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A. J. MUCHOW

2,506,379

ALARM INTENSITY CONTROL

Filed April 27, 1946

Fig. 1.

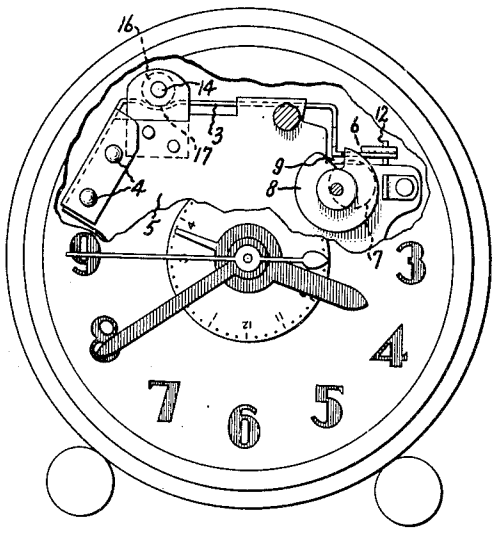


Fig. 2.

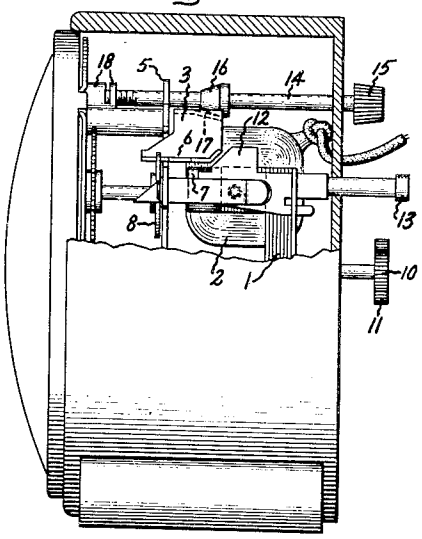


Fig. 3.

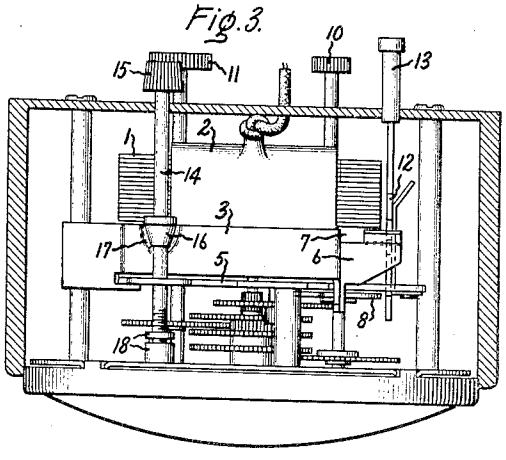
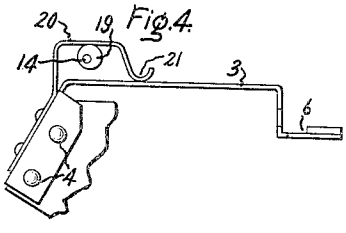


Fig. 4.



Inventor:
Albert J. Muchow,
by Rowell S. Mack
His Attorney.

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ALARM INTENSITY CONTROL

Albert J. Muchow, Holliston, Mass., assignor to Warren Telechron Company, a corporation of Maine

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1 Claim. (Cl. 58—38)

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My invention relates to alarm clocks and in particular to an alarm clock in which the loudness of the alarm may be adjusted to any desired value from maximum loudness to silence, and wherein such loudness adjusting device is designed to remain in the desired adjustment condition until changed and cannot be altered by the vibration incident to the operation of the alarm. Such loudness adjustment is employed in combination with a manual alarm shutoff and an automatic alarm time control the actions of which are made independent of each other to the end that the alarm may be allowed to sound at a predetermined adjustable time or not, as desired, and the operation of this manual shutoff device cannot change the loudness adjustment.

The features of my invention which are believed to be novel and patentable will be pointed out in the claim appended hereto. For a better understanding of my invention, reference is made in the following description to the accompanying drawings in which Fig. 1 represents a front view of an alarm clock with a portion of the front broken away to show portions of the alarm and alarm control mechanism; Fig. 2 represents a partially sectioned side view of the clock of Fig. 1 as viewed from the right side thereof; Fig. 3 represents a top view of the mechanism of Fig. 1; and Fig. 4 represents a modified form of tone control.

