

July 16, 1935.

L. B. EHRLICH ET AL

2,008,492

ENGINE IGNITION TIMER

Filed May 22, 1930

2 Sheets-Sheet 1

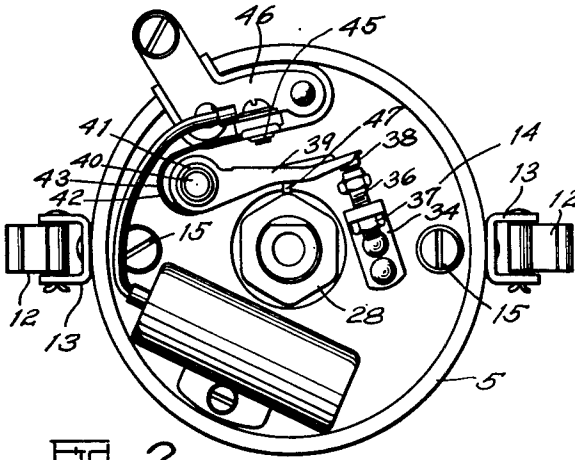


FIG-2

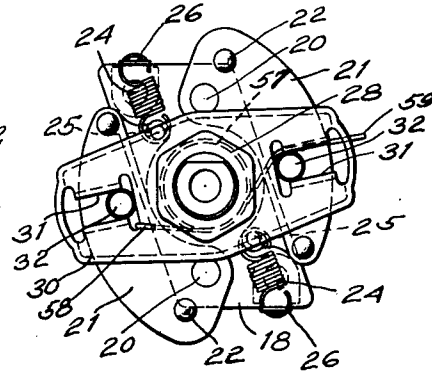


FIG-4

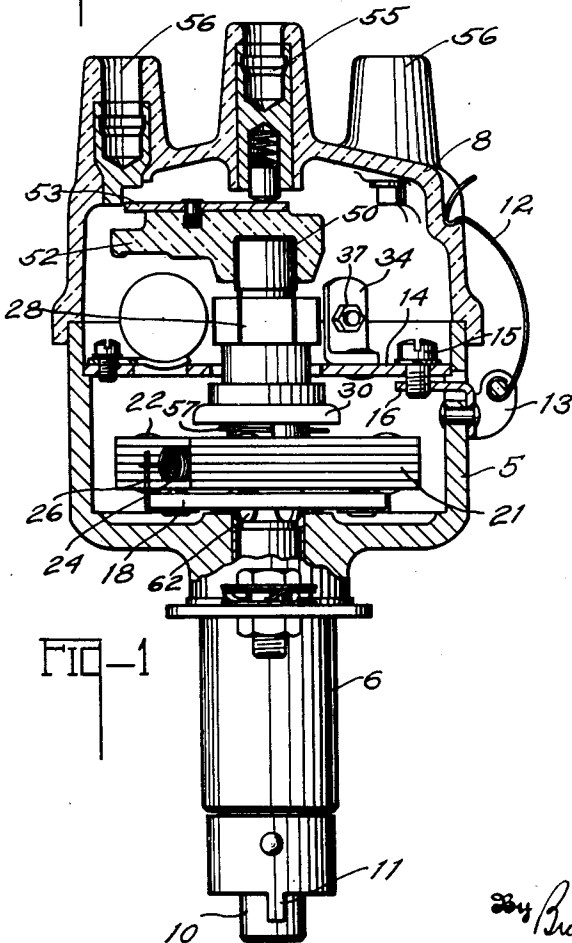


FIG-1

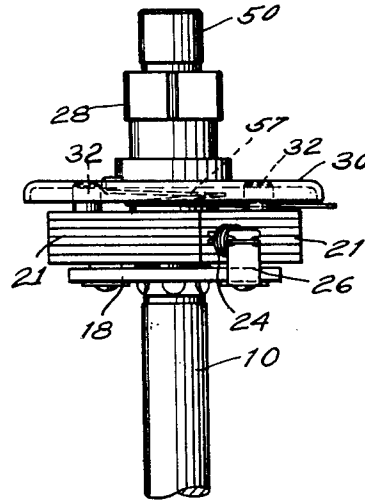


FIG-3

Inventors
Louis B. Ehrlich
William G. Schneider

By *Braseltton, Whitcomb & Davis*
Attorneys

July 16, 1935.

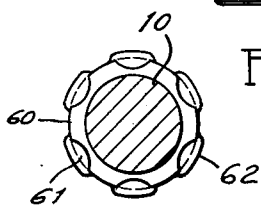
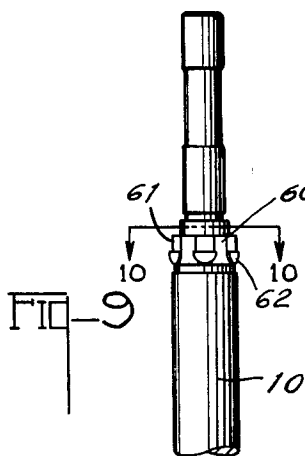
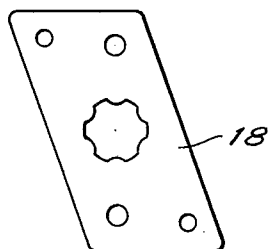
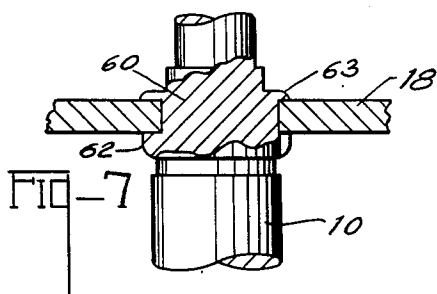
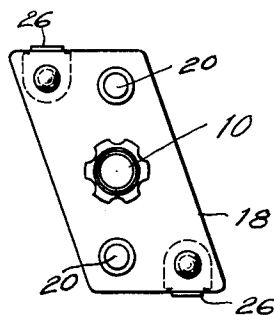
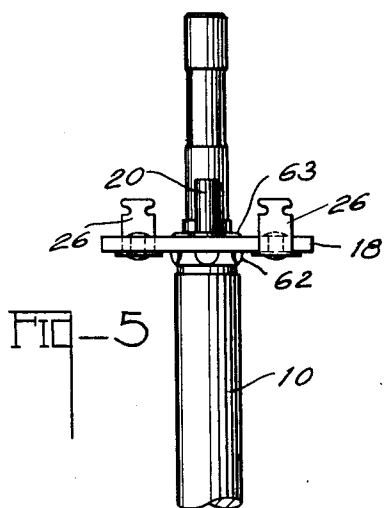
L. B. EHRLICH ET AL

2,008,492

ENGINE IGNITION TIMER

Filed May 22, 1930

2 Sheets-Sheet 2



Inventors
Louis B. Ehrlich
William G. Schneider

By *Braseltton, Whitcomb & Davies*

Attorneys.

UNITED STATES PATENT OFFICE

2,008,492

ENGINE IGNITION TIMER

Louