J. M. ELLICOTT & P. FERBER.

PELORUS.

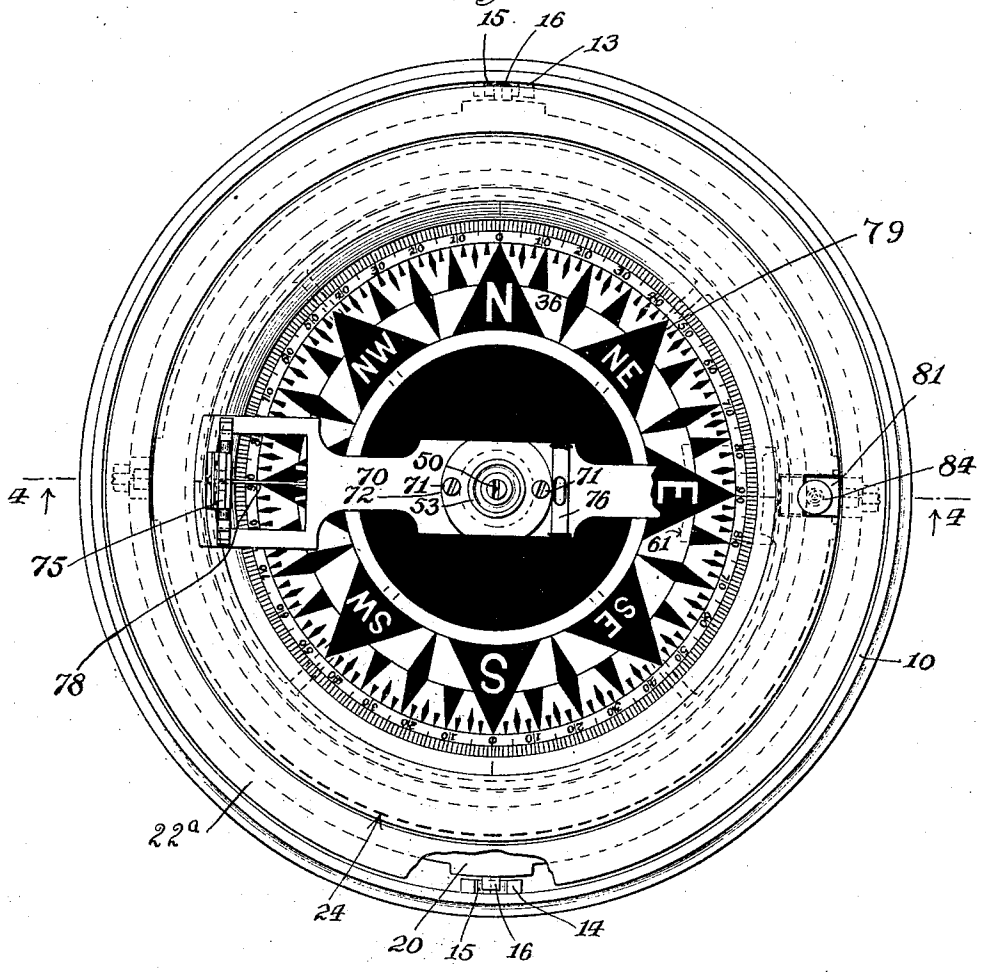
APPLICATION FILED OCT. 18, 1906.

**918,133.**

Patented Apr. 13, 1909.

4 SHEETS—SHEET 1.

*Fig. 1.*




Attest:
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by William R. Baird
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4 SHEETS—SHEET 2.

