Oct. 23, 1934. R. STAR 1,978,331

SHIP'S LOG

Filed March 9, 1933 2 Sheets-Sheet 1

Fig. 1.

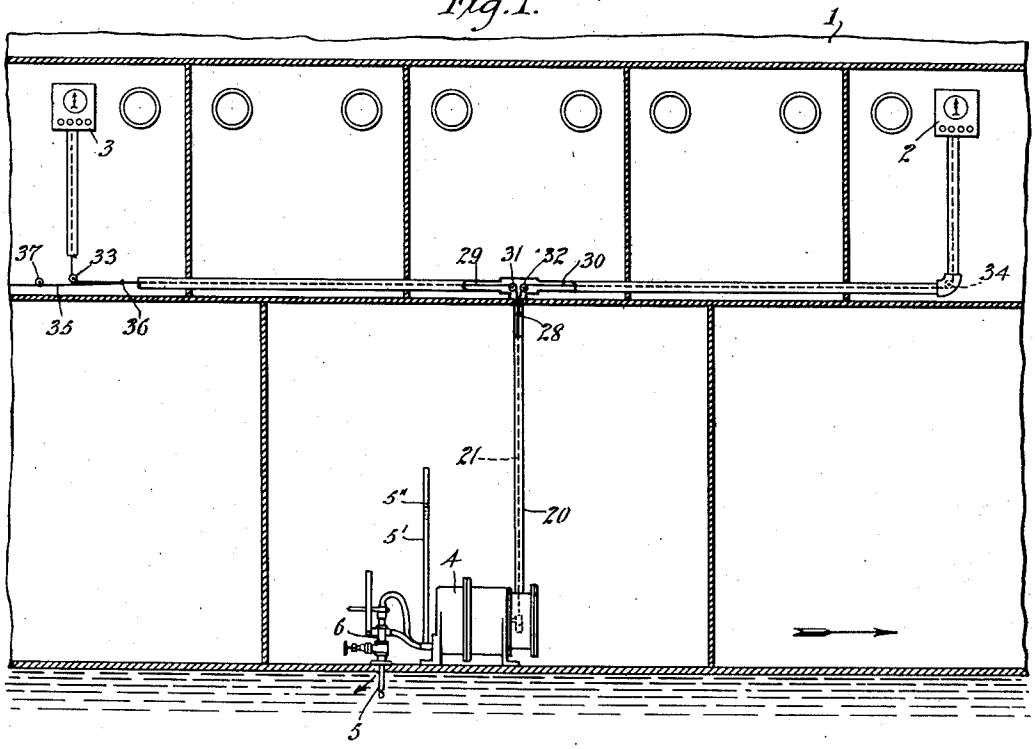



Fig. 2.

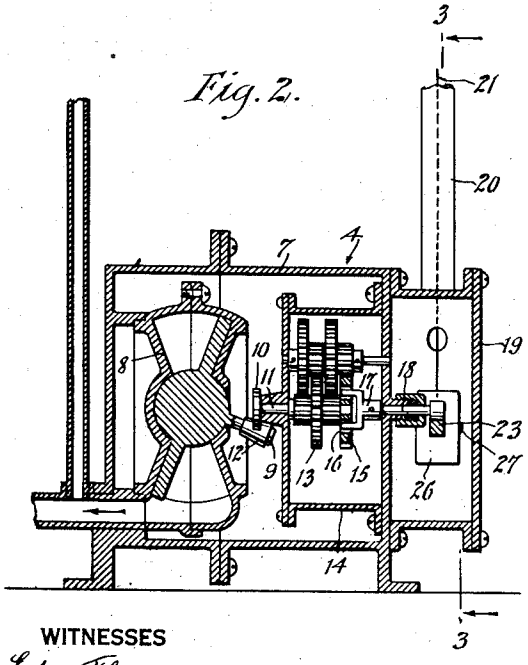
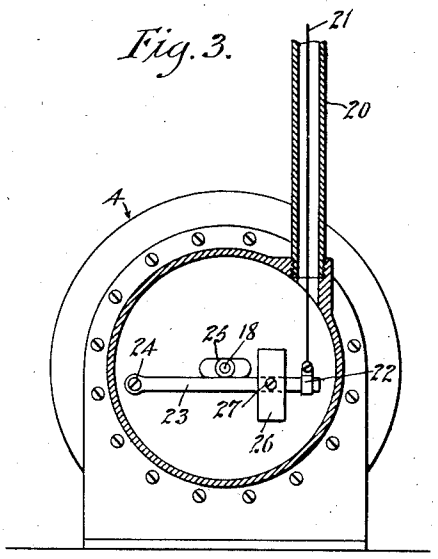



