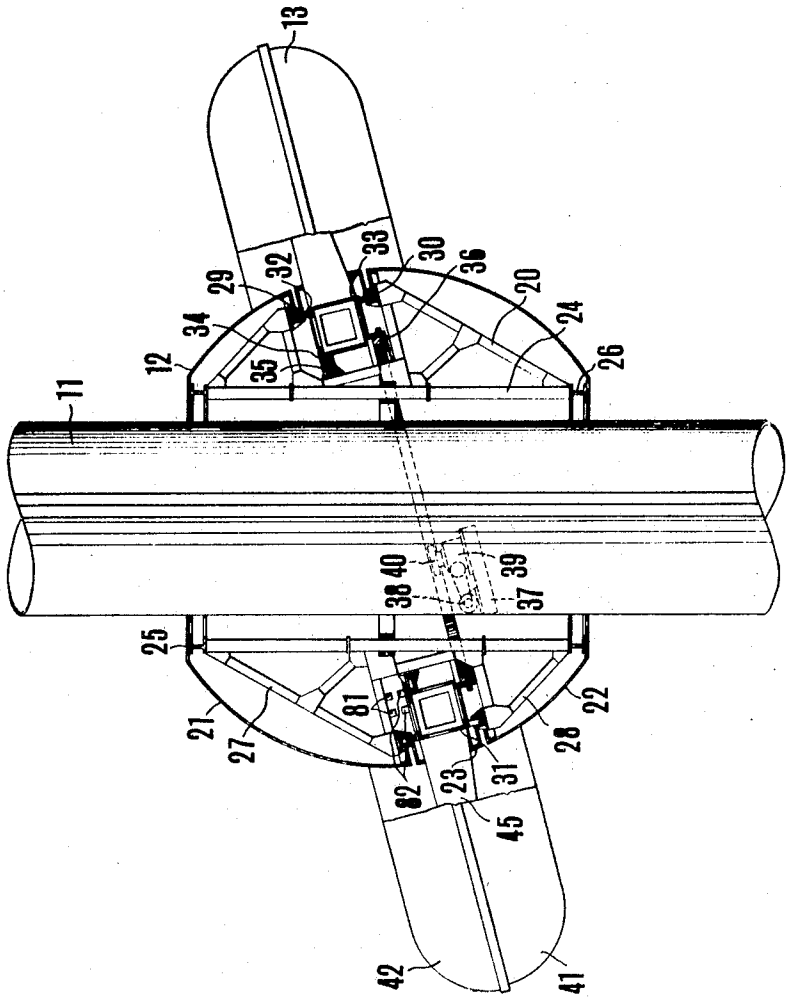
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FIG. 4.

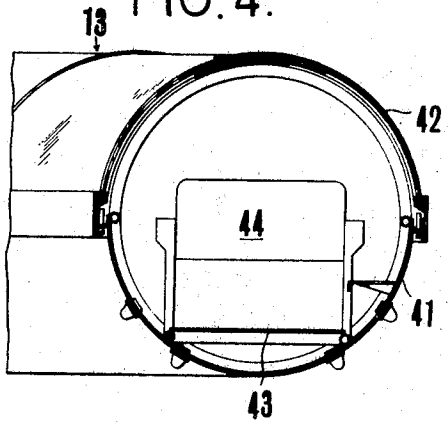

FIG. 5.