The clock shown is of a type driven by a self-starting synchronous alternating current motor having a laminated magnetic field core structure 1 and single phase energizing coil 2 on the yoke of the core to produce the necessary operating flux in the core and across the armature gap. The yoke of the field structure with coil 2 thereon is uppermost in the clock, and the lower portion of the motor structure including the armature gap portion is not shown in the drawing. In shunting relation to the yoke portion of the motor field core outside the coil is a magnetic arm vibrator element 3. This vibrator element is made of sufficiently thin strip material as to be resilient and is securely fastened at its left end, as viewed in Fig. 1, by rivets 4 to a clock plate 5 secured in fixed relation in proximity to the motor core structure. The right end of vibrator element 3, as viewed in Fig. 1, is relatively free to vibrate and has a downward and lateral right angular

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bend so that its right end portion 6 extends in close proximity to the corresponding end of the yoke of field core 1. When the coil 2 is energized a small part of the flux from the motor core is shunted through the vibrator element 3 and tends to cause the same to vibrate with the alternating current frequency, the right end 6 of the vibrator being attracted downward to strike against a magnetic block 7 secured to the motor core when the flux is a maximum and springing away when the flux is zero, this being the action when the vibrator is free to vibrate. A forward extension of part 6 cooperates with a cam 8 driven clockwise as viewed in Fig. 1 by the clock at one revolution in 12 or 24 hours, or such other period as the automatic alarm action is designed for. The high part of the cam holds the vibrator away from block 7 and prevents any sound. However, when the depression 9 in the cam is opposite the cam follower part of the vibrator, such part falls into the depression and the vibrator is free to vibrate and produce a sound. This is the position of the cam shown in Fig. 1. The cam is adjustable relative to the clock hands so that the alarm may be set to sound at the desired time of day. In Fig. 3 the thumb shaft 10 represents the alarm time adjustment and thumb shaft 11 represents means for setting the clock hands. The depression 9 in the cam 8 is generally of such dimensions as to allow the alarm to sound for about one-half hour, after which the alarm will be automatically shut off by the cam.

In case the person using the alarm clock desires to shut off the alarm when operating in response to an automatic operation or to prevent the alarm from sounding when it would otherwise sound automatically, a slidable wedge member 12 with a handle 13 is provided and which, when pushed inward from the back of the clock, wedges beneath the part 6 of the vibrator and lifts the same so that it will not strike against block 7. Thus in a 12-hour alarm clock the alarm would usually be set to sound, say, at 6:30 a. m. and again at 6:30 p. m. The user is generally awakened by the alarm in the morning and upon arising shuts it off by pushing in wedge member 12. Upon retiring at night, say, at 10 p. m. the user pulls the wedge member 12 out so that the alarm will again sound the following morning.

The features thus far described are well known

and are not my invention except as they cooperate with my alarm volume control now to be described.

Different people desire different degrees of loudness in the alarm sound produced by such clocks and prefer to be able to control and set the degree of loudness to suit themselves, and to vary this setting from time to time as conditions warrant. This can only be done with any degree of accuracy when the alarm is sounding and once having adjusted the alarm to the desired volume, this adjustment should remain the same and not be altered by the vibration incident to such alarm mechanisms or by the manual shutoff mechanism. While it has been proposed to employ the manual shutoff mechanism as a volume control, this is very unsatisfactory because such shutoff control is not designed for volume control and every time the shutoff control is used for its intended purpose it would need subsequent readjustment for volume control.

