June 5, 1928.

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1,672,802

DEVICE FOR RESETTING POWER DRIVEN MECHANISM TO A PREDETERMINED POSITION

Filed Nov. 19, 1926

2 Sheets-Sheet 1

Fig.1.

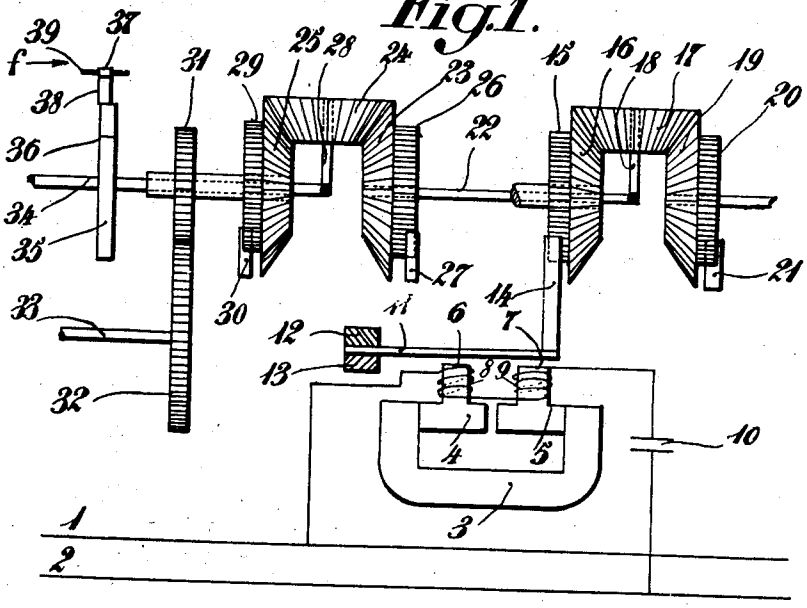


Fig.6.

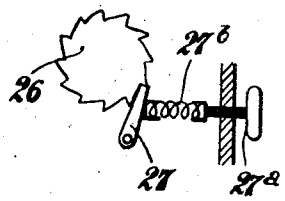
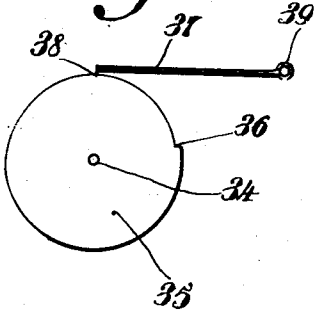


Fig.2.



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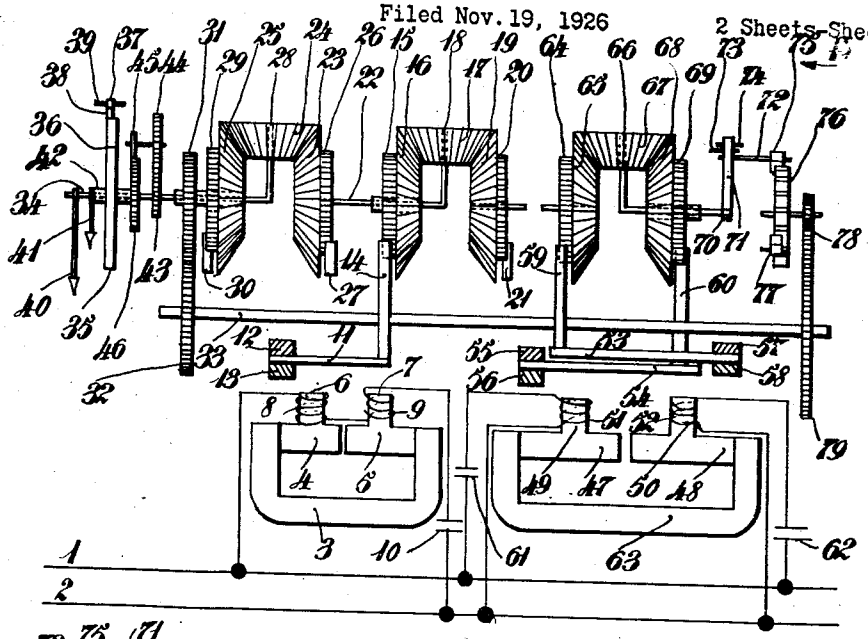
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DEVICE FOR RESETTING POWER DRIVEN MECHANISM TO A PREDETERMINED POSITION

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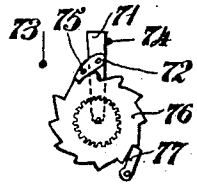


Fig. 3.

Fig. 4.

