



Nov. 4, 1969

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3,475,900

ALARM CONTROL MECHANISM

Filed Aug. 23, 1967

3 Sheets-Sheet 2

Fig. 3.

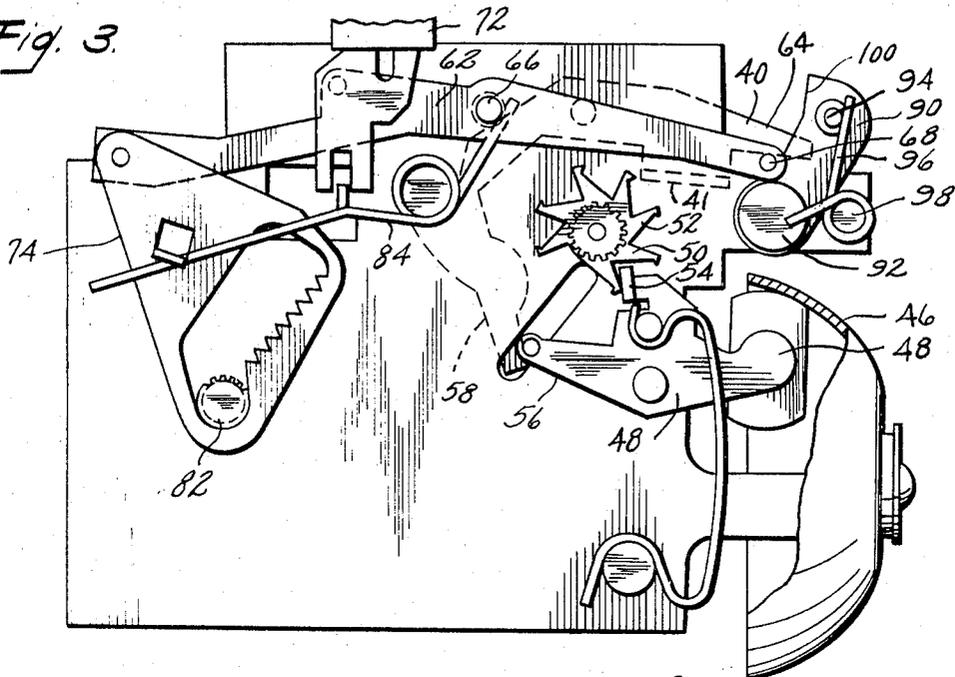
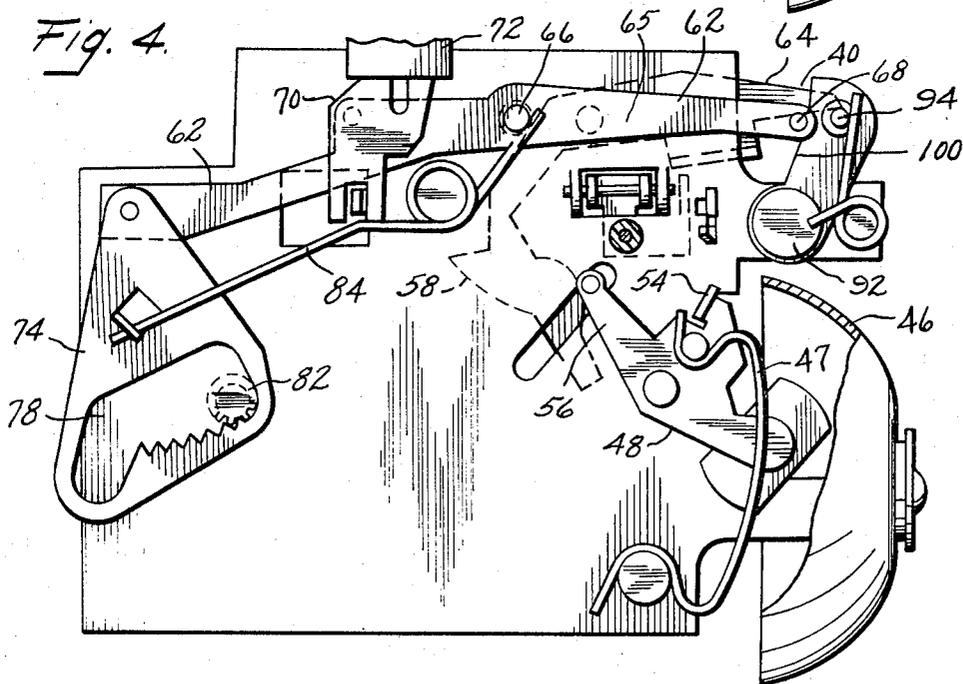


Fig. 4.



