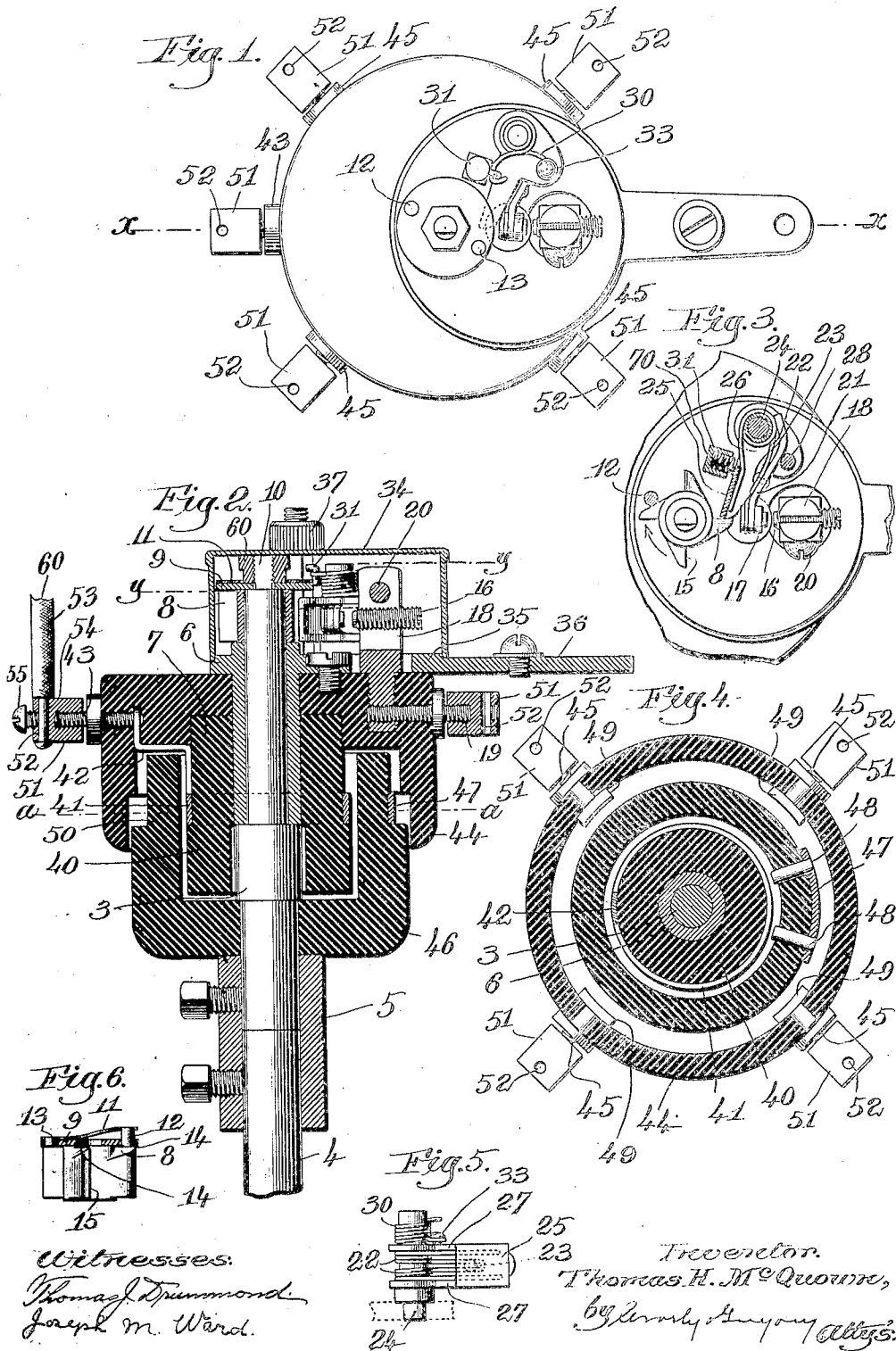


T. H. McQUOWN.
 TIMER AND DISTRIBUTER.
 APPLICATION FILED JUNE 21, 1907.

973,447.

Patented Oct. 18, 1910.



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UNITED STATES PATENT OFFICE.

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TIMER AND DISTRIBUTER.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, THOMAS H. McQUOWN, a citizen of the United States, and a resident of Cambridge, in the county of Middlesex and State of Massachusetts, have invented an Improvement in Timers and Distributers, of which the following description, in connection with the accompanying drawing, is a specification, like letters on the drawing representing like parts.

This invention relates to a timer and distributor for use in connection with gas engines, and it has for its object to provide a device of this class which is compact in its structure and thereby occupies a small space, which has comparatively few parts and is simple and inexpensive to manufacture, and which is also effective in operation and not liable to get out of order.

I will first describe one embodiment of my invention and then point out the novel features thereof in the appended claims.

In the drawings Figure 1 is a top plan view of a timer and distributor embodying my invention with the cap removed to show the timer mechanism; Fig. 2 is a vertical central section on substantially the line *x-x*, Fig. 1; Fig. 3 is a section through the timer on the line *y-y*, Fig. 2; Fig. 4 is a section through the distributor on the line *a-a*, Fig. 2; Fig. 5 is a detail of the method of supporting the movable contact of the timer; Fig. 6 is a detail of the means for driving the contact making device.

The parts of the mechanism are operated by a shaft 3 which may be connected by means of a sleeve 5 with the shaft 4 that is driven by the engine with which the device is operated. The said shaft 3 is shown as rotating in a bearing 6 formed in the stationary part 7 of the casing. Said shaft carries at its upper end a star or toothed member 8, the teeth of which operate to close the contacts of the timer as the shaft is rotated. This toothed member 8 will have as many teeth as it is desired to close the contacts of the timer during each rotation of the shaft 3, there being four such teeth in this embodiment of my invention. Said member 8 is preferably loosely mounted on the shaft 3 and is driven therefrom by a ratchet mechanism, which will drive the contact-making

member 8 forward therewith but which will permit said shaft to turn backwardly without moving the contact-making member 8.

The pawl-and-ratchet connection I have herein shown comprises a disk member 9 fast on the tip 10 of the shaft 3 and has secured thereto at one end thereof a resilient disk 11 which carries a pin 12 that projects through an aperture in the disk 9 and extends below said disk. The resilient disk 11 is secured to the disk 9 at one edge, as at 13, and the pin 12 is located in the opposite edge of the disk 11.

The teeth or wings of the member 8 are beveled on their upper edge, as at 14. With this construction the pin 12 will engage the vertical face 15 of one of the teeth on the toothed member 8 during the forward rotation of the shaft, but when said shaft rotates backwardly the pin 12 will ride up over the incline or cam surface 14 without rotating the contact-making member 8 backwardly, said pin being allowed to click over the teeth because of the resiliency of the washer or disk 11.

The contacts of the timer are designated 16 and 17. The contact 16 is the fixed contact and is carried by a post 18 supported by the fixed portion 7 of the casing and has connected thereto a binding post 19 to which a wire may be connected. The post 18 is preferably split, as shown, and the contact 16 has screw-threaded engagement with the post and is held in position by the clamping screw 20. This construction permits the fixed contact to be adjusted toward and from the movable contact and to be firmly held in any adjusted position.

The movable contact is yieldingly supported so as to permit it to have a slight yielding movement in any direction, and it is also so arranged that when the contacts are brought together, the movable contact has a slight sliding movement on the fixed contact. In the present embodiment of the invention the movable contact has extended therefrom an arm 21 which is backed and supported by a spring 22. Said spring is shown as a piece of spring wire doubled on itself and secured at its central portion to the arm 21, as at 23, and having the two ends thereof wound about a stud 24 and the ends thereof engag-

ing the bridge 25 of a follower or holder 26. This follower or holder has the two side wings 27 which are pivotally mounted on the stud 24, and which are connected by the bridge portion 25 against which the ends of the spring 22 bear.

The wings 27, see Fig. 3, are connected by a pin 28 forming a rest against which the arm 21 of the contact is held normally by the action of the spring 22.

The bridge portion 25 of the holder is arranged to be acted upon by the teeth of the contact-making member 8 as the latter revolves in the direction of the arrow, Fig. 3, and said teeth by engagement with said holder 26 turns the latter about the stud 24 thereby swinging the movable contact 17 toward the fixed contact 16.

The contact 17 will close against the fixed contact 16 before the holder 26 has been given its full movement and the spring 22 permits the holder to complete its movement after the contacts have closed together. When the contact 17 has been brought against the fixed contact 16, further movement of the holder will wind the spring 22 about the post 24, such winding movement of the spring tending to draw the movable contact 17 slightly toward the post 24 so that after said contact has engaged the fixed contact, there will be a slight sliding movement of the movable contact on the fixed contact. During this further movement of the holder also the pin 28 is carried away and separated from the arm 21.

One advantage of this construction is that since the movable contact has a movement other than that toward and from the fixed contact, the surfaces of the contacts are kept in better condition and are less liable to become pitted or rough than where the movable contact is rigidly carried by an arm so that it has movement in one direction only.

As soon as any tooth of the contact-making member 8 has passed out from engagement with the holder 26 said holder is returned to its initial position by means of a spring 30 which is fastened at one end to a post or stud 31, see Fig. 1, and which is coiled about the stud 24 and is fastened at its other end to the holder, as at 33. Preferably in this embodiment of my invention the holder is provided with a sleeve extending laterally therefrom which sleeve surrounds the stud 24 and about which the spring 30 is coiled. Said spring is so arranged that when the holder swings toward the fixed contact thereby to close the contacts together the spring 30 is tightened or put under added tension, and as soon as the tooth of the member 8 passes out from engagement with the holder said spring asserts itself to return the holder to normal position.

