

No. 824,640.

PATENTED JUNE 26, 1906.

H. A. GADSDEN.
ARTIFICIAL HORIZON.
APPLICATION FILED OCT. 5, 1905.

2 SHEETS—SHEET 1.

Fig. 1.

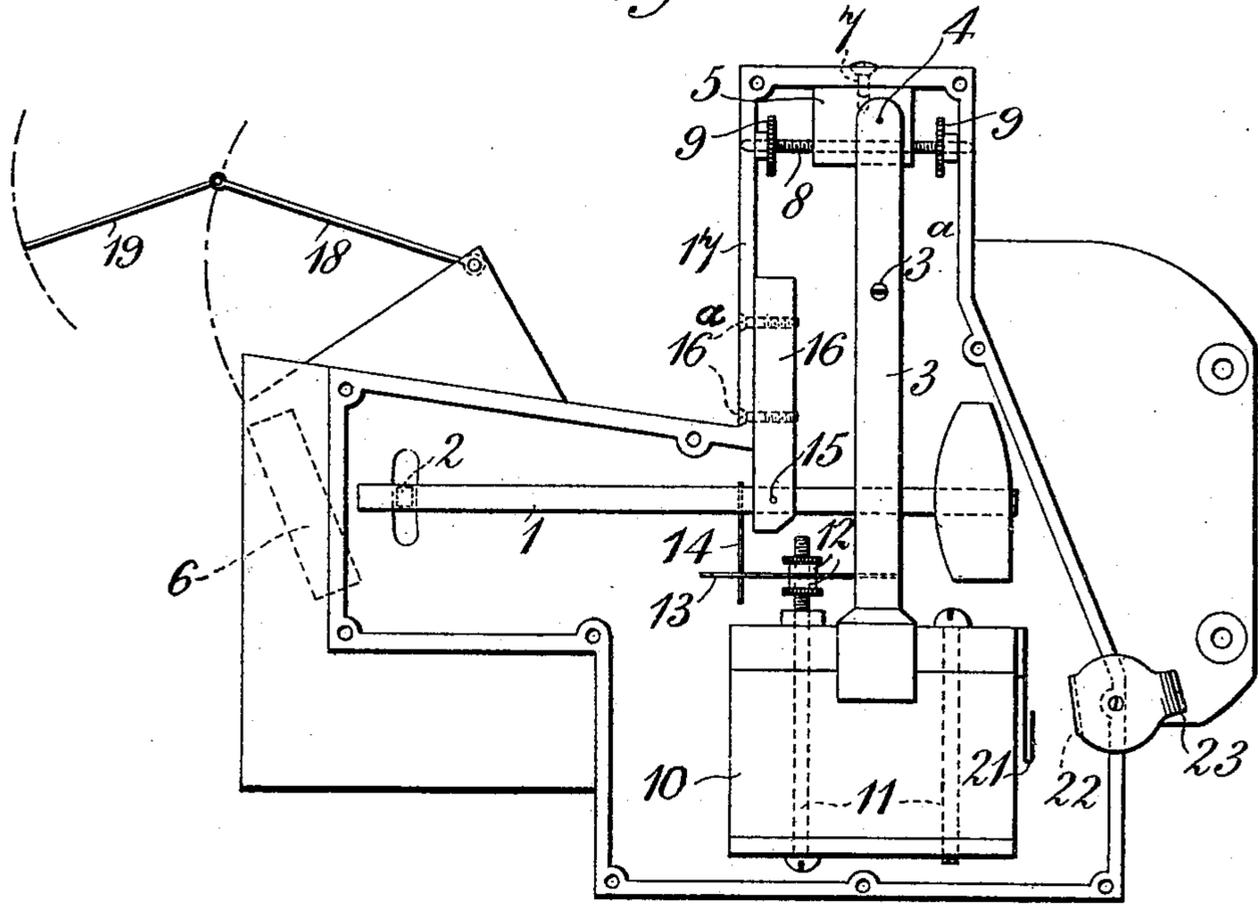
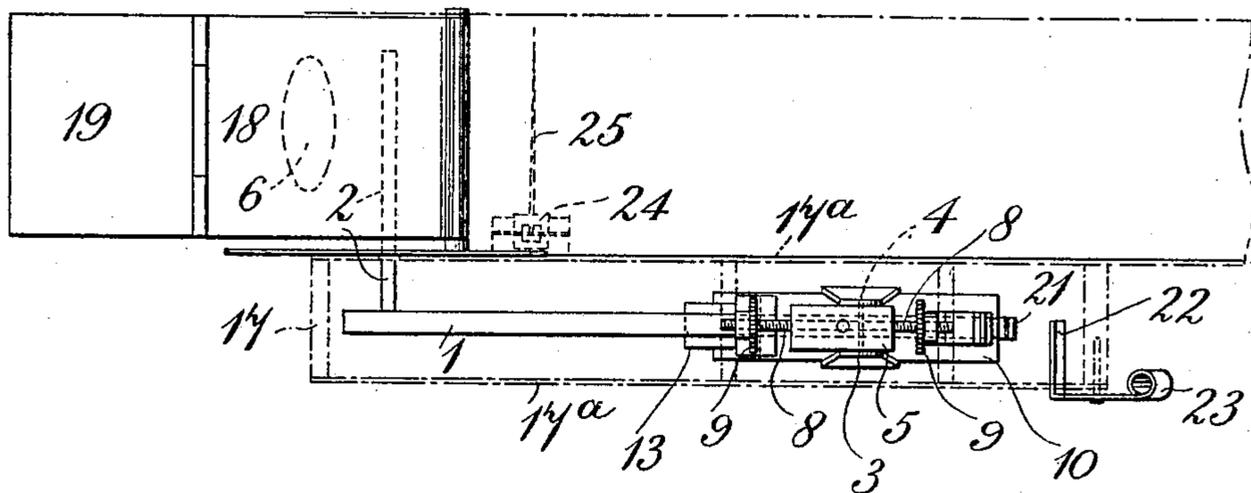


