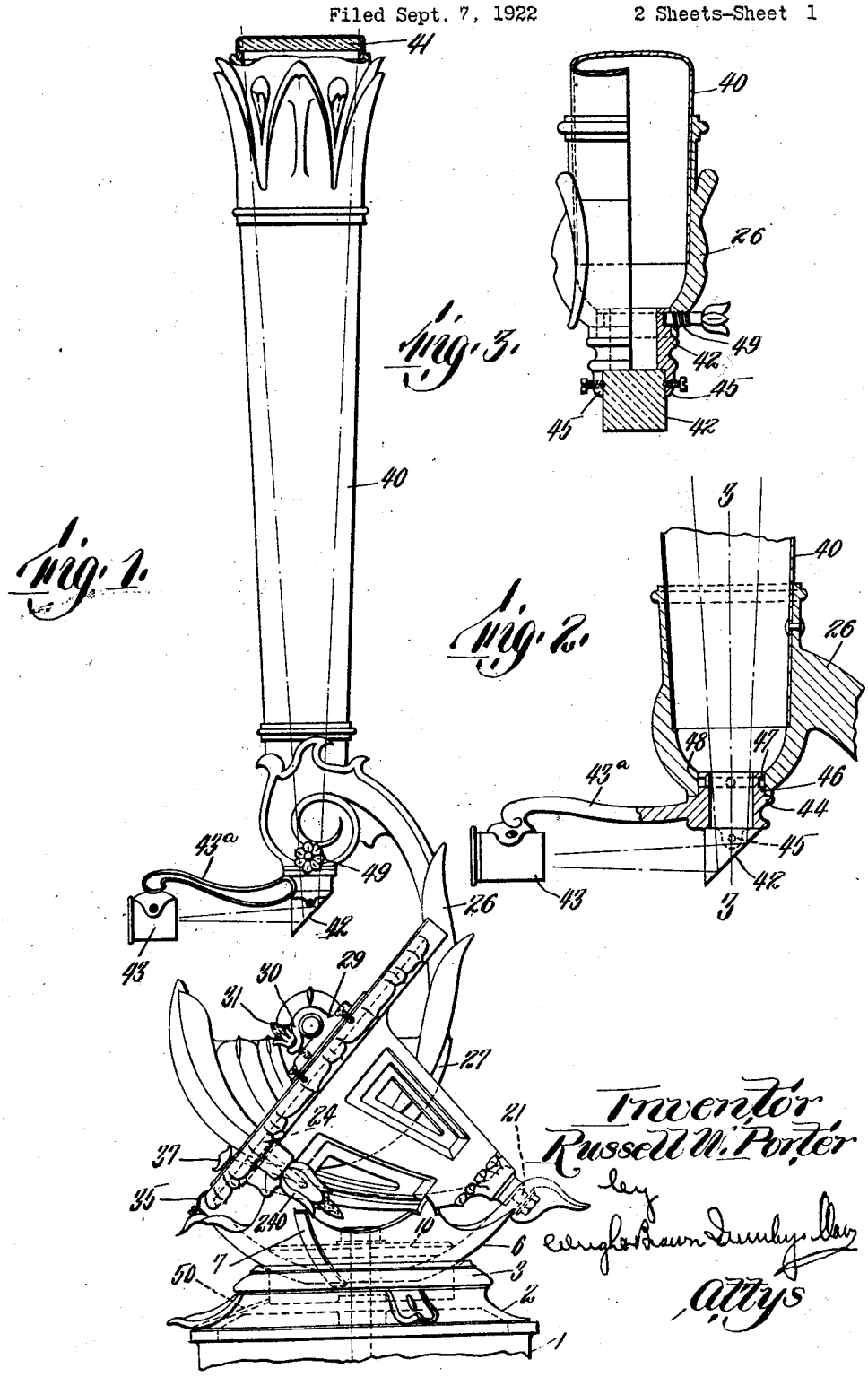
Dec. 6, 1927. 1,651,412

R. W. PORTER

TELESCOPE

Filed Sept. 7, 1922 2 Sheets-Sheet 1



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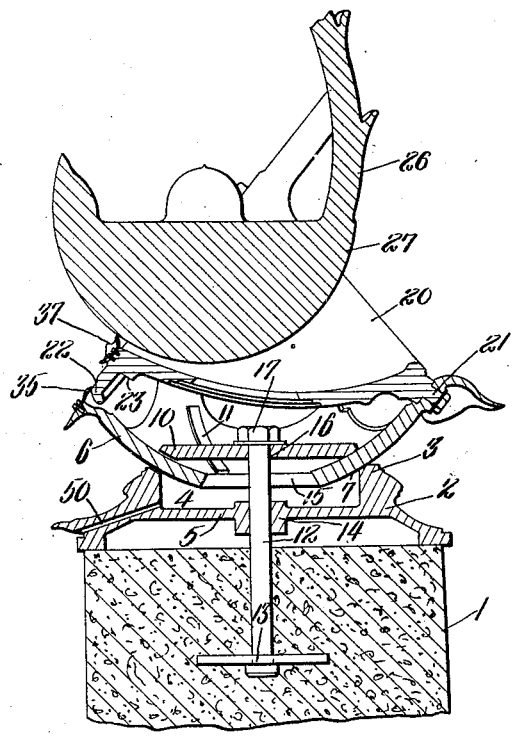

Fig. 4.

