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N. G. HORWITT ET AL

2,001,195

CLOCK

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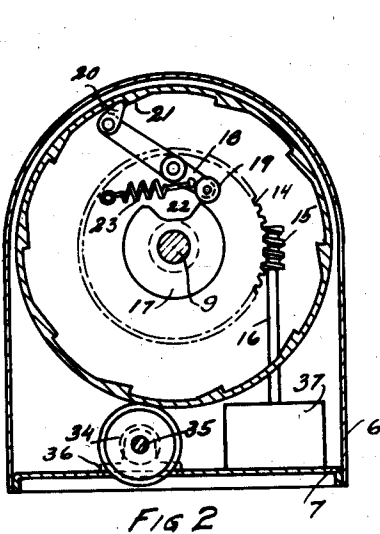


FIG 2

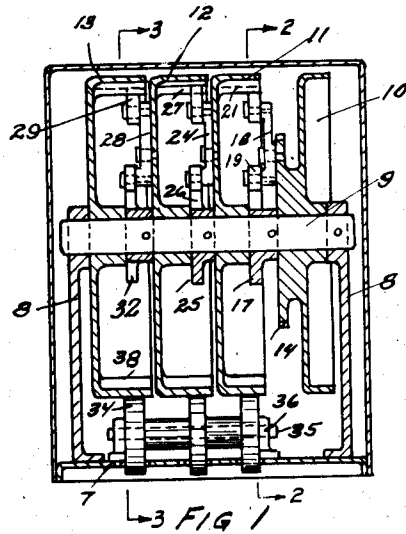


FIG 1

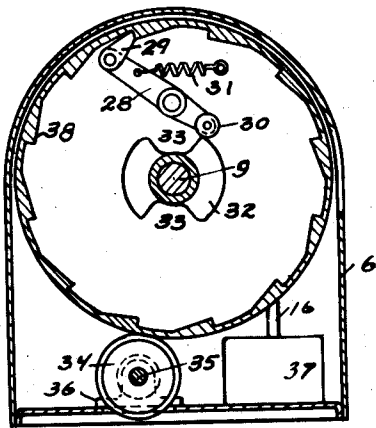


FIG 3

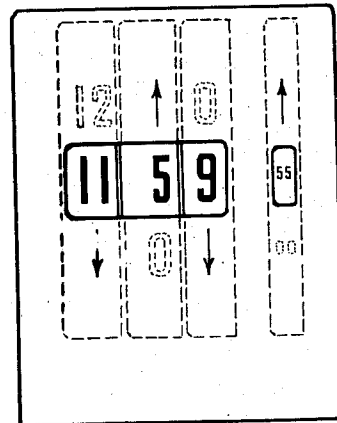


FIG 4

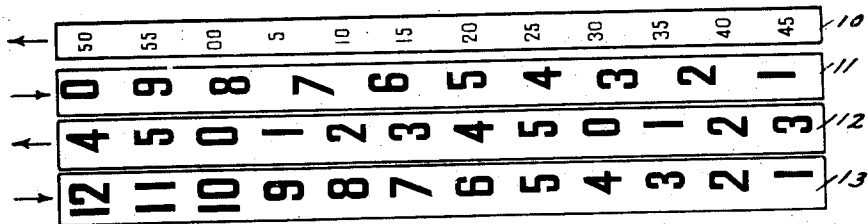


FIG 5

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CLOCK

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15 Claims. (Cl. 58—125)

This invention relates to an improvement in clocks in which the time noting figures are carried upon the periphery of rotary drums, so constructed and arranged as to expose the proper time in hours, minutes and seconds through windows on the face of a clock.

Our clock is so constructed that from the steady motion of the "second" drum, a step by step rotation is imparted to the other drums, in proper related movement to indicate the time. Each drum is used to effect the step by step rotation of its adjacent drum. Another feature is the provision of setting wheels projecting through the casing of the clock.

Other objects and advantages will become apparent upon further study of the description and drawing, in which:—

Fig. 1 is a longitudinal section substantially through the center of the clock, looking to the rear.

Fig. 2 is a cross section taken along the line 2—2 of Fig. 1.

Fig. 3 is a cross section taken along the line 3—3 of Fig. 1.

Fig. 4 is a front elevation of the clock, with the drums indicated in dotted lines, and

Fig. 5 is a development of the periphery of the drums showing the time numerals in their relation to indicate 11:59:55, the time shown by the clock in Fig. 4.

