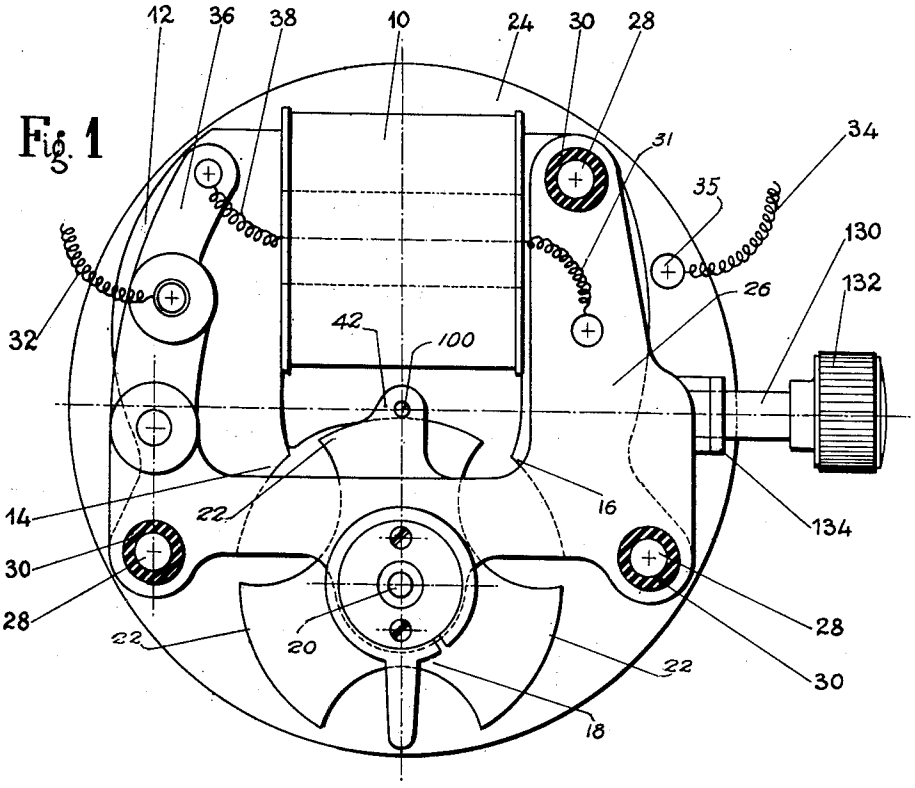
Feb. 23, 1943. A. QUEBATTE ET AL 2,311,964