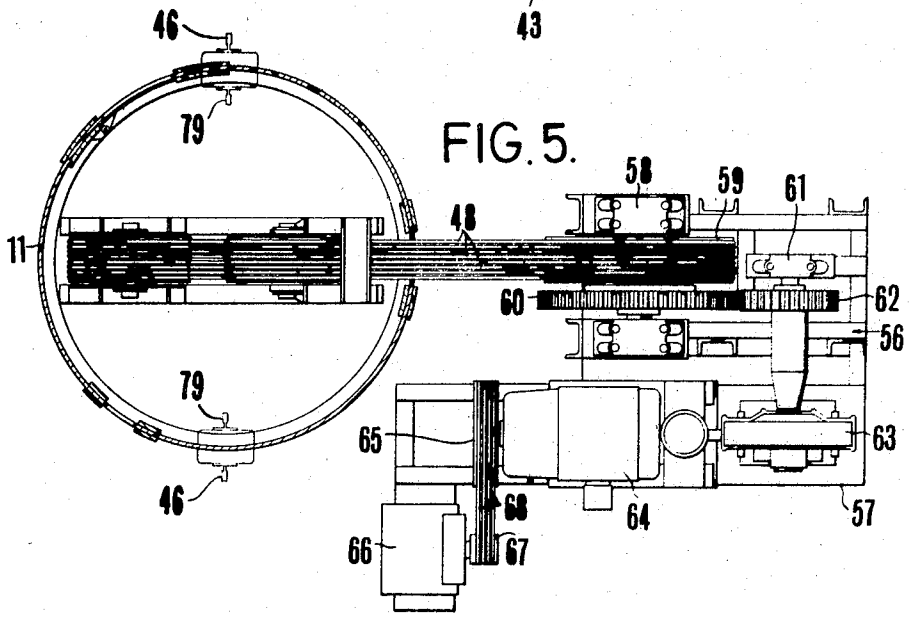

FIG. 6.

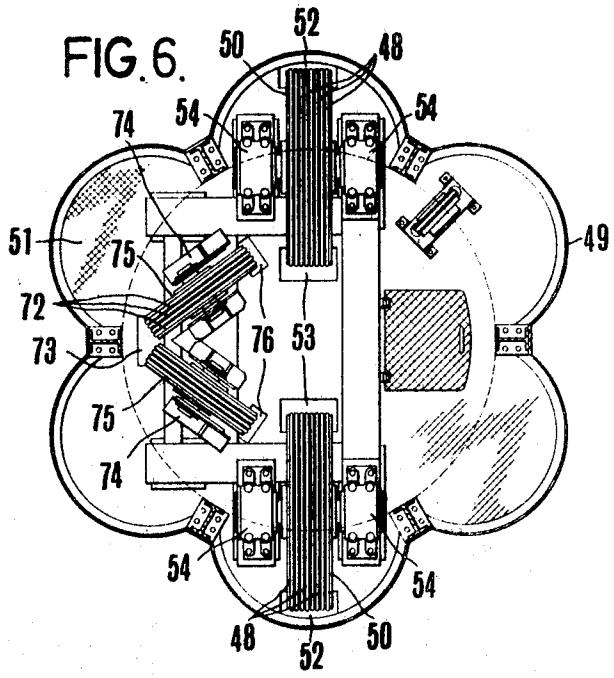
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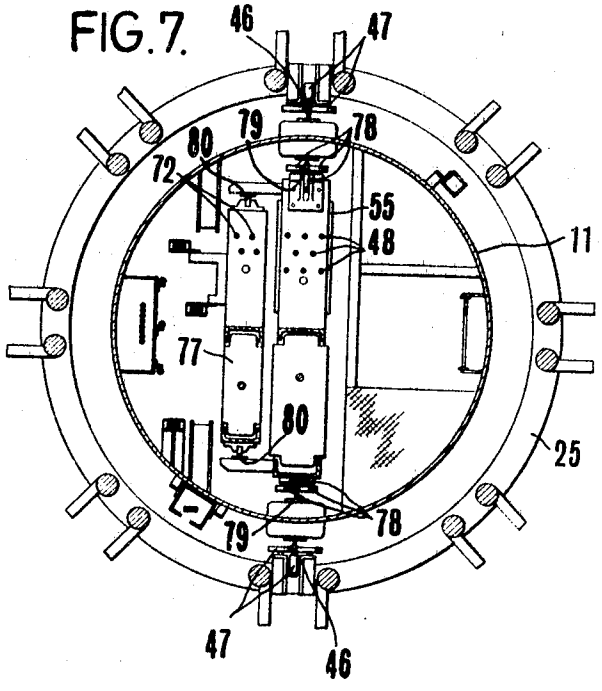
FIG. 7.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ROTARY ELEVATOR OBSERVATION TOWER

This invention relates to a rotary elevator observation tower to be provided at a tourist resort.