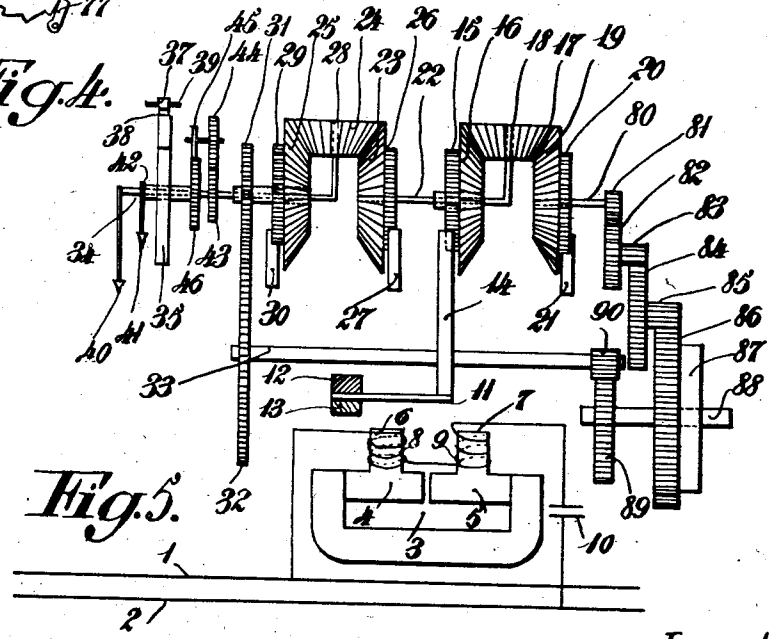


Fig. 5.

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UNITED STATES PATENT OFFICE.

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DEVICE FOR RESETTING POWER-DRIVEN MECHANISM TO A PREDETERMINED POSITION.

Application filed November 19, 1926, Serial No. 149,469, and in France October 13, 1926.

The present invention relates to a device for resetting power driven mechanisms to a predetermined position. More particularly, this invention relates to a device for resetting at a distance and to a predetermined position, any movable member which normally rotates in one direction, without opposing a resisting torque to the driving torque acting on this movable member.

This invention is particularly applicable to the resetting at a distance of clocks to time; it can equally well be applied to the zero-setting at a distance of all meters and registers, and to the synchronization of mechanisms.

In the drawings:

Fig. 1 is a diagrammatical view of the device for resetting a movable member to a predetermined position;

Fig. 2 is a diagrammatical view of the actual resetting device of the said member as seen in the direction of the arrow *f* (Fig. 1);

Fig. 3 is a diagrammatical view showing, by way of example, the device applied to the resetting of a clock to time, the hands of said clock being electrically driven from a distance.

Fig. 4 is a detailed view of the mechanism for advancing the hands of the clock as seen in the direction of the arrow f_1 (Fig. 3);

Fig. 5 is a diagrammatical view showing, by way of example, the device as applied to the resetting of an ordinary clock to time, the winding-up of which is effected automatically.

Fig. 6 is a diagrammatical view of a braking mechanism of some of the wheels.

In the various figures, the same reference numerals refer to the same parts respectively.

In Figure 1, 1 and 2 are the leads of an electricity distributing network, 3 is a magnet, 4 and 5 are two laminated magnetic poles separated by an air gap, 6 and 7 are two projecting pole pieces on which are respectively arranged two coils 8 and 9, connected in series with a condenser 10. The electrical circuit 8, 9, 10 is connected across the leads 1 and 2. 11 is a magnetic vibrating blade secured at one end between two fixed members 12 and 13 and carrying at the other end a flexible plate 14. The vibrating blade 11 has a frequency of own vibration which corresponds to the frequency at which the electrical circuit 8, 9, 10 enters into resonance. 15 is a ratchet wheel integral with the sun wheel 16 of a differential gear; 17 and 19 are respectively the planet wheel and the second sunwheel of this differential gear, 18 being the shaft of the planet wheel. 20 is a ratchet wheel integral with the sunwheel 19 and on which bears a pawl 21 preventing the rotation of the sun wheel 19 in the same direction as the sun wheel 16. The shaft 18 is made integral with the sun wheel 23 of a second differential gear by means of the shaft 22; 24 and 25 are respectively the planet wheel and the second sun wheel of this differential gear; 26 is a ratchet wheel integral with the sun wheel 23 and 27 is a pawl which prevents the wheel 26 and consequently the sun wheel 23 from rotating in a direction opposite to that of rotation of the sun wheel 16. 28 is the shaft of the planet wheel 24 and 29 is a ratchet wheel integral with the sun wheel 25 and on which bears a pawl 30 preventing the sun wheel 25 from rotating in the same direction as the sun wheel 23. The ratchet wheels 20, 26, and 29 are braked by suitable means, for example by reason of the fact that the elastic pressure of each pawl such as 27 can be adjusted by means of a screw 27^a acting on the spring 27^b of the pawl 27 (Fig. 6).

31 is a gear wheel integral with the sun wheel 25 and driven by a gear wheel 32 fixed to the motor shaft 33. The shaft 28 is integral with the shaft 34 on which is mounted the movable member (not shown) which is to be reset to a predetermined position. 35 is the resetting cam (see also Fig. 2) which is fixed to the shaft 34 and which carries a shoulder 36. A lever 37 rotatable about an axis 39 and carrying a heel 38, bears on the said cam 35. When the cam

rotates in a clockwise direction, the lever 37 slides on the cam 35; when the cam rotates in an anti-clockwise direction, the heel 38 locks the cam 35 by means of the shoulder 36.

The operation of the apparatus is as follows:

The shaft 33 is rotated, by any appropriate means, either continuously or intermittently, but always in the same direction. This shaft drives, by means of the gear wheels 32 and 31; the sun wheel 25 in a direction in which the pawl 30 slides on the ratchet wheel 29 (in a clockwise direction, for instance, if the wheel 29 is looked at in the direction of the arrow *f*). The ratchet wheel 26 being suitably braked by the pawl 27, the shaft 28 is driven in the same direction as the sun wheel 25 as well therefore as the shaft 34 of the cam 35 and of the movable member which is to be reset at any moment to a predetermined position.

This resetting is effected in the following manner:

From any given locality, a current is sent in the leads 1 and 2, this current having a frequency for which the circuit 8, 9, 10 enters into resonance, thereby causing the blade 11 to vibrate, as known. The plate 14 engages the ratchet wheel 15 in the manner of a pawl and causes the said ratchet wheel to rotate in a direction opposite to that of rotation of the wheel 29. As the wheel 20 is unable to rotate in the same direction as the wheel 15 and as it is suitably braked by the pawl 21, the shaft 18 of the planet wheel 17 rotates in the same direction as the sun wheel 16 and drives, by means of the shaft 22, the sun wheel 23 which is braked to a lesser extent by the pawl 27 than the wheel 20 is by the pawl 21. The sun wheel 23 then drives the shaft 28 of the planet wheel 24 in the same direction, and consequently in an opposite direction to that of rotation of the sun wheel 25. The shaft 34 and the cam 35 rotate until the heel 38 abuts against the shoulder 36. The movable member integral with the shaft 34 is then reset at the desired predetermined position. At this moment, the shafts 34 and 28, the planet wheel 24, the sun wheel 23, the shafts 22 and 18 are locked, since the wheel 29 can only rotate at the speed which is imparted to it by the motor shaft 33. From this moment, the planet wheel 17 rotates on its shaft 18, driving the sun wheel 19 in an opposite direction to that of rotation of the sun wheel 16. Both these sun wheels and the planet wheel 17 continue to rotate until the current sent in the leads 1 and 2 ceases and consequently until the blade 11 ceases to vibrate. Of course, the operation of the device described is all the more simple to understand as one supposes that the normal speed of the shaft 34 driven by the shaft 33 is smaller than the speed in the opposite direction which is communicated to the said shaft 34 by the sun wheel 23 in order to effect the resetting.

The cam 35 can equally well be mounted on a gearing having a reduced speed relative to the shaft 34, as shown in the following examples:

Referring to Figure 3, the device shown in Figures 1 and 2 can be recognized. 40 is the minute-hand of the clock, mounted on the shaft 34. 41 is the hour-hand mounted on the sleeve 42 which carries the time resetting cam 35 and which is connected to the shaft 34 through the intermediary of the gears 46, 45, 44 and 43. 63 is a magnet; 47 and 48 are laminated poles separated by an air-gap and on the respective projecting pole-pieces 49 and 50 of which are mounted two coils 51 and 52 respectively in series with the condensers 61 and 62. The circuits 61, 51 and 62, 52 are connected across the leads 1 and 2. 53 and 54 are two magnetic vibrating blades; 53 is secured at one end between two fixed members 57 and 58 and carries at the other end a flexible plate 59. The blade 54 is secured at one end between two fixed members 55 and 56 and carries at the other end a flexible plate 60. The period of own vibration of the blade 53 corresponds to the frequency F_1 for which the circuit 61, 51 enters into resonance; likewise, the period of own vibration of the blade 54 corresponds to the frequency F_2 for which the circuit 62, 52 enters into resonance. 64 is a ratchet wheel integral with the sun wheel 65 of a differential gear of which 67 is the planet wheel rotatable around the shaft 66. 68 is the second sun wheel of this differential gear and is integral with the ratchet wheel 69. The shaft 70 (see also Fig. 4) integral with the shaft 66 carries a member 71 which is movable between two fixed abutments 73 and 74. The member 71 carries a spindle 72 on which is fixed a pawl 75 which engages the ratchet wheel 76; 77 is a counter-pawl; 78 is a gear wheel integral with the ratchet wheel 76; the gear wheel 79, driven by the gear wheel 78 is mounted on the shaft 33.

