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Banner

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[54] **TIDE AND TIME CALCULATING DEVICE**

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[52] **U.S. Cl.** ..... **235/88,** 235/61 NV, 58/3

[51] **Int. Cl.** **G06c 3/00,** G04b 19/26

[58] **Field of Search** ..... 235/85, 88, 61 S, 61 NV; 58/3

[56] **References Cited**

UNITED STATES PATENTS

2,252,074	8/1941	Gulesian	58/3
2,284,701	6/1942	Wardenburg et al.	235/88
2,677,928	5/1954	Haynes	58/3
3,248,866	5/1966	Spilhaus	58/3
3,524,313	8/1970	Wood	58/3
3,703,804	11/1972	Appelberg	58/3
3,708,971	1/1973	Wlodyka	58/3

FOREIGN PATENTS OR APPLICATIONS

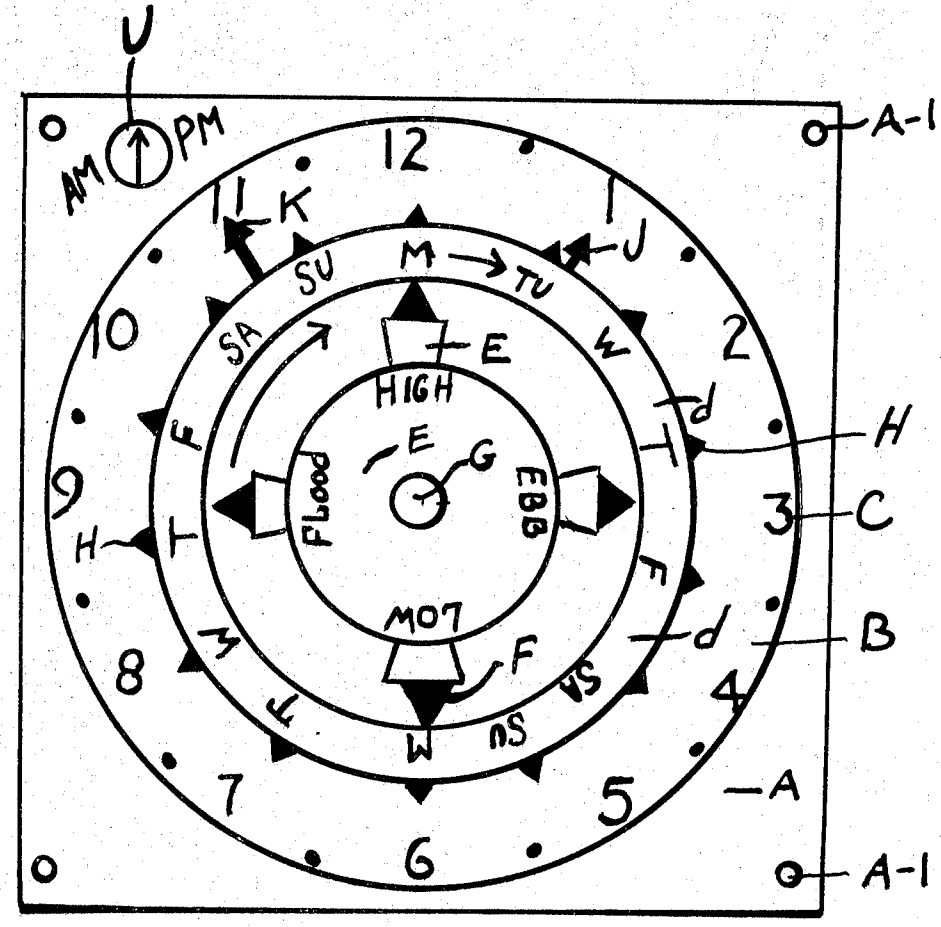
283,127	9/1952	Switzerland	58/3

Primary Examiner—Stephen J. Tomsky

[57] **ABSTRACT**

A time and tide calculating device that registers the tides and time of the tides, comprising a base having a standard time dial face imprinted upon same and a rotatable concentric tide calandar dial member, associated with said time dial and base peripherally adjacent and for indicative registration with the calibrations of said time dial. Another smaller tide selector dial concentric and rotatable independently to the other dial members and base, having exact tide definitions and markings with arrows settable to the calandar dial below it, so that the tide and time values can be pre-set upon a calculator or time piece so as to render this important information, necessary to all navigation.

