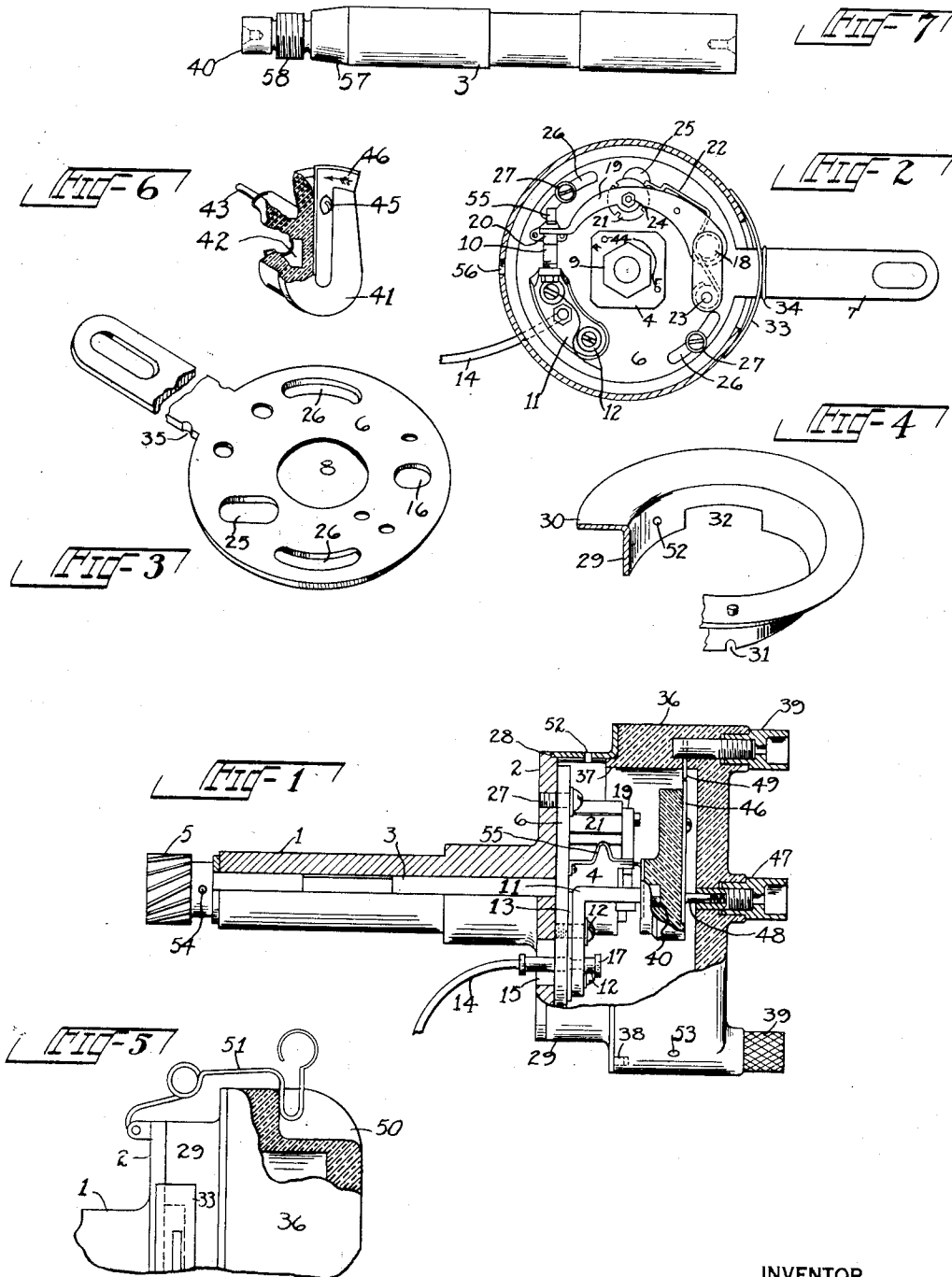


G. L. LANG.
 COMBINED TIMER AND DISTRIBUTER.
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INVENTOR
GEORGE L. LANG.
 BY *Albion D. Libby*
 ATTORNEY.