Fig. 3.




WITNESSES

Edw. Thorpe

A. L. Kitchin.

INVENTOR

Richard Star

BY

Munn, Anderson, Stanley, Foster & Liddy.

ATTORNEY

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Fig. 4.

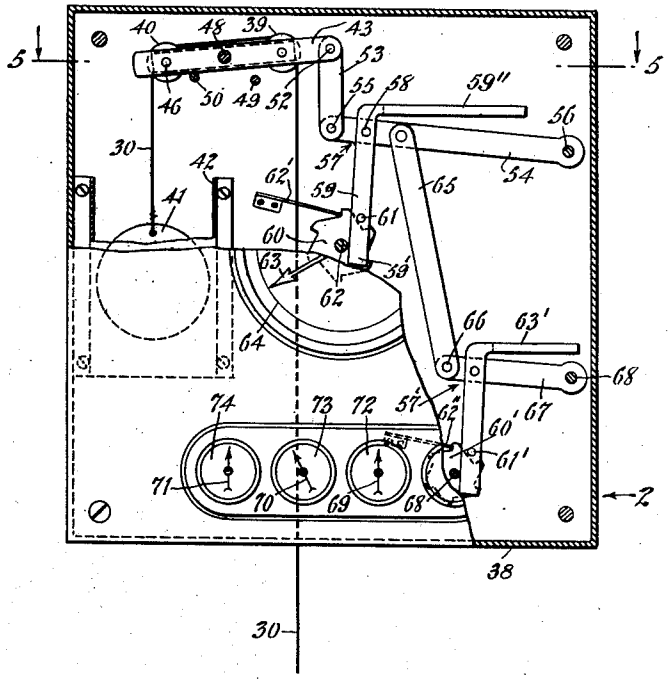
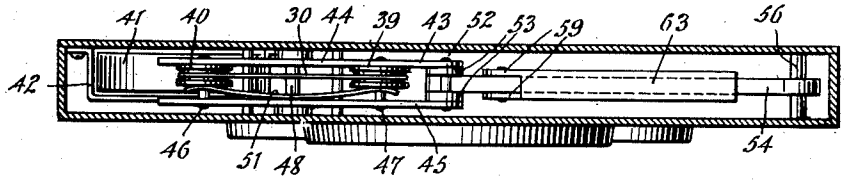



Fig. 5.




WITNESSES

Edw. Thorpe.

A. L. Ritchie

INVENTOR

Richard Star.

BY

Munn, Anderson, Stanley, Foster & Liddy

ATTORNEY

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# UNITED STATES PATENT OFFICE

1,978,331

## SHIP'S LOG

Richard Star, Brooklyn, N. Y.; Frank Kruth administrator of said Richard Star, deceased

Application March 9, 1933, Serial No. 660,177

10 Claims. (Cl. 73—122)

This invention relates to logs for ships and has for an object to provide an improved construction wherein one or more indicators may be used and placed at any desired point on the ship.

Another object of the invention is to provide an improved log for ships wherein an actuator is provided and arranged at the lower part of the ship but formed to actuate the indicators at various points over the ship.

