April 29, 1947. G. G. ENSIGN ET AL 2,419,768

GIMBAL LOCKING MECHANISM

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Fig. 1.

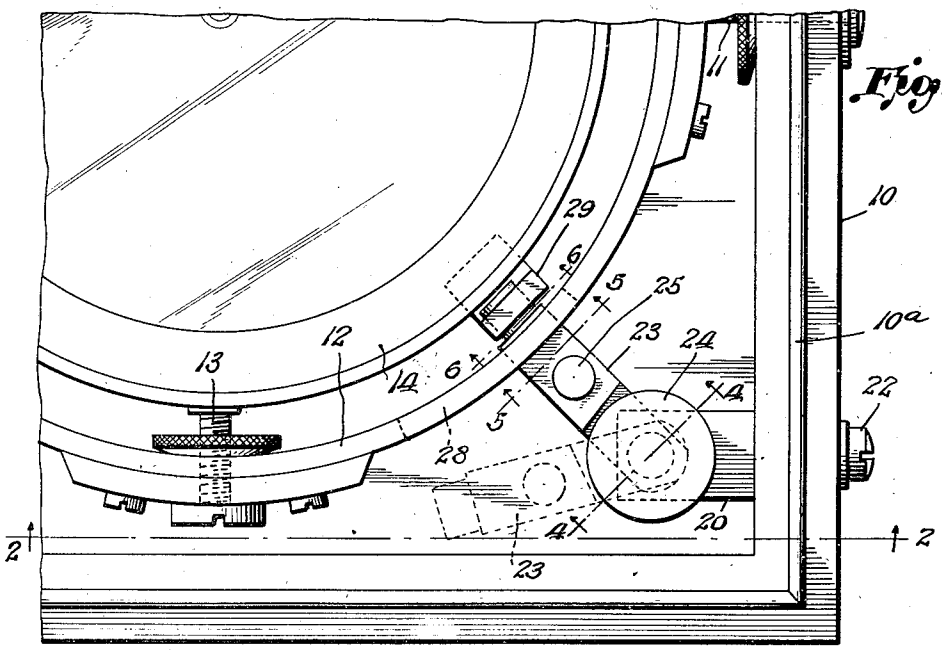
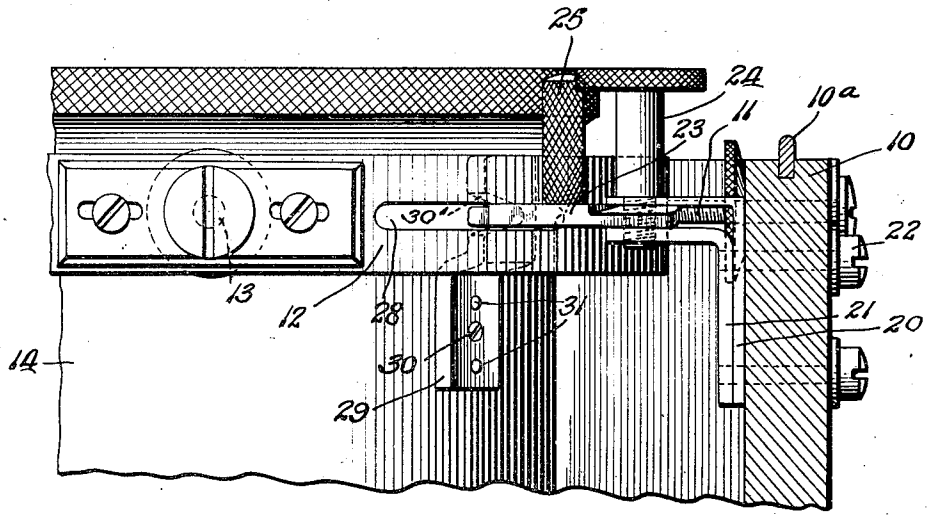


Fig. 2.



Inventors
George G. Ensign
Robert R. Lawson
Earl H. Schaefer
Wenzel M. Wochos Jr.