*Fig. 2.*

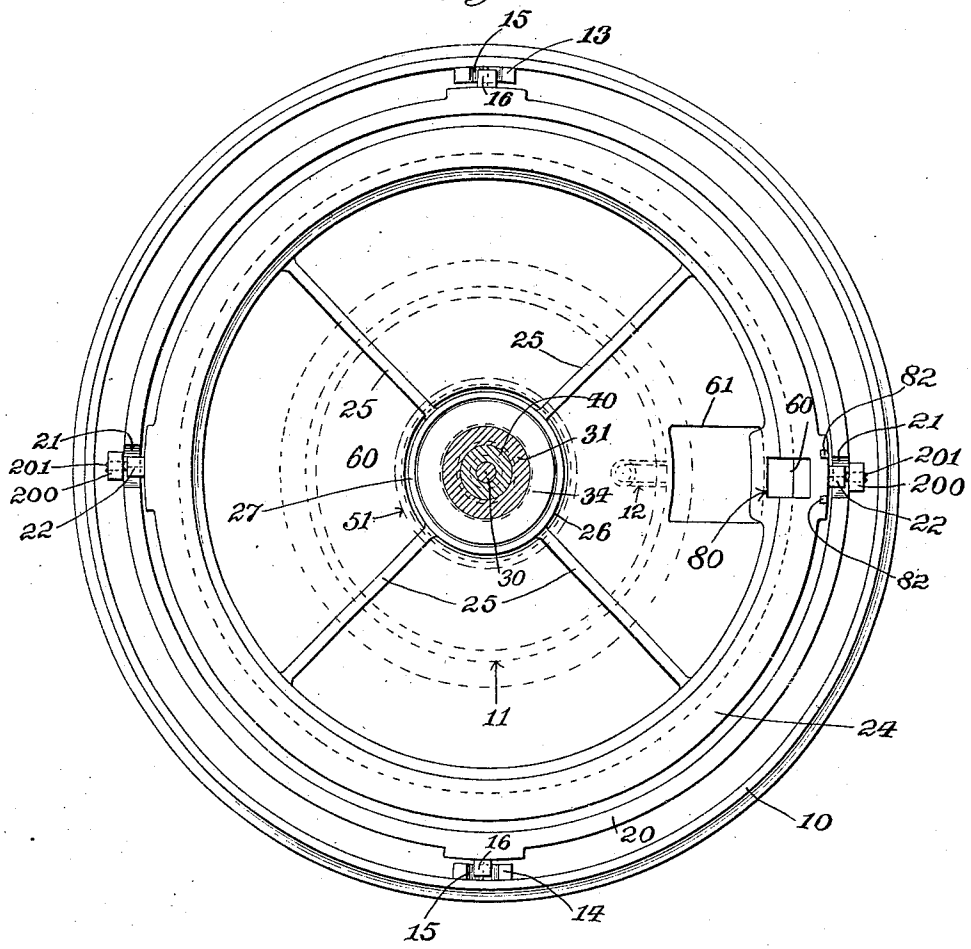
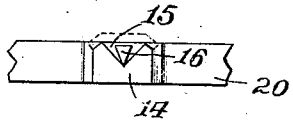



