June 5, 1934. R. H. WORRALL 1,961,320

HOROLOGY SYSTEM

Filed Dec. 31, 1930

FIG. 1

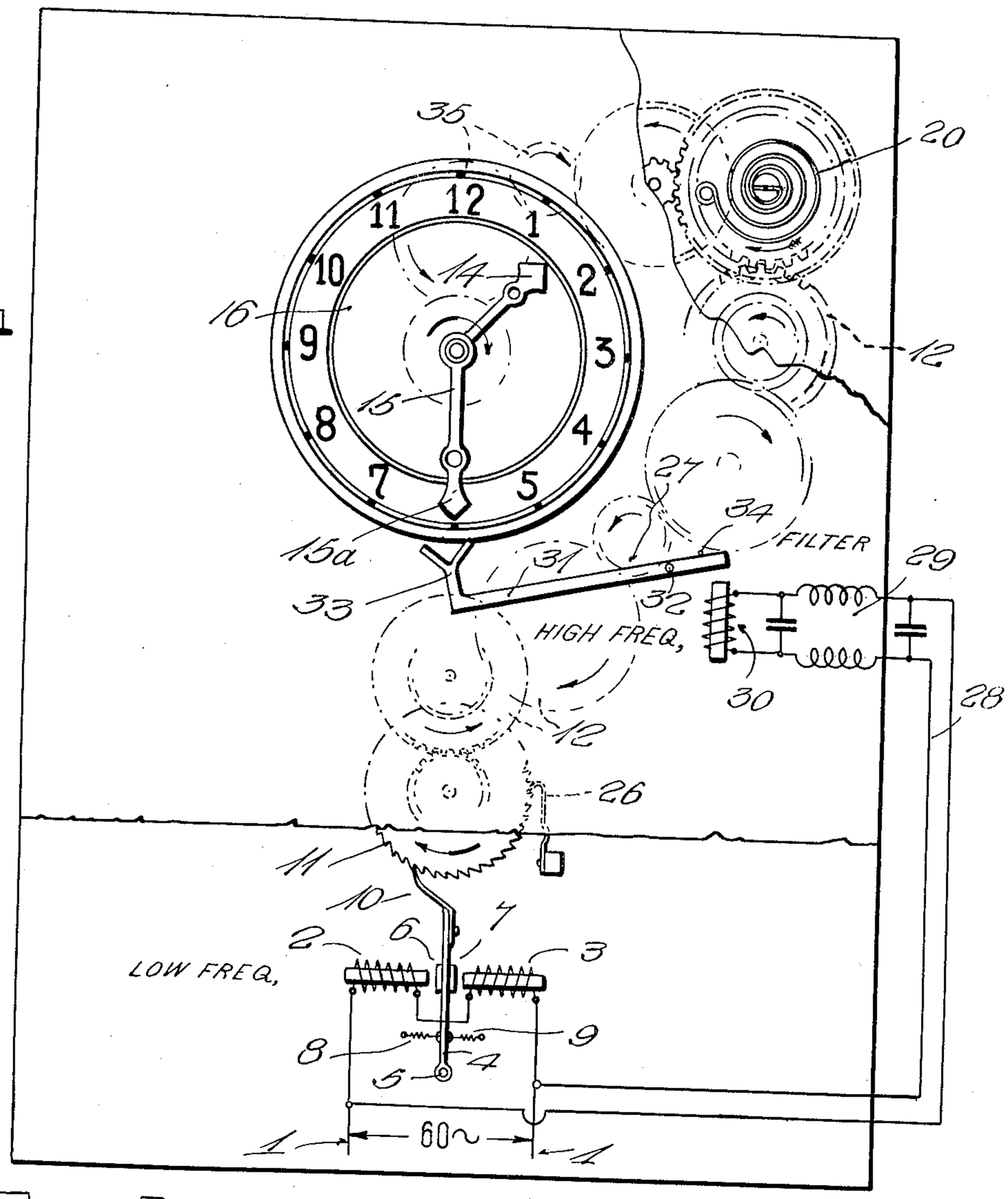
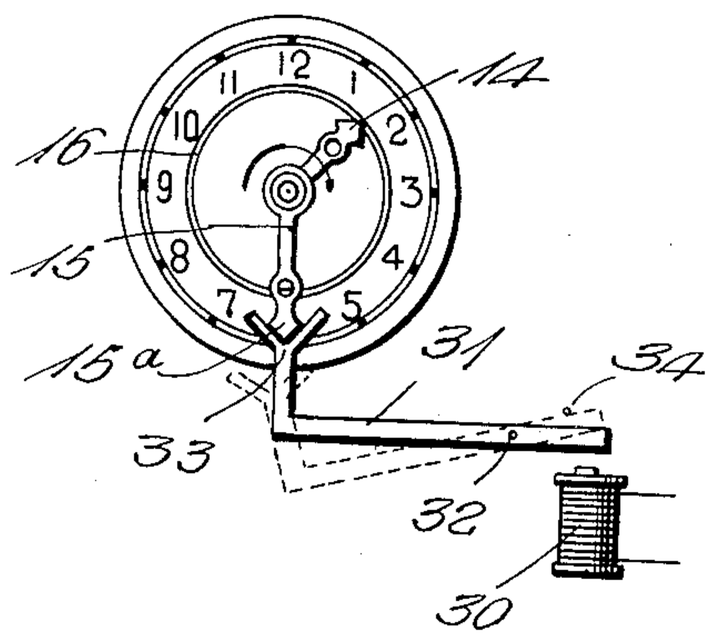


