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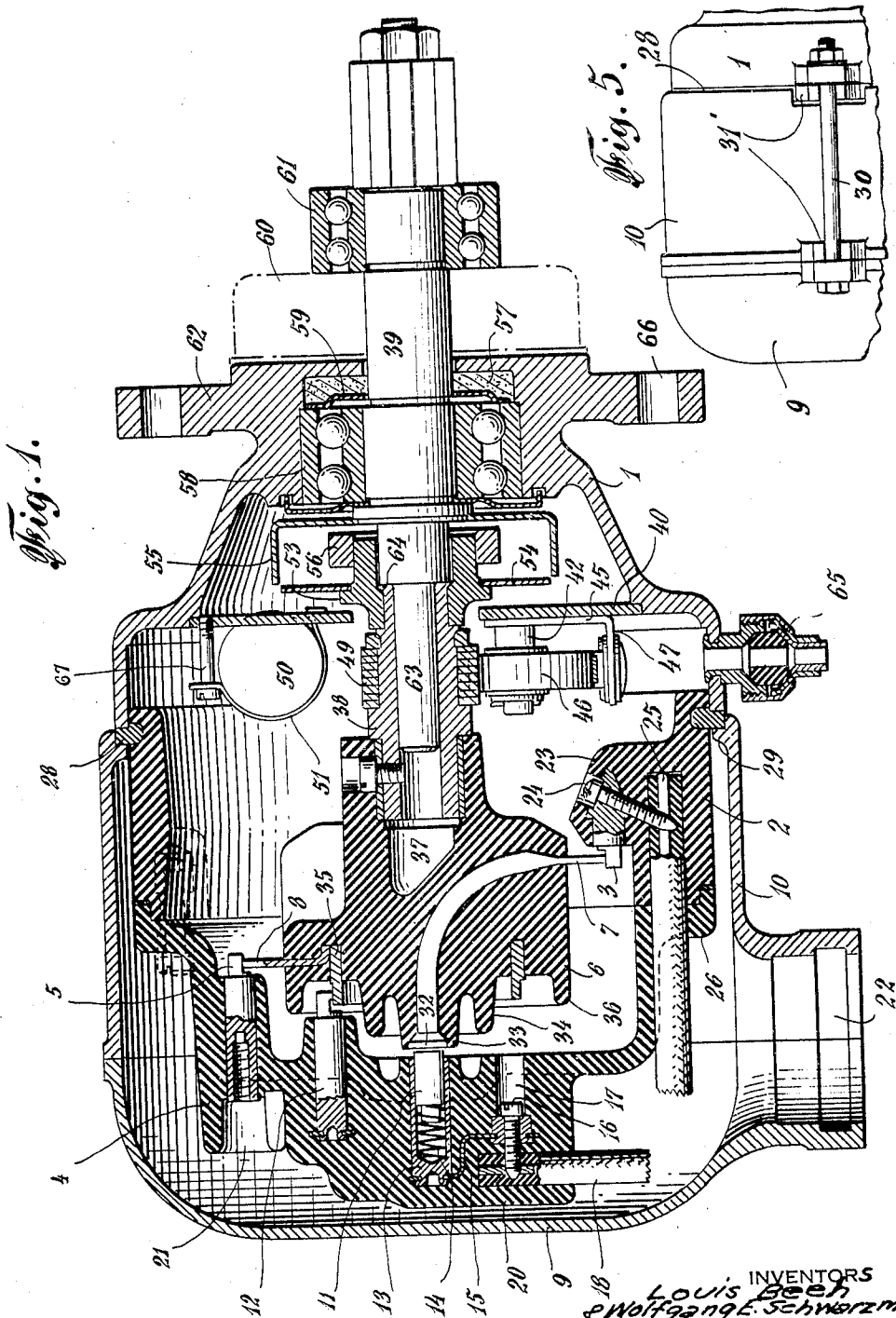
L. BEEH ET AL

