

April 10, 1928.

1,665,804

P. J. WALSH

TIMING APPARATUS

Filed May 22, 1922

2 Sheets-Sheet 1

FIG. 1.

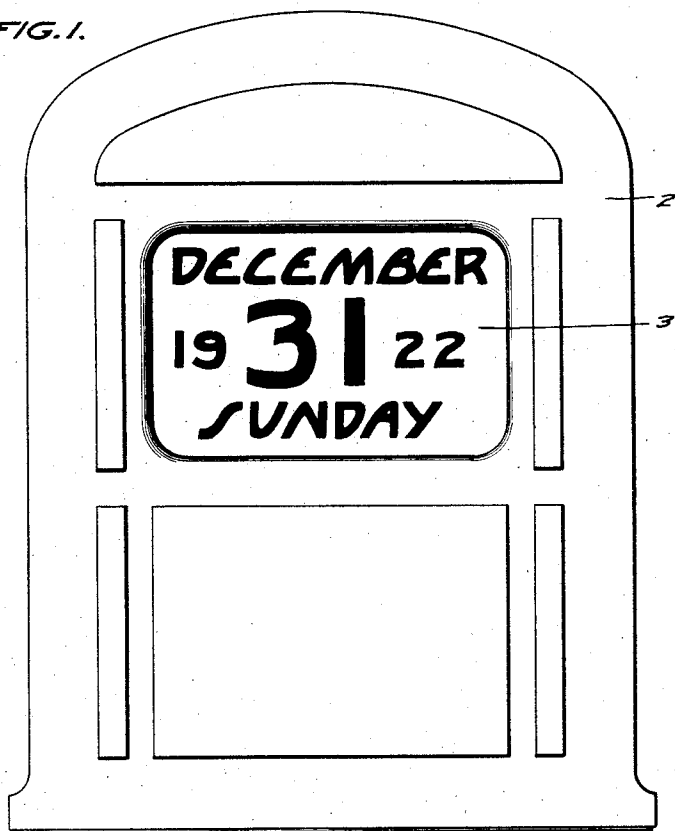


FIG. 4.

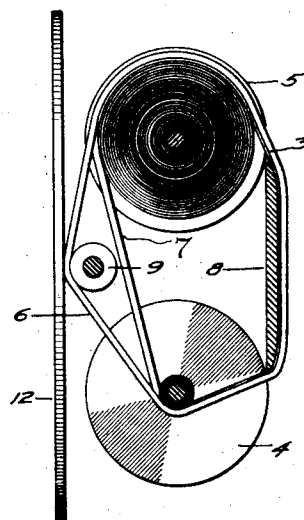


FIG. 7.

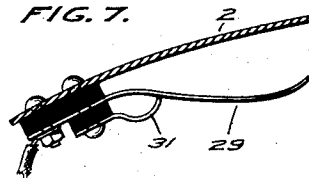
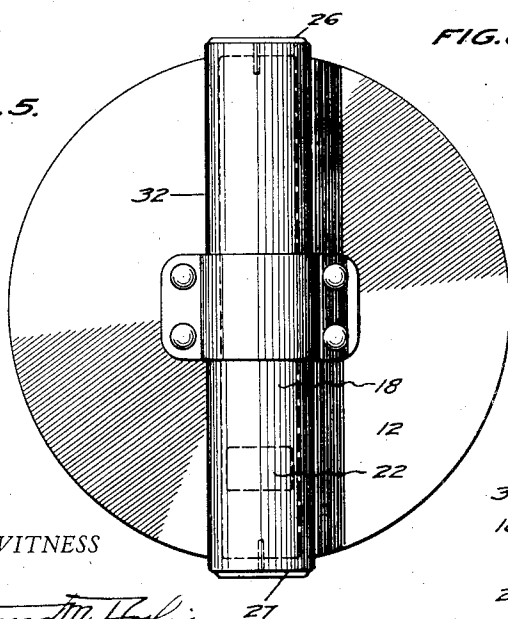


FIG. 5.