According to my invention, I provide a volume control the operation and adjustment of which are independent of the shutoff control. This volume control consists of a shaft 14 turnable from the back of the clock by a thumb piece 15. The shaft carries a cone-shaped cam member 16 arranged to bear down on the top side of the vibrator member 3 at some point between the secured end of the vibrator member and its free end. The vibrator arm may have a suitably shaped recess 17 into which the cone 16 enters to a greater or less extent, depending upon its adjustment. The shaft 14 is screw-threaded into a split resilient nut piece 18 mounted on the back side of clock plate 5. The threaded arrangement of the nut is such that its split portions are sprung apart or toward each other when the shaft 14 is screwed therein so that there is a binding action that holds the shaft 14 against easy turning and positively prevents turning of shaft 14 due to the vibration incident to alarm mechanisms, and hence, the volume control, while adjustable by turning thumb piece 15, will not vibrate out of adjustment. Other means of preventing easy turning of shaft 14 may be used. The cone 16 resting against the top side of vibrator arm 3 limits the distance the arm may spring away from attracted position, and hence, screwing in the shaft 14 from the back of the clock reduces the throw of the vibrator arm and reduces the volume of sound produced, and screwing the shaft out increases the throw of the vibrator arm and volume or loudness of the alarm. The fine screw thread in nut 18 is such as to give a fine, accurate control, and the cone 16 is made of ample dimensions so as to enable control of volume over the complete range from maximum loudness where the cone does not contact with the vibrator arm, to complete silence where the vibrator arm is held against block 7 even when allowance is made for differences in dimensions and assembly of parts as is likely to occur in mass production. The alarm clock may now be designed for the extra loudness desired by people who are somewhat hard of hearing without making the alarm clock objectionable to those who desire an alarm of minimum sound volume, because the volume can be accurately reduced to any desired extent by this adjustment and when adjusted will not change unless changed intentionally.

The volume control does not interfere with the automatic operation or with the manual shutoff, and the operation of the manual shutoff cannot change the volume control adjustment. The volume control is of course adjusted to suit the user while the vibrator alarm is in operation.

The volume control cam 16 preferably is located nearest the fixed end of the vibrator arm 3. By so doing the volume control adjustment causes less load and wear at the cam 8 when the cam follower is riding on the high portion of the cam and the volume control is adjusted for low volume than would be the case if the volume control were located near the cam end of arm 3. Likewise, the shutoff wedge 12 works easier with such longer flexible portion of the arm to work on. The pivot of arm 3 is largely at the point of the volume adjustment 16 when these parts are in contact. I have found that by placing the volume control cam as shown about one-fourth the distance from the fixed end of arm 3 toward its free end, the natural rate of vibration of such arm is not interfered with by the volume control to the extent of reducing tone quality as distinguished from volume.

A modified tone control which has been found to work satisfactorily is represented in Fig. 4. An eccentric cam 19 instead of a cone cam is used on the tone control shaft 14. The shaft 14 has bearings in suitable clock plates and does not move endwise as in Fig. 1. It is, however, prevented from easy turning by any suitable friction producing expedient. The cam 19 of Fig. 4 does not act directly upon the vibrator arm 3 but rather upon a non-magnetic spring 20 fastened at its left end with the corresponding end of vibrator arm 3 and having its free end at 21 bent down so that it may contact the upper surface of vibrator arm 3 at about one-fourth the distance from its fixed end toward its free end. It is evident that by turning shaft 14 and cam 19, the spring 20 can be raised and lowered to vary the pressure applied to arm 3 at 21 or to lift the spring 20 slightly away from arm 3 when the latter is in fully raised position. The amplitude of vibration of the arm 3 may thus be accurately controlled as in Fig. 1 without interfering with the shutoff control or automatic alarm operation. The spring 20 being resilient may give a little when struck by the vibrating arm 3 and to the extent that this occurs, it adds its stiffness to that of arm 3 in limiting the upward movement of vibration by a sort of damping action. Tone quality remains good. The vibration impact on the cam 19 of Fig. 4 is somewhat less than on the cam 16 of Fig. 1. The accuracy, range, and permanency of the volume control adjustment of the arrangement of Fig. 4 are very satisfactory.

What I claim as new and desire to secure by Letters Patent of the United States is:

In an alarm clock, an alternating current motor for operating said clock, a magnetic vibrator arm fixed at one end and being resilient such that its other end may vibrate, said vibrator arm being disposed relative to the synchronous motor so as to have its free end attracted toward the motor by alternating flux therefrom and thus caused to vibrate and to produce an audible sound when the motor is energized and such vibrator is free to vibrate, means operated by the clock for preventing vibration of the magnetic vibrator except during a predetermined alarm period, manual means adapted to be moved at will to and from the path of vibration of said vibrator to prevent or permit the operation of said vibrator, and means for adjusting the relative magnitude of the vibration of said vibrator arm to adjust the volume of the sound made thereby comprising a

rotatable shaft extending adjacent to and transversely of said vibrator arm, said shaft being threaded into a fixed nut such that by turning the shaft its endwise position may be adjusted, said shaft carrying a cone-shaped cam adapted to bear against the vibrator arm between its ends to limit and thus control the magnitude of its vibration in accordance with the endwise adjustment of said shaft.

ALBERT J. MUCHOW.

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