Feb. 2, 1971 W. C. WINGLER 3,559,396

VARIABLE LOUDNESS ALARM MECHANISM

Filed Feb. 28, 1969

Fig. 1.

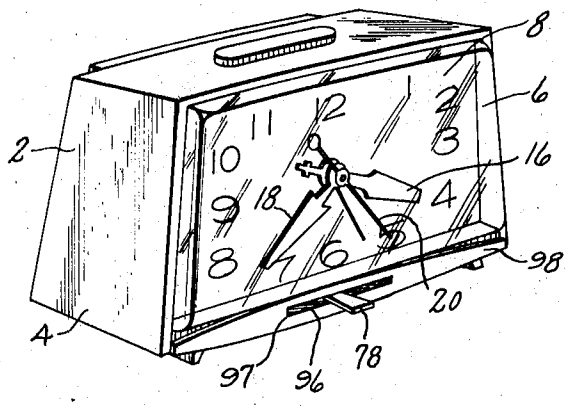


Fig. 2.

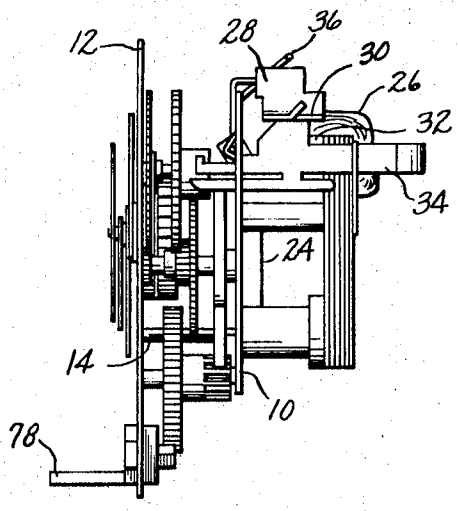


Fig. 3.

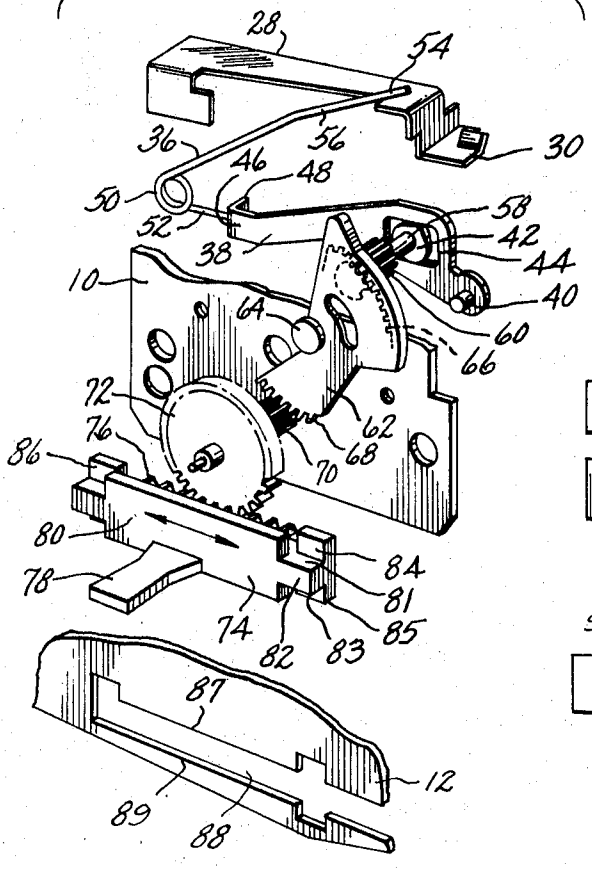
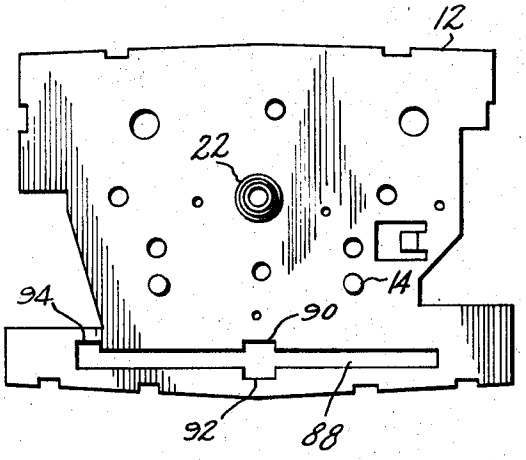


Fig. 4.



