July 11, 1944. M. T. SWISHER 2,353,280

MEANS FOR COMPUTING MEASUREMENT

Filed April 30, 1943 3 Sheets-Sheet 1

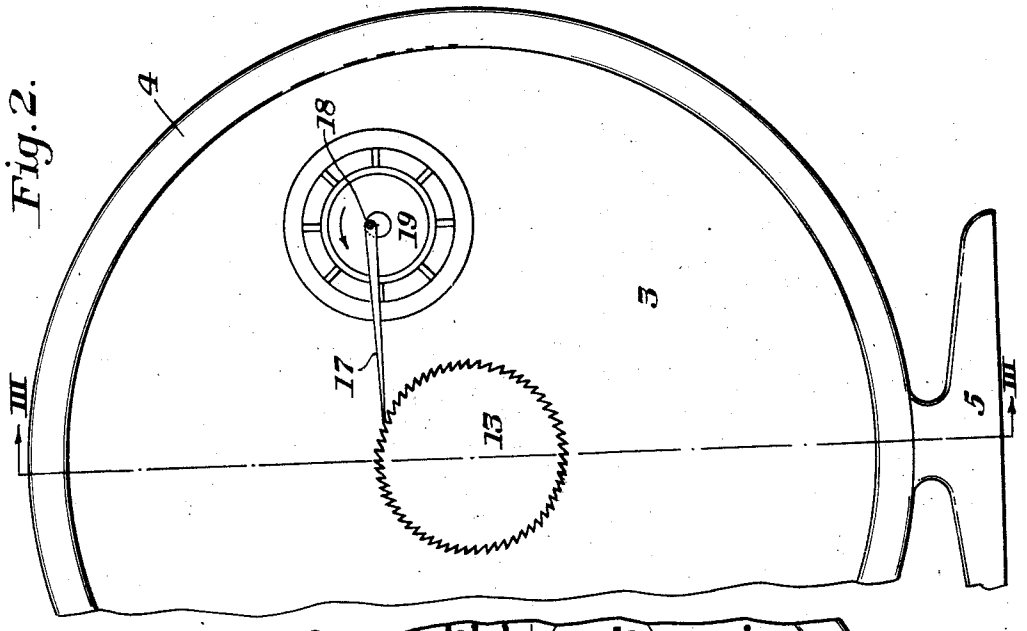


Fig. 2.

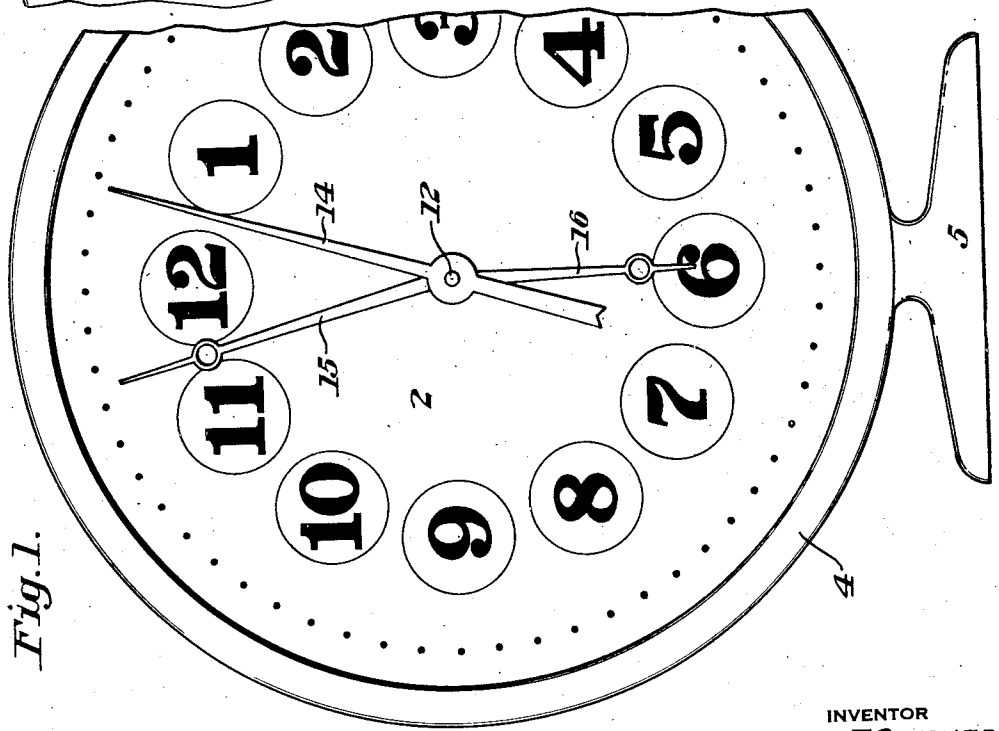


Fig. 1.