UNITED STATES PATENT OFFICE.

GEORGE L. LANG, OF NEWARK, NEW JERSEY, ASSIGNOR TO SPLITDORF ELECTRICAL COMPANY, OF NEWARK, NEW JERSEY.

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Specification of Letters Patent.

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Continuation in part of abandoned application Serial No. 133,950, filed November 28, 1916. This application filed September 17, 1918. Serial No. 254,510.

To whom it may concern:

Be it known that I, GEORGE L. LANG, a citizen of the United States, residing in Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Combined Timers and Distributers, of which the following is a clear and exact description.

My invention has to do with timer and distributor mechanisms in connection with systems wherein high and low tension circuits are employed, and wherein the timer device is adapted to periodically open and close the low tension circuit in accordance with the operation of certain elements of the system, while the distributor is arranged to cooperate with said timer in such a way that the currents induced in the high tension winding are distributed to the proper working circuit and in the proper time relation with the operation of the system. More specifically this invention relates to certain features of construction and operation in a mechanism in which there is combined in a single structure the timing and distributing devices ordinarily employed in the ignition systems for internal combustion engines. This application is a continuation of my application S. N. 133,950, filed November 28, 1916.

One of the objects is to provide a mechanism of the above class having its various parts so constructed and arranged as to render the operation of its working members, together with the adjustment of the several elements thereof, both of a simple and desirable nature. To the attainment of this end I have preferably mounted upon a supporting plate the several parts associated with the timer, such as a stationary and movable contact, a movable arm, and the cam actuated member. And in conjunction with this arrangement of timer parts I have also provided a novel means of housing said parts and supporting the distributor block, whereby all working members are inclosed and protected while in operation, yet in the necessity of repair and adjustment said working members may be readily exposed and made accessible to facilitate any such adjustment as may be required.

Inasmuch as I prefer to employ means for timing the circuit breaker consisting of a lever formed integrally with the supporting

plate for the timer members, and which lever is adapted to extend through an opening in the timer housing, it is another object of my invention to provide means whereby said opening is at all times completely covered to prevent the inroad of foreign substances, regardless of the position said lever may assume.

Another important feature which the present invention aims to secure is the provision of means whereby the inclosure within which the several members are contained may be properly ventilated in order to prevent the accumulation of those agents whose presence tends to rapidly depreciate the contact members of the mechanism.

These and other such objects as are contemplated by the present invention will become apparent to those skilled in the art from a study of the following description taken in connection with the accompanying drawing wherein like characters of reference designate like parts throughout the several views.

With respect to the drawing, Figure 1 is a longitudinal view, partly in section, of a timer and distributor mechanism constructed in accordance with my invention, with certain parts broken away in order to more clearly illustrate the relative arrangement of the working members.

Fig. 2 is a top plan view of the adjustable timer plate showing the arrangement of the timer members thereon.

Fig. 3 is a perspective view of the timer plate shown in Fig. 2 but with all of the timer parts removed.

Fig. 4 is a perspective showing of a housing member, a portion of which is broken away in the figure in order to show its form more clearly.

Fig. 5 is a fragmentary view of the distributor block and housing member showing the manner in which the same are mounted and secured in position, and

Fig. 6 is a perspective view of the distributor member, partly broken away, and illustrating the manner in which the distributor finger is attached.

Fig. 7 is a view of the shaft carrying the cam.

Coming now to the description of my mechanism, 1 is the main supporting member, of hollow formation, and flanged at one