1,935,610

TIMER FOR INTERNAL COMBUSTION ENGINES

Filed April 13, 1933

2 Sheets-Sheet 1



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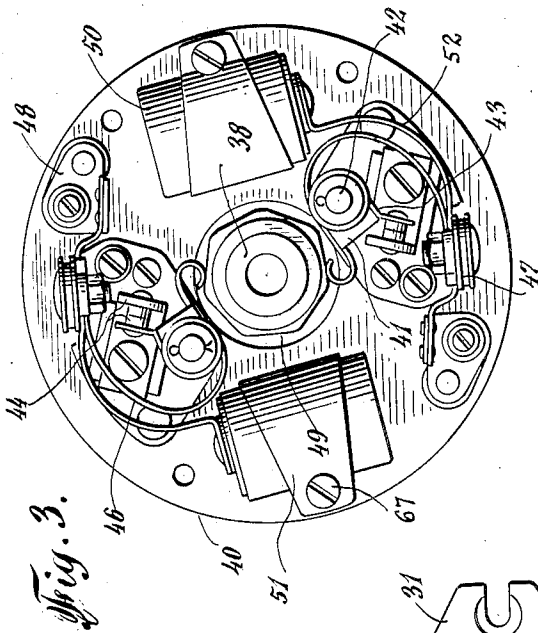
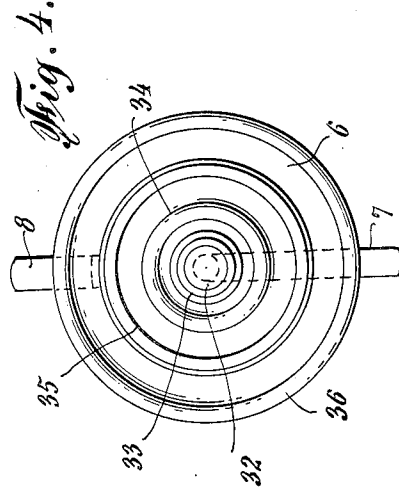
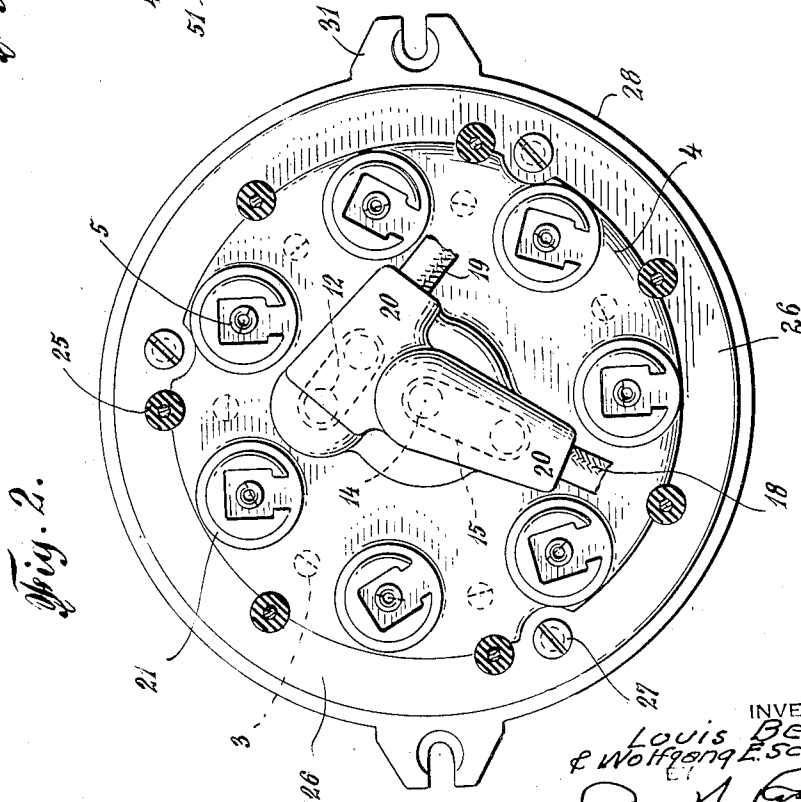
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TIMER FOR INTERNAL COMBUSTION ENGINES

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2 Sheets-Sheet 2



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TIMER FOR INTERNAL COMBUSTION ENGINES

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9 Claims. (Cl. 200—20)

Our invention relates to improvements in timers for internal combustion engines; and especially to a timer comprising a circuit breaker and distributor for the ignition circuits of engines for aircraft.

