Feb. 14, 1950 C. E. GODLEY 2,497,079

TIMER MAIN SPRING VARIABLE PRELOADING MEANS

Filed Feb. 21, 1941

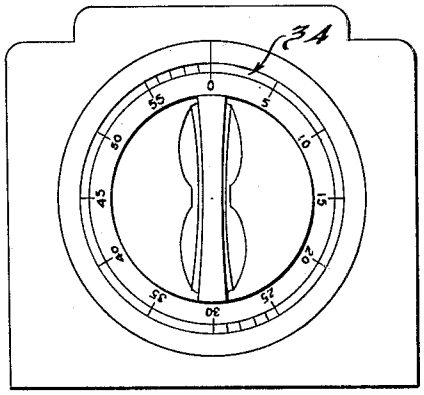

FIG. 1.

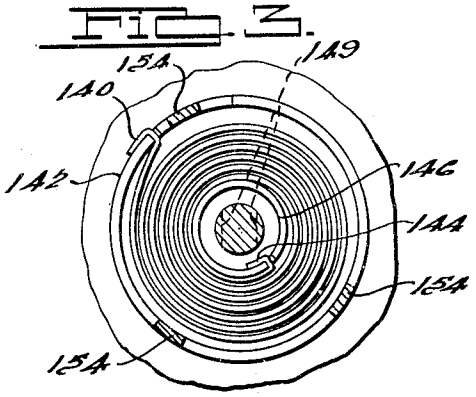

FIG. 3.

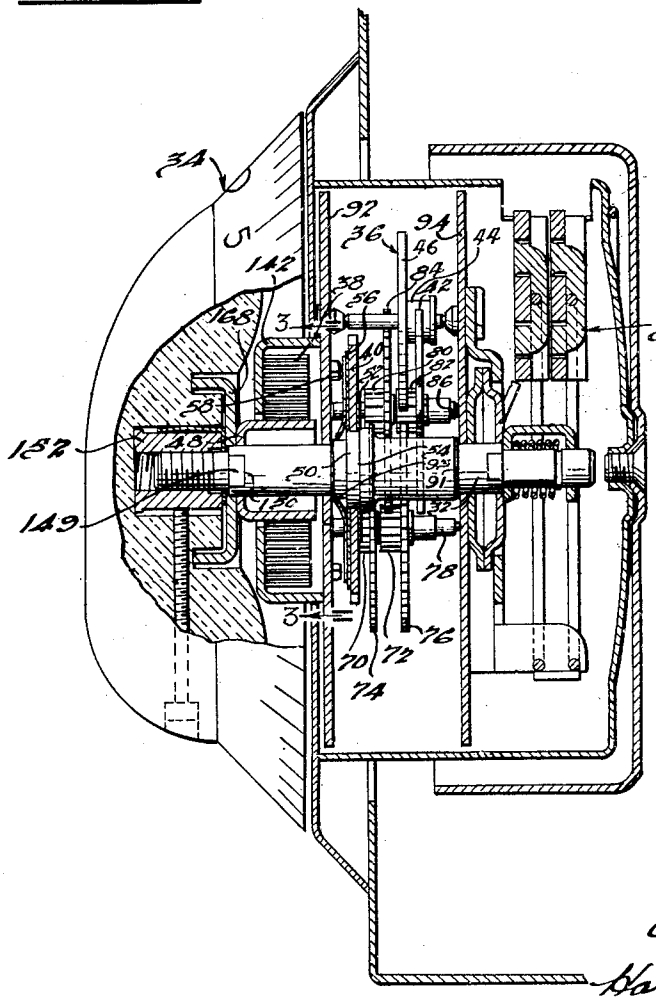

FIG. 2.

INVENTOR
Charles E. Godley.
BY
Harness, Dickey & Pierce.
ATTORNEYS.

Patented Feb. 14, 1950 2,497,079

UNITED STATES PATENT OFFICE

2,497,079

TIMER MAINSPRING VARIABLE PRELOADING MEANS

Charles E. Godley, Ferndale, Mich., assignor to King-Seeley Corporation, Ann Arbor, Mich., a corporation of Michigan

Application February 21, 1941, Serial No. 379,925

8 Claims. (Cl. 161—23)

1

The present invention relates to timing devices, and in particular is directed to the provision of an improved timer for producing an audible or other signal, or other operation, at the expiration of a selectively adjustable interval.