FIG. 2



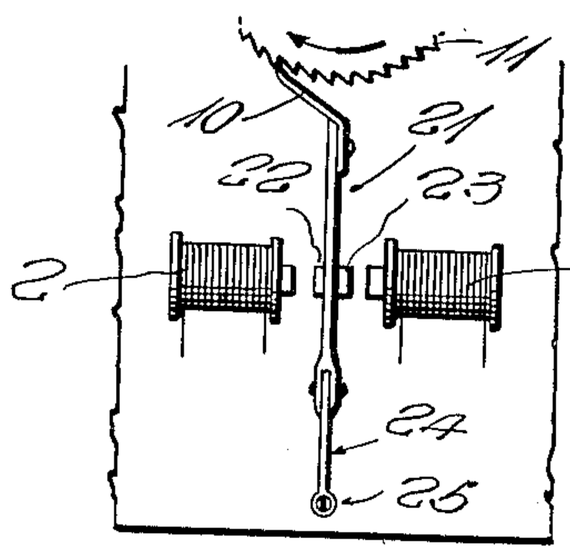


FIG. 3

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HOROLOGY SYSTEM

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5 Claims. (Cl. 58—34)

My invention relates broadly to horology and more particularly to electric clock systems.

One of the objects of my invention is to provide an electric clock system having means for periodically effecting a correction of the time mechanism for maintaining the operation of the clock mechanism with high degree of precision.

Another object of my invention is to provide an electric clock mechanism having means for maintaining the clock mechanism in operation in the event of failure of the power on the line system from which the electric clock is wound.

Still another object of my invention is to provide a mechanism for clocks in which a spring actuating mechanism is maintained in wound condition by power derived from a power transmission line.

A further object of my invention is to provide an electric clock system operative upon an alternating current power supply line having means for selectively responding to a correcting pulse of a frequency differing from the frequency of the power which drives the clock mechanism for resetting the clock at periodic intervals and thus maintaining accurate operation thereof.

Other and further objects of my invention reside in the clock system set forth in the specification hereinafter following by reference to the accompanying drawing, in which:

Figure 1 schematically illustrates a clock system embodying the principles of my invention; Fig. 2 shows schematically one form of correcting device which I provide for resetting the clock periodically and thus maintaining precise operation thereof; and Fig. 3 is a fragmentary view of a modified form of the electric drive of the clock mechanism which I employ.

My invention is directed to a combined spring and power actuated clock having a power operated mechanism for correcting the clock every hour and resetting the minute hand to the minute every hour for maintaining accurate time. The spring actuated mechanism will continue the clock mechanism in operation over a period of several hours in the event that the power should go off. When the power comes on again, the spring actuated mechanism will be automatically wound ready for operation during the next period that the power may go off. The spring actuated mechanism may be wound and the clock mechanism operated from the usual alternating current power line at such standard frequencies as 25 cycles, 60 cycles, etc. The resetting device of my invention is operated at a higher frequency such as, for example, 500 cycles and is operative to actuate an independent solenoid circuit for resetting the clock mechanism to the precise minute.

Referring to the drawing in detail, reference character 1 designates the power line system over which the 60 cycle alternating current power is supplied to the clock and over which the 500 cycle impulses are periodically transmitted for correcting the clock to the precise minute. The line wire circuit connects to a pair of diametrically opposed solenoids indicated at 2 and 3 which are connected in series across the line wire circuit. An armature member 4 pivotally mounted at 5 carries the magnetic members 6 and 7 which are attracted by the solenoids 2 and 3. The armature member 4 is normally maintained centrally between the poles of solenoids 2 and 3 by means of springs 8 and 9 as shown. The extremity of the armature 4 carries a spring detent 10 which engages the ratchet teeth on the ratchet 11. The vibratory movement of armature 4 in timed relation to the 60 cycle alternating current supplied over the power line 1 sets the armature 4 into vibration, moving the detent 10 with respect to ratchet 11, operating the train of gears 12 which are properly proportioned to store energy in spring 20. A convenient conventional arrangement heretofore known in the art for connecting spring 20 between the motor gear train 11—12 and the clock gear train 35 consists in mounting two gears as shown in Fig. 1 on the same shaft, but at least one gear being freely rotatable on the shaft. One end of shaft 20 is attached to one of these gears which engages gear 12. The other end of spring 20 is carried by a pin on the other gear, which engages gear train 35. When spring 20 has been entirely wound, the winding train driven from ratchet 11 is blocked and the spring tends to unwind, thereby operating gear system 35, driving the shafts carrying the hour hand 14 and minute hand 15 of the clock 16. In the event of failure of the power on line 1, the spring 20 unwinds and imparts movement to the gear system 35, driving the hands 14 and 15. That is, the clock is driven from the spring 20 which is wound from time to time from the power line 1. The synchronous movement of the armature enables detent 10 to advance the ratchet 11. The pawl 26 prevents the reverse movement of the ratchet 11.

