J. S. HARTLEY.

ALARM CLOCK.

APPLICATION FILED DEC. 18, 1916.

1,369,427.

Patented Feb. 22, 1921.

3 SHEETS—SHEET 1.

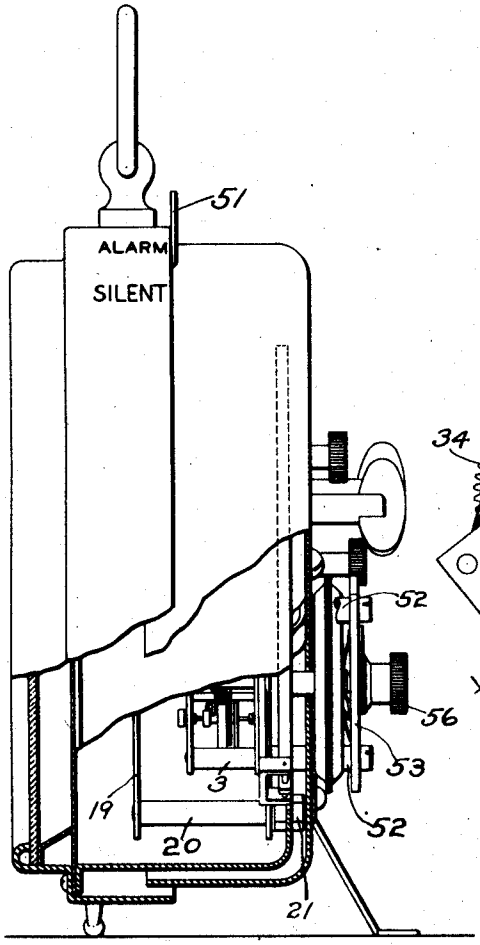

Fig. 1

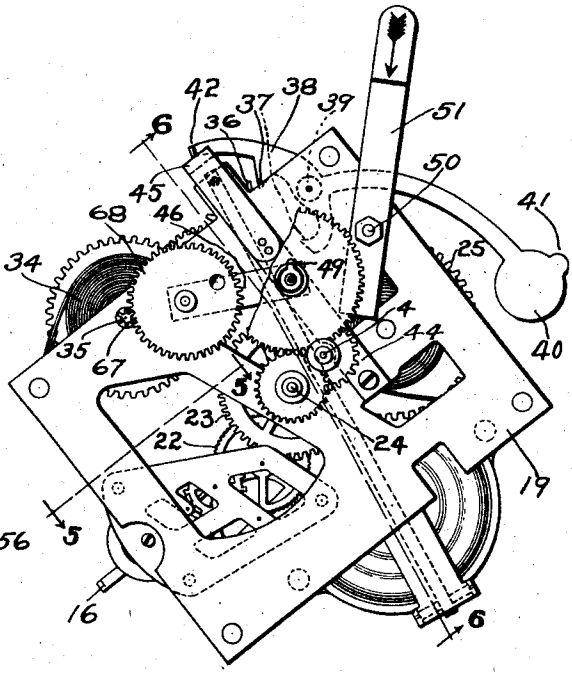

Fig. 2

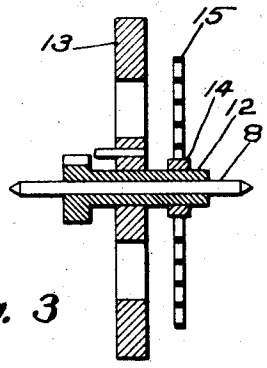