By

Mason, Fenwick & Lawrence,
Attorneys.

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Fig. 3.

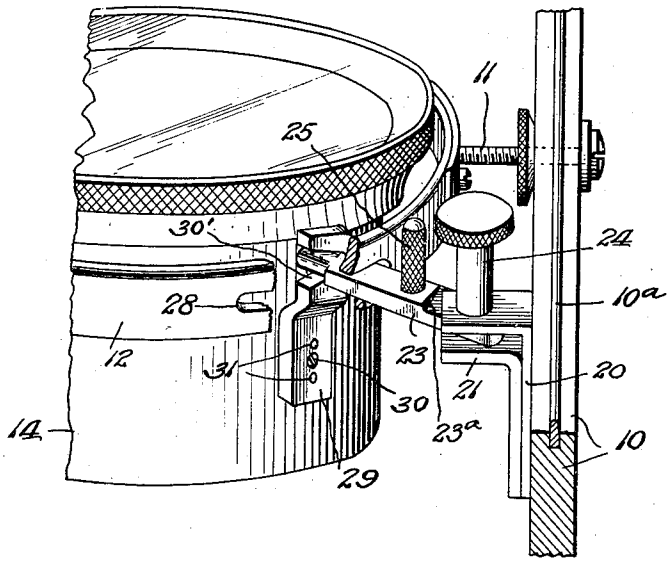


Fig. 4.

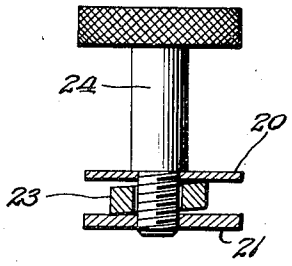


Fig. 5.

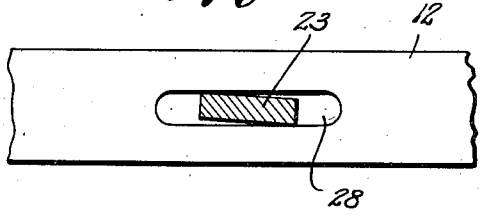
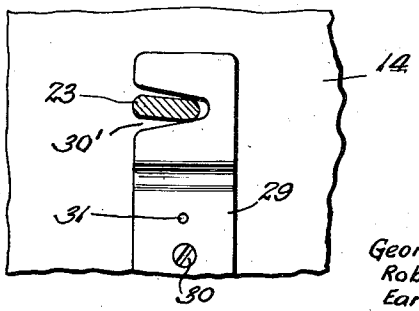


Fig. 6.



Inventors
George G. Ensign
Robert R. Lawson
Earl H Schaefer
Wenzel M. Wochos

By Mason, Fenwick & Lawrence,
Attorneys

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GIMBAL LOCKING MECHANISM

George G. Ensign, Robert R. Lawson, Earl H. Schaefer, and Wenzel M. Wochos, Jr., Elgin, Ill., assignors to Elgin National Watch Company, Elgin, Ill., a corporation of Illinois

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5 Claims. (Cl. 248—182)

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In the employment and servicing of gimbal-supported devices, it is frequently desirable to block the assembly so that no relative movement can occur. For example, marine chronometers are usually constructed as clock-works within a protective case, and this case is mounted by a gimbal in an outer housing: and in assembly, disassembling, winding and adjusting the structure, the work is facilitated by having the supporting elements immovable.

A feature of this invention is the provision of a locking mechanism which engages and locks the gimbal structures against movement.

Another feature is the provision of a simple and effective gimbal locking mechanism which is normally disposed out of position for interference with the gimbal action but which may be moved into a position in which it engages and firmly holds both gimbal ring and clockwork case against movement relative to the outer housing.

An illustrative form of practice is shown in the accompanying drawings in which

Figure 1 is a top view of a part of the housing, gimbal and case, with the locking elements in locked position.

Figure 2 is a sectional view, substantially on line 2—2 of Figure 1.

Figure 3 is a perspective view, with parts of the gimbal ring and housing broken away, to show the relative position of parts.