The correcting mechanism is shown at 27 including an auxiliary line 28 connected to a filter 29 and including a solenoid 30 which acts mag-

netically upon the armature 31 pivoted at 32. The armature 31 has a fork shaped end represented at 33 adapted to be moved into the full line position as shown in Fig. 2 from the dotted line position restrained by pin 34. This movement is effected by the receipt of a signal impulse of a frequency distinguished from the frequency which drives the clock mechanism. A frequency of 500 cycles for example, transmitted over the line 1 each hour will be selected by filter 29 and utilized to excite solenoid 30 which moves armature 31 into a position where the forked end of the armature centers either the minute hand 15 or a projecting member connected to the shaft thereof and shaped as represented at 15*a* to conform with the forked end 33 of the armature 31. The fork moves up precisely on the minute and frictionally engages the projecting end of the minute hand 15 moving the minute hand forward or backward within small angular limits for precisely setting the minute hand on the exact minute.

In lieu of the spring biased armature system shown in Fig. 1, I may provide an armature member having inherent resiliency as illustrated in Fig. 3, wherein the armature 21 carries magnetic members 22 and 23 which are alternately attracted and repelled by solenoids 2 and 3 in synchronism with the 60 cycle alternating current where the armature is carried by a flat spring 24 secured at 25.

While I have described my invention in certain of its preferred embodiments, I desire that it be understood that modifications may be made and that no limitations upon my invention are intended other than are imposed by the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent of the United States is as follows:

1. A clock system comprising a clock mechanism including a main spring, an alternating current power supply line, a pair of solenoids electrically connected in series and operated by said power supply line, an armature member movable between said solenoids at a rate depending upon the frequency of said power supply line, a ratchet mechanism controlled by said armature member, gearing interconnecting said ratchet mechanism with said main spring for winding said main spring, and a setting device controlled by signal impulses transmitted over said alternating current power supply line for correcting said clock mechanism at periodic time intervals, the frequency of said signal impulses being widely different from the frequency of the power supplied over said power supply line of said solenoid.

2. A clock system comprising a clock mechanism, a main spring for driving said clock mechanism, an alternating current power supply line, an electromagnetic device actuated by said power supply line, a ratchet mechanism controlled by said electromagnetic device, means interconnecting said ratchet mechanism with said main spring for winding said main spring, an auxiliary circuit connected with said power supply line, a frequency selective filter connected with said auxiliary circuit, a solenoid connected with said filter and adapted to selectively respond to signaling energy transmitted over said power supply line at a frequency widely different from the frequency of the power supplied to said electromagnetic device for periodically resetting said clock mechanism at recurring time intervals.

3. In a clock system, a clock mechanism, a main spring for driving said clock mechanism, a 60 cycle alternating current power supply line, an electromagnetic device controlled by said power supply line, an armature member controlled by said electromagnetic device, a ratchet mechanism controlled by said armature, gearing interconnecting said ratchet mechanism with said main spring for winding said main spring under vibratory action of said armature, an auxiliary circuit leading from said power supply circuit, a frequency selective filter connected therewith, a solenoid connected with said frequency selective filter, said solenoid responding to signal impulses transmitted over said power supply line at a frequency differing from the frequency of the alternating current supplied to said electromagnetic device, and an electromagnetic armature member actuated by said solenoid for resetting said clock mechanism at recurring time intervals in accordance with the signal impulses transmitted over said power supply circuit.

4. A clock system comprising a clock mechanism, a main spring for driving said clock mechanism, an alternating current power supply line, an electromagnetic device actuated by said power supply line, a ratchet mechanism controlled by said electromagnetic device, means interconnecting said ratchet mechanism with said main spring for winding said main spring, an electromagnetic element, means controlled by said electromagnetic element for resetting said clock mechanism, a frequency selective filter connected in a branch line between said electromagnetic element and said power supply line, said filter comprising an inductance in each side of the branch line and capacities respectively connected in shunt across the branch line at each terminal of said inductances, and passing to said electromagnetic element from said power supply line only alternating current of a frequency widely different from the frequency of the alternating current supplied continuously by said power line for actuating said electromagnetic device.

5. A clock system comprising a clock mechanism, a main spring for driving said clock mechanism, an alternating current power supply line, an electromagnetic device actuated by said power supply line, a ratchet mechanism controlled by said electromagnetic device, means interconnecting said ratchet mechanism with said main spring for winding said main spring, an electromagnetic element, means controlled by said electromagnetic element for resetting said clock mechanism, a frequency selective filter connected in a branch line between said electromagnetic element and said power supply line, said filter comprising capacities and an inductance unit independent of the actuating winding of said electromagnetic element, and passing to said electromagnetic element from said power supply line only alternating current of a frequency widely different from the frequency of the alternating current supplied continuously by said power line for actuating said electromagnetic device.

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