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3 Sheets-Sheet 3

Fig 5.

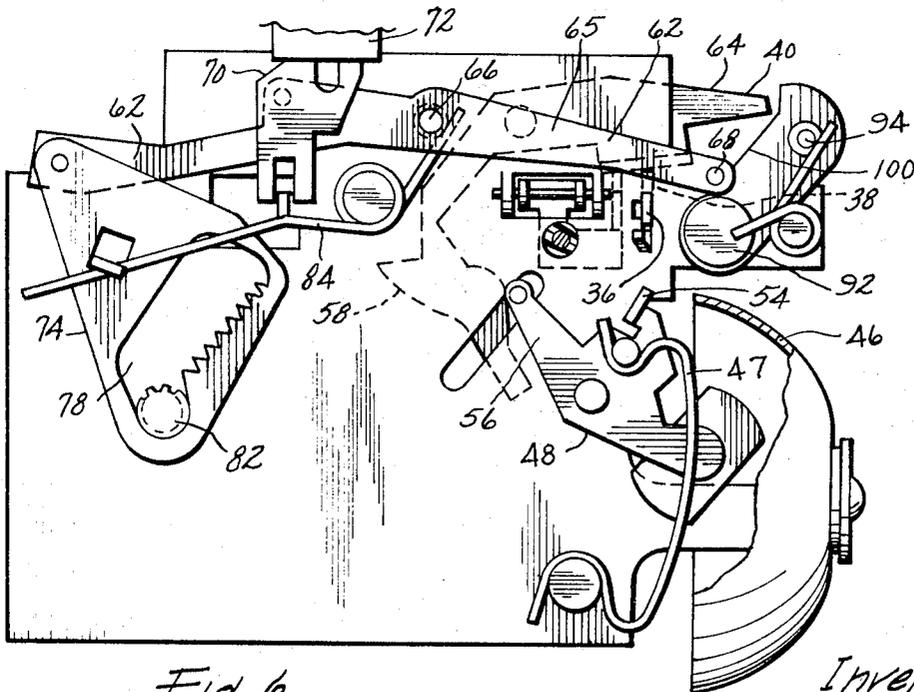
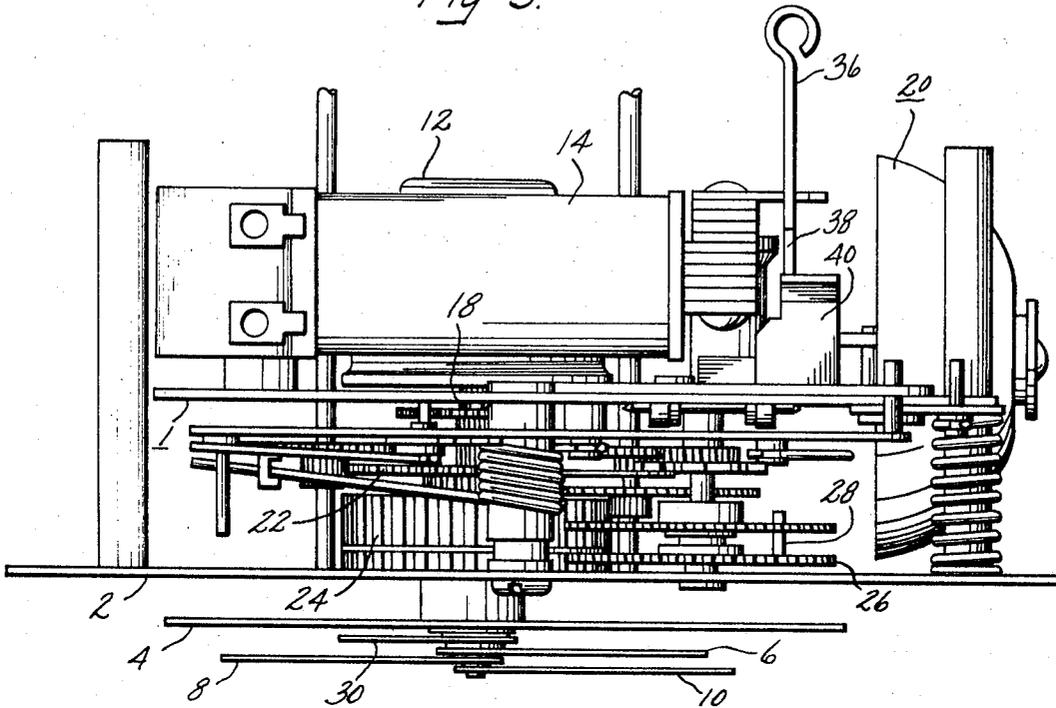


