

Sept. 15, 1942.

G. G. GRUETTNER

2,295,993

TIMING DEVICE

Filed July 10, 1941

2 Sheets-Sheet 1

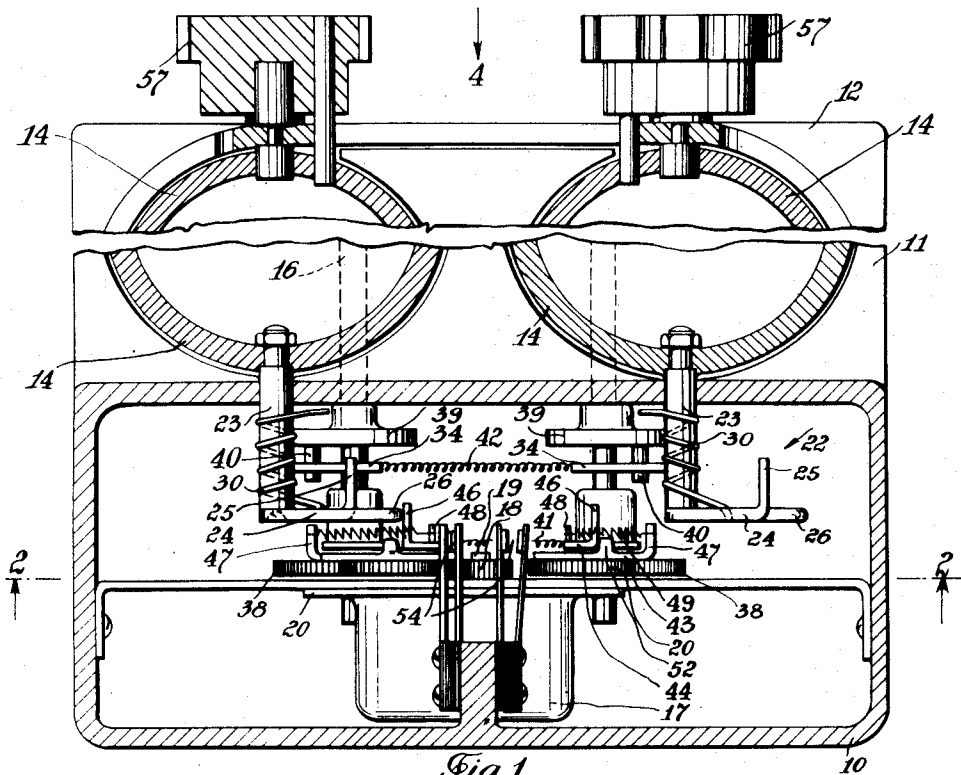


Fig. 1

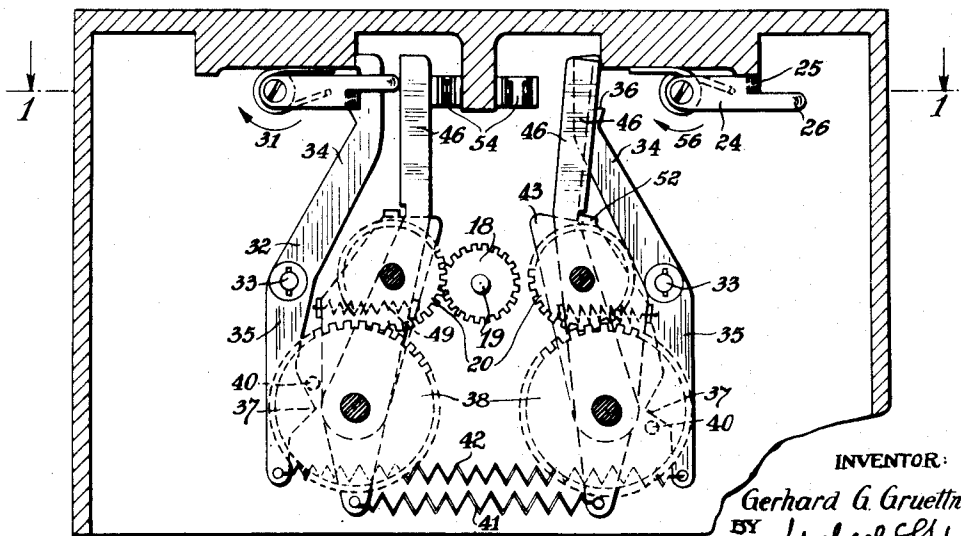


Fig. 2

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2 Sheets-Sheet 2

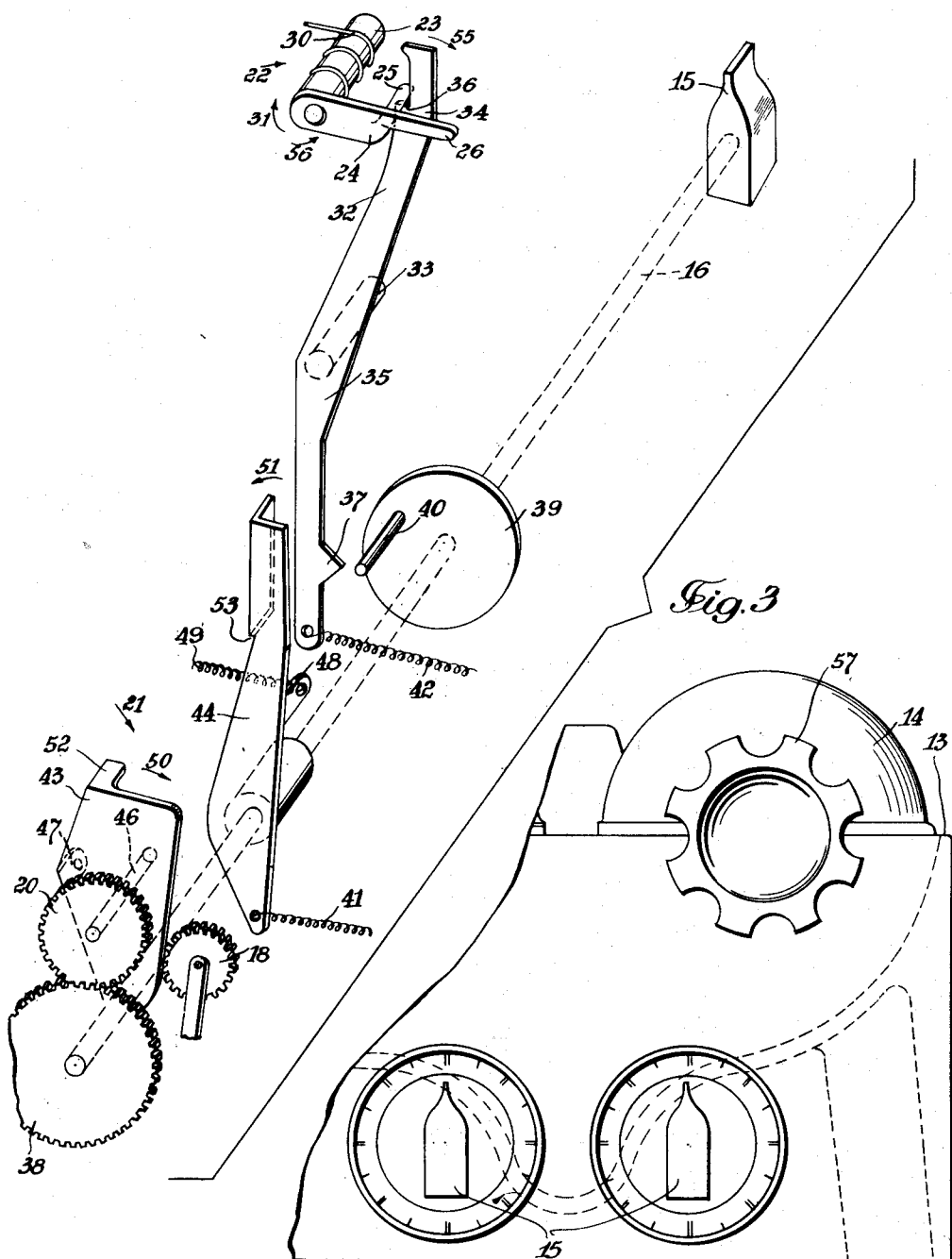


Fig. 4

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UNITED STATES PATENT OFFICE

2,295,993

TIMING DEVICE

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16 Claims. (Cl. 161—1)

The present invention relates to timing devices of the type which is intended to actuate one or more mechanisms or to produce an alarm or other signal at the end of a predetermined and adjustable period of time subsequent to setting the timer into operation. Such a device is useful, for example, for egg-cooking devices of the type described in the U. S. Patent No. 2,253,154.