In case of the conventional tower of this kind, an observation room was simply provided at the top thereof or the observation room was rotated at best, involving inconvenience of having to make use of a staircase to climb up and down the tower.

The first object of the invention is to remove the inconvenience of having to climb up and down the tower making use of a staircase by providing an observation room which climbs up and down along the tower, thereby obviating the defects of the conventional tower.

The second object of the invention is to enable those who are inside the observation room to observe the surrounding scenery as they sit by arranging the said observation room in an annular shape, the said observation room itself climbing up and down along the tower.

The third object of the invention is to incline the rotary surface of the observation room against the horizon so that the scenery seen from the observation room may be inclined at various angles according to the rotation of the observation room, thereby giving those inside the room an impression as if they were enjoying scenery from an airplane, which is different from the view seen from an observation room which is either stationary or rotating horizontally.

The fourth object of the invention is to give the observation room a doughnut shape so as to obtain an observation room of an extremely novel appearance as if it were a space station.

The foregoing objects are attainable by the combination and operation of each part constituting the invention, and the embodiment thereof will be made clear by the detailed description set forth hereinunder and in reference to the annexed drawing, of which:

FIG. 1 is an elevational view of the observation tower of the invention.

FIG. 2 is a longitudinally sectional elevation of the essential part of the observation tower of the invention with omission in part.

FIG. 3 is a longitudinally sectional elevation on a magnified scale of the elevator part of the observation tower of the invention.

FIG. 4 is a longitudinally sectional view on a magnified scale of the observation room of the observation tower of the invention.

FIG. 5 is a cross-sectional view on a magnified scale showing the driving apparatus mechanism at the base of the tower.

FIG. 6 is a cross-sectional elevation of the upper machinery room of the observation tower of the invention.

FIG. 7 is a cross-sectional view on a magnified scale of the tower body of the observation tower of the invention.

The invention consists of a cylindrical hollow tower body **11** erected on the ground; an elevator body **12** climbing up and down along the outside of the said tower; an annular observation room or enclosure **13** rotatably fitted to the outside of the said elevator body; and a driving apparatus for those parts.

The tower body **11**, as shown in FIGS. **1** and **2**, is erected in the center of the area enclosed by cylindrical circumferential wall **14** provided on the ground.

The upper edge of the foregoing circumferential wall **14** is inclined, an annular platform **15** being provided on the said inclined circumferential wall **14**. The lower part of the said platform **15** is communicated with an intermediate stage **16**, a staircase **17** being provided on one side of the intermediate stage **16**, an operation room **18** being provided on the said stage **16**.

Furthermore, handrails **19** are provided along the external peripheries of the foregoing platform **15** and the intermediate stage **16** as well as on both sides of the staircase **17**.

As illustrated in FIG. **3**, the elevator body **12**, consisting of globular external walls provided with an annular opening which is loosely and vertically fitted to the tower body **11**, is arranged on the outside of an elevator frame **20** which is elevatably fitted to the tower body **11**, the said external walls

consisting of semiglobular upper and lower walls **21**, **22** fixed to the elevator frame **20** and an annular wall **23** revolvably fitted between the said walls **21**, **22**.

The foregoing elevator frame **20** is composed by fixing the upper and lower ends of a plurality of stays **24** arranged in parallel with the tower body **11** to upper and lower annular frames **25**, **26** surrounding the tower body **11**, an upper bracket **27** and a lower bracket **28** being fixed to the outside of each stay **24**, each of the brackets **27**, **28** being formed in different sizes, a plurality of wheels **29**, **30** being appropriately fitted by means of bearings to the lower external end of each upper bracket **27** and the upper external end of each lower bracket **28** in such a manner that the said wheels **29**, **30** will revolve at an incline against the horizon and along the circumference surrounding the tower body **11**.

The numeral **31** designates a rotary frame, annular rails **32**, **33** provided on the upper and lower outside thereof being in contact with the wheels **29**, **30**, annular rail **34** on the internal periphery of the rotary frame **31** is borne by a wheel **35** revolvably fitted to the frame **20** so as to be located at the inner end between the brackets **27**, **28**.