Casing 6 of the clock has a removable floor 7, upon which are mounted standards 8. A shaft 9 is mounted in standards 8 and fixed against rotation therein. Drums 10, 11, 12, and 13 are loosely mounted on shaft 9. Drum 10 is graduated to indicate seconds, "minute" drum 11 has ten numerals marked thereon to indicate the units of the minutes, "minute" drum 12 has twelve numerals thereon to indicate the tens of minutes twice in the extent of its periphery and "hour" drum 13 has twelve numerals thereon to indicate the hours.

Drum 10 has worm wheel 14 fixed to it. Meshing with worm wheel 14 is worm 15 fixed to the top of vertical shaft 16. Electric clock motor 37 drives shaft 16. It is to be understood that a spring clock motor could be used instead. A cam 17, fixed to shaft 9 and hence held stationary, is provided next to worm wheel 14. Pivotaly mounted on "second" drum 10 is a lever 18, which normally tends to rotate about its pivot in a clockwise direction, as regarded in Fig. 2, under the influence of spring 23. One end of lever 18 has mounted thereon a roller 19 which contacts with the periphery of cam 17. Pawl 20 is pivot-

ally mounted on the other end of said lever, said pawl under the influence of a spring (not shown) in its mounting normally tending to rotate the pawl about its pivot in a counter-clockwise direction. On the inside of the flange or shell of drum 11 are ten teeth 21, spaced 36-degrees, with which pawl 20 is adapted to engage. Worm wheel 14 is constantly driven in a counter-clockwise direction, as regarded in Fig. 2, causing roller 19 to travel around the high part of cam 17 in that direction, said cam being provided with a low dwell 22 of sufficient extent so that when roller 19 enters the dwell, there is space enough to permit lever 18 to swing through an arc of 36 degrees of the drum 11 in a clockwise direction under the influence of spring 23. Pawl 20 comes into engagement with a tooth 21 when roller 19 enters dwell 22 causing drum 11 to make a tenth of a revolution in a clockwise direction, corresponding to the passage of a minute's time.

Drum 11 carries a pivoted lever 24, with a pawl and roller similar to that of lever 18 of drum 10. Cam 25 is fixed on shaft 9 adjacent drum 11. It also has a dwell 26, similar to that of cam 17, except that the extent of dwell 26 is such as to cause drum 12 to make one-twelfth of a revolution, every time the lower end of lever 24 passes through it. There are twelve teeth 27 provided on the inside of the flange of drum 12, with which the pawl of lever 24 engages, turning drum 12 one-half a revolution in a counter-clockwise direction every hour. As drum 12 has two sets of numerals 1, 2, 3, 4, 5, 6 or twelve in all, each partial revolution which is in a counter-clockwise direction, every time lever 24 engages dwell 26, will indicate the passage of ten minutes. If only one set of numbers were provided for drum 12, lever 24 would be required to turn it one-sixth of a revolution for each impulse. Such a long throw would prove unsatisfactory with the mechanism as organized.

Drum 12 carries a pivoted lever 28, with a pawl 29, a roller 30, and a spring 31 normally tending to rotate lever 28 in a clockwise direction about its pivot. Cam 32 is fixed to shaft 9, adjacent to drum 12, and is formed with two dwells 33. There are twelve teeth 34 formed on the inside of the flange of drum 13 with which pawl 29 is adapted to engage. The extent of a dwell 33 is such that when roller 30 passes through it, lever 28 under the influence of spring 31, causes pawl 29 to rotate drum 13 one-twelfth of a revolution. As drum 12 rotates one-half a revolution per hour, and there are two dwells 33,

drum 13 is given one-twelfth of a revolution each hour and indicates thereby the passage of an hour.

Drums 11, 12 and 13 are in contact with wheels 34 loosely mounted on shaft 35 supported in bearing 36 on floor 7. Said wheels, which are rubber tired, project through openings in floor 7 and are for the purpose of manually setting the drums. Because of their friction with shaft 35, wheels 34 have a slight braking action to prevent drums 11, 12 and 13 from jumping ahead too far under the impact of levers 18, 24, and 28.

The clock may be constructed without the "second" drum in which case the motor would be connected to the unit "minute" drum with a suitable gear ratio for reduced speed.