*Fig. 3.*




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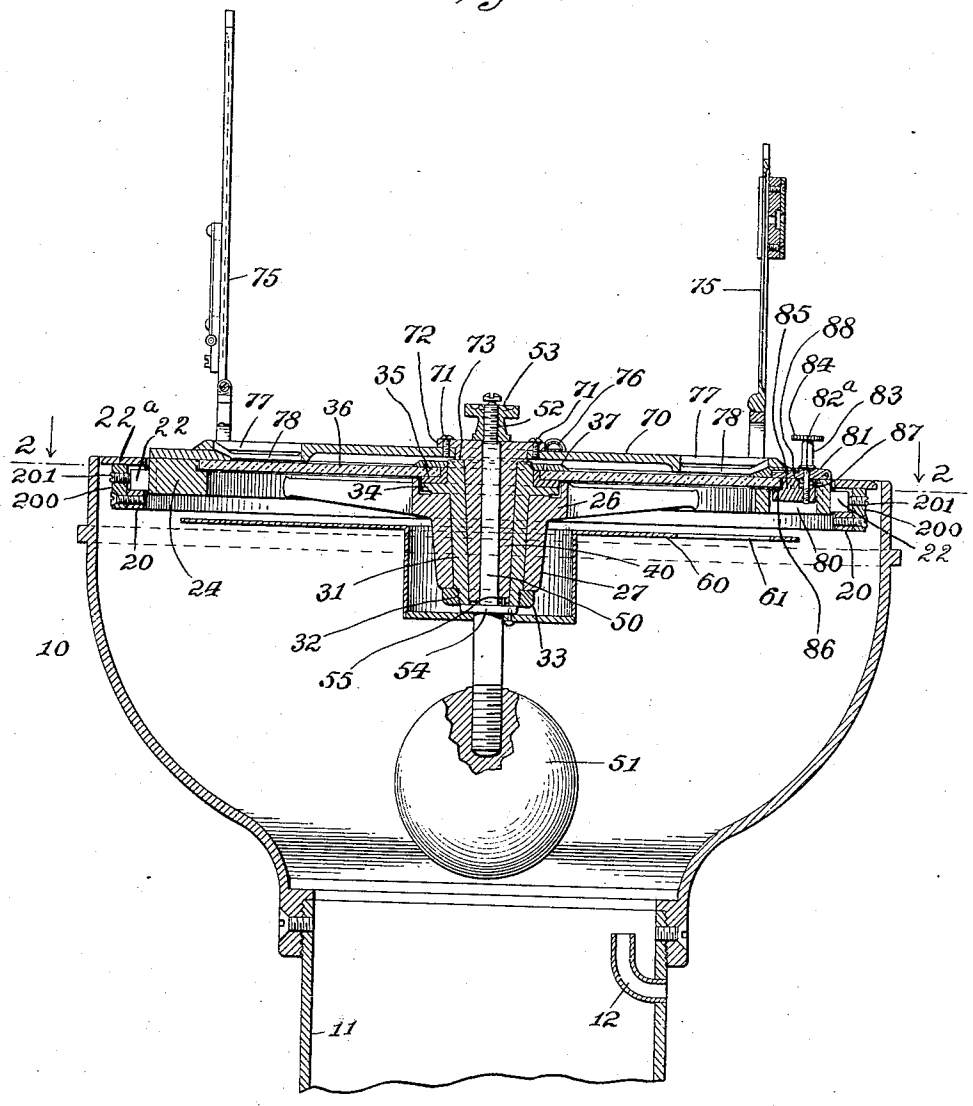
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4 SHEETS—SHEET 3.

*Fig. 4.*




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4 SHEETS—SHEET 4.

*Fig. 5.*

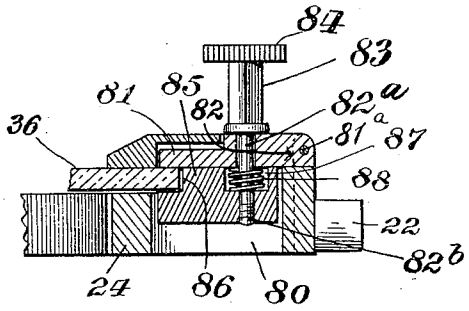



*Fig. 6.*

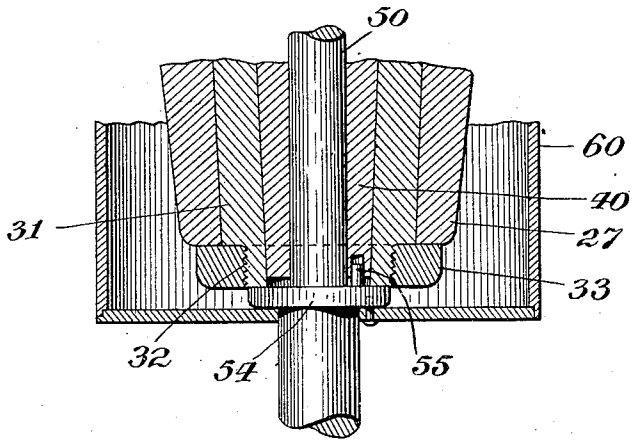
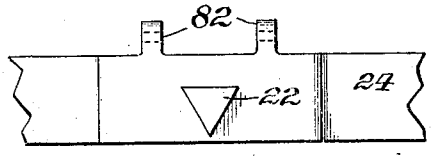



*Fig. 7.*




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# UNITED STATES PATENT OFFICE.

