Sept. 4, 1928. 1,683,392

M. MALLORY

TIMER

Filed Dec. 26. 1922

Fig. 1.

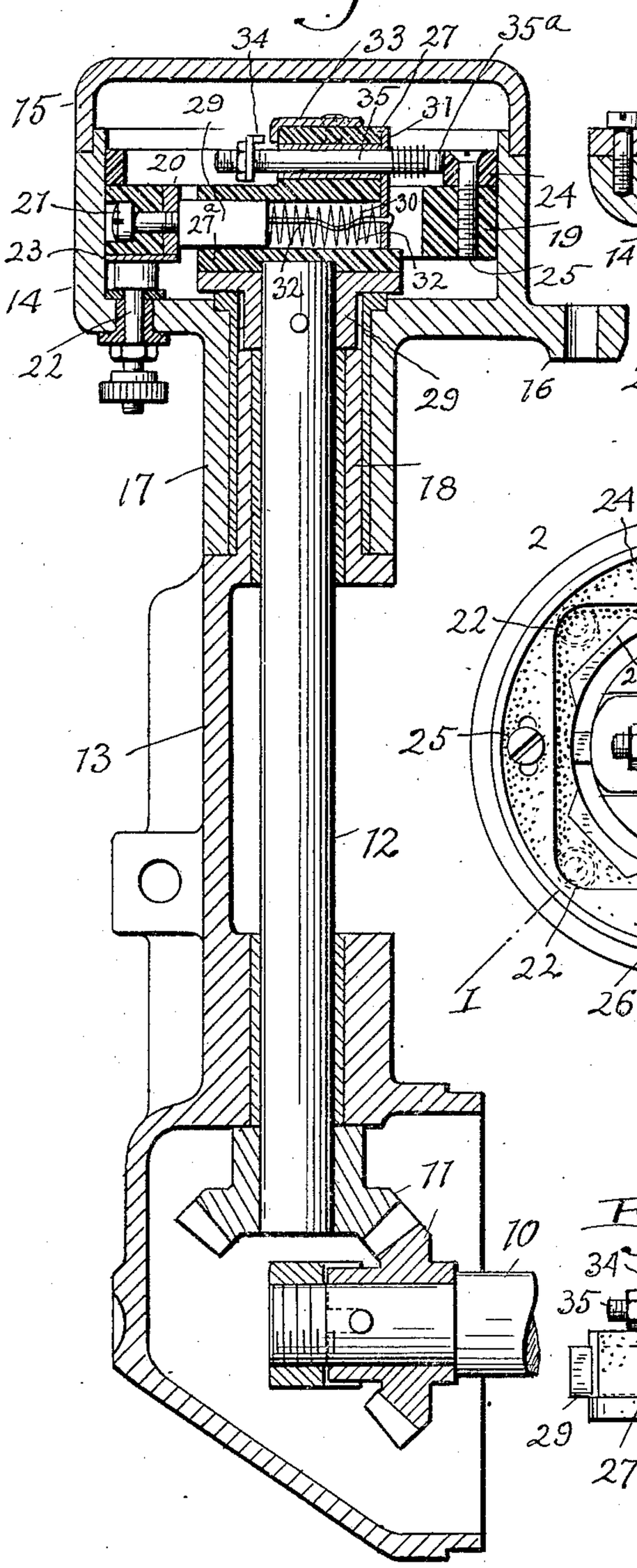

Fig. 2.

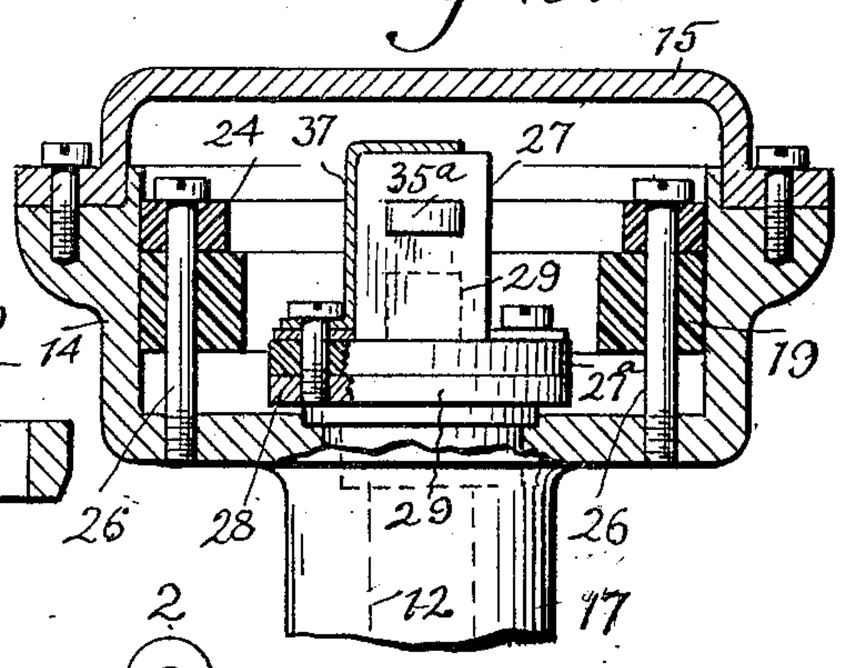

Fig. 3.

