Aug. 29, 1933. A. W. FOWLER 1,924,116

CLOCK WINDING MECHANISM

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Fig. 1.

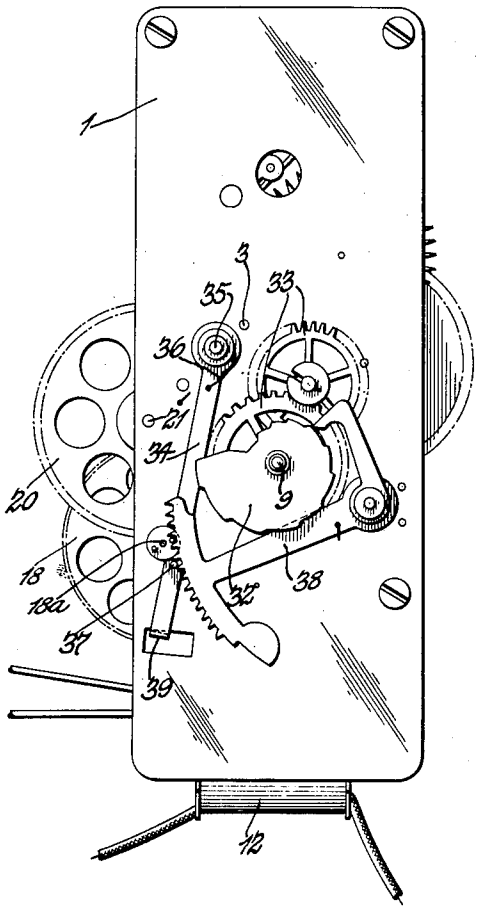


Fig. 2.

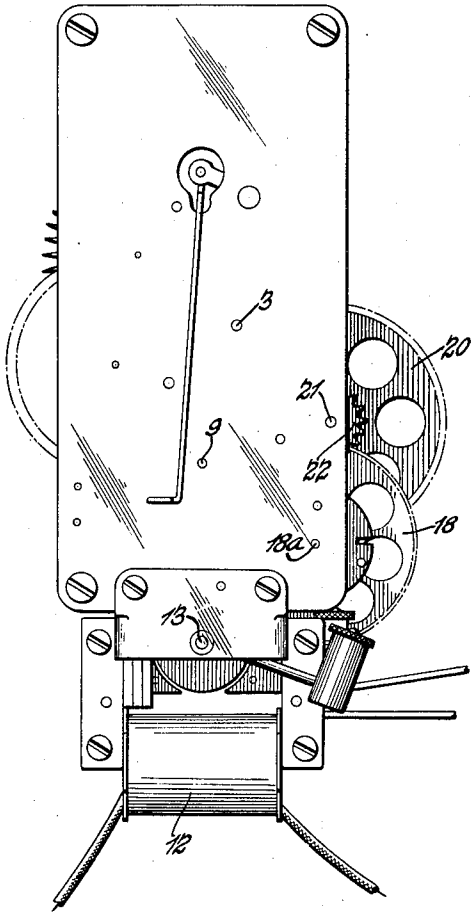
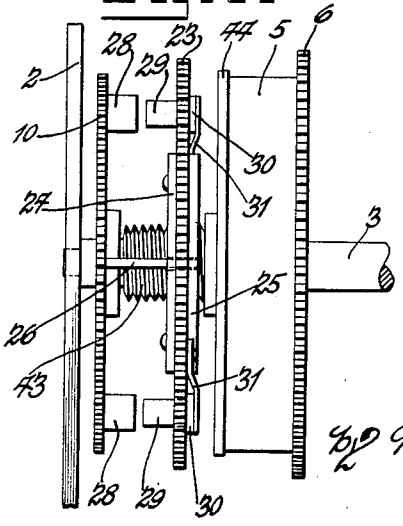


Fig. 3.



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Fig. 3.

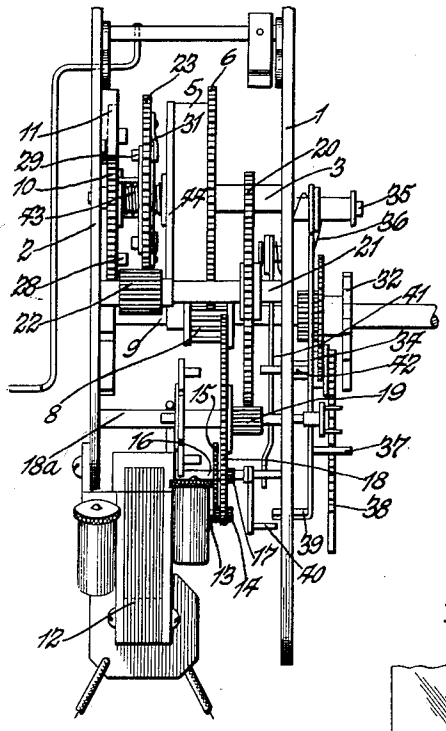


Fig. 4.

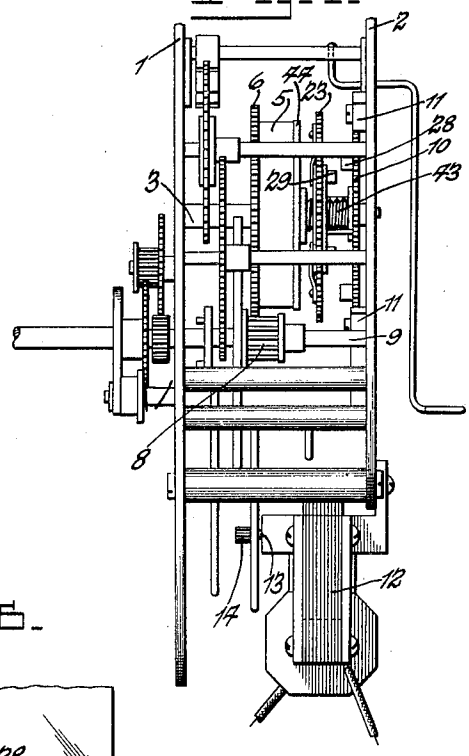


Fig. 6.

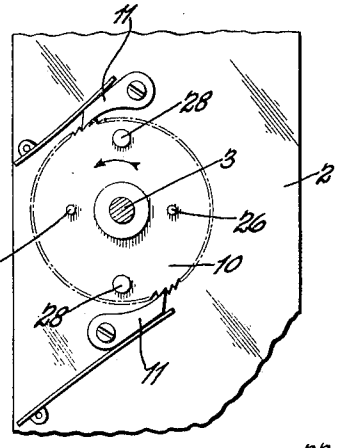


Fig. 5.

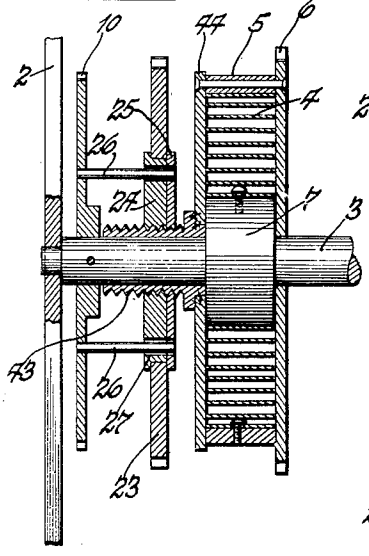


Fig. 7.

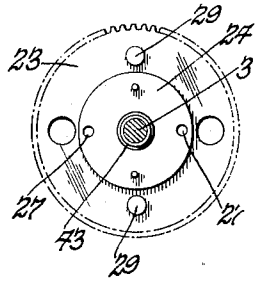
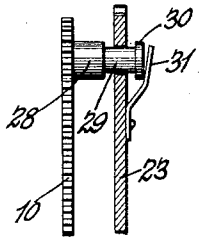


Fig. 8.



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Patented Aug. 29, 1933 1,924,116

UNITED STATES PATENT OFFICE

1,924,116

CLOCK WINDING MECHANISM

Arno W. Fowler, Highland, Ill.

