

Nov. 10, 1931.

W. E. PORTER

1,831,605

AUTOMATIC TIMING DEVICE

Filed March 14, 1930

2 Sheets-Sheet 1

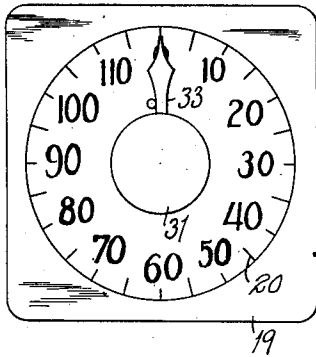


Fig. 8.

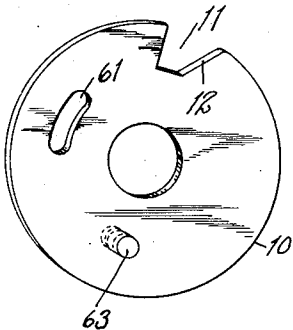


Fig. 7.

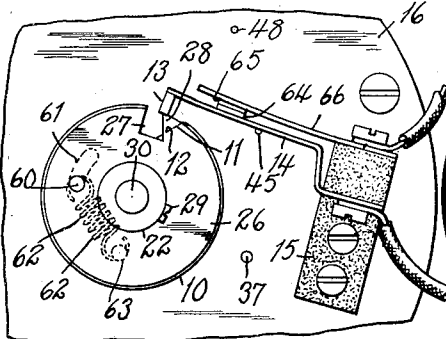
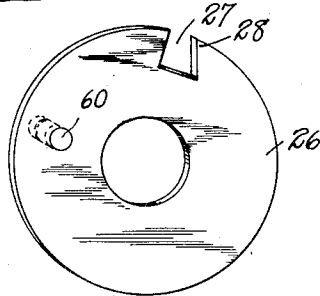


Fig. 9.



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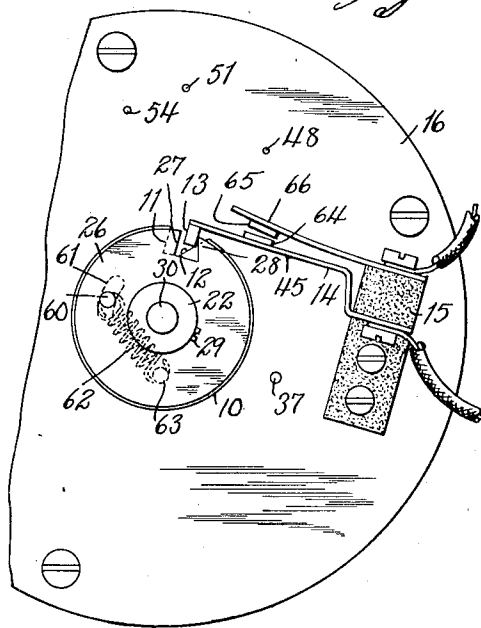
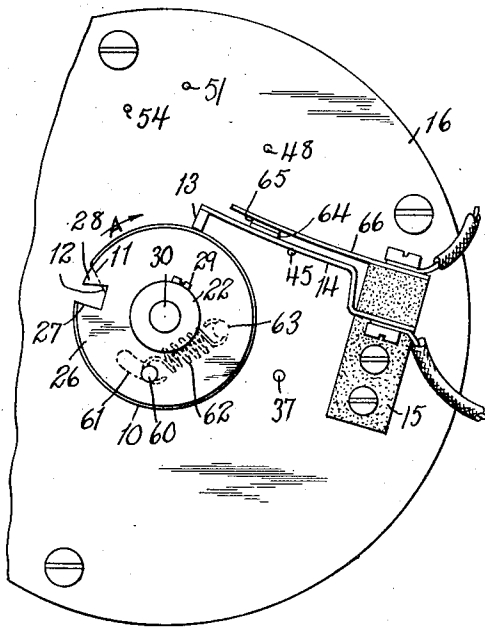
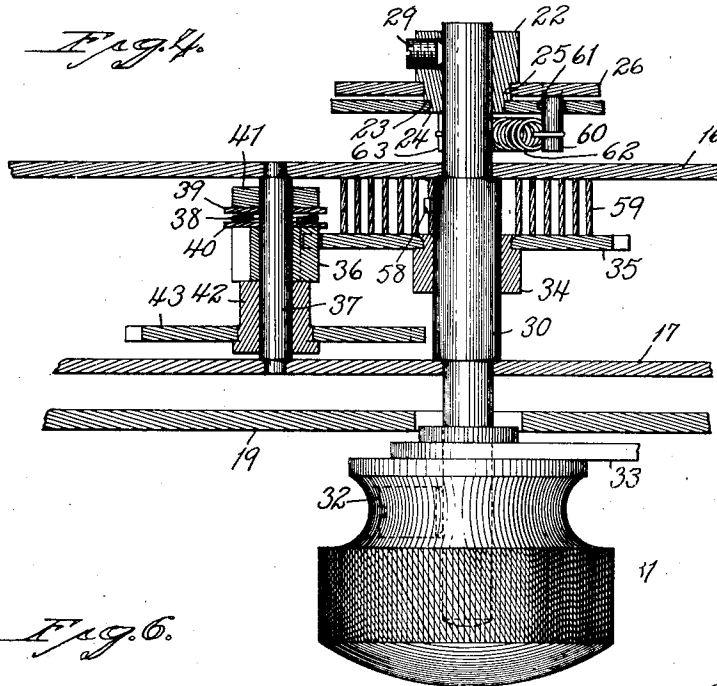
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AUTOMATIC TIMING DEVICE