Fig. 6.

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**ALARM CONTROL MECHANISM**

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U.S. Cl. 58—21.155

5 Claims

**ABSTRACT OF THE DISCLOSURE**

A temporary alarm shut off mechanism for a bell alarm clock having an alarm actuator lever 40 pivoted to a base plate of the clock. An interval control lever is also pivotally mounted on the base plate and is arranged to be selectively driven by a continuously rotated gear. A latch lever is uniquely positioned between the alarm actuator lever 40 and the interval control lever 62 and is arranged to be tripped by the interval control lever 62 at the end of a predetermined short interval to permit the alarm actuator lever to be instantaneously moved to its alarm "on" position.

**BACKGROUND OF THE INVENTION**

This invention relates to an alarm control mechanism, and more particularly, to an improved temporary shut off mechanism for an alarm clock.

In a prior U.S. Patent No. 3,328,952 to Clark dated July 4, 1967, assigned to the same assignee as the present invention, there is disclosed a bell striking mechanism for an alarm clock.

Alarm clocks and timers which include a temporary alarm shut off mechanism have been especially desirable. With such a mechanism, when the alarm sounds, a person awakened may actuate the temporary mechanism and return to sleep for a short period of time without fear of oversleeping since the alarm will sound again after a short time interval. My invention is concerned with such a temporary shut off mechanism and the inclusion of such a mechanism in the bell striking alarm clock disclosed in the abovementioned patent.

**SUMMARY OF THE INVENTION**

In adding such a temporary shut off mechanism to a bell alarm clock, it is necessary that the alarm actuating movement occur very rapidly. Otherwise, the alarm sounding mechanism will be gradually actuated and may emit objectionable noises before it becomes fully operative. Accordingly, it is a primary object of this invention to provide an improved, reliable mechanism for temporarily shutting off an alarm and resounding the alarm after a short time interval.

It is a further object of this invention to provide an improved temporary alarm shut off movement which may be uniquely and easily combined with the bell alarm clock disclosed in the above-mentioned patent.

In accordance with one aspect of my invention, an alarm clock comprises a base plate and an alarm sounding mechanism pivoted to the base plate. An alarm actuator lever is also pivoted to the base plate for controlling the alarm sounding mechanism. The alarm actuator lever has an alarm "on" position permitting the alarm sounding mechanism to sound, and an alarm "off" position in which it prevents the operation of the alarm sounding mechanism. An interval control lever is pivotally mounted on the base plate, and gear means continuously rotated as a function of time by the clock cooperates with the interval control lever to hold the interval control lever in an alarm "off" position for a predetermined short interval. A latch lever is uniquely positioned between the alarm actuator

lever and the interval control lever. The latch lever is arranged to be tripped by the interval control lever at the end of a predetermined short interval. When the latch lever is tripped, the alarm actuator lever rapidly moves to its alarm "on" position to sound the alarm. By this unique latch arrangement, the alarm actuator lever instantaneously actuates the alarm sounding mechanism; hence objectionable noises which could be caused by gradual actuation of the alarm sounding mechanism are prevented.