We claim:—

1. A clock comprising a shaft, a row of drums presenting numerals representing seconds, minutes and hours, loosely mounted for rotation on said shaft, a motor for driving the drum presenting numerals representing seconds, a member pivotally mounted on each drum, except the one presenting numerals representing hours, releasably engaging the next succeeding drum on said shaft, said member being normally spring actuated to swing about its pivotal axis in a direction opposite to that of the rotation of the drum upon which it is mounted, means for restraining said member from said swing, and means for tripping each member allowing it to swing from said restraining means into engagement with and partially rotate its next succeeding drum at predetermined intervals.

2. A clock comprising a fixed shaft, a row of drums presenting time indicating numerals loosely mounted for rotation on said shaft, a motor for driving a drum at one end of said row, a member pivotally mounted on each drum except on the one at the other end of the row from the motor driven one, said member releasably engaging the drum adjacent to the one upon which it is mounted for rotating said adjacent drum in a direction opposite to that of the one on which it is mounted, and means for releasing said member from engagement with its adjacent drum after the drum upon which said member is mounted has been given a partial rotation, whereby a predetermined amount of rotation of said latter drum effects a partial revolution of the adjacent drum in the opposite direction.

3. A clock comprising a fixed shaft, a row of drums, presenting time indicating numerals, loosely mounted for rotation on said shaft, the drum at one end of said row being motor driven, a member pivotally mounted on each drum except the one at the other end of the row from the driven one, spring means for normally swinging said member about its pivotal axis, the drums on the shaft succeeding the driven one having ratchet teeth, a pawl pivotally mounted on said member adapted to engage the ratchet teeth of the drum adjacent to the one on which it is mounted, a fixed cam, corresponding to each member, and in engagement therewith, said cam being suitably formed to permit the spring means to effect the motion of the pawl against the ratchet teeth at intervals, whereby a predetermined amount of rotation of the drum carrying a member causes a partial revolution of its adjacent drum.

4. A clock comprising a fixed shaft, a row of drums, presenting time indicating numerals, loosely mounted for rotation on said shaft, the drum at one end of said row being motor driven,

a lever pivotally mounted on each drum except the drum at the other end of the row from the driven one, each lever, when turned about its pivotal axis, adapted to engage the drum adjacent to the one upon which it is mounted for causing partial rotation of said adjacent drum at each engagement, a spring normally tending to turn said lever about its pivotal axis in a direction counter to the rotation given the drum upon which said lever is mounted, and a fixed cam corresponding to each lever, each lever being held in engagement with its corresponding cam under the influence of its corresponding spring, said cams being suitably formed to prevent turning of said levers under the influence of their springs, except at predetermined locations.

5. A clock comprising a fixed shaft, a row of drums, presenting time indicating numerals loosely mounted for rotation on said shaft, the drum at one end of the row being motor driven, a member pivotally mounted on each drum except the one at the other end of the row from the driven one, said member being normally spring actuated to have an end swing into operating engagement with the next succeeding drum on the shaft, about its pivotal axis, in a direction opposite to that of the rotation of the drum upon which it is mounted and a cam corresponding to each member fixedly mounted on said shaft, the opposite end of each member from its engaging end being adapted to pass over the periphery of its corresponding cam, said periphery comprising a high part and a low part, the high part of the periphery holding its member out of operative engagement with the next succeeding drum and the low part permitting the member to swing into operative engagement and cause a partial rotation of the next succeeding drum.

6. A clock comprising a fixed shaft, a row of drums, presenting time indicating numerals, loosely mounted for rotation on said shaft, the drum at one end of the row being motor driven and the others being formed with annular ratchet teeth on the inside of their shells, a member pivotally mounted on each drum except the one on the other end of the row from the driven drum, a pawl mounted on the outer portion of each member, each member being normally spring actuated to swing its pawl into operative engagement with the ratchet teeth of the next succeeding drum on the shaft as each member is tripped, thereby causing a partial rotation of said succeeding drum, said member rotating when tripped in a direction counter to that of the drum upon which it is mounted, and a cam corresponding to each member fixedly mounted on said shaft, the inner portion of said member engaging its corresponding cam, said cam having a high portion and a low dwell, said high portion of each cam preventing the tripping of its corresponding member and the low dwell effecting said tripping.