An object of the present invention is to provide an automatic timing device incorporated in a cooking machine for the purpose of ensuring the cooking of eggs for a predetermined length of time.

A further object of the present invention is to provide a timing device of the character set forth which is simple in operation and easy to handle.

Still a further object is to construct the main operating parts of the timing device in the form of a self-contained unitary structure capable of being attached to any suitable apparatus as, for instance, to steam cooking devices for cooking eggs or other articles.

Another object is to provide a timing device of compact, sturdy and durable construction of marked accuracy of timing and of simplicity in operation.

With the above objects in view, the present invention mainly consists of a timing device comprising a main driving shaft, a driving gear secured to this shaft, a driven gear, a coupling member carrying the driven gear and being tiltable between inoperative position with the driven gear out of mesh with the driving gear and operative position with the driven gear in mesh with the driving gear, means for turning and thereby adjusting the angular position of the driven gear when the coupling member carrying said gear is in inoperative position, hand-operated means for tilting said coupling member into operative position, and means for automatically tilting the coupling member after a predetermined time interval back into inoperative position.

In accordance with a preferred embodiment of the present invention, this timing device includes an electric switch for closing the circuit of an electric motor rotating said driving shaft; this switch is built and positioned in such a manner as to be closed by a turnable operating member when the same is turned into operative position and to stay closed as long as the operating member remains in this position.

The above and other objects of the invention will appear more fully from the following detailed description and by reference to the accompanying drawings forming a part hereof where-

in a satisfactory constructional example of a device embodying the principles of the present invention has been selected for the purpose of illustration and wherein:

Fig. 1 is a cross-section of the timing device shown in Fig. 2 along line 1—1;

Fig. 2 is a cross-section of the timing device shown in Fig. 1 along line 2—2;

Fig. 3 is an expanded perspective view of the main elements of the timing device shown in Figs. 1 and 2; and

Fig. 4 is a front view of an egg-cooking device embodying the new timing device, seen in direction of arrow 4 of Fig. 1.

Referring to the drawings by characters of reference, the timing device includes a housing 10 built together with and forming part of the egg-cooking device 11. The entire timing device is arranged within housing 10 and only the knobs operating the timing device are on the front face 12 of the cooking device 11. The timing device shown in the drawings is constructed for a multiple egg-cooking device adapted to cook two articles consecutively or simultaneously. For this purpose, carriers, not shown in the drawings, are arranged on the upper face 13 of the cooking device 11. Since these carriers for the articles to be cooked and the means for operating the same are not part of the present invention, they will not be described in detail. It should be explained only that the articles, e. g. eggs, are carried by stationary carriers arranged on the upper face of the cooking device.

Rotatable covers 14 are arranged for each carrier separately in order to admit or to shut off the cooking steam generated within the housing of the cooking device 11. The knobs 15 serve for opening and closing the covers 14. The timing knobs 15 in the front wall of the cooking device are connected by shaft-like rods 16 to the timing device arranged within housing 10. This timing device regulates the duration of the connection between the electric circuit and the electrical resistance wire producing the cooking steam; this device, furthermore, automatically opens the covers after a predetermined cooking period, as will be described below in detail.

The timing device itself consists of a synchronous motor 17 adapted to drive gear 18 carried by shaft 19, which latter is connected with and driven by motor 17.

This driving gear 18 is adapted to drive both timing devices shown in Figs. 1 and 2. In order to simplify the following description, only one of these timing devices will be described in detail.

The main elements of each of the timing devices are shown in Fig. 3. They consist of the driving gear 18 secured to shaft 16, a driven gear 20, a coupling member 21 carrying the driven gear 20 and being tiltable between inoperative position with the driven gear 20 out of mesh with driving gear 18, and operative position with the driven gear 20 in mesh with driving gear 18; the timing device furthermore comprises means for turning and thereby adjusting the angular position of the driven gear 20 when the coupling member 21 carrying this gear is in inoperative position; also, hand-operated means are arranged for tilting the coupling member 21 into operative position and means for automatically tilting said member after a predetermined time interval back into inoperative position. It is also necessary to provide means for holding the coupling member 21 in operative position when it has been turned into this position by the hand-operated means, mentioned above.

As shown in the drawings, especially in Figs. 1 and 3, the hand-operated means for tilting the coupling member 21 into operative position comprise an operating member 22 consisting of a shaft 23 secured to cover 14, and plate 24 screwed to shaft 23; a part of this plate is bent, forming thereby two contact pieces 25 and 26. The second spring member 30 is wound about shaft 23 and is secured at its one end to the shaft, and at its other end to housing 10; this spring tends to turn the operating member 22 in direction of arrow 31.