The principal objects of the present invention are to provide a timer of the above generally indicated character, embodying an improved clock movement which is economical of manufacture and assembly, and which is positive and reliable in operation; to provide such a structure having a mainspring removably mounted externally of the movement plates, whereby the movement gear trains may be run in after the gear train is assembled with the movement plates; to provide such a timer wherein the mainspring is readily replaceable and may be secured to the movement in any of a plurality of rotative positions, thereby facilitating the initial loading of the mainspring; and to generally improve the construction and arrangement of timing devices of the type to which the present invention relates.

With the above as well as other objects in view, which appear in the following description and in the appended claims, a preferred but illustrative embodiment of the invention is shown in the accompanying drawings throughout the several views of which corresponding reference characters are used to designate corresponding parts and in which:

Figure 1 is a view in front elevation of a timer embodying the invention;

Fig. 2 is a view in axial vertical section through the timer of Fig. 1; and,

Fig. 3 is a fragmentary sectional view, taken along the line 3—3 of Fig. 2.

It will be appreciated from a complete understanding of the present invention that the improvements thereof may be embodied in timing mechanism of widely varying specific constructions, and intended for a relatively wide variety of different purposes. Also, in a generic sense, the character of the signal produced by the device may be of either audible, visual, or other character. In an illustrative but not in a limiting sense, the present improvements are herein disclosed in connection with a timing unit which operates to provide an audible signal.

Referring more particularly to Figs. 1 and 2 of the drawings, the present mechanism comprises generally a hammer mechanism designated as a whole as 30, which is directly connected to a main arbor 32, which, in turn, is adapted to be rotated in a winding or setting direction from a normal

2

or starting position by means of a setting dial 34 and which is driven in the opposite or timing direction by a movement designated as a whole as 36. It will be appreciated that the movement 36, which has a clutch connection with the arbor 30, is effective, upon release of the dial 34, to drive the hammer mechanism in the return direction at a substantially uniform rate, and that, consequently, the time interval for which the device is set is determined by the degree of angular movement through which the arbor 32 and the hammer mechanism 30 are moved in the setting direction by the dial 34. The setting movement of the dial also serves to wind or load the main spring 38, associated with the movement 36, and the initial setting movement also acts to cock the hammer mechanism 30. The hammer mechanism has associated therewith means to trip the same at the conclusion of the return movement, which tripping action enables the hammer mechanism to effect an operation. As previously mentioned, the hammer may, in a generic sense, be caused to effect a wide variety of operations and consequently, throughout the present description and in the claims, except where a specific type of operation is particularly referred to, the term hammer mechanism is used in a generic sense, as referring to a suitable operator or like part. In the present instance, the hammer mechanism is arranged to ring a bell, and as illustrated, the hammer mechanism is of the multiple type, and produces a succession of bell notes.

Referring to Figure 2, the movement 36 comprises a main gear 40, which drives the arbor 32 at a rate determined by the escapement. The escapement comprises the escapement wheel 42, a pallet 44, a balance wheel 46, and a pallet spring, (not shown) adjustable to vary the escape rate.

More specifically, the main gear 40 is rotatably journalled on a portion 50 formed on the arbor 32, and a face plate 52 secured to the back of the main gear 40 abuts a shoulder 54 formed on the arbor, thereby preventing movement of the gear 40 to the right relative to the arbor 32. The other face of the main gear 40 is provided with a face plate 56, which is also seated on the portion 50 and directly and frictionally engaged by a clutch plate 58. The plate 58 is rigidly secured to and directly rotatable with the arbor 32.

It will be understood, as hereinafter described, that even in the normal or zero setting of the timer, the mainspring 38 is loaded to a substantial extent, and this loading is, of course, in-

creased each time the dial is rotated to set the timer for a predetermined timing interval. The holding effect of the clutch connection between the members 56 and 58 must, of course, be sufficient to reliably sustain the maximum loading of the spring 38 without introducing slippage. On the other hand, in order to facilitate a winding operation, and also to minimize the duty of the clutch elements, it is desirable to maintain the slippage value of the clutch at as low a value as is consistent with the just-mentioned duty.

The main gear 40 drives the escapement through a train of intermediate gears comprising the pinions 70 and 72 and the gears 74 and 76 which are carried by a staff 78, and further comprising the pinions 80 and 82 and the gear 84, which are carried by the staff 86. The staff 86 also carries the escape wheel 42. The staffs 78 and 86, and the staff 90 which carries the balance wheel 46 and the pallet 44, are rotatably supported by front and rear movement plates 92 and 94, which, in turn, are rigidly maintained in predetermined spaced relation to each other by the pillars, (not shown).

The movement plates 92 and 94 are also provided with aligned bearing openings in which the arbor 32 is journalled, it being noted that axial play of the arbor 32 is limited by the engagement of the shoulder 91 thereon with the movement plate 94 and by the engagement of the shoulder 93 thereon with the movement plate 92.

Referring particularly again to Figs. 2 and 3, the main spring 38 is of usual spiral form, one outwardly turned end 140 whereof is hooked through an opening provided therefor in the main spring housing 142, and the other inwardly turned end 144 whereof is hooked through a corresponding opening provided in the outer wall of a spring dog 146. It is preferred to anneal or otherwise treat the main spring prior to assembly so as to overcome any otherwise existing tendency of this spring to take a set after being placed in service.

The dog 146 is of cup-shaped form, the inner end whereof is open, and the base 148 whereof is provided with a non-circular opening, which non-rotatably receives the complementarily formed portions 149 of the arbor 32. The inner surface of the base 148 bears against shoulders, such as 150, formed on the arbor 32, and the dog 146 is maintained in place on the portions 149 by a nut 152, which is threaded on to the outer reduced end of the arbor 32. The main spring housing 142, in turn, is provided with a plurality of axially extending, circumferentially distributed teeth or projections 154, which project through corresponding openings provided in the front movement plate 92. The housing 142 may, therefore, be secured to the movement plate 92 in any one of a plurality of rotative positions, each whereof corresponds to a different initial loading of the main spring 38.

The just described arrangement, wherein the main spring and its housing are mounted external to the movement plate and are readily connectible to and disconnectible therefrom, not only permits ready replacement of the main spring, but also serves a further important advantage of enabling the movement, comprising the arbor, the main gear, and the intermediate gears, to be freely run in before the escapement and the main spring are applied.

A setting movement of the dial 34 positively rotates the arbor 32 to which it is connected by a setting lever 168, in a clockwise direction as viewed in Fig. 1. The just mentioned rotation of the arbor correspondingly drives the spring dog 146 in a counterclockwise direction, as viewed in Fig. 3, thereby winding up or loading this spring. The rotation of the arbor 32 applies a rotative force through the clutch plate 58, which tends to rotate the main gear 40 in a clockwise direction, as viewed in Fig. 1. This tendency is transmitted through the gear train to the escape wheel 42 and tends to rotate the latter in a clockwise direction, which is the opposite to the direction of rotation normally imparted thereto by the main spring 38. During a setting movement of the dial 34, the clutch plate 58 slips past the main gear 40. Upon release of the dial 34, however, the main spring 38 becomes effective to apply a torque to the arbor which rotates the latter in a counterclockwise direction, as viewed in Fig. 1, the rate of such clockwise or return movement being determined, of course, by the escapement, as aforementioned. The return movement is stopped at the zero position of the timer by the bell hammer mechanism above mentioned, and at the conclusion of such movement also, the bell hammer mechanism operates to give one or more audible signals.

Although only a single specific embodiment of the invention has been described in detail, it will be appreciated that various modifications in the form, number and arrangement of parts may be made without departing from the spirit and scope of the invention.

What is claimed is:

1. In a timing mechanism, the combination of a main arbor, timing elements comprising an escapement associated with said arbor for controlling the rate of movement thereof, means comprising spaced plates for supporting said timing elements and said arbor with a portion of said arbor extending externally of said plates, said arbor being journaled in said plates, a main spring positioned externally of said plates for driving said arbor having one end connected to said portion of said arbor, the other end of said main spring being connectible to one of said plates in any of a plurality of rotative positions so as to vary the normal loading of said main spring.