7. A clock comprising a fixed shaft, a "minute" drum presenting numerals from 0 to 9 representing the units of minutes loosely mounted on said shaft, a second "minute" drum presenting two sets of numerals from 0 to 5 representing tens of minutes loosely mounted on said shaft adjacent the first "minute" drum, an "hour" drum presenting numerals from 1 to 12 loosely mounted on said shaft adjacent the second "minute" drum, a member pivotally mounted on each of said "minute" drums, the member mounted on the "minute" drum representing the unit of minutes being normally spring actuated to have its outer portion swing about its pivotal

axis into operative engagement with the "minute" drum representing tens of minutes when said member is tripped, causing thereby a one-twelfth of a revolution of said latter "minute" drum, said member rotating, when tripped, in a direction counter to that of the unit "minute" drum, another member pivotally mounted on the "minute" drum representing the tens of minutes being normally spring actuated to have its outer portion swing about its pivotal axis into operative engagement with the "hour" drum when said latter member is tripped, causing thereby a one-twelfth of a complete revolution of the "hour" drum, said latter member rotating, when tripped, in a direction counter to that of the tens of minutes "minute" drum, and a cam corresponding to each member fixedly mounted on said shaft, the inner portion of each member engaging its corresponding cam, the cam corresponding to the member mounted on the unit "minute" drum having a high portion and a low dwell, and the cam corresponding to the member mounted on the tens of minutes "minute" drum having a high portion and two diametrically opposite low dwells, the high portion of each cam preventing the tripping of its corresponding member and the low dwells effecting said tripping.

8. A clock comprising a fixed shaft, a row of drums, presenting time indicating numerals, loosely mounted for rotation on said shaft, the drum at one end of said row being motor driven, a member pivotally mounted on each drum except the one at the other end of the row from the driven one, each member being normally spring actuated to swing about its pivotal axis when tripped and to cause a partial revolution of its next succeeding drum on the shaft, means for restraining each member from said swing, means for effecting the tripping of each member whereby it swings free of the restraining means when the drum upon which it is mounted has been given a predetermined amount of rotation, and braking means adjacent each drum except the motor driven one, for preventing overrun of a drum when given a partial revolution under the impulse of its corresponding member when tripped.

9. A clock as claimed in claim 8 in which the braking means comprise a wheel rotatably mounted adjacent each drum except the driven one, each wheel having rolling engagement with the periphery of its corresponding drum.

10. A clock as claimed in claim 8 in which the braking means comprise a shaft and a wheel for each drum except the driven one, rotatably mounted on said shaft in rolling contact with the periphery of its corresponding drum.

11. A clock as claimed in claim 8 in which the braking means comprise a wheel rotatably mounted adjacent each drum except the driven one, each wheel having a tire of yieldable material pressed into rolling engagement with the periphery of its corresponding drum.

12. A clock as claimed in claim 8 having a casing, and in which the braking means comprise a wheel rotatably mounted adjacent each drum except the driven one, each wheel having rolling engagement with the periphery of its corresponding drum and projecting through the casing, the projecting portion of said wheels serving as means for setting their corresponding drums by hand.

13. A clock comprising a row of rotatably mounted drums presenting time indicating numerals, a motor for driving a drum at one end of the row, means between adjacent drums operatively connecting each drum with its neighboring drum in the row, said means effecting a partial rotation of each succeeding drum for a predetermined amount of rotation of its predecessor in the row, beginning with the motor driven drum, and a wheel rotatably set against each drum except the motor driven one, the setting of each wheel providing substantial frictional resistance against its rotation to prevent overrun of a drum when given a partial rotation by its preceding drum, each wheel having a tire of yieldable material pressed into rolling engagement with its corresponding drum.

14. A clock comprising a shaft, a row of drums, presenting time indicating numerals loosely mounted for rotation on said shaft, the drum at one end of said row being motor driven, a member pivotally mounted on each drum except the one at the other end of the row from the driven one, each member being normally spring actuated to swing about its pivotal axis when tripped and to cause thereby a partial revolution of its next succeeding drum on the shaft, means for restraining each member from said swing, and means for effecting the tripping of each member whereby it swings free of the restraining means when the drum upon which it is mounted has been given a predetermined amount of rotation.

15. A clock comprising a casing, a row of drums rotatably mounted in the casing, said drums presenting time indicating numerals, a motor for driving a drum at one end of the row, means between adjacent drums operatively connecting each drum with its neighboring drum in the row, said means effecting a partial rotation of each succeeding drum to a predetermined amount of rotation of its predecessor in the row, beginning with the motor driven drum, a wheel, rotatably set against each drum except the motor driven one, the setting of each wheel providing substantial frictional resistance against its rotation to prevent overrun of a drum when given a partial rotation by its preceding drum, each wheel having rolling engagement with its corresponding drum and projecting through the casing, the projecting portions of said wheels serving as means for setting their corresponding drums by hand.

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