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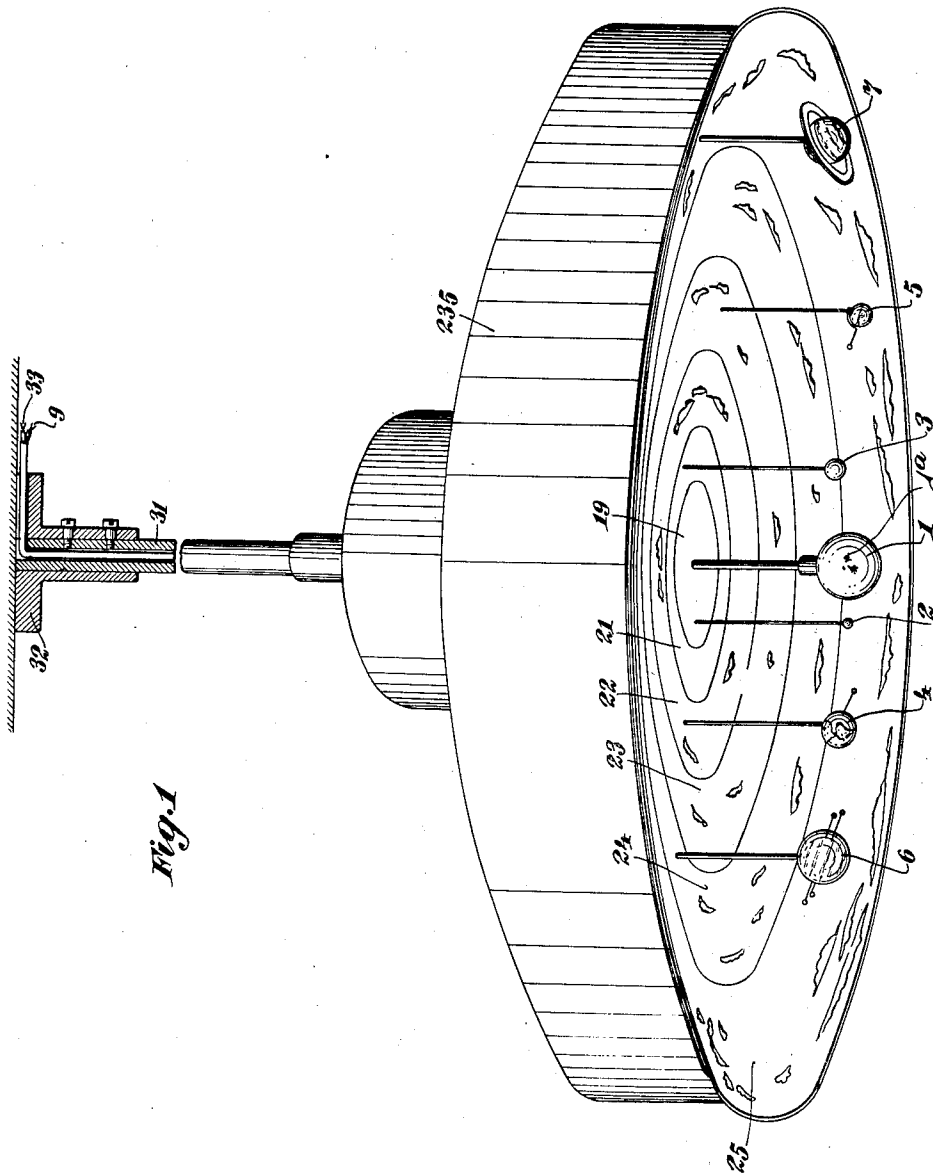
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2,226,032

PLANETARIUM

Filed May 10, 1940

6 Sheets-Sheet 1



BY

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Dec. 24, 1940.

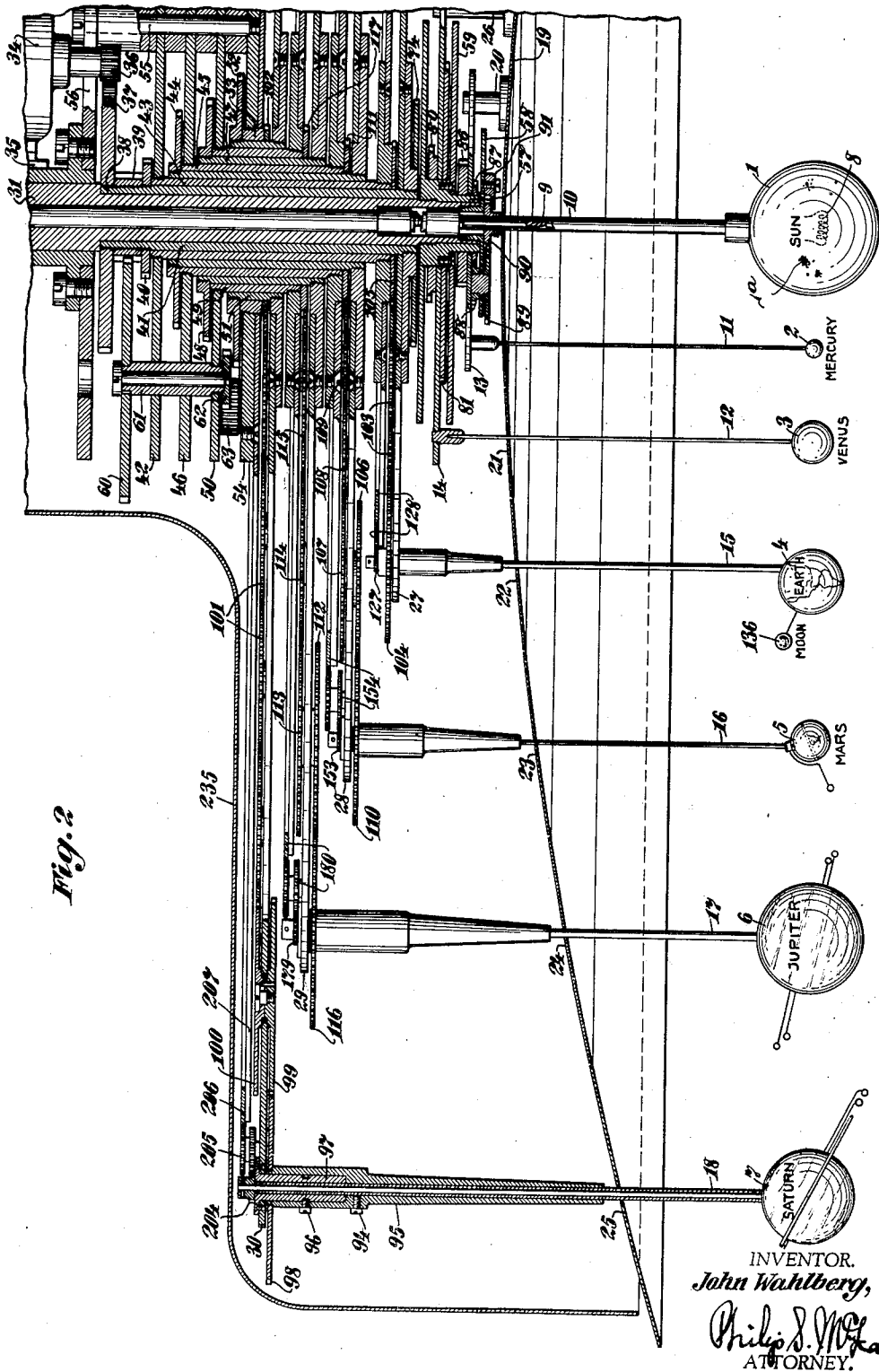
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PLANETARIUM