Filed March 14, 1930

2 Sheets-Sheet 2



Inventor
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UNITED STATES PATENT OFFICE

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AUTOMATIC TIMING DEVICE

Application filed March 14, 1930. Serial No. 435,792.

This invention relates to an improvement in timing-devices designed for automatically effecting a given operation, such as the opening or closing of an electric circuit, after the lapse of a predetermined period of time.

The main object of this invention is to provide, at a low cost for manufacture, a simple, reliable and effective timing-device in which the release of the part or member-to-be-controlled is automatically effected definitely and quickly at the termination of the predetermined period for which the device may have been set.

With the above and other objects in view as will appear from the following, my invention consists in an automatic timing-device characterized by its provision with a cocking-member having a cam-surface coacting with the member-to-be-controlled for cocking the same, and a control-member coupled to the said cocking-member for movement therewith but with capacity for limited independent movement with respect thereto and provided with a drop-off nose movable into overlapping relationship with respect to the cam-surface of the said cocking-member for restraining the member to be operated in its cocked position during the latter portion of the time-period for which the device has been set.

My invention further consists in an automatic timing-device characterized as above and having certain other details of construction and combinations of parts as will be hereinafter described and particularly recited in the claims.

In the accompanying drawings:

Fig. 1 is a view in front elevation of one form which an automatic timing-device constructed in accordance with my invention may assume;

Fig. 2 is a view thereof in rear elevation, on a larger scale and showing the parts in the positions due to them when the device is at rest;

Fig. 3 is an edge view thereof;

Fig. 4 is a broken, detail, transverse-sectional view taken on the line 4—4 of Fig. 2, but on a larger scale;

Fig. 5 is a broken view in rear elevation

corresponding to Fig. 2, but showing the parts in the positions due to them after the cocking-disk has been moved to partially cock the switch-member;

Fig. 6 is a corresponding view showing the parts in the positions due to them after the switch-member has been fully cocked and the device set for a time-interval of approximately thirty minutes;

Fig. 7 is a similar view, but showing the parts in the positions due to them just prior to the release of the switch-member by the control-disk and near the termination of the time-period for which the device has been set;

Fig. 8 is a detached perspective view of the cocking-disk; and

Fig. 9 is a similar view of the control-disk.

In the embodiment of my invention herein chosen for illustration, I employ a cocking-disk 10 formed in its periphery with a notch 11, one wall of which is tangentially sloped, as shown, to provide a cam-surface 12 for coaction with a shoe 13 offsetting from the free end of a flexible switch-arm 14. The opposite end of the said switch-arm is mounted, as shown, upon a block 15 of insulating material rearwardly offsetting from a rear movement-plate 16 secured in spaced relation with respect to a front movement-plate 17 by pillars 18. Located forwardly of and in spaced relation to the front movement-plate 17 is a rectangular dial-plate 19 having engraved upon its front face an annular series of graduations 20 and secured to the said front movement-plate by short pillars 21.

