Jan. 10, 1928. 1,655,803

R. VARLEY

TIMER

Filed July 3, 1924

Fig. 1.

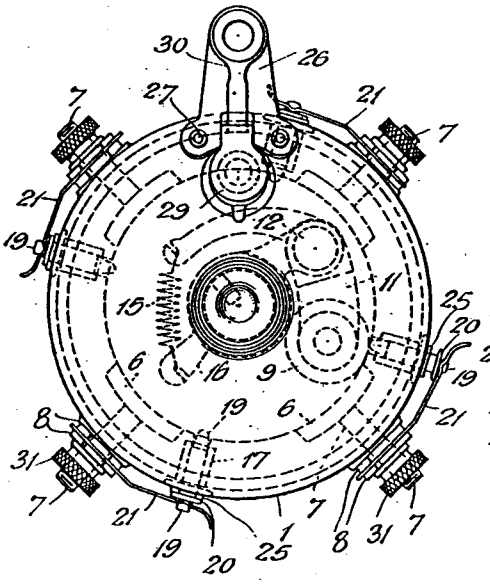


Fig. 2.

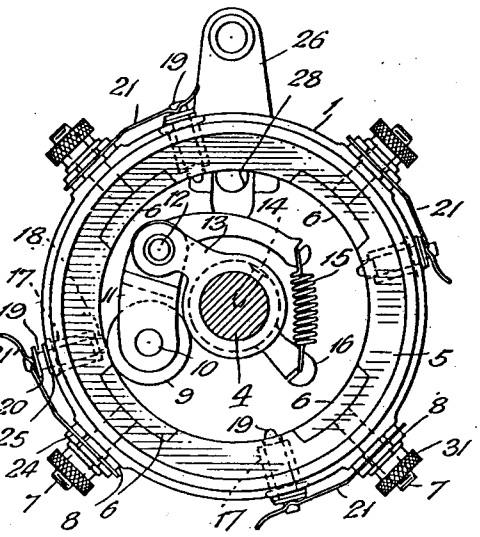


Fig. 3.

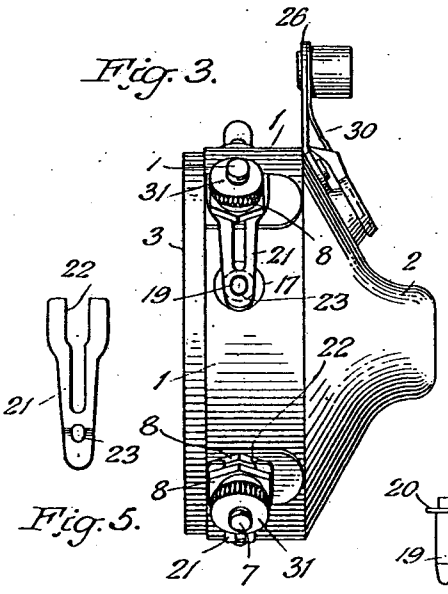


Fig. 4.

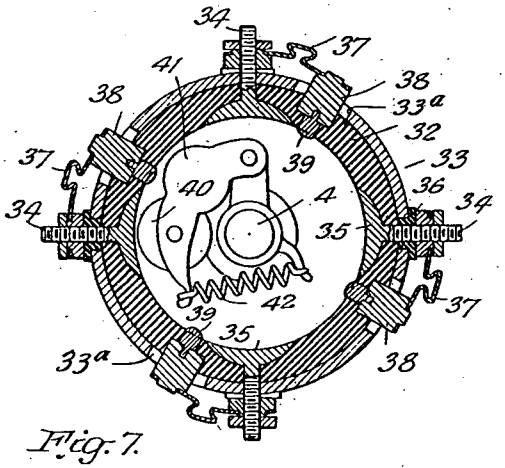


Fig. 5.

Fig. 6

Fig. 7.



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UNITED STATES PATENT OFFICE.

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TIMER.

Application filed July 3, 1924. Serial No. 723,919.