Application March 18, 1929. Serial No. 347,858

4 Claims. (Cl. 185—40)

This invention relates to clock winding mechanism whereby the winding of the clock is effected by the operation of the continuously energized motor under control of the time indicating mechanism of the clock in such a way that the motor is permitted to function only when the train of operating mechanism is conditioned for operation by the motor. According to the present invention the train of operating mechanism whereby the clock spring is rewound by operation of the motor is held against operation until a certain condition is brought about by the time indicating mechanism of the clock to permit the train of operating mechanism to be operated by the motor.

An object of the invention is to provide an improved clock winding mechanism embodying the subject matter mentioned and provided with means for automatically stopping operation of the winding mechanism so as to prevent overwinding.

Other objects will appear from the following description, reference being made to the drawings in which Fig. 1 is a front elevation of the clock embodying the present invention.

Fig. 2 is a rear elevation.

Fig. 3 is a side elevation.

Fig. 4 is an elevation showing the opposite side of the clock from that shown in Fig. 3.

Fig. 5 is a sectional view of the spring winding device.

Fig. 6 is a view showing parts of the present invention in connection with the ratchet pinion that is attached to the spring shaft of the clock.

Fig. 7 is a side elevation of the cooperation device whereby said pinion is rotated effectively to rotate said shaft and thereby wind the spring of the clock.

Fig. 8 is a detail view showing the cooperative relationship of parts carried by said ratchet pinion and other parts carried by the gear shown in Fig. 7.

Fig. 9 is an elevation of the embodiment shown in Fig. 5.

The subject matter of the present invention is embodied in a clock mechanism supported by a front frame 1 and a rear frame 2. This clock mechanism includes a rotary shaft 3 supported by the frames 1 and 2. A spring 4 is mounted within a barrel 5 attached to a gear wheel 6 that is rotative about the shaft 3. One end of the spring 4 is attached to a collar 7 that is rigid on the shaft 3 and the opposite end of said spring is attached to the barrel 5. The power and energy of this spring is utilized to rotate the gear 6 about the shaft 3. The present invention comprises mechanism under control of the clock striking device for effecting and controlling winding of the spring 4. The gear wheel 6 meshes with a pinion 8 mounted on a shaft 9. Said pinion 8 constitutes a part of the familiar mechanism for operating the time-indicating mechanism by the gear 6. An element 10 is attached to the shaft 3 (Figs. 5, 6 and 9) and, as shown, is a ratchet wheel or pinion and is engaged by spring-actuated detents 11 which prevent the shaft 3 from being turned by the spring 4, but permit the shaft 3 to be turned in the opposite direction to energize said spring 4.

A constantly energized motor 12 is supported by the framework of the clock and is arranged to rotate a shaft 13 on which a small pinion 14 is secured. The pinion 14 meshes with a gear 15 rigid on a spindle 16 rotatively supported by the frames 1 and 2. A small pinion 17 rigid on the spindle 16 meshes with a gear 18 rigid on the shaft 18a. A pinion 19 rigid on the shaft 18a meshes with a gear wheel 20 that is rigid on a shaft 21 rotatively supported by the frames 1 and 2 and having rigid thereon a pinion 22 in permanent mesh with an annular rack 23. The annular rack 23 is rotative on a support comprising a hub 24 and a disc 25 attached to said hub. The hub 24 and the disc 25 embrace the annular rack 23 loosely between peripheral portions of said parts to enable it to rotate on said hub 24. A number of pins 26 rigid with the ratchet pinion 10 project through holes 27 in the parts 24 and 25 so as to permit the annular rack 23 and its support to move laterally toward and away from the ratchet wheel 10. A number of lugs 28 project laterally from the ratchet pinion 10 toward the annular rack 23. A number of plunger detents 29 are mounted for sliding movements in holes in the annular rack 23, each having on one end a head 30 engaged by a spring 31 whereby said detents are pressed toward the ratchet wheel 10. The detents 29 are the same distance from the axis of the shaft 30 as the lugs 28 so that these parts engage with each other at the proper time.