The cocking-disk 10 before referred to is rigidly mounted upon the reduced inner end of a collar 22 by being clamped between a shoulder 23 thereupon and an outturned flange 24 thereon. The said collar is also formed with an annular bearing-surface 25 upon which is mounted, with freedom for rotation, what I shall for convenience of description call a "control-disk" 26, formed with a notch 27 resulting in the formation of a drop-off nose 28 which, as will hereinafter appear, is adapted to overlap the cam-surface 12 of the adjacent cocking-disk 10.

The collar 22, carrying the cocking-disk 10

and the control-disk 26, is secured, by means of a set-screw 29, to the projecting rear end of a setting-arbor 30 which has bearing in the rear and front movement-plates 16 and 17 and has its forward end projecting through the dial-plate 19, where it is provided with a knurled finger-button 31 secured to it by a set-screw 32 and carrying a pointer 33 sweeping over the graduations upon the said dial-plate.

Staked to the central portion of the setting-arbor 30, between the movement-plates 16 and 17, is a hub 34 having riveted to it the main wheel 35 of a time-train which may be of any approved construction and which, as shown, consists also of a pinion 36 meshing into and driven by the main-wheel 35 and frictionally coupled to an arbor 37, by means of a split spring-washer 38 encircling the same and held between hardened washers 39 and 40.

The rear washer 39 bears against a collar 41 staked upon the rear end of the arbor 37, while the forward washer 40 bears against the rear face of the pinion 36 which, in turn, bears against the rear end of a hub 42 staked to the said arbor 37 and carrying a gear-wheel 43. The spring-washer 38 just described serves to frictionally couple the pinion 36 to the arbor 37 with capacity for being turned thereon when it is desired to set or reset the timing-device, as will be hereinafter described.

The wheel 43 meshes into a pinion 44 mounted upon an arbor 45 carrying a gear-wheel 46 meshing into a pinion 47 secured to an arbor 48 carrying a gear-wheel 49 meshing, in turn, into a pinion 50 upon the escapement-wheel arbor 51. The escapement-wheel arbor 51, just referred to, carries the usual escapement-wheel 52 co-acting with an escapement-lever 53 having a staff 54 and co-acting at its opposite end with the usual balance-wheel 55 mounted upon a balance-staff 56 carrying a usual hair-spring 57.

The central portion of the setting-arbor 30 is provided with a hook 58 serving to connect the inner end of a spiral main-spring 59 to the said arbor for turning the same in one direction under the control of the time-train. The opposite end of a main-spring 59 is secured, as clearly shown in Figs. 2 and 3, to one of the pillars 18 extending between the rear and front movement-plates 16 and 17.

As before pointed out, the cocking-disk 10 is rigidly coupled to the setting-arbor 30, while the control-disk 26 may turn upon the bearing 25 of the collar 22 carried by the said arbor. Now, for the purpose of coupling the control-disk 26 to the cocking-disk 10 for movement therewith but with capacity for limited relative movement, I provide the said control-disk with a forwardly-projecting pin 60 extending through an arcuate slot 61 in the cocking-disk 10 and having one end of a helical spring 62 hooked over its for-

ward end. The opposite end of the said spring 62 is hooked over the forward end of a pin 63 forwardly projecting from the cocking-disk 10.

The spring 62 just above described exerts a constant effort to turn the control-disk 26 with respect to the cocking-disk 10 in a direction required to cause the drop-off nose 28 of the former to overlap the cam-surface 12 of the latter.

The resilient switch-arm 14 carries upon its upper face a contact 64 adapted to engage a complementary contact 65 mounted upon the under-face of the outer end of a resilient switch-arm 66 also secured to the insulating-block 15, which serves to mount the switch-arm 14 before referred to.

In the operation of my improved timer, the user grasps the finger-button 31 and turns the same clockwise until the pointer 33 carried thereby registers with the graduation upon the dial-plate 19 indicating the particular time-interval which it is desired to have elapse before the automatic accomplishment of a function such as the opening of a circuit, as herein illustrated. For the purpose of description, let it be supposed that the desired interval is thirty minutes.

As the finger-button 31 is turned clockwise, as above described, to register the pointer 33 with the desired graduation 30, the arbor 30 is also turned with the effect of winding the mainspring 59 and turning the cocking-disk 10 so as to cause the cam-surface 12 thereof to lift the shoe of the switch-arm 14 and flex the latter so as to engage its contact 64 with the contact 65 of the switch-arm 66 and thus close the circuit. This turning of the arbor 30 is permitted by the fact that the pinion 36 may be turned independent of the arbor 37 and the time-train, though it is frictionally coupled thereto for effecting the driving of the said train.