JOHN M. ELLICOTT, OF ST. INIGOES, MARYLAND, AND PHILIP FERBER, OF WEEHAWKEN HEIGHTS, NEW JERSEY, ASSIGNORS TO KEUFFEL & ESSER COMPANY, OF HOBOKEN, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## PELORUS.

No. 918,133. Specification of Letters Patent. Patented April 13, 1909.

Application filed October 18, 1906. Serial No. 339,466.

*To all whom it may concern:*

Be it known that we, JOHN M. ELLICOTT, a citizen of the United States, residing at St. Inigoes, St. Mary county, Maryland, and PHILIP FERBER, a citizen of the United States, residing at Weehawken Heights, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Peloruses, of which the following is a specification.

This invention relates to the instrument known as a pelorus, employed for ascertaining the variation of the compass and the bearings of terrestrial and celestial objects for the purposes of navigation, and its novelty consists in the construction and adaptation of the parts whereby ease of use and accuracy of adjustment are secured and maintained.

Instruments of this class have comprised two types—a type which was provided with a metal or other opaque dial, and a type called an "illuminating" pelorus provided with a translucent or transparent compass dial which can be illuminated from below. This latter type while of great advantage in that it enabled the navigator to use the fixed stars and other objects at night, has some defects in construction which seriously affect its accuracy and reliability. It was provided with cylindrical and not knife edge bearings in its gimbal rings, and these were too sluggish, and its pivot bearings for rotating and clamping the alidade were short and at times unreliable. In the instrument forming the subject matter of this application these and other disadvantages have been overcome and the instrument shown and described has also good features of its own.

In the drawings, Figure 1 is a top plan view of a preferred form of the instrument showing a portion of the sealing ring and the alidade broken away. Fig. 2 is a similar view beneath the plane of the line 2—2 in Fig. 4. Fig. 3 is an enlarged edge view of the outermost gimbal support. Fig. 4 is a central vertical section through the instrument on the plane of the line 4—4 in Fig. 1, some of the parts being shown in elevation. Fig. 5 is an enlarged detail of the pinching lid. Fig. 6 is an enlarged sectional detail view of the lower extremity of the socket member 31 and the adjacent parts, and Fig. 7 is a side view of a part of the inner gimbal and its ears.

In the drawings, 10 is a basin-shaped frame mounted on a suitable standard 11 secured to the ship's deck and which standard is hollow and is provided with a vent tube 12. This frame 10 is provided at diametrically opposite points inside of its rim with brackets 13 and 14 having V-shaped depressions, 15, 15, adapted to receive knife edge pivots, 16, 16, secured to, or made integral with, the outer gimbal ring. 20. This outer gimbal ring 20 is provided with two V-shaped recesses 21, 21, arranged diametrically opposite each other and at right angles to the vertical plane of the gimbal supports 13 and 14, and which recesses are adapted to receive the knife edge pivots 22, 22, secured to or made integral with the rim of the inner gimbal ring 24, which is provided with radial arms 25, 25, terminating centrally in a hub 26 provided with a dependent conical portion 27 which is concentric with, but separated from, a central cylindrical rod 50, presently to be described. This ring and its parts constitute a supporting frame.

On the gimbal ring 20 are secured lugs 200, 200, threaded to receive adjusting screws 201, 201, the inner ends of which impinge upon the vertical edges of the pivots 22, 22, and by means of these screws the inner gimbal ring may be diametrically adjusted in its bearings. On this outer gimbal ring there is mounted an upper light excluding ring $22^a$ which prevents the transmission of light from the interior of the instrument. This ring is shown best in Fig. 1, where it is shown partly broken away in order that the gimbal pivots beneath it may be seen.

Arranged centrally within the conical portion 27 of the hub 26 is a conical socket member 31 provided externally at its lower and smaller extremity with threads 32 adapted to engage with an internally threaded ring 33 which provides a bearing for the lower portion 27 of the hub 26.

The upper part of the socket member 31 is formed or provided with a flat annular flange 34 which is adapted to support a bushing 35 upon which in turn is placed a glass compass dial 36 which is secured in place by the retaining ring 37. This ring is internally threaded and adapted to engage with external threads on the socket member 31. The compass dial displays on its upper sur-

face the points of the compass arranged in the standard manner, preferably in black and white. By the means described, one dial may be removed and another inserted in its place.