5 Claims, 4 Drawing Figures



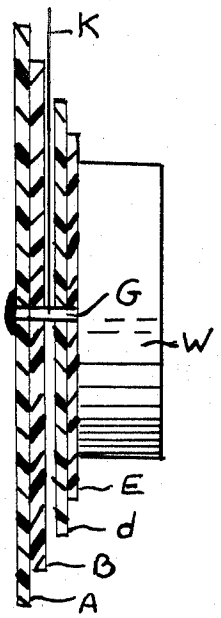


FIG-3

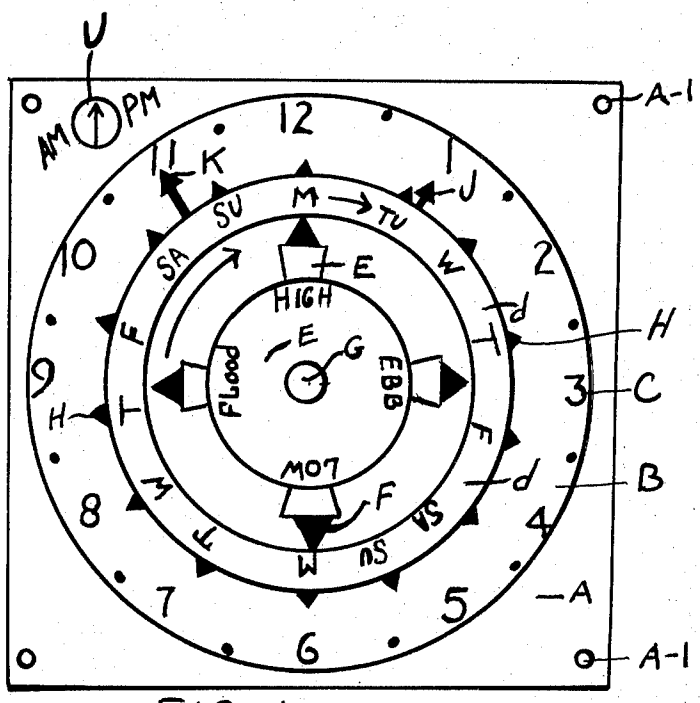


FIG-1

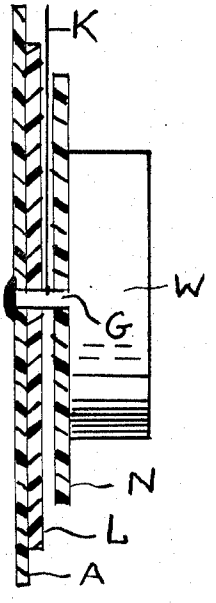


FIG-4

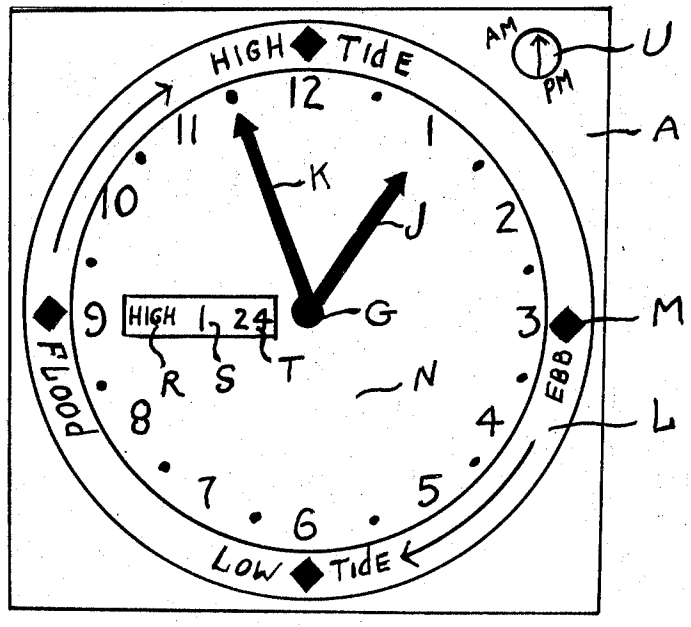


FIG-2

TIDE AND TIME CALCULATING DEVICE

This invention relates to register type of devices wherein this invention, a time and tide calculating device is useful to all who navigate at sea, or to anyone that works around the water or has a boat, or further, a fisherman desiring to keep track of the tides. This invention would be employable in actual navigation or in the preparation thereof, providing a new navigation assist to professionals and amateurs in various forms. It has been designed to facilitate rapid reading of important information relative to all marine navigation and assisting with various teaching methods. Very often, the operation of a small-boat or a ship in too shallow waters is unsafe and could have been avoided if the navigator had specific knowledge of the tidal information attendant to that area on a chart, or merely looking at the tide disc in this invention will give him the much needed tide information, for fast decisions. The tremendously increasing traffic of small-craft in inland waters is an excellent example of tides causing unsafe conditions, wherein the lower tides make some areas un-navigatable and are responsible for a major part of the accidents that occur in all our waters. With a proper tide, a small craft could safely proceed accross fairly shallow water, taking advantage of the higher water table due to the state of the tide. This invention will save equipment damages that are responsible for increasing insurance costs and also serve the safety factor in preventing unnecessary accidents caused by not having this tide information. One glance at a tide and time calculating device will give the exact tide and other tide data such as may be needed by the navigator. It will show the sequence of high tide, ebb current, low tide or flood tide and the corresponding time it will occur. The attached drawings shows two models employing the tide and time calculating device, one that is manually settable to the calendar days of a week or more and having visible marking showing the state of the tide on subsequent days without having to move the discs, and another model having an automatic means of continuing the operation of the invention, giving compensated time and tide information for as long as there is power means used to operate said invention. This invention does not claim said power means to operate either of the examples shown in the illustration and intends to use said power means where ever applicable for the reasonable use of this invention. in interchangeable apparent arrangements. This would provide automatic compensation for the 50 minute time differential in the tides each day of the year, that is caused by the difference in time it takes the moon to rotate on its axis around the earth which is 24 hours and 50 minutes. The tides is the periodic fall and rise of all ocean waters, including those of the open sea, gulfs and bays, resulting from the gravitational attraction of the moon and the sun upon the water, and upon the earth itself. The moon being much nearer to the earth than the sun, is the principle cause of the tides. When directly over a given point on the surface of the earth it exerts a powerful pull upon the water, which therefore rises above its normal level. Low and high tide waters alternate