As the cocking-disk 10 is turned, as just above described, to lift the shoe 15 (Fig. 5), the control-disk 26 will remain stationary until the said shoe has been lifted high enough to permit the drop-off nose 28 thereof to be snapped under it by the spring 62, this being effected by virtue of the fact that the cocking-disk is of slightly greater diameter than the control-disk. The continued rotation of the arbor 30 until the pointer 33 registers with the thirty-minute graduation upon the dial-plate 19 will bring the parts in the positions in which they are shown in Fig. 6 of the drawings, in which the shoe 13 is resting upon the periphery of the cocking-disk 10.

Upon the setting of the device just above described and the removal of any manual restraint upon the finger-button 31, the mainspring 59 will immediately assert itself and slowly turn the arbor 30 counter-clockwise, together with the disks 10 and 26 and pointer 33, under the control of the time-train already

described. When the pointer 33 has reached the zero mark upon the dial-plate 19 (see Fig. 7), the drop-off nose 28 of the control-disk 26 will have ridden out from under the shoe 13, which will immediately snap downward under the tension of the resilient switch-arm 14 into the position shown in Fig. 2, with the result that the contact 64 is separated from the contact 65 and the circuit thus broken in a manner so rapid as to prevent any appreciable arcing.

It will thus be seen that by virtue of the fact that the drop-off nose 28 of the control-disk 26 automatically moves into overlapping relationship with respect to the cam-surface 12 of the cocking-disk when the latter has been moved sufficiently to fully lift the shoe 13, instead of the said shoe retiring gradually down the said cam-surface 12 as the disks are turned in the direction of the arrow "A" of Fig. 6 by the main-spring 59, the said shoe moves rapidly and at a definite point, i. e., when the pointer 33 reaches its zero position.

While I have herein shown my improved timing-device as acting to automatically open a circuit, it is obvious without further illustration that my invention is not limited to the particular character of the member to be controlled since various devices, such as gas-cocks, etc., may be lifted and dropped in the same manner that the switch-arm 14 is acted upon.

It will be further understood by those skilled in the art that my invention may assume varied physical forms without departing from the inventive concept and I therefore do not limit myself to the specific embodiment herein chosen for illustration, but only as indicated in the appended claims.

I claim:

1. In an automatic timing-device the combination with a member-to-be-controlled; of a time-train; driving-means for the said time-train; a cocking-member manually movable in one direction and automatically movable in the opposite direction by the said driving-means under the control of the said time-train and provided with a cocking cam-surface co-acting with the member-to-be-controlled for cocking the same; manually-operable setting-means for the said cocking-member; a control-member coupled to the said cocking-member for movement therewith but with capacity for limited independent movement with respect thereto and provided with a drop-off nose movable into overlapping relationship with respect to the cam-surface of the said cocking-member; and spring-means for moving the said control-member with respect to the said cocking-member to cause the drop-off nose of the former to overlap the cam-surface of the latter when the same has been manually moved by the said setting-means.

2. In an automatic timing-device the com-

bination with a member-to-be-controlled; of a time-train; driving-means for the said time-train; a cocking-member manually movable in one direction and automatically movable in the opposite direction by the said driving-means under the control of the said time-train and provided with a cocking cam-surface co-acting with the member-to-be-controlled for cocking the same; manually-operable setting-means for the said cocking-member; a control-member coupled to the said cocking-member for movement therewith but with capacity for limited independent movement with respect thereto and provided with a drop-off nose movable into overlapping relationship with respect to the cam-surface of the said cocking-member; and a spring coupled at its opposite ends to the said control-member and cocking-member respectively for moving the former with respect to the latter to cause its drop-off nose to overlap the cam-surface of the said cocking-member when the same has been manually moved by the said setting-means.

3. In an automatic timing-device the combination with a member-to-be-controlled; of a time-train; driving-means for the said time-train; a rotary cocking-member manually rotatable in one direction and automatically rotatable in the opposite direction by the said driving-means under the control of the said time-train and provided with a cam-surface co-acting with the member-to-be-controlled for cocking the same; manually-operable setting-means for the said cocking-member; a rotary control-member substantially coaxial with and coupled to the said cocking-member for rotation therewith but with capacity for limited independent rotary movement with respect thereto and provided with a drop-off nose movable into overlapping relationship with respect to the cam-surface of the said cocking-member; and spring-means for rotating the said control-member with respect to the said cocking-member to cause the drop-off nose of the former to overlap the cam-surface of the latter when the same has been manually moved by the said setting-means.