This invention relates to timers for internal combustion engines, and particularly to those of the type commonly used in Ford automobiles. In present designs of timers a plurality of contacts are arranged in a trackway over which a brush travels for engaging with said contacts successively and thereby distributing a current to a plurality of coils or spark plugs. There is considerable sparking or arcing between the brush and the contacts at their separation, and this causes pitting and burning of the contacts. As the burning and pitting continues, the duration of the engagement between each contact and the brush becomes uncertain and unreliable, and the renewal of the contacts requires more skill than the ordinary driver possesses.

An object of this invention is to provide an improved timer with which any arcing or burning at each contact will occur solely upon parts which are readily replaceable by unskilled persons without tools, without disconnecting any of the circuit wires, and without opening the timer casing; and which will be relatively simple, durable and compact in construction, and relatively inexpensive. A further object is to provide an improved timer for accomplishing the above objects in which the replaceable parts are small and exceptionally simple and inexpensive. Various other objects and advantages will be apparent from the following description of an embodiment of the invention, and the novel features will be particularly pointed out hereinafter in claims.

In the accompanying drawing:—

Fig. 1 is a front elevation of one type of timer, constructed in accordance with the invention;

Fig. 2 is an inside face elevation of the same;

Fig. 3 is a side elevation of the same;

Fig. 4 is a sectional elevation through a timer of a slightly different type which is also constructed in accordance with the invention;

Fig. 5 is a plan of the leaf spring utilized in the timers shown in Figs. 1, 2, and 3;

Fig. 6 is an elevation of one of the renewable pins utilized in Figs. 1 to 3; and

Fig. 7 is a plan of a washer which is also utilized in Figs. 1 to 3.

Referring particularly to Figs. 1 to 3, 5, 6 and 7, the illustrated timer shell 1 is molded from suitable insulating material such as a suitable phenol condensation product. This shell has the usual boss 2, by which it is held in position with its open edge 3 fitting against a part of the engine and over the end of the timer shaft 4. A ring 5 of suitable insulating material, such as bone hard fibre, is inserted into and secured within the interior of the shell, so as to serve as a race or trackway. A plurality of metal contacts 6 are countersunk flush into the inner peripheral surface of the ring so that the outer surface of the contacts will form substantial continuations of the inner peripheral surface of the ring. Each contact is provided with a binding post 7 extending outwardly through the ring and shell, and a nut 8 is threaded upon the outer end of each post and against the shell so as to lock each contact within the ring. These contacts are arranged in spaced relation around the inner periphery of the ring as usual in timers.

The brush, which travels around the inner periphery of the ring may comprise a roller 9 pivoted at 10 to one end of the lever 11, the lever, intermediate of its ends, being pivoted at 12 to the outer end of an arm 13 that is keyed to the timer shaft 4 in any suitable manner such as by a pin 14. The other end of the lever 11 is connected by a tension spring 15 to an extension or lug 16 carried by the arm 13, so that the spring will constantly urge the roller 9 against the inner periphery of the ring. The roller is connected to one side of the circuit and the binding posts are connected to other parts of the ignition system, so that a circuit will be established each time that the roller 9 passes over a contact during its rotation.

As the roller leaves each contact there will be a tendency for the current to arc or burn and thus pit the contact, and this invention relates to a construction by which the pitting of the contacts will be prevented.

To this end bushings 17 are inserted through the shell and nearly through the ring in a radial direction immediately following each contact, considered in the direction of travel of the roller, and the ring is provided with passages 18, each the diameter of, aligned with and forming a continuation of the bore of a bushing 17. The bushings, which are preferably of metal, may, if desired, have a flanged edge which is countersunk into the outer surface of the shell but, since the bushings do not pass entirely through the ring, such flanged edges are not essential. A pin 19 is slidably mounted in the bore of each bushing, so as to be projectable inwardly through the ring and from its trackway surface to an extent determined by the position of a flange 20 provided on the pin near its outer end. The pins 19 may be made of any suitable metal, but preferably of steel or of heat resistant metal such as the metal of which the electrodes of spark plugs are made.