A further object of the invention, more particularly, is the provision of a log for ships wherein there is provided an actuator receiving its power through the use of a Pitot tube, and a motor driven by water forced through the Pitot tube as the ship on which the log is positioned moves along.

An additional object is to provide a ship's log with a mechanical transmitting device between the actuator and the indicator, the arrangement being such that any expansion or contraction will be automatically taken up so that the indicator will be caused to function correctly and in unison with the actuator.

In the accompanying drawings—

Figure 1 is a vertical sectional view through part of a ship showing the general arrangement of the log including the actuator, indicators and power transmitting means;

Figure 2 is a longitudinal, vertical, sectional view through the actuator shown in Figure 1, the same being on a large scale;

Figure 3 is a sectional view through Figure 2 on the line 3—3;

Figure 4 is a view partly in section and partly in elevation showing one of the indicators illustrated in Figure 1, the same being on an enlarged scale;

Figure 5 is a sectional view through Figure 4 approximately on the line 5—5.

Referring to the accompanying drawings by numerals, 1 indicates a ship of any kind on which is arranged one or more indicators, for instance, indicators 2 and 3. Arranged adjacent the bottom of the ship is an actuator 4 which is provided with a Pitot tube 5 whereby water is forced upwardly into the actuator as the ship moves forward. The exhaust water from the actuator 4 passes downwardly and out through pipe 6 which surrounds the tube 5 but is larger than the same so that there will be ample space for the exhaust water to pass to a point exterior of the ship. As the ship moves forward water enters the Pitot tube and passes upwardly and through the actuator 4 and then downwardly through pipe 6 into the body of water supporting the ship. As indicated in Fig. 1, there is a standpipe 5' which acts as a vent, the level of water being shown at 5''. As the water passes out of actuator 4 the air may readily pass upwardly through pipe 5' and be exhausted therefrom.

The actuator is shown more or less in detail in Figs. 2 and 3 to which references are now made. As illustrated particularly in Figure 2, there is provided a housing 7 secured in any desired manner to the bottom of the ship or to some support on the ship whereby it will be rigid with the ship. Arranged in the housing 7 is a water motor 8 which is shown as being of the wabbling type, though an oscillating piston type or other type of motor may be used without departing from the spirit of the invention. The wabbling type of motor is shown in Figure 2 and has been found to be very desirable as it will function either with a small head of water or with a great head of water and will move in proportion to the head of water used. As the motor 8 functions the arm 9 will swing around in a circle and will carry with it the arm 10 which is rigidly secured to shaft 11. A roller 12 is rotatably mounted on arm 9 so as to reduce friction between the parts. Shaft 11 will rotate therefore at the same speed as motor 8. This shaft is connected to a train of gearing 13 arranged in the auxiliary housing 14, said train of gearing reducing the speed but naturally increasing the power so that the gear wheel 15 will rotate at a less speed than shaft 11. This gear wheel has a pair of apertures 16 into which the forked member 17 extends. It will be noted that the apertures 16 are larger than the forks of the forked member 16 whereby there is a slight loose motion between the parts. This is desirable because it does not necessitate all the parts being accurately mounted, while at the same time it permits power to be transmitted readily to shaft 18 to which the bifurcated member 17 is rigidly secured by a rivet or other means. Shaft 18 extends into an auxiliary housing 19, said auxiliary housing accommodating the lower end of pipe 20 so that the wire cable or other member 21 may extend in a vertical direction. The lower end of cable 21 is secured by a suitable fitting 22 rigidly to the arm 23, which arm is pivotally mounted at 24 on a suitable support, as, for instance, on casing 7. Shaft 18 has rigidly secured thereto a double armed cam 25 which is shown as lying flatwise against the swinging arm 23. A weight 26 is slidingly mounted on arm 23, said weight being locked in different positions by the set screw 27. This weight functions to maintain a pull or strain on cable 21 and connected parts so that it will

only be necessary to put a small additional pull on the cable by the cam 25 in order to move the cable and operate the different indicators.