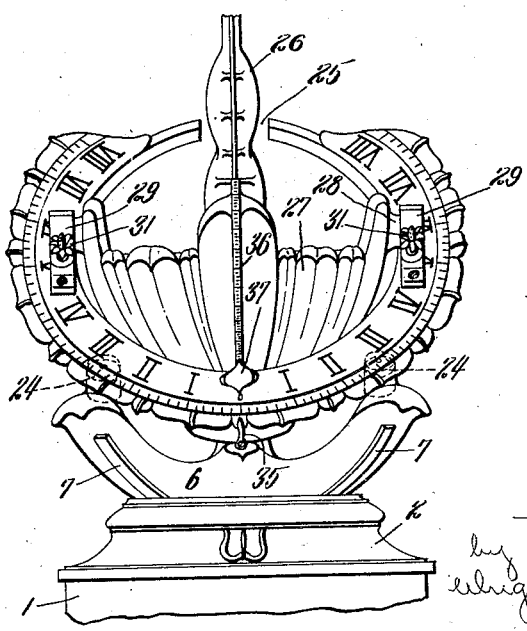

Fig. 5.

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UNITED STATES PATENT OFFICE.

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TELESCOPE.

Application filed September 7, 1922. Serial No. 586,740.

This invention relates to telescopes and has for its object to produce a construction which may be produced at a sufficiently small price to bring it within the reach of the amateur observer, but which will be of sufficiently high grade to enable accurate observations to be made.

It further provides a construction susceptible of ornate treatment so as to be an embellishment to the grounds of the owner, the major portion thereof being intended to remain out of doors while the more delicate optical features may be removed when not being used for protection from the weather and for safe keeping.

For a more complete understanding of this invention, together with further objects and advantageous details and combinations of parts, reference may be had to the accompanying drawings in which

Figure 1 illustrates a side elevation of the telescope which is shown supported at the upper end of a pier of masonry, the telescope being directed to the zenith.

Figure 2 is an enlarged sectional detail of the ocular and lower end of the telescope tube and its support.

Figure 3 is a fragmentary elevation partly in section, the section being taken on the line 3—3 of Figure 2.

Figure 4 is a central vertical section taken through the lower portion of the telescope mounting.

Figure 5 is an elevation of a portion of this mounting.

Referring first to Figures 4 and 5, at 1 is indicated a pier, or other suitable support, preferably of masonry or concrete, which supports a superstructure carrying the telescope. The base or pier 1 carries at its top a base cap plate 2 which may rest thereon or be made fast thereto in any suitable manner. The cap plate 2, as shown, is provided with a circular upstanding flange 3 surrounding a centrally depressed portion or recess 4 having as its base a transverse web 5. Seated on the flange 3 is a shell 6 formed in the shape of a segment of a sphere. In order to provide a firm bearing for the shell on the flange, the lower face of this shell has preferably formed thereon three spaced ribs 7, these ribs being along arcs radiating from each other at angles of 120°. These ribs bear on the edge of the flange and furnish a three point support for the shell 6, the shell being capable of being adjusted universally relative to the base. For the purpose of fixing this shell in any adjusted position, clamping means are provided. This means as shown comprises a circular clamping plate 10 having its outer edge formed to engage three internal radiating ribs 11 similar to the ribs 7 on the concave side of the shell 6, these ribs also forming a three point contact for the clamping plate 10 thereon. This plate 10 is held firmly against the ribs 11 by means of an anchoring bolt 12 having its lower end fixed or anchored in the pier or base 1 as at 13, and extending through a hollow boss 14 of the web 5, through a comparatively large aperture 15 in the shell 7, through a perforation 16 in the plate 10, and having threaded at its upper end a nut 17.

Carried by the shell 6 is a substantially bell-shaped member 20. The small end of this member is journaled at 21 in the shell 6 about an axis which by proper adjustment of the shell relative to the base may be made a polar axis. The large end of the bell terminates in an outwardly directed flange 22 and immediately beneath this flange is formed a track 23. The shell 6 has journaled thereon a pair of rollers 24 on which the track 23 bears so as to support the large end of the bell member so that its longitudinal axis coincides with that of the pivot 21 which serves as the polar axis of the telescope.