Concentric with the socket member 31 is an inner conical socket member 40 centrally apertured to receive the rod 50 above referred to. This rod is provided at its lower extremity with a weight 51 and is constricted at its upper extremity 52 and threaded to receive a clamp nut 53. Intermediate the lower extremity of the socket member 40 and the weight 51, the rod 50 is provided with a collar 54 which has a projecting pin 55 engaging with a suitable aperture in the lower edge of the socket member 40 to secure unity of movement between the rod and the socket. The weight 51 must be symmetrically placed with reference to the rod.

Secured to the collar 54 of the rod 50 and adapted to move with it is a means adapted to intercept or exclude light from an illuminating means below the dial 36, except at one place. The means herein shown for the purpose consists of an opaque light excluding diaphragm 60 provided with a suitable opening 61 to admit light upwardly from a source of light (not shown) and preferably having its upper surface formed of light reflecting material whereby it is adapted to illuminate the compass dial from beneath. This diaphragm being secured to the collar 54 moves with it and consequently with an alidade 70 which is secured to the socket 40 by means of screws 71, which pass through a flange 72 in the socket 40. A circular shoulder 73 is formed on the socket 40 to provide a clamping surface for use in coupling the socket 40 with the socket 31 to prevent their relative rotation. The light opening 61 always registers with the alidade and illuminates the part of the compass dial between them.

The alidade 70 is secured to the socket member 40 which acts as a pivot for it. It is preferably provided with the usual sighting vanes 75, 75, and with a test spirit level 76. It is also provided at each end with openings 77, 77, having radially arranged pointers 78 to assist in reading the graduations beneath it on the compass card 79.

The inner gimbal ring 24 is provided with a recess 80 over which is placed a lid 81, one end of which is preferably provided with a pivot $81^a$ having projecting ends which are journaled in ears 82 on the gimbal ring or said lid is otherwise hingedly mounted. This lid forms one member of a clamp, between the members of which the outer edge of the compass dial 36 is secured. The other member of the clamp herein shown is provided by a plate 85, which is stepped at 86 to receive the outer edge of said dial. These two clamp members are desirably secured together, to pinch said dial-edge between them, by a barrel 83 which has a downwardly projecting pin or portion $82^a$ which extends through the lid and has a threaded portion $82^b$ for engagement with the clamping plate 85. The outer end of the barrel 83 is formed or provided with a milled head 84 by which it may be turned to move the plate 85, toward or from the lid 81, in order to pinch the edge of the compass dial between the lid 81 and plate 85, or to release said edge. When the latter is released the compass dial may be turned by hand to any desired position and when it is clamped in the manner described it will be held fixedly in its adjusted position. The clamping plate 85 is shown as provided with a recess 87 through which the pin $82^a$ extends and which provides around said pin a space adapted to receive a coiled spring 88 which bears against the pivoted lid 81 and presses the same upward to release the compass dial when the clamping screw 83, $82^a$ is slackened.

From the foregoing it will be seen that the inner gimbal ring and its central hub and depending bearing is adapted to oscillate but not to rotate; that the glass compass dial is adapted to rotate upon its long central socket member and may be rotated therein independent of the alidade which is itself adapted to rotate upon its socket placed within the socket of the glass compass dial. By means of the binding screw nut 53 the alidade and glass compass dial may be firmly locked to rotate together, and by releasing the pinching lid, just described, from is clamping engagement with the glass compass dial the latter may be released to rotate independently from the alidade. It will also be noticed that by means of the long central bearings of the rotatable parts, a great steadiness is secured and it becomes impossible for the parts to wabble. In addition, the placing of a weight on the central rod inside of the alidade socket throws the center of gravity of the parts suspended upon the inner gimbal below the center of symmetry of such parts, and also conduces to steadiness. It is a great convenience also to be able to remove the glass compass dial which may become accidentally broken and to replace it by another. This end is secured in the present construction by providing for the movability or removability of the parts which hold the dial in place.

