

- [54] MECHANISM FOR TIDE CLOCK
- [75] Inventor: Anselm James Leone, Quincy, Mass.
- [73] Assignee: The Bunker-Ramo Corporation,
Oak Brook, Ill.
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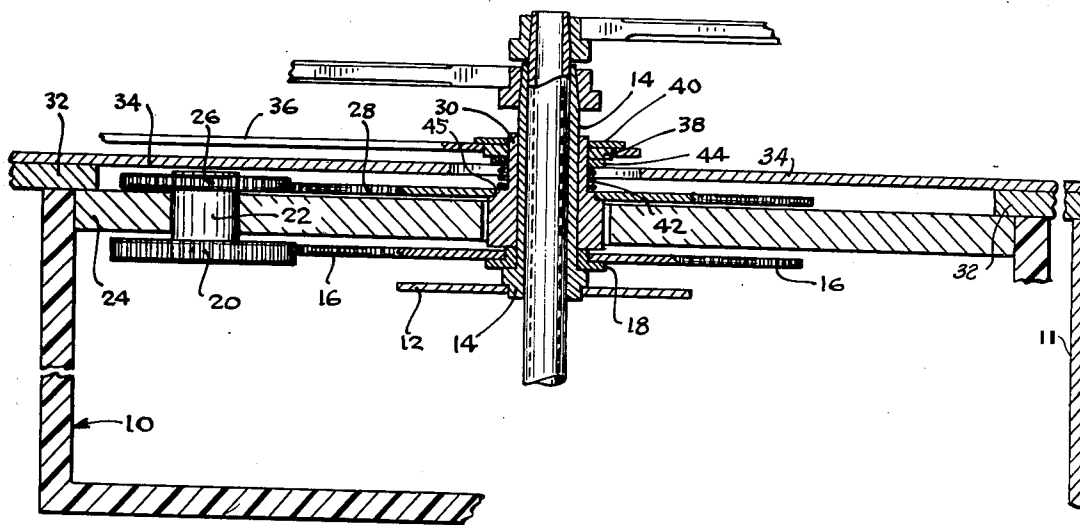
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Primary Examiner—Edith Simmons Jackmon
Attorney, Agent, or Firm—D. R. Bair; F. M. Arbuckle

[57] **ABSTRACT**

A first tide wheel is fixed to the hour hand tube of a conventional clock movement, below the fit-up cover. A first idler pinion fixed to a shaft journaled in the fit-up cover engages the first tide wheel. The pinion shaft has a second idler pinion above the fit-up cover, which engages a second tide wheel on a tide wheel bushing rotatably carried on the hour hand tube. The tide hand is frictionally carried on the tide wheel bushing so that it can be slipped for setting to correct indication. A dial is provided, on which the tide hand indicates the hours to or from high tide, low tide and mid tide.

9 Claims, 3 Drawing Figures



MECHANISM FOR TIDE CLOCK

BACKGROUND OF THE INVENTION

Those whose affairs are related in some way to tide-water may have need for an instrument which indicates the current stage of the tide cycle, and many devices have been proposed for this purpose. U.S. Pat. Nos. 2,677,928, 3,248,866, 3,524,313, 3,703,804 and 3,708,971 disclose clocks and indicators of widely varying complexity which have been devised to meet the need. In many cases it is a convenience if the tide indicator can be combined with a conventional clock, and from the standpoint of low cost, this combination is a very attractive one.

SUMMARY OF THE INVENTION

The present invention utilizes a conventional clock movement. Such movements are widely available, and may be obtained in the form known as a "fit-up", with a housing which provides dust protection. A rigid front plate, through which the tubes and shaft for the hands extend, provides a surface for attachment to a dial plate, and thus for mounting the fit-up in a clock case. The present invention can be implemented in conjunction with such a fit-up by very simple means, involving no rework of moving parts of the existing mechanism.