Figure 4 is a detail, on a larger scale, of the pivot and clamp structure, substantially on line 4—4 of Figure 1.

Figure 5 is a detail view of the locking slot in the gimbal ring, substantially on line 5—5 of Figure 1.

Figure 6 is a detail view of the locking notch on the wall of the clockwork case, substantially on line 6—6 of Figure 1.

In these drawings, the outer housing or box 10 customarily has a hinged closing cover, not shown, to engage the sealing strip 10*a* in the edge of the box 10. Within this housing are mounted two diametrically opposed pivots 11, of which one is indicated, for supporting the gimbal ring 12. This gimbal ring 12, in turn, has two pivots 13, of which one is shown, located diametrically opposite one another and at 90 degrees from the pivots 11. These pivots 13 are engaged with and support the case 14 which contains the chronometer clockwork mechanism. This arrangement provides a universally movable support for the clockwork, and the weight of depending portions of the case and clockwork, below the common plane of the axes of pivots 11, 13, causes the

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clockwork to remain essentially in gravity-induced position regardless of the movements of the housing 10 as it rests on a table or shelf of a pitching and rolling boat, for example. Such structures are well known, and are not claimed herein except as they illustratively provide parts with which the inventive structures cooperate.

According to this invention, a bracket is fixed on the inner wall of the housing 10, being composed in the illustrated form of the two angle pieces 20, 21, which are fastened to the wall by the screws 22, and are spaced apart to receive loosely between them the swinging latch bar 23 which is pivotable about the reduced lower end of a clamping screw 24. This latch screw 24 has a shoulder to engage the top surface of the thinner upper angle piece 20, and is threaded at its lower end (see Figure 4) for engaging the lower angle piece 21. The latch 23 is of oblong section and has a wind or twist (compare Figures 4, 5 and 6) with its upper and lower surfaces essentially parallel at successive cross-sections, but with these surfaces disposed at different angles to the general plane in which the latch swings, so that in locked position one edge is down and the other up at the end between the angle pieces (Figure 4) while at the other or free end the opposite condition prevails (Figures 5 and 6). The latch may be made from a rectangular piece of metal, by removing prismatic portions adjacent the clamp screw 24 for a length sufficient to clear the angle pieces 20, 21, for example as far as the shoulder 23*a* (Figure 3): and rounding the edges at the free end (Figure 6). A finger knob 25 on the latch 23 permits moving it.

The gimbal ring 12 has an aperture in the form of a slot 28 (Figure 5) of a width slightly greater than the effective thickness of the latch 23. The case 14 has a bracket 29 secured thereto by a screw 30 and accurately positioned by dowel pins 31 (Figure 6) at a point spaced peripherally from all of the pivots 11, 13. The upper end of the bracket 29 is offset outwardly (Figures 2 and 3) and has an aperture in the form of a notch 30 in its edge, this notch having its wall converging at an angle greater than the twist between the ends of the latch 23, and with a radius at its inner end which is smaller than the radius of the curved end section of the latch (Figure 6). This notch 30', the slot 28, and the space between the angle pieces 20, 21 are in alignment when the case 14 is in normal symmetrical position in the housing; thus, when the gimbal pivots are in a horizontal plane with the housing on a horizontal support,

the latch 23 swings essentially in a plane parallel to the plane of the pivots 11, 13.

When readying for use on shipboard, the latch 23 is brought into the dash-line position of Figure 1 and secured by tightening the clamp screw 24.

When it is desired to lock the gimbal suspension against movement of parts relative to the housing 10, the clamp screw 24 is released, and the latch 23 is swung about its pivot. Its end is caused to enter the slot 28, whereby a primary holding of the gimbal ring 12 occurs; and then by further movement, the rounded free end of the latch 23 is caused to enter the notch 30', and tightly engage the walls thereof whereby a detention of the case 14 occurs. The clamp screw 24 is tightened again, whereby the approach of the horizontal portions of the angle pieces 20, 21 causes the latch to rock about a longitudinal axis, in relatively clockwise direction in Figures 4, 5 and 6, so that the right hand edge in Figure 4 is depressed and the left hand edge raised. This causes a similar movement at the gimbal ring 12 (Figure 5) so that any looseness is taken up, the latch 23 engages both walls of the slot 28, and the gimbal ring 12 is solidly locked. At the bracket 29 on the case 14, the part of the rounded end of latch 23 which is engaged in the notch acts as a fulcrum or pivot for the movement about the longitudinal axis, and the original tight engagement is continued.

