April 5, 1955 L. REICHOLD 2,705,631

TIMING DEVICE

Filed Nov. 19, 1949

Fig. 1.

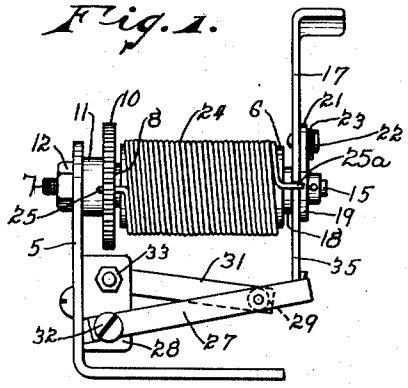


Fig. 2.

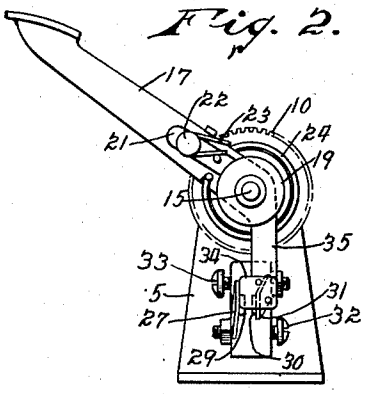


Fig. 3.

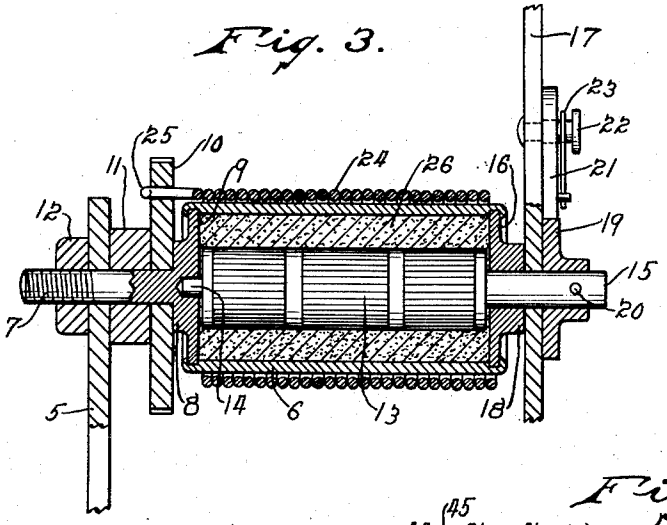
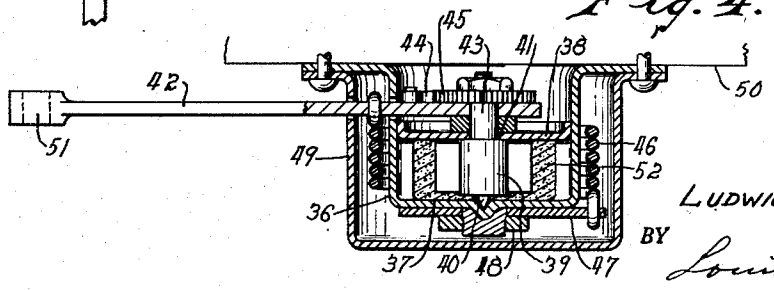


Fig. 4.



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TIMING DEVICE

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3 Claims. (Cl. 267—1)

This invention relates to a timing device and more particularly to timing devices which are adapted to provide a predetermined timing period for each operation thereof and such as commonly used for controlling the operation of such appliances as slot machines, washing machines, pin ball machines, electric toasters and also door checks and the like.

It is an object of this invention to provide a timing device which is inexpensive to produce and which may be easily operated to provide a desired predetermined time period.

A further object of the invention is to provide such a timing device which is controlled by a suitable material, preferably a plastic material, having permanent qualities and durable characteristics.

A still further object of the invention is to provide a timing device which may be adjusted for different timing periods and which will operate to provide a mechanical movement or control an electric circuit.

A still further and important object of this invention is to provide such a timing device in which the plastic material used is characterized by being responsive to temperature changes so as to vary the duration of the time periods provided by said timing device in accordance with such temperature changes and thereby render said timing device particularly adapted for use on such devices as automatic electric toasters and the like.

Further objects and advantages of this invention will be more clearly understood from the following description and from the accompanying drawings in which:

Fig. 1 is a front view of a timing device embodying my invention.

Fig. 2 is a side view thereof.