2. In a timing mechanism, the combination of a main arbor, timing elements comprising an escapement associated with said arbor for controlling the rate of movement thereof, means comprising spaced movement plates for supporting said timing elements, said arbor being journaled in said movement plates with a portion projecting externally thereof, a main spring positioned externally of said plates for driving said arbor having one end connected to said portion of said arbor, a cup shaped member having a central aperture through which said arbor extends, the other end of said spring being connected to said member, and said member being connectable to one of said movement plates in any of a plurality of rotative positions so as to vary the normal loading of said main spring.

3. In a timing mechanism, the combination of a main arbor, timing elements comprising an escapement associated with said arbor for controlling the rate of movement thereof, means comprising spaced movement plates for supporting said timing elements and said arbor with a portion of said arbor extending externally of said movement plates, said arbor being journaled in said movement plates, a main spring positioned externally of said movement plates for driving

said arbor having one end connected to said portion of said arbor, and means for selectively connecting the other end of said main spring to one of said plates in any of a plurality of rotative positions so as to vary the normal loading of said main spring.

4. The structure of claim 3 wherein said last named means is a cup-shaped member for enclosing said spring.

5. In a timing mechanism, the combination of a main arbor, timing elements comprising an escapement associated with said arbor for controlling the rate of movement thereof, means comprising spaced movement plates for supporting said timing elements and said arbor with a portion of said arbor extending externally of said movement plates, said arbor being journaled in said movement plates, a main spring positioned externally of said plates for driving said arbor having one end connected to said portion of said arbor, a plurality of angularly spaced abutments on one of said plates, and means on said other end of said main spring for selectively engaging said abutments for selectively anchoring the other end of said main spring in any of a plurality of fixed positions angularly spaced about the axis of said arbor so as to vary the normal loading of said main spring.

6. The structure of claim 5 wherein said last named means is a cup-shaped spring enclosure.

7. In a timing mechanism, the combination of a main arbor, timing elements comprising an escapement associated with said arbor for controlling the rate of movement thereof, means comprising spaced movement plates for supporting said timing elements and said arbor with a portion of said arbor extending externally of said movement plates, said arbor being journaled in said movement plates, a main spring positioned externally of said plates for driving said arbor having one end connected to said portion of said arbor, an anchoring member having the other end of said main spring connected thereto, and co-operating means on said member and one of said plates for selectively connecting said member to said one of said plates in any of a plurality of rotative positions so as to vary the normal loading of said spring.

8. In a timing mechanism, the combination of

a main arbor, timing elements comprising an escapement associated with said arbor for controlling the rate of movement thereof, means comprising spaced movement plates for supporting said timing elements and said arbor with a portion of said arbor extending externally of said movement plates, said arbor being journaled in said movement plates, a main spring positioned externally of said plates for driving said arbor having one end connected to said portion of said arbor, a cup-shaped spring housing having the other end of said spring connected thereto, and co-operating means on said housing and one of said plates for selectively connecting said housing to one of said plates in a plurality of rotative positions so as to vary the normal loading of said spring.

CHARLES E. GODLEY.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
474,058	Davies	May 3, 1892
598,055	McCabe	Jan. 25, 1898
673,053	Henderson	Apr. 30, 1901
1,226,810	Redfield et al.	May 22, 1917
1,241,148	Porter	Sept. 25, 1917
1,398,597	Lux	Nov. 29, 1921
1,408,365	Larson	Feb. 28, 1922
1,441,389	Vincent	Jan. 9, 1923
1,447,587	Calvert	Mar. 6, 1923
1,797,912	Hammond	Mar. 24, 1931
1,821,628	Gains	Sept. 1, 1931
1,821,629	Gains	Sept. 1, 1931
1,914,748	Lopez	June 20, 1933
1,934,611	Franz	Nov. 7, 1933
2,092,715	Grayson	Sept. 7, 1937
2,150,633	Rhodes et al.	Mar. 14, 1939
2,192,600	Lurtz	Mar. 5, 1940
2,196,532	Lurtz	Apr. 9, 1940
2,209,181	Wendel	July 23, 1940
2,258,474	Simmons	Oct. 7, 1941

FOREIGN PATENTS

Number	Country	Date
352,338	Germany	Apr. 25, 1922