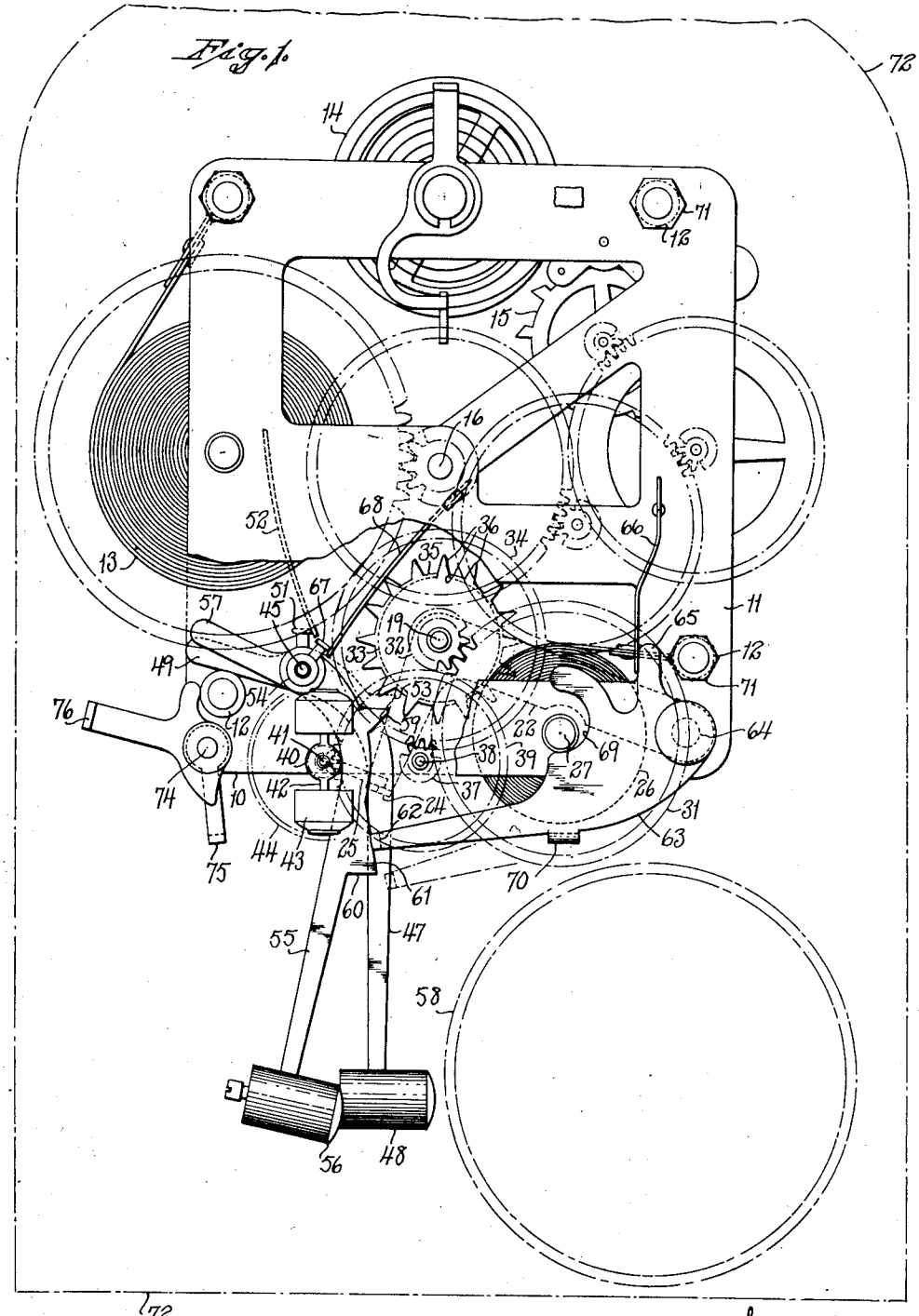
Jan. 8, 1935. W. E. PORTER 1,987,210

VARIABLE BEAT ALARM CLOCK

Filed Nov. 9, 1933 2 Sheets-Sheet 1

Fig. 1.




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VARIABLE BEAT ALARM CLOCK

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Fig. 2.