WITNESS

Bernard M. Holm

FIG. 6.

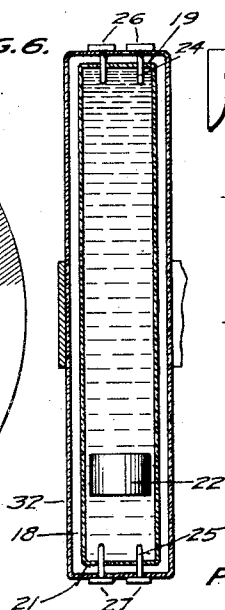
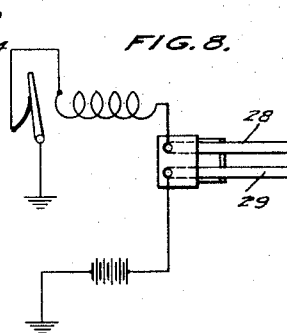


FIG. 8.



INVENTOR
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BY
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his ATTORNEYS

April 10, 1928.

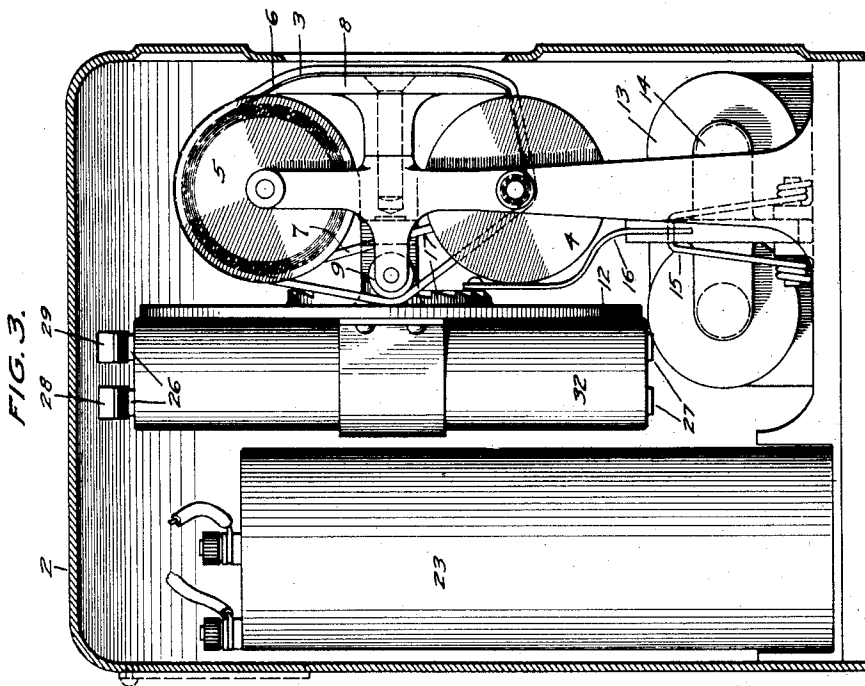
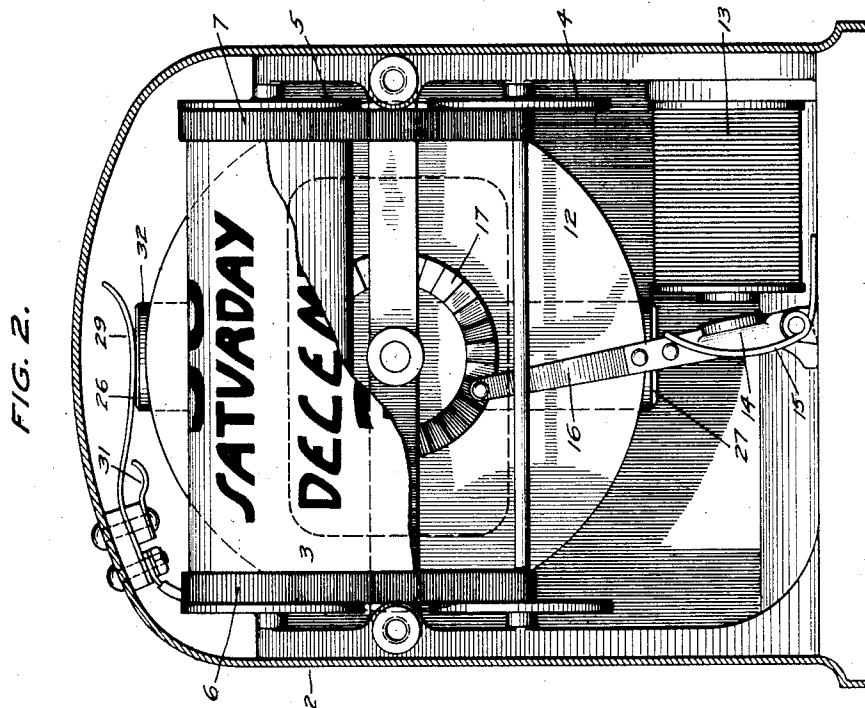
1,665,804