The timer described herein is of the same general construction as the timer of our copending application Serial No. 646,476, filed December 9, 1932; but the distributor is provided with two groups of terminals so that the timer can be used for engines with a larger number of cylinders. An object of this invention is to provide a timer of this type, compact and simple in form, but strong and durable and capable of rendering the most efficient service.

The nature, objects and advantages of this invention are fully set forth in the ensuing description and the novel features are pointed out in the appended claims. We reserve the right, however, to make changes in practice which do not depart from the principle of the invention or exceed the scope thereof.

On the drawings:

Fig. 1 is a longitudinal section of a timer according to this invention;

Fig. 2 is a front view of the distributor casing thereof;

Fig. 3 is a front elevation of the circuit breaker of the timer;

Fig. 4 is a front elevation of the rotor of the distributor;

Fig. 5 is a view showing the means for fastening the sections together.

On the drawings the same numerals identify the same parts throughout.

On Fig. 1 the numeral 1 indicates a cup-shaped housing in which the circuit breaker is mounted; this housing being closed at one end and open at the other to be joined at the open end with one section 2 of the distributor casing; this section being of insulation and carrying fixed high tension terminals 3 to be connected to the spark plugs. The section 2 is substantially cylindrical, and to its outer end is secured the cover or cap section 4 of the distributor casing, also of insulation, and carrying fixed high tension terminals 5. The rotor of the distributor, also of insulation, is shown at 6, inside the sections 2 and 4. Embedded in the rotor 6 are conductor elements or brushes 7 and 8 which turn with the rotor to cooperate with the terminals 3 and 5 respectively. The entire distributor casing is received in a suitable metallic shield consisting of a front section 9 and a rear section 10.

The section 4 of the distributor casing carries

a brush 11 which projects centrally from the inner surface thereof; and embedded in this section is another brush 12 that likewise projects from the inner surface to one side of the center. The brush or contact 11 is mounted in a conductive socket 13 which contains a spring 14 which tends to urge the contact 11 in an outward direction. The sleeve or socket 13 is united by a conductor 15, embedded in the section 4 and connected also by a screw 16, which is inserted into a bore 17 in the section 4 and opening through the inner face thereof, to the conductor of a high tension cable 18; the end of which is received in a suitable bore or recess which leads into the section 4 from the outside thereof. The screw 16 when tightened holds the end of this cable 18 in this recess and maintains connection of the cable to the brush 11. A similar cable 19 is similarly joined to the brush 12; and, as indicated particularly in Fig. 2, the outside of the cover section 4 has bosses 20 in which the recesses for the cables 18 and 19 are formed. The terminals 5 are accessible at their outer ends through bosses 21 in the outside face of the cover section 4 and these terminals may be shaped at their outer ends in any suitable manner to enable high tension conductors similar to cables 18 to be joined to the terminals 5. The shield comprising the sections 9 and 10 has an outlet neck 22 so that the ends of the necessary cables can be passed into the shield as required. The other terminals 3 carried by the section 2 are embedded in projections 23 inside of this section and are attached by screws 24 to conductors 25 which are similar to the cables 18 and 19 pass into similar recesses. These recesses extend into the rim of the section 2 and are continued out through a flange or collar 26 which forms the rim of the section 4. The cables which are connected to the terminals 3 and 5 of course run to the spark plugs, but the cables 18 and 19 are between the distributor and the source of high tension current.

The rim or shoulder 26 of the section 4 is perforated to pass screws 27 which enter bores in the section 2 and secure these two sections together. The section 2 has embedded in its outer surface an encircling ring 28 near one end which abuts the rim of the housing 1 and engages an inside rim or flange 29 on the section 10 of the shield. Hence when the sections 9 and 10 of the shield are made fast with the housing 1, the distributor casing is held securely in place within the shield. To affix the shield to the housing 1, we employ bolts and nuts 30 which engage per-

forated lugs 31 on the two sides of the section 9 and the housing 1. The section 10 and the ring 28 may have notched projections 31' which likewise receive bolts 30 so that the section 10 and the ring 28 are not permitted to rotate with reference to the other parts of the timer. The two sections of the shield and the casing of the distributor are thereby secured in the desired positions.