At the lower part of the foregoing rotary frame **31** is fixed an internal gear **36** surrounding the tower body **11**, the said internal gear **36** and each of the foregoing rails **32**, **33**, **34** being concentrical.

The numeral **37** designates a machinery chassis fixed to a part of the frame **20**, it being so arranged that the revolution of an electromotor **38** provided on the chassis **37** is transmitted after reduced by a speed reducer **39** to a gear **40** engaging with the said internal gear **37**.

As shown in FIG. **4**, the observation room or enclosure **13** is in the shape of a doughnut, comprising a lower half **41** made of steel plate or the like having a semicircular cross section and has an equatorial division line through its major annular dimension constituting a generally medial orientation plane above which there is an upper half **42** made of transparent material, such as transparent synthetic resin and the like, having semicircular cross section, floorboard **43** being provided on the floor inside the lower half **41**, a plurality of seats **44** being appropriately spaced thereon.

Furthermore, the upper half **42** is radially split into a plurality of divisions which are openable by the sliding system or the like. A plurality of arms **45** protruded from the foregoing rotary frame **31** are fixed to the lower half **41** so that the observation room **13** will rotate together with the rotary frame **31**.

On both sides of the external periphery of the tower body **11** are provided a pair of perpendicular guide rails **46**, wheels **47** pivoted on the inside of the upper and lower annular frames **25** of the foregoing frame **20** being brought in contact with both sides and the inside of the said rails **46**, so as to guide the frame **20** by the contact between the rails **46** and the wheels **47**.

Adjacent the wheels **47** fitting parts of the annular frame **25** at the upper end of the foregoing frame **20** are fixed the lower ends of a plurality of wire ropes **48** respectively, the ropes **48** being wound round a pair of multigrooved wheels **50** inside a machinery room **49** provided at the upper end of the tower body **11**.

As shown in FIG. **6**, the grooved wheels **50** are revolvably pivoted by bearings **54** on the floorboard **51** of the machinery room **50**, on the said floorboard **51** being provided a pair of openings **52** through which to loosely pass the wire ropes **48** perpendicularly rising from the elevator frame **20** and another pair of openings **53** through which to lower inside the tower body **11** the ropes **48** which are guided downward after passing through the said openings **52** and travelling round the grooved wheel **50**.

From the lower end of the wire rope **48** hung down inside the tower body **11** is suspended the main counterweight **55** which climbs up and down inside the tower body **11**.

The numeral **56** in FIG. **2** designates an elevator driving apparatus, the mechanism of which is as shown in FIG. **5**.

A multigrooved wheel **59** is revolvably pivoted with a bearing **58** on the chassis **57**, a gear **60** fixed to the axis of the said multigrooved wheel **59** being engaged with a gear **62** pivoted with a bearing **61** on the chassis **57**, the axis of the said gear **62** being fixed to the output axis of a worm reducer **62** on the chassis **57**, the input axis of the said reducer **63** being connected with the axis of an electromotor **64**.

To the other axis of the electromotor **64** is fixed a V-pulley **65**, the said V-pulley **65** being linked with another V-pulley **67** fixed to the axis of an emergency diesel engine provided on the chassis **56** by means of a V-belt **68**, so that the grooved wheel **59** can be driven by the diesel engine **66** in case of emergency, such as power stoppage and the like, it being so arranged that the axis of the diesel engine **66** is disconnected from the V-pulley **67** by providing a clutch at the part of the V-pulley **67**.

The foregoing chassis **57**, as shown in FIG. **2**, is provided at one side of the lower end of the tower body **11**, two grooved wheels **69**, **70** which are in parallel with the foregoing grooved wheel **59** being revolvably pivoted on a machinery frame **71** fixed inside the bottom of the tower body **11**.