P. J. WALSH

TIMING APPARATUS

Filed May 22, 1922

2 Sheets-Sheet 2



Witness.

Bernard M. Forlin

INVENTOR.

Philip J. Walsh.

BY *White Post Evans*
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UNITED STATES PATENT OFFICE.

PHILIP J. WALSH, OF SAN FRANCISCO, CALIFORNIA.

TIMING APPARATUS.

Application filed May 22, 1922. Serial No. 562,715.

The invention relates to timing apparatus in which a record sheet or indicating sheet is moved a predetermined distance at the lapse of the successive predetermined time periods.

An object of the invention is to provide a simple, accurate, self-contained timing apparatus which will operate, without attention, for long time periods.

Another object of the invention is to provide a timing apparatus actuated by current derived from a dry cell, the circuit of which is closed only momentarily at spaced time intervals.

Another object of the invention is to provide a simple timing element which is practically uninfluenced by atmospheric temperature changes.

The invention possesses other advantageous features, some of which, with the foregoing, will be set forth at length in the following description where I shall outline in full, that form of the invention which I have selected for illustration in the drawings accompanying and forming part of the present specification. In said drawings I have shown one embodiment of my invention, but it is to be understood that I do not limit myself to such form, since the invention, as set forth in the claims, may be embodied in a plurality of forms.

The illustrated embodiment of the invention includes a movable strip which is moved a predetermined distance at the end of a predetermined lapse of time, the strip in the present instance comprising a calendar and being moved every twenty-four hours to display successive dates. The strip, however, may be moved at other time intervals and may carry on its surface any desired information, data or legend or may have a plain surface adapted to receive a record as it is moved.

Referring to the said drawings:—

Figure 1 is a front elevation of a calendar embodying my invention.

Fig. 2 is an elevation of the device with the front plate removed and the paper strip broken away to disclose the construction.

Fig. 3 is a side elevation of the device with the side plate removed.

Fig. 4 is a diagrammatic representation of the strip drive.

Fig. 5 is a rear elevation of the rotatable timing member.

Fig. 6 is a longitudinal section through the timing element.

Fig. 7 is a detail of the circuit controlling means.

Fig. 8 is a diagrammatic representation of the electric circuit of the apparatus.

The apparatus comprises a casing 2, preferably metallic, having a sight opening therein, through which a section of the strip 3, preferably made of thin paper, is visible. Means are provided within the casing for moving the strip past the opening in a step-by-step movement, the elapsed time between steps being of any desired magnitude, such for instance, as twenty-four hours. The strip is preferably moved the same distance in each step, so that a successive section of the strip is visible at the sight opening after each step. The strip 3 is arranged on two spools 4 and 5 and unwinds from spool 4, moves past the sight opening and winds on spool 5. The strip is of any desired length, commensurate with the dimensions of the casing and when it serves the function of a daily calendar, may be of sufficient length to contain dates for several years.