The striking mechanism of the clock is of a familiar type comprising a snail 32 rotative on the spindle 9 and operated by a train of gearing 33 driven by the time-indicating mechanism. A swinging arm 34 suspended from a pivot 35 is actuated toward the shaft 9 by a spring 36 and has a pin 37 projecting into engagement with a rack 38 controlled by the snail 32. The swinging arm 34 is bent to provide a projection 39 extending into the path of movement of a crank 40

attached to the spindle 16 so that when the striking mechanism is not operating the crank 40 is held from rotation, thereby preventing operation of the motor and preventing winding of the clock. It is familiar that at the proper time this arm 34 is moved by an arm 41 under control of and operated by the time-indicating mechanism and this operation of said arm 41 is utilized to engage a pin 42 projecting from the arm 34 so as to move said arm 34 a sufficient extent to disengage the extension 39 from the crank 40. The arm 41 is also displaced from the path of movement of the crank 40 by operation of the time-indicating mechanism so that during operation of the striking mechanism the motor 12 is free to operate the train of gearing leading to and including the annular rack 23.

The support 24—25 is screwed on a threaded hub 43 loosely supported on the shaft 3 and rigid with the end wall 44 of the spring barrel.

In operation the time-indicating mechanism is driven by the spring 4 which rotates the gear 6 and thereby the threaded hub 43. Since the ratchet wheel 10 is held by the detents 11 from being rotated with the gear 6; and since said ratchet gear 10 is rigid with the shaft 3 it is clear enough that the support 24—25 is held from rotation. Since the threaded hub 43 is rotated with the gear 6 it necessarily follows that during the operation of the time-indicating mechanism the support 24 is moved toward the ratchet wheel 10. This movement continues until the detents 29 engage the sides if the lugs 28. If the detents 29 are brought into endwise abutting contact with the lugs 28, as shown in Fig. 8, the springs 31 will yield to prevent the parts from being damaged and a slight rotary movement of the annular rack 23 about its support 24 will carry the sliding detents 29 out of endwise abutting contact with the lugs 28. When the detents 29 are moved out of endwise abutting contact with the lugs 28 it is clear that the springs 31 will move the detents 29 a sufficient distance so that as the rack 23 continues to rotate about its support 24 said detents 29 will engage against the sides of the lugs 28. Thus, continued rotation of the annular rack 23 will, because of the engagement of the detents 29 against the sides of the lugs 28, rotate the ratchet wheel 10 and thereby the shaft 3 in a direction to wind the spring 4. This turning of the shaft 3 relative to the spring barrel with which the threaded hub 43 is connected obviously moves the support 24 in a direction toward the spring barrel and away from the ratchet wheel 10 to an extent sufficient to carry the detents 29 out of engagement with the lugs 28. When the detents 29 are thus carried out of engagement with the lugs 28 the annular rack 23 is free to rotate about its support 24 as an axis without further operation of the ratchet wheel 10 so that there is no possibility of overwinding the spring.

This operation of the train of gearing from the motor to the annular rack 23 continues until the operation of the striking mechanism is stopped, whereupon the spring 36 automatically moves the swinging arm 34 to a position in which the projection 39 is in the path of movement of the crank 40. The crank 40 then engages the projection 39 and stops the motor which will not be started again until the time-indicating mechanism has caused the familiar arm 41 to push the pin 42 and thereby the arm 34 to a position in which the projection 39 is out of engagement with the crank 40.

This invention, therefore, winds the clock frequently so as to maintain the spring 4 practically under uniform tension. There is no possibility of overwinding the spring, such objection being obviated by the novel arrangement and mounting of the annular rack 23. The striking mechanism of the clock may be operated optionally for demonstration purposes without any danger of overwinding the spring so that no consideration need be given by the operator or demonstrator to the motor of preventing overwinding while demonstrating the striking or chiming qualities of the clock.