What we claim as new is:—

1. An instrument of the class described comprising a frame, a gimbal ring, a light excluding ring carried by said gimbal ring, and a relatively movable dumb compass card and alidade.

2. An instrument of the class described comprising a frame, inner and outer gimbal rings, a light excluding ring carried by the

outer gimbal ring, a rotatably mounted alidade carrying a sighting vane, and a dumb compass card.

3. An instrument of the class described, comprising a device having the points of the compass indicated thereon, a pointer mounted to have movement adjacent to said device, a movably mounted device for admitting light to the point to which the pointer is directed and excluding light from places adjacent to said point and means whereby movement is transmitted between the latter device and the pointer.

4. An instrument of the class described comprising a supporting frame, gimbal rings provided with knife edge pivots mounted in approximately V-shaped recesses, and a light excluding ring carried by one of the gimbal rings.

5. An instrument of the class described, comprising an outer frame, an outer gimbal ring supported thereby, an inner gimbal ring provided with a hub which projects downward therefrom, and a dial carried by the inner gimbal ring and provided with a pivot which extends downward therefrom and is revolubly seated in the hub.

6. An instrument of the class described, comprising a gimbal ring having a hub pendent therefrom, a compass dial having a hollow pivot revolubly mounted in said hub, a second pivot revolubly mounted in the first one; an indicating element arranged above the dial and a connection between the indicating element and the second pivot.

7. An instrument of the class described, comprising inner and outer gimbal rings one of which is provided with a dependent hub, a compass dial having a socket member adapted to revolve within said hub, an alidade, and a pivot for the alidade mounted in said socket member.

8. An instrument of the class described, comprising inner and outer gimbals one of which is provided with a dependent hub, a dial having a hollow socket adapted to revolve in said hub, an alidade having a pivot adapted to revolve in said socket and a weight suspended from the alidade.

9. An instrument of the class described, comprising inner and outer gimbals one of which is provided with a dependent hub, a dial having a hollow socket adapted to revolve in said hub, an alidade having a pivot adapted to revolve in said socket and a weight suspended from the alidade; said weight provided with a rod which extends through said pivot and has means for securing it to the latter.

10. An instrument of the class described, comprising a gimbal embodying a ring, a hub and arms radiating from the hub to the ring, means for sustaining the gimbal, and a dial which rests on the gimbal and is provided with a pivot which extends into the hub.

11. An instrument of the class described, comprising an outer gimbal ring, a supporting frame having an inner gimbal ring, a pendent hub and arms radiating from the hub to the inner gimbal ring, a dial and a central pivot for the dial adapted to revolve within the hub of the supporting frame.

12. An instrument of the class described, comprising a gimbal ring having a supporting frame provided with a depending hub, a dial provided with a pivot adapted to revolve in said hub and an alidade having a pivot engaging the pivot of the dial and adapted to revolve independently thereof.

13. An instrument of the class described having a supporting frame provided with a hub, a dial supported by the frame and having a socket mounted to turn in said hub, and an alidade having a pivot which extends into said socket.

14. In an instrument of the class described, the combination with a gimbal, of a compass dial and an alidade, the dial and alidade having pivots which are pendent therefrom and are mounted one in the other, means whereby the pivots are sustained by the gimbal, and means whereby the center of gravity of the parts suspended from the gimbal is thrown below the center of symmetry of such parts.

15. In an instrument of the class described, the combination with a gimbal, of a compass dial and an alidade, the dial and alidade having sockets pendent therefrom and mounted one in the other and extending below the gimbal, means whereby the sockets are sustained from the gimbal, a rod extending through the inner socket, and means connected with the rod for throwing the center of gravity of the parts suspended from the gimbal below the center of symmetry of such parts.

16. An instrument of the class described, comprising a gimbal ring having a supporting frame provided with a depending conical hub, a compass dial provided with a socket adapted to revolve within the hub of the supporting frame and an alidade mounted above the dial and provided with a projection extending into said socket.

17. An instrument of the class described having a supporting frame provided with a hub, a dial supported by the frame and having a socket mounted to turn in said hub, an alidade having a pivot which extends into said socket and is adapted to turn therein, a weighted rod which extends through said pivot and means for securing said pivot and rod together.