ELECTRIC CLOCK

Filed March 30, 1938 3 Sheets-Sheet 1

Fig. 1



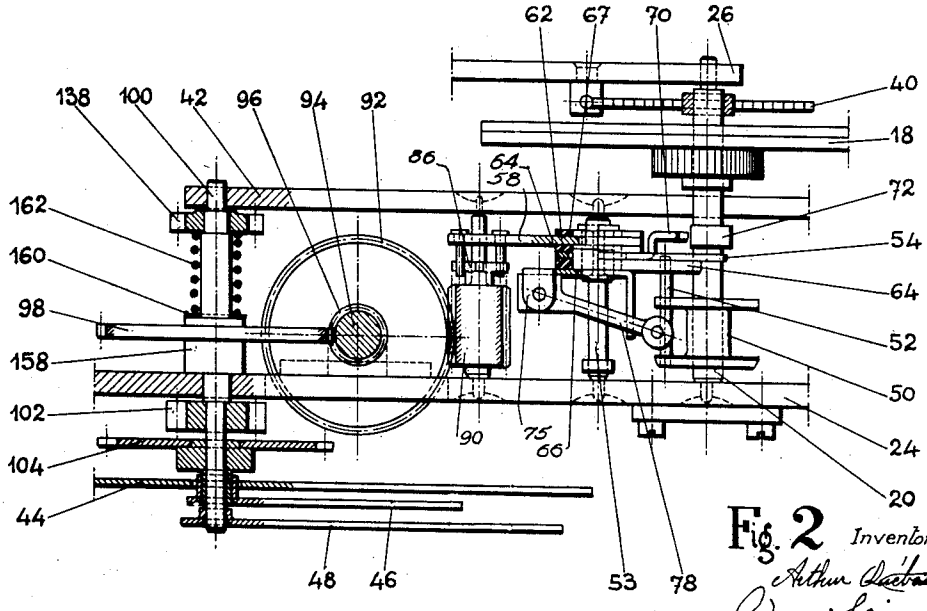


Fig. 2

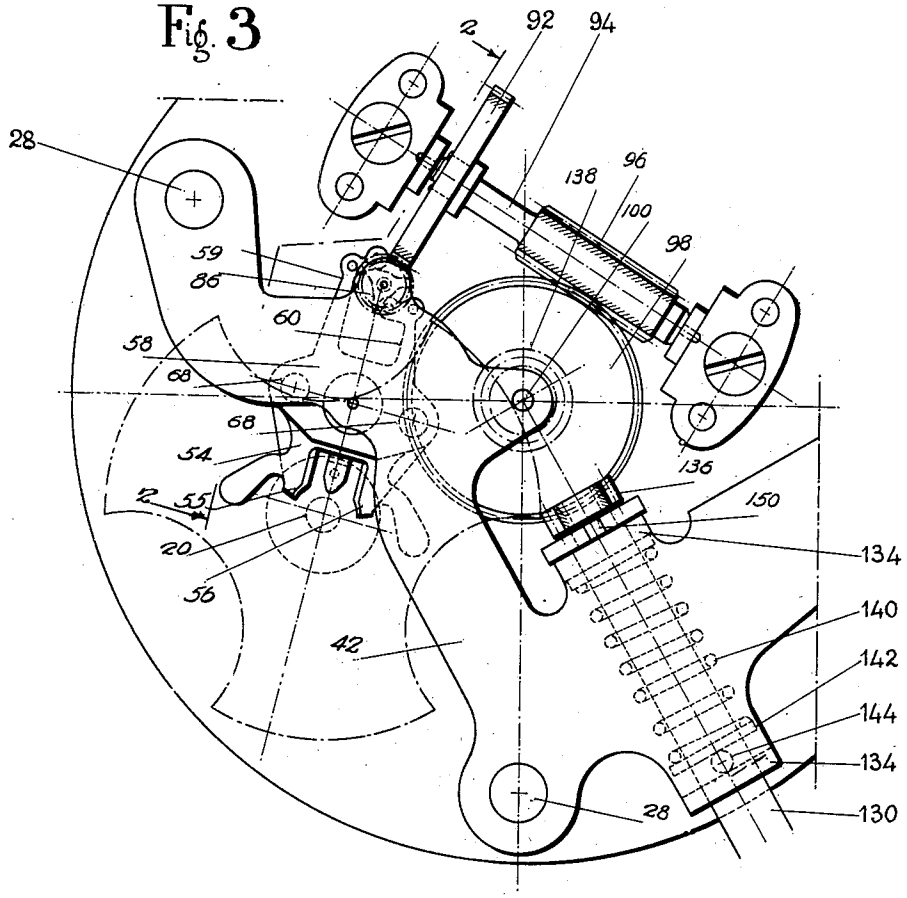
Inventors:
Arthur Quebatte
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Feb. 23, 1943. A. QUEBATTE ET AL 2,311,964

ELECTRIC CLOCK

Filed March 30, 1938 3 Sheets-Sheet 2

Fig. 3



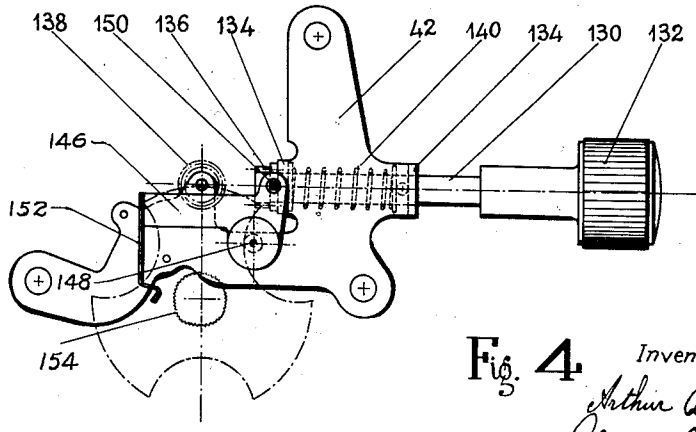


Fig. 4

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Feb. 23, 1943. A. QUEBATTE ET AL 2,311,964

ELECTRIC CLOCK

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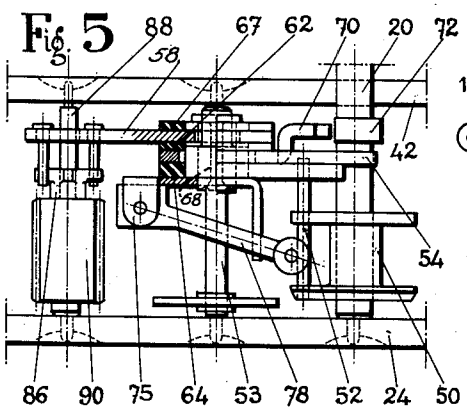