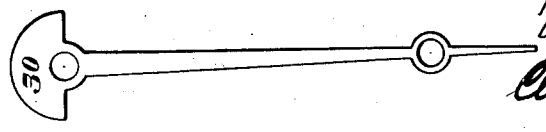


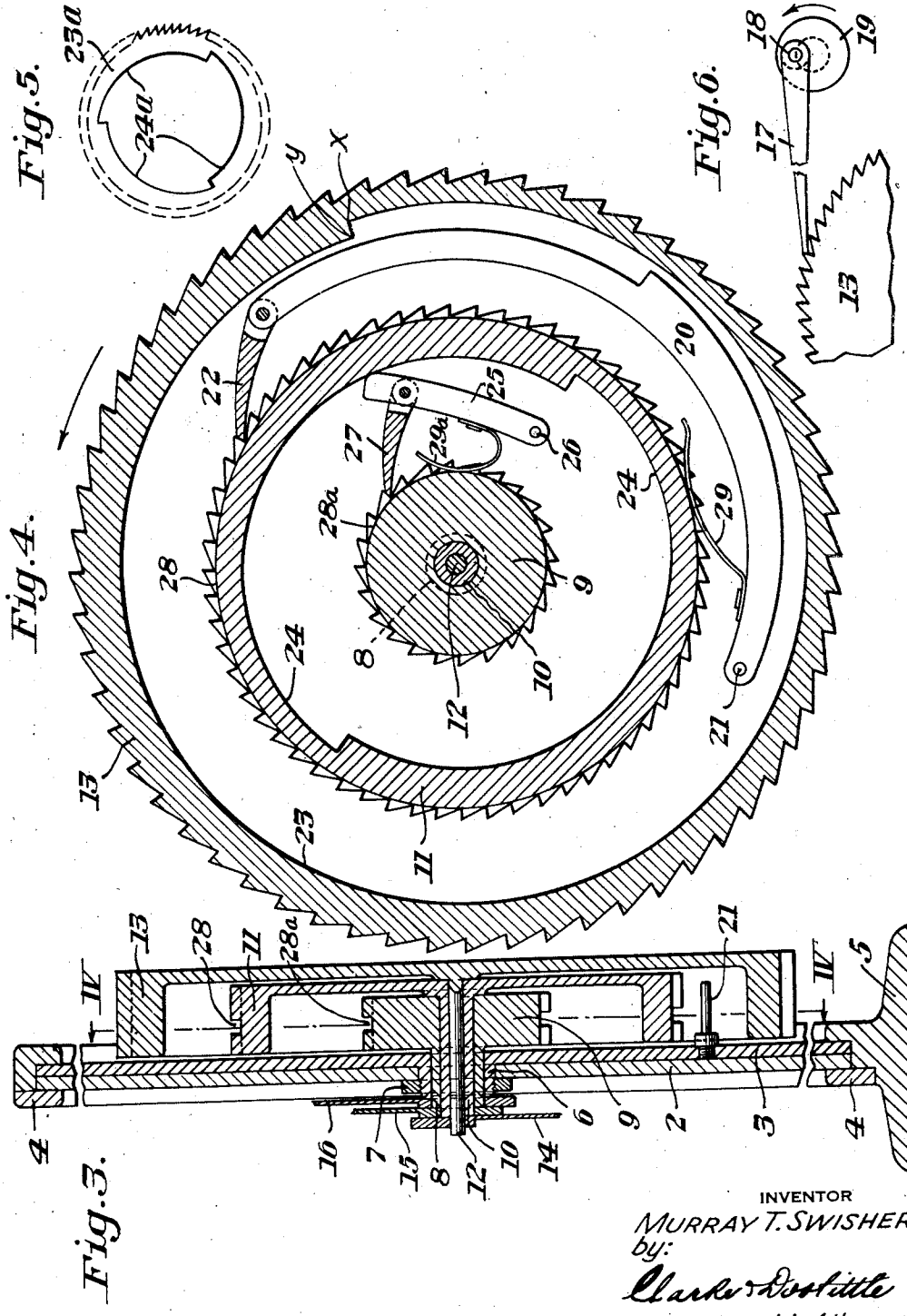
Fig. 10.