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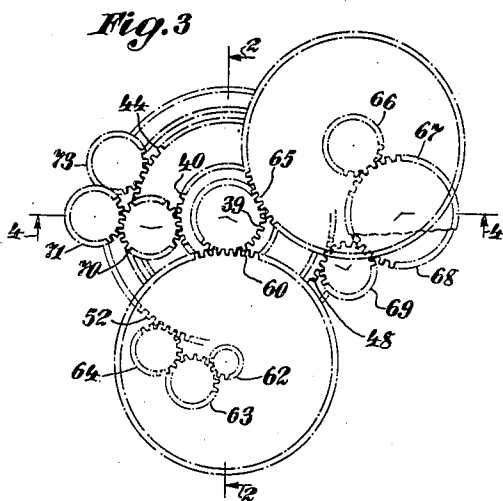
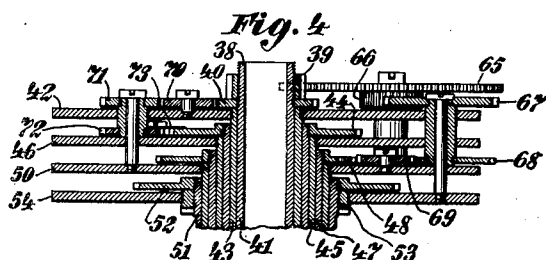
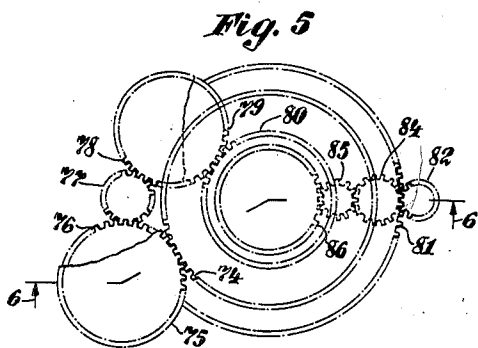
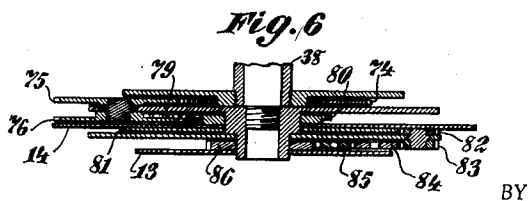
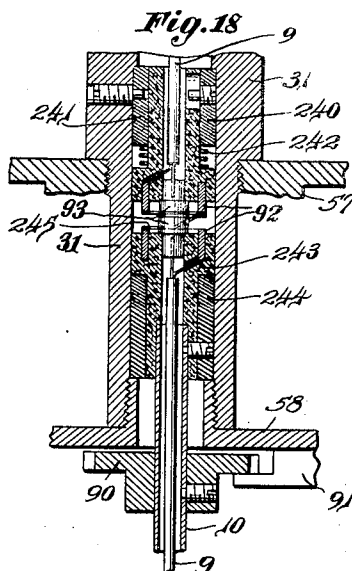
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PLANETARIUM

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PLANETARIUM

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Fig. 8

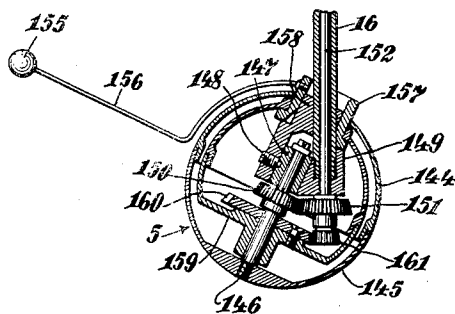
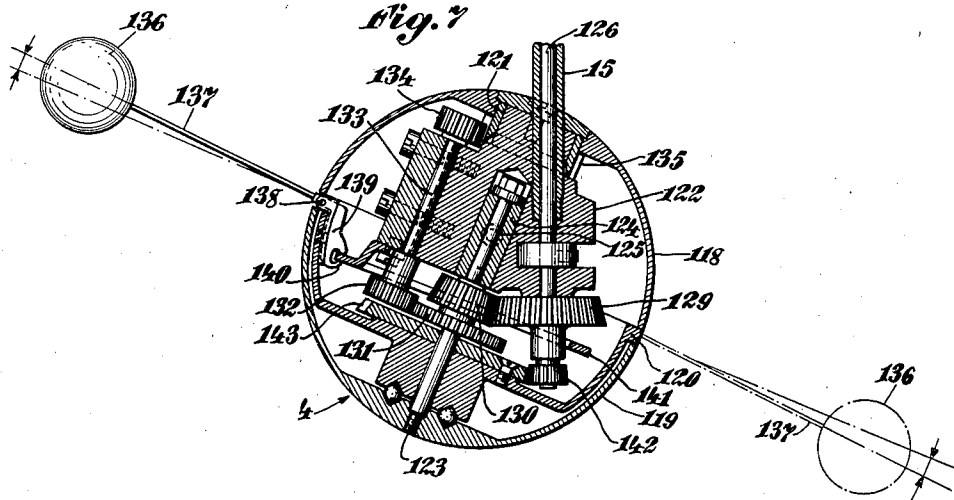


