

A. G. WISEMAN.
ELECTRIC CLOCK SYNCHRONIZER.

No. 502,157.

Patented July 25, 1893.

Fig. 1.

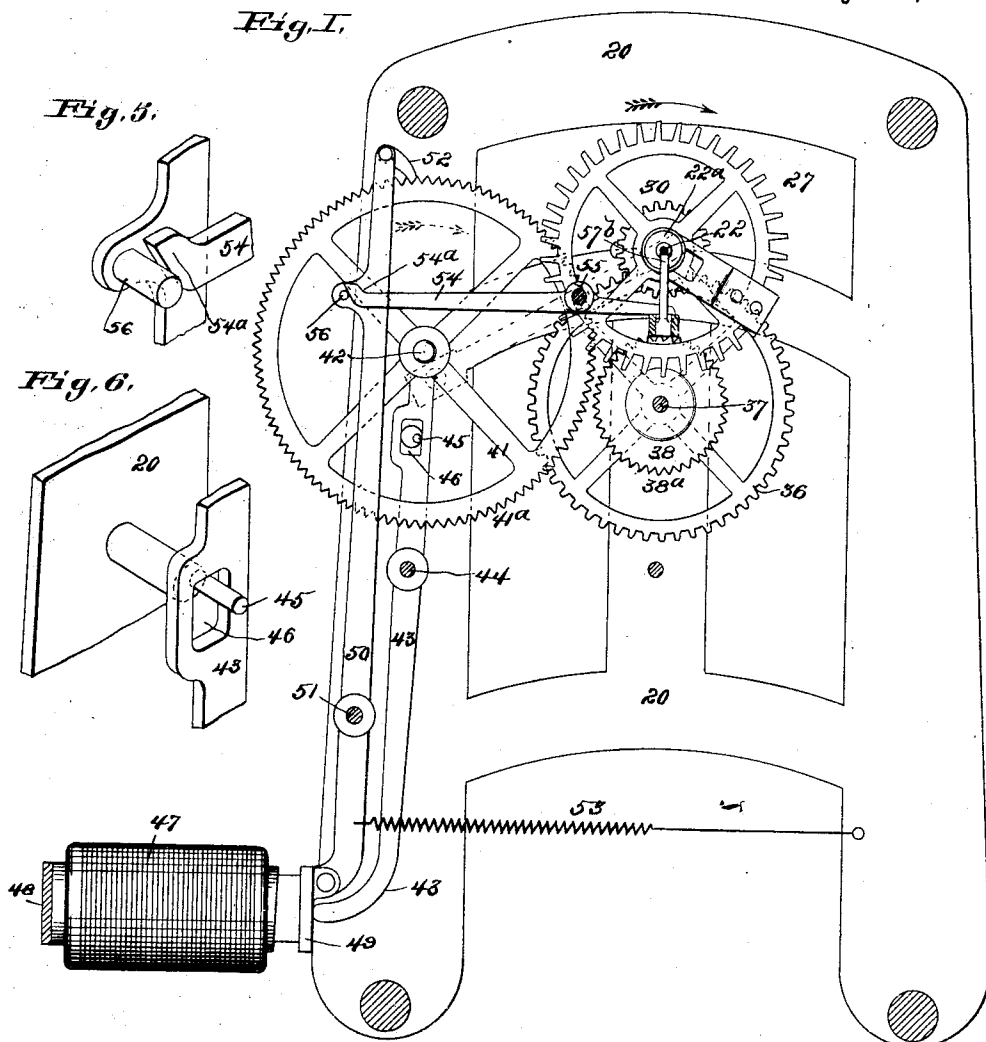
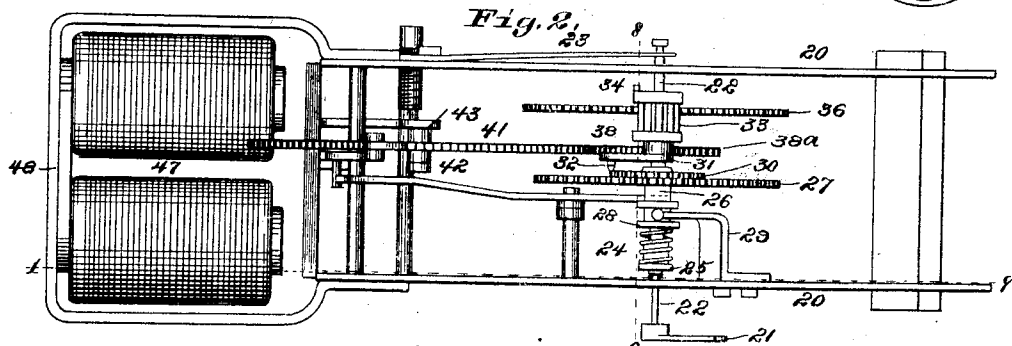