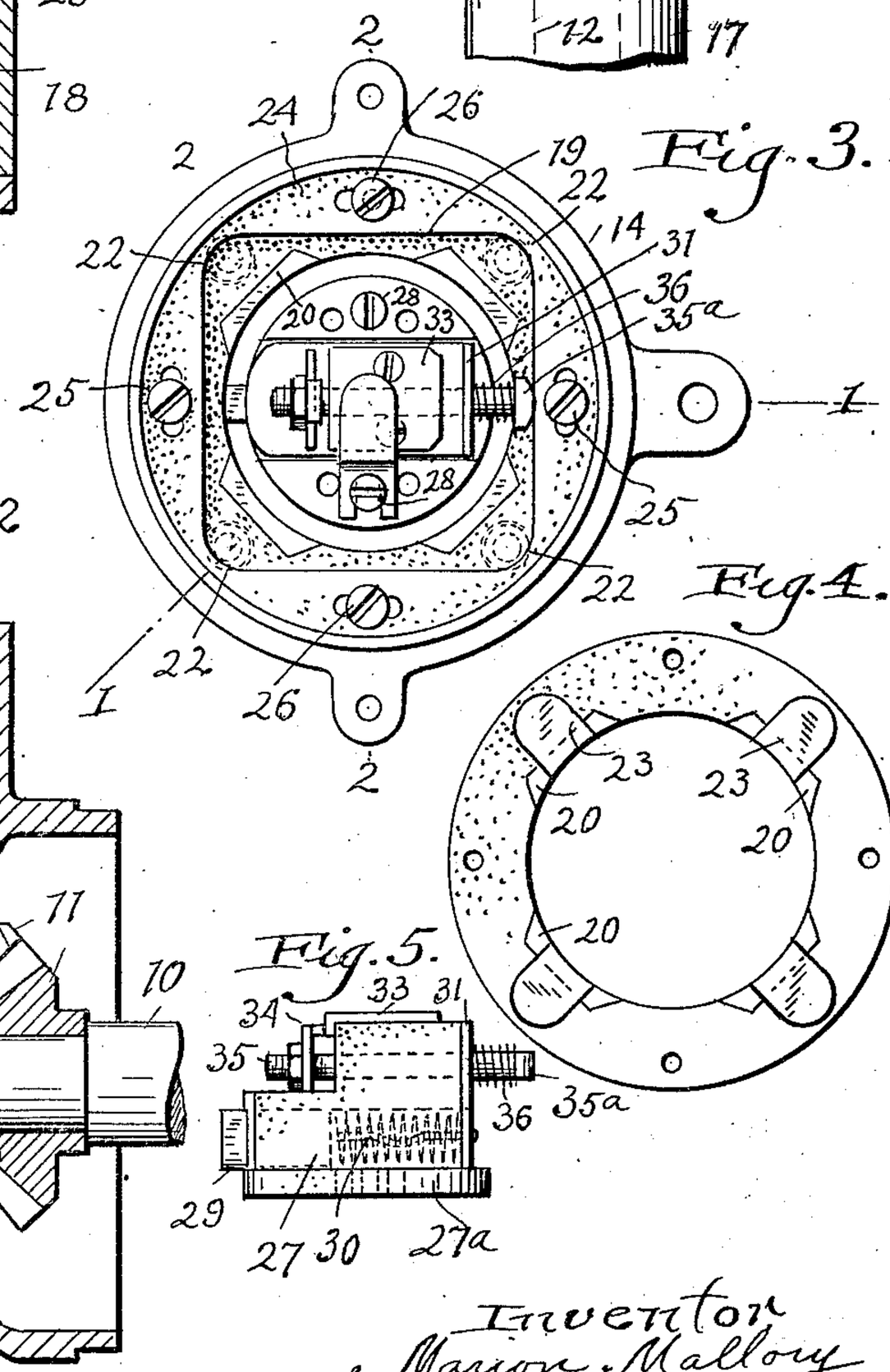

Fig. 4.

Fig. 5.

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UNITED STATES PATENT OFFICE.

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TIMER.

Application filed December 26, 1922. Serial No. 608,890.