Fig. 3

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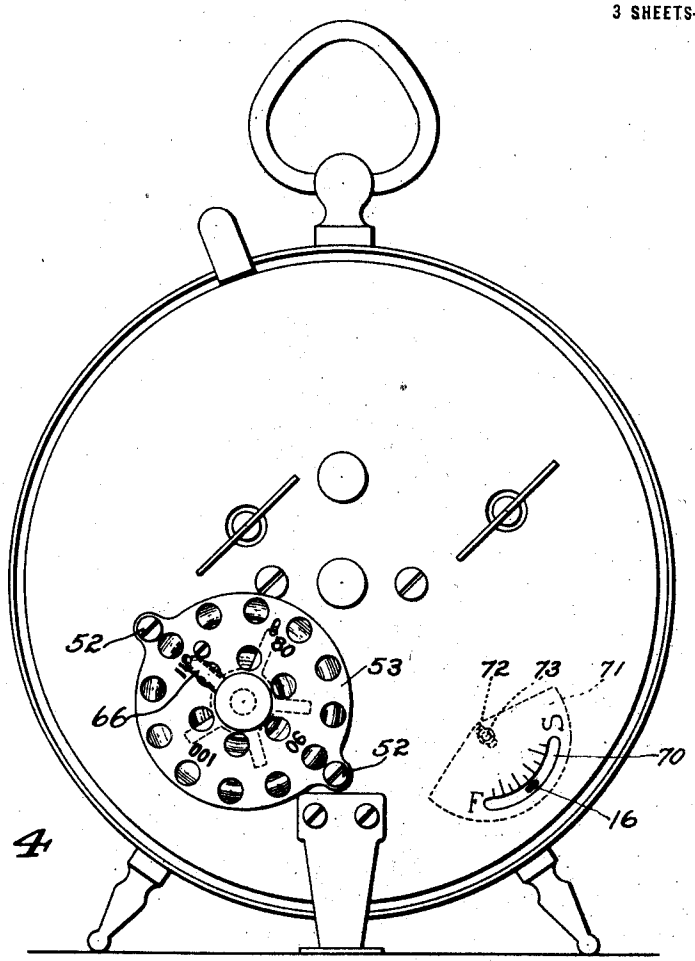

Fig. 4

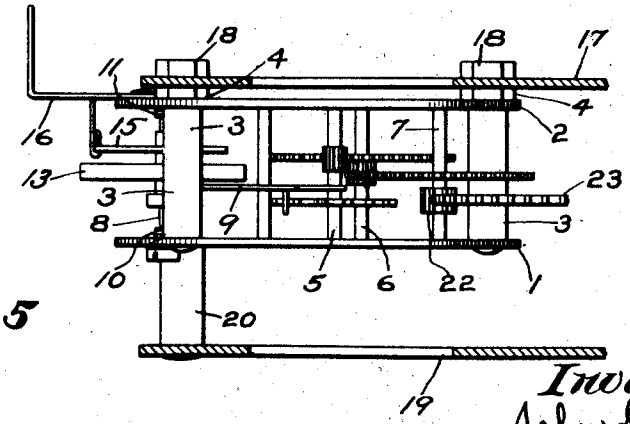

Fig. 5

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3 SHEETS—SHEET 3.

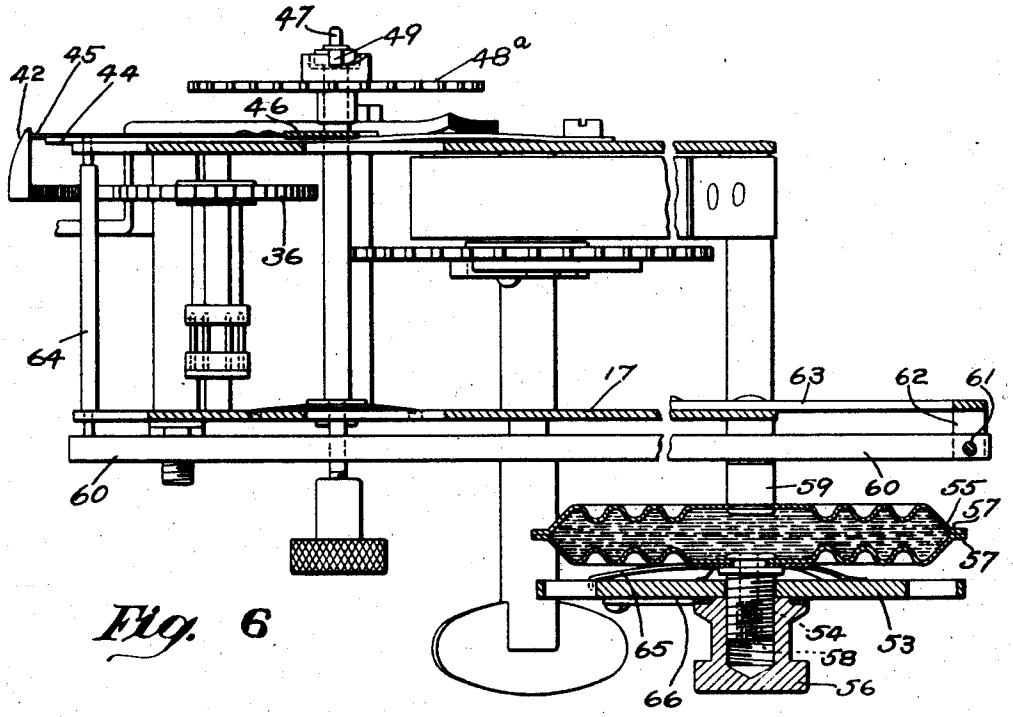

Fig. 6

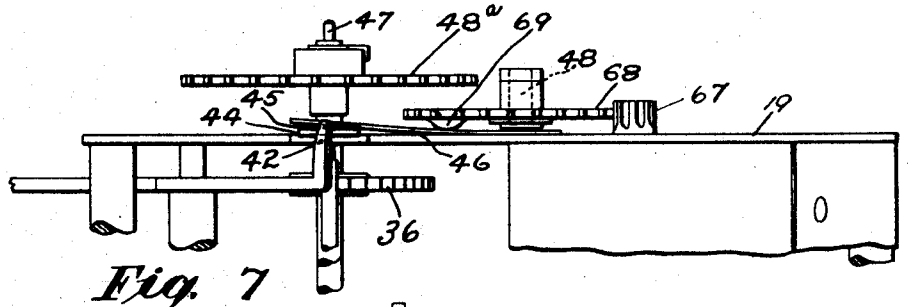

Fig. 7

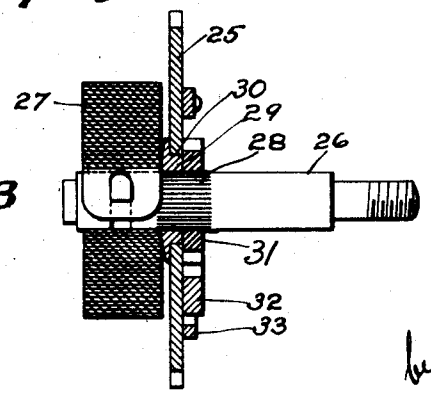

Fig. 8

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UNITED STATES PATENT OFFICE.

JOHN S. HARTLEY, OF LYNN, MASSACHUSETTS, ASSIGNOR TO HARTLEY CLOCK COMPANY, A CORPORATION OF MASSACHUSETTS.

ALARM-CLOCK.

1,369,427. Specification of Letters Patent. Patented Feb. 22, 1921.

Application filed December 18, 1916. Serial No. 137,559.

To all whom it may concern:

Be it known that I, JOHN S. HARTLEY, a citizen of the United States, residing at Lynn, in the county of Essex and State of Massachusetts, have invented a new and useful Improvement in Alarm-Clocks, of which the following is a specification.

The present invention relates to clocks, and more particularly to alarm clocks having, in addition to the usual time-controlled alarm-ringing devices, mechanism for ringing the alarm in case of fire.

One object of the present invention is to provide a novel construction and arrangement of the devices for ringing the alarm in case of fire, or other increase in temperature, whereby the prompt and reliable ringing of the alarm at a predetermined temperature is insured.

To the accomplishment of this object, and such others as may hereinafter appear, the features of the invention relate to certain devices, combinations and arrangements of parts, hereinafter described and then set forth broadly and in detail in the appended claims, which possess advantages readily apparent to those skilled in the art.

The various features of the present invention will be readily understood from an inspection of the accompanying drawings illustrating the invention in its best form at present known to the inventor, in which,

Figure 1 is a right side elevation, partly in section, of the alarm clock;

Fig. 2 is a front elevation of the movement plates and the parts carried thereby;

Fig. 3 is a sectional detail of the balance wheel, hair spring and balance staff;

Fig. 4 is a rear elevation of the clock;

Fig. 5 is a sectional plan on the line 5—5, Fig. 2;

Fig. 6 is a sectional elevation on the line 6—6, Fig. 2;

Fig. 7 is a detail showing the operation of the automatic shut-off for the time-controlled alarm-ringing mechanism; and

Fig. 8 is a detail, partly in section, of one of the winding arbors and the parts supported thereby.