Fig. 5

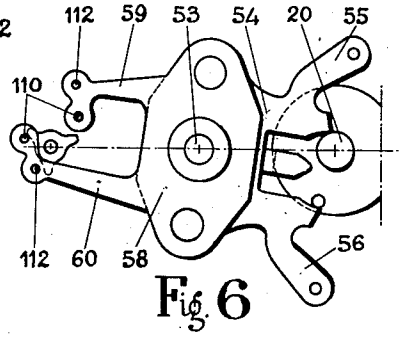


Fig. 6

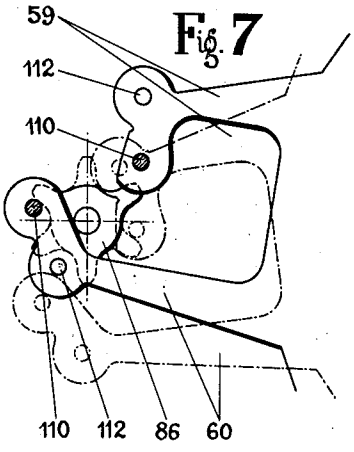


Fig. 7

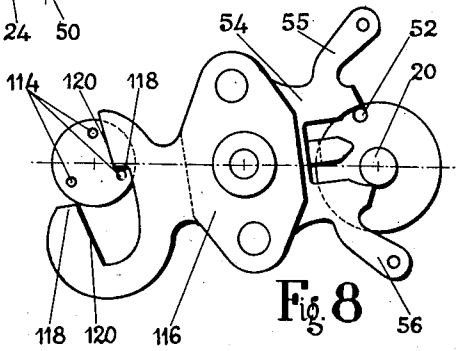


Fig. 8

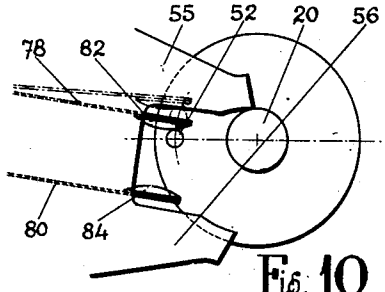


Fig. 10

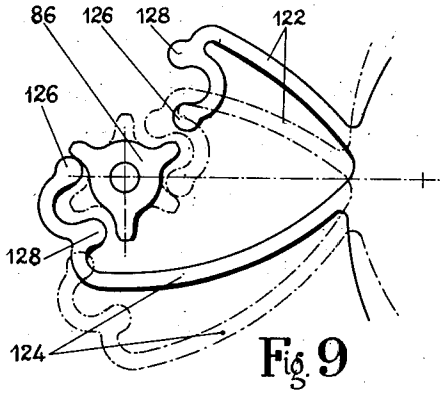


Fig. 9

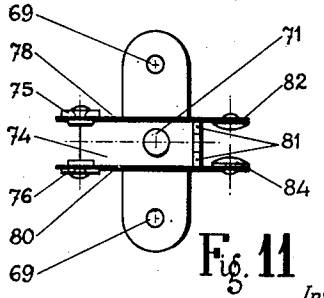


Fig. 11

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2,311,964

UNITED STATES PATENT OFFICE

2,311,964

ELECTRIC CLOCK

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Application March 30, 1938, Serial No. 199,036
In France August 11, 1937

8 Claims. (Cl. 58—28)

The present invention relates to time pieces particularly of the type wherein the balance wheel is electrically operated. It is an important object of this invention to provide improvements in the escapement mechanism and to provide as a result thereof a structure which is rugged and simple in construction, certain in operation, precise in its timing, and utilizing a very small amount of electric current for operation.

These results are obtained by this invention particularly by improvements in certain features relating to the construction of the escapement mechanism. One such feature relates to the device receiving from the balance wheel the alternate operating impulses. Another such feature relates to a novel circuit maker and breaker associated with the escapement mechanism and adapted to momentarily close the circuit to an electric magnet in timed relation to the movement of the balance wheel so that the latter is magnetically influenced at the proper time for regular continuous movement. A third feature relates to the pallet fork and escapement wheel for transforming these alternate impulses to a circular movement. Other features of the invention concerning the construction and assembly of the escapement mechanism and of other elements of a clock mechanism are described hereinafter.

The description of the invention which follows and the accompanying drawings show by way of example a structural embodiment of the present invention. It is evident that the details of construction shown in the drawings and described herebelow are able to be combined together or employed separately if desired.

Various other objects, advantages and meritorious features of the invention will become more apparent from the following specification, appended claims and accompanying drawings, wherein:

Fig. 1 is a back elevation of a clock mechanism embodying this invention showing the electromagnet and the balance wheel influenced thereby,

Fig. 2 is a sectional view through a portion of the clock mechanism along line 2—2 of Fig. 3 but with the shaft carrying the hour and minute hand removed from its centered position in the clock mechanism to clearly illustrate the train of operating elements from the balance wheel to the hour and minute hands,

Fig. 3 is an enlarged inside plan view of a portion of the clock mechanism showing the mounting of the double pallet fork with respect to the balance wheel shaft and the escapement wheel and, in addition, illustrating the driving connection between the escapement wheel and the central hand shaft,