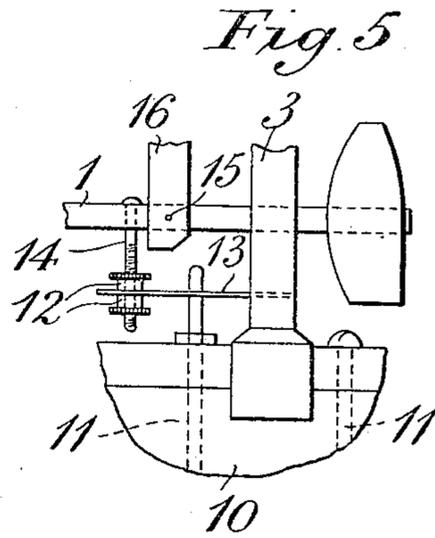
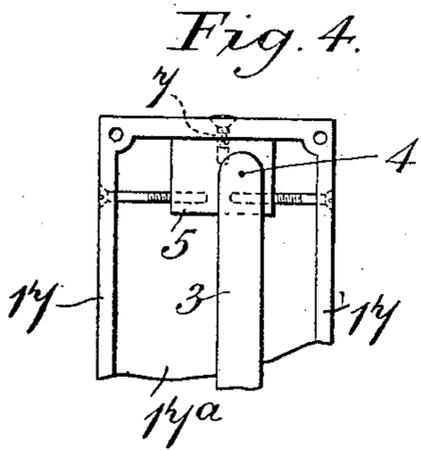
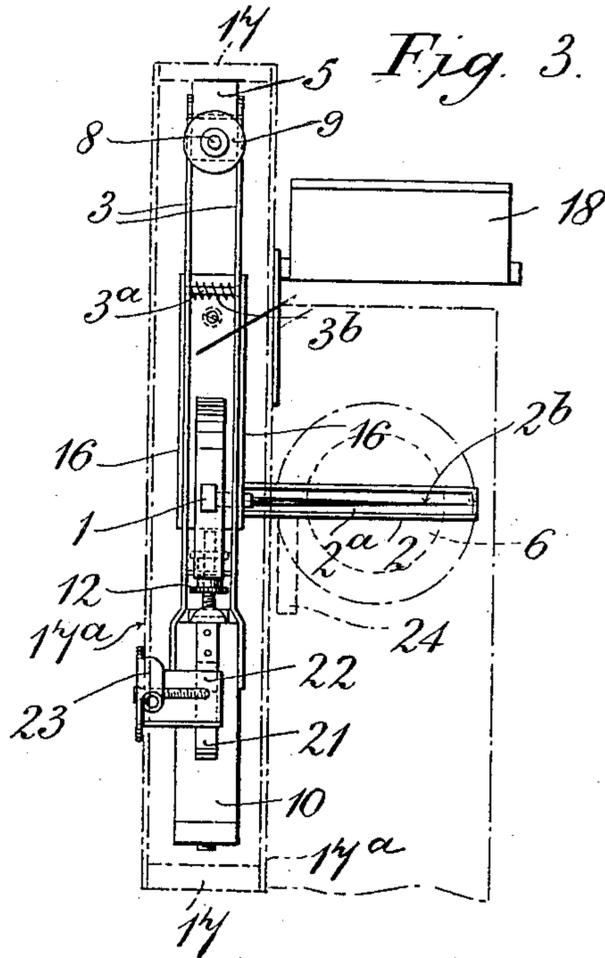
Fig. 2.