In the illustrated embodiment of the invention the escapement of the clock is carried by a pair of plates 1 and 2 (Fig. 5) which are connected together by three posts 3. One end of each post is staked to the plate 1. The other end of each post is threaded to receive a nut 4 for binding the plate 2 to the post 3. The plates 1 and 2 support all the staffs or arbors of the escapement comprising the escape wheel staff 5, the second hand or fourth wheel staff 6, and the third wheel staff 7. The plates 1 and 2 also support the balance wheel staff 8 (Figs. 3 and 5). These staffs together with the parts supported thereby and the escape lever 9 compose the escapement all of which is carried by the plates 1 and 2.

The balance staff 8 is constructed of needle wire in order that a balance staff may be provided for the clock having a smaller diameter than the turned steel staffs heretofore used for balance staffs. The use of needle wire for a balance staff is a great advantage as the pointed ends thereof are so small and so hard that they make durable pivots of much better wearing qualities than the pivots on the larger staffs of soft steel. The hard small ends of the staff 8 oscillate on seats formed in terminal screws 10 and 11 (Fig. 5) carried respectively by the plates 1 and 2.

Frictionally mounted on the balance staff 8 is a sleeve 12 (Fig. 3) which supports the balance wheel 13 and hair spring collet 14. The hair spring 15 is regulated by a regulator 16 (Fig. 5) pivoted on the terminal screw 11. With this construction the balance staff 8 may be removed from the clock for inspection, substitution or repair without the removal of the hair spring collet and balance wheel. All that is required to remove the balance staff is to free one end of the balance staff from one of the terminal screws and tip the balance staff upwardly into a position convenient for the application of a pair of pliers thereto. The balance wheel may then be withdrawn from the sleeve 12 without disconnecting the hair spring from the hair spring collet.

The support for the escapement comprising the connected plates 1 and 2 is supported by a plate 17 (Fig. 5) forming the back plate for the movement. To this end the posts 3 are elongated to extend through holes formed in the plate 17 and the ends of the posts 3 are threaded to receive nuts 18 for securing the support for the escapement to the plate 17. The plate 17 is connected to the front movement plate 19 by four posts 20 one end of each of which is staked to the plate 19 and the other end of

each of which is threaded to receive a nut 21 for securing the plate 17 to the posts.

With this construction the entire escapement may be removed as a unit while the movement plates remain connected. Furthermore the back plate 17 may be removed from the posts 20 to permit the removal or insertion of the alarm and time train springs without necessitating a change in the assembly of the escapement.

The staff 7 (Fig. 5) of the escapement carries a pinion 22 which meshes with the center wheel 23 (Figs. 2 and 5) on an arbor 24 (Fig. 2) journaled in the plates 17 and 19. The arbor 24 carries the usual lantern pinion (not shown) which meshes with the main gear wheel 25 supported from a winding arbor 26 (Fig. 8) journaled in the plates 17 and 19.

The winding arbor 26 carries the time train spring 27 one end of which is connected to the winding arbor and the other end of which is looped on one of the posts 20. In order to effect an economy in the manufacture of clocks the winding arbor is knurled as shown at 28 (Fig. 8) and upon this knurled portion of the arbor a collet 29 is forced. A shoulder 30 is then formed on the collet by the same machine which forces the collet on the arbor. The shoulder 30 forms a seat for the main gear 25 and this gear is held in place on the shoulder by a ratchet 31 which is first punched from sheet metal and then forced upon the knurled portion of the arbor 26 against the collet 29. The gear 25 carries a pivoted pawl 32 (Fig. 8) which is pressed against the teeth on the ratchet 31 by a spring 33.