end to form the plate 2. Within said supporting member is a rotatable shaft 3 which carries the cam 4 at one end thereof. At the other end of this shaft is a spiral gear 5 secured thereto by pin 54, and by means of which the device is operatively connected to any suitable member in the system to which it is applicable, such as to some member operated by an internal combustion engine. Mounted upon the said flange 2 is a member 6 which I shall term as the timer supporting plate, and having formed there-with an integral lever 7 by means of which the angularity of said timer plate, with respect to the cam 4, may be shifted at will in order to fulfil the requirements of the engine. In the plate 6 is a circular hole 8 which permits said plate in its assembly upon the supporting member 1 to pass on over shaft 3, which has a tapered end 57 with threads 58 cut thereon adjacent to the tapered portion 57 and a further reduced end 40 which will be hereinafter referred to. The cam 4 may then be placed upon the tapered end 57 of shaft 3 and secured in position for rotation therewith by means of a nut 9. Carried by this timer supporting plate 6 are the several elements which constitute the timer mechanism; said elements include a stationary contact 10 which is adjustably mounted upon the contact supporting member 11, secured upon the plate 6 by means of screws 12 and electrically insulated therefrom in any suitable manner as by a strip of fiber 13. This contact is electrically connected in the primary circuit of the battery ignition system. However, if desirable, my device may be used in connection with magneto ignition, in which case the said stationary contact would be likewise connected in series with the low tension circuit thereof. As seen in Figs. 1 and 2 such connection is accomplished by means of the wire 14 which passes through a hole 15 in the main supporting member 1 and the hole 16 in plate 6 to be connected to the contact support 11 as by means of a nut 17. Said hole 15 of the main supporting member is also of sufficient size to prevent any interference of the conductor 14 while the timer plate is being adjusted to its several advance and retard positions. Pivottally mounted upon said timer plate as by means of a stud 18 is a lever 19 which carries the movable contact 20, adapted to coöperate with said contact 10 in order to intermittently open and close the primary circuit. In order to effect this circuit interrupting process there is a member 21 secured to the lever 19 in such a way as to be actuated by the cam 4. This member 21 may be of any suitable wearing material and is so constructed as to be adjustable for the purpose of presenting a plurality of wearing surfaces to the action of said cam 4. Disposed

about the stud 18 is a spring 22 having one end fixed to the lever 19 and the other end secured to a stud 23 whereby its tension tends to constantly hold contacts 10 and 20 in their closed position. Wearing member 21 is secured upon the said lever by means of a bolt 24 the head of which bolt (not shown) is allowed to play back and forth, with the movement of said lever, in the aperture 25 of the timer supporting plate 6. Said plate 6 is also provided with two angular slots 26. Screws 27 pass through these slots and are threaded into the supporting member 1 to thereby hold said timer plate in its proper working position. Said slats are of sufficient arc to allow the timer plate to be adjusted to its several positions and they further serve as a limiting stop for the extreme advance and retard positions thereof. Also mounted upon plate 6 is a resilient element 55. This element 55 has its free end imposed in the path of oscillation of the lever 19 and coöperates therewith to maintain a uniform time period for the opening of the contacts 10 and 20. This feature is especially advantageous at high speeds of the cam 4 since said element 55 acts to overcome the inertia of the lever 19, and thereby eliminates the so called "mechanical lag" and its attendant results of improper timing. It will be understood that the movable contact 20 is suitably grounded in order to properly complete the primary circuit above mentioned.

The outer periphery of flange 2 is formed with an annular shoulder 28, around which shoulder is adapted to fit the ring 29. Said ring serves as a member to inclose and protect the working elements of my device, and has its upper end flanged outwardly at right angles as at 30, the purpose of which flange will presently be described. In the lower portion of member 29 is a notch 31 which is adapted to engage a suitable pin 56 projecting radially from the flange 2 whereby said ring 29 is held securely in place against the possibility of relative rotation with the support 1 due to excessive jar and vibration. At a point preferably opposite the notch 31 the housing ring 29 is cut away to form the elongated notch 32. This notch 32 serves as an opening through which the timer lever 7 is adapted to extend. In order to guard against the inroad of dirt and other foreign substances through said opening 32 I have provided a closing member 33 which is adapted to be mounted upon the lever 7 and secured in position by means of a resilient ring 34, which may be sprung into the notches 35 to thereby hold said member in place. In this position the closing member 33 presses against the exterior surface of ring 29 to keep the slot 32 completely closed throughout the entire range of movement of the lever 7.