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UNITED STATES PATENT OFFICE.

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ARTIFICIAL HORIZON.

No. 824,640.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, HENRY ARTHUR GADSDEN, a citizen of the United States of America, residing at Ravenscourt Park, in the county of Middlesex, England, have invented Improvements in Artificial Horizons, of which the following is a specification.

This invention has reference to improvements in artificial horizons whereby they are rendered more convenient, also less liable to accidental or intentional derangement and to interference with their proper action by outside conditions.

The invention comprises improvements in the construction, combination, and arrangement of parts, as hereinafter described, and set forth in the claiming clauses hereof.

Referring to the accompanying drawings, Figure 1 is a side elevation of an artificial horizon embodying the present improvements, the cover-plate of the casing being removed. Fig. 2 is a plan with the casing shown in dotted lines. Fig. 3 is an end view also with the casing shown in dotted lines, and Figs. 4 and 5 are detail views illustrating modified constructions.

The apparatus comprises a pivoted balance-beam 1, which normally lies in an approximately horizontal position and is provided with a projecting pin 2 or equivalent that serves as a substitute for the natural horizon and extends horizontally across the horizon-glass of the sextant or the like instrument to which the apparatus is affixed. The beam 1 is connected to a pendulum which normally hangs vertically, so that movement of the latter about its pivot causes a corresponding movement of the beam.

According to this invention the pendulum comprises two plates 3, the upper ends of which embrace and are pivoted at 4 to a block 5, fixed to the inside of the casing by a screw 7 with a practically flat or countersunk head and passes through the casing into the block and a transverse screw 8, which does not project beyond the outer surface of the casing and which is provided with nuts 9 that can be screwed up against the inside of the casing to prevent any movement of the screw and block. This construction obviates the use of external nuts or bolt-heads, which are liable to catch in the clothes, &c., of the operator and can be readily meddled with. Instead of the screw 8 other means may be employed to hold the block 5 steady

in correct position. Thus two screws with countersunk or practically flat heads may pass through opposite sides of the casing into the block 5, as illustrated in Fig. 4.

Between the lower ends of the plates 3 is fixed a weight 10, which may conveniently consist of upper and lower brass plates and an interposed block of lead, the whole being clamped together by bolts 11, extending vertically therethrough. One of the bolts 11 extends upwardly, and its upper part is provided with a couple of adjustable nuts 12, between which is clamped a plate 13, whose free end is formed with a hole through which projects a pin 14, rigidly fixed to and depending from the balance-beam 1. This enables the amount of movement imparted to the balance-beam by a given movement of the pendulum to be readily readjusted should the parts become accidentally deranged, but cannot easily be tampered with. The arrangement, moreover, is one which permits of the casing of the instrument being shortened, which is of advantage, because with long casings it is sometimes difficult to read the markings on the arc and vernier of a small sextant. Instead of the nuts 12 and plate 13 being carried by the bolt 11 they may be carried by the pin 14, the upwardly-extending bolt 11 having a plain upper end portion which extends through a hole in the plate 13, as illustrated in Fig. 5; but this modification is not regarded as so satisfactory, as it increases the weight of the outer arm of the beam 1. Although the device is referred to and shown as a plate, obviously a suitably-bent wire might be employed, and the expression "plate" is intended to include such equivalents.

To secure greater firmness and to enable the distance between the fulcrum of the beam 1 and the pin 2 or equivalent to be increased, so as to render only a slight sway of the pendulum necessary to effect the object in view, the beam 1 is mounted upon a pivot or pin 15, carried by plates or brackets 16, that are secured by screws 16^a to the frame 17 of the casing, which frame is a rigid casting and has thin light metal cover-plates 17^a secured to it. The plates or brackets 16 are arranged so as to extend beyond the pivot 15 and prevent lateral movement of the beam 1 thereon.

To modify or prevent tremulousness of the pendulum, as may be required on ships more or less agitated by machinery in motion, the

plates 3 of the pendulum may be caused to bear with more or less pressure upon the sides of the block 5, so that the friction will reduce the quivering movements of the pendulum.