When the parts are in proper functioning position, arm 23 is continually resting against the cam 25 so that as this cam moves the arm will be swung. For instance, when the cam moves from the position shown in Figure 3 to a position at 90° therefrom, arm 23 will be moved downward to its extreme lower position. A further movement of 90° will bring cam 25 to the position shown in Figure 3 and arm 23 will automatically move back to the position shown in Figure 3.

It will thus be seen that for each revolution of shaft 18, arm 23 will move downwardly and back twice. The ratio between the rotation of shaft 11 and shaft 18 may be any desired ratio, but preferably shaft 18 rotates very much slower than shaft 11. For instance, it may rotate four or five times per minute, while shaft 11 may rotate fifty to one hundred times per minute. As the ship 1 moves forwardly the motor 8 will begin to function as long as the ship is in motion. This will cause shaft 18 and cam 25 to move continually and, therefore, continually actuate arm 23.

The cable 21 extends upwardly to a point approximately at 28, where the auxiliary cables 29 and 30 are connected thereto. These auxiliary cables extend upwardly and over the pulleys 31 and 32, and from thence over pulleys 33 and 34. Cable 30 extends from pulley 34 to the indicator 2, while cable 29 extends from pulley 33 to the indicator 3.

If additional indicators are desired, any desired number of cables may be connected with cables 29 and 30, as, for instance, cable 35 is shown in Figure 1 as being connected to cable 29 at 36 and extends over pulley 37. Cable 35 can be connected to an indicator shown as indicator 3 and, if desired, additional cables can be connected with cable 35, so that any desired number of indicators may be used and may be placed at various points over the ship. All these cables are continually under tension so that even the slightest movement of arm 23 will produce a corresponding movement in the various cables and the various indicators. As illustrated in Figure 1, the various cables are incased in suitable housings such as ordinary pipes, whereby they are prevented from sagging or accidental injury.

As all of the indicators are of identical construction, a description of indicator 2 will apply to all the other indicators. Indicator 2 is shown in detail in Figures 4 and 5 wherein the cable 30 is shown as extending upwardly into the casing 38 and over pulleys 39 and 40, whereby the weight 41 may be secured to the end thereof and be actuated properly by gravity to maintain cable 30 under tension. As is well known, ships will roll as they pass along over the ocean and sometimes they will toss. To prevent any appreciable swinging movement of the weight 41 a guiding structure 42 is provided whereby appreciable swinging is prevented but the weight is permitted ready up-and-down movement at all times. To take care of contraction and expansion of the cable 30 and certain other things, pulleys 39 and 40 are mounted on a frame 43, which frame is shown in Figure 5 as formed from side members 44 and 45 carrying rivets 46 and 47 which act as pivotal pins for the pulleys 39 and 40. A journal shaft or pin 48 extends through the frame 43 and is supported by a casing 38 in any desired manner. The shaft 48 is preferably midway between pulleys 39 and 40 whereby an even balance is secured. Pins 49 and 50 are also carried by the casing 38 and act to limit the swinging movement of the frame 43, though they do not in any way affect the rotary movement of the pulleys 39 and 40. However, a spring 51 is mounted on shaft 48 and extends to a position for pressing against the sides of pulleys 39 and 40, as shown in Fig. 5, whereby these pulleys are pressed against bar 44, thus producing a desired friction. For instance, when the parts are as shown in Figure 4, and wire 30 is pulled downwardly the friction holding pulleys 39 and 40 is such that they will not at first be rotated but will remain stationary in respect to the frame 43, but this frame will swing downwardly until it strikes pin 49. If there is any further movement of the cable 30, the pulleys will then begin to rotate and the weight 41 will be raised. When cable 30 is attempting to give slack, a reverse action takes place, namely, the first action is to swing frame 43 back to the position shown in Figure 4, and then pulleys 39 and 40 will rotate as the weight 49 takes up all the slack. As the arm 23 swings upwardly and downwardly slowly, weight 41 will move accordingly, namely, it will move upwardly and downwardly, frame 43 will swing back and forth and the pulleys will rotate at the proper time. The respective bars or plates 44 and 45 extend beyond the pin 47 and carry pin 52 on which a pair of links 53 are mounted, said links at the lower end being pivotally connected to lever 54 by pin 55. Lever 54 is pivotally mounted at 56 to the casing 38 and carries a bifurcated member 57 which straddles the lever and is pivotally connected thereto by pin 58. The arms or bifurcations 59 not only straddle the lever 54, but straddle the toothed wheel 60. A pin 61 extends through the members 59 near their lower ends, said pin being adapted to engage the teeth on the wheel 60 so as to rotate this wheel step-by-step as the bifurcated member 57 moves upwardly and downwardly. It will be seen from Figure 4 that the bifurcations 59 have lower extensions 59′ which always extend below the shaft 62 so that weight 59″, which is rigidly secured to or formed integral with member 57, cannot swing the bifurcations 59 beyond shaft 62 and thus causes the parts to always remain in position so that pin 61 will engage the proper tooth on the wheel 60.