10 Embedded in the rotor 6 is a curved conductor 32, one end of which is disposed at the center of the rotor and is engaged by the brush 11 and the other end of which carries the moving terminal 7. The extremity of this conductor, which makes contact with the brush 11, is disposed in a central boss 33 carried by the rotor surrounded by a circular rib 34. A conductor ring 35 is also embedded in the front end of the distributor and this ring projects enough to make sliding contact with the adjacent end of the brush 12. The other moving terminal 8 carried by the rotor is connected to the ring 35 and projects from the side of the rotor so as to cooperate with the distributor terminals 5. Another ring 36 integral with the rotor 6 surround the conductor ring 35. The boss 33 and the rings 35 and 36 of insulation carried by the rotor 6 present large intervening outside surfaces between the conductor 32 and conductor 35 and between the ring 35 and the terminals 5; and the inside of the casing 4 is so shaped that the brush 12 is likewise mounted in an internally projecting boss carried by the section 4, so that a large extent of surface intervenes between this brush and the terminals 5. Thus creeping of current between the wrong terminals and risk of flashover are virtually eliminated.

The distributor rotor 6 has a recess 37 in its rear end to receive one end of a sleeve 38, this sleeve and the rotor 6 being secured together to turn the rotor. At 39 is a drive shaft of the timer which is mounted in a bearing in the closed end of the housing 1. Within the housing and secured against a circumferential shoulder is the plate 40 on which are mounted the contacts of the circuit breakers which are two in number. Each circuit breaker comprises an interrupter lever of insulation mounted on journals or pivot posts 42. Each interrupter lever 41 carries a strip of metal 43, one end of which carries a movable contact to engage and disengage a fixed contact supported on a member 44. The members 44 are attached to plates 45 secured to the plate 40 and at 46 are springs affixed to the interrupter levers 41 at one end and to upright projections 47 on the plates 45 at the other. At 48 on the breaker plate 40 are binding posts connected to the projections 47. One end of each metallic strip 43 bears upon a cam 49 rigidly mounted upon the sleeve 38. Normally the springs 46 actuate the interrupter levers so that the contacts which they carry on the ends remote from the cam engage the fixed contacts on the members 44, but when the projections on the cam strike the adjacent ends of the strips 43 the movable contacts of the interrupter levers are separated from the fixed contacts.

Preferably the plates 45 with their projections 47 and the binding posts 48 are insulated from the plate 40; while the members 44 carrying the fixed contacts are in electrical connection with the plate 40. Therefore the current of the low tension winding of an ignition coil reaching either binding post 48 will flow through the projection 47, spring 46 and strip 43 to the fixed contact and back to the source by way of ground. But

when the cam 49 moves either interrupter lever, the fixed and movable contacts will be separated and the circuit broken so as to produce sparks at the proper points in the engine cycle.

On the interrupter plate 40 are two condensers 50 held fast by the clips 51 and suitable screws 67. These condensers are grounded at one terminal and the other terminal is united by means of a metallic conductor 52 to the projections 47 so that each of these condensers will be in parallel with the adjacent pair of circuit breaker contacts.

The plate 40 is open at the middle and the sleeve 38 projects through said opening and carries rigid thereon between the plate 40 and the closed end of the housing 1 a fixed head 53 bearing a fixed plate 54. On the shaft 39 is a fixed cup-shaped member 55 which is joined to the plate 54 by governor members indicated diagrammatically at 56. Hence this governor lies between the plate 54 and member 55 and serves to change the angular relation of the sleeve 38 and cam 49 to the shaft 39. The closed end of the housing is counter-bored to provide a bearing for the shaft 39 and this bearing contains a gasket 57 and anti-friction elements 58 between which and the gasket is a washer 59. At 60 is diagrammatically indicated part of the engine framework to support the housing and this part may carry another anti-friction bearing 61 for the end of the shaft which is connected to the engine. The housing also has a flange or collar 62 at its closed end to enable the housing to be affixed in position.

The inner end of the shaft 39 is reduced at 63 to fit inside the sleeve 38, and the head 53 is affixed to the sleeve 38 by expanding the adjacent end of the sleeve as indicated at 64. At 65 is a nipple carried by the housing 1 through which the low tension conductors can be passed to fasten their inner ends to the binding posts 48.