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United States Patent Office 3,559,396 Patented Feb. 2, 1971

3,559,396

VARIABLE LOUDNESS ALARM MECHANISM

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Filed Feb. 28, 1969, Ser. No. 803,355
Int. Cl. G04b 23/10
U.S. Cl. 58—21.12 4 Claims

ABSTRACT OF THE DISCLOSURE

A mechanism for adjusting the loudness of an alarm from the front of an alarm clock wherein a slider having a rack integrally formed thereon is located between a front mounting plate and a front wall of the clock casing. An actuating lever integrally formed with the slider extends through the front wall of the casing so that the volume of the alarm may be adjusted by simply sliding the actuating lever back and forth across the front wall of the clock.

BACKGROUND OF THE INVENTION

This invention relates to a mechanism for varying the loudness of an alarm of an alarm clock, and more particularly, to a unique slider construction for adjusting the loudness of the alarm from the front of the clock.

In United States Letters Patent No. 3,251,182, May 17, 1966 to Marble, assigned to the same assignee as the present invention, there is disclosed a mechanism for varying the loudness of an electromagnetic vibrator alarm of an alarm clock. As shown and described in the patent, a coin slot control knob protrudes from the rear of the clock for adjusting the loudness of the alarm mechanism. Within the clock, a control spring is arranged to exert a variable force on a vibrator alarm, and a cam and lever mechanism is arranged for transmitting motion of the control knob to the control spring to adjust the loudness of the alarm. It is desirable that the mechanism for adjusting and setting of the loudness of the alarm be accessible from the front of the clock and also be visible from the front of the clock. It is also desirable to provide a front control mechanism which may be manufactured at relatively low cost and be compactly arranged so that it may be incorporated in an alarm clock without increasing the size of the clock casing.

SUMMARY OF THE INVENTION

Accordingly, it is a primary object of this invention to provide an improved variable loudness alarm mechanism for an electric clock having a minimum number of parts which may be readily manufactured and assembled to each other, and which may be readily and conveniently adjusted from the front of a clock.

In accordance with one of the aspects of this invention, a mounting plate of the alarm clock is formed with an elongated slot, a front casing wall of the clock is also provided with a slot, and a unique slider is located between the front mounting plate and the front casing wall. The elongated slider includes an integrally formed flat guide wall, an integrally formed toothed rack extending rearwardly from the guide wall and an integrally formed actuating lever extending forwardly from the guide wall. The slider is positioned on the clock so that the guide wall is located between the front mounting plate and the front casing wall, the rack extends behind the mounting plate, and the actuating lever extends forwardly in front of the front casing wall. Gear means extends from the toothed rack to the means for adjusting the spring. With this arrangement, the forwardly extending actuating lever may be manually adjusted at the front of the clock for adjusting the spring and the loudness of the alarm.

Accordingly, a very simple, yet effective arrangement for controlling the loudness of the alarm by reciprocating a lever at the front of the clock is achieved.

BRIEF DESCRIPTION OF THE DRAWINGS

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

FIG. 1 is a front perspective view of an electric clock incorporating the variable loudness alarm mechanism of this invention;

FIG. 2 is a side elevational view of the electric clock with the casing partially removed;

FIG. 3 is an exploded view of the principal components of the variable loudness alarm mechanism and the vibrator of the alarm; and

FIG. 4 is a front elevational view of the clock mounting plate.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawing and first particularly to FIG. 1, there is shown an electric clock **2** comprising a plastic casing **4** having an open front which is closed by a transparent front casing crystal wall **6** making visible a dial face **8** located behind the front casing wall.