The operation of the clock described is as follows:

When a current of frequency F_2 flows in the leads 1 and 2, the circuit 62, 52 enters into resonance and, as known, the blade 54 vibrates. The plate 60 actuates the ratchet wheel 69 in the manner of a pawl and causes it to rotate in an anti-clockwise direction when viewed in the direction of the arrow f^1. The sun wheel 65 being unable to rotate in the same direction as the sun wheel 68, and being suitably braked, for example by the plate 59, acting as a pawl, the pressure of which can be regulated as that of the pawl 27, the shaft 66 of the planet wheel 67 rotates, as known, in the same direction as

the sun wheel 68. The shaft 70 then drives the member 71 until the latter abuts against the fixed abutment 73. During this movement, the pawl 75 rotates the ratchet wheel 76 and consequently the gear wheels 78, 79 and the shaft 33. When the member 71 abuts against the member 73, the shaft 66 is locked, and as known, the sun wheel 65 then rotates in the opposite direction to that of rotation of the sun wheel 68 until the current of frequency F_2 is no longer sent. When a current of frequency F_1 is sent in the leads 1 and 2, it will be understood that, in the same way, the plate 59 vibrates, rotates the ratchet wheel 64 in a clockwise direction (when viewed in the direction of the arrow f_1) and drives the planet wheel 67 and its shaft 66 in this same direction, the wheel 69 being suitably braked, for example by the plate 60 acting as a pawl and the pressure of which can be regulated as that of the pawl 27. The rotation of the shaft 66 returns the member 71 against the abutment 74 without rotating the wheel 76, owing to the counter-ratchet 77.

Hence, by sending, for example, two currents having frequencies F_1 and F_2 respectively, per minute, it will be understood that, through the intermediary of suitably designed gear wheels such as 78, 79 32 and 31, the minute-hand 40 is advanced by $\frac{1}{60}$th turn per minute, that is to say by one minute. The hour-hand 41 connected to the shaft 34, through the intermediary of the gear wheels 46, 45, 44 and 43 simultaneously advances with the desired stepping down.

When it is desired to reset the clock to time, a current is sent in the leads 1 and 2 of frequency such that the blade 11 is vibrated, and as previously described, rotates the shaft 34 and consequently the sleeve 42 and the cam 35 until the heel 38 comes into engagement with the shoulder 36. At this moment the hands are set in well determined position, for example, noon.

It will thus be possible to effect two resetting operations per day: for example at noon and at midnight.

The described system allows of changes in the hour to be made such as, for instance, the transition from summer to winter time and vice-versa. With this end in view the change in the hour can be effected at midnight to either 1 a. m. or 11 p. m.

Fig. 5 shows also, by way of example, the use of the resetting device above described in the resetting to time of an ordinary escapement clock and in which use is made, for rewinding the spring of the clock of the movement of the sun wheel 19 which rotates only when the resetting of the hands is effected.

In Fig. 5, 80 is the shaft of the sun wheel 19 integral with the gear wheel 81. 82, 83, 84, 85, 86 are gear wheels which drive, with a certain stepping down, the barrel 87 of the clock-spring. The spring shaft 88 through the intermediary of the gear wheels 89, 90, 32, and 31, rotates the sun wheel 25 which then normally drives the hands 41 and 42 with a continuous motion.

In Fig. 5, the escapment mechanism of the clock has not been represented, as it can be of any type.

For resetting the clock to time, the mode of operation is as above described.

It should be pointed out, however, that during the time resetting operation, the shaft 28 which rotates in the opposite direction to that of rotation of the clock and which cannot drive the sun wheel 25 in the same direction owing to the pawl 30, has no tendency to oppose the escapement of the clock.