18. An instrument of the class described having a supporting frame provided with a hub, a dial supported by the frame and having a socket mounted to turn in said hub, an alidade having a pivot which extends into said socket and is adapted to turn therein, a

weighted rod which extends through said pivot and a collar fixed to said rod and means for securing said collar to said pivot.

19. In a device of the class described, a supporting frame having a depending hub, a compass dial having a hollow socket adapted to revolve in said hub, an alidade having a pivot adapted to revolve in said socket and means for securing said dial and frame together, said means being adapted to release the dial to permit its rotation relatively to the frame.

20. In a device of the class described, a supporting frame having a depending hub, a compass dial having a hollow socket adapted to revolve in said hub, an alidade having a pivot adapted to revolve in said socket and means for securing said dial and frame together, said means being adapted to release the dial to permit its rotation relatively to the frame and comprising a clamp engaging the edge of the dial and provided with a hinged member.

21. An instrument of the class described comprising a supporting frame having a hub, a dial having a projection adapted to revolve in said hub, a pivoted alidade and means for connecting said alidade and dial with each other for unitary movement, said means being releasable to permit relative movement of the dial and alidade.

22. An instrument of the class described comprising a gimbal ring having a supporting frame with a depending conical hub, a dial having a projection adapted to revolve in said hub, an alidade and means adapted to lock the dial and alidade together for unitary movement and to unlock them for relative movement.

23. An instrument of the class described comprising a gimbal having a hub, a dial provided with a socket extending into the hub, an alidade having a projection adapted to revolve in the socket and means for locking the projection to the socket and both to the hub.

24. In instrument of the class described comprising a supporting frame provided with a gimbal ring and a depending conical hub, a dial mounted above said frame and having a socket which extends into the hub, an alidade having a projection adapted to revolve in the dial-socket and means for locking the projection and socket together and both to the hub.

25. In an instrument of the class described, the combination of a transparent compass dial, an opaque diaphragm adapted to revolve beneath the compass dial and provided with an upper light reflecting surface, and means for supporting the diaphragm.

26. In an instrument of the class described, the combination with an alidade provided with an opening and an index pointer in said opening, of a transparent compass dial arranged to rotate beneath the alidade, and an opaque diaphragm having an upper light reflecting surface and means for supporting the diaphragm below the dial.

27. An instrument of the class described comprising a dial, an alidade and light intercepting means respectively mounted to turn on opposite sides of the dial, and means for supporting the alidade and light intercepting means.

28. An instrument of the class described comprising a dial, an alidade and a light intercepter having an axis coincident with that of the dial and respectively mounted to turn on opposite sides of the dial and means for supporting the alidade and light intercepter.

29. An instrument of the class described comprising a dial, an alidade mounted to turn on one side of the dial, a device mounted to turn on the other side of the dial for admitting light to the portion of the dial toward which the alidade points and excluding light from the contiguous portion thereof and a connection between the alidade and said device whereby they move together.

30. An instrument of the class described, comprising a dial, a rotatable alidade, a rotatable device for admitting light to the portion of the dial to which the alidade points and excluding light from the dial contiguous to said portion and a connection between the alidade and said device whereby they move together.

31. An instrument of the class described, comprising a dial, a gimbal which supports the dial, a rotatable alidade which points to the dial, a rotatable diaphragm having a light intercepting portion and a portion for passing light, the latter portion registering with the indicating portion of the alidade, whereby light is admitted to the portion of the dial to which the alidade points and is excluded from a portion of the dial contiguous thereto, and a connection between the alidade and diaphragm whereby they move together.

32. An instrument of the class described, comprising a dial, a gimbal which supports the dial, a rotatable alidade mounted on one side of the dial, a device for excluding light from a portion of the dial, mounted on the side of the dial opposite the alidade, and a connection between the alidade and said device whereby they move together.

33. An instrument of the class described, comprising inner and outer gimbals supported one from the other, a rotatably mounted alidade carried by one of the gimbals and provided with a sighting vane, a rotatable light excluding device, a dial mounted between the alidade and light excluding device and a connection between said alidade and device whereby they move together.