Fig. 7



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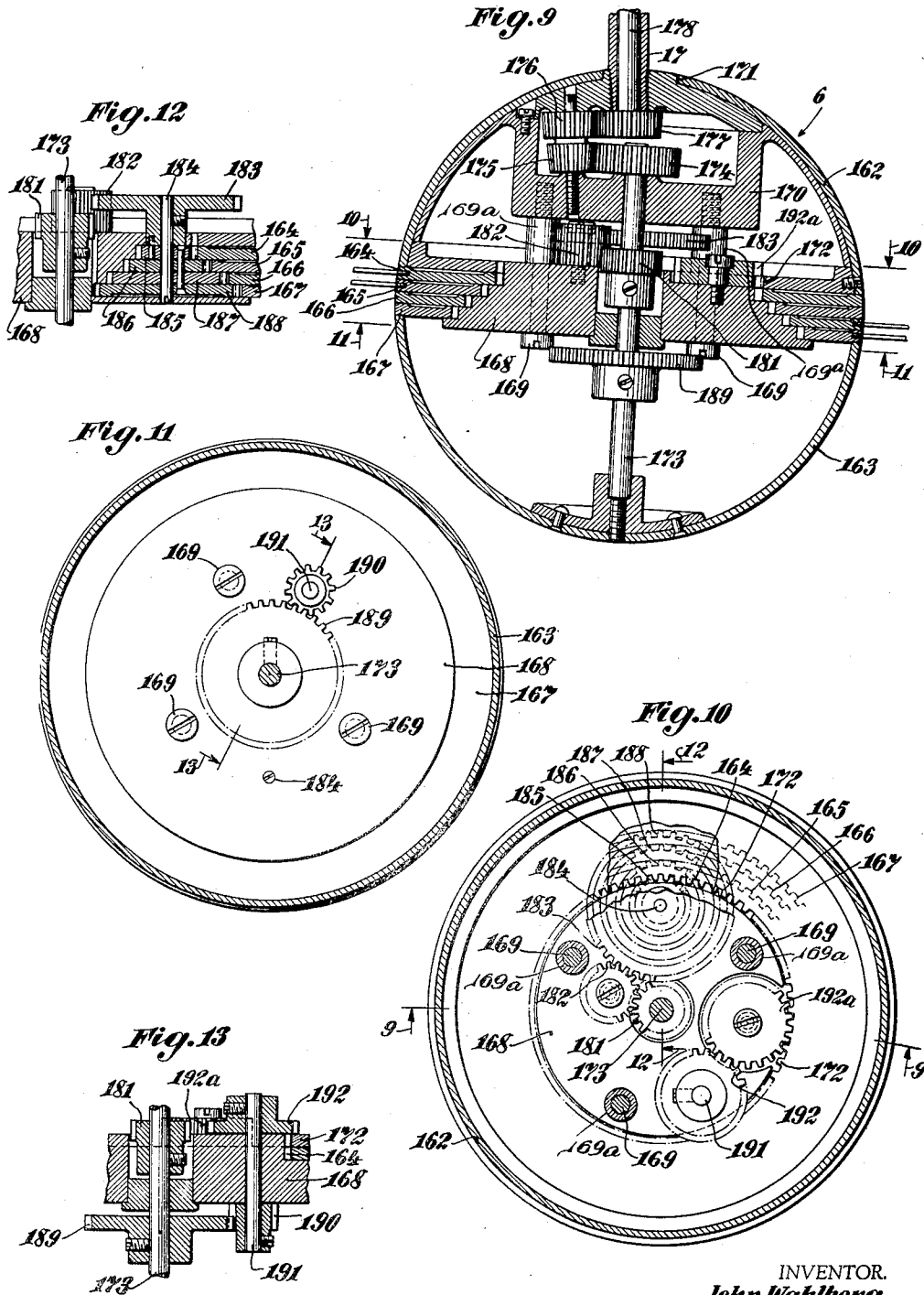
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PLANETARIUM

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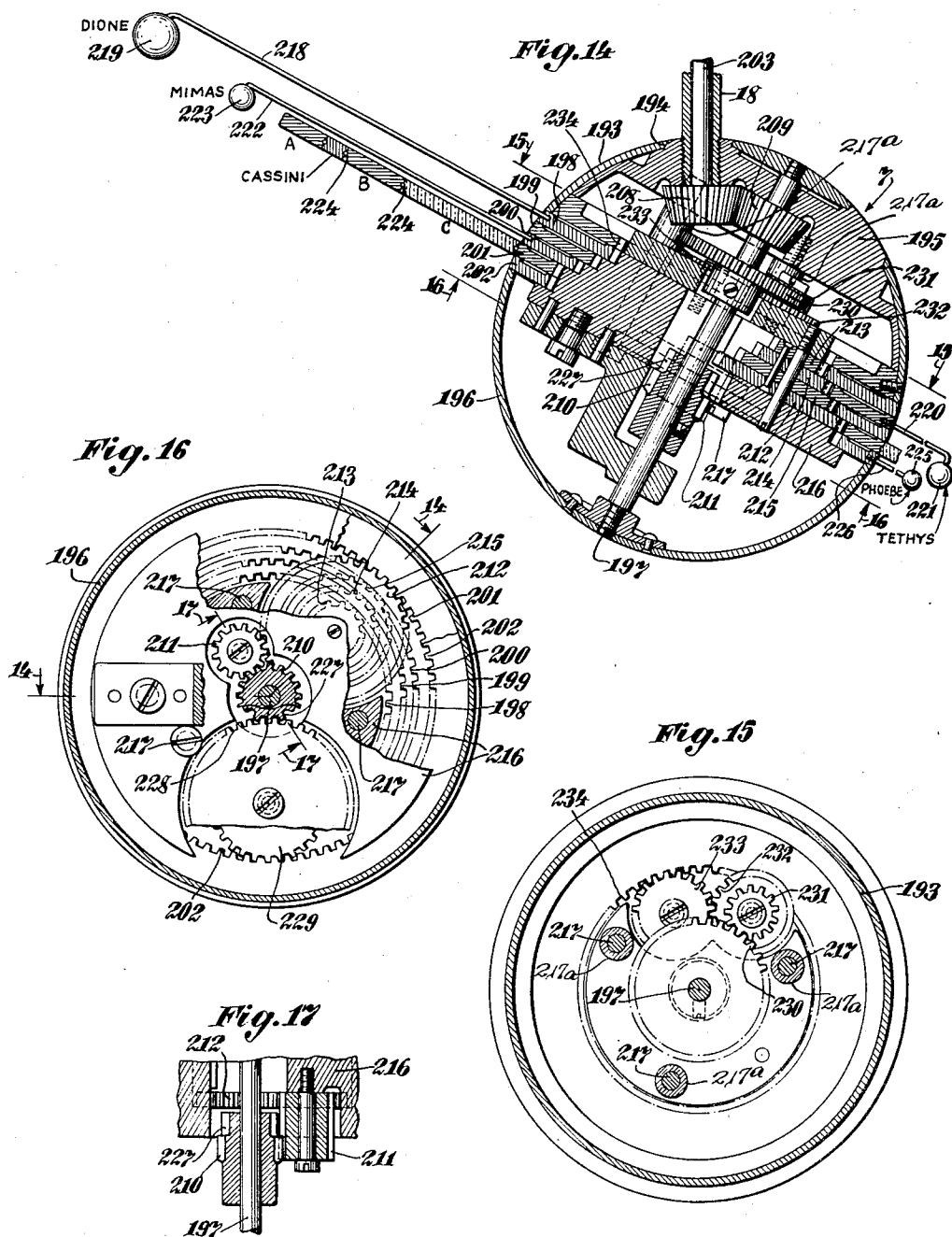
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2,226,032