A leaf spring 21 for each post is provided at one end with a slot 22 and at the other end with an aperture 23. Each spring is secured to its binding post by sliding the slotted end 22 into an annular peripheral groove 24 in the nut 8 on the post, so that the spring may rotate as well as slide upon the nut. The free end of each spring presses upon the outer end of a pin 19, with the outer end of the pin beyond the flange 20 passing through the aperture 23. Each leaf spring therefore serves to electrically connect a contact to its corresponding pin, and also to yieldingly press the pin inwardly to the extent permitted by the engagement of the flange 20 of the pin with its bushing or the shell. The pins are freely slidable in the bushings so that they will move freely into their innermost positions in which they project somewhat from the trackway surface of the ring and within the path of the brush roller. The springs, intermediate of their ends, are bowed or bent slightly so that, when attached to the binding posts, the free ends must be snapped over the pins. The engagement of each pin in the aperture 23 of its spring serves also to hold the spring from disengagement from its nut 8 and binding post 7. A washer 25 is preferably placed initially over the end of the pin which passes through the ring for a purpose which will appear hereinafter.

The pins are so mounted with respect to their corresponding contacts that the brush roller 9, prior to its leaving each contact, will engage with the corresponding pin 19 and then remain in contact with the pin for an instant after leaving engagement with the corresponding contact. Then when the roller leaves the pin, any arcing which may occur will be solely between the roller and the pin. The pin is, of course, cammed outwardly by the roller as the latter moves over it and then forced inwardly by its spring.

The shell may be provided with the usual operating arm 26 which is secured thereto in any suitable manner such as by rivets 27, and with the usual oiling aperture 28 which is normally closed by a flap 29, confined to the operating arm by a leaf spring 30. Nuts 31 may be threaded upon the outer ends of the binding posts so as to secure circuit wires to the binding posts and against the nuts 8.

In the operation of such a timer, as the roller brush 9 rotates with the timer or cam shaft 4, it will engage successively with the contacts and pins, the engagement with each pin being established prior to the breaking of the engagement between the roller and the corresponding contact, the pin being cammed outwardly slightly as the roller passes thereover. Any arcing that may occur will be solely between the roller and pin. After a time, the ends of the pins will be worn off or burned off, and then the pins may be removed, the washers 25 taken off, and the pins then reinserted into the bushings, with the result that they will again project into the path of the roller, thus serving as new pins.

To remove a pin, it is merely necessary to spring the free end of the holding leaf spring outwardly to disengage it from the pin, and then swing it laterally to uncover the pin, whereupon the pin may be removed so that the washer may be taken off. After the pin is reinserted into the bushing, the leaf spring may be rotated to cover the pin and snapped over the projecting end so as to yieldingly hold it in its innermost position. After the pins have been burned or worn off a second time, they may be removed and new pins inserted.

It will be observed that the washers 25 may be removed or new pins inserted in but a moment of time by any one without special skill and without tools, and the pins, which are the only parts that become pitted or burned off, are small and very inexpensive. With this arrangement, therefore, a timer will operate for relatively long intervals of time without requiring the removal of the timer shell or the attention of a skilled mechanic. In fact, the attention of a skilled mechanic is never necessary to adjust or repair the timer for the reason that it is an exceptionally simple operation to replace the inexpensive pins which are the only parts that receive any appreciable wear or depreciation.

In Fig. 4, I have illustrated a somewhat similar timer in which the ring 32, corresponding to the ring 5, is mounted within a

metal shell 33, being secured therein by a tight fit and by the binding posts 34 of the contacts 35 which pass through the shell. The posts 34 may be insulated from the shell by insulating bushings 36. In the particular embodiment illustrated, only two of the four binding posts are insulated as usual, but they may all be insulated, if desired. The leaf springs 37, which are somewhat similar to the springs 21 of the other embodiment, are secured upon the binding posts and fitted over pins 38 which are mounted in the insulating ring 32 for a limited radial movement. The shell is provided with apertures 33ª through which the pins 38 pass, the apertures being larger than the pins to provide the necessary clearance and prevent short circuiting of the pins by the shell. The pins 38 are of metal and carry tips 39 of heat resisting metal such as tungsten or the metal of which the electrodes of spark plugs are made. The tips 39 may be detachably connected to the pins 38, such as by threading them therein, or by any other suitable means.