Unlocking of the gimbal assembly is effected by release of the clamping screw 24 and rotation of the latch 23 back into the dotted line position (Figure 1), and reclamping it therein.

The structure is simple, and has the advantage of self-adjustment and self-compensation for wear and minor inaccuracies in construction.

It is obvious that the illustrative form is not restrictive, and that the invention may be practiced in many ways within the scope of the appended claims.

We claim:

1. A lock for a gimbal suspension having an outer support, a gimbal ring pivoted on said support, and an inner member pivoted on the gimbal ring, which comprises a movable latch carried by the outer support, said ring and inner member having apertures therein spaced from the gimbal pivots for receiving the latch when in locking position, and means for holding the latch against releasing movement when in locking position.

2. A lock for a gimbal suspension having an outer support, a gimbal ring pivoted on said support, and an inner member pivoted on the gimbal ring, which comprises a swinging latch, the inner member having spaced from the gimbal pivots a notched part to receive the latch in locking position, the gimbal ring having a slot for permitting the latch to swing into engagement with the notch whereupon the walls of the slot embrace the latch and restrict movement of the gimbal ring, and means for securing the latch in locking position.

3. A lock for a gimbal suspension having an outer support, a gimbal ring pivoted on said support, and an inner member pivoted on the gimbal ring, which comprises a swinging latch of oblong section, the inner member having spaced from the gimbal pivots a notched part to receive the latch in locking position, the gimbal ring having a slot for permitting the latch to swing into engagement with the notch, whereupon the walls of the slot embrace the latch and restrict movement of the gimbal ring, and means for rocking the latch about its longitudinal axis whereby it engages said walls tightly in locking position, said means including parts for releasably maintaining the latch in its swung and rocked position of locking.

4. A lock for a gimbal suspension having an outer support, a gimbal ring pivoted on said support, and an inner member pivoted on the gimbal ring, which comprises a swinging latch of oblong section and having a rounded edge at its free end, the inner member having spaced from the gimbal pivots a notched part, the notch having convergent edges for tightly receiving the rounded edge in locking position of the latch, the gimbal ring having a slot for permitting the latch to swing into engagement with the notch whereupon the walls of the slot embrace the latch and restrict movement of the gimbal ring, and means for rocking the latch about its longitudinal axis essentially concentric with the rounded edge whereby the latch tightly engages said walls when in locking position, said means including parts for releasably maintaining the latch in its swung and rocked position of locking.

5. A lock for a gimbal suspension having an outer support, a gimbal ring pivoted on said support, and an inner member pivoted on the gimbal ring, which comprises a swinging latch of oblong section and having a rounded edge at its free end and having the parts of its faces adjacent its pivot located in planes at angles to the planes of the parts of its faces positioned adjacent the ring when in locking position, spaced pieces on the outer support between which the latch can swing loosely, the inner member having spaced from the gimbal pivots a notched part, the notch having convergent edges to receive the latch in locking position, the gimbal ring having a slot for permitting the latch to swing into engagement with the notch whereupon the walls of the slot embrace the latch and restrict movement of the gimbal ring, and a clamping screw engaged with said pieces for providing a pivot for the latch and effective upon being tightened for causing the pieces to engage said latch and produce a rocking thereof about a longitudinal axis essentially concentric with the rounded edge whereby the latch tightly engages said walls when in locking position, said clamp screw being effective when tightened to hold said latch against swinging movement.

GEORGE G. ENSIGN.
ROBERT R. LAWSON.
EARL H. SCHAEFER.
WENZEL M. WOCHOS, JR.

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