A first tide wheel is fixed to the hour tube, and through pinions on an idler shaft, drives a second tide wheel on a bushing which carries a "tide hand". This hand, by its position with reference to an appropriate dial, indicates the stage of the tide cycle. The dial may also carry the conventional clock figures, on which the time of day is shown by the ordinary hour and minute hands.

Thus the functions of two instruments are conveniently and compactly combined. In a boat, where instrument panel space may be limited, this can be a substantial advantage.

BRIEF DESCRIPTION OF THE DRAWING

The invention is more fully described with reference to the accompanying drawings, in which

FIG. 1 is a fragmentary cross sectional view of a clock mechanism embodying the invention, and

FIG. 2 is a front view of a dial suitable for such a clock, with a 12-hour movement;

FIG. 3 shows the front view of dial suitable for a 24-hour movement, a tide hand to hour hand ratio is approximately 1.9326.

DETAILED DESCRIPTION

FIG. 1 illustrates a way in which the invention may be embodied in an otherwise conventional clock mechanism. The fit-up, only a portion of which is illustrated, has a dust housing 10 enclosing a mechanism, not shown, which may be spring wound, synchronous motor driven, battery powered, or any other type which has an hour wheel 12 fixed to an hour tube 14 and rotating once in 12 hours or once in 24 hours. A first tide wheel 16 is fixed to the hour tube 14, preferably being mounted thereon by a bushing 18. The wheel 16 is engaged by a pinion 20 on an idler shaft 22 journaled in the fit-up cover plate 24. On the opposite side of the plate, the shaft 22 carries a pinion 26, which engages a second tide wheel 28, the latter being fixed to a tide wheel bushing 30 which is freely rotatable around the hour tube 14.

The clock may be provided with a conventional dial ring 32, mounted on the housing 10 and/or the fit-up cover plate 24, and carrying the dial 34. The entire assembly is mounted in a clock case 11.

The tide wheel bushing 30 extends through the dial, and carries the tide hand 36 on the face side of the dial. The tide hand should be mounted in a way which permits it to be easily set, and there are various well known ways of doing this. As an example, the drawing shows the hand mounted on a bushing 38 which is freely rotatable on the bushing 30, being held thereon by a retaining ring 40 press fitted on the end of bushing 30. A helical spring 42 bears against a shoulder 45 on the bushing 30, and against a washer 44 freely movable on the bushing 30. This has the result of pressing the mounting bushing 38 against the retaining ring 40, so that the tide hand normally moves with the tide wheel bushing 30, but can be easily adjusted with reference thereto for setting purposes.

The gear ratios should be such as to provide the necessary relation in the rate of movement of the hands. If one tide cycle is shown on the dial, the tide hand should rotate in about 12 hours, 25½ minutes. With a 12-hour movement a practical arrangement is obtained when the wheel 16 is provided with 86 teeth and the wheel 28 with 89 teeth. Where the idler pinions 20 and 26 have identical numbers of teeth, this gives a tide hand to hour hand ratio of 0.96629, and hence a rotation time for the tide hand of about 12 hours 25 minutes and 7 seconds.

Using an hour tube to pinion shaft center-to-center spacing of 0.9062 inches, the 86-tooth wheel 16 will have a pitch diameter of 1.3437 inches, the 89-tooth wheel 28 a pitch diameter of 1.3555 inches; the pinion 20 will have 30 teeth and a pitch diameter of 0.46875 inch, and the pinion 26, 30 teeth and a pitch diameter of 0.4569 inch. All of these can be made with 64 pitch tooling.

With a 24-hour movement, a tide hand to hour hand ratio of approximately 1.9326 is provided by appropriate gearing in a similar way.

The face of a dial 34 for the clock with a 12-hour movement is illustrated in FIG. 2. The conventional hour and minute hands, indicating a time of 10:05, are shown pointing to the usual indicia 46 on the outer periphery of the dial. Markings 48 for the high tide, low tide and mid tide points are provided in the central area of the dial, and the shorter tide hand 36 shows the status of the tide cycle as about 3½ hours past high tide.