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MEANS FOR COMPUTING MEASUREMENT

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Fig.7.

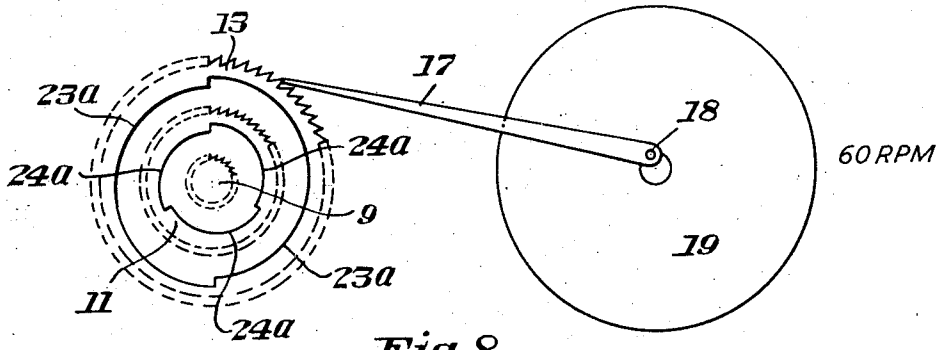


Fig.8.

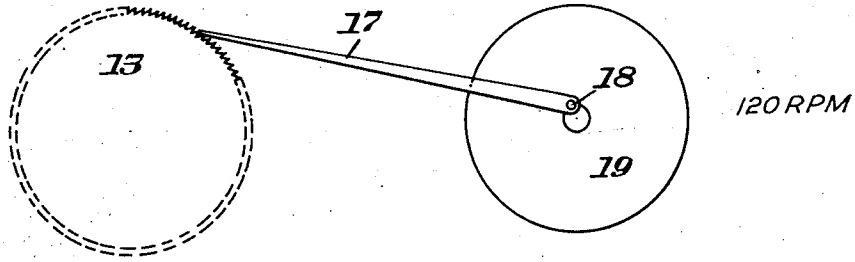
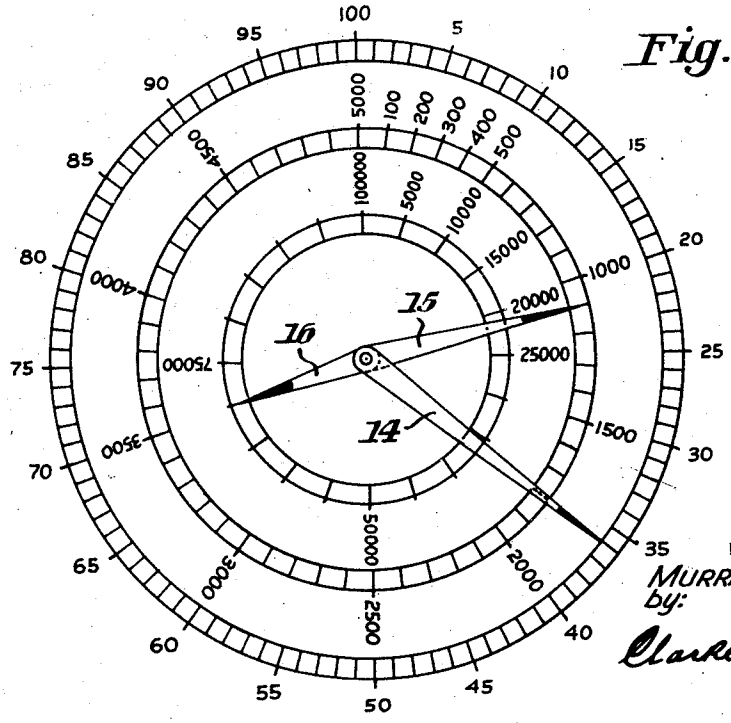


Fig.9.



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MEANS FOR COMPUTING MEASUREMENT

Murray T. Swisher, Clairton, Pa.