A friction drive is provided for moving the strip the predetermined distance at the end of each time interval. Surrounding the strip, at one edge thereof, and passing over the wound strip on both spools, is a flexible band 6, preferably made of rubber, which is driven and with which the strip moves. A second band 7 surrounding the strip at the other edge serves to guide the strip and insure its proper winding. Between the spools and behind the sight opening, is a platen 8, over which the strip passes and on which it lies flat.

The band 6, passes over an idler roller 9, suitably supported within the casing behind the platen. Arranged behind the spools and rotatable on an axis perpendicular to the axes of the spools, is a friction disc 12, the marginal portion of which passes adjacent the idler roller and in contact with the band 6 passing thereover. Rotation of the disc 12 therefore causes movement of the strip and this movement is for a constant distance, regardless of the relative amounts of strip wound on the two spools.

Means are provided for rotating the disc 12 through a predetermined angle at the ends of predetermined time periods. Arranged in the casing is an electromagnet 13

having a pivoted armature 14, normally held from the electromagnet by a spring 15. The armature is arranged so that movement thereof toward the magnet, breaks the circuit of the energizing current, as in buzzers, so that when the circuit is closed, the armature is vibrated. The armature is provided with a finger or extension 16 which co-operates with a ratchet wheel 17 on the disc, to cause vibration of the armature to produce rotation of the disc, which in turn produces movement of the strip.

Mounted on and rotatable with the disc is the timing element which controls the closing of the electric circuit through the solenoid. The timing element preferably comprises a cylindrical tube 18, usually made of glass and closed at its ends 19 and 21. The ends 19 and 21 may be closed by the insertion in the tube 18 of plugs of insulating material. The tube is filled with a fluid, usually a rather viscous liquid, although a heavy gas could also be used. Immersed in the fluid is a freely movable metallic member 22 of specific gravity different from that of the fluid in tube 18. This member may conveniently be in the form of a float, which has a tendency to rise in the fluid. The float is preferably cylindrical in form and of substantially the same diameter as the interior of the tube, so that a very thin annular passage is provided for the passage of the liquid past the float. The liquid can pass from one side of the float 22 to the other only through this very small passageway. It is thus evident that the movement of the float is dependent to a great extent upon the rate at which this liquid can be forced through the annular passage by the force due to the buoyancy of the float; this movement is thus a great deal slower than if the float were permitted to rise unhampered through the liquid. The rate of rise will also depend upon the viscosity or thickness of the liquid, if a liquid is used, and by choosing liquid of the proper characteristics, any desired rate of travel may be obtained. Using glycerine as the liquid, the float rises at the rate of about one inch in six minutes; with liquid glue in the tube the float rises at the rate of one inch in eight days. In the embodiment shown in the drawings I employ a liquid through which the float rises, from the bottom to the top in twenty-four hours, so that the disc is moved every twenty-four hours. When using a heavy gas instead of a liquid, the period of the float movement would of course be relatively shorter. The tube is mounted on the disc and is normally held in a vertical position. When the float reaches the top of the tube, the electric circuit is closed and the disc rotated through an angle of 180°, thus inverting the tube and the rotation of the disc through 180° causes the strip to ad-

vance one section. The tube is thus held vertical, permitting the float to slowly rise. As soon as the float reaches the top, the tube is inverted, again placing the float at the bottom, whence it slowly rises to the top. The electric circuit is energized only during the time that the disc is turning and since this occurs at spaced time intervals, a minimum of power is consumed, so that the apparatus will operate for a very long time on the energy derived from a dry battery contained within the casing.