PLANETARIUM

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6 Sheets-Sheet 6



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UNITED STATES PATENT OFFICE

2,226,032

PLANETARIUM

John Wahlberg, East Orange, N. J.

Application May 10, 1940, Serial No. 334,308

20 Claims. (Cl. 35—45)

The invention here disclosed relates to apparatus in the nature of planetariums.

Objects of the invention are to reproduce as nearly as possible the general appearance, the relations and the movements of the planets and to simulate as closely as may be, the sense of these bodies as suspended in space and traveling in their ways without visible means of locomotion.

A further and important purpose of the invention is to present the planetary bodies in association with the sky or the heavens substantially as they appear to the inhabitants of the earth.

Additional objects are to provide a planetarium structure which will be entirely practical from the mechanical point of view, in which all the parts will operate smoothly and quietly and may be continued in action over long periods, for example, to illustrate relations of the bodies at certain periods of time, or to show concurrence of the planets and their moons in creating eclipses and other phenomena, to enable arbitrary "setting" of the parts, such as to facilitate astronomical study and in general, to provide apparatus of high educational, instructive and entertaining value.

The foregoing and other desirable objects are attained in this invention by the novel features of construction, relations and combinations of parts, hereinafter set forth, illustrated in the accompanying drawings and broadly covered in the claims.

The drawings accompanying and forming part of the following specification illustrate one practical embodiment of the invention. The structure however may be modified and changed in various ways, all within the true intent and broad scope of the invention, as will appear from the following.

Fig. 1 is a perspective and part sectional view showing how the planetarium of this invention is constructed in simulation of the celestial dome and with the planets operating in such dome seemingly without mechanical means of propulsion.

Fig. 2 is an enlarged broken sectional view across the center of the dome illustrating particularly the suspension and operation of the planetary bodies and their association with the respective rings which cooperatively form the sky for such bodies.

Fig. 3 is a diagrammatic plan view of the gearing for operation of the planets Mars, Jupiter and Saturn and Fig. 4 is a broken sectional detail of the same as on substantially the line 4—4 of Fig. 3.

Fig. 5 is a diagrammatic plan of the gearing for

operation of the planets Mercury and Venus and Fig. 6 is a broken vertical section of such gearing as on line 6—6 of Fig. 5.

Fig. 7 is an enlarged broken cross-sectional view of the Earth and Moon representing unit.

Fig. 8 is a broken vertical sectional view of the Mars and its Deimos moon representing unit.

Fig. 9 is a broken sectional detail of the Jupiter representing unit, as on substantially the line 9—9 of Fig. 10.

Figs. 10 and 11 are sectional views of such unit as on substantially the planes 10—10 and 11—11 respectively of Fig. 9.

Figs. 12 and 13 are broken sectional details of the gearing as on line 12—12 of Fig. 10 and line 13—13 of Fig. 11.

Fig. 14 is a broken sectional view of the Saturn representing unit, as taken substantially on the line 14—14 of Fig. 16.

Figs. 15 and 16 are broken sectional views substantially on the lines 15—15 and 16—16 of Fig. 14.

Fig. 17 is a broken sectional detail as on line 17—17 of Fig. 16.

Fig. 18 is a broken sectional detail of rotary contacts for the Sun light.

The present illustrated embodiment of the invention involves a representation of the Sun at 1, centrally disposed in a sky representing dome and representations of Mercury 2, Venus 3, the Earth 4, Mars 5, Jupiter 6 and Saturn 7, supported and animated to travel in their orbits about the Sun. These elements may be proportioned and spaced to follow as nearly as practicable the true sizes and relations. The Sun element is indicated as a globe containing a lamp 8, supplied by wiring 9, extending down through the tubular stem 10, which supports such globe. To make them as realistic as possible, the various elements may carry identifying names or characters. Thus as indicated in Figs. 1 and 2, the globe forming the Sun element may have Sun spots 1a which become noticeable in the rotation of this element, the Earth element 4, may carry the outlines of the continents, the element 136 may be marked like the Moon, the Mars element 5 may be marked to resemble that planet and the Jupiter and Saturn elements 6, 7, may be banded or ringed to resemble the originals.

Mercury and Venus being apparently non-rotative, the elements 2, 3, representing the same are here simply carried by rigid rods 11, 12, dependent from discs 13, 14, which rotate to carry these elements in their circular orbits about the Sun.

The other planets illustrated, Earth, Mars, Jupiter and Saturn rotating as they do, on their own axes, are carried respectively by rotating stems 15, 16, 17, 18, tubular in form as will later appear to carry shafting for driving their satellite elements.

The various supports mentioned extend down through the sky structure and the latter, to permit of the necessary independent orbital movements, is made sectional in form, with a central circular section 19, suspended by studs 20, from the Mercury carrying disc 13, and successively surrounding rings 21, 22, 23, 24, 25, suspended by similar studs 26, from the rotating supports 14, 27, 28, 29, 30, which carry the Venus, Earth, Mars, Jupiter and Saturn elements.