As shown in FIG. 2, the clock mechanism comprises a supporting structure including a base plate **10** and a front mounting plate **12** spaced from the base plate and arranged generally parallel thereto for supporting the clock mechanism. Conventionally, the base plate **10** and front mounting plate **12** are maintained in spaced relation by a number of studs and spacer posts including those indicated at **14**. The clock is provided with hour, minute and second hands **16**, **18** and **20**, respectively, driven by a plurality of concentric shafts which extend through a center stack bushing **22** which is attached to the front mounting plate **12**.

The timing device may include any suitable form of timer motor, here shown as a self-starting synchronous motor **24**, a field coil **26** of which is connected to a source of regulated frequency alternating current. A resilient magnetic vibrator **28** operated by leakage flux from the motor is arranged to have its free end portion **30** vibrate against a stator **32** and produce an audible signal at all times when the motor is energized unless the vibrator is prevented from vibrating by a lever **34**.

As is known in the art, it is possible to vary the loudness of an electromagnetic vibrator by varying the air gap between the vibrator **28** and the stationary member **32** which it strikes. As shown more particularly in FIG. 3, an adjustable spring **36** is provided for varying the air gap and simultaneously the stiffness of the vibrator **28** to thereby vary the loudness of the alarm. A lever **38** is pivotally supported by a pin **40**. Rotation of a cam **42** in an aperture **44** in the lever causes rotation of the lever **38** about the pin **40**. The free end of the lever **38** includes a spring engaging means **46** which may be a tab **48** bent at right angles to the lever with a hole formed therein to receive one end of the spring **36**. Spring **36** includes a convolute section **50** which is placed over a spacer post. The spring **36** has arms of unequal length. The shorter arm **52** is connected to the spring engaging means **46**, **48** of the lever while portion **54** of the longer arm **56** of the spring is positioned to engage the top surface of vibrator **28**.

Rotation of the cam **42** in a clockwise direction causes the lever **38** to be pivoted counter clockwise, thereby rotating the short arm **52** of the said spring **36** in a clockwise direction. Clockwise rotation of the spring **36** brings portion **54** of the longer arm **56** of the spring into engagement with the top surface of the vibrator **28** to soften or lower the volume of the alarm.

Until the portion **54** of the spring engages the vibrator, the lever system comprising the cam **42**, the lever **38** and the spring **36** has a large mechanical ratio such as 18 to 1. This large ratio results from positioning the aperture **44** closer to pin **40** than the spring engaging means **46**, **48** and by making the spring arm **52** shorter than the spring arm **56**. Slight rotation of the cam **42** will effect a relatively large movement of the portion **54** of the longer arm **56** of the spring. Even though the mechanical tolerances of the dimensions and positions of the alarm mechanism components are large, it is possible to compensate for these large tolerances by bringing the portion **54** of the longer spring arm **56** into contact with the vibrator **28** by a very slight rotation of the cam **42**.

In accordance with my invention, a unique mechanism is provided for adjusting the position of cam **42** from the front of the alarm clock in order to vary the loudness of the alarm. As shown more particularly in FIG. 3, a pinion gear **60** is fixed to cam **42** so that rotation of the pinion gear will cause corresponding rotation of the cam **42** and an integrally formed rocker lever and sector gear construction **62** is provided for causing rotation of the pinion gear **60**. As illustrated, rocker lever **62** is pivoted to the base plate **10** of the clock by a pivot pin **64**, a sector gear **66** is formed at one end of the rocker for cooperating with pinion gear **60**, and a sector gear **68** is formed at the other end of the rocker for cooperating with a pinion gear **70**. Preferably, pinion gear **70** and a larger gear **72** are integrally formed of plastic material and are suitably mounted between base plate **10** and front plate **12**.

In accordance with my invention, an integrally formed rack and slider **74** is provided for moving gear **72** and gear train members **70**, **68**, **66** and **60** for adjusting spring **52** to adjust the loudness of the alarm. With this construction, it can be appreciated that movement of the rack slider **74** to the right as shown in FIG. 3 will cause counter clockwise rotation of gear **72** and pinion **70**, clockwise rotation of rocker **62** and sector gears **68** and **66**, clockwise rotation of pinion **60** and cam **42** to cause lever **38** to be pivoted counter clockwise thereby rotating the spring **36** in a clockwise direction to bring the longer arm **56** of the spring into engagement with the top surface of the vibrator **28** to soften or lower the volume of the alarm. As shown more particularly in FIG. 3, my unique rack slider **74** which is preferably formed of plastic or other suitable material includes a plurality of rack teeth **76** for meshing with gear **72**, and an integrally formed control lever **78** which extends through the front wall **6** of the clock for permitting manual setting of the slider.