This particular embodiment of the timer was originally disclosed in my prior Patent #1,492,340, issued April 29th, 1924.

The operation of this timer is the same as in the preceding embodiment except that the brush roller 40 is carried by a lever 41 which is normally pulled away from the trackway by a spring 42. When the timer shaft 4 rotates and causes rotation of the roller brush, the centrifugal force acting upon the lever 41 and the roller 40 will throw the roller outwardly into contact with the trackway, so that it will then engage successively with the contacts 35 and the auxiliary contacts or pins 38—39.

In both of the illustrated embodiments of the invention, each leaf spring may also, if desired, be provided with an extension from its slotted end which may be utilized to yieldingly hold a reserve pin in a suitable cavity in the timer shell, although this is optional.

I claim:

1. In a timer, a shell having a trackway, a plurality of contacts arranged in spaced relation along the trackway, a brush movable along the trackway and engaging successively with said contacts, a plurality of pins carried by the shell so as to project into the path of the brush, said pins being located one adjacent to and spaced from that edge of each contact where the brush leaves it, each contact having a binding post, a spring carried by each post, pressing the pin, cooperating with that contact, into the path of the brush and also electrically connecting the pin and post, whereby any arcing as the brush leaves each contact will occur solely between the brush and the pins.

2. In a timer, a shell having a trackway, a plurality of contacts arranged in spaced relation along the trackway, a plurality of pins also arranged along the trackway, one for each contact and all on corresponding sides of the contacts, each pin being located in close proximity to but spaced from and electrically connected to its corresponding contact, and a brush movable over said trackway in a direction to engage each contact before its corresponding pin and engaging each pin before moving out of engagement with the corresponding contact whereby any arcing will occur solely between the brush and pins, said pins being detachably supported directly by the shell to permit of their ready replacement.

3. In a timer, a shell having a trackway, a plurality of contacts arranged in spaced relation along the trackway, a plurality of pins passing through the shell and also arranged along the trackway, one for each contact, and mounted for projection outwardly from the surface thereof, said pins being arranged upon corresponding sides of the contacts and in close proximity thereto, springs connected to the outer ends of the pins for urging the pins outwardly from the face of the trackway and connected to the contacts, and a brush movable along the trackway to engage successively with the contacts and pins.

4. In a timer, a shell having a trackway, a plurality of contacts arranged in spaced relation along the trackway, a plurality of pins also arranged along the trackway, one for each contact, and mounted for projection outwardly from the surface thereof, said pins being arranged upon corresponding sides of the contacts and in close proximity thereto, said contacts having external binding posts, a leaf spring clamped upon each post and pressing each pin in a direction inwardly through the trackway, and a brush movable along the trackway to engage successively with the contacts and pins.

5. In a timer, a shell having a trackway, a plurality of contacts arranged in spaced relation in the surface of the trackway, the shell and trackway surface having apertures therethrough at corresponding ends of and in proximity to but spaced from the contacts, pins slidably mounted in the apertures to project through the surface of the trackway, means for yieldingly urging the pins in a direction to project from the trackway surface and connecting each pin to a corresponding contact, and a brush movable along the trackway surface to engage successively with the contacts and pins.

6. In a timer, a shell having a trackway, a plurality of contacts arranged in spaced relation in the surface of the trackway, the shell and trackway surface having apertures

therethrough at corresponding ends of and in proximity to but spaced from the contacts, pins slidably mounted in the apertures to project through the surface of the trackway, said pins having shoulders engaging with the shell to limit the extent to which they may project from the trackway surface, means for yieldingly urging the pins in a direction to project from the trackway surface and connecting each pin to a corresponding contact, and a brush movable along the trackway surface to engage successively with the contacts and pins.

7. In a timer, a shell having a trackway, a plurality of contacts arranged in spaced relation in the surface of the trackway, the shell and trackway surface having apertures therethrough at corresponding ends of and in proximity to but spaced from the contacts, bushings fitted in said apertures, pins slidably mounted in the bushings to project through the surface of the trackway, means for yieldingly urging the pins in a direction to project from the trackway surface and connecting each pin to a corresponding contact, and a brush movable along the trackway surface to engage successively with the contacts and pins.

8. In a timer, a shell having a trackway, a plurality of contacts arranged in spaced relation in the surface of the trackway, the shell and trackway surface having apertures therethrough at corresponding ends of and in proximity to but spaced from the contacts, bushings fitted in said apertures, pins slidably mounted in the bushings to project through the surface of the trackway and having shoulders engaging with said bushings to limit the extent that the inner ends may project from the surface of the trackway, means for yieldingly urging the pins in a direction to project from the trackway surface and connecting each pin to a corresponding contact, and a brush movable along the trackway surface to engage successively with the contacts and pins.

9. In a timer, a shell having a trackway, a plurality of contacts arranged in spaced relation in the surface of the trackway, the shell and trackway surface having apertures therethrough at corresponding ends of and in proximity to but spaced from the contacts, pins slidably mounted in the apertures to project through the surface of the trackway, means for yieldingly urging the pins in a direction to project from the trackway surface and connecting each pin to a corresponding contact, said pins being separate from the said means whereby the pins can be readily replaced at will, and a brush movable along the trackway surface to engage successively with the contacts and pins.

10. In a timer, a shell having a trackway, a plurality of contacts arranged in spaced relation in the surface of the trackway, the shell and trackway surface having apertures therethrough at corresponding ends of and in proximity to but spaced from the contacts, pins slidably mounted in the apertures to project through the surface of the trackway, each contact having a binding post, a metal leaf spring clamped on each post and pressing at its free end upon a corresponding pin to urge the latter in a direction to project from the trackway surface, and a brush movable along the trackway surface to engage successively with said contacts and pins.

11. In a timer, a shell having a trackway, a plurality of contacts arranged in spaced relation in the surface of the trackway, the shell and trackway surface having apertures therethrough at corresponding ends of and in proximity to but spaced from the contacts, pins slidably mounted in the apertures to project through the surface of the trackway, each contact having a binding post, a metal leaf spring having a slotted end embracing each binding post and clamped thereon, each spring at its free end pressing upon a corresponding pin to urge the latter in a direction to project from the trackway surface, and a brush movable along the trackway surface to engage successively with said contacts and pins.

12. In a timer, a shell of phenolic condensation material having a trackway, a plurality of contacts arranged in spaced relation in the surface of the trackway, the shell and trackway surface having apertures therethrough at corresponding ends of and in proximity to but spaced from the contacts, bushings fitted in said apertures, pins slidably mounted in the bushings to project through the surface of the trackway, means for yieldingly urging the pins in a direction to project from the trackway surface and connecting each pin to a corresponding contact and a brush movable along the trackway surface to engage successively with the contacts and pins.

13. In a timer, a shell of phenolic condensation material having a trackway, a plurality of contacts arranged in spaced relation in the surface of the trackway, the shell and trackway surface having apertures therethrough at corresponding ends of and in proximity to but spaced from the contacts, metal bushings fitted in said apertures, pins slidably mounted in the bushings to project through the surface of the trackway, means for yieldingly urging the pins in a direction to project from the trackway surface and connecting each pin to a corresponding contact, and a brush movable along the trackway surface to engage successively with the contacts and pins.

14. In a timer, a shell having a trackway, a plurality of contacts arranged in spaced relation along the trackway, a plurality of

pins passing through the shell and also arranged along the trackway of each contact and mounted for projection outwardly from the surface thereof, said pins being arranged on corresponding sides of the contacts and in close proximity thereto, a spring external of the shell connected to the outer ends of the pins and to the adjacent contacts for urging the pins outwardly from the face of the trackway, and a brush movable along the trackway to engage successively with the contacts and pins.

In witness whereof I hereunto subscribe my signature.

RICHARD VARLEY.