A single central mounting for all the mechanism is provided, in the form of a rigid column 31, having a fitting 32, at the top for connection with a ceiling or other overhead support and tubular in character to pass the wiring 9, for the Sun lamp and wiring 33, for a motor to drive the mechanism.

The motor is indicated at 34, supported from the column at 35, and driving through reduction gearing, shown as a pinion 36, in mesh with a large, Earth drive gear 37, on the upper end of a sleeve 38, rotatably engaged on the column. This sleeve also carries the Jupiter and Saturn drive gear 39, and the Mars gear 40, and the latter supports the sleeve by riding on the upper end of a stationary surrounding sleeve 41, secured in a supporting plate 42.

Surrounding the stationary sleeve 41, is a rotary sleeve 43, having a gear 44, riding on the end of a surrounding stationary sleeve 45, carried by supporting plate 46. In similar fashion, a surrounding sleeve 47, carrying a gear 48, rotates within a stationary sleeve 49, supported by plate 50, and a surrounding sleeve 51, carrying a gear 52, rotates within the stationary sleeve 53, carried by support 54. The supports 42, 46, 50, 54, are shown suspended by studs 55, in properly spaced relation from a flange 56, carried by the column.

The four rotary sleeves 38, 43, 47 and 51, carry at their lower ends the respective supports 27, 28, 29, 30, for the Earth, Mars, Jupiter and Saturn elements. The Mercury and Venus carrying members 13, 14, are shown as rotatably engaged on shouldered portions of a stationary hub member 57, screwed fast over the lower end of the column, being retained in such relation respectively by a stationary member 58, screwed fast within the lower end portion of the column and a confining plate 59, secured to the external hub member 57.

The gearing for driving the various elements in proper direction and as nearly as possible at proper relative speeds, comprises first the Earth drive gear 37, on the sleeve 38, which carries the Earth support 27. The Jupiter and Saturn drive pinion 39, on this sleeve meshes with a gear 60, on the upper end of shaft 61, journaled in support plates 42, 46, 50, and carrying at its lower end pinion 62, meshing gear 63, Fig. 3, which is in mesh with gear 64. The latter engages gear 52, on the upper end of sleeve 51, carrying the Saturn support 30. A Jupiter driving gear 65, Figs. 3 and 4, in mesh with the Jupiter and Saturn pinion 39, carries a pinion 66, in engagement with gear 67, and the latter carries pinion 68, in mesh with pinion 69, which engages gear 48, on the upper end of the Jupiter carrying sleeve 47.

The drive for Mars is from pinion 40, on the Earth drive sleeve 38, through pinions 70, 71, 72, 73, Figs. 3 and 4, back to the gear 44, on the upper end of the pinion carrying sleeve 43.

The drive for Venus is from gear 74, on the lower end of the Earth carrier sleeve 38, Figs. 5 and 6, through pinions 75—76, 77, and connected pinions 78, 79, to gear 80, attached to the Venus carrier 14.

The drive for Mercury is from the gear 81, on the Venus carrier 14, through pinions 82—83, 84 and 85 to the gear 86 of the Mercury carrier plate 13.

Rotation of the Sun also is effected in the illustration through gear 87, on the lower side of the Mercury carrier in engagement with pinion 88, journaled in the stationary support 58, at the lower end of the column and connected with a pinion 89, in mesh with pinion 90, on the upper end of the Sun support stem 10.

The Sun carrying stem 10, is shown as engaged in the lower end of the supporting column and as rotatably supported in this relation by means of the bracket 91, secured to stationary member 58, and engaging beneath the Sun rotating pinion 90.

Conduction of current to the rotating Sun carrying stem is provided in the illustration by slip contacts indicated at 92, 93, Fig. 18. The upper ring contact 92 and center contact 93, are carried by an insulating fiber sleeve 240, slidably guided in bushing 241, and pressed downwardly by spring 242, while the lower ring and center contacts 92, 93, are carried by an insulating fiber sleeve 243, secured to bushing 244, fastened on the upper end of the Sun element carrying stem 10. The separate conductors of the wiring 9, are shown connected to said ring and center contacts respectively and the lower ring contact is shown as carrying a spring brush 245, in sliding engagement with the upper ring contact.

The manner of mounting those planet elements which turn to maintain the same axial relation to the Sun is indicated at the left Fig. 2, where the element Saturn is shown carried by tubing 18, held by set screw 94, in a surrounding sleeve 95, rotatably retained by screw 96, on a dependent tubular stud 97, fixed to the carrier disc 30, said sleeve having at the top the pinion 98, in mesh with pinion 99, both on the underside of disc 30, and pinion 99, having connected therewith a pinion 100, at the upper side of said carrier and in connection, through idler pinions 101, with the central gear 102, fixed to the outer stationary sleeve 53. With an unequal number of interposed pinions, five in this first instance, the planet element through relative rotation as between such element and the rotating carrier which traverses it about the Sun, will maintain the same axial relation while traveling about the Sun.

The other planet carrying tubes 15, 16, 17, are similarly constructed and operated, it being sufficient just to refer to the gears for holding such planets in the same inclined positions and which in the case of the Earth element consists of a series of three pinions 103, interposed between the outside gear 104, and the inside gear 105, on the stationary sleeve 43; in the case of Mars the three interposed pinions 106—107, 108, 109, between the outer gear 110 and inner gear 111, on stationary sleeve 43; and in the case of Jupiter consisting of a series of interposed gears 112—113, 114, 115, between outer gear 116, and inner gear 117, on the stationary 75

sleeve 49. By such means, the planet elements are kept properly facing the Sun element during their bodily rotation about the latter.

Rotation of the elements representing those which spin on their own axes and travel of associated satellites is effected as follows:

In the case of the Earth element, this is made in upper and lower hemispherical sections 118, 119, Fig. 7, separated by an equator ring 120, the upper section rotating on an inclined bearing 121, on the block 122, fixed on the lower end of supporting tubing 15, and the lower section carried by concentric shaft 123, rotatably supported in bearing block 124, secured by screws 125, to the support 122. Synchronous rotation of the two halves in the inclined relation shown is effected through a shaft 126, extending down through supporting tubing having a gear 127, at its upper end in mesh with gearing 128, carried by fixed sleeve 41, and having a bevel gear 129, at its lower end in mesh with bevel gear 130, on the lower hemisphere shaft 123, the latter carrying a gear 131, meshing with a gear 132, on shaft 133, journaled in support 122 and carrying a gear 134, in mesh with an annular gear 135, on the bearing hub portion of the upper hemispherical section.