in a continuous cycle, and at most shores throughout the world there occurs two high waters and two low waters every lunar day, the average length of a lunar day being 24 hours and fifty minutes and twenty eight seconds. In confined areas a tidal current flows for about six hours and 12 minutes in an upstream or shoreline direction, corresponding to high water. It then reverses and flows for approximately the same time in the opposite direction, corresponding to low water. During the period of reversal, the water is characterized by a state of rest or calm known as slack water. A current flowing towards the shore or upstream is called flood current and that flowing in a direction away from land or downstream is known as ebb current.

The apparent phenomenon is inseparately important in navigation and to boat operators desirous of having this information for leisure or work, or for purely informative reasons. This invention will eliminate the last minute crisis, affording the navigator factual reliable data concerning his safety, allowing more time for attention to other responsibilities. The change of the tides and time of the tides each day necessitate the practicability of this invention that can be used with a degree of proficiency and advantage by all kinds of people, not requiring any special skills. Tide charts or other former art devices do not propose the advantages of this invention shown in the drawings and further explained in the specification and claims.

One object of the invention is to provide an instrument for converting one scale of measurement to another, particularly time and tides.

Another object of the invention is to provide a time and tide measuring instrument of simple, inexpensive and durable construction, particularly adapted to give the corresponding tide by a glance at a watch dial, and a tide disc.

Another object of the invention is to provide a time and tide device that would operate a manually operated calandar disc member with settable readings on the tide disc, having pointers showing the day and the tide, for a specified continuous period of calandar days as may be required, and resettable again for the same periods thereafter in registration with a manually settable clock or motorized means which may be any well known type of wound spring or electric means.

Another object of the invention is to provide a tide and time device that is adaptable to power motorized form wherein the tide differential is compensated within the clock or watch, being self adjusting for the time difference that is adaptable to standard clocks or hand watches.

Still another object of the invention is to provide a time and tide device that may be used on other means, in any other form that incorporates this new invention whether placed upon a base, or made on clocks and watches.

Other objects and advatages will be apparent from the following description, and it will be understood that changes in the specific structure shown and described may be made within the scope of the claims without departing from the spirit of the invention. Since the details of a clock movement are not a part of this invention and not in the claims, details of the clock movement are not referred to, except generally.

Referring more particularly to the accompanying drawings in which corresponding parts are indicated by similar reference characters;

FIG. 1 is a top plan view of the invention.

FIG. 2 is a plan view of a slightly modified form of device embodying the invention.