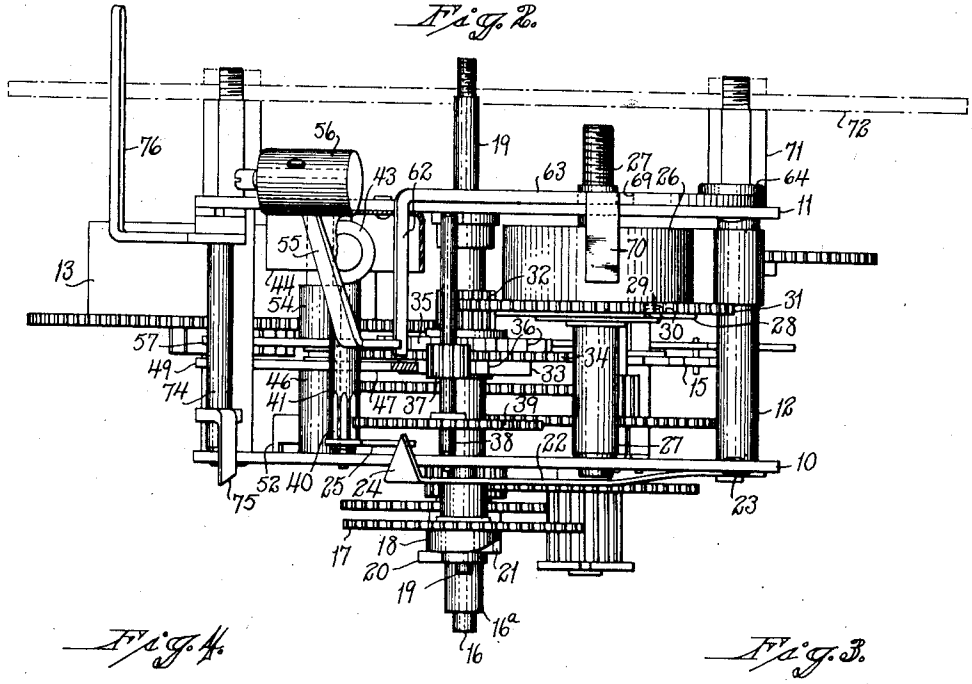



Fig. 4.

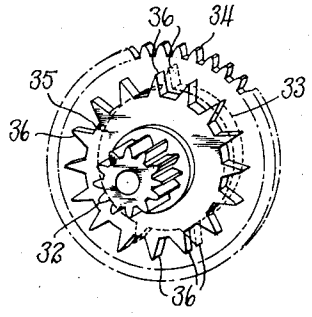



Fig. 5.

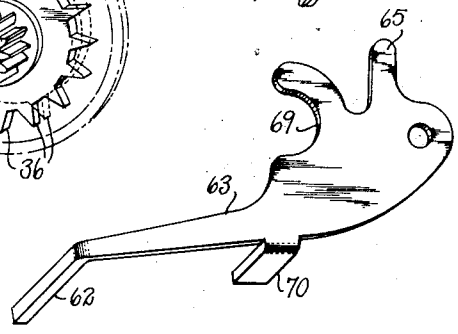



Fig. 3.

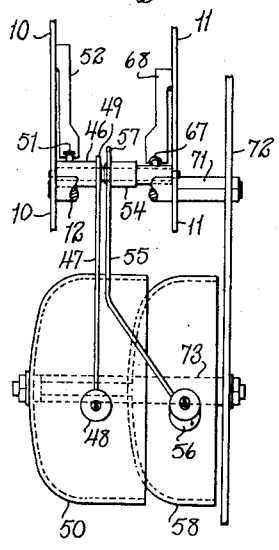
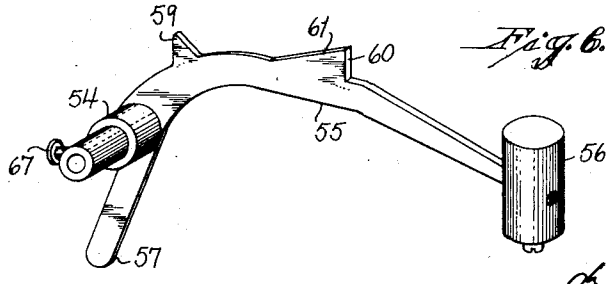



Fig. 6.




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1,987,210

# UNITED STATES PATENT OFFICE

1,987,210

## VARIABLE-BEAT ALARM CLOCK

Wilson E. Porter, New Haven, Conn., assignor to The New Haven Clock Company, New Haven, Conn., a corporation

Application November 9, 1933, Serial No. 697,285

4 Claims. (Cl. 58—16)

This invention relates to improved variable-beat alarm clocks, that is to say, alarm clocks in which means is provided for automatically changing the beat frequency, tone, or both, of the alarm-sounding mechanism, and constitutes a novel variation of the alarm clocks shown and described in my co-pending application, filed July 27, 1933, Serial No. 682,369.