When the hands are reset as previously described, the sun wheel 19 begins to rotate, use is made of this movement in order to wind the clock up through the intermediary of suitable gear wheels. If the resetting to time of the hands requires at the most 10 seconds and if a current is sent in the leads 1 and 2 for 60 seconds, for example, the spring of the clock can be wound up during 50 seconds. Of course, if the resetting position of the hands corresponds to the noon position, the sending of the current will begin at one minute before noon, so that it will be exactly noon at the precise moment when, the current ceasing to flow, the hands are again normally driven by the spring of the clock.

From an examination of Fig. 5, it will be apparent that the above described system of resetting can be utilized for the resetting to time of any clock which is wound up by hand or by any independent automatic means.

I claim:

1. A position resetting device comprising a differential gear having two sun wheels and one intergearing planet wheel, means for rotating one sun wheel in one direction, a connection between said planet wheel and the member to be reset to a given position, a second differential gear having two sun wheels and one integearing planet wheel, a connection between said second planet wheel and the other sun wheel of said first differential gear, and means for rotating one of the sun wheels of said second differential gear.

2. A position resetting device comprising a differential gear having two sun wheels and one intergearing planet wheel, means for rotating one sun wheel in one direction, a connection between said planet wheel and the member to be reset to a given position, a second differential gear having two sun wheels and one intergearing planet wheel, means for locking said sun wheels against

rotation in one direction respectively, a connection between said second planet wheel and the other sun wheel of said first differential gear, and means for rotating one of the sun wheels of said second differential gear.

3. A position resetting device comprising a differential gear having two sun wheels and one intergearing planet wheel, means for rotating one sun wheel in one direction, a connection between said planet wheel and the member to be reset to a given position, a second differential gear having two sun wheels and one intergearing planet wheel, means for locking said sun wheels against rotation in one direction respectively, means for braking said sun wheels, a connection between said second planet wheel and the other sun wheel of said first differential gear, and means for rotating one of the sun wheels of said second differential gear.

4. A position resetting device comprising a differential gear having two sun wheels and one intergearing planet wheel, means for rotating one sun wheel in one direction, a rotating shaft connecting said planet wheel and the member to be reset to a given position, a cam on said shaft, a locking member adapted to lock said cam against rotation in one direction, a second differential gear having two sun wheels and one intergearing planet wheel, means for locking said sun wheels against rotation in one direction respectively, means for braking said sun wheels, a connection between said second planet wheel and the other sun wheel of said first differential gear, and means for rotating one of the sun wheels of said second differential gear.

5. A position resetting device comprising a differential gear having two sun wheels and one intergearing planet wheel, a connection between said planet wheel and the member to be reset to a given position, a second differential gear having two sun wheels and one intergearing planet wheel, a spring barrel, a shaft actuated by the spring of said barrel, a connection between the second differential gear and said spring barrel, and a connection between said shaft and the first differential gear.

6. A position resetting device comprising a differential gear having two sun wheels and one intergearing planet wheel, a connection between said planet wheel and the member to be reset to a given position, a second differential gear having two sun wheels and one intergearing planet wheel, means for locking said sun wheels against rotation in one direction respectively, a spring barrel, a shaft actuated by the spring of said barrel, a connection between the second differential gear and said spring barrel, and a connection between said shaft and the first differential gear.

7. A position resetting device comprising a differential gear having two sun wheels and one intergearing planet wheel, a connection between said planet wheel and the member to be reset to a given position, a second differential gear having two sun wheels and one intergearing planet wheel, means for locking said sun wheels against rotation in one direction respectively, means for braking said sun wheels, a spring barrel, a shaft actuated by the spring of said barrel, a connection between the second differential gear and said spring barrel, and a connection between said shaft and the first differential gear.

8. A position resetting device comprising two differential gears having each two sun wheels and one planet wheel, a connection between the planet wheel of the second differential gear and one sun wheel of the first, a spring for imparting motion to the other sun wheel of the first differential gear, means for winding said spring from one sun wheel of the second differential gear, means for actuating the other sun wheel of the second differential gear, and a connection between the planet wheel of the first differential gear and the member to be thereby driven and reset.

9. A position resetting device comprising a differential gear having two sun wheels and one intergearing planet wheel, a rotating shaft connecting the planet wheel of said differential gear and the member to be reset to a given position, a cam mounted on said shaft, means for locking said cam against rotation in one direction, a second differential gear having two sun wheels and one intergearing planet wheel, a connection between said second planet wheel and one sun wheel of the first differential gear, an electro-mechanical motor for rotating one of the sun wheels of said second differential gear, a spring barrel connected by gears to the other sun wheel of the second differential gear, a spring contained in said barrel and connected by gears to the other sun wheel of the first differential gear, means for locking all the sun wheels against rotation in one direction respectively, and means for braking all of said sun wheels.

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