If the power to the motor should become exhausted or if there should be interruptions in the power for a sufficient time to permit the clock to run down; that is to say, if there was no power to operate the motor until the clock ran down, it is obvious that the clock would stop when the spring 4 became unwound or run down. Upon resumption of the power it would only be necessary to turn the hands of the clock in a clockwise direction until the clock would strike. This would immediately set the motor in operation by removing the abutment 39 and the arm 41 from the path of the crank 40 and this running of the motor would wind the spring 4 sufficiently to operate the clock until the next succeeding operation of the striking mechanism which would again start the motor in operation. These intermittent windings of the spring 4 by the motor would eventually wind up said spring 4 to the maximum extent, after which the clock would continue to operate in the manner herein described.

The spring 4 will be eventually wound up from a completely run-down condition by the intermittent windings described because, at each operation of the annular rack 23 by the motor, said rack 23 is rotated to a greater extent than is needed or required to rewind the spring 4 to its previous condition. Thus, so long as the detents 29 are in engagement with the lugs 28, each operation of the motor rotates the ratchet wheel 10, and thereby the shaft 3, to wind up the spring 4 to a greater extent than said spring had run down since the preceding operation of the rack 23 by the motor. When the spring 4 is completely wound up, overwinding is prevented because the rack 23 has moved away from the ratchet wheel 10 a sufficient distance to permit the detents 29 to escape from the lugs 28, and thus prevent overwinding of the spring.

I am aware that the construction, arrangement and relationship of the parts of this invention may be varied without departure from the nature and principle of the invention. I contemplate such variations as may be desirable or expedient and what I claim and desire to secure broadly by Letters Patent is:—

1. In a device of the character described, a shaft supported for rotation in one direction, a wheel attached to said shaft, a gear wheel mounted for rotation about said shaft as an axis, a spring connected with said shaft and with said gear wheel for rotating said gear wheel about said shaft as an axis, a constantly energized motor, a threaded hub attached to said gear wheel, a support screwed on said hub for movement toward and from said first named wheel, a connection holding said support from rotating with respect to said first named wheel during movement of said support toward and from said first named wheel, an annular rack rotative about said support, gearing operated by said motor for rotating said rack about said support, and members for rotating said first named wheel and thereby said shaft by said rack to wind said spring to a predetermined degree.

2. In a device of the character described, a shaft supported for rotation in one direction, a wheel attached to said shaft, a gear wheel mounted for rotation about said shaft as an axis, a spring connected with said shaft and with said gear wheel for rotating said gear wheel about said shaft as an axis, means cooperating with said first named wheel preventing rotation of said shaft by said spring, a motor, a threaded hub rigid with said gear wheel and extending toward said first wheel, a support screwed on said hub for movement toward and from said first wheel, means holding said support from rotating with respect to said first wheel during movement of said support toward and from said first wheel, an annular rack rotative about said support, gearing operated by said motor for rotating said rack about said support, and members for rotating said first wheel and thereby said shaft by said rack to wind said spring.

3. In a device of the character described, a shaft rotative in one direction only, an element rigid on said shaft, a gear wheel mounted for rotation about said shaft as an axis, a spring connected with said shaft and with said gear wheel for rotating said gear wheel about said shaft as an axis while said shaft remains stationary, a constantly energized motor, a threaded hub attached to and rotated by said gear wheel and extending toward said element, a support screwed on said hub and movable thereby toward and from said element, means holding said support from rotating with respect to said element during movement of said support toward and from said element, an annular rack mounted for rotation about said support, gearing operated by said motor for rotating said rack about said support, and members for rotating said element and thereby said shaft by said rack to wind said spring to a predetermined degree.

4. In a device of the character described, a shaft rotative in one direction only, an element rigid on said shaft, a gear wheel mounted for rotation about said shaft as an axis, a spring connected with said shaft and with said gear wheel for rotating said gear wheel about said shaft as an axis while said shaft remains stationary, a constantly energized motor, a threaded hub attached to and rotated by said gear wheel and extending toward said element, a support screwed on said hub and movable thereby toward and from said element, means holding said support from rotating with respect to said element during movement of said support toward and from said element, an annular rack mounted for rotation about said support, gearing operated by said motor for rotating said rack about said support, members for rotating said element and thereby said shaft by said rack to wind said spring to a predetermined degree, and mechanism operated by said gear wheel controlling operation of said gearing by said motor.

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