A dial 34A for a 24-hour movement is illustrated in FIG. 3.

There is thus provided an instrument which tells at a glance the present tide status, the time to the next high tide (or to some other significant tide stage) and also gives the normal clock time, a great convenience in the making of plans or taking of action which must be based on this data.

While the arrangement shown is a preferred embodiment of the invention, it will be understood that it may be exemplified in other forms. Rather than transmit the rotary motion through the fit-up cover as shown, it is possible to mount both pinions and both tide wheels on one side or the other of the fit-up cover. The pinions themselves can be supported on some other part of the movement, instead of on the fit-up cover.

The mechanical features are such that they can be incorporated in a normal clock works with a minimum

of alteration, and in most cases using space in the structure which does not require any rearrangement of other parts. The resulting cost savings should extend the advantages of such an instrument to a much wider range of potential users than is served by devices heretofore available.

That which is claimed is:

1. A timepiece utilizing a clockwork fit-up having a 12-hour tube, and including a first gear wheel fixed to said tube, a second gear wheel rotatably carried on said tube, a pair of pinions corotatably mounted and each respectively engaging one of said wheels, the rotation rate of said second wheel being substantially 0.9663 times that of said tube, an indicator corotating with said second wheel, and a dial bearing indicia for one complete tide cycle, whereon said indicator denotes the tide stage.

2. A timepiece in accordance with claim 1, wherein said first wheel has 86 teeth, and said second wheel has 89 teeth.

3. A timepiece in accordance with claim 1, wherein said fit-up has a cover plate, said 12-hour shaft extends through the cover plate, and said pinions are mounted on said cover plate.

4. In conjunction with a 12-hour clock movement fit-up having a fit-up cover plate, and wherein the hour hand is mounted on an hour tube extending through the fit-up cover plate, the improvement consisting of an 86 tooth wheel fixed to the hour tube, an 89 tooth wheel on a bushing rotatably carried on said hour tube, a pinion shaft carried by said fit-up cover plate, a pair of pinions of like numbers of teeth, corotating on said pinion shaft and each respectively engaging one of said wheels, an indicating hand on said bushing, rotating with said 89 tooth wheel, and a dial whereon said hand indicates stages of tide, said dial bearing indicia for one tide cycle.

5. The invention as defined in claim 4, wherein said

86 tooth wheel is mounted on said hour tube beneath said fit-up cover plate and engages a first pinion on a shaft extending through said fit-up cover plate, said shaft carrying a second pinion above said fit-up cover plate which engages said 89 tooth wheel.

6. The invention as defined in claim 4, wherein said dial carries conventional 12 hour clock markings, a minute tube extends through said hour tube and carries a minute hand, and said hour tube carries an hour hand, said hour and minute hands indicating solar time on said dial.

7. The invention as defined in claim 4, wherein said hand is frictionally mounted on said bushing, to permit setting of the indication of said hand.

8. In conjunction with a clock movement fit-up having an hour tube for supporting an hour hand, and having a fit-up cover plate through which said hour tube extends, mechanism for indicating the stage of tide cycles comprising a first gear wheel fixed on said hour tube beneath said cover plate, a second gear wheel rotatably carried on said hour tube above said cover plate, a pinion shaft journaled in said cover plate, a first pinion on said shaft engaging said first wheel, a second pinion on said shaft engaging said second wheel, an indicating hand fixed with reference to and rotating with said second wheel, and a dial whereon said hand indicates stages of tide.

9. A timepiece utilizing a clockwork fit-up having a 24-hour tube, and including a first gear wheel fixed to said tube, a second gear wheel rotatably carried on said tube, a pair of pinions corotatably mounted and each respectively engaging one of said wheels, the rotation rate of said second wheel being substantially 1.9326 times that of said tube, an indicator corotating with said second wheel, and a dial bearing indicia for two complete tide cycles, whereon said indicator denotes the tide stage.

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