When the cable 30 is pulled downwardly from the position shown in Figure 4, lever 53 and associated parts including pin 61 will move downwardly sufficiently to rotate the wheel 60 one-sixth of a revolution, or a distance of one tooth. As soon as the cable 30 is released and moved upwardly, the parts will move gradually upward and assume the position shown in Figure 4 ready for the next movement downward.

Wheel 60 is rigidly secured to shaft 62 which is in turn secured to a pointer 63 which moves over the dial 64, which dial is preferably formed with graduations. By timing the movement of the pointer 63 anyone may ascertain the speed of the ship. It will be understood that the motor 8 and associated parts are set to function so many times per mile. For instance, if the parts should be so set that lever 63 is swung downwardly twenty-four times per mile, and it should be seen that pointer 63 moves around the dial four times in ten minutes, it will be clear that the ship is moving one mile every ten minutes, or six miles per hour. The pointer 63 and associated parts really act as the principal parts of the indicator, but

in order to find out the number of miles traveled, additional mechanism has been provided.

From Figure 4 it will be seen that link 65 is pivotally connected to the arm 54, and pivotally connected at 66 to arm 67, which arm is pivotally connected at 68 to the casing 38. A bifurcated member 57', similar to member 57, is provided with a counter balancing weight 63' so that the pin 61' and parts associated therewith may function in respect to the toothed wheel 60' in a similar manner to the way the same parts function in respect to the wheel 60. In order that the wheels 60 and 60' may function properly and not rotate in a reverse direction, resilient pawls or springs 62' and 62'' are provided. As the respective wheels rotate in the correct direction these resilient members move out of the way, but will quickly snap back into position as soon as a tooth is passed.

The toothed member 60' has teeth of the same number as toothed member 60, whereby the shaft 68 rotates at the same speed as shaft 62. Shaft 68 is connected by suitable gearing to the various pointers 69, 70 and 71 which form a register. For instance, dial 72 over which the pointer 69 moves, may be divided into ten parts so that one revolution of the pointer 69 will indicate ten miles or knots, as preferred. Preferably the dials 73 and 74 are likewise provided with divisions of ten so that when pointer 69 has reached one revolution pointer 70 will rotate one-tenth of a revolution, and when pointer 70 has rotated one revolution pointer 71 will rotate one-tenth of a revolution. By adding the number of miles indicated by all three dials the distance traveled by the ship will be found. It will be noted that when pointer 71 has made a complete revolution the register starts all over again to register a new set of miles. If for any reason the distance measured by pointer 71 is not sufficient, another pointer and associated parts may be provided and connected up with pointer 71 in the same way that pointer 71 is connected up with pointer 70. It will be understood that a well known train of gears connect all these pointers, so that they will function as described. If desired, an ordinary distance meter or indicator may be used and shaft 68 geared thereto. If a pointer was mounted on shaft 68 it would function identically with pointer 63.