Supported upon the housing ring 29 is a distributor block 36 which is of suitable insulating material, and is of cup-shape formation in order to cooperate with said housing ring to provide an inclosure for the various working elements. In its assembly said distributor block is adapted to rest upon the above mentioned flange 30 and is further provided with a depending flange 37 which cooperates with the inner wall of the ring 29 to hold said block in proper position. To further prevent the distributor block from becoming accidentally displaced with reference to the ring 29 there is also a pin and notch engagement between these two parts seen in dotted lines as at 38 in Fig. 1. In the embodiment shown there is seen to be a mechanism of the character described which is applicable to the ignition system of gas engines of the 4-cylinder type, and accordingly my distributor block is designed with four terminal posts 39 whereby the high tension current is directed in proper sequence to each of the engine cylinders. The cam actuating shaft 3 has its end reduced in diameter as at 40. The distributor member generally indicated by reference character 41 is provided with a circular aperture 42 which permits the same to be detachably mounted upon said reduced portion 40 of the shaft 3. On the underside of this distributor member is a metallic plate carrying a projecting pin 43 which is adapted to be inserted in either of the holes 44 of the cam 4 to lock the distributing member 41 for rotation with the cam shaft. It will be readily understood that for timing purposes the nut 9 carried on the threads 58 of shaft 3 is loosened and the cam 4 turned to the proper position and the nut 9 again turned in the proper direction to draw the cam 4 down on to the taper 57. It will also be observed that since the distributing member 41 is drivingly carried by the cam 4 that it will be adjusted in position along with the said cam. Secured to the upper portion of this distributor member, as by means of a screw 45, is the distributing finger 46. This finger is adapted, in its rotation, to convey high tension ignition current flowing from the post 47 to the spring pressed brush 48, to each of the contacts 49 and thence to the proper sparking device associated with each of the respective engine cylinders. While I have chosen to call the members 49, of which but one is shown, contact members, yet in reality the distributing finger 46 in its rotation does not make actual contact with these members. However, the clearance is so slight as to be negligible as far as the passage of current is concerned while by providing this clearance the unnecessary wearing of these elements is eliminated. Inasmuch as it is desirable that devices of this character shall be appli-

cable to be driven in either right or left hand direction, depending upon the manner in which they are associated with the engine, I have so designed my timer-distributor that this change of direction may be accomplished in a comparatively simple manner and without affecting the efficiency of its operation. For a given direction of rotation the distributing finger 46 is seen to be of sufficient arc to allow for complete adjustment of the timer plate. In order to adapt my structure for a different direction of rotation it is merely necessary to remove the screw 45 and invert the finger 46, at the same time removing the pin 43 from its position and inserting it in the other of said holes 44. That is, if it is desired to change my device from right to left hand rotation the finger 46 is inverted as described and distributor member 41 is moved relative to the shaft 3 so that the pin 43 may be inserted in hole 44 marked as L.

With particular reference to Fig. 5, there is shown here a method by which the several parts of the device are securely held in position. At convenient points as between the posts 39, the distributor head 36 is provided with slots 50. Cooperating with the shoulders at the bottom of these slots are resilient members 51, pivotally mounted on the flange 2 of the main supporting member. These members 51, when clamped in place, securely hold the distributor head 36 and the housing ring 29 in place against the flange 2. While but one of spring members 51 is shown it is evident that there may be any suitable number. By unclamping these spring members the distributor block 36 and the housing ring 29 may be quickly removed to freely expose the entire working structure of my device and in this manner the adjustment or repair of the various working elements is greatly facilitated.

I come now to an important feature of my invention. It is found that the repeated passage of electric sparks in confined spaces, as is the case in the ordinary timer distributor of this character, is usually attended with a more or less deleterious effect upon the sparking points. These injurious results are partially due to the fact that under the influence of the electric spark the nitrogen and oxygen present combine with each other to give the well known oxides of nitrogen, and since there is considerable moisture present, due to the temperature changes, these oxids readily combine with the moisture to give the corresponding acids. Such deteriorating agents, and especially the acids mentioned, tend to rapidly impair the metallic contact members. In order to avoid this difficulty I have provided a hole or air passage 52 in the ring 29. In the distributor block 36 and preferably at a point substantially opposite hole 52 is a second air

duct 53. In this manner a circulation of air is maintained within the housing of the device. The increased temperature together with the fanning effect produced by member 41 both tend to keep the air freely circulating through the ducts 52 and 53, and thereby preventing the accumulation of any substances which tend to depreciate and impair the contacts and other working members.