Fig. 2.



Attest:

Edward L. Knight
 Geo. E. Bruce.

Fig. 3

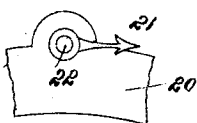


Fig. 4.



Inventory:

Arthur G. Wiseman
By Knight Bros
Attys.

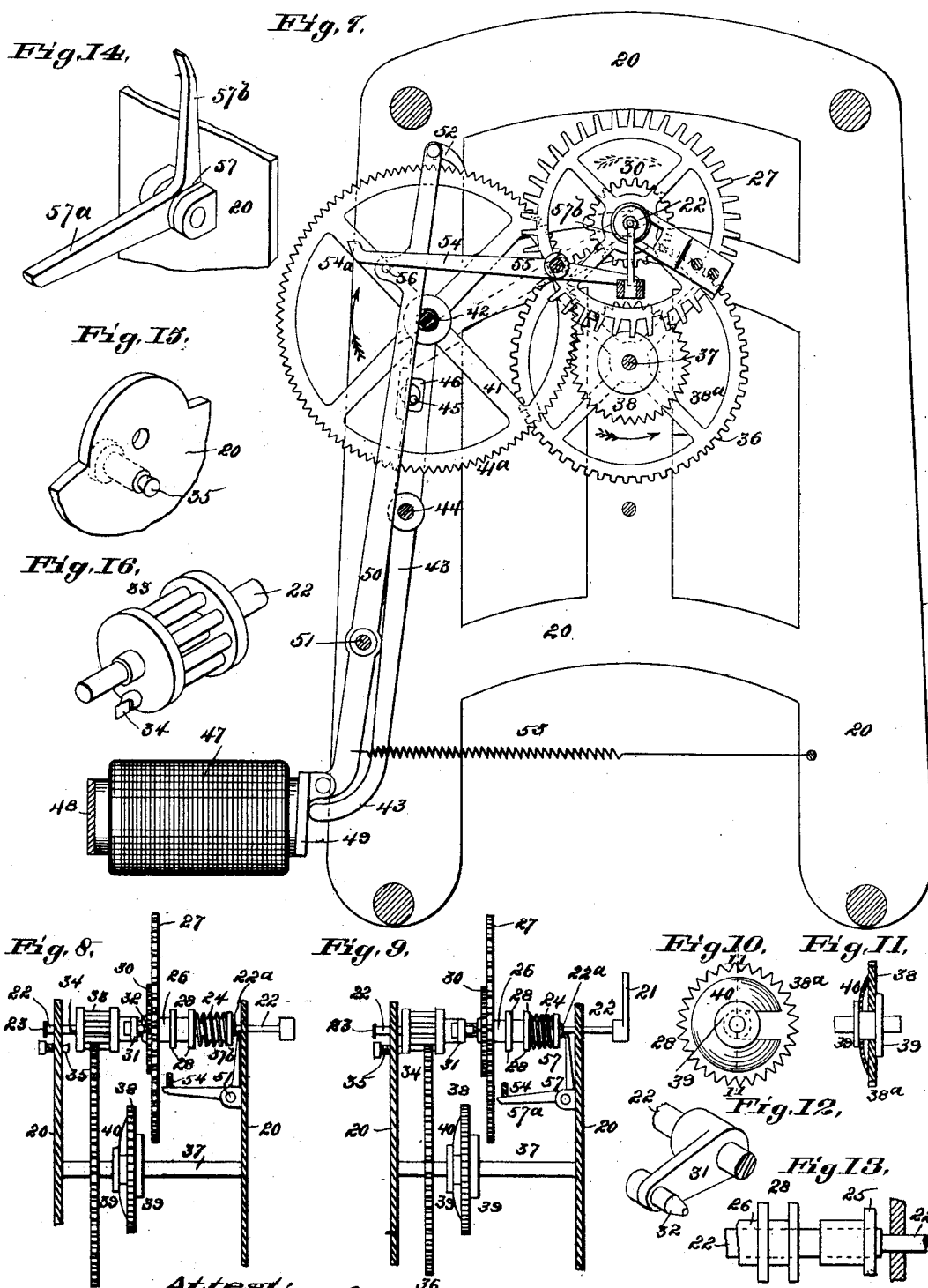
(No Model.)