As stated above, it is also necessary to provide means for holding the coupling member 21 in operative position when it has been turned by the operating member 22 into this position. These means mainly consist of a turnable holding member having the shape of the double-armed lever 32. This double-armed lever is pivoted to the housing by means of pivot 33. It consists of two lever arms 34 and 35. Lever arm 34 is provided with catch-like means 36 adapted to engage the contact piece 25 of the operating member 22 when the same is turned against action of spring 30 in direction of arrow 56. Turning of the operating member 22 in direction of arrow 56 is attained by closing of the corresponding cover 16 by means of knob 57. Lever arm 35 is provided with the projection 37, the function of which will be described below in detail. Furthermore, a third spring member 42 is secured to the lever 32; this spring 42 tends to turn lever arm 32 into engagement with the operating member 22 when the same is in operative position.

The means for automatically tilting the coupling member after a predetermined time interval back into inoperative position consist of a first spring member 41 tending to tilt the coupling member back into inoperative position, and means releasing the above mentioned lever 22. These releasing means comprise a timing gear 38 being in mesh with the driven gear 20 and a releasing disk 39 carrying the releasing pin 40. This releasing pin is arranged in such a manner as to strike against projection 37 when the double-armed holding lever 32 is in operative position engaging the operating member 22. This projection 37 provides a means for gradually moving the double-armed holding lever 32 out of engagement with the operating member 22. It further will be noted that the shape of this projection 37 is symmetrical, i. e., it is identical, whether approached from top or bottom. Accord-

ingly, when lever 32 is reversed and assembled in the timing device on the opposite side of the driving gear 18, it is also engaged by the releasing disk 39. This permits the use of identical parts for two timing devices symmetrically assembled in the same machine, driven by the same driving gear and motor.

It must be noted that the coupling member 21, the tilting gear 38, and the releasing disk 39 are all arranged on and supported by the common shaft 16; thus, the gears 20 and 38 are constantly in mesh, irrespectively of the position of the coupling member 21 carrying gear 20.

Furthermore, the co-axial arrangement of all these elements of the timing device makes it possible to adjust the angular position of timing gear 38 and releasing disk 39 by turning the timing knob 15 when the driven gear 20 is in inoperative position, i. e., when it is out of mesh with the driving gear 18. Timing gear 38 and releasing disk 39 are fastened to shaft 16 and rotate with the same when the timing knob is turned; levers 43 and 44, however, rotate independently on shaft 16.

It must be noted that by this arrangement the shaft, and thereby the timing knob, rotate during timing, thereby indicating on the dial around the timing knob the time passed since setting of the timing device.

The coupling member 21 carrying gear 20 is not made of one piece but consists of two levers 43 and 44, both rotatably carried by shaft 16. The lever 43 is provided with a shaft butt 45 carrying the driven gear 20 in the above described manner. Lever 44 is provided with a bent projecting part 46 engaging contact piece 26 of the operating member 22. The lugs 47 and 48 are arranged on the levers 43 and 44, respectively; these lugs are connected by a spiral spring member 49 tending to turn lever 43 in direction of arrow 50 and lever 44 in direction of arrow 51. This turning movement is limited by the projecting stop 52; this stop is pressed by action of spring 49 against the edge of lever 44 at the place indicated by numeral 53. The fact that the coupling member 21 is composed of two levers 43 and 44 held together by spring 49, enables resilient engagement between the gears 20 and 18 when the coupling member carrying gear 20 is tilted by means of operating member 22 in direction of arrow 50.

The above described timing device is operating as follows:

In inoperative position the timing mechanism is in the position shown in Fig. 2 on the right. For adjusting the time during which the covers 14 are closed and the water heating means are operated, the timing knob is turned. By turning this knob, the position of the releasing pin 40 is adjusted. After this adjustment the operating lever is turned in direction of arrow 56 engaging thereby the catch 36 on the double-armed lever 32.

This turning movement of the operating lever has the following three effects: First, the double-armed lever 32 is turned from its position shown on Fig. 2 on the right into the position shown on the same figure on the left, i. e. into a position in which releasing pin 40 is adapted to strike against projection 37; second, the contact piece 26 of the operating lever 22 strikes against the projecting part 46 of the combined coupling member 21 tilting thereby this member and forcing the driven gear 20 into mesh with the driving gear 18; third, by tilting of the coupling member 21 the projecting part 46 of this member strikes against the

switch member 54 closing thereby the circuit for the electric motor 17.

By closing of the motor circuit, rotation of shaft 19 and the driving gear 18 carried by this shaft, is started. The driving gear 18 rotates the driven gear 20 which latter rotates the timing gear 38. The timing gear 38 transmits its rotating movement by means of shaft 18 unto the releasing disk 39, whereby the releasing pin 40 is also rotated. Depending upon its initial position, adjusted by means of the timing knob 15, the releasing pin 40 strikes after a predetermined time against projection 37, turning thereby the double-armed lever 32 in direction of arrow 55. By this turning movement of lever 32, the contact piece 25 of operating member 22 disengages the catch 36 on lever arm 34 of lever 32, and the operating member 22 returns by action of spring 23 into its inoperative position shown on Fig. 2, on the right, opening thereby simultaneously cover 16.

This turning movement of the operating member 22 has the following three effects: First, the double-armed lever 32 returns by action of spring 42 into its initial, inoperative position out of engagement with releasing pin 40; second, the coupling member 21 is tilted by action of spring 41 in direction of arrow 51, into its initial, inoperative position with the driven gear 20 out of mesh with the driving gear 18; third, by tilting of the projecting part 46 of the coupling member 21 in direction of arrow 51, this projecting part ceases to press against the switch 54, thereby enabling this switch to open the circuit of motor 17, stopping the rotation of the motor and the driving gear operated by the same.

After removing the cooked articles, the cooking device and the timing mechanism is again ready for use.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of cooking devices differing from the types described above.

While the invention is illustrated and described as embodied in timing devices, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention, and therefore such adaptations should and are intended to be comprehended within the meaning and range of equivalency of the following claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. A timing device comprising a main driving shaft, a driving gear secured to said shaft, a driven gear, a coupling member carrying said driven gear and being tiltable between inoperative position with said driven gear out of mesh with said driving gear and operative position with said driven gear in mesh with said driving gear, means for turning and thereby adjusting the angular position of the driven gear when the coupling member carrying said gear is in inoperative position, a turnable operating member for tilting said coupling member into operative position, spring-like means tending to turn said op-

erating member from operative tilting position into inoperative position out of engagement with said coupling member, means holding said coupling member in operative position in engagement with said operating member when tilted by said operating member into this operative position, and means for automatically disengaging after a predetermined time interval said operating member from said coupling member, whereby said spring-like means are turning said operating member into inoperative position out of engagement with said coupling member and this member is tilted into inoperative position with the driven gear out of mesh with the driving gear.

2. A timing device comprising a main driving shaft, a driving gear secured to said shaft, a driven gear, a coupling member carrying said driven gear and being tiltable between inoperative position with said driven gear out of mesh with said driving gear and operative position with said driven gear in mesh with the driving gear, a first spring member tending to turn said coupling member into inoperative position, means for turning and thereby adjusting the angular position of the driven gear while the coupling member carrying said gear is in inoperative position, a turnable operating member for tilting said coupling member into operative position, a second spring member tending to turn said operating member from operative tilting position into inoperative position out of engagement with said coupling member, means holding said coupling member in operative position in engagement with said operating member when tilted by said operating member into this operative position, and means for automatically disengaging after a predetermined time interval said operating member from said coupling member, enabling said second spring member to turn said operating member into inoperative position out of engagement with said coupling member and said first spring member to tilt said coupling member into inoperative position with the driven gear out of mesh with said driving gear.

3. A timing device comprising a main driving shaft, a driving gear secured to said shaft, a driven gear, a coupling member carrying said driven gear and being tiltable between inoperative position with said driven gear out of mesh with said driving gear and operative position with said driven gear in mesh with the driving gear, a first spring member tending to tilt said coupling member into inoperative position, a turnable operating member for tilting said coupling member into operative position, a second spring member tending to turn said operating member from operative tilting position into inoperative position out of engagement with said tiltable member, means holding said coupling member against the action of both spring members in operative position in engagement with said operating member when manually tilted by means of said operating member into this operative position, and a releasing mechanism operated by said driven gear, said releasing mechanism adapted to release said holding means and thus to disengage said operating and said coupling members after a time interval determined by the angular position of said driven gear, thereby enabling said operating member to turn by action of said second spring member into inoperative position out of engagement with said coupling member and enabling this member to tilt by action of said first spring member into inoperative position with the driven gear out of mesh with said driving gear.