From the foregoing description it will be apparent that my invention is characterized by several novel and desirable features, all of which are instrumental in securing a more effective and efficient device of this character. Among these features is the manner in which I have mounted the several timer elements upon a single supporting plate having formed therewith an integral adjusting lever. By this means the time of the spark may be adjusted without any movement of the distributor head. This feature is especially made possible by the novel manner in which the distributor block is mounted relative to the other elements of the structure.

It is obvious that many changes and alterations may be made and I therefore do not desire to be limited to the exact details of construction and operation shown herein. Any such changes it is believed will come within the scope of the appended claims.

Having thus described my invention what I claim is:—

1. In a timer distributor, a main supporting plate, a shaft extending therethrough, a second plate adjustably mounted upon said supporting plate and having a timing lever formed integral therewith, a cam carried on said shaft, timer member carried on said second plate and cooperating with said cam, a distributing member having a driving connection with the shaft through said cam, a distributor head, having contacts to cooperate with the distributing member; an annular ring having a slot in the side thereof to receive said lever and resting upon the main supporting plate and carrying said head and means for engaging said head for holding both it and the ring to the main plate.

2. In a timer-distributor, a main supporting plate, a second plate adjustably mounted on said first plate, an annular ring detachably mounted upon said main plate and serving as a housing for said second plate, a slot in said ring, a lever extending through said slot and integral with said second plate and serving as a means whereby this plate may be rotatably adjusted relative to the main supporting plate, and means associated with said lever to cover said slot.

3. In a timer-distributor, a main supporting plate, timer members and a second plate for supporting said timer members, a distributor block, a housing member detachably

mounted upon the main supporting plate and having a slot therein, said distributor block being detachably mounted upon said housing member, a portion of said second plate extending through said slot whereby the timer members may be adjusted, and means exterior of said housing member for closing the said slot therein.

4. In a timer-distributor, a timer supporting plate having an integral adjusting lever, timer members mounted upon said plate, a shaft extending through said plate and carrying a cam adapted to actuate said timer members, a housing member having an aperture therein through which said lever extends for the purpose of rotating said plate relative to said shaft, resilient means detachably carried upon and actuated by said lever, resilient means for securing said first means in place, said first means being adapted to slidably engage the housing member to provide a closure for said aperture.

5. In a timer-distributor, a housing member, a plate within said housing with timer members thereon, a lever integral with said plate extending through an aperture in said housing for the purpose of adjusting said timer members, and means actuated by said lever to constantly maintain a closure for said aperture.

6. In a timer-distributor, a housing member, a plate within said housing with timer members thereon, an aperture in said housing and a portion of said plate extending therethrough whereby said plate may be revolved to adjust said timer members, a resilient member mounted upon said extending portion of the plate and engaging the surface of the housing member on either side of said aperture, whereby said aperture is covered at all times.

7. In a timer-distributor, a main support with a shaft extending therethrough, a supporting plate mounted upon said main support, timer members carried by the supporting plate, a cam on said shaft to actuate said timer members, a housing shell detachably mounted upon the main support, a distributor head detachably mounted upon the said housing shell, a distributor member carrying a distributing finger mounted upon said shaft and cooperating with the distributor head, an aperture in said shell and means extending therethrough to adjust said timer members, and means for adjusting the finger position to give forward and reverse rotation which involves an angular shift of both distributor member and its associated finger.

8. In a timer-distributor, a rotatable shaft having a cam thereon, a support for said shaft, a timer supporting plate with timer members thereon, said cam being adapted to actuate said timer members, a housing ring and a distributor block and a common means

for detachably securing the same in position upon the first said support, a distributing member carrying a distributor finger supported by said shaft and cooperating with the distributor block, means including said cam whereby the distributing member and distributor finger in its cooperation with said distributor block may be adapted for either direction of rotation of said shaft, said last means also serving to rotatably connect 10 the distributor member to said shaft.

In witness whereof, I affix my signature.

GEORGE L. LANG.