Preferably the motor 8 and associated parts are rather small and, therefore, take up very little space on the ship. Also, preferably, the indicators are small and consequently may be placed conveniently in the captain's cabin, in the pilot house, in the engineer's room, and at other points.

It will be noted that the combined weights 41 of the various indicators are slightly heavier than the weight 26 so as to maintain the various cables or wires continually taut. By arranging the parts in this way, the slightest movement of the cable 30 will be transmitted to the indicators so that the indicators will accurately indicate the action of the motor 8 and associated parts, which motor and parts form the actuator or driving mechanism operated by the flow of water through the Pitot tube 5. It will also be noted that all parts of the log are mechanical and that the system is substantially balanced so that only a very small amount of power is needed for actuating the various cables.

I claim:—

1. A ship's log including a plurality of indicators adapted to be placed at different points on a ship, a cable extending from each of said indicators, said cables being connected together, a master cable extending from the point of connection of said cables, an actuator secured to said master cable, means in each of the indicators for attempting to pull the cables in one direction, and a counter balance arranged adjacent the end of the master cable which is connected to the actuator, whereby the various cables are maintained under tension so that all movements of the actuator may be accurately transmitted to the indicators.

2. In a ship's log, an indicator, a cable for actuating the indicator and a weight for maintaining the pull in one direction on the cable, said indicator including a pointer, a ratchet wheel rigidly connected with said pointer, a swinging structure adapted to engage said ratchet wheel for moving the same step-by-step, a swinging frame carrying a pair of pulleys, said pulleys accommodating said cable, means for producing friction between the pulleys and frame sufficient to permit the cable to swing the frame before the pulleys will rotate, means for connecting said frame with said ratchet operating means whereby when said frame is swung by movement of said cable, said ratchet operating means will function.

3. In a ship's log, a frame comprising a pair of side plates, a pair of pulleys arranged between said side plates, said pulleys being arranged at the respective ends of said side plates, and means for retarding the rotation of said pulleys, a shaft extending through the center of said frame for pivotally mounting the frame, means for limiting the rocking movement of said frame on the pivotal mounting thereof, a cable positioned with part extending over said pulleys, means for pulling said cable in one direction, a weight for pulling said cable in the opposite direction whereby said frame is rocked, a lever connected with said frame, said lever being pivotally mounted at one end, a swinging member pivotally mounted on said lever, a weight for causing said swinging member to continually tend to swing in a given direction, a pin carried by said swinging member, a rotatable ratchet wheel positioned to be engaged by said pin and moved step-by-step thereby, said pin moving said ratchet wheel one step upon each downward swinging movement of said lever, and means including a pointer for indicating the amount of movement of said ratchet wheel.

4. In a ship's log, an indicator including a register for indicating the dstance traveled, a pointer, a toothed wheel secured to said pointer, a second toothed wheel forming part of said register, means for simultaneously intermittently moving said toothed wheels, a swinging frame for moving said means, abutments acting to limit the swinging movement of said frame, a pair of pulleys mounted on said frame, and means for producing friction against the pulleys so as to cause them to resist rotation, a cable mounted on said pulleys, said cable adapted to be reciprocated, means for moving said cable in one direction, a weight connected to said cable functioning to move the cable in the opposite direction, whereby when said cable is moved in one direction the frame will swing in a given direction until it reaches one of said abutments, and when the cable moves in the opposite direction the frame will swing in the opposite direction until it strikes the other abutment, said cable being permitted to move extra distances without affecting the position of the frame.