At each end, the tube is provided with two spaced insulated contacts 24—25 provided with sharp points extending into the tube. These contacts connect with spaced metallic bands 26—27 arranged on the ends of the tube and disposed circumferentially with relation to the disc. Arranged within the casing and preferably at the upper part thereof, are two spaced insulated metallic brushes 28 and 29 adapted to respectively engage the contact bands 26 and 27. These brushes are arranged in the electromagnet circuit and when the circuit between them is closed, the electromagnet is energized. When the float, rising in the tube, contacts with the contact points 24 or 25, the circuit is closed and the electromagnet starts rotating the disc. The brushes are curved and flexible and when not in contact with the bands, extend downwardly below the path of the bands and when in contact with the bands, are bent upwardly. Disposed below the brushes and in position to contact therewith when they are released from the contact bands, is a metallic short-circuiting member 31, which connects the depressed brushes together, thus maintaining the circuit closed. The electromagnet continues to operate, rotating the disc, until the lower end of the tube engages the brushes and lifts them from the member 31, thus opening the circuit. The float is now at the bottom of the tube and the circuit remains open until it reaches the top and closes contact between the contact points at that end.

The wiring diagram, Fig. 8, illustrates in a clear manner how the circuit for the electromagnet 13 is controlled. The usual normal condition is that tube 18 is in a vertical position, with float 22 rising therein but not contacting with either contacts 24 or 25. Under such circumstances the electromagnet circuit is broken, since the bands 26 or 27 hold contact springs 28 and 29 out of contact with finger 31. However, as soon as the float rises to the top of tube 18, these two springs are bridged by bands 26 or 27, contacts 24 or 25, and float 22. The circuit is energized; arm 16 moves the friction disc 12 to invert the tube 18. As soon as this tube moves away from vertical position, the contact springs 28 and 29 are allowed to drop on finger 31, which thus keeps the cir-

cuit closed until the tube 18 is completely inverted by the step-by-step device including arm 16 and ratchet 17.

To prevent atmospheric temperature changes from varying the viscosity or thickness of the liquid in the tube, I heat insulate the tube, preferably by enclosing it in a vacuumized chamber. The tube 18 is preferably sealed within an outer glass tube 32 and the space between the two tubes vacuumized. The tube 18 is supported within the tube 32 by the contact wires 24—25 which extend inward from the contact bands 26 and 27.

I claim:

15 1. A timing apparatus comprising a disc, an electromagnet arranged to rotate said disc, an electric circuit for said electro-magnet, a fluid filled tube carried by said disc and a float in said tube adapted to close said circuit.

20 2. A timing apparatus comprising a disc, an electromagnet arranged to rotate said disc, an electric circuit for said electro-magnet, a fluid filled tube carried by said disc adapted to open the electric circuit and a float in said tube adapted to close said circuit.

30 3. In a timing apparatus, an invertible, closed container adapted to hold a fluid, a float in the container, and means for periodically inverting said container, comprising an electroresponsive device, an electric circuit therefor, means whereby said circuit is opened when the container is fully inverted, and is closed during inversions, and means whereby the rise of the float to a definite level independently closes the circuit.

35 4. In a timing apparatus, an invertible, closed container adapted to hold a fluid, a float in the container, said float and con-

tainer being so formed that fluid can pass from one side of the float to the other only through a restricted path, whereby an appreciable time must elapse for the float to rise in said fluid, and means for periodically inverting said container, comprising an electroresponsive device, an electric circuit therefor, means whereby said circuit is opened when the container is fully inverted, and is closed during inversions, and means whereby the rise of the float to a definite level independently closes the circuit.

5. In a timing apparatus, a timing element comprising a tube filled with liquid, a vacuumized second tube enclosing and spaced from the first tube, electrical conductors extending into said first tube and supporting it within the second tube and a float in said first tube adapted to move into contact with said conductors.

6. A timing apparatus comprising a disc, a strip arranged on winding and unwinding spools, a flexible band passing around said spools and engaging said strip and means holding the band in frictional contact with the surface of the disc.

7. The combination with two spools, of a strip arranged partly on both spools, a flexible band passing around the spools and engaging the strip and friction drive means engaging the band.

8. The combination with two spools, of a strip arranged partly on both spools, a flexible band passing around the spools and engaging the strip, friction drive means and a roller holding the band in contact with said drive means.

In testimony whereof, I have hereunto set my hand.

PHILIP J. WALSH.