Application April 30, 1943, Serial No. 485,258

14 Claims. (Cl. 58—125)

This invention relates to improvements in clockwork and other similar mechanism, in which the impulses or individual movements imparted by a prime mover of suitable type, are utilized to register totals and subdivisions thereof by plural readings, on a single dial.

The invention involves the use of a concentric assembly comprising an outer and one or more inner ratchet wheels, preferably on a common transverse plane or zone; a thrusting lever and pawl between adjacent ratchet wheels; cam engagement and movement of such lever by its surrounding ratchet wheel; a plurality of spindles extending telescopically from each ratchet wheel, each having an indicating hand traversable around a fixed dial; and a prime mover.

While the construction, as shown, is primarily applicable to clock movements, it may be also used in connection with the art of metering flowing gases, liquids, or the like, when incorporated with a suitable flow-controlled motor.

The working elements of the invention are illustrated in the accompanying drawings, in which:

Fig. 1 is a partial face view of a clock, embodying the invention;

Fig. 2 is a similar view of the reverse side;

Fig. 3 is an enlarged vertical sectional view on the line III, III of Fig. 2, including the framing support, partly broken away and omitting certain structure;

Fig. 4 is a transverse sectional view on the line IV, IV of Fig. 3;

Fig. 5 is a detail view showing a triple cam surface ratchet wheel;

Fig. 6 is an enlarged detail view, partly broken away, showing the ratchet and pawl connection with the crank of the prime mover;

Figs. 7 and 8 are diagrammatic views showing varying relations between prime movers of different speeds and correspondingly varying ratchet tooth and cam equipment, of the concentric assembly;

Fig. 9 is an illustrative face view of the dial and hand arrangement, in utilizing the concentric assembly in a meter;

Fig. 10 is a view of one of the clock hands, detached.

Referring to the actuating assembly as applied to the dial of a time piece or clock, it utilizes a circular dial 2 laid in front of a supporting panel back 3 mounted in any appropriate surrounding frame 4, for support by a bottom pedestal 5, or any other suitable means, as for hanging on a wall.

Centrally of the back panel plate 3 is a forwardly extending cylindrical bearing 6 extending through the dial and secured by a nut 7, providing a journal bearing for sleeve extension 8 of the innermost or "hour" hand actuating ratchet wheel 9. Telescoped therethrough is sleeve extension 10 of next outermost or intermediate "minute" hand actuating ratchet wheel 11, and extending through the latter is the stem or shaft extension 12 of the "second" hand actuating outermost ratchet wheel 13.

The "second" hand 14 is mounted on the stem 12 of the outermost ratchet wheel 13; "minute" hand 15 is mounted on tubular extension 10 of intermediate ratchet wheel 11; and "hour" hand 16 is on tubular extension 8 of innermost ratchet wheel 9. As thus arranged the several telescoping extensions are freely journalled for independent rotation, within the bearing 6, with suitable lubrication.

The several ratchet wheels 13, 11 and 9, as viewed in Fig. 4, are actuated anti-clockwise primarily by alternating movement of pawl 17 and crank connection 18, or by an eccentric, of a prime mover or motor 19. Such motor is of suitable constant speed, as 60 R. P. M., and wheel 13 as shown has sixty teeth, whereby it, and its "second" hand, receives one complete revolution per minute.

The intermediate or "minute" hand ratchet wheel 11 as shown, has also sixty teeth, and makes 1/60 of a revolution for each revolution of the outermost ratchet wheel 13, i. e. one complete revolution with its hand 15, each hour. For effecting such movement, an arcuate lever 20 is pivoted to pin 21 of stationary plate 3 in such position as to gravitate outwardly with its pivotal pawl 22, after each one-tooth movement.

Tooth engagement is effected by the gradual inward movement of the lever 20 by continuous inner cam 23 of wheel 13 extending around from low point x to high point y, such action being gradually continuous for each successive minute, and for one complete movement of the "minute" hand.

Similar movement is imparted to the "hour" hand ratchet wheel 9 and its hand 16 by the two half-round cam faces 24, 24, of intermediate ratchet wheel 11 acting in the same way on lever 25, pivoted on panel 3 at 26 for suitable gravity release, and action by pawl 27 on the teeth. Inas much as the "hour" hand of said wheel 9, by its sleeve 8, should make but one complete rotation for each 12 hours, for convenience as to pawl leverage, wheel 9 has twenty-four teeth,

each rotation of wheel 11 thus effecting engagement of 2 teeth each hour.