Under the foregoing counterweight **55** are fixed the upper ends of a plurality of wire ropes **72**, the said wire ropes **72** being lowered perpendicularly as shown in FIG. **2**, passed round the grooved wheel **69**, then passed from under the said grooved wheel **69** on to the outside of the grooved wheel **59** from the upper side of the said wheel **59** through an opening **73** provided at one side of the bottom of the tower body **11**, the said wire ropes **72** thus reversed being passed under the grooved wheel **69** from the lower side of the grooved wheel **59** through the opening **73**, passed to the outside of the grooved wheel **70** from the lower side thereof, then guided upward along the inside of the tower body **11**.

The wire ropes **72** thus guided upward is passed into the machinery room **49** through an opening **73** provided on the floorboard **51** of the machinery room **49**, then passed round a pair of grooved wheels **75** revolvably pivoted by bearings **74** on the floorboard **51**, the wire ropes **72** thus reversed by the respective grooved wheels **75** being guided again inside the tower body **11** through a pair of openings provided on the floorboard **51**, from the lower end thereof being suspended a secondary counterweight **77** which climbs up and down inside the tower body **11**.

As illustrated in FIG. **7**, each three wheels **78** provided at both ends of the main counterweight **55** are maintained in contact with rails **79** provided inside the tower body **11**, so that the said main counterweight **55** can climb up and down along the rails **79**, guide grooves on both sides of the secondary counterweight **77** being slidably fitted to guide rails **80** provided on the main counterweight **55**.

To the elevator frame **20** are concentrically fixed a plurality of power-supplying sliprings **81** which are concentrical with the rails **32**, a plurality of sliding electrodes **82** (FIG. **3**) provided on the rotary frame **31** being made to slide on the foregoing sliprings **81**, the said electrodes **81** being connected with illuminating equipment or the like provided inside the observation room **13**. Furthermore, cab tire cables for transmitting power to the sliprings **81** and the motor **38** are so distributed between the elevator frame **20** and the inside of the tower body **11** as will not interfere the elevation of the elevator frame **20**, though particular description thereof is omitted here.

A plurality of posts **83** of different heights are erected on the outside of the lower part of the tower body **11**, buffer springs **84** bearing the lower side of the elevator body **12** being provided on top of the respective posts **83**.

It is further so arranged that the angle of inclination of the observation room **13** and that of the platform **15** be identical so that embarkation onto the observation room **13** is possible at any position of the platform **15**.

The structure of the observation tower of the invention is as described heretofore. When the grooved wheel **59** is driven by the motor **64** as illustrated in FIG. **5** through the reducer **63** and the gears **62**, **60**, the wire rope **72** wound round the said grooved wheel **59** is set in motion. For instance, the rope **72** is moved as indicated by arrow in FIG. **2** and thereby the main counterweight **55** is lowered.

If the main counterweight **55** is lowered as described above, the wire ropes **48** attached to the weight **55** are lowered, the external side of the said ropes **48** which suspend the elevator frame **20** on the outside of the tower body **11** being pulled up consequently, with the result that the elevator frame **20** is elevated. At this juncture, the secondary counterweight **77** is also lowered by approximately same degree as the main counterweight **55**, some disparity between both weights **55**, **77** being adjusted without hindrance by the mutual sliding through the guide rails **79**. The elevator frame **20** can be lowered by reversing the electromotor **64**.

As described above, the elevator frame **20** is sent up and down by revolving the grooved wheel **59** by means of right and reverse revolution of the electromotor **64**, as a result of which the elevator body **12** climbs up and down along the tower body **11**.

If the gear **40** is turned by the electromotor **38** on the chassis of the foregoing elevator frame **20**, the internal gear **36** is revolved, as a result of which the rotary frame **31** integrated therewith revolves guided by the wheels **29**, **30**, **35** of the elevator frame **20**. Consequently, the observation room **13** too which is integrated with the rotary frame **31** revolves as it climbs up and down together with the elevator body **12**. Since the rotary surface is inclined against the horizon, those sitting in the seats **44** and viewing the outside scenery through the transparent upper half **42** of the observation room **13** have an impression as if they were on an airplane making a circular ascent or descent while flying at a low altitude. The invention therefore is completely different from the simple observation tower of the conventional type.