Fig. 4 is a detail view illustrating the hand setting and clock starting device,

Fig. 5 is an enlarged detail view illustrating the construction of the double pallet fork and the flexible contacts for making and breaking the electro-magnet circuit,

Fig. 6 is a detail view of one form of a novel double pallet fork construction for transmitting the oscillatory movements of the balance wheel to the escapement wheel,

Fig. 7 is an enlarged detail view of the escapement wheel operating end of the double pallet fork illustrated in Fig. 6 showing the manner in which it intermittently rotates the escapement wheel,

Fig. 8 is a detail view of another form of double pallet fork illustrating a different novel way of operating the escapement wheel therefrom,

Fig. 9 is an enlarged detail view of another novel form of pallet fork construction for rotating the escapement wheel,

Fig. 10 is an enlarged detail view illustrating the construction and operation of the flexible electric contacts and the driving pin associated with the balance wheel, and

Fig. 11 is a detail view illustrating the manner of supporting the flexible electrical contacts on the double pallet fork.

Referring in detail to the mechanism, electromagnet coil 10 produces when energized a magnetic field in a laminated stator core 12 having opposite pole sections 14 and 16 partially embracing a movable or oscillatory armature 18. The armature 18 is fixed to a shaft 20 and is shaped with three arms 22 as shown, two of which are capable at the same time of approaching into close magnetic relationship with the pole sections 14 and 16 of the stator core. As will become more apparent hereinafter, the oscillatory armature 18 functions as a balance wheel in the clock mechanism.

The mechanism thus far described is preferably mounted between a front supporting plate element 24 and a back irregularly shaped supporting element 26. These elements are secured together in spaced parallel relationship by three pillar members 28 extending between these elements. Tightening nuts are secured to the threaded ends of these pillars but these have been omitted from view in Figure 1 for purpose of clarity. The pillar members 28 are electri-

cally insulated from the supporting element 26 as indicated by washers 30. Leads 32 and 34 deliver direct electric current from any suitable source of electricity, such as a wet or dry cell battery of proper voltage. The lead 32 is connected directly to the coil 10 through a conductor 36 insulatively supported on the stator core 12 and through a wire 38 from this conductor to the coil. Lead 34 is connected to plate 24 at 35. The connection might be made to other suitable parts of the mechanism except the stator core 12, the balance wheel 18, the shaft 20 to which the balance wheel is fixed, and the supporting element 26. A complete electric circuit through the coil 10 from lead 32 and 34 is intermittently formed by movable contact means associated with the balance wheel as will be more particularly described hereinafter.

The oscillatory armature 18, as previously described, functions as a balance wheel and oscillates back and forth with shaft 20. As customary, a spirally coiled spring is provided to yieldingly oppose the movement of the balance wheel in opposite directions and to return the balance wheel after each oscillation. The spiral spring is shown in cross section at 40 in Fig. 2. It is fixed at one end to shaft 20 and at the other end to the supporting element 26, which receives the electric current from the coil 10 through the lead 31 mounted to any suitable part of this supporting element 26. The balance wheel is preferably composed of two metal parts laminated together as shown in Fig. 2. The balance wheel and spiral spring are carried on shaft 20 outside of an intermediate supporting element 42 which, in combination with the front plate element 24, supports shafts of the escapement mechanism and associated gear train for driving the hands of the clock. A dial supported in spaced parallel relationship to plate elements 24 is indicated at 44. The minute and hour hands are indicated at 46 and 48 respectively.

An element or double rimmed wheel 50 is fixed to shaft 20 and carries a driving pin 52 extending in spaced parallel relationship to the shaft. One end of this pin projects rearwardly from the wheel 50 between one set of arms of an escapement operating lever or double pallet fork which is mounted on shaft 53 and is of composite construction. One part 54 of the pallet fork structure carries the spaced arms 55 and 56 between which the pin 52 extends. The other part 58 of the pallet fork carries the spaced arms 59 and 60 which are capable of operating an escapement wheel 86 carried upon an adjacent shaft. A plan view of the double pallet fork is best shown in Fig. 6. Sandwiched between the parts 54 and 58 of the double pallet fork is a strip of insulating material 62. A metal plate 66 forms the bottom member of the assembly. Disposed between the plate 66 and the part 58 is a strip of insulating material 64. An outside strip of insulating material 67 completes the assembly. Fastening means in the form of set screws or rivets 68 extend through the assembly on opposite sides of the shaft 53 and serve to hold the parts together. The holes in the pallet fork parts 54 and 58 through which the shaft 53 extends are oversize the latter and the fastening means 68 so secures the assembly together that the parts 54 and 58 are spaced from the shaft at all times. The plate 66 is fixed to the shaft 53 so that it rotates jointly with the shaft. As is customary, the pallet fork carries a part 10 offset with respect to the forked arms 56 and engageable with a flat sided collar 72 carried on shaft 20.