2 Sheets—Sheet 2.

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Inventor:
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UNITED STATES PATENT OFFICE.

ARTHUR G. WISEMAN, OF WEBSTER GROVES, MISSOURI.

ELECTRIC-CLOCK SYNCHRONIZER.

SPECIFICATION forming part of Letters Patent No. 502,157, dated July 25, 1893.

Application filed April 29, 1892. Renewed March 24, 1893. Serial No. 467,451. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR G. WISEMAN, of Webster Groves, in the county of St. Louis and State of Missouri, have invented a certain new and useful Improvement in Clock-Synchronizers, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

10 This is in some respects an improvement on the invention for which Letters Patent were granted to me May 12, 1891, under No. 452,299, the seconds hand being disconnected from the scape wheel in both cases and turned
15 forward to a given point, in the act of synchronizing.

In this present invention no means are shown for synchronizing the minute hand but means may be used for this purpose substantially as described in Letters Patent granted to me August 7, 1888, No. 387,276, or September 23, 1890, No. 437,168.

The novel features of the present invention are set forth in the claims.

25 Figures 1 and 7 are vertical sections taken at 1—7, Fig. 2 showing the synchronizing apparatus in elevation and in different positions. Fig. 2 is a top view. Figs. 3 and 4 are detail front views showing the seconds hand in different positions. Fig. 5 is a detail perspective
30 view showing part of the armature lever with the lifting pin or stud and the inclined end of a lever upon which the pin acts. Fig. 6 is a detail perspective view showing part of the case with a stop pin and part of the lever carrying the wheel actuated by a click or pawl on the armature lever. Figs. 8 and 9 are vertical sections taken at 8—9, Fig. 2, showing
35 parts of the synchronizing mechanism in different positions. Fig. 10 is a side view of a gear wheel having friction connection with its shaft. Fig. 11 is a section taken at 11—11, Fig. 10. Fig. 12 is a perspective view of part of the shaft of the seconds hand and the arm
40 thereon having a pin engaging with a wheel or disk on the sleeve carrying the scape wheel. Fig. 13 is a side view of the sleeve carrying the scape wheel. Fig. 14 is a perspective view of the bell-crank lever through which the shaft
45 of the seconds hand is given endwise movement to disengage it from the scape wheel while the act of synchronization is taking

place. Fig. 15 is a detail perspective view showing the stop pin or stud arresting the movement of the seconds hand at a given
55 point. Fig. 16 is a perspective view of the lantern wheel on the seconds hand shaft with the stop tooth or projection thereon.

20 is a clock frame of usual construction. The form or construction of the clock frame
60 and of the mechanism except that part in direct connection with the synchronizing mechanism is not material, the synchronizer being applicable to clocks in general.

21 is the seconds hand fixed to its shaft 22. 65 This shaft has endwise movement in its bearings, and is held in its forward or normal position, seen in Fig. 8, by a spring 23 bearing against its rear end; a spiral spring 24 upon the shaft also tending to hold it in normal
70 position. Either of these springs (23, 24) may be dispensed with, and the other left to perform the office. The spiral spring presses at one end against a collar 25 fixed to the shaft
75 22 and at the other end against the sleeve 26 that carries the scape wheel 27 and which is loose upon the shaft except when clutched to it. The sleeve has collars 28 that embrace
80 the end of a fixed arm 29 and by this means the sleeve is restrained from endwise movement while its rotation is not interfered with.

30 is a spur-wheel fast upon the scape wheel 27 or sleeve 26.