**BRIEF DESCRIPTION OF THE DRAWINGS**

Other specific and attendant advantages of this invention will be apparent from the following description taken in connection with the accompanying drawings in which:

FIG. 1 is a partial rear perspective view of an alarm clock in accordance with this invention, the motor and certain other portions being removed to reveal particular features of the mechanism;

FIG. 2 is a front cross sectional view of a portion of the mechanism of this invention taken substantially along the line 2—2 of FIG. 1 showing the alarm set in the automatic "off" position shown in FIG. 1;

FIG. 3 is a partial cross sectional view similar to FIG. 2 showing the alarm sounding mechanism in the alarm "on" position;

FIG. 4 is a partial cross sectional view similar to FIGS. 2 and 3 showing the alarm sounding mechanism in the temporary "off" position;

FIG. 5 is a top plan view of the alarm clock shown in FIG. 1; and

FIG. 6 is a partial cross sectional view similar to FIG. 2 showing the alarm mechanism in the manual "off" position.

**DESCRIPTION OF THE PREFERRED EMBODIMENT**

Referring now to the drawings and first, particularly to FIGS. 1 and 5, there is shown a bell alarm clock comprising a supporting structure including a base plate 1 and a front plate 2 upon which is mounted a dial plate 4 having the usual clock indicia painted or otherwise generally centrally placed thereon. The clock is provided with hour, minute and second hands 6, 8 and 10, respectively, mounted for movement over the dial and driven by a conventional timing device gear train.

The timing device may include any suitable form of timer motor here shown as a self-starting synchronous motor 12, a field coil 14 of which is connected to a source of regulated frequency alternating current. A terminal shaft including a gear 18 fixed thereto extends through the base plate 1 for driving the hands of the clock. In a conventional manner, a minute hand gear 22 is connected to the timing device for driving minute hand 8, and hour hand gear 24 suitably connected to the timing device for driving hour hand 6.

An alarm time set cam gear 26 having a projecting cam portion 28 located thereon is rotatably mounted on the supporting structure. The angular position of cam gear 26 is manually adjustable in a conventional manner, and a hand 30 is connected to cam gear 26 for rotation therewith in order to indicate the time setting of cam gear 26. A second cam gear member 32 having abrupt cam surfaces formed by a slot 34 is also rotatably mounted on the clock supporting structure as shown in the drawings and is axially movable to actuate a bell alarm mechanism 20 in a manner to be more fully described hereinafter.

The bell alarm mechanism is provided with a suitable permanent shut off device such as a lever 36 having a projection 38 thereon which is positioned so as to engage a tab 39 on an alarm actuator lever 40. With this construction, operation of the bell alarm mechanism 20 is prevented when the lever 40 is moved upwardly and coun-

terclockwise to the "off" position illustrated in FIG. 6. The alarm actuator lever 40 is shown in the "on" position in FIG. 3, that is, with the projection 38 out of engagement with tab 39 on the alarm actuator lever 40 to permit the bell alarm mechanism 20 to be operated.

The bell alarm actuator lever 40 may also be controlled by the conventional alarm timing cam gears 26 and 32 through a suitable lever mechanism including a bell crank 42 which is pivoted to base plate 1 by means of pivot pin 43. As shown more particularly in FIG. 1, bell crank 42 is positioned between the outwardly extending tab 39 formed on the alarm actuator lever 40 and an axially movable shaft 44 which is fixed to axially movable cam gear 32. Accordingly, when the timing mechanism of the clock drives cam 32 to a position where the abrupt cam surface 28 becomes aligned with the abrupt surface formed by the slot 34 the shaft 44 moves axially forwardly to permit bell crank 42 to pivot downwardly to release tab 39 of the alarm actuator lever 40. In this position, as illustrated in FIG. 3, the alarm actuator lever 40 permits the bell alarm mechanism 20 to be operated.

From the foregoing description, it can be appreciated that the alarm actuator lever 40 controls the operation of the bell striking mechanism 20. When the lever 40 is in the "off" position illustrated in FIG. 1, the bell alarm mechanism is prevented from operation, and when the alarm actuator lever 40 is pivoted to the position illustrated in FIG. 3, the bell alarm mechanism is placed in operation.