This invention relates to ignition apparatus, and particularly to timers for Ford automobiles and others having like ignition systems.

As is well known, Ford cars are usually equipped with ignition systems of the vibrator type, the current being supplied from a battery or magneto successively to the primaries of the different coils, each coil having a vibrator associated therewith for rapidly opening and closing the primary circuit, and the primaries of the different coils being successively connected to the source by the rotating member of the timer or commutator.

While this system is satisfactory in many respects, it has the disadvantages that the circuit remains closed through the primary of each coil, except for the rapid interruptions produced by the vibrator, as long as the segment of the timer is engaged by the rotor and the circuit is interrupted when the rotor contact leaves the segment. This causes pitting of the timer segments and in time interferes with the proper functioning of the system.

It was proposed by me and described in my pending application Serial No. 539,973, filed February 28, 1922, to obviate this difficulty by placing in series with the rotor of the timer a circuit breaker, the function of which is to open the circuit just before the rotor leaves each of the segments. By this expedient pitting of the segments can be obviated and the life of the timer is not only greatly prolonged, but the initial efficiency of the system as a whole is maintained longer than it otherwise would be since the segments of the timer are maintained in smooth and relatively clean condition.

The object of the present invention is to embody the device above referred to in a form satisfactory mechanically and electrically, and without introducing undesirable complications in the way of special wiring to incorporate the circuit breaker in the primary circuit and particularly to connect it to the rotor.

In the accompanying sheet of drawings wherein I have shown one embodiment of the invention, Fig. 1 is a vertical sectional view of the timer, with the timer shown elevated above the cam shaft of the engine, the section through the timer proper being taken substantially along the irregular line 1—1 of Fig. 3; Fig. 2 is a sectional view through the timer proper, the section being taken substantially along the line 2—2 of Fig. 3; Fig. 3 is a plan view of the timer with the cover of the timer case removed; Fig. 4 is a bottom view of the timer or commutator ring which carries the stationary segments; and Fig. 5 is a detached elevation of the rotor head.

In this instance, instead of mounting the timer at the end of the cam shaft as is frequently done, the timer is driven by an upright shaft geared to the end of the cam shaft and supported in a bracket which may be secured to the engine in any desired manner. This, however, is not an essential feature of the invention, as the timer embodying my invention may be supported on the front of the engine at the end of the cam shaft in the well known manner.

In the embodiment shown, the end of the cam shaft is illustrated at 10, and this shaft drives through bevel gears 11 the upwardly extending timer shaft 12 which is journaled in the bracket 13 above referred to. At the top of the bracket is a timer casing including a cup-shaped body portion 14 and a removable cover 15, this casing being normally stationary but capable of adjustment to advance or retard the spark, and for that purpose it is provided with an outstanding lug 16 to which the spark advance member is designed to be connected. The casing has at the bottom a downwardly extending tubular flange 17 which surrounds and may be turned on the upper cylindrical part 18 of the bracket.

Supported in fixed position in the body portion 14 of the casing is a ring 19 which may be formed of bakelite or other suitable insulating material, and in which are embedded the segments 20 of the timer or commutator, there being in this instance four of these segments spaced 90° apart. The segments may be secured in place by any suitable means such as by screws 21 extending through from the outer periphery of the ring 19.

The primaries of the four coils of the vibrator ignition system are designed to be electrically connected to these segments 20, and though this can be done in different ways, in this instance I extend through the bottom of the body portion 14 of the casing terminal screws 22 to the outer ends of which the primaries are designed to be connected. The upper ends of these screws are suitably

connected to these segments, and in this instance this is brought about by extending over the bottom of the insulating ring 19 contact strips 23 which are connected to and constitute extensions of the segments 20, and by clamping the ring and therefore the strips 23 down against the upper ends of the screws 22, the upper ends of these screws being shown enlarged for this purpose.

At the top of the ring I provide a stationary circuit breaker cam 24 which is fastened by a pair of diametrically opposite screws 25, to the insulating ring 19, one of these screws being shown in Fig. 1, and both shown in Fig. 3. The cam 24 and ring 19 are secured to the bottom of the casing by a pair of diametrically opposite screws 26 shown in Figs. 2 and 3. It is by these screws that the contact strips 23 connected to the segments 20 are solidly clamped down against the upper ends of the terminal or binding post screws 22.

The rotor of the timer includes an insulating head 27 which may be formed of bakelite or other good insulating material, this head having a flanged base 27[a] which is secured by screws 28 to a flanged sleeve 29 pinned or otherwise secured to the top of the timer shaft 12 so as to rotate therewith, this sleeve 29 having at its upper end a flange which lies and is adapted to rotate within the lower part of the timer casing. This head performs the two-fold function of rotating the timer or commutator brush which engages the segments 20, and of carrying a rotating circuit breaker so that its movable member will be suitably actuated by the stationary cam 24.

This insulating head 27 is provided in the plane of the segments 20 with a transverse opening extending therethrough, and mounted in this opening is a commutator brush 29. The outer end of this brush is pressed yieldingly against the inner surface of the ring 19 or against the inner faces of the segments 20 by a coil spring 30 which lies between the brush 29 and an upright metallic plate 31 to which the current is conducted from the brush 29, preferably independently of the spring 30 by a flexible pig-tail 32 secured to the brush and to the plate 31.

Secured to the top of the head 27 is the stationary member 33 of the circuit breaker, the function of which, as previously stated herein and as more fully explained in my prior application, is to open the primary circuit just before the commutator brush leaves each of the several segments to which the primary coils are connected. The movable member of the circuit breaker is shown at 34, and in this instance the circuit breaker member 34 is moved into and out of engagement with the contacting portion of the stationary circuit breaker element 33 by an endwise movable pin or plunger 35 which is slidably mounted in a transverse opening of the head above the opening which receives the brush 29. This plunger 35 slidably engages the plate 31 and is therefore electrically connected to the brush 29.

The plunger 35 carrying the movable circuit breaker member or contact 34 extends beyond the plate 31, and at its end it is provided with a shoe 35[a] which is directly opposite or in the plane of the stationary cam 24. As this shoe is rotated, it wipes over the inner face of the cam which is here shown as rectangular in shape,—that is to say, as the shoe approaches the center of the flat faces of the cam the plunger is moved inwardly so as to separate the contacts and thereby break the primary circuit, the parts being so arranged that this occurs each time the brush 29 is on one of the segments 20, and just before it leaves the latter. Immediately after the brush reaches the next segment, the circuit is again closed at the contacts of the circuit breaker as the shoe moves toward the angle or deeper portion of the cam. The circuit will then remain closed until just before the brush leaves this next contact when it will again be opened by the action of the next flat face of the cam on the circuit breaker shoe. This action is repeated four times for each revolution of the head.

The circuit breaker is closed each time the shoe 35[a] is released by the cam, in this instance by a coil spring 36 which lies between and bears against the shoe 35[a] and the plate 31, the spring being compressed as the shoe is moved inwardly by the cam.

In the ordinary vibrating coil ignition system the rotating brush of the commutator is grounded, but it is important to my invention in order to avoid wiring complications, not only that the breaker be in series with the rotor of the commutator, but that it be interposed between the commutator brush and the ground. By proceeding in this manner it is possible to utilize the circuit breaker in the simplest possible manner. I have already explained that the commutator brush 29 is electrically connected through the pig-tail 32, plate 31 and plunger 35 to the movable member 34 of the circuit breaker. Therefore, to accomplish the result above stated, i. e. to interpose the circuit breaker between the rotor of the commutator and the ground, it is only necessary to connect the stationary contact member 33 of the circuit breaker to ground, and this is accomplished by a conducting member 37 in the form of a stamping which engages the circuit breaker member 33 and extends down along the side of the insulating head 27 as shown in Fig. 2, and at its lower end is secured under the head of one of the screws 28 and is therefore electrically connected to the sleeve 29 and therefore to ground.

In this manner the circuit described in my prior application is completed through the

circuit breaker from the source of current, i. e. either magneto or battery through the primary of one of the coils (whose secondary is connected to the spark plug and whose circuit is rapidly opened and closed by the associated vibrator in the well known manner) to the proper segment of the commutator, through the circuit breaker (when the latter is closed) to ground, and therefore to the opposite terminal of the source.

While I have shown one embodiment of the invention, this embodiment may be varied in many of its details without deviating from the principle of the invention, and I therefore do not desire to be confined to the precise details shown, but aim in my claims to cover all modifications which do not involve a departure from the spirit and scope of my invention as defined in the appended claims.

Having described my invention, I claim:

1. In a timer for ignition systems, a stationary element in the form of an insulating ring having segments and a circuit breaker cam ring attached thereto, a rotor within the rings carrying a radially disposed brush for successively engaging the segments and a circuit breaker having a contact member fixed to the rotor and a radially disposed, slidable, spring-pressed contact member electrically connected to the brush and engageable with the cam.

2. In a timer for ignition systems, a stationary element in the form of an insulating ring having segments, a rotor within the ring having a brush positioned in the plane of the ring and engaging the segments, a circuit breaker having a stationary contact member carried by the rotor and a second contact member mounted on the rotor for movement in a plane parallel to that of the ring and brush into and out of engagement with the first mentioned contact member, and a stationary cam in the plane of said movable contact member with which said contact member engages.

In testimony whereof, I hereunto affix my signature.

MARION MALLORY.