The alarm spring 34 and the main gear of the alarm train are constructed and assembled on the alarm-winding arbor 35 in the same manner as the corresponding parts of the time train illustrated in Fig. 8. The alarm train driving gear 36 (Figs. 2 and 6) is engaged by a pair of pallets 37 (Fig. 2) formed on a body portion 38 which is secured to a rock shaft 39 journaled in the plates 17 and 19. One end of the body portion 38 is enlarged to form a hammer head 40 the striking face of which is a small protuberance 41 formed on the periphery of the head 40. By employing a hammer having a small striking face backed by a large mass of metal, chattering of the hammer on the gong is avoided. The other end of the body portion 38 is provided with a tail 42 which is normally engaged by a trip lever (Fig. 2).

The trip lever is composed of two pieces of spring metal one of which, the piece 44, is secured at one end to the plate 19 and the other one of which, the piece 45, is secured at one end to the piece 44. The piece 44 is normally bent to press against a strip 46 (Figs. 6 and 7) provided at its opposite ends with holes through which pass the setting rod 47 and a stud 48 staked to the plate 19. The strip 46 is pressed by the piece 44 against the hub of the alarm-setting wheel 48^a which is one of the wheels of the time train.

Normally the hub of the wheel 48^a presses the trip lever into position to hold the alarm train stationary. When the set 49 (Fig. 2) drops off the ledge on the usual verge on the wheel 48^a the trip lever is free to move away from the tail 42 and thus release the alarm train to sound the alarm.

In order to stop the ringing of the alarm and at the same time relieve the time train of the drag of the trip lever the plates 17 and 19 carry a rock shaft 50 (Fig. 2) to which a shut-off lever 51 is secured. One end of the lever 51 is positioned to engage the trip lever between its point of connection with the plate 19 and its point of application of pressure to the wheel 48^a. The other end of the lever 51 is positioned outside the casing in convenient position for manipulation. This construction provides a one-piece shut-off lever which is secured to a rock shaft to permit its movement with a minimum of friction and which effectively shuts off the alarm and relieves the time train of the drag of the trip lever during the travel of the alarm-set up the slope on the verge.

In order to ring the alarm in case of fire or other increase in temperature the plate 17 carries a pair of posts 52 which support a perforated plate 53 having a temperature-indicating dial thereon (Fig. 4). The plate 53 has a central opening which loosely receives the threaded end of a shank 54 (Fig. 6) on a thermostat 55. The thermostat is secured to the plate 53 by a nut 56 fitted on the shank 54. The thermostat 55 comprises a pair of corrugated disks 57 joined at their peripheral edges. The fluid for expanding and contracting the thermostat under changes of temperature is ether which is inserted into the thermostat through a central opening in the shank 54. The thermostat is sealed by a screw 58 which is soldered into place after closing the opening in the shank 54.

The thermostat carries a boss 59 which engages a bar 60 which is secured at one end to a pin 61 journaled in ears 62 formed on a bracket 63 secured to the plate 17. The other end of the bar 60 engages one end of a rod 64 loosely mounted in the plates 17 and 19. The other end of the rod 64 passes through a hole in the piece 44 in position to engage the piece 45 and release it from the tail 52 when the thermostat expands under the influence of heat.

In order to set the thermostat to sound the alarm at a predetermined temperature a centipede spring 65 is interposed between the thermostat and the support 53. When

the nut 56 is turned contra-clockwise the spring 65 positions the thermostat to ring the alarm at low temperature. When the nut 56 is turned in a clockwise direction the thermostat is drawn toward the support and the thermostat is set to ring the alarm at a higher temperature.

The thermostat is held from rotation when the nut 56 is turned by the spring 65 one foot of which is anchored to the support and the body portion of which has a rectangular opening embracing a rectangular portion on the shank 54.

To indicate the temperature at which the alarm will sound the nut 56 carries a pointer 66 (Figs. 4 and 6) which travels over the dial on the support when the nut is turned.

It is highly desirable in a fire alarm clock that the alarm be sounded in case of fire even when the alarm spring 34 is no longer effective to sound the alarm when the trip lever is released by the time train. To this end the winding arbor 35 carries a pinion 67 which meshes with a gear 68 journaled on the stud 48. When the arbor 35 turns under the influence of the uncoiling spring 34 the pinion 67 rotates the gear 68 until a lug 69 on its back face engages the strip 46 which is thus pressed against the trip lever to reset it into position to stop the alarm. When this occurs the alarm spring is no longer effective to sound the alarm at the rising time although sufficient reserve power is in the spring to sound the alarm when the trip lever piece 44 is tripped through the connections from the thermostat.