The tension of the spring 30 is sufficient to

give the holder a quick return movement, and during such return movement the post 28 strikes the arm 21 a sharp blow thereby instantly separating the contacts.

The movable contact 17 it will be noticed is at all times backed by a spring 22 which tends to force said movable contact toward the fixed contact and so long as the contacts are closed together they are held pressed against each other by the force of this spring 22, and this condition continues until they are instantly separated by the engagement of the pin 28 on the arm of the movable contact. The contacts are thus separated instantly from a condition in which they are firmly pressed together. I find from practice that by means of this construction wherein the contacts are instantly separated from a condition where they are held together by pressure of a spring a much hotter spark can be made especially if a non-vibrating coil were used than would be possible if the contacts were separated comparatively slowly.

70 is a spring which is confined in a recess in the post 31 and which forms a yielding stop for the holder as it returns to its initial position.

The parts of the timer are inclosed within a cap 34 which rests on and is supported by a metallic backing 35 having an operating arm 36 extending therefrom, and said cap is held in place by a nut 37 which is screwed on the upper end of the post 31.

The fixed portion of the casing 7 is provided with the hub 40 around which extends a contact ring 41 that is connected through an arm 42 with a terminal 43 to which a wire 60 of the secondary circuit is connected. Said portion 7 of the casing is also provided with the outer flange 44 that carries a plurality of terminals 45 to which the wires leading to the various spark plugs are connected.

Fast to the shaft 3 is a cup-shaped member 46 of insulating material which carries the contact 47 that is adapted to electrically connect the distributing ring 41 with the various terminals 45 as the shaft rotates. The contact 47, as herein shown, comprises a contact plate fastened on the outside of the flange of the cup-shaped member 46 and the pins 48 which extend through said flange and terminate adjacent to the distributing ring 41.

Each of the terminals 45 has at its inner end a contact plate 49, said contact plates being situated in the same horizontal plane as the contact piece 47. If desired the contact 47 may be arranged to wipe by the contact plates 49 although it is not essential that there be actual contact between these elements as the high-tension current generated in the secondary of the induction coil will cause the current to jump any slight

gap which might exist between the contacts. As the shaft and the cup member 46 are rotated the distributing ring 41 is put into electrical connection with the various contact plates 49 in succession through the medium of the contact 47 and pins 48 as will be obvious, and thus the current of the secondary will be distributed to the various spark plugs.

Since in a device of this character the current generated in the secondary has quite a high tension it is important that the contacts of the terminals leading to the spark plugs should be so thoroughly insulated from the distributing ring that there will be no liability of the current jumping across the gap between said ring and said contacts and thus becoming short circuited.

In many distributors it has been customary to place the distributing ring and the contacts for the terminals at different positions along the shaft, but this necessitates a rather large and cumbersome construction. In my improved device the distributing ring and the contact plates 49 are situated on opposite sides of the flange 50 of the cup member 46, and said flange operates to thoroughly insulate them from each other and to prevent any short-circuiting. By means of this construction it is possible to arrange the contact ring and terminals 45 in substantially the same horizontal plane without any danger of short-circuiting and thus the device can be made very compact.

The spark is advanced or retarded, as desired, by turning the portion 7 of the casing relative to the shaft. This may conveniently be done by a suitable connection secured to the arm 36. It will be noted, however, that the terminals 45 are carried by this fixed portion 7, and, therefore, any turning of said portion 37 relative to the shaft would result in bending the wires if they were connected to said terminals in the ordinary way. This constant bending of the wires at the terminals is a detriment because it is apt to cause the wire to break at the end of the insulation. To avoid this objection I use a special form of terminal which obviates the necessity of bending the wire as the portion 7 of the casing is turned to advance or retard the spark. As herein shown each terminal has swiveled to its outer end a head 51 having a wire-receiving aperture, 52 through which the end of the wire may be passed.

In connecting up the wires the ends 54 thereof are stripped of insulation 53, and said bared ends are passed through the apertures 52 and each wire may then be held in place either by a set screw 55 screw threaded into the head or by a drop of solder or in some other suitable way.

In wiring the device the end of the insulation is brought down firmly against the

head, as shown in Fig. 2, and because of the fact that each head is mounted to turn on its terminal the said heads will turn as the member 7 is swung about the shaft without bending the wires connected to the terminals.

The heads may be swiveled to the terminals in any suitable way, and as one convenient way I have shown them merely screw-threaded thereto so that they can freely turn thereon.

The parts are held together by means of the nut 60 on the tip 10 of the shaft 3, and the two parts of the distributor can be separated merely by removing said nut and withdrawing the portion 7 carrying the timer from the shaft.