Fig. 3 is an enlarged front view, in central vertical section, of a portion of said device.

Fig. 4 is a side view, in central vertical section, of a door check embodying my invention in a modified form.

In the embodiment of my invention illustrated in the drawings, the numeral **5** denotes a base having an upright portion on which there is mounted a drum **6** having an axial post **7** extending therefrom and by means of which the said drum is horizontally mounted to the said upright portion. The said post is surrounded by an annular shoulder **8** adjacent to the end wall **9** of the drum **6** and a disk **10** is rotatably mounted on the post between the said shoulder and a spacing collar **11** which is also mounted on said post and positioned between the disk **10** and the upright portion of the base **5**. A clamping nut **12** is threaded to the post **7** and, when tightened, is adapted to secure the disk **10** against rotation.

A rotor **13** is contained within the drum **6** and is axially and rotatably mounted therein by means of a trunnion **14**, which rotates in a bearing in the end wall **9**, and a shaft **15** which extends through the end wall **16** and is rotatable in a bearing therein. An operating lever **17** is rotatably mounted on the shaft **15** and is disposed between the end of a hub **18**, on the end wall **16**, and a rotating member **19**, preferably in the form of a disk, is secured to the shaft **15** against rotation thereon by suitable means such as a pin **20**. A pawl **21** is pivotally mounted on the lever **17**, by means of a stud **22**, and biased into contact with the surface of the disk **19** by means of a spring **23**. If desired, the said disk **19** may be in the form of a ratchet wheel having a series of teeth around the periphery thereof which are engaged by the pawl **21** to provide positive engagement for rotating the disk in one direction.

The lever **17** is urged to rotate upon the shaft **15** by means of a driving spring **24** which is anchored by one end **25** to the disk **10** and by its opposite end **25***a* to the said lever.

The novel medium for controlling the operation of my improved timing device consists of a suitable material **26** which is contained within the drum **6** and is in engagement with the interior of said drum and with the surface of the rotor **13**. This material is preferably a plastic having the desired qualities for particular requirements in the use of the timing device for different timing operations.

A material found particularly desirable for use in connection with my present invention consists of a pliable silicone plastic, commonly called silicone rubber, or silicone putty, which resembles putty but has stability and permanence in its consistency.

In the operation of the embodiment of my invention illustrated in the drawings, a timing cycle may be initiated by rotating the lever **17** in a contra-clockwise direction against the tension of the driving spring **24** until it reaches a predetermined position which may be regulated by a suitable stop (not shown). When the said lever is released, the spring **24** will urge the said lever to rotate in a clockwise direction. This rotation of the lever will cause the end of the pawl **21** to bind against the periphery of the disk, or ratchet wheel **19**, and thereby connect the lever to the shaft **15** and cause rotation of the rotor **13** against the yielding resistance provided by the plasticity of the material **26** which will retard the rotation of the said rotor and thereby also retard the rotation of the lever **17** by the driving spring **24** and consequently provide a time interval which may be used in performing different controlling operations, where a delayed action is desired.

My improved timing device may be adapted for efficiently controlling the operation of such heating devices as electric toasters wherein, as is commonly known, it is desired that the length of the time intervals for successive toasting operations be reduced in proportion to the rise of the temperature in the toaster so that uniformly toasted bread slices may be obtained regardless of whether the toaster is started from a cold condition, as in the first toasting operation, or in a heated condition, as in the closely following toasting operations.

In adapting my improved timing device for such automatic toasters and the like, wherein variable time periods proportionate to the temperature of the device are desired, I use, as the timing element, a plastic material the plasticity of which will increase as the temperature of the material rises, so that the time periods provided by said timing device for a timing operation will vary in accordance with changes in the temperature of the device in which the said timing device is contained. In effect, the material which I use for providing such variable timing periods is responsive to temperature changes in a heating device, which is controlled by my timing device, to provide shorter time periods as the temperature of the heating device rises, and thereby produce uniform results in cooking or toasting operations.

In the embodiment shown in the accompanying drawings, the timing device may be adjusted for providing longer or shorter time periods by reducing the tension in the driving spring **24** so that it will apply less torque to the rotor **13** against the plasticity of the material **26** and thereby increase the length of the time period, or apply more torque to the said rotor and reduce the length of the time period.