4. In an automatic timing-device the combination with a member-to-be-controlled; of a time-train; driving-means for the said time-train; a cocking-disk manually rotatable in one direction and automatically rotatable in the opposite direction by the said driving-means under the control of the said time-train and provided with a cam-surface co-acting with the said member-to-be-controlled for cocking the same; manually-operable setting-means for the said cocking-disk; a control-disk positioned adjacent to the said cocking-disk and coupled thereto for rotation therewith but with capacity for limited independent rotary movement with respect thereto and provided with a drop-

off nose movable into overlapping relationship with respect to the cam-surface of the said cocking-disk; and spring-means for rotating the said control-disk with respect to the said cocking-disk to cause the drop-off nose of the former to overlap the cam-surface of the latter when the same has been manually moved by the said setting-means.

5. In an automatic timing-device the combination with a member-to-be-controlled; of a time-train; driving-means for the said time-train; a rotary cocking-disk manually rotatable in one direction and automatically rotatable in the opposite direction by the said driving-means under the control of the said time-train and provided with a cam-surface co-acting with the member-to-be-controlled for cocking the same; manually-operable setting-means for the said cocking-disk; a rotary control-disk positioned adjacent to the said cocking-disk and coupled thereto for rotation therewith but with capacity for limited independent rotary movement with respect thereto and provided with a drop-off nose movable into overlapping relationship with respect to the cam-surface of the said cocking-disk; and a spring coupled at its opposite ends to the said control-disk and cocking-disk respectively for rotating the former with respect to the latter to cause its drop-off nose to overlap the cam-surface of the said cocking-disk when the same has been manually moved by the said setting-means.

6. In an automatic timing-switch the combination with a pair of complementary switch-members; of a time-train, driving-means for the said time-train; a cocking-member manually movable in one direction and automatically movable in the opposite direction by the said driving-means under the control of the said time-train and provided with a cocking cam-surface co-acting with one of the said switch-members for moving the same with respect to its complementary switch-member; manually-operable setting-means for the said cocking-member; a control-member coupled to the said cocking-member for movement therewith but with capacity for limited independent movement with respect thereto and provided with a drop-off nose movable into overlapping relationship with respect to the cam-surface of the said cocking-member; and spring-means for moving the said control-member with respect to the said cocking-member to cause the drop-off nose of the former to overlap the cam-surface of the latter when the same has been manually moved by the said setting-means.

7. In an automatic timing-device the combination with a pair of complementary switch-members; of a time-train; driving-means for the said time-train; a rotary cocking-member manually rotatable in one direc-

tion and automatically rotatable in the opposite direction by the said driving-means under the control of the said time-train and provided with a cam-surface co-acting with one of the said switch-members for moving the same with respect to its complementary switch-member; manually-operable setting-means for the said cocking-member; a rotary control-member coupled to the said cocking-member for rotation therewith but with capacity for limited independent rotary movement with respect thereto and provided with a drop-off nose movable into overlapping relationship with respect to the cam-surface of the said cocking-member; and spring-means for rotating the said control-member with respect to the said cocking-member to cause the drop-off nose of the former to overlap the cam-surface of the latter when the same has been manually moved by the said setting-means.

8. In an automatic timing-device the combination with a pair of complementary switch-members; of a time-train; driving-means for the said time-train; a rotary cocking-disk manually rotatable in one direction and automatically rotatable in the opposite direction by the said driving-means under the control of the said time-train and provided with a cam-surface co-acting with one of the said switch-members for moving the same with respect to its complementary switch-member; manually-operable setting-means for the said cocking-disk; a rotary control-disk positioned adjacent to the said cocking-disk and coupled thereto for rotation therewith but with capacity for limited independent rotary movement with respect thereto and provided with a drop-off nose movable into overlapping relationship with respect to the cam-surface of the said cocking-disk; and spring-means for rotating the said control-disk with respect to the said cocking-disk to cause the drop-off nose of the former to overlap the cam-surface of the latter when the same has been manually moved by the said setting-means.

In testimony whereof, I have signed this specification.

WILSON E. PORTER.