With reference to FIG. 3, it can be seen that the bell alarm mechanism 20 includes a bell 46, a striking hammer and lever 48, and a plastic gear 50 having six radially extending arms 52. The plastic gear 50 is driven from the gear train so that each of the arms 52 sequentially engages a tab 54 of the hammer lever 48 causing the hammer 48 to pivot away from bell 46 and then toward the bell under the influence of spring 47 to strike the bell. As illustrated more particularly in FIGS. 3 and 4, the hammer lever 48 includes a leftwardly extending arm 56 which is arranged for cooperation with a depending arm 58 of the alarm actuator lever 40. With this arrangement, when the alarm actuator lever 40 is moved to its alarm "off" position by the manual shut off lever 36, or the timing gear bell crank lever 42, the lower portion 58 of the alarm actuator lever 40 is moved to the alarm "off" position illustrated in FIG. 4 wherein it holds hammer arm 48 away from bell 46 to prevent operation of the bell striking mechanism. In the position illustrated in FIG. 3, the lower portion 58 of the alarm actuator lever 40 is in its left clockwise position and does not interfere with movement of the bell striking hammer lever 48.

The structure so far described is illustrated and described in greater detail in the above-mentioned U.S. Patent No. 3,328,952 of Donald W. Clark assigned to the same assignee as the present invention. According to this invention, there is combined with the aforesaid bell alarm clock a uniquely designed and positioned interval lever arrangement for temporarily preventing operation of the bell alarm mechanism.

#### Temporary alarm shut off mechanism

My improved mechanism for temporarily preventing operation of the bell alarm mechanism 20 will now be described. Such a mechanism is particularly useful for turning off the alarm without fear of dozing off and oversleeping since with such a temporary shut off mechanism the alarm will sound again after a short time interval. This improved temporary shut off mechanism does not interfere with any of the previously described alarm control mechanisms except to the extent that the operation of the temporary shut off mechanism temporarily takes over control of the alarm actuator lever 40.

The improved short interval mechanism includes an interval control lever 62 for cooperation with a right end portion 64 of the alarm actuator lever 40. As illustrated more

particularly in FIG. 1, the interval control lever 62 is pivoted to the base plate 1 by a pivot stud 66; and its right end portion 65 as viewed in FIGS. 2, 3 and 4, includes a rearwardly extending stud 68 which is arranged for slidable movement on the lower surface of the right end portion 64 of alarm actuator lever 40. A manually operated actuating arrangement is provided for rotating interval control lever 62 about its pivot 66 to lift the right end portion 64 of alarm actuator lever 40 to the alarm off position illustrated in FIG. 4. As shown more particularly in FIGS. 2 and 4, this arrangement includes a lever 70, and a manually movable plunger 72 which is attached to the interval control lever 62 to the left of pivot 66. With this construction, plunger 72 may be moved downwardly to cause interval control lever 62 to pivot counter clockwise about pivot 66 thereby lifting stud 68 and the right end portion of alarm actuator lever 40 to the alarm off position illustrated in FIG. 4.

A generally triangular interval gear 74 is pivotally mounted on the interval control lever 62 for holding the interval control lever in the alarm "off" position for a predetermined short time interval. As shown in FIG. 2, the upper portion of the interval gear lever 74 is pivoted at 76 to interval control lever 62, and the lower portion of the interval gear 74 includes a slot 78 and a plurality of gear teeth 80 for cooperation with a continuously rotatable pinion gear 82. A spring 84 is slidably attached to a tab 86 of the interval gear 74 for urging the interval gear 74 and the interval control lever 62 upwardly. With this arrangement, when the manually movable plunger 72 is moved downwardly to the alarm "off" position illustrated in FIG. 4, spring 84 pivots interval gear 74 from the position illustrated in FIG. 2 to the position illustrated in FIG. 4. In the position illustrated in FIG. 4, pinion gear 82 holds the interval gear 74 and the left portion of the interval gear lever 62 in their lower position and the right portion of interval control lever 62 in its upper position to hold the alarm actuator lever 40 in the alarm "off" position. Rotation of the continuously rotatable gear 82 in a counter clockwise direction gradually drives interval gear 74 from the position illustrated in FIG. 4 to the alarm sounding position illustrated in FIG. 3.