FIG. 3 is a side view of the invention shown in FIG. 1.

FIG. 4 is a side view of the invention shown in FIG. 2.

Briefly stated, the tide and time calculating device shown in FIG. 1 comprises a base A having a clock face scale B imprinted upon it having two hands J & K showing the hour and the minutes, movable by manual operation or by motorized means such as any well known type of wound spring or electric means. In the case of manual movement, the operator would place the exact time of his watch on this base A, turning the next corresponding disc to the correct tide, in that specific location and at that moment gives you a seven or more day recording of time and tides by merely turning the tide disc E each day to the proper corresponding day next to the arrow on the on the calendar disc D. Monthly calendar discs could be provided to show continuous time or tidal information. In FIG. 1 the base A is shown having mounting holes A–1, a clock disc B, with numerals C, also showing the calendar disc D, showing two weeks of days for high tides with reciprocals showing the corresponding low tides and other tidal information for that same day. The tide disc E has pointing arrows F, and shows the center pivot holding means G holding all the concentric parts of this invention together. The calendar disc D shows the daily pointing arrows H opposite the corresponding time C. the hourly clock hand J and the minute clock hand K demonstrate the example of time on the illustrated drawing; time 12;55, the day Monday and the tide high because the arrow is pointing to Monday and 12. You will note the reciprocal of high, showing the next low or other tides opposite the other arrows, each having a significant value of 50 minutes each day corresponding to the position of the tides on succeeding days. The AM or PM factor is served, shown as U, registers the starting position correctly, orientating the start to AM or PM for visual analysis, possibly saving a 12 hour error in calculation. When the tide, calandar and clock are in registration tidal information in the form of time and tide happenings are resultant. The motorized version W of FIG. 1 would be to operate the clock part, turning the hands J & K so that constant tidal information becomes automatic by viewing the position of the state of the tide, the calandar day and viewing the position of the arrow showing when, at what time the desired tide will occur. The calendar disc serves as a register of the days, weeks, months of the year. By placing numbered days on this disc it would then, in that illustration, provide a monthly control of time and tide information wherein each day is separated by approximately 50 minutes allowing for daily time differentials. In this instance the tide disc could be turned to any day of the month to review the expected tides for any one day or days.

FIG. 2 also has a base plate A with mounting holes A–1, having a tide reference disc L with marking arrows M to be placed at the corresponding time and tide. The clock face is shown N and the clock numbers as C, the clock hands J & K and holding pivot means G. The readout data for exact tide R and a calendar clock readout T showing the day of the month. It's apparent that this can be made in a form adaptable to wrist watches as well as a separate instrument device as shown. The operation of this modification is simplified to the user, the date T is first set on the watch calendar in the readout cutout R that is calibrated to adjust for the delay period each day on tides previously explained in the specifications. Then the user sets the tide disc L to what ever the readout shows, this will automatically correlate the indexing of correct tide information to the whole clock. Once the disc L has been set the evaluation for the tides on that day is apparent. Manual or motorized means of turning the tide reference disc L obviously will give tide information for that day manually, or for continuous days continuously when motorized, moving 50 minutes per day for correct calculation. The viewing cutout could also show other secondary readings S which will record where necessary the inbetween graduations between the different tides. The AM and PM control U is shown as having an indicator pointer movable to either side. In the motorized for an AM PM control would move from one position to another according to the proper time of day.

FIG. 3 shows a side view of FIG. 1, showing parts; base A, time disc B, date disc D, tide disc E respectively with clock hands J & K and AM PM indicator U, motor means W and center pivot holding means G.

FIG. 4 shows a side view of FIG. 2, showing base A, tide disc L, time disc N, a common centering device G, and motor means W.

The employment of motorized means W to operate this invention illustrated in FIGS. 1 & 2 would accomplish a variety of advantages in giving tide and time information. Apparently, it is obvious that when FIG. 1 is motorized, the movement of the clock hands will register the time in coordination with the state of the tide. Further, the illustration shown in FIG. 1 would be read as follows; 5 minutes to 1, high tide occurs at 12 oclock on Monday, PM. The arrow on Tuesday is placed at a 50 minute interval, therefore, high tide on Tuesday will occur at approximately 12;50 PM..