One of the objects of the present invention is to provide a variable-beat alarm clock having superior means for arousing a sleeper without undue shock.

A further object is to provide a variable-beat alarm clock having means for sounding an alarm varying in both tone and beat-frequency.

Another object is to provide an alarm clock having simple, reliable and effective means for automatically restoring the mechanism to its initial condition by merely winding the alarm-spring preparatory to another cycle of operation.

Other objects and advantages will appear to those skilled in the art from the following, considered in conjunction with the accompanying drawings and the appended claims.

In the accompanying drawings:

Fig. 1 is a view mainly in rear elevation of one form which an alarm-clock movement may assume in accordance with the present invention, with the back-plate omitted and the rear movement-plate partly broken away;

Fig. 2 is an under-side view of the movement with the alarm-bells omitted;

Fig. 3 is a fragmentary view in edge elevation, showing the relationships of the dual hammers and dual bells;

Fig. 4 is a perspective view of the hammer-actuating unit, detached;

Fig. 5 is a similar view of the control-lever, detached; and

Fig. 6 is a similar view of the secondary hammer-unit, detached.

The particular alarm-clock movement herein chosen for illustration includes a front movement-plate 10 and a rear movement-plate 11, which are rigidly secured together in spaced relationship by four (more or less) pillars 12 in the ordinary manner of clock movements.

Between the respective movement-plates 10 and 11 is mounted a time-train of any approved construction, but as herein shown being of the type driven by a spiral mainspring 13, and is provided with the usual balance-wheel 14 and escapement features 15.

As before pointed out, the time-train may be of any approved construction and requires no detailed description herein other than to say that in addition to driving a minute-arbor 16 and an hour-sleeve $16^a$, it also serves to continuously rotate a cam-wheel 17 carrying a sleeve-like cam 18 and loosely mounted with freedom for both rotary and axial movement, in the ordinary manner of alarm clocks, upon the forward end of an alarm-set staff 19, extending through the movement-plates 10 and 11 and bearing therein. The forward end of the said alarm-set staff 19 rigidly carries a radially-projecting cam-finger 20 coacting with the forward edge of the cam 18 and on occasion registering with the cam-notch 21 therein to permit the alarm-wheel 17 and the said cam 18 to move forwardly on the said staff 19 under the urge of a sheet-metal alarm-control spring 22.

The said alarm-control spring 22 is formed of spring-metal and is rigidly secured at one end by a rivet 23 to the front movement-plate 10 and at its opposite end is provided with an alarm-control finger 24 adapted to be moved into and out of the path of a stop-finger 25 rigidly mounted upon a governor-shaft 41, for the purpose of stopping and releasing the alarm-train, as will presently be described.

Also mounted between the front and rear movement-plates 10 and 11 is an alarm-train comprising a spiral alarm-drive spring 26 having one end anchored to the adjacent one of the pillars 12 and having its opposite end anchored to a winding-arbor 27 bearing in the same movement-plates 10 and 11. The said winding-arbor has rigidly coupled to it a ratchet-disk 28 having a laterally-offsetting ratchet-finger 29 engaging any given one of a plurality of perforations 30 formed in an alarm-train main-wheel 31. The spring 26 acts through the intermediary of the features 27, 28, 29 and 30 to drive the said main-wheel 31, which is loosely mounted upon the said arbor 27 in the usual manner of alarm clocks.

The main-wheel 31 meshes into a pinion 32 which is mounted upon the alarm-set staff 19 with freedom for rotation thereupon, and has rigidly attached to it what for convenience of description may be termed a "primary" alarm-actuating wheel 33, the second-wheel 34 of the alarm-train, and what may be termed a "secondary" alarm-actuating wheel 35. Each of the alarm-actuating wheels 33 and 35 is provided with a series of peripheral actuating-teeth 36, the former with three (more or less) teeth, and the latter with sixteen (more or less) teeth, for the purpose as will hereinafter appear.

The second-wheel 34 of the alarm-train meshes into and drives a pinion 37, rigidly carried by an arbor 38 bearing at its respective opposite ends in the front and rear movement-plates 10 and 11. The arbor 38 also rigidly carries a third wheel 39 meshing into a pinion 40 forming a rigid feature of a governor-shaft 41, also bearing at its respective opposite ends in the movement-plates 10 and 11 before referred to. Adjacent its rear end, just forwardly of the rear movement-plate 11, the governor-shaft 41 has staked to it a diametrically-arranged governor-support 42 having mounted upon each of its respective opposite ends, with freedom for radial movement thereon, a brake-shoe 43 adapted to engage the interior surface of the rim of a cup-shaped brake-drum 44 secured to and forwardly projecting from the inner face of the rear movement-plate 11.