A separate view of plate 66 is shown in the enlarged detail view in Figure 11. The two holes through which the set screw 68 extends are indicated at 69; and the hole 71 in the center is for receiving the shaft 53 when the plate is assembled thereon. Plate 66 is shaped with a laterally extending section 74 bent at its outer end to provide a pair of spaced brackets 75 and 76 to each of which is secured an end of a flexible metal strip or finger. These strips or fingers are indicated at 78 and 80 respectively and extend across the plate 66 on opposite sides of the hole 71 through which shaft 53 extends. Plate 66 is provided with two arms 81 extending perpendicularly to the plate and functioning as stops limiting the flexible movement of the strips toward one another.

As shown in Fig. 5, the flexible strips extend angularly to the body of the mechanism and when the mechanism is properly assembled the ends of the strips will overlie the path of movement of the driving pin 52 at that section thereof between the two rims of the wheel 50. The free ends of the strips 78 and 80 are enlarged and each carry an electric contact button 82 and 84 respectively for engagement with the driving pin. The relationship of the strips to the pallet forked part 54 is such that as the driving pin swings in one direction it first engages and flexes one strip before the projected end of the pin strikes an arm of the forked part 54. This relationship is illustrated in the enlarged detail view in Fig. 10. The purpose of this construction will be described in the description of the operation of the mechanism herebelow..

The spaced arms of the pallet forked arms 58 may be shaped in various novel ways for driving an escapement wheel 86 fixed to shaft 88 (Figs. 2 and 5). Shaft 88 carries a worm gear 90 engaging a toothed wheel 92 fixed to the shaft 94. The latter shaft carries a worm gear 96 engaging a toothed wheel 98 carried on the central shaft 100. This last mentioned wheel is frictionally coupled to the shaft 100 as will be more fully explained hereinafter. The shaft 100 projects through the face of the dial 44 and carries the minute hand 46 on its outer extremity. Suitable gear means, including pinion 102 and toothed wheel 104, and other gears not shown, are employed for driving the hour hand 46 at a reduced rate as is customary.

The construction and operation of the novel pallet fork 54, 58 is depicted in Figs. 6 and 7. This device receives the oscillatory movement of the balance wheel shaft and transforms this movement so that it drives the shaft 100 intermittently in one direction. The two arms 59 and 60 of the pallet forked element 58 extend to positions substantially on opposite sides of the axis of the escapement wheel 86. Each arm is doubly headed as shown in Fig. 7 and carries an operating pin 110 and a retaining pin 112. These pins project perpendicularly from one side of the headed portions of the arms of the pallet fork and engage the teeth of the escapement star wheel 86 which is offset the plane of the pallet fork. The teeth of the escapement wheel are three in number and are of appropriate dimensions to receive the pins 110 and 112 of the pallet fork.

It is obvious from Figure 7 that oscillatory movement of the pallet fork from full line position to dotted line position and return will

impart intermittent rotary movement in one direction to the escapement wheel. Arm 60 is shown in this figure in the position of driving the escapement wheel. The operating pin 110 on this arm is completing its operating movement against one of the teeth on the escapement wheel, and has imparted one-sixth of a revolution to the same. The retainer pin 112 is coming into position ahead of a succeeding tooth on the escapement wheel to stop further rotation of the wheel. After the operating movement of arm 60 is finished, the pallet fork swings to the dotted position shown in Figure 7 and the escapement wheel now receives an impulse from the operating pin 110 of arm 59. As arm 59 concludes its operating movement, pin 112 thereon will act as a stop against which a succeeding tooth of the escapement wheel will abut. Thus the escapement wheel is intermittently driven around its axis of rotation as the arms 59 and 60 of a pallet fork rock back and forth.

In Figure 8 a different type of pallet fork and escapement wheel structure is shown. In this modification of the invention, the escapement wheel is not provided with teeth but instead carries three equidistant laterally projecting pins 114 which operate in a manner equivalent to pins 110 and 112 in the preceding modification. The pins 114 in the present modification project rearwardly from the escapement wheel into the plane of the pallet fork 116. The pallet fork, in place of carrying two arms and four pins, is now shaped with two arms each having an operating face 118 and a retaining face 120. The arms are disposed on opposite sides of the axis of the escapement wheel. These operating and retaining faces are of predetermined shape to cooperate with the pins 114 on the escapement wheel.

Under the impulsion of the balance wheel, the operating face 118, for example, will come into contact with one of the pins 114 as shown and cause the escapement wheel to travel one-sixth of a turn. At the end of this movement the next succeeding pin 114 will approach and contact the retainer face 120 which will stop further rotation of the escapement wheel. The pallet fork then reverses its movement and operating face 118 will act upon the pin 114 which will be then in position to receive its impulse. This will continue the rotation of the escapement wheel until the next succeeding pin on the escapement wheel abuts the retainer face 120 and stops further movement. The escapement wheel is thus intermittently rotated in one direction about its axis of rotation.