FIG. 2 presents a different arrangement, which is intended to work manually or automatically in the following manner. In the manual application a clock movement provides the motorized means to turn the clock hands and operate the movement of the information in the viewing cutout having the state of the tide, the time and the day. The user would set the tide disc L to the corresponding information in the cutout and therefore have tidal information for that date. In the manual operation the AM PM indicator is moved manually. In the fully motorized means the tide disc L moves 50 minutes each day, advancing to a given point as shown on FIG. 1 and giving constant tide information daily. Therefore, FIG. 2 responsibly shows a tide date calendar, a running time account, a movable tide disc relating to the various state of the tides and being in registration with tide and time to render economical efficient means of producing same. FIG. 2 was also pictured having the combination of advantages shown in FIG. 1. The placement of the calendar disc of FIG. 1 showing calendar days or dates on FIG. 2 obviously indexes the tide and calendar disc to great advantage, as intended. This combination would allow the device of FIG. 2 to show calendar days or dates in combination with a tide disc and a clock movement means that also has tide and date readout capability. Such would be turned by an ordinary clock gear movement means showing the time and date of the high tide. In this application of an automatic movement of the tide disc it will provide optimum utility wherein each day it moves to the next corresponding position, showing the state of the tide for that entire date. The combination of a tide disc, a clock face having 12 numerals upon it, an AM

PM disc, digital readout capability and motorized means brings together a time tide calculating device providing a means of safety to users.

It is important to note that in FIG. **1**, in this invention, the **12** hour clock dial represents a calculation of 720 minutes wherein if **13** days as illustrated in FIG. **1** was employed, each day would have a value of approximately 51 minutes instead of the usual 50 minutes. If desired, it could be made to precisely show 50 minutes a day for 14 days and having a fraction remaining. However, in the 14 day illustration it would be rather simple to make an adjustment at any time and therefore presents a time and tide device having continuous information that could continue to operate infinitely, giving tidal time of occurrence. The non-uniformity of tides dictates the necessity for tide adjustments proved by the following information.

The evidence of difficulty in daily tide conditions occurs because the hours at which high tide and low tide occur are constantly changing, and the tide intervals are entirely non-uniform. The following tide chart information illustrates an example of the variables I mentioned, that applies to tide table east coast, for the Town of Oyster Bay South Shore Beaches.

Example Fishing and Boating Months 1972

Date	MAY		JULY		SEPT	
1.	10;13 pm	Min.	11;49 pm	Min.	2;39 pm	Min.
2.	10;50	37	12;23	34	3;50	71
3.	11;35	45	1;18	55	4;59	69
4.	12;11	36	2;14	56	5;57	58
5.	1;04	53	3;15	61	6;45	48
6.	2;04	60	4;20	65	7;31	46
7.	3;07	63	5;24	64	8;11	40
8.	4;10	63	6;22	58	8;49	38
9.	5;11	61	7;16	54	9;36	47
10.	5;15	4	8;04	50	10.00	24

This is a cross section of 3 months in 1972 and the tide calendar is attached to this application, providing the source of information. These irregularities are representative of the variables referred to wherein a tide and time device is needed that has adjustable features to adjust the time factor as noted in the chart. Tide devices not associated with time are valueless because the state of the tide and the exact time of occurence are relative facts that govern this informations accuracy. As shown, the average for May 1972 is 42.2 minutes of change per day; for July 49.7 minutes per day; for September **44.1** minutes per day. The existence of these irregularities and low water problems in inland water travel makes it imperative that a navigator of a boat or a ship have a reliable means of determining the tidal information in relation to the time of day or night, allowing maximum safety to life and property. The present invention in watch form referred to in the early part of the specification is needed by fishermen as well as boatmen, navigators and shore dwellers.

From the foregoing description of the invention, it will be apparent that a time and tide calculating device having unique characteristics is provided. Accordingly, the foregoing embodiment is to be considered illustrative rather than restrictive of the invention & those modifications which come within the meaning are included therein.

What I claim is:

1. A time and tide indicating device of the character described, comprising a base member with a twelve numeral clock face, movable hour and minute hands associated therewith, a movable calendar disc associated therewith and having intervally spaced markers extending about the periphery and said markers spaced apart at approximately 50 minute intervals, a movable tide disc associated therewith and having four spaced markers and a movable AM PM disc associated therewith having an indicating pointer.

2. A time and tide indicating device as in claim **1** having a motor to drive said hour and minute hands.

3. A time and tide indicating device as in claim **1** wherein said movable calendar disc is operated manually.

4. A time and tide indicating device as in claim **1** wherein said tide disc is operated manually.

5. A time and tide indicating device as in claim **1** wherein said AM PM disc and said pointer is operated manually.

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