Ratchet wheels 11 and 9 are each provided with an annular groove 28, 28a, respectively for engagement by a friction spring 29, 29a, respectively on levers 20 and 25. Such springs effect desirable braking action on the wheels, preventing back lash or momentum turning, and also tending to assist gravity in returning the levers to the initial low terminals of the cam faces 23 and 24.

If desired, the outer wheel 13 may have sixty teeth actuated from a 60 R. P. M. motor with two cam faces 23a; intermediate wheel 11 may have one hundred and twenty teeth with three cam faces 24a; and inner wheel 9 in such case has its teeth increased proportionally to thirty-six, as in Fig. 7. Likewise with a motor of 120 R. P. M., the outer wheel 13 may have a double number of teeth, or one hundred and twenty, giving half-second arrests, if desired. Other proportional changes may of course be adopted if desired, and the prime mover 19 may be of increased R. P. M., with suitable reducing gearing for proper pitman movements.

Fig. 9 illustrates the application of the invention to the dial of a meter, where the wheel assembly may be actuated by impulses developed from motion of a prime mover of the rotary type, which may be primarily operated in consonance with the flow action of the fluid being measured. In such case the three corresponding hands 14, 15, 16, identify digits, hundreds, and multiples of thousands, as indicated on the corresponding dial scale rings, up to one hundred thousand.

Such application of the assembly and hands may be used with a series of one hundred tooth, fifty tooth, and twenty tooth ratchet wheels, having single cam surfaces and the appropriate levers and pawls. The reading on the scales of Fig. 9 is seventy thousand-eleven hundred-thirty six, totaling 71,136, and is readily observable at a glance.

Fig. 10 shows one of the hands as preferably provided with an overbalancing counterweight 30, tending to maintain equilibrium at varying different positions around the dial.

Obviously, if desired, the wheel assembly may be modified, as by eliminating the second hand, or the entire outer wheel 13, and applying pitman 17 directly to the teeth of ratchet wheel 11, or otherwise, depending on any particular application.

The construction is comparatively simple, compact and of minimum thickness, readily applied to the rear of panel 3 allowing of placement against a wall. It dispenses with the usual springs, escapements, pendulum, etc. and is readily capable of efficient application to various instrumentalities with which the wheel assembly and its parts may be combined, for indicating progressive computations. Excepting the "second" hand, the movement of the "minute" and "hour" hands, is gradual and progressive without interruption.

The invention may be changed or modified by the skilled mechanic to be effective in any particular adaptation or use, within the scope of the following claims.

I claim:

1. A movement imparting assembly comprising a plurality of concentrically disposed outermost, intermediate ratchet, and innermost ratchet wheels on a common transverse plane, a lever between the outermost and the intermediate wheel having a pawl engageable with the teeth thereof, a cam face on the inner periphery of the outer wheel engageable with the lever, means for transmitting movement from the intermediate wheel to the innermost wheel, and means for rotating the outer wheel.

2. A movement imparting assembly comprising a plurality of concentrically disposed ratchet wheels on a common transverse plane, each having a central spindle and an indicating hand thereon, a lever between an outer and an inner wheel having a pawl engageable with the teeth of the inner wheel, an interior annular cam face on the outer wheel engageable with the lever, and means for rotating the outer wheel.

3. A movement imparting assembly comprising a plurality of concentrically disposed ratchet wheels, a lever between an outer and an inner wheel having a pawl engageable with the teeth of the inner wheel, an annular cam face on the interior of the outer wheel engageable with the lever, a resistance spring on the lever engaging the inner wheel, and means for rotating the outer wheel.

4. In combination with a stationary panel having a central cylindrical bearing, a plurality of concentrically disposed ratchet wheels having telescoping extensions in said bearing, a lever between an outer and an adjacent inner wheel pivoted on the panel having a pawl engageable with the teeth of the inner wheel, an interior annular cam face on the outer wheel engageable with the lever, and ratchet engaging means for rotating the outer wheel.

5. In combination with a stationary panel having a cylindrical bearing, a plurality of concentrically disposed ratchet wheels, a lever between an outer and an adjacent inner wheel pivoted on the panel and having a pawl engageable with the teeth of the inner wheel, an annular cam face on the interior rim of the outer wheel engageable with the lever, a telescoping spindle extending from each wheel through the panel bearing, means effecting reversal of the lever, and means for rotating the outer wheel.

