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R. P. DODDS

1,966,543

RECORDER

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Fig. 1

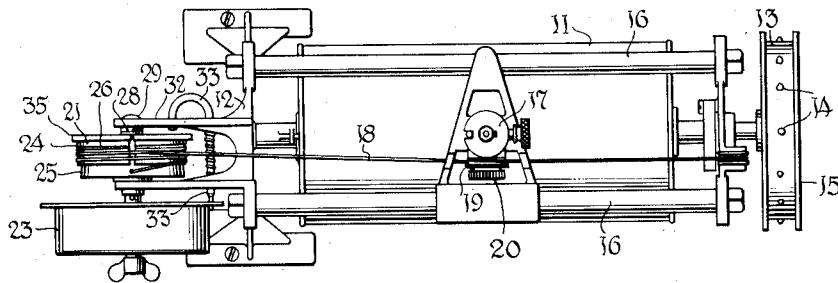


Fig. 2

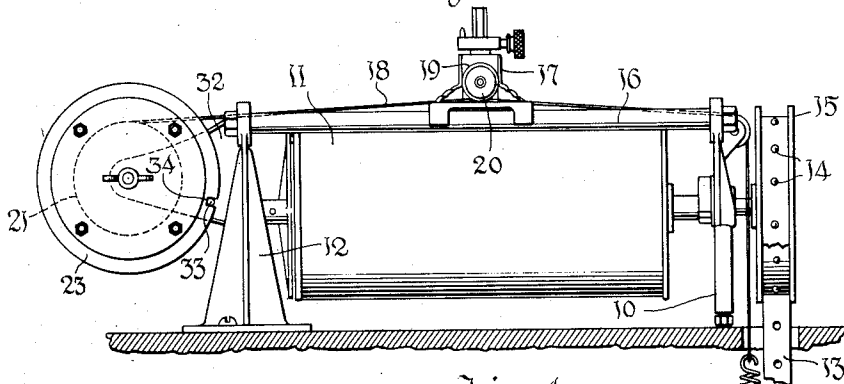


Fig. 3

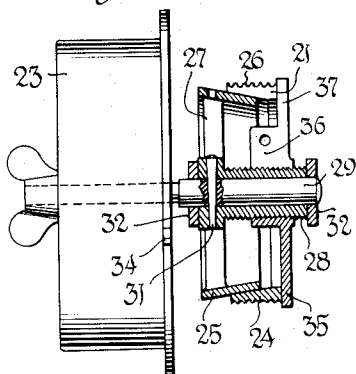
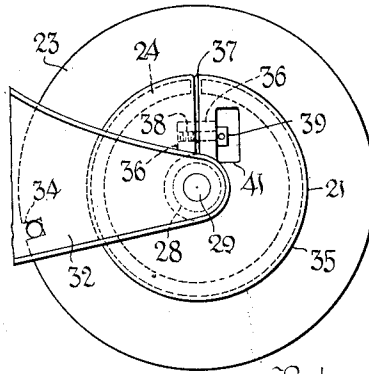
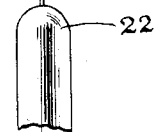


Fig. 4



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UNITED STATES PATENT OFFICE

1,966,543

RECORDER

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Application October 28, 1930, Serial No. 491,758

9 Claims. (Cl. 234—10)

The present invention relates to clock-controlled recording mechanisms, and particularly to means for providing a secondary time adjustment independent of the control of the clock escapement. It is desirable to provide for adjustment larger in degree than that afforded by the escapement. The best clock performance can be secured by avoiding adjustment of the escapement once the clock has assumed a definite rate.

The invention is particularly intended for recorders of the graphic type, such, for example, as water stage recorders, and will be described as applied to that type in which the pencil is caused to move by connecting it to the weight cord of the clock.

In devices of this character the rate of unwinding is controlled by the effective radius of the drum, that is, the actual radius plus one-half the diameter of the cord. It follows that stretching of the cord such as would reduce its diameter, wear of the cord, expansion of the drum, and similar variations, will all introduce errors in the movement of the pencil over the record, no matter how accurately the clock itself may function.

These difficulties are overcome by the structure described in the accompanying drawing, in which,—

Fig. 1 is a plan view of a water level recorder in which is embodied the adjustable drum;

Fig. 2 is a front elevation of the recorder shown in Fig. 1;

Fig. 3 is an enlarged sectional view of the drum illustrating the manner in which it is attached to the clock or escapement mechanism; and

Fig. 4 is a side view of the drum.

In the drawing a cylinder 11 is mounted for rotation in a fixed standard 12 and an adjustable support 10. The cylinder is adapted to hold a record sheet having coordinate lines thereon and is rotated in either direction by a perforated tape 13 cooperating with pins 14 on a pulley 15 secured to the cylinder shaft. It is to be understood that one end of the tape is connected to a float and the other end to a weight, neither of which is shown, since the actuation of the cylinder by these means is well known in the art.

Mounted on guide rails 16 supported on standard 12 and support 10 and parallel with the axis of cylinder 11 is a pencil holder 17. A cord 18 passes once around a grooved sheave 19 on the pencil holder and is connected at its ends to a drum 21 and weight 22, respectively. The sheave is normally clamped to the pencil holder so that the cord binds with respect thereto, but may be

loosened by unscrewing a clamp screw 20 to permit adjustment of the pencil holder with respect to the cord. A clock 23, including an escapement mechanism, permits uniform and timed unwinding of the cord from the drum, the pencil, being normally fixed to the cord, moving longitudinally along the cylinder 11 as the cord unwinds. The mechanism above described conforms in a general way to known practice in the recorder art. The invention is applicable to various recorders provided they be of the type in which the motion of the recording stylus is controlled by the winding or unwinding of a cord on or from a drum driven at uniform angular velocity. The usual way of driving such a drum at uniform angular velocity is to connect it with a clock. Consequently, the above description is to be considered as illustrative rather than limiting.