31 is a clutch arm fast upon the shaft 22 and having a tooth 32 engaging the teeth of 85 the spur wheel 30 when the shaft is in normal position. When, however, the shaft is in its rear position, seen in Fig. 9, the tooth 32 is out of engagement with the wheel 30 and the shaft is at liberty to turn while the scape
90 wheel is at rest.

33 is a lantern wheel fast upon the shaft 22 and having upon its rear end a tooth 34.

35 is a pin or stud projecting from the rear plate of the frame 20 and which is in position
95 to engage the tooth 34 when the shaft 22 is in its rear position and the seconds hand, by the rotation of the shaft, reaches a given position.

36 is a spur wheel engaging the gear wheel 33 and which is fast upon a shaft 37, that is
100 driven by usual gear connection with the clock spring or weight.

38 is a wheel carried on the shaft 37 and capable of turning on the shaft. The wheel

is between two collars 39 fixed to the shaft. The wheel bears against one of these collars, being pressed against it by a concavo-convex spring plate 40 that bears against the other collar. Thus when the wheel 38 is turned the friction between it and the disk causes the rotation of the shaft and with it the seconds-hand, see Figs. 9, 10, 11. The wheel 38 has teeth 38^a, preferably angular, to allow the ready engagement with them of similar teeth 41^a upon a movable wheel 41 by which the wheel 38 is driven. The wheel 41 turns freely on an arbor 42 fixed to the upper end of a lever 43 fulcrumed to the frame at 44, and limited in its movement, upon its fulcrum, by a pin 45 fixed to the case, the said pin occupying an aperture 46 in the lever the sides of the aperture striking against the pin at the extreme position of the lever. It is only necessary that the wheel 41 should move away from the wheel 38 a sufficient distance for their disengagement, and that it should move toward the wheel 38 sufficiently for their effective engagement and any nearer approach would cause undue friction between the teeth, hence the provision for limiting the movement of lever 43, and wheel 41.

47 is the electro magnet supported upon a bracket 48 and whose coils are in the electric circuit controlled by the central time piece. 49 is the armature and 50 the armature lever fulcrumed to the frame at 51. The armature lever carries at the upper end a click or pawl 52 that engages the teeth 41^a. The lower end of the lever 43 rests against the armature 49 when the parts are in normal position, as shown in Fig. 1, and thus the wheel 41 is held out of engagement with the wheel 38 until the movement of the armature to the magnet allows the wheel 41 to fall by gravity into engagement with the wheel 38 at the same time the pawl 52 acts on the wheel 41 to rotate it and with it the wheel 38 and shaft 37. It will be seen that this will tend to rotate the seconds-hand shaft 22. If the shaft 22 is in engagement with the scape wheel said shaft is not turned and the wheel 38 simply turns on the shaft 37. When however the shaft 22 is disengaged from the scape wheel and also from the stop pin 35 the shaft and seconds hand are turned until the tooth 34 strikes the pin 35 when the movement of the shaft (22) and hand 21 are arrested and any excess of motion given by the pawl 52 to the wheels 41 and 38 causes the latter wheel to slip on its shaft 37.

53 is a spring drawing the armature from the magnet when the current is broken.

The means for disengaging the shaft 22 from the scape-wheel will now be described.

54 is a horizontal lever fulcrumed to the frame at 55.

56 is a pin on the armature lever that works against the under side of the lever 54 as the armature moves toward the magnet and lifts that end 54^a of the lever. The other end of the lever bears upon the horizontal arm 57^a

of a bell crank lever 57 and moves the vertical arm 57^b of the bell-crank lever backward. The upper end of the arm 57^b acts upon a shoulder 22^a of the shaft 22 and pushes said shaft inward disengaging the tooth 32 from the wheel 30 so disengaging the shaft 22 from the scape wheel. If the seconds hand is exactly right the tooth 34 will be against the pin 35 and no movement of the seconds hand will take place, but if the seconds hand is at all out of a correct position its shaft 22 will be turned until the tooth 34 strikes the pin 35 and thus the seconds hand will be carried to a correct position.

It will be seen that the sole force used in synchronization is derived from the electric current and consequently the driving power of the clock is relieved from demands upon it for this purpose; it will also be seen that the electric force derived from the electric current cannot be violently exerted on the clock mechanism as it is limited by the amount of friction between the wheel 38 and shaft 37.