Mounted adjacent and to one side of the alarm-set staff 19 is a hammer-shaft 45, mounted at its respective opposite ends in the movement-plates 10 and 11. Mounted upon the said hammer-shaft 45, adjacent the forward end thereof, and with freedom for oscillation thereon, is a hub 46 having staked to its rear end a sheet-metal hammer-arm 47, which for convenience of description, will be designated as the "primary" hammer-arm. At its outer lower end, said hammer-arm 47 is provided with a hammer-head 48 and at its opposite end, it is provided with a stop-arm 49 engageable with the upper surface of the adjacent one of the pillars 12, to limit the swinging movement of the said hammer-arm toward a "primary" bell or other sounder 50.

The hub 46, upon which the primary hammer-arm 47 is mounted, carries a radially-projecting pin 51, which is engaged by the lower end of a sheet-metal spring 52 secured to the inner face of the front movement-plate 10 and exerting a constant effort to swing the hammer-arm 47 and its hammer-head 48 toward the bell 50. The hammer-arm 47 is also provided with an integral offsetting actuating-finger 53 which is aligned with the actuating-teeth 36 of the primary actuating-wheel 33 before referred to.

Also mounted upon the hammer-shaft 45, but adjacent the rear end thereof, with freedom for oscillatory movement thereon, is a hub or sleeve 54 having rigidly staked to its forward end a "secondary" hammer-arm 55 carrying at its outer end a hammer-head 56 and provided at its opposite end with a stop-arm 57 engageable with the upper surface of the adjacent one of the pillars 12, to limit the swinging movement of the said hammer-arm 55 and its head 56 toward a "secondary" bell or other suitable sounding device 58.

Like the hammer-arm 47, the secondary hammer-arm 55 is provided with an integral offsetting actuating-finger 59 which is aligned with the actuating-teeth 36 of the secondary actuating-wheel 35 for being engaged thereby, as will hereinafter appear. The secondary hammer-arm 55 is also provided with an offsetting lug 60, one edge of which constitutes a cut-out shoulder 61 engageable on occasion by a cut-out finger 62 forwardly offsetting from a sheet-metal control-lever 63 pivotally mounted, by means of a stud 64, to the lower portion of the rear movement-plate.

For the purpose of normally urging the control-lever 63 to a position to engage its cut-out finger 62 with the cut-out shoulder 61 of the secondary hammer-arm 55, the said lever is provided with an upwardly-extending finger 65 engaged by the lower end of a sheet-metal spring 66 secured to the rear face of the rear movement-plate 11.

Like the hub 46, the hub 54 of the hammer-arm 55 is provided with a radially-offsetting stud 67 engaged by the lower end of a sheet-metal spring 68 staked to the inner face of the rear movement-plate 11 and exerting a constant effort to engage the hammer-head 56 with the bell 58.

For the purpose of limiting the swinging movement of the control-lever 63, the same is provided with a notch 69, the opposite side walls of which are engageable with the adjacent sides of the winding-arbor 27. Inwardly projecting from the control-lever 63, about midway the length thereof, is an integral finger 70 extending over the outer convolution of the spiral alarm-spring 26 and engageable thereby as the said spring expands, for the purpose of swinging the said lever 63 downwardly to move its cut-out finger 62 out of the path of the cut-out shoulder 61 of the hammer-arm 55.

Secured to the rear of the clock-movement by means of pillar-extensions 71 is a back-plate 72 extending parallel with the rear movement-plate 11 and reaching considerably below the lower edge thereof. Adjacent its lower end the said back-plate 72 is provided with a forwardly-extending stud 73 upon which is rigidly mounted the primary bell 50 and the secondary bell 58 before referred to.

It will be noted by reference to Fig. 3 that the secondary bell 58 partly nests within the primary bell 50, which latter is preferably of greater depth than the said secondary bell, in order to have a relatively-deeper tone, though if desired both the primary and secondary bells may be of the same tonal pitch.