One portion of the bell member 20 is cut away as shown at 25 for the passage of an arm 26 upstanding from a support 27. This support 27 is formed as the segment of a sphere and is provided with trunnions 28 journaled in bearing brackets 29 made fast to the flange 22 of the bell shaped member. These brackets are so positioned that the pivotal axis of the support 27 is at right angles to the polar axis and serves as the declination axis of the telescope. The brackets 29 are each formed with a resilient portion 30 through which passes a screw 31 threaded into the base portion of the bracket. By tightening these screws the trunnions 28 may be clamped firmly against rotation within these brackets. The support 27 is pivoted considerably above its center of gravity by means of the trunnions so that its lower portion furnishes a counterbalance for the telescope proper which is carried by the arm 26 so that the whole mechanism, including the

telescope assembly and the supports therefor, are in equipoise. For the same purpose the brackets 29 are positioned slightly above the axis of the pivot 21, this allowing for the loss of weight due to the cut out portion 25 of the bell shaped member.

The flange 22 of the bell shaped member is provided on its upper face with an hour circle having graduations as shown for each ten minutes, and cooperating with this hour circle is a pointer 35 fixed to the edge of the shell 6 and pointing toward the hour circle. Similarly the support 27 is provided with a circumferential rib 36 graduated in degrees and minutes and subdivided as finely as required with which coacts an index piece 37 fixed to the hour circle.

The telescope proper comprises a tube 40 made fast at its lower end in the upper end of the arm 26. This tube carries an objective 41 at its upper end. In the optical axis of this objective, and as shown carried by a portion of the arm 26, is fixed a diagonal or totally reflecting prism indicated at 42 and in operative relation to this diagonal or prism is an ocular indicated at 43. This ocular, as shown, is fixed to the outer end of a substantially horizontal arm 43^a, the inner end of which is formed as a hub 44 which carries the diagonal or prism between ears 45 projecting from the lower face thereof. The upper face of the hub 44 is provided with an upwardly extending boss 46 having a circumferential groove 47 therein. This boss is journaled within a circular opening 48 beneath the lower end of the tube 40 in the arm 26, and is removably held therein with capability of rotation relative to the arm 26 by means of a set screw 49 threaded in the arm 26 and bearing at its inner end within the groove 47. By this means the ocular and the diagonal or prism may be swung about the optical axis of the objective to any position most convenient for the observer.

By this construction above outlined the gravity axis of the telescope falls within the three point support between the bell shaped member and the shell which is formed by the pivot or journal 21 and the rollers 24 and it also passes within the three points of support between the ribs 7 and the points 3 of the base cap. The mounting, therefore, is entirely stable and the telescope is equipoised in position for adjustment about the polar or declination axes. The construction as shown permits a range of latitude from 25° from the equator to 55° north or south.

In use, the telescope is set for the angle of declination for the particular celestial object to be observed, this being determined from any ephermeris or nautical almanac and is clamped against movement about that axis by means of the screws 31. The telescope may then be turned about the polar axis to the required hour angle position by rotating either of the rollers 24, which are provided with finger-engageable heads 240, by which action also the diurnal motion of the earth may be compensated for so as to maintain the object viewed within the field of the telescope.

When the observer is not using the instrument the objective and the arm 43 carrying the ocular and the prism or diagonal may be removed, the remaining construction being preferably formed of material such as bronze which is not adversely affected by the weather.

The bell shaped member 20 may be provided with openings through its sides, as shown, in order to permit the free passage of water therefrom, and the space formed within the flange 3 above the web 5 may communicate through a channel 50 to the outer face of the cap, thus permitting water to drain therefrom.

Having thus described an embodiment of this invention it should be evident that many changes and modifications might be made therein without departing from its spirit or scope as defined by the appended claims.

I claim:

1. In a device of the class described, a base having an upstanding flange, a member seated on said flange with capability of universal turning movement relative thereto, means for clamping said member to said base, an element pivoted to said member, and a telescope carried by said element.

2. In a device of the class described, a base having an upstanding circular flange, a shell formed as the segment of a sphere having three spaced ribs on the inner and outer faces thereof, the ribs on the outer face bearing on said flange, a circular plate bearing on the ribs on the inner face of said shell, and clamping means engaging the top face of said plate extending through an aperture in said shell and anchored in said base.

3. A device of the class described comprising a base having an upstanding circular flange, a shell formed as the segment of a sphere and having its outer face resting on said flange, means for clamping said shell against said flange, a bell shaped member having its small end journaled in said shell and its large end rotatably carried thereby, and a telescope pivoted to said member.