A different modification of the pallet fork construction is shown in Figure 9. This fork is capable of operating upon the star shaped escapement wheel of the type described in the first modification but without acting through the intermediary of pins. In Figure 9 the star or escapement wheel 86 is disposed in the plane of the pallet fork. This fork as shown consists of two narrow arms 122 and 124 extending to points on opposite sides of the escapement wheel. The extremity of each arm is irregularly shaped to provide an operating finger 126 and a retainer finger 128. The operating finger of each arm is adapted to engage a tooth on the escapement wheel and like the preceding modifications cause the wheel to rotate for a part of its revolution. Arm 124 is shown in operating position and at substantially the conclusion of its operating movement. In this position the retainer finger 128 of the arm is in position to stop the advance of the next succeeding tooth on the escapement wheel. It is obvious that as the pallet fork in this modification swings from full line position to dotted position and return it will intermittently drive the escapement wheel in one direction about its axis.

A control is provided for starting the operation of the clock mechanism and for setting the time indicated by the hands. This control is shown in Figs. 1, 3 and 4, and comprises a shaft 130 mounted for longitudinal reciprocal movement and carrying a knurled knob 132 for facilitating its operation. This shaft may be supported for reciprocal movement by apertured tangs 134 bent outwardly from the interior supporting plate element 42 as shown. The inner end of shaft 130 carries a pinion 136 fixed thereto which is capable of engaging a pinion 138 fixed to the hand shaft 100 when the control shaft 130 is thrust inward the full distance of its movement. When these pinions are engaged, rotation of the knurled knob will cause the shaft 100 to rotate and thus turn the hands 46 and 48 relative to the dial. A coil spring 140 (Fig. 3) encircles the shaft 130 and is supported at one end by the inner tang 134 and at the other end by a washer 142 forced to move with the shaft 130 by a pin 144. It is obvious that the coil spring yieldingly maintains the control shaft at its projected inoperative position.

The control shaft 130, as previously described, is also capable of starting the clock mechanism. This is accomplished by providing a crank arm 146 (Fig. 4) pivoted at 148 to the intermediate supporting plate 42. One end of the crank arm is connected in any suitable way to the inner end of the control shaft 130 such as by means of a pin 150 forming an integral part of a collar on the shaft and movable therewith. The opposite end of the crank arm carries a flexible metal strip or pusher element 152 which extends into close proximity to the balance wheel shaft 20. This shaft carries a finely toothed wheel 154 preferably adjacent to the balance wheel with which the free end of the pusher element 152 is engageable. It is obvious from the construction illustrated that when the control shaft 130 is thrust inward, the flexible end of the pusher 152 will be swung into frictional engagement with the toothed wheel 154 and cause the latter and the balance wheel shaft 20 to turn against the tension of the spiral spring 40. Upon release of the control shaft 130 the pusher element will be disengaged from the wheel 154 and the stored energy in the spiral spring will cause the balance wheel shaft to oscillate a sufficient number of times opening and closing the circuit through the contact buttons 82 and 84 on the flexible strips so that electric current is supplied to the coil and the magnetic impulses provided thereby will continue the oscillations regularly thereafter.

As previously explained, the toothed wheel 98 is frictionally mounted on shaft 100. It is mounted between a collar 158 fixed on shaft 100 and a washer 160 (Fig. 2). A coil spring 162 is compressed between pinion 138 and washer 160 and continuously urges the wheel 98 into frictional engagement with the collar 158 with a force sufficient to maintain proper operating conditions between the escapement mechanism and the hands of the clock. It is only when time setting operations are performed that pinion 138 will be rotated while wheel 98 will be held against such rotation by its engagement with the worm wheel 96. Thus the setting operations will not effect the escapement mechanism and associated parts.

The operation of the mechanism is readily perceivable from the preceding description but it will be summarized here to correlate the functions of the various elements into closer relationship. As previously explained, certain parts of the machine are insulatively supported from one another so that the circuit through the electro-magnet is intermittently closed in accordance with the movement of the balance wheel. Current from lead 34 passes through plate 24, shaft 53, plate 66 to the flexible strips 78 and 80 and thence through either one or the other contact buttons 82 or 84 when the driving pin 52 strikes the same in its swinging movement. Only when the pin is in contact with either one of the buttons 82 or 84 does the current flow from the pin through shaft 20 to supporting plate 26 and thence through wire 31 to the magnetic coil attached thereto. The current flows through the magnetic coil and completes the circuit to the source of electricity by way of wire 38, insulated conductor 36 and lead 32. At all other times the circuit to the electromagnet is broken so that the stored energy of the spiral spring and the kinetic energy of the moving parts continue the operation until one of the buttons 82 or 84 closes the circuit through pin 52.