With the arrangement thus far described, when the last tooth of the interval gear 74 starts to come out of mesh with pinion gear 82 lug 68 of the interval control lever 62 would be gradually lowered and, hence, would gradually move the alarm actuator lever 40 in a clockwise direction. This gradual movement would permit the bell striking lever 48 to be gradually moved in a counter clockwise direction to a position wherein the arms 52 of the plastic gear 50 would abut tab 54, but the lever 48 would not have been moved far enough downwardly to permit the hammer lever 48 to strike bell 46. Under such conditions, an objectionable click would occur when one of the arms 52 hit the trigger plate 54 until the last tooth on the interval gear 74 came completely out of mesh with the pinion gear 82 and the bell started to sound.

In accordance with my invention, a latch lever arrangement 90 is uniquely combined with the construction thus far described to permit the alarm actuator lever 40 to be instantaneously moved from the temporary alarm "off" position illustrated in FIG. 4 to the alarm "on" position illustrated in FIG. 3. As shown more particularly in FIG. 3, the latch lever 90 is formed from a single small flat piece of metal and is pivotally mounted to the base plate at 92. An inwardly extending stud 94 is fixed to the upper portion of the latch lever for cooperation with the lower surface of alarm actuator lever 40, and a spring 96 is positioned over a mounting and spacer post 98 between the front plate and base plate for urging the latch lever 90 to the left as viewed in FIGS. 2, 3 and 4. In addition, a cam surface 100 is formed on the left side of the latch lever 90 for uniquely cooperating with stud 68 of the interval control lever 62. With this construction, when the

plunger 72 of the temporary alarm shut off lever is moved downwardly to lift the right side of alarm actuator lever 40, the latch lever and stud 94 is snapped into position below the right surface of alarm actuator lever 40 to hold the alarm actuator lever 40 in the alarm "off" position 5 illustrated in FIG. 4. Gradual downward movement of the right side of interval control lever 62 and stud 68 causes stud 68 to slide on cam surface 100 to move latch lever 90 to the right. When the last tooth of the triangular interval gear 74 starts to come out of mesh with the pinion gear 82, the right side of lever 62 has not 10 dropped far enough to permit stud 68 and cam surface 100 to disengage stud 94 from the lower surface of actuator lever 40. In this position, the trigger plate 54 of the bell striking lever 48 does not touch the arms 52 on the plastic gear 50. As the lever 62 and stud 68 drop 15 slowly, stud 68 sliding on the cam surface 100 rotates latch lever 90 clockwise until the point is reached when the triangular gear lever 74 drops completely out of mesh with pinion gear 82. When this happens, the latch lever 20 90 is tripped. Stud 68 operating against the cam surface 100 of latch lever 90 pushes the stud 94 out from under the lower surface of alarm actuator lever 40 causing the alarm actuator lever 40 to be moved instantaneously downwardly under the influence of spring 47 to its alarm 25 "on" position illustrated in FIG. 3 thereby permitting the arms 52 and spring 47 to fully pivot bell striking lever 58 to the bell striking position illustrated in FIG. 3.

With this improved construction, it can be appreciated that a prior known bell alarm mechanism has been 30 uniquely combined with a temporary alarm shut off mechanism. The arrangement comprises a relatively few number of parts which may be inexpensively manufactured and combined with each other. Most of the parts, including the unique latch lever 90, interval control lever 35 62 and alarm actuator lever 40 are directly pivoted to base plate 1 along parallel axes which extend generally perpendicular to the base plate. Moreover, the studs 68 and 94 are also arranged generally perpendicular to the base plate and front plate thereby providing a clock movement 40 which may be readily manufactured and reliably operated. Further, the unique shaped latch lever is biased by a spring 96 which is positioned over an existing spacer and mounting post 98. Thus, an exceedingly simple and 45 reliable temporary bell alarm mechanism is achieved.

What I claim is:

1. An alarm clock comprising:

- (a) a supporting structure including a base plate;
- (b) an alarm sounding mechanism pivoted to said supporting structure;
- (c) an alarm actuator lever pivoted to said supporting structure, said alarm actuator lever having an alarm "on" position permitting said alarm sounding mechanism to sound, and an alarm "off" position preventing the operation of said alarm sounding mechanism;
- (d) an interval control lever pivotally mounted on said supporting structure;
- (e) gear means continuously rotated as a function of time by said clock cooperating with said interval control lever to hold said interval control lever in an alarm "off" position for a predetermined short interval;
- (f) a latch lever positioned between said alarm actuator lever and said interval control lever, said latch lever having an alarm "off" position in which it holds the alarm actuator lever in its alarm "off" position, said latch lever being arranged to be tripped by said interval control lever at the end of said predetermined short interval to release the alarm actuator lever from said latch lever and permit the alarm actuator lever to be instantaneously moved to its alarm "on" position.