This adjustment of the driving spring **24** may be made by loosening the nut **12**, rotating the disk **10** in the required direction to loosen or tighten the said spring, and then tightening the nut **12** so as to secure the said disk **10** in adjusted position. If desired, the said disk may be connected to a suitable adjusting member which extends to the exterior of the device in which the timing device is used so that adjustment of the driving spring be made from the exterior of said device. Such adjustments may also be determined by means of a dial and pointer, not shown, such as commonly used on timing devices.

As illustrated in Figs. 1 and 2 of the drawing, my improved timing device may be combined with a suitable electric switch for timing the opening or closing of an

electric circuit. In the form shown, the electric switch may include a spring bar **27** which is mounted on an insulating block **28** and has an electric contact **29** engaging a similar contact **30** on a resilient bar **31** which is also mounted on said block. Each of said bars **27** and **31** may be provided with binding screws **32** and **33**, respectively, for securing electric wires to said switch. When the member **17** is moved downwardly, the electric switch is closed. As the said lever reaches the end of the timed cycle, the insulating abutment **34**, at the end of the extension **35** on said lever, will engage the spring bar **27** and move it away from the bar **31** and thereby separate the contacts **29** and **30** and break the electric circuit.

As illustrated in Fig. 4, my invention may be modified in order to provide a door check for checking the closing of a door to prevent it from slamming. In this form, the device may include a stationary member in the form of a shell or container **36** having a material chamber **37** which is covered by a suitable closure **38**. A rotor **39** is rotatable in said shell upon a pivot **40** and in a bearing **41** in the closure. A lever **42** is rotatable on the shaft **43** of the rotor and has a pawl **44** which engages a ratchet **45** on the said shaft.

A spring **46** surrounds the shell **36** and is secured at one end to the lever **42** and at the other end to an adjusting disk **47** which is secured to the shell by an adjusting nut **48**.

A cover **49** may be used to cover the entire device.

In the operation of the door check illustrated, the device is mounted to the frame of the door, illustrated at **50**, and the lever **42** is secured to the door in any suitable conventional manner by the bearing **51**.

When the door is opened, it will wind the spring **46**. As the door is released, the spring will move it towards closed position against the tension of the plastic material **52** which is contained in the material chamber **37** between the shell **36** and the rotor **39**. This material is of the same nature as that used in the above described timing device and will retard the closing action of the door and thereby prevent slamming. Tension of the spring **46**, to control the speed with which the door will close, may be adjusted by means of the adjusting disk **47**.

A door check embodying this modified form of my invention provides a desired advantage over door checks of conventional form since it provides a uniform resistance for the full closing movement of the door and thereby prevents the rapid closing of the door during the initial portion of the closing movement which applies considerable strain upon the door check.

I claim:

1. A timing device including a base, a stationary member secured to said base and having a material containing chamber therein, a rotor rotatable in said chamber, a spring member surrounding said stationary member, a lever rotatable on said rotor and connected to said spring member, a ratchet member secured to said rotor, a pawl on said lever engageable with said ratchet to impart to said rotor power from said spring in one direction and to permit rotation of said lever independently of said rotor to wind said spring, anchoring means securing said spring to said base, and means permitting adjustment of said anchoring means for varying the power imparted by the spring to the lever.

2. A timing device comprising a base having an upright portion, a stationary drum, a co-axial post on said drum mounting the drum to the said upright portion, a rotor rotatable in said drum, a shaft projecting from said rotor through an end wall of said drum, a lever rotatable on said shaft, a connecting member secured to said shaft, a driving spring surrounding said drum, an anchoring disk rotatable on the post and having one end of the said spring anchored thereto, the other end of the spring being connected to said lever, uni-directional connecting means on said lever for connecting the lever to the connecting member to drive the rotor in one direction, a plastic material between said drum and rotor for yieldingly resisting the rotation of said rotor to retard the movement of said lever under the tension of the spring, and means for adjustably securing the said anchoring disk to the drum to vary the tension of the spring.

3. A timing device including a stationary drum, a rotor rotatable in said drum, a lever rotatably connected to said rotor, a driving spring adjustably connected to said drum, and connected to said lever for driving it in one direction, uni-directional ratchet means connecting said lever to the rotor to impart power from said spring for driving the rotor in one direction and to permit winding of the spring by rotation of said lever in an opposite direction independently of the rotor, a pliable plastic material between said drum and rotor yieldingly resisting the rotation of said rotor by the spring, and means for adjusting said spring to vary the power imparted therefrom to the rotor and thereby vary the speed of rotation of the rotor.

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