Figure 10 shows pin 52 in the act of contacting button 82 and flexing the same to the dotted position. The pin strikes the contact button before engaging the arm 55 of the pallet fork. As the pin contacts the button 82, one section 22 of the balance wheel 18 is approaching into close proximity with one of the arms 14 or 16 of the stationary magnet. Another section 22 of the balance wheel is leaving the vicinity of the magnetic field of the other arm of the stationary magnet. The energization of the magnet caused by the closing of the circuit through button 82 and the pin 52 will produce a magnetic field exerting a pull on the section 22 of the balance wheel advancing toward the stationary magnet and thus accelerating the movement of the balance wheel so that it will travel a further distance than if it were left to itself.

As the balance wheel is carried further in the direction in which it is urged by the magnetic field, the driving pin 52 will be caused to travel beyond the ends of the strips 78 and 80 and break the electric contact between the pin and the button 82. The normal limit of pin travel is substantially that shown in Fig. 8. After the pin contacts the button 82 it engages one arm of the pallet fork 54, such as the arm which it is approaching in Figure 10 and causes the pallet fork to oscillate and carry the two strips 78 and 80 therewith. This movement in combination with the fact that the pin is also moving outwardly relative to the pallet fork causes the electric circuit which has thus been momentarily set up to be broken before the balance wheel reaches the end of its travel in one direction. The balance wheel will continue to travel under its own impetus until the pin 52 reaches a position substantially that as shown in Figure 8 where it abuts the outer extremity of one arm of the pallet fork 54. The pallet fork 54 is limited in its oscillatory movement by the engagement of the other arm of the pallet fork with the shaft 20 as shown in Figure 8.

At the conclusion of its travel in one direction, the balance wheel will be returned in the opposite direction by the stored energy in the spiral spring 40. The pin 52 will then rotate from the extremity of one arm of the pallet fork 54 toward the other arm of the same. However, the double pallet fork structure 54—56 will remain stationary until the pin 52 engages the button 84 and the arm 56 of a pallet fork adjacent thereto. The pin will now repeat the same operation as heretofore described in connection with contact button 82 except that the current to the electromagnet will be established through the contact button 84. As a result the magnetic field will again be created to attract one of the sections 22 of the balance wheel and accelerate this movement.

In this manner, the strips or fingers on the double pallet fork will intermittently feed electric impulses to the electromagnet at the proper time to cause the magnetic field to impart a further turning movement to the balance wheel. The flexible character of the strips is such that a clean electric contact, yielding and prolonged, is produced. The construction results in a reduction in the intensity of the breaker point sparks, hence insures positive contact and a large reduction in the consumption of electric current.

The oscillatory movement imparted to the double pallet fork by the pin 52 will, as previously explained, intermittently drive the escapement wheel in one direction. The end of the double pallet fork construction which acts upon the escapement mechanism may be shaped in any one of the three novel ways illustrated herein.

What is claimed:

1. In clock mechanism, an electro-magnet including a direct current circuit therefor, a balance wheel oscillatively mounted adjacent to the magnetic field of said electro-magnet and magnetically influenced thereby, a pallet fork, a pin oscillatory with the balance wheel adapted to swing between the extended arms of the pallet fork and to alternately strike the arms to rock the pallet fork in accordance with the oscillatory movement of the balance wheel, a yieldable electrical contact associated with each arm of the pallet fork and so disposed in the path of the movement of the pin that the latter strikes each contact before striking the arm of the pallet fork with which it is associated, said electric contacts and said pin forming a switch for the circuit of the electro-magnet and acting to intermittently close the circuit in timed relation to the oscillations of the balance wheel.

2. In clock mechanism, an electro-magnet, a balance wheel oscillatively mounted between the poles of said magnet, a member rockably supported about an axis parallel to said balance wheel, a pin operatively associated with said balance wheel and oscillatory therewith, one end of said member shaped with arms which in inoperative position of the mechanism are disposed on opposite sides of the pin against which the pin alternately strikes in operation, a pair of flexible fingers of electrical conductive material each having one of their ends secured to the member at a point remote from said pin, the opposite ends of said fingers extending when the mechanism is inoperative to opposite sides of the pin but closer to the latter than the arms of said member so that the pin in its oscillatory movement first strikes a finger before striking an arm of the member, said fingers and said pin forming a circuit breaker and maker for the circuit of the electro-magnet and adapted to energize the latter in timed relation to the oscillations of the balance wheel.