2. An alarm clock comprising:

- (a) a base plate;

- (b) an alarm sounding mechanism pivoted to said plate;
- (c) an alarm actuator lever pivoted to said base plate, said alarm actuator lever having an alarm "on" position permitting said alarm sounding mechanism to sound, and an alarm "off" position preventing the operation of said alarm sounding mechanism;
- (d) an interval control lever pivotally mounted on said base plate;
- (e) gear means continuously rotated as a function of time by said clock cooperating with said interval control lever to hold said interval control lever in an alarm "off" position for a predetermined short interval; and
- (f) a latch lever pivoted to said base plate between said alarm actuator lever and said interval control lever, said latch lever having a cam surface arranged for cooperation with said interval control lever, said latch lever having an alarm "off" position in which holds the alarm actuator lever in its alarm "off" position, said interval control lever being slidable on the cam surface of said latch lever for moving said latch lever at the end of said predetermined short interval to release the alarm actuator lever from said latch lever and permit the alarm actuator lever to be instantaneously moved to its alarm "on" position.

3. An alarm clock comprising:

- (a) a base plate;
- (b) a front plate;
- (c) a spacer post fixed to said front plate and said base plate for holding said plates generally parallel to each other;
- (d) an alarm sounding mechanism pivoted to said base plate;
- (e) an alarm actuator lever pivoted to said base plate, said alarm actuator lever having an alarm "on" position permitting said alarm sounding mechanism to sound, and an alarm "off" position preventing the operation of said alarm sounding mechanism;
- (f) an interval control lever pivotally mounted on said base plate;
- (g) gear means continuously rotated as a function of time by said clock cooperating with said interval control lever to hold said interval control lever in an alarm "off" position for a predetermined short interval;
- (h) a latch lever pivoted to said base plate between said alarm actuator lever and said interval control lever; and
- (i) a spring positioned over said spacer post for urging said latch lever toward said interval control lever, said latch lever having an alarm "off" position in which it holds the alarm actuator lever in its alarm "off" position, and said interval control lever being slidable on the latch lever against the force of said spring for moving the latch lever at the end of said predetermined short interval to release the alarm actuator lever from said latch lever and permit the latch lever to be instantaneously moved to its alarm "on" position.

4. An alarm clock comprising:

- (a) a base plate;
- (b) an alarm sounding mechanism pivoted to said base plate;
- (c) an alarm actuator lever pivoted to said base plate, said alarm actuator lever having an alarm "on" position permitting said alarm sounding mechanism to sound, and an alarm "off" position preventing the operation of said alarm sounding mechanism;
- (d) an interval control lever pivotally mounted on said base plate, said interval control lever having a stud fixed thereto and extending rearwardly therefrom for moving said alarm actuator lever upwardly to its alarm "off" position;
- (e) gear means continuously rotated as a function of

7

time by said clock cooperating with said interval control lever to hold said interval control lever in an alarm "off" position for a predetermined short interval;

- (f) a latch lever pivoted to said base plate between said alarm actuator lever and said interval control lever, said latch lever having a cam surface arranged for cooperation with the stud on said interval control lever, said latch lever having a stud fixed thereto arranged generally parallel to the stud on said interval control lever for holding said alarm actuator lever in the alarm "off" position after the alarm actuator lever has been moved to said alarm "off" position by said interval control lever, the stud on said interval control lever being slidable on the cam surface on said latch lever for moving said latch lever at the end of said predetermined short interval to release the alarm actuator lever from said latch lever and permit the alarm actuator lever to be instantaneously moved to its alarm "on" position.

8

5. An alarm clock as defined in claim 4 wherein the pivot axes of the alarm actuator lever, the interval control lever and the latch lever are arranged generally perpendicular to said base plate and front plate, and the studs on said interval lever and latch lever are also arranged generally perpendicular to said base plate and front plate so as to provide a clock movement which may be easily manufactured and reliably operated.

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