A unique arrangement is provided for mounting and guiding the slider on the clock. As shown, the slider includes a generally vertical front guide wall **80**, a generally horizontal central guide portion **82**, two upwardly and downwardly extending rear guide tabs **84** and **85**, respectively, formed at the right side of the slider, and an upwardly extending guide tab **86** formed at the left side of the slider. As shown more particularly in FIG. 4, an elongated slot **88** is formed in the front mounting plate **12** of the clock for receiving and mounting slider **74**. The slot **88** includes upwardly and downwardly extending notches **90** and **92** which correspond to the upwardly and downwardly extending tabs **84** and **85** on the slider and an upwardly extending notch **94** which corresponds to the upwardly extending rear guide tab **86** of the slider. With this construction, the slider **74** may be readily assembled to the clock without the use of separate fastening devices. With reference to FIGS. 3 and 4, the slider **74** is simply aligned with the slot **88** so that tabs **84** and **85** are in line with notches **90** and **92**, and tab **86** is in line with notch **94**. Then, the slider may be pushed rearwardly to position the tabs **84** and **86** behind front mounting plate **12**, as illustrated in FIG. 2. Movement of the slider to the right, as illustrated in FIG. 4, causes the

tabs **84**, **85** and **86** to slide on the rear surface of mounting plate **12** to thereby hold the slider on the front plate **12** of the clock. It can be appreciated that the rear surface of the front guide wall **80** slides on the front surface of front mounting plate **12**, the front surfaces of tabs **84** and **86** slide on the rear surface of mounting plate **12**, and the top and bottom surfaces **81** and **83**, respectively, of the central guide portion **82** slide on the upper and lower inner surfaces **87** and **89**, respectively, of the wall which forms the slot **88**.

In order to complete the assembly of the clock, a slot **96** is formed in the bottom portion **98** of the front wall **6** of the clock casing for receiving control lever **78** of the slider **74**. The upper portion of the crystal wall **6** is preferably made of transparent material so that the clock indicia may be readily viewed, and the lower portion **98** of the front wall is preferably painted so that the internal mechanism of the clock cannot be seen from the front of the clock. While the slot **96** which receives the control member **78** is made long enough to permit a full range of adjustments to the variable loudness alarm mechanism the left end **97** of the slot **96** is related to the left end of the slot **88** and notches **90**, **92** and **94** so that upon movement of the control lever **78** to the left as viewed in FIG. 1, the lever **78** will abut the end **97** of slot **96** before tabs **84**, **85** and **86** become in line with the notches **90**, **92** and **94** in the front mounting plate **12**. Thus, the slider **74** is retained on the front mounting plate.

OPERATION

If it is desired to soften or lower the volume of the alarm, it is merely necessary to touch the manually adjustable lever **78** which protrudes from the front of the clock and move it a slight distance to the right. Such movement will cause rightward movement of the rack **76**, counter clockwise movement of gears **72** and **70**, clockwise movement of rocker **62** and gears **68** and **66**, clockwise movement of pinion gear **60** and cam **42** to cause counter clockwise movement of lever **38** which, in turn, causes clockwise movement of spring **36** thereby increasing the force of spring **36** on the vibrator arm **28** to soften the alarm. Conversely, should it be desired to increase the volume of the alarm and make it louder, it is merely necessary to touch the control lever **78** and move it a slight distance to the left as shown in FIG. 3. During such movement, the gear train **72**, **70**, **68**, **66**, **58** will pivot spring **36** counter clockwise to lessen the force of spring **36** on vibrator **28** thereby making the alarm louder. Accordingly, the loudness of the alarm may be conveniently set from the front of the clock and after having been set the relative loudness of the alarm will be indicated to the user by simply looking at the front of the clock and observing the relative position of the control lever **78** with respect to the front of the clock and the slot **96** within which it travels.