Rotation of the Moon representing element 136, on its oppositely inclining orbits about the Earth element is effected by mounting said Moon element on a projecting stem 137, pivoted at 138, on the equator ring 120, and having an arm 139, of that stem slidingly engaged at 140, over the edge of a cam ring 141, fixed to the lower end of support 122, and by rotating said equator ring by a pinion 142, on the lower end of shaft 126, in engagement with gear 143, on the hub portion of the equator ring and which portion is rotatably supported on the axial shafting 123.

The Mars element 5 is shown in Fig. 8, as made of two hemispherical shells 144, 145, joined together at the equator to rotate as a single sphere, with the lower section having an internal axial shaft 146, rotatably supported in block 147, held by screw 148, in the support 149, secured in angular relation on the lower end of the tubular stem 16. This shaft carries a bevel pinion 150 in engagement with bevel pinion 151, on the lower end of the shafting 152, extending up through the hollow stem and carrying a spur gear 153, at its upper end in engagement with gearing 154, carried by the lower end of the stationary sleeve 45.

Mars is represented as having a single moon, Deimos, 155, carried by a rod 156, projecting from a ring 157, surrounding the tubular supporting stem and journaled on the bearing 158, on inclined support 149. This ring is shown attached to a disc 159, journaled on shaft 146, and carrying a bevel gear 160, in mesh with a bevel pinion 161, on the lower end of shaft 152, and by which means such moon element is caused to rotate about the Mars element.

The Jupiter element 6 is shown in Fig. 9 as made up of upper and lower hemispherical shells 162, 163, separated at the equatorial zone by four moon carrying rings 164, 165, 166, 167, stepped in diameter and journaled on correspondingly stepped shoulders of a supporting block 168, spaced by bushings 169a and secured by screws 169, to a support 170, screwed fast in inclined relation onto the lower end of the hollow supporting stem 17. The upper shell section 162, rotates about a bearing portion 171, on the inclined support 170 and has attached to

its lower end an internal ring gear 172 and the lower shell section is carried by the inclined axial shaft 173, journaled in support 170, and carrying a bevel gear 174, at its upper end in mesh with bevel pinion 175, which latter is driven through the connected pinion 176, from a bevel gear 177, on the lower end of drive shaft 178. The latter carries a spur gear 179, at its upper end in mesh with gearing 180, carried by the lower end of stationary sleeve 49.

Motion is imparted to the moon carrying rings by pinion 181, on axial shaft 173, in mesh with a wide faced pinion 182, journaled on support 168, and in mesh with gear 183, on the upper end of shaft 184, carrying the succession of gears 185, 186, 187, 188, in mesh respectively with the gear toothed inner edges of the moon carrying rings 164, 165, 166, 167.

The lower hemispherical section 163, is directly carried and rotated by the axial shaft 173. Synchronous rotation of the upper shell section is accomplished by a gear 189, on shaft 173, in mesh with pinion 190, on the lower end of shaft 191, which carries at the top a pinion 192, in mesh with gear 192a engaging the internal gear ring 172, of the upper shell section.

The Saturn element 7 is shown in Fig. 14, as made up of an upper shell section 193, journaled at 194, on the support 195, secured in the proper inclined polar relation on the lower end of supporting tubing 18, and a lower shell section 196, carried by internal axial shaft 197, the two shell sections separated for the three upper moon carrying rings 198, 199, 200, the Saturn ring carrying element 201 and the reverse rotating moon carrying ring 202.

The shaft 203, extending down through the supporting tubing 18, carries a pinion 204, at its upper end, driven through interposed gearing 205, from the large ring gear 206, carried by the stationary support 207, attached to the fixed outer sleeve 53. Bevel pinion 208, on the lower end of shaft 203, in mesh with bevel pinion 209, on axial shaft 197, drives the latter and this through pinion 210, in mesh with a wide faced pinion 211, Fig. 17, effects the drive of gear 212, which is in mesh with the internal gear teeth of the Saturn ring carrying element 201, and which carries, Fig. 14, pinions 213, 214, 215, in mesh respectively with the moon carrying internal ring gears 198, 199, 200.

The five rings 198, etc., are shown as of successively larger internal diameter and as journaled on correspondingly stepped shoulders of the block 216, spaced by bushings 217a and secured by screws 217, to the support 195. The upper ring 198, carries by stem 218, the Dione representing moon 219. The next ring, by projecting stem 220, carries the Tethys representing moon 221, the third ring 200, carries a projecting stem 222, mounting the Mimas representing moon 223 and the fourth ring 201, carries the A, B, C, representing rings of Saturn with the Cassini division, preferably supported on the ball bearings represented at 224, Fig. 14, to render them relatively rotatable.

The reversely rotating Phoebe representing moon element 225, is shown carried by a wire stem 226, projecting from the lowermost ring 202, and the latter is indicated as reversely driven from pinion 227, on shaft 197, meshing gear 228, Fig. 16, which carries gear 229, in mesh with the teeth on the inner circumference of the lowermost ring 202.

Rotation of the upper shell section 193, in syn-

chronism with the lower section 196, is effected by gear 230, on shaft 197, in mesh with pinion 231, carrying gear 232, which drives gear 233, in mesh with the internal gear ring 234, carried by

the upper shell section.
The motor and all the gearing above the sky structure may be wholly covered and concealed within a hood 235, supported from the column, which may be made in independently removable sections to enable convenient inspection of the various parts. With the operating mechanism thus covered, the only moving portions visible are those parts on which it is desired to concentrate the attention, that is, the Sun and its related planets with their satellites. These elements are all preferably colored and marked to be recognizable as miniature representations of the originals and such features may be incorporated as "Sun spots" on the rotating Sun, the continents on the Earth, the craters on the Moon, the bands on Saturn and Jupiter, the semi-transparent and darker rings of Saturn, etc. Similarly, the sky rings may be painted and finished with cloud effects and the like, to serve as a sky-like background forming part of the Solar system represented and aiding in creating the effect of the planets seemingly floating and performing their evolutions in space. The supports by which the planetary elements are suspended, can be so fine and so finished to blend in with the sky, so as to be practically unnoticeable. There is thus created a fully realistic sense of the planets travelling in space and in their movements effecting such phenomena as eclipses of Sun and of the Moon, etc. Such phenomena are readily studied by operating the mechanism at different speeds, by stopping it in different positions of transition and by setting the parts in different predetermined relations, for instance, either by driving the mechanism up to a predetermined point in a cycle or in another way as by arbitrarily uncoupling one or more trains of gearing and then setting the associated parts in certain desired relations. For the latter purpose, such gears as those designated 60, 65-66 and 70, when mounted in the readily removable relation shown, may be temporarily removed and then replaced after the parts have been adjusted in their new relation. The stationary hood which covers the upper part of the mechanism may be shaped to more or less merge into the rotating sky structure beneath it and if desired, may be used for the support of any number of stationary star representing elements about the rim of the sky and which, if desired, may be illuminated.