Furthermore, when the observation room **13** is at its lowest position, it is supported by the higher springs **84** as illustrated in FIG. **2**, the upper edge of the lower half **41** of the observation room **13** being slightly higher than the upper surface of the platform **15**. In this state, if the lower half **41** is set free by sliding the upper half **42**, it becomes possible to reach the seats **44** inside the lower half **41** from any part of the platform **15** and vice versa.

What is claimed is:

1. In a passenger-carrying combined elevator and rotary observation enclosure having passenger ingress and egress means and mounted on a vertical centrally disposed tower, the improvement comprising an annular-shaped observation enclosure with means for rotatably mounting said enclosure at a fixed nonvariable predetermined inclined angle relative to the horizon upon an elevatable but nonrotatable elevator body disposed concentrically within said annular enclosure; means mounting said elevator body concentrically and coaxially around said central support tower; means for selectively elevating and lowering said elevator body and the attached observation enclosure; and cooperative means on said elevator body and said enclosure for selectively revolvably rotating said enclosure around said elevator body and tower at said fixed inclined angle and independent of said means for elevating and lowering said elevator body.

2. The combined elevator and rotary observation enclosure as defined in claim **1** further comprising a boarding and disembarking platform at the base of said tower and having a common ingress and egress surface of substantially fully angular configuration, said surface being inclined relative to the horizon at the identical angle as that of said observation enclosure; said surface being located so as to be closely adjacent the outer periphery of said observation enclosure and at a predetermined level relative thereto to facilitate safe passenger ingress and egress when said enclosure is in a stopped and fully lowered condition and irrespective of the stopped state of revolution thereof.

3. The combined elevator and rotary observation enclosure as defined in claim **2** wherein said observation enclosure is of

generally doughnut shape and has an equatorial division line through its major annular dimension constituting a generally medial orientation plane by which said observation enclosure is inclinedly oriented, and further having a generally upright central axis normal to and centrally intersecting said inclined orientation plane, said upright axis being inclined relative to the center vertical axis of said support tower; said equatorial division line serving to further define said enclosure into lower and upper portions, the upper portion of which comprises transparent viewing panels or sections, at least some of which are selectively openable and closeable to permit said ingress and egress relative to said platform surface and observation enclosure.

4. The combined elevator and rotary observation enclosure as defined in claim 2 wherein said enclosure is divided into passenger compartments and provided with seating means.

5. The combination as defined in claim 2 wherein the means for nonrotatably mounting said elevator body include fixed vertical guide rails on at least two circumferentially spaced portions of said tower's outer periphery, and antifriction means on said elevator body complementally coacting with said rail means.

6. The combination as defined in claim 2 wherein said support tower has a hollow central portion and said means for elevating and lowering said elevator body and its rotatably attached observation enclosure comprises a primary and secondary power source of which means are provided for selectively connecting said secondary source into the system only in emergency conditions in the event of a failure of said primary power source, a power drive train connected with a main drive pulley means, a plurality of drive cables operably connected at one end with said elevator body and extended up the center of said tower and trained over a support pulley means mounted in the upper end of said tower and then connected at their other cable ends to counterweight means having suitable guide means within said tower for vertically guiding said counterweight means.

7. The combination as defined in claim 2 wherein said means for rotatably mounting said observation enclosure on said elevator body comprise frame means on said elevator body defining an annular pathway disposed at the predetermined angle of inclination of said observation enclosure, said annular pathway having a radially upright circumferential surface and lower and upper planar surface means; a complementary annular framework for complemental disposition within said pathway and having a plurality of outwardly radial extending connecting arms connected to the inner periphery of said annular enclosure; fixed annular rail means and complementally engaging antifriction rollers operatively mounted on said pathway surfaces and on said complementary annular framework to facilitate relative rotation of said enclosure and elevator body; an annular ring gear fixedly mounted on said complementary annular framework and a separate drive motor and drive train means including a drive gear disposed to peripherally engage with and rotate said annular ring gear to impart revolving rotation to said observation enclosure.

8. The combination as defined in claim 7 further including means for conducting electrical power into said enclosure including annular electric power supplying sliprings and sliding electrodes cooperably mounted on said elevator body framework and on said complementary annular framework rotatable within said annular pathway of said elevator body.

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