The drum on which the pencil actuating cord is wound comprises a split collar 24 cooperating with a tapered core 25 and having a helical groove 26 therearound. Core 25 is connected by spokes 27 to a threaded hub 28 secured to the clock shaft 29 by means of pin 31 or other suitable fastening means. It will be seen that the shaft 29 is journaled in a bracket 32 on the instrument frame and that the clock is fixed thereto by means of a retractable pin 33 on the bracket cooperating with a detent 34 in the clock housing. Rotation of shaft 29 is effected by weight 22, controlled, of course, by the clock escapement, and turns drum 21 on its axis to permit unwinding of cord 18.

To modify the diameter of sleeve 24 a flanged nut 35, also split, is threaded on hub 28. This nut bears against the split sleeve and, depending on whether it is screwed toward or from the tapered core, positions the split sleeve with respect to core 25 thereby to expand or contract the sleeve. Nut 35 is provided with projections 36 adjacent the split 37, one of the projections having a threaded aperture 38 to accommodate a capstan screw 39, the head of which bears against the opposite projection. Access may be had to screw 39 through an opening 41 in the flange of the nut. By turning screw 39 the nut may be loosened to permit turning of the nut and axial adjustment of the split sleeve 34, but when the projections 36 are drawn toward each other by the screw, the nut is locked to the hub. It is thus possible to maintain the adjusted relation of the split sleeve and core as long as the instrument functions accurately.

In operation, the clock is rotated counterclockwise to wind the cord on the drum, the pin 33 first

being disengaged to permit rotation of the clock, and then reengaged. The clamp screw 20 is then partially unscrewed, the pencil is set to the correct time marking, and the clamp screw 20 again set up. The clock permits uniform unwinding of the cord as weight 22 tends to unwind it from the drum. The rate at which the pencil moves is dependent on the diameter of the drum. This diameter is adjustable to permit adjustment of the rate of movement of the pencil with respect to the record sheet without requiring adjustment of the time rate of the clock.

The effect is to minimize all necessity for adjustment of the clock escapement, and to provide a precise adjustment of considerable range, permitting neutralization of errors without interference with the clock mechanism.

While the preferred embodiment of the invention has been described in considerable detail, it is to be understood that the invention is applicable to other recording instruments, and that various structural changes fall within the scope of the invention.

In the claims the word "stylus" will be used as a generic term to cover the pencil described in the specification, and other equivalent marking devices.

What is claimed is:—

1. In a recording instrument, a clock; a rotatable drum controlled by said clock; a cord wound on said drum; recording means actuated by movement of the cord upon rotation of the drum; and adjusting means for varying the diameter of the drum.

2. In a recording instrument, a clock; a rotatable expansible drum controlled by said clock; a cord wound on said drum; recording means actuated by movement of the cord upon rotation of the drum; and adjusting means for expanding said drum to vary the circumference thereof.

3. In a recording instrument, a clock; a tapered core; a split sleeve encircling said core; means for rotating said core including a cord wound on said sleeve, the rotation of said core being controlled by said clock; recording means actuated by the cord as it unwinds from the sleeve; and means for positioning the sleeve with respect to the core to vary the diameter of the sleeve.

4. In a recording instrument, a clock; a tapered core; a split sleeve encircling said core; means for rotating said core including a cord wound on said sleeve, the rotation of said core being controlled by said clock; recording means including a record sheet and a marking stylus, said cord being wound on said sleeve and adapted to move said stylus with respect to said sheet while being unwound from the sleeve; and means

for positioning said sleeve with respect to said core to vary the diameter of the sleeve.

5. In a recording instrument, a clock; a tapered core having a threaded hub; a split sleeve encircling said core; means for rotating said core including a cord wound on said sleeve, the rotation of said core being controlled by said clock; recording means including a record sheet and a marking stylus; said cord being wound on said sleeve and adapted to move said stylus with respect to said sheet while being unwound from the sleeve; and means cooperating with said threaded hub for positioning said sleeve with respect to said core to vary the diameter of the sleeve.

6. In a recording instrument, a clock; a tapered core; a split sleeve encircling said core; means for rotating said core including a cord wound on said sleeve, the rotation of said core being controlled by said clock; recording means actuated by the cord as it unwinds from the sleeve; means for positioning said sleeve with respect to the core to vary the diameter of the sleeve; and means for locking said positioning means with respect to said core.

7. In a recording instrument, a clock; a tapered core having a threaded hub controlled by said clock; a split sleeve encircling said core; means for rotating said core including a cord wound on said sleeve, the rotation of said core being controlled by said clock; recording means including a record sheet and a marking stylus, said cord being wound on said sleeve and adapted to move said stylus with respect to said sheet while being unwound from the sleeve; and a flanged nut cooperating with said threaded hub and said sleeve for positioning the sleeve with respect to said core to vary the diameter of the sleeve.

8. In a recording instrument, a clock; a tapered core having a threaded hub controlled by said clock; a split sleeve encircling said core; means for rotating said core including a cord wound on said sleeve, the rotation of said core being controlled by said clock; recording means including a record sheet and a marking stylus, said cord being wound on said sleeve and adapted to move said stylus with respect to said sheet while being unwound from the sleeve; a split nut cooperating with said threaded hub and said sleeve for positioning the sleeve with respect to said core to vary the diameter of the sleeve; and means for contracting said nut whereby the nut is clamped to said hub.

9. The combination of claim 1, further characterized in that said drum is spirally grooved and said cord is wound spirally in said groove.

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