The structure is particularly compact, for what it illustrates and can be produced at a practical cost and the gearing is readily arranged to accomplish movements approximating or proportioned to the true sidereal time. The axial inclinations and relative positions of the planets can be closely approximated. The movements of the moons, rings or other satellites can be quite closely represented and it has been shown that one or a number of the satellites and traveling in the same or different directions can be visualized.

It is realized that many changes and modifications are possible within the scope of the invention and coverage of the claims. For this reason terms employed herein have been used in a descriptive rather than in a limiting sense, except where the intent of limitation appears or state of the prior art may require.

What is claimed is:

1. In a planetarium or the like, the combination of a stationary tubular column provided with means for supporting the same in suspended relation, telescopically arranged sleeves on the lower portion of said column, means on said column for supporting certain of said sleeves in stationary and others of said sleeves in rotatable relation, horizontally extended supports carried by said relatively stationary and rotatable sleeves, gearing for driving said rotatable sleeves, planetary elements suspended from the extended supports of said rotatable sleeves and a sky representing dome suspended from rotatable portions of said apparatus and including separate annular sky sections suspended respectively from different horizontally extended supports of said rotatable sleeves and gearing carried by said horizontally extended supports of the stationary sleeves and connected with said suspended planetary elements.

2. In a planetarium or the like, the combination of a stationary tubular column provided with means for supporting the same in suspended relation, telescopically arranged sleeves on the lower portion of said column, means on said column for supporting certain of said sleeves in stationary and others of said sleeves in rotatable relation, horizontally extended supports carried by said relatively stationary and rotatable sleeves, gearing for driving said rotatable sleeves, planetary elements suspended from the extended supports of said rotatable sleeves, a sky representing dome suspended from rotatable portions of said apparatus and including separate annular sky sections suspended respectively from different extensions of the rotatable sleeves gears connected with said planetary elements, gears carried by said stationary sleeves and connecting gears on the horizontally extended supports of said rotatable sleeves between said gears at the planetary elements and said gears at the stationary sleeves.

3. In a planetarium or the like, the combination of a stationary tubular column provided with means for supporting the same in suspended relation, telescopically arranged sleeves on the lower portion of said column, means on said column for supporting certain of said sleeves in stationary and others of said sleeves in rotatable relation, horizontally extended supports carried by said relatively stationary and rotatable sleeves, gearing for driving said rotatable sleeves, planetary elements suspended from the extended supports of said rotatable sleeves, a sky representing dome suspended from rotatable portions of said apparatus and including separate annular sky sections suspended respectively from different extensions of the rotatable sleeves, said gearing operating said rotatable sleeves at different speeds, certain of said planet elements having rotary portions and gearing carried by said stationary sleeves for operating said rotary portions.

4. In a planetarium or the like, the combination of a stationary tubular column provided with means for supporting the same in suspended relation, telescopically arranged sleeves on the lower portion of said column, means on said column for supporting certain of said sleeves in stationary and others of said sleeves in rotatable relation, horizontally extended supports carried by said relatively stationary and rotatable sleeves, gearing for driving said rotatable sleeves, planetary elements suspended from the extended supports of said rotatable sleeves, a sky representing dome suspended from rotatable portions of said apparatus and including separate annular sky sections suspended respectively from different extensions of the rotatable sleeves, said gearing operating said rotatable sleeves at different speeds, certain of said planet elements having rotary portions and gearing carried by said stationary sleeves for operating said rotary portions.

ratus, a Sun representing element rotatably suspended from the end of the column at the center of said sky structure and means for effecting rotation of said Sun element, including gearing operated from one of said rotatable sleeves, gearing carried by the horizontally extended supports of the stationary sleeves for imparting movement to the planetary elements and said sky representing dome being in annular sections connected with the horizontally extended supports of different rotatable sleeves.

5. In a planetarium or the like, the combination of a stationary tubular column provided with means for supporting the same in suspended relation, telescopically arranged sleeves on the lower portion of said column, means on said column for supporting certain of said sleeves in stationary and others of said sleeves in rotatable relation, horizontally extended supports carried by said relatively stationary and rotatable sleeves, gearing for driving said rotatable sleeves, planetary elements suspended from the extended supports of said rotatable sleeves, a sky representing dome suspended from rotatable portions of said apparatus and gearing interposed between at least one of said stationary sleeves and one of said rotating planetary elements and carried by the horizontally extended support of one of said rotatable sleeves, said sky representing dome being in annular sections supported by horizontally extended supports of the rotatable sleeves.

6. In a planetarium or the like, the combination of a supporting column, means at the upper end of said column for supporting the same in suspended relation, outstanding carriers mounted in concentric relation on said column, transversely curved annular sky forming sections at the lower end of said column suspended from said outstanding carriers, means for rotating said carriers and the sky sections suspended therefrom at different speeds, supports extending from said carriers down through the sky sections suspended therefrom and planet representing elements carried by said supports beneath said rotating sky sections.

7. In a planetarium or the like, the combination of a supporting column, means at the upper end of said column for supporting the same in suspended relation, outstanding carriers mounted in concentric relation on said column, transversely curved annular sky forming sections at the lower end of said column suspended from said outstanding carriers, means for rotating said carriers and the sky sections suspended therefrom at different speeds, supports extending from said carriers down through the sky sections suspended therefrom, planet representing elements carried by said supports beneath said rotating sky sections, said planet supports being rotatably mounted in said carriers and gearing for effecting rotation of said carriers and rotation of said supports in relation to the carriers for the same.