6. In combination with a stationary panel having a cylindrical bearing and an outer dial, a plurality of concentrically disposed ratchet wheels each having a telescoping spindle extending through the bearing and having an indicating hand, a lever between an outer and an adjacent inner wheel pivoted on the panel and having a pawl engageable with the teeth of the inner wheel, an inner annular cam face on the rim of the outer wheel engageable with the lever, and means for rotating the outer wheel.

7. In combination with a stationary panel having a cylindrical bearing and an outer dial, a plurality of concentrically disposed ratchet wheels on a common transverse plane, each having a telescoping spindle extending through the bearing and having an indicating hand, a lever between an outer and an adjacent inner wheel pivoted on the panel having a pawl engageable with the teeth of the inner wheel, an inner annular cam face on the outer wheel engageable with the lever, and a motor on the panel provided with a reciprocable pitman engaging the teeth of the outer wheel.

8. Means for indicating measurement comprising an indicia dial, a supporting panel, a series of outer, intermediate, and inner concentric ratchet wheels on a common transverse plane, each having a telescoping spindle extending through the

panel provided with a hand beyond the dial, inner annular cam faces on the outer and intermediate wheels, a lever having a pawl between the outer and intermediate and between the intermediate and inner wheels respectively engageable with said cam faces, and means for intermittently actuating the outer wheel with following timed movement of the intermediate and inner wheels and their spindles and hands.

9. Means for indicating measurement comprising an indicia dial, a supporting panel, a series of outer, intermediate, and inner concentric ratchet wheels on a common transverse plane, each having a telescoping spindle extending through the panel provided with a hand beyond the dial, inner annular cam faces on the outer and intermediate wheels, a lever having a pawl between the outer and intermediate and between the intermediate and inner wheels respectively engageable with said cam faces, and a prime mover mounted on the panel having a pitman engaging the teeth of the outer wheel.

10. In a gear assembly as described, the combination with an outer ratchet wheel having a rotatable spindle and an interior annular cam face, an inner ratchet wheel having a spindle, an arcuate lever pivotally mounted between said wheels engageable by the cam face and provided with a pawl, and an outwardly pressing spring on the lever engageable with the inner ratchet wheel for effecting the non-feeding stroke of the pawl.

11. In a gear assembly as described, the combination with an outer ratchet wheel having a rotatable spindle and semi-annular cam faces, an inner ratchet wheel having a spindle, an arcuate lever pivotally mounted between said wheels engageable by said cam faces and provided with a pawl, and a spring engageable with the inner ratchet wheel for effecting the non-feeding stroke of the pawl.

12. In a gear assembly as described, the combination with an outer ratchet wheel having a rotatable spindle and a counterweighted hand thereon, an interior annular cam face on the ratchet wheel, an inner ratchet wheel having a spindle and a counterweighted hand thereon, an arcuate lever pivotally mounted between said wheels engageable by the cam face and provided with a pawl, and a spring on the lever engageable with the inner ratchet wheel for effecting the non-feeding stroke of the pawl.

13. In combination with a vertically arranged supporting panel and an outer front dial, a rear assembly of concentrically disposed vertically arranged ratchet wheels having a common peripheral transverse flange relation, each of said wheels having a telescoping spindle extending centrally through the panel and dial and having an indicating hand, the outermost of said ratchet wheels having an inner annular cam face, a gravity retracted lever pivoted to the panel between the outer ratchet wheel and an inner adjacent ratchet wheel having a pawl therefor and subject to inward movement by said cam face for actuation thereby, and a motor on the panel provided with a reciprocable pitman engaging the teeth of the outermost wheel.

14. In combination with a vertically arranged supporting panel and an outer front dial, a rear assembly of concentrically disposed vertically arranged ratchet wheels having a common peripheral transverse flange relation, each of said wheels having a telescoping spindle extending centrally through the panel and dial and having an indicating hand, the outermost of said ratchet wheels having an inner annular cam face, a spring retracted lever pivoted to the panel between the outer ratchet wheel and an inner adjacent ratchet wheel having a pawl therefor and subject to inward movement by said cam face for actuation thereby, and a motor on the panel provided with a reciprocable pitman engaging the teeth of the outermost wheel.

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