3. In clock mechanism, an electro-magnet, a balance wheel adapted to be magnetically influ-

enced by said electro-magnet, a pin eccentrically carried by said balance wheel, a pallet fork having a pair of arms partially embracing the axis of the balance wheel, said pin adapted upon oscillatory movement of the balance wheel to strike on the insides of first one and then the other arm and cause the pallet fork to rock back and forth, a pair of electrically conductive flexible fingers secured at one end to said pallet fork and having their opposite free ends extending to the same relative positions as said arms but closer together so that the pin first strikes these fingers before striking the arms, said fingers and said pin adapted when in engagement to close the circuit to the electro-magnet, said fingers being shorter than said arms so that upon further movement of the pin in either direction of its oscillatory movement it will advance beyond the ends of the flexible finger and break the electrical contact.

4. In clock mechanism, an oscillating balance wheel carrying a pin movable therewith, an electro-magnet for magnetically influencing the oscillations of said balance wheel, a device rockably supported about an axis parallel to that of the balance wheel, said device provided with arms which partially embrace said pin and against which the pin alternately strikes as it oscillates with the balance wheel, and a pair of flexible metal fingers secured to said device and having their free ends disposed so that the pin in its oscillatory movement first strikes the free end of one of the fingers before striking an arm of the device, the fingers yieldingly acting in this capacity to absorb the shock of the striking action of the pin, said flexible fingers and the pin also serving as electric contacts making and breaking the circuit to the electro-magnet.

5. In clock mechanism, an electro-magnet, a balance wheel oscillatably mounted between the poles of said magnet, a pin operatively associated with said balance wheel and swingable back and forth in timed relation to the oscillations of the balance wheel, a body mounted for rocking movement about an axis parallel to but spaced from the axis of the balance wheel, said body having a pair of arms shaped to alternately engage an escapement wheel and impart intermittent rotary movement thereto as said body rocks on its mounting, said body having a second pair of arms extending toward said pin and past opposite sides thereof such that the pin in its swinging movement is capable of alternately striking the inside of each arm and causing the body to rock on its mounting, said pairs of arms being offset in their respective planes, and material on the body between said pairs of arms acting as a spacer therebetween and also to electrically insulate one from the other.

6. In clock mechanism having an oscillating balance wheel, an electro-magnet for influencing the oscillations of the balance wheel, and a pin swingable in an arc in timed relation to the oscillations of the balance wheel, a shaft disposed parallel to but spaced from the axis of oscillation of said balance wheel, a body mounted on said shaft and rockable about the axis thereof, a pair of arms extending from one side of said body and shaped to alternately engage the teeth of an escapement wheel and impart intermittent rotary movement thereto as the body rocks on its mounting, a pair of arms extending from the opposite side of the body to positions adjacent said pin and so disposed with respect thereto that when the pin swings in timed relation to the oscillations of the balance wheel it is capable of alternately striking the arms and causing the body to rock on its mounting, a pair of flexible electrically conductive fingers carried by said device and extending to positions adjacent to the pin such that when the pin swings in timed relationship to the balance wheel it alternately strikes the ends of the fingers before striking the adjacent arms of the body, said fingers and said pin forming a switch mechanism alternately opening and closing the circuit to the electro-magnet, and means carried by said body insulating said escapement wheel operating arms from electrical connection with the arms engaged by said pin.

7. In a clock mechanism, an electro-magnet, a balance wheel oscillatably mounted between the poles of said magnet, a pin operatively associated with said balance wheel and swingable back and forth in timed relation to the oscillations of the balance wheel, a body mounted for rocking movement about an axis parallel to but spaced from the axis of the balance wheel, said body including a pair of metal plates extending radially to the axis thereof and offset in parallel planes from one another, one plate shaped with a pair of arms extending away from the axis of the balance wheel and capable of alternately engaging an escapement wheel and causing it to rotate intermittently as the body rocks on its mounting, the other plate shaped with a pair of arms extending toward and partially embracing said pin and so disposed with respect to the pin that the pin in its swinging movement alternately strikes the inside of the arms and causes said body to rock on its mounting, said body also including a pair of flexible metal fingers on the side of said second plate opposite the first described plate, said flexible fingers extending substantialy parallel to one another toward said pin and overlapping upon the path of swinging movement of the pin such that the latter alternately strikes said fingers as it swings back and forth, said fingers and pin forming part of the circuit to the electro-magnet and functioning to open and close the circuit in timed relation to the oscillations of the balance wheel, and a member between said plates acting to space the same from one another and electrically insulate the same from one another.

8. In clock mechanism, an oscillating balance wheel, an electro-magnet for magneticaly influencing the oscillations of said balance wheel, a device supported for rocking movement about an axis substantially parallel to that of the balance wheel, said device provided with a pair of spaced arms arranged in a plane substantially perpendicular to the axis of the balance wheel and extending toward said axis, means swingable in unison with the oscillations of said balance wheel engaging first one and then the other of said pair of arms and causing the device to rock back and forth about its axis, and a yielding electric contact swingable with each arm and so positioned with respect thereto that said means first engages said contact before engaging the arm, said means and said yielding electric contacts forming a make and break device for the circuit of the electro-magnet.

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