From the foregoing description, it will be appreciated that my improved variable loudness alarm mechanism which may be adjusted from the front of the clock includes a minimum number of relatively easily manufactured parts. The integrally formed rocker lever **66** and sector gears **66** and **68** may be formed in a simple casting operation. Likewise, the gear and pinion **70**, **72** may be integrally molded with each other. The unique slider member **74** may be molded of a suitable plastic material, and as previously described may be readily and conveniently connected to the clock without the use of tools or a single piece of fastening hardware. Thus, an exceedingly simple yet sturdily constructed mechanism for varying the loudness of an alarm from the front of a clock has been achieved.

What I claim is:

1. In a variable loudness alarm mechanism for use with an alarm clock including a vibrator for sounding an alarm, a spring engaging said vibrator, and an adjustble means to effect movement of the spring to vary the

loudness of the alarm; a mechanism manually movable from the front of the alarm clock for adjusting the spring to vary the loudness of the alarm comprising:

(a) a mounting plate having an elongated slot formed therein;

(b) a front casing wall having a slot formed therein; and

(c) an elongated slider including an integrally formed generally flat guide wall, an integrally formed toothed rack extending rearwardly from said guide wall, and an integrally formed actuating lever extending forwardly from said guide wall, said slider being positioned on said clock with said guide wall being located betwen said front mounting plate and said front casing wall, said rack extending behind said mounting plate and said actuating lever extending in front of said front casing wall; and

(d) gear means extending from said toothed rack to the means for adjusting the spring so that the loudness of the alarm may be adjusted by manually adjusting the position of said actuating lever at the front of the clock.

2. In a variable loudness alarm mechanism for use with an alarm clock including a vibrator for sounding an alarm, a spring engaging said vibrator, and an adjustable means to effect movement of the spring to vary the loudness of the alarm; a mechanism manually movable from the front of the alarm clock for adjusting the spring to vary the loudness of the alarm comprising:

(a) a mounting plate having an elongated slot formed therein, said slot including upwardly and downwardly extending notches;

(b) a front casing wall having a slot formed therein;

(c) an elongated slider including an integrally formed generally flat guide wall, a central guide portion extending rearwardly from said guide wall, an integrally formed toothed rack extending rearwardly from said guide wall, and integrally formed upwardly and downwardly extending tabs located behind said front guide wall, so that said slider may be positioned on said front mounting plate by inserting said upwardly and downwardly extending tabs within said upwardly and downwardly extending notches and then sliding the slider with respect to said front plate so that the front plate is positioned between the front guide wall of the slider and the upwardly and downwardly extending tabs; and

(d) gear means extending from said toothed rack to the means for adjusting the spring so that the loudness of the alarm may be adjusted by manually adjusting the position of said actuating lever at the front of the clock.

3. A variable loudness alarm mechanism as defined in claim **2** wherein said elongated slider includes an integrally formed control lever extending forwardly from said central guide portion, said control lever extending through the slot formed in the front casing wall and being arranged with respect to said slot so that it will abut the end of the slot before the tabs formed on said slider become in line with the notches formed in said mounting plate so that the slider is retained on the front mounting plate when the parts are in their assembled position.

4. In a variable loudness alarm mechanism for use with an alarm clock including a vibrator for sounding an alarm, a spring engaging said vibrator, and an adjustable cam for moving lever to effect movement of the spring to vary the loudness of the alarm; a mechanism adjustable from the front of the alarm clock for effecting movement of the lever and the spring to vary the loudness of the alarm comprising:

(a) a pinion gear fixed to said cam for adjusting the position of said cam;

(b) a pivoted rocker lever having sector gears formed at opposite ends thereof, one of said sector gears being in mesh with said pinion;

(c) an integrally formed gear and pinion, said gear and pinion being formed of the same material and being concentric with each other, said pinion being in mesh with said other sector gear,

(d) an elongated slider having a plurality of rack teeth formed thereon, the teeth of said rack being in mesh with said gear; and

(e) an actuating lever integrally formed with said slider, said actuating lever extending through a front wall of said alarm clock whereby the loudness of the alarm may be adjusted by simply moving the slidable adjustable lever back and forth across the front wall of the clock.

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