For the purpose of manually stopping the alarm mechanism, a shut-off shaft 74 is mounted between the movement-plates 10 and 11, so as to bear at its respective opposite ends therein. At its forward end, the said shaft 74 is provided with an L-shaped shut-off arm 75 which is adapted to be swung into and out of the path of the stop-finger 25 of the governor-shaft 41 by an L-shaped finger-piece 76 rigidly attached to the said shaft 74 adjacent the rear end thereof.

For the purpose of describing the variable-beat alarm clock herein chosen for the illustration of the present invention, let it be presumed that the alarm-spring 26 has been tightly wound, as shown in the drawings, and that the shut-off arm 75 has been retired out of the path of the stop-finger 25.

Now, when in the revolution of the alarm-wheel 17 by the time-train, the cam-notch 21 of the alarm-cam 18 carried by the said wheel is brought into registration with the cam-finger 20 on the staff 19, the control-spring 22 will be permitted to snap the parts 17 and 18 forwardly with the effect of retiring the control-finger 24 out of the path of the stop-finger 25. The alarm-train will now start to operate at a predetermined speed under the control of the brake-shoes 43, and since at this time the cut-out finger 62 is in engagement with the cut-out shoulder 61 of the secondary hammer-arm 55 to hold the said hammer-arm in its retired position, the revolution of the hammer-actuating wheels 33 and 35 will effect only the swinging of the primary hammer-arm 47, with the result that only the primary bell 50 will be struck at relatively long intervals to sound a very mild initial alarm.

As the alarm-spring 26 expands in the course of expending its stored energy in driving the pri-

mary hammer-arm 47, the periphery of the outer convolution of the said spring will, in time, engage the operating-finger 70 of the control-lever 63 and swing the same against the tension of the spring 66 to move the cut-out finger 62 out of the path of the cut-out shoulder 61 of the secondary hammer-arm 55. The said secondary hammer-arm 55 will now be free to be actuated by the secondary hammer-actuating wheel 35 but at a much more rapid rate than the rate at which said primary hammer-arm 47 is being operated, owing to the greater number of actuating-teeth on the wheel 35 as compared to the number of similar teeth on the wheel 33.

Thus, at this stage of the operation of the clock, both of the hammers 47 and 55 will be in action to provide a "climax," so to speak, for the alarm-sounding cycle, of sufficient volume to effectively arouse the sleeper in the event that he has not already been aroused by the action of the primary alarm-hammer 47 and its complementary bell 50.

In the usual course of events, the alarm mechanism will be manually shut off by the aroused sleeper, who will swing the finger-piece 76 in the direction required to interpose the shut-off arm 75 in the path of the stop-finger 25.

When the alarm-spring 26 is again wound, it will contract and permit the spring 66 to swing the cut-out finger 62 of the control-lever 63 upwardly for engagement with the cut-out shoulder 61 of the primary hammer-arm 55 preparatory to another cycle of operation.

The invention may be carried out in other specific ways than that herein set forth without departing from the spirit and essential characteristics of the invention, and the present embodiment is therefore to be considered in all respects as illustrative and not restrictive, and all changes coming within the meaning and equivalency range of the appended claims are intended to be embraced therein.

I claim:

1. An alarm clock comprising a time-train; an alarm-train automatically released by the said time-train; an alarm-driving spring for the said alarm-train; an alarm-sounding member adapted to be moved by the said alarm-train; and control-means normally holding the said alarm-sounding member in an inoperative position and actuated by the expansion of the said alarm-driving spring to release the said alarm-sounding member for movement by the said alarm-driving spring after the said alarm-train has been released by the said time-train.

2. An alarm clock comprising a time-train; an alarm-train automatically released by the said time-train; an alarm-driving spring for the said alarm-train; an alarm-striker adapted to be driven by the said alarm-train; and control-means normally holding the said alarm-striker in an inoperative position and actuated by the expansion of the said alarm-driving spring to release the said alarm-striker for actuation by the said alarm-driving spring after the said alarm-train has been released by the said time-train.

3. An alarm clock comprising a time-train; an alarm-train automatically released by the said time-train and including a primary alarm-sounding member, a secondary alarm-sounding member and an alarm-driving spring; and control-means normally holding the said secondary alarm-sounding member in an inoperative position and actuated by the expansion of the said alarm-driving spring itself to release the said secondary alarm-sounding member.

4. An alarm clock comprising a time-train; an alarm-train automatically released by the said time-train and including a primary alarm-striker, a secondary alarm-striker and an alarm-driving spring; and control-means normally holding the said secondary alarm-striker in an inoperative position and actuated by the expansion of the said alarm-driving spring itself to release the said secondary alarm-striker.

WILSON E. PORTER.