5 A screw 3^a is passed freely through a hole in one plate and is screwed into the other to enable the plates 3 to be drawn together. A spring 3^b encircles the screw and tends to spread the plates 3 apart. The pin 2 is preferably slotted, as shown, in such wise that

10 erably slotted, as shown, in such wise that the upper and lower edges or surfaces of its slot 2^a will just coincide with the highest and lowest points of the image of the sun in the horizon-glass 6—that is to say, the periphery of the image is just spanned by the

15 slotted pin. The slot may be divided longitudinally by a delicate pin or wire 2^b, secured so as to occupy the longitudinal center line of the slot, and thus provide for great accuracy in measuring, as may be required for stellar work and the determination of the altitude of other objects smaller to the sight than the image of the sun in the horizon-glass.

25 Over the horizon-glass and attached, preferably, by a bolt, which may form one of the fastenings by which the casing is secured to the sextant, is a movable roof or cover 18, adapted to prevent downdraft affecting

30 the proper position of the split pin 2 and to prevent spray or rain getting onto the pin 2, and thus affecting its balance, or onto the horizon-glass, and thus blurring the sun's image and spoiling the sharpness of its disk.

35 This roof or cover, moreover, reduces the glare of the sun. In some cases it may be provided with a sliding or hinged extension or drop-window 19, that will wholly exclude from view through the horizon-glass objects

40 on a level with the eye. The extension 19 if arranged to constitute a drop-window may be formed of talc or other suitable material that will not wholly exclude the light and can be shut up and put out of the way when the

45 natural horizon is used.

For the purpose of locking and preventing movement of the pendulum and other parts, so that the split pin 2 may be kept out of the line of sight when not required, and thus allow

50 of the use of the sextant in the ordinary way for natural horizon observations, the pendulum is provided with a rearwardly-extending hook or the like 21, and within the casing is mounted a catch 22, which also may be in the

55 form of a hook, as shown, and is operable from the exterior of the casing by means of a thumb-piece or the like 23 for the purpose of causing the catch 22 to engage with or disengage from the hook 21 or the like.

60 24 is a short pendulum arranged to swing in a plane at right angles to the plane in which the pendulum connected to the balance-beam swings and having fixed to it a needle 25, so arranged that when the sextant is vertical, as

65 it must be when measuring altitudes, the nee-

dle 25 will be in the line of sight and parallel with the slot in the pin 2.

What I claim is—

1. In an artificial horizon, the combination of a normally horizontal balance-beam, a device carried thereby and adapted to serve as an artificial horizon, a normally vertical pendulum, and a connection between said pendulum and balance-beam which is capable of adjustment along said pendulum and toward and from the beam, as set forth. 70 75

2. In an artificial horizon, the combination of a normally horizontal balance-beam, a device carried thereby and adapted to serve as an artificial horizon, a normally vertical pendulum and a connection between said pendulum and balance-beam comprising a pair of parallel pins secured respectively to said pendulum and to said beam and a plate adjustably secured to the one pin and having a hole through which the other pin freely projects, as set forth. 80 85

3. In an artificial horizon, the combination of a normally horizontal balance-beam, a device carried thereby and adapted to serve as an artificial horizon, a normally vertical pendulum and a connection between said pendulum and balance-beam comprising a downwardly-extending pin fixed to said beam, an upwardly-extending pin fixed to the pendulum, a plate formed with a hole through which said downwardly-extending pin freely projects, and means for adjustably securing said plate to said upwardly-extending pin, as set forth. 90 95 100

4. In an artificial horizon, the combination of a normally horizontal balance-beam, a device carried thereby and adapted to serve as an artificial horizon, a normally vertical pendulum and a connection between said pendulum and balance-beam comprising a downwardly-extending pin fixed to said beam, an upwardly-extending screw-threaded pin fixed to said pendulum, a plate formed with holes through which said pins respectively extend and nuts upon the upwardly-extending pin adapted to adjustably secure said plate in position thereon, as set forth. 105 110

5. In an artificial horizon, the combination of a normally horizontal balance-beam, a device carried thereby and adapted to serve as an artificial horizon, a normally vertical pendulum, a fixed pivot upon which the upper end of said pendulum is mounted, and a connection between said pendulum and balance-beam which is capable of adjustment along said pendulum and toward and from the beam, as set forth. 115 120

6. In an artificial horizon, the combination of a normally horizontal balance-beam, a device carried thereby and adapted to serve as an artificial horizon, a normally vertical pendulum comprising a weight and a pair of plates, a fixed block which is embraced by the upper ends of said plates, a pivot-pin 125 130

connecting said plates to the fixed block, means for causing said plates to bear with more or less pressure against said block, and a connection between said pendulum and balance-beam, as set forth.