4. A timing device comprising a main driving shaft, a driving gear secured to said shaft, a driven gear, a coupling member carrying said driven gear and being tiltable between inoperative position with said driven gear out of mesh with said driving gear and operative position with said driven gear in mesh with the driving gear, a first spring member tending to tilt said coupling member into inoperative position, a turnable operating member for tilting said coupling member into operative position, a second spring member tending to turn said operating member from operative tilting position into inoperative position out of engagement with said tiltable member, means holding said coupling member against the action of both spring members in operative position in engagement with said operating member when manually tilted by means of said operating member into this operative position, and a releasing mechanism comprising a timing gear being in mesh with said driven gear, said timing gear arranged rotatably about the axis of turning of said coupling member being thereby also during tilting of said member in mesh with the driven gear carried by the same, hand-operated means for turning and thereby adjusting the angular position of the timing gear when the coupling member carrying the driven gear is in inoperative position, and releasing means operated by said timing gear, said releasing means adapted to release said holding means and thus to disengage said operating and coupling members after a time interval predetermined by the angular position of the timing gear, thereby enabling said first and said second spring to turn both said operating member and said coupling member into inoperative position in which the driven gear is out of mesh with the driving gear.

5. In a timing device of the type claimed in claim 4, said holding and said releasing means comprising a holding lever adapted to hold said operating member in operative position when the same is turned manually into this position, and a releasing member rotated by said timing gear in such a manner that after a time interval determined by the angular position of the timing gear and said releasing member this releasing member strikes against said holding member, thereby releasing said operating member which is turning by action of said second spring member into inoperative position out of engagement with said holding lever and with said coupling member, enabling said coupling member to turn by action of said first spring member into inoperative position in which the driven gear is out of mesh with the driving gear.

6. In a timing device of the type claimed in claim 4, said holding and said releasing means comprising a double-armed holding lever, one lever arm of which cooperates with said operating member and is adapted to hold said operating member in operative position when the same is turned manually into this position, and a releasing member rotated by said timing gear in such a manner that after a time interval predetermined by the angular position of said timing gear and said releasing member this releasing member strikes against the second lever arm of said double-armed holding lever, releasing thereby said operating member which on its part is turning by action of said second spring member out of engagement with the first lever arm of said double-armed holding lever and with said coupling member, enabling said coupling

member to turn by action of said first spring member into inoperative position in which the driven gear is out of mesh with the driving gear.

7. In a timing device of the type claimed in claim 4, said holding and said releasing means comprising a double-armed holding lever, one lever arm of which cooperates with said operating member and is adapted to hold said operating member in operative position when the same is turned manually into this position, and a releasing member provided with a releasing pin rotated by said timing gear in such a manner that after a time interval predetermined by the angular position of said timing gear and said releasing member the releasing pin secured to said releasing member strikes against the second lever arm of said double-armed holding lever, releasing thereby said operating member which on its part is turning by action of said second spring member out of engagement with the first lever arm of said double-armed holding lever and with said coupling member, enabling said coupling member to turn by action of said first spring member into inoperative position in which the driven gear is out of mesh with the driving gear.

8. In a timing device of the type claimed in claim 4, said holding and said releasing means comprising a double-armed holding lever, one lever arm of which cooperates with said operating member and is adapted to hold said operating member in operative position when the same is turned manually into this position, and a releasing disk, a common shaft carrying said releasing disk and said timing gear, a releasing pin secured to said releasing disk, said releasing disk rotated by said common shaft in such a manner that after a time interval predetermined by the angular position of said shaft said releasing pin strikes against the second lever arm of said double-armed holding lever, releasing thereby said operating member which on its part is turning by action of said second spring member out of engagement with the first lever arm of said double-armed holding lever and with said coupling member, enabling said coupling member to turn by action of said first spring member into inoperative position in which the driven gear is out of mesh with the driving gear.