5. In a ship's log, a cable, a cable actuated indicator comprising a swingable frame, a pair of pulleys mounted on said frame over which said cable

passes, means for frictionally resisting the rotation of said pulleys whereby when said cable is moved in either direction the frame will swing before said pulleys will rotate, means for limiting the swinging movement of said frame in both directions, an indicating pointer, and means actuated by said frame for moving said pointer, said means including a pivotally mounted member having at one end a weight and adjacent the other end a pin, and a ratchet wheel rigidly secured to said pointer positioned to be engaged by said pin and moved as the pin is actuated.

6. In a ship's log, a cable, a cable actuated indicator comprising a register for indicating the distance traveled, a pointer, means actuated by said cable for causing said pointer and register to function, said means including a ratchet wheel connected with the pointer and register respectively, a weight actuated pawl cooperating with each of said ratchet wheels, a lever pivotally mounted on one end for each of said pawls, means for pivotally mounting said pawls on the respective levers, a link connecting the respective levers so that they will act in unison, a swinging frame, a link connecting the swinging frame with one of said levers, so that when the frame swings in one direction the pawls will function to rotate the respective ratchet wheels, and when swung in an opposite direction said pawls will be moved back to engage new teeth, means on said frame for receiving said cable, and friction producing means to cause the cable receiving means to not function until after said frame has been swung a predetermined distance.

7. In a ship's log, a cable, a cable actuated indicator including a pointer, a toothed wheel secured to said pointer, a pawl acting on said toothed wheel intermittently moving the same, said pawl being provided with a pin for engaging the teeth of the toothed wheel, and an extension positioned to swing against the shaft carrying the toothed wheel when the pawl is not engaging the teeth, a weight carried by said pawl for tending to swing the same in a given direction, a lever, means for pivotally mounting the pawl on the lever, and a rocking frame actuated by said cable for moving said lever up and down as the cable reciprocates.

8. In a ship's log, an indicator, a cable for actuating the indicator, and an actuator for causing the cable to function, said actuator including a Pitot tube, a water motor adapted to be operated by the water passing through said Pitot tube, an arm pivotally mounted at one end and secured at the other end to said cable, a cam for moving said arm in one direction so as to pull said cable, said cam having a pair of parallel flat sides and a pair of rounded ends, one of said sides normally resting flatwise against the upper surface of said arm and means for transmitting power from said motor to said cam for rotating the cam so that said arm will be intermittently moved and the cable will be pulled and then released alternately, said means including a transmitting structure formed in such a way that the cam will operate at a much slower speed than said motor

9. A ship's log including an indicator, a cable for actuating said indicator, a weight connected to said cable and acting to pull the cable when permitted and an actuator for causing the cable to move in the opposite direction to the movement caused by said weight, said actuator including a pivotally mounted arm connected to said cable, a cam having a pair of parallel flat surfaces and a pair of rounded ends for swinging said arm in one direction and then gradually releasing the same so that said weight may function, a water motor for actuating said cam, said cam being positioned so that the flat surfaces and rounded ends will alternately engage said arm for at one time swinging the arm and at another time holding the arm substantially stationary, a Pitot tube for directing water into the water motor, and means including a discharge tube for directing water from the water motor.

10. In a ship's log, an actuator, a cable moved in one direction by the actuator, an indicator adapted to function through the movement of said cable, a weight arranged within the indicator for moving the cable in a direction opposite to the direction of movement caused by said actuator, whereby said cable will be given a back and forth movement, an indicating member carried by the indicator, a toothed wheel connected with the indicating member, a pawl for intermittently rotating said toothed wheel, and means for actuating said pawl, said means including a rocking frame, said frame including a pair of side plates, a pair of pulleys, journal members for supporting said pulleys on said side members, said cable being fitted over said pulleys, and a spring acting against one of said side members and against the pulleys for forcing the pulleys against the other side member with sufficient force to permit the cable to swing the frame a sufficient distance before said pulleys will rotate, and a pair of stops for limiting the swinging movement of the frame in either of two directions.

RICHARD STAR.