4. A device of the class described comprising a support, a member carried by said support with its center of gravity thereabove and with its gravity axis lying within its bearing on said support to rotate on a polar axis, and a refracting telescope assembly pivoted at substantially its center of gravity on a declination axis to said member.

5. A device of the class described com-

prising a base having an upstanding circular flange, a shell formed as a segment of a sphere supported concave side up on said flange, a bell shaped member journaled in said shell, a segment of a sphere journaled above its center of gravity in said member, an arm upstanding from said segment and passing through an opening in said member, and a telescope tube carried by said arm.

6. A device of the class described comprising a base having an upstanding circular flange, a shell formed as a segment of a sphere supported concave side up on said flange, a bell shaped member journaled in said shell on a polar axis, a segment of a sphere journaled above its center of gravity in said member about a declination axis, an arm upstanding from said segment and passing through an opening in said member, and a telescope tube carried by said arm.

7. A device of the class described comprising a base having an upstanding circular flange, a shell formed as a segment of a sphere supported concave side up on said flange, a bell shaped member journaled in said shell on a polar axis, a segment of a sphere journaled above its center of gravity in said member about a declination axis, an arm upstanding from said segment and passing through an opening in said member, and a telescope carried by said arm and counterbalanced by said segment about the declination axis so as to be equipoised.

8. A device of the class described comprising a base having an upstanding circular flange, a shell formed as a segment of a sphere supported concave side up on said flange, a member journaled in said shell on a polar axis and provided with an hour circle, a pointer fixed to said shell in cooperative relation to said hour circle, and a telescope pivoted to said member on a declination axis.

9. A device of the class described comprising a base having an upstanding circular flange, a shell formed as a segment of a sphere supported concave side up on said flange, a member journaled in said shell on a polar axis, and a telescope pivoted to said member on a declination axis, said telescope being equipoised with its gravity axis lying within said circular flange.

10. A device of the class described comprising a base, a shell formed as a segment of a sphere adjustably supported concave side up at three spaced points from said base, a member engaging said segment at three spaced points for clamping said shell in position, a member journaled in said shell on a polar axis, and a telescope journaled on said member on a declination axis, the gravity axis of said telescope passing within the three points of support for said shell.

11. A device of the class described comprising a base, a shell formed as a segment of a sphere supported concave side up on said base, a bell shaped member having its small or thrust end journaled in said shell on an inclined axis, a plurality of radial rollers journaled in said shell and on which the large end of said member rests, a support journaled in said member on an axis perpendicular to said inclined axis, and a telescope fixed to said support.

12. A device of the class described comprising a telescope tube, an objective at one end of said tube, a diagonal or prism in the optical axis of said objective rotatably carried at the other end of said tube, and an ocular bodily movable with said prism about the optical axis of said objective and positioned to receive rays from said prism, the optical axis of said ocular being at an angle to the optical axis of said objective.

13. A device of the class described comprising a telescope tube, an objective at one end of said tube, an ocular rotatable relative to said tube about the optical axis of said objective and angularly disposed relative thereto, and means for deflecting the light rays from said objective to said ocular in all of the angular positions of said ocular.

14. A device of the class described comprising a support, a telescope tube having one end fixed to said support, an objective at the other end of said tube, an arm carried by said support and rotatable about the optical axis of said objective, an ocular carried by said arm and having its axis radial to the axis of said objective, and means for deflecting the rays of light from said objective to said ocular in all the angular positions of said ocular.

15. A device of the class described comprising a support, a telescope tube having one end fixed to said support, an objective at the opposite end of said tube, an arm carried by said support and rotatable about the optical axis of said objective, an ocular carried by said arm, means for deflecting the rays of light from said objective to said ocular, and means for carrying said support for movement about a polar and declination axis.

16. In a device of the class described, a base, a shell formed as the segment of a sphere seated on said base convex side down, means to clamp said shell to said base, an element pivoted to said shell, a second element pivoted to said first mentioned element, and a telescope carried by said second element.

17. In a device of the class described, a base, a member seated on said base with capability of universal movement relative thereto, a telescope tube movably carried by said member, an objective carried by said tube, and an ocular movable with and independently of said tube while maintained in optical relation to said objective.

18. In a device of the class described, a

base, a member carried by said base and having a supporting arm, a telescope tube having one end fixed to said arm, an objective in the opposite end of said tube, an ocular arm swiveled to said supporting arm and extending at an angle to said tube, an ocular carried at the outer end of said ocular arm, and a diagonal carried by said ocular arm in the axis of said tube for directing light rays from said objective to said ocular in all angular positions thereof about the axis of said tube.

In testimony whereof I have affixed my signature.

RUSSELL W. PORTER.