34. An instrument of the class described, comprising a dial, an alidade arranged on one side of the dial and provided with an open-

ing, a light intercepting device arranged on the other side of the dial and having a light-opening and means whereby the openings in the alidade and light intercepting device are caused to register with each other.

35. An instrument of the class described, comprising a dial, and an alidade and a light intercepter arranged on opposite sides of the dial and mounted to turn pivotally relatively thereto, said light intercepter having a light opening, and a connection between the alidade and light intercepter whereby they move together.

36. An instrument of the class described, comprising a dial, a rotatably mounted diaphragm mounted below the dial and having an opaque portion adapted to exclude light therefrom and an opening through which light is admitted to the dial, an alidade mounted to rotate above the diaphragm and provided with an opening which is adapted to register with the opening in the diaphragm, an index pointer in one of said openings and means whereby the openings in the alidade and diaphragm are caused to register with each other.

37. An instrument of the class described, comprising a rotatably-mounted dial, provided with a pivoting socket member, an alidade mounted above the dial and having a pivot which extends into said socket member, and a light excluding diaphragm having connection with said pivot to turn therewith, said alidade and diaphragm having registering openings.

38. An instrument of the class described, comprising a rotatably-mounted dial, provided with a pivoting socket member, an alidade mounted above the dial and having a pivot which extends into said socket member, a light excluding diaphragm having connection with said pivot to turn therewith, said alidade and diaphragm having registering openings and an index pointer in one of said openings.

39. An instrument of the class described, comprising inner and outer gimbal rings, a compass dial carried by the inner gimbal ring, and an alidade and a light excluding device mounted on opposite sides of the compass dial and provided with means whereby they turn together relatively to the latter and having registering openings.

40. An instrument of the class described, comprising inner and outer gimbal rings, the inner gimbal ring having a depending hub, a rotatable dial supported by the inner gimbal ring and provided with a socket which extends into said hub, an alidade having a pivot which extends into said socket, and a light excluding diaphragm connected with the alidade and having a light opening, said diaphragm and alidade being arranged on opposite sides of the dial.

41. An instrument of the class described, comprising inner and outer gimbal rings the inner gimbal ring having a depending hub, a pivoted dial supported by the inner gimbal ring and provided with a socket which extends into said hub, means for clamping the outer edge of the dial against rotation and to the inner gimbal ring, a pivotally mounted alidade having a socket which extends into the socket of the dial, a rod extending through the socket of the alidade, and a weight secured to the lower end of said rod.

42. An instrument of the class described, comprising inner and outer gimbal rings, the inner gimbal ring having a depending hub, a pivoted dial supported by the inner gimbal ring and provided with a socket which extends into said hub, means for clamping the outer edge of the dial against rotation and to the inner gimbal ring, a pivotally mounted alidade having a socket which extends into the socket of the dial, a rod extending through the socket of the alidade and secured thereto, a weight secured to the lower end of the rod, and a light intercepter arranged to turn on the side of the dial opposite the alidade and connected with said alidade and having a light opening.

43. An instrument of the class described, comprising a gimbal provided with a hub, a dial provided with a socket rotatably mounted in the hub, an alidade provided with a socket rotatably mounted in the dial-socket, and means adapted to secure the sockets for unitary movement, comprising a rod which extends through the alidade-socket and is provided with means for securing the sockets thereto, said rod being movable to release the sockets for relative movement of the latter.

44. An instrument of the class described, comprising a gimbal provided with a hub, a dial provided with a socket rotatably mounted in the hub, an alidade provided with a socket rotatably mounted in the dial-socket, and means adapted to secure the sockets for unitary movement, comprising a weighted rod which extends through the alidade-socket and has a pin to engage the latter and a shoulder to engage the dial-socket, said rod also provided with a clamping nut.

In testimony whereof we affix our signatures in presence of two witnesses.

JOHN M. ELLICOTT.
PHILIP FERBER.

Witnesses:
W. M. CROSE,
G. T. SMITH.