The operation of course is as usual because when the shaft 39 turns the cam 49, the circuit breakers break the low tension circuit periodically; and whenever the low tension circuit is interrupted, one or the other of the brushes 7 and 8 is in position for high tension current to flow to one of the spark plugs in the engine and ignite the charge therein.

The flange 62 may have slots 66 to enable the housing to be adjustably mounted by means of bolts passing through this flange.

In practice the device is preferably used with two ignition coils, the primaries thereof being connected separately to the two circuit breakers and the secondary windings to the cables 18 and 19 to supply the two groups of high tension terminals 3 and 5. These two groups, as shown in Fig. 1, are in different transverse planes, but one extends toward the other in the direction of the axis of the rotor 6.

Having described the invention, what is claimed is:

1. A timer comprising a housing, a distributor casing mounted on said housing, said casing comprising a section engaging the rim of the housing and a cover section therefor, a group of high tension terminals carried by each of said sections, the terminals of the two groups extending in substantially opposite directions, a rotor in the casing, and a brush carried by the rotor for each of said groups of terminals.

2. A timer comprising a housing, a distributor casing engaging the rim of said housing, said casing comprising a pair of sections, a group of high tension terminals carried by each section,

the terminals of the two groups extending in substantially opposite directions, a rotor in the casing, and a brush carried by the rotor to cooperate with each of said groups, said terminals all extending in the direction of the axis of the rotor.

3. A timer comprising a housing, a distributor casing on the housing, a plurality of groups of high tension terminals mounted in the housing, and a rotor having brushes to cooperate with said groups of terminals, said groups being mounted in different transverse planes but all extending in the direction of the axis of the rotor.

4. A timer comprising a housing, a distributor casing mounted on the housing, said casing containing two groups of high tension terminals, each group extending in substantially opposite directions, a rotor in the casing having a brush to cooperate with the terminals of one group, and a conductor embedded in the rotor and connected to said brush at one end and exposed through the middle of the front of the rotor at the other, a fixed contact engaging said conductor, means embedded in said casing to connect said contact to a source of high tension current, a conductor ring embedded in the front of said rotor, a brush carried by the rotor connected to said ring, to cooperate with the other group of terminals, another contact carried by the casing to engage said ring, and means embedded in the casing to connect said last-named contact to a source of high tension current.

5. A timer comprising a housing, a distributor casing of insulation connected to the housing, said casing comprising a cylindrical section and a cover section, the cylindrical section having insulating projections inside and high tension terminals mounted in said projections, a plurality of high tension terminals mounted in the cover section, the terminals of the first-named section extending towards the plane of the terminals of the cover section, a rotor in the distributor casing and brushes carried by the rotor to cooperate with each group of terminals.

6. A timer comprising a housing, a distributor

casing secured to said housing, said casing comprising a cylindrical section and a cover section having a rim fitting upon the cylindrical section, means extending through said rim to attach the two sections together, high tension terminals embedded in each of said sections, a rotor having brushes to cooperate with said terminals, means carried by the cover section and the rotor for conveying high tension current to each of the brushes, and means carried by each section to connect the terminals to the igniters of an engine, part of said means extending through the rim of the cover section and united to the terminals of the cylindrical section.

7. A timer comprising a housing, a distributor casing on the housing, said casing having an external shoulder between its ends, high tension terminals in the casing, means for connecting said terminals to the igniters of an engine, part of said means emerging through said shoulder, and a rotor in the casing carrying one or more brushes to cooperate with said terminals.

8. A timer comprising a housing, a distributor casing of insulation on the housing, said casing having a rotor therein bearing a high tension terminal, the casing having one or more insulating projections on the inside thereof, a fixed high tension terminal in each of said projections, a conductor received in the wall of said casing and extending to the outside thereof and means in each of said projections engaging each fixed terminal and the conductor to hold same in position.

9. A timer comprising a housing, a distributor casing of insulation on the housing, a rotor in the casing carrying a movable terminal, the casing having one or more inside projections, a fixed terminal on each of said projections, the casing having a conductor in the wall thereof adjacent each projection and a screw passing through the terminal in each projection and engaging the inner end of the conductor to connect the latter and secure them in position.

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