The end of the shaft 22 carrying the seconds hand is preferably made square or in other manner not circular, so that the seconds hand cannot turn upon it.

The sleeve 26 of the escapement wheel is preferably chambered out between the ends so as to have bearing upon the shaft only at the ends, to decrease the friction.

As the main spring in some clocks is nicely adjusted to the work to be performed in running the clock, and so has not surplus power to actuate the synchronizing mechanism, it is necessary for the use of the synchronizer with such clocks that it should be actuated by some power other than the main spring; hence my improvement has special value, in that it is applicable to clocks of this description. In this connection it may be said that the use of a main spring having an unnecessary degree of strength causes undue wear to the machinery.

I claim as my invention—

1. In a synchronizing mechanism for clocks, an armature, a seconds-hand shaft, a scape wheel carried loose on said shaft, a clutch adapted to engage the said shaft and scape wheel and mechanism between the armature and seconds hand shaft adapted to rotate the shaft and disconnect it from the scape wheel, for the purpose set forth.

2. In a synchronizing mechanism for clocks, an armature, an armature lever, the seconds-hand, a shaft giving motion to the seconds-hand and a wheel having frictional connection with the said shaft and mechanism between the armature lever and said wheel adapted to rotate the wheel by the simple movement of the armature lever, for the purpose set forth.

3. In a synchronizing mechanism for clocks, an armature lever having a pawl, a wheel acted on by the pawl on the movement of the lever and a wheel upon a shaft of the clock

mechanism adapted to engage the pawl wheel and having frictional connection with its shaft, substantially as, and for the purpose set forth.

5 4. In a synchronizing mechanism for clocks, an armature lever carrying a pawl, a lever adapted to swing with the armature lever and carrying a wheel with teeth adapted for engagement by the pawl upon the armature lever, and a wheel upon a shaft of the clock
10 mechanism and having frictional connection therewith and in engagement with the pawl wheel in the active position of the pawl wheel, substantially as, and for the purpose set forth.

15 5. In a synchronizing mechanism for clocks, an armature-lever carrying a pawl, a pawl wheel carried on a lever adapted to swing with the armature-lever, a stop-pin limiting the movement of the wheel carrying lever, a spur wheel adapted for engagement with the pawl wheel in one position of the latter and upon a shaft of the clock mechanism and having connection therewith, substantially as, and for the purpose set forth.

25 6. In a synchronizing mechanism for clocks, a seconds-hand shaft, a scape wheel revoluble on the said shaft, a clutch engaging the shaft with the scape wheel and disengaged by an endwise movement of the shaft, an armature lever, mechanism in connection with the armature lever adapted to revolve and give the said endwise motion to the seconds hand shaft, and a spring restoring the shaft to engagement with the scape wheel, substantially as
30 set forth.

35 7. In a synchronizing mechanism for clocks,

an armature lever carrying a pawl, a lever carrying a wheel having teeth engaged by the pawl the two levers swinging together, gear mechanism connecting the pawl wheel with
40 the clock mechanism, a pin upon the armature lever, a lever acted on by the pin and acting on a bell crank lever, a seconds hand shaft having endwise movement, a collar on the shaft engaged by the bell crank lever, a
45 scape wheel turning on the shaft, a clutch between the shaft and scape wheel adapted for engagement and disengagement by the endwise movement of the shaft, and a spring acting on the shaft in opposition to the bell-
50 crank lever, substantially as, and for the purpose set forth.

8. In a synchronizing mechanism for clocks, an armature lever carrying a pawl 52 and a pin 56, a lever swinging with the armature lever and carrying a wheel acted on by the
55 pawl, a spur wheel engaging the pawl wheel on the active position of the latter, said spur wheel being upon a shaft of the clock mechanism, a lever 54 actuated by the pin 56, a
60 bell crank lever 57, a seconds-hand shaft 22 with clutch connection with the scape wheel and having a collar adapted to receive the pressure of the bell crank and a spring acting upon the shaft 22 in opposition to the
65 bell-crank, substantially as, and for the purpose set forth.

ARTHUR G. WISEMAN.

Witnesses:

SAML. KNIGHT,

BENJN. A. KNIGHT.