8. In a planetarium or the like, the combination of a supporting column, outstanding carriers mounted in concentric relation on said column, annular sky forming sections suspended from said outstanding carriers, means for rotating said carriers and the sky sections suspended therefrom at different speeds, supports extending from said carriers down through the sky sections suspended therefrom, planet representing elements carried by said supports beneath said rotating sky sections, satellite elements carried by one or more planetary elements and drive mechanism

extending down through one or more said planet suspending support for operating said satellite elements.

9. In a planetarium or the like, the combination of a supporting column, means at the upper end of said column for supporting the same in suspended relation, outstanding carriers mounted in concentric relation on said column, transversely curved annular sky forming sections at the lower end of said column suspended from said outstanding carriers, means for rotating said carriers and the sky sections suspended therefrom at different speeds, supports extending from said carriers down through the sky sections suspended therefrom, planet representing elements carried by said supports beneath said rotating sky sections, said sky structure including a central disc portion and a Sun representing element suspended from said column below said central disc section.

10. In a planetarium or the like, the combination of a supporting column, means at the upper end of said column for supporting the same in suspended relation, outstanding carriers mounted in concentric relation on said column, transversely curved annular sky forming sections at the lower end of said column suspended from said outstanding carriers, means for rotating said carriers and the sky sections suspended therefrom at different speeds, supports extending from said carriers down through the sky sections suspended therefrom, planet representing elements carried by said supports beneath said rotating sky sections, the means aforesaid including a motor and drive gearing supported by the column above the sky forming structure and a hood covering said motor and drive gearing.

11. In a planetarium or the like, a planet representing unit, comprising a tubular stem, a support carried thereby, substantially hemispherical upper and lower shells rotatably supported on an inclined axis on said support, a satellite mounting ring journaled on said support, a satellite representing element carried by said ring off the equatorial portion between the shells, a drive shaft extending through the tubular supporting stem and gearing within the shells operated from said shaft for imparting movement to said satellite ring.

12. In a planetarium or the like, a planet representing unit, comprising a tubular stem, a support carried thereby, substantially hemispherical upper and lower shells rotatably supported on an inclined axis on said support, a satellite mounting ring journaled on said support, a satellite representing element carried by said ring off the equatorial portion between the shells, a drive shaft extending through the tubular supporting stem, gearing within the shells operated from said shaft for imparting movement to said satellite ring and gearing for rotating said tubular supporting stem.

13. In a planetarium or the like, a planet representing unit comprising an equatorial ring and substantially hemispherical globe sections at opposite sides of the same, all mounted for independent rotation, a tubular stem for supporting said parts, means for carrying said stem in an orbital path and for effecting independent rotation of the same, a drive shaft extending through said tubular stem, means for effecting rotation of said drive shaft and gearing connections from said drive shaft to said equatorial ring and substantially hemispherical globe sections.

14. In a planetarium or the like, a planet representing unit, comprising an equatorial ring and substantially hemispherical globe sections at opposite sides of the same, all mounted for independent rotation, a tubular stem for supporting said parts, means for carrying said stem in an orbital path and for effecting independent rotation of the same, a drive shaft extending through said tubular stem, means for effecting rotation of said drive shaft, gearing connections from said drive shaft to said equatorial ring and substantially hemispherical globe sections, a reversely rotating ring associated with the first equatorial ring and gearing from said shaft for effecting reverse rotation of said last mentioned ring.

15. In a planetarium, orrery, cosmoscope or the like, a planetary unit comprising substantially hemispherical shell elements, an intermediate equatorial element, a projecting satellite carrier pivoted on said equatorial element, means for effecting rotation of said elements and cam means within said hemispherical shell elements engaged by said pivoted satellite carrier for effecting angular movements of the latter in the rotation of the same.

16. A planetary unit, comprising a tubular supporting stem, a drive shaft extending through said tubular stem a globe element mounted to rotate in inclined relation on said stem, a rotating ring on the upper end of said globe element and rotating about the axis of said supporting stem independently of said globe element, gear connections from said drive shaft within said globe element for independently rotating said globe element and said satellite element carrying ring, a satellite element carried by said rotating ring.

17. In a planetarium or the like, the combination of a stationary support, telescopically arranged sleeves on said support, means on said support for supporting certain of said sleeves in stationary and other of said sleeves in rotatable relation, means for rotating a rotatable sleeve, laterally extended supports carried by said relatively stationary and rotatable sleeves, a planetary element rotatably carried by the laterally extended support of the rotatable sleeve, gearing connections between said rotatably carried planetary element and the stationary sleeve, whereby rotative movement will be imparted to said planetary element in said extended support in the

rotation of said rotatable sleeve, an independently rotatable member associated with said planetary element, a gear carried by the extended support of said stationary sleeve and gear connections from said independently rotatable member to said gear on the extended support of said stationary sleeve.

18. In a planetarium or the like, a centrally disposed Sun element, relatively stationary and rotatable supports concentrically related to said Sun element, a planetary element rotatably mounted on said rotatable support, a gear connected to said rotatably mounted planetary element, a gear carried by said stationary support, an uneven number of interposed gears between said planetary gear and said stationary gear and whereby said planetary element in its rotation in the support carrying the same will be always faced to the Sun element in the same relation during its bodily rotation about the Sun and means for rotating said rotatable support for effecting bodily travel of the planetary element about the Sun and rotation of the planetary element in its support to face said element in the same relation to the Sun during such bodily travel.

19. In a planetarium or the like, the combination of a tubular stem, a support carried thereby, a shaft journaled in said support on an axis inclined to the axis of said tubular stem, a drive shaft extending through said tubular stem, connecting gearing between said relatively inclined shafts and a planetary shell connected with and rotating on the inclined axis of said inclined shaft and enclosing said support, inclined shaft and connected gearing.

20. In a planetarium or the like, the combination of a tubular stem, a support carried thereby, a shaft journaled in said support on an axis inclined to the axis of said tubular stem, a drive shaft extending through said tubular stem, connecting gearing between said relatively inclined shafts and a planetary shell connected with and rotating on the inclined axis of said inclined shaft and enclosing said support, inclined shaft and connecting gearing, said shell being in sectional form, an equatorial ring rotatably mounted on the support between said sections and gearing for effecting independent rotation of said equatorial ring.

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