7. In an artificial horizon, the combination of a normally horizontal balance-beam, a device carried thereby and adapted to serve as an artificial horizon, a normally vertical pendulum comprising a weight and a pair of plates, a fixed block which is embraced by the upper ends of said plates, a pivot-pin connecting said plates to the fixed block, a screw adapted to draw said plates together and a spring tending to spread them apart, and a connection between said pendulum and balance-beam, as set forth.

8. In an artificial horizon, the combination of a normally horizontal balance-beam, a laterally-projecting pin fixed thereto and having a slot therein whose upper and lower edges will just coincide with the highest and lowest points of the image of the sun, a wire which longitudinally bisects said slot so as to pass through the center of the sun's image when spanned by the slot, a normally vertical pendulum and a connection between said pendulum and said balance-beam, substantially as set forth.

9. In an artificial horizon, the combination of a normally horizontal, pivoted balance-beam, a normally vertical pendulum, a connection between said pendulum and said balance-beam, means for adjusting said connection, a device carried by said beam and adapted to serve as an artificial horizon, and a cover adapted to extend over and shield said device, substantially as set forth.

10. In an artificial horizon, the combination of a normally horizontal, pivoted balance-beam, a normally vertical pendulum, a connection between said pendulum and said balance-beam, means for adjusting said connection, a device carried by said beam and adapted to serve as an artificial horizon, and a cover adapted to extend over and shield said device and comprising a hinged laterally-extending plate, substantially as set forth.

11. In an artificial horizon, the combination of a normally horizontal, pivoted balance-beam, a normally vertical pendulum, a connection between said pendulum and said balance-beam, means for adjusting said connection, a device carried by said beam and adapted to serve as an artificial horizon, and a cover adapted to extend over and shield said device and comprising a hinged laterally-extending plate with a second plate movably connected thereto, substantially as set forth.

12. In an artificial horizon of the kind referred to the combination with an inclosing casing of a roof or cover adapted to extend over and shield the device serving as an arti-

ficial horizon and comprising a hinged laterally-extending plate with a second plate of translucent material and hinged to the front portion of the first-mentioned plate, as set forth.

13. In an artificial horizon, the combination of a normally horizontal balance-beam, a device carried thereby and adapted to serve as an artificial horizon, a normally vertical pendulum and a connection between said pendulum and balance-beam and means whereby said parts can be locked in an inoperative position, as set forth.

14. In an artificial horizon, the combination of a normally horizontal balance-beam, a device carried thereby and adapted to serve as an artificial horizon, a normally vertical pendulum and a connection between said pendulum and balance-beam, means whereby said parts can be locked in an inoperative position and external means for actuating said locking means as set forth.

15. In an artificial horizon, the combination of a normally horizontal balance-beam, a device carried thereby and adapted to serve as an artificial horizon, a normally vertical pendulum and a connection between said pendulum and balance-beam, a rearwardly-extending hook carried by said pendulum and a movable catch provided with external actuating means and adapted to engage said hook and lock said beam in an inoperative position, as set forth.

16. In an artificial horizon, the combination of a normally horizontal balance-beam, a device carried thereby and adapted to serve as an artificial horizon, a normally vertical pendulum, a connection between said pendulum and balance-beam which is capable of adjustment and an inclosing casing comprising a rigid frame to which are secured light cover-plates and brackets extending rearwardly from the rigid frame toward the pendulum and carrying the pivot of the balance-beam, as set forth.

17. In an artificial horizon, the combination of a normally horizontal balance-beam, a laterally-projecting pin fixed thereto and formed with a slot divided longitudinally by a central wire, a normally vertical pendulum, a connection between said pendulum and said balance-beam, a second pendulum and a needle carried thereby and adapted to swing in a plane at right angles to the first-mentioned pendulum and adapted, when the instrument is vertical, to bring the said needle into parallelism with the central wire of the slotted pin, as set forth.

18. In an artificial horizon, the combination of a normally horizontal balance-beam, a device carried thereby and adapted to serve as an artificial horizon, a normally vertical pendulum and a connection between said pendulum and balance-beam, means adapted to check agitation of said parts and means

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whereby said parts can be locked in an inoperative position, as set forth.

19. In an artificial horizon, the combination of a normally horizontal pivoted balance-beam, a device carried thereby and adapted to serve as an artificial horizon, a normally vertical pendulum, a connection between said pendulum and balance-beam,

and means for adjusting said connection, substantially as set forth.

Signed at London, England, this 5th day of September, 1905.

HENRY ARTHUR GADSDEN.

Witnesses:

H. D. JAMESON,

F. L. RAND.