As well known to those skilled in the art an oscillating balance wheel operates as a suction pump to suck dust into the escapement through the regulating slot 70 (Fig. 4). In order to prevent dust entering through the slot 70 the clock illustrated in the drawings is provided with a dust guard 71. The guard 71 is provided with an elongated slot 72 which loosely embraces a pin 73 on the casing. The hair spring regulator 16 extends through the guard 71 into the slot 70. With this construction the hair spring regulator may be shifted in the slot 70 in the usual manner without danger of dust entering the clock through the regulating slot.

It will be apparent from an inspection of Fig. 2 that the plates 1 and 2 are cuttings from the main plates 17 and 19.

It will be apparent to those skilled in the art with the various features of the present invention in view, that changes may be made in the details of structure the described and illustrated embodiment thereof being intended as an exploitation of its underlying essentials, the features whereof will be definitely stated in their true scope in the claims hereto appended.

What is claimed as new, is:—

1. An alarm clock, having, in combination, mechanism for ringing the alarm at a predetermined time, mechanism for ringing the alarm at a predetermined temperature, and automatic means for rendering the time-controlled mechanism inoperative without affecting the operation of the heat-controlled mechanism, substantially as described.

2. An alarm clock, having, in combination, an alarm train, mechanism for releasing the alarm train at a predetermined time, mechanism for releasing the alarm train at a predetermined temperature, and automatic means for preventing the release of the alarm train by the time-controlled mechanism without affecting the operation of the heat-controlled mechanism, substantially as described.

3. An alarm clock, having, in combination, an alarm mechanism, a compound trip lever for stopping the alarm mechanism comprising a pair of spring arms, a timing mechanism for operating the trip lever to release the alarm mechanism, and an additional mechanism for operating one of the arms of the trip lever independently of the other arm to release the alarm mechanism, substantially as described.

4. An alarm clock, having, in combination, an alarm mechanism, a compound trip lever for stopping the alarm mechanism comprising a pair of spring arms, a timing mechanism for operating the trip lever to release the alarm mechanism and mechanism other than time-controlled mechanism for operating one of the arms of the trip lever independently of the other arm to release the alarm mechanism, substantially as described.

5. An alarm clock, having, in combination, an alarm mechanism, a compound trip lever for stopping the alarm mechanism comprising a pair of spring arms, a timing mechanism for operating the trip lever to release the alarm mechanism, and heat-controlled mechanism for operating one of the arms of the trip lever independently of the other arm to release the alarm mechanism, substantially as described.

6. An alarm clock, having, in combination, stored power for ringing the alarm, time and heat controlled mechanisms for releasing the power to sound the alarm, and means for reserving a portion of the stored power to sound the alarm exclusively under the control of the heat-controlled mechanism, substantially as described.

7. An alarm clock, having, in combination, a coiled spring for ringing the alarm, time and heat controlled mechanisms for releasing the spring to sound the alarm, and means for preventing the exhaustion of the power in the coiled spring under the control of the

time-controlled mechanism, substantially as described.

8. An alarm clock, having, in combination, a coiled spring for ringing the alarm; a winding arbor therefor; a trip lever for shutting off the alarm; a setting arbor passing loosely through the trip lever; and mechanism for operating the trip lever to shut off the alarm comprising a pinion on the winding arbor, a gear wheel driven therefrom, a stud for the gear wheel, a second trip lever having holes therein through which the setting arbor and gear wheel stud pass, and means on the gear wheel for operating the second trip lever to press upon the first trip lever, substantially as described.

9. In a clock, the combination of a thermostat, a support therefor, a threaded shank on the thermostat passing loosely through the support, adjusting means on the shank for drawing the thermostat toward the support, and a spring interposed between the thermostat and support for moving the thermostat away from the support, substantially as described.

10. In a clock, the combination of a thermostat, a support therefor, a threaded shank on the thermostat passing loosely through the support and having a rectangular portion, a thumb nut on the shank for drawing the thermostat toward the support, and a centipede spring interposed between the thermostat and support with the feet thereon engaged with the support and with the body portion of the spring fitted over the rectangular portion of the shank, substantially as described.

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