9. In a timing device of the type claimed in claim 4, said holding and said releasing means comprising a double-armed holding lever, one lever arm of which cooperates with said operating member and is adapted to hold said operating member in operative position when the same is turned manually into this position, a third spring member tending to turn said double-armed lever into engagement with said operating member when the same is in operative position, and a releasing member adapted to operate the second lever arm of said double-armed holding lever, said releasing member rotated by said timing gear in such a manner that, after a time interval predetermined by the angular position of said timing gear and said releasing member, this releasing member strikes against the second lever arm of said double-armed holding lever, turning thereby the first lever arm of said double-armed lever against the action of said third spring member out of engagement with said operating member which thus released is turning by action of said second spring member out of engagement with the first lever arm of said double-armed holding lever and said coupling member, enabling thereby said coupling

member to tilt by action of said first spring member into inoperative position in which the driven gear is out of mesh with the driving gear.

10. In combination with the timing device claimed in claim 3, an electrical switch for closing the circuit of an electric motor rotating said driving shaft, said switch being built and positioned in such a manner as to be closed by said turnable operating member when the same is turned into operative position, and to stay closed as long as the operating member remains in this position.

11. In a timing device of the type claimed in claim 4, said holding and said releasing means comprising a double-armed holding lever, one lever arm of which is provided with catch-like means cooperating with said operating member and adapted to hold this member in operative position when the same is turned manually into this position, and a releasing member rotated by said timing gear in such a manner that after a time interval predetermined by the angular position of said timing gear and said releasing member this releasing member strikes against the second lever arm of said double-armed holding lever, releasing thereby said operating member which on its part is turning by action of said second spring member out of engagement with said coupling member and with the catch-like means on the first lever arm of said holding lever, enabling said coupling member to turn by action of said first spring member into inoperative position in which the driven gear is out of mesh with the driving gear.

12. In a timing device of the type claimed in claim 4, said holding and said releasing means comprising a holding lever having two lever arms, the first lever arm cooperating with said operating member and adapted to hold said operating member in operative position when the same is turned manually into this position, and the second lever arm being provided with a projection, and a releasing member rotated by said timing gear in such a manner that after a time interval predetermined by the angular position of the timing gear and the releasing member this releasing member strikes against the projection on the second lever arm of said double-armed holding lever, releasing thereby said operating member which on its part is turning by action of said first spring member out of engagement with the first lever arm of said double-armed holding lever and with said coupling member, enabling said coupling member to turn by action of said first spring member into inoperative position in which the driven gear is out of mesh with the driving gear.

13. In a timing device of the type claimed in claim 1, said coupling member comprising two superimposed plate-shaped levers, one of said levers provided with a shaft butt carrying said driven gear and the other with a projection cooperating with said operating member, a spring member connecting both levers, and a common shaft to which are pivoted both levers.

14. A timing device comprising a main driving shaft, a driving gear secured to said shaft, a driven gear, a coupling member carrying said driven gear and being movable between inoperative position with said driven gear out of mesh with said driving gear and operative position with said driven gear in mesh with said driving gear and being urged toward said inoperative position, means for moving and thereby adjusting the angular position of the driven gear when the coupling member carrying said gear is in inoperative position, a hand-operated mechanism adapted to engage said coupling member and move the same from said inoperative into said operative position and to hold it in this operative position during the timing operation, and a releasing member for automatically moving said coupling member out of engagement with said mechanism after ending of said timing operation.

15. A timing device comprising a main driving shaft, a driving gear secured to said shaft, a driven gear, a coupling member carrying said driven gear, said coupling member being movable between inoperative position with said driven gear out of mesh with said driving gear and operative position with said driven gear in mesh with said driving gear and being urged toward said inoperative position, means for turning said driven gear from initial position into timing position, while said coupling member carrying said gear is in said inoperative position, a hand-operated mechanism adapted to engage said coupling member and to turn the same into operative position with said driving gear and said driven gear in mesh and to hold it during the timing operation in this position, and a releasing member for automatically moving said coupling member out of engagement with said mechanism and back into said inoperative position with said driving gear and said driven gear out of mesh, when said driven gear has been rotated by said driving gear from said timing into said initial position.

16. A timing device comprising a main driving shaft, a driving gear secured to said shaft, a timing gear, a driven gear adapted to be moved between inoperative position not coupling the driving gear with the driven gear and operative position coupling said gears and transmitting motion impulses from said driving gear to said timing gear, hand-operated means for turning and thereby adjusting the angular position of said timing gear when said driven gear is in said inoperative position, a hand-operated mechanism adapted to move said driven gear from said inoperative into said operative position and to hold the same in this operative position, and a releasing member associated with said timing gear for automatically moving said driven gear from said operative into said inoperative position after a time interval predetermined by the angular position of said timing gear.

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