The cap 34 is of advantage in that it incloses the parts of the timer and prevents them from becoming clogged or from becoming inoperative by the presence of dirt or other foreign matter. Said cap may be readily removed by simply removing nut 37.

Referring to Fig. 2, it will be seen that the cup-shaped member 46 is separated slightly from the flange 44 of the casing 7, this separation affording an air chamber in which currents of air are established by the rapid rotation of the member 46 sufficient to prevent the confined air from getting unduly warm. It appears to be a demonstrated fact that the resistance of an air gap is lessened if the air confined in the gap is heated, and if the air space between the casing 7 and cup-shaped member 46 were not open to the atmosphere, as shown, confined air might become heated sufficiently so that there would be a tendency for the current to short circuit between the distributing ring 41 and the various contact plates 49.

From the above it will be seen that my device is exceedingly compact and yet may be readily taken apart for inspection or repair. It also embodies some features with reference to mounting the movable contact which serve to produce a very fat spark.

I have not attempted herein to show all forms of my invention but have merely illustrated the preferred embodiment thereof.

Having fully described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. In a circuit breaker, the combination with a fixed contact, of a pivoted holder having side wings connected by a bridge, a post to which said holder is pivoted, a spring encircling the post and having engagement with the bridge, a movable contact carried by said spring, and means for operating the holder.

2. In a circuit breaker, the combination with a fixed contact, of a holder, a post on which said holder is pivoted, a spring encircling the post and having one end in

engagement with the holder, a movable contact supported by the other end of the spring, and means to operate said holder.

3. In a circuit breaker, the combination
5 with a fixed contact, of a pivoted holder, a spring supported independently of the holder and having one end engaged by the holder, a movable contact engaged by the other end of the spring, and means to
10 operate the holder and thereby give movement to the movable contact through said spring.

4. In a circuit breaker, the combination with a fixed electrical contact, of a pivoted
15 holder, a spring having two resilient arms, one of which bears continuously against the holder, a movable electrical contact supported by the spring and against which the spring bears, and means to move the
20 holder to cause the movable contact to engage the fixed contact.

5. In a circuit breaker, the combination with a fixed contact, of a pivoted holder, a post on which said holder is pivoted, a
25 spring encircling said post and provided with two branches, one of which has engagement with the holder, a movable contact carried by the other branch of said spring, and means for operating the holder.

30 6. In a circuit breaker, the combination with a fixed contact, of a pivoted holder, a post on which said holder is pivoted, a spring encircling said post and provided with two branches, one of which has
35 engagement with the holder, a movable contact carried by the other branch of said spring, and means for operating the holder, said holder having a stop for limiting the expanding movement of the spring.

40 7. In a circuit breaker, the combination with a split post, of a fixed contact member screw-threaded thereinto, means to clamp said contact member in adjusted position, a holder, a post to which said holder
45 is pivoted, a spring encircling said post, a movable contact carried by said spring, and means to operate the holder thereby to close the contacts together.

8. In a circuit breaker, the combination
50 with a fixed contact, of a movable contact, means to yieldingly support the movable contact to permit it to yield both in the direction of its movement toward the fixed

contact and transversely thereto, means for closing said contacts together, and auto- 55 matically-operative means to break the contacts with a hammer blow movement.

9. In a circuit breaker, the combination with a shaft, of a toothed contact-making member loosely mounted thereon, a movable 60 contact operated thereby, a resilient disk secured to the shaft, and a pin carried thereby and engaging said contact-making member.

10. In a circuit breaker, the combination 65 with a shaft, of a toothed contact-making member loosely mounted thereon, a resilient disk secured to said shaft to rotate therewith and carrying a projection extending parallel to said shaft and adapted to engage 70 the teeth of the contact member, and a movable contact operated by said member.

11. In a current-distributing device, a shaft, a cup-shaped member fast thereon, a casing having a hub and an annular flange 75 forming between them a recess to receive the edge of the flange of the cup-shaped member, a distributing ring on said hub, contacts on said annular flange, said contacts and distributing ring being separated 80 by the flange of the cup-shaped member, and a contact member on the flange of the cup-shaped member to electrically connect the ring to the other contacts.

12. In a current-distributing device, the 85 combination with a non-rotary casing formed with a central hub and with a peripheral flange concentric with said hub, of a current-conducting ring surrounding the hub, a shaft extending through the hub, a 90 cup-shaped rotary member fast to the shaft and having its flange or rim situated between the hub and the flange of the casing, a plurality of contacts situated in the flange of the casing, and a current-distributing 95 contact carried by the flange of the cup-shaped member and adapted to distribute the current from the current-conducting ring to the contacts.

In testimony whereof, I have signed my 100 name to this specification in the presence of two subscribing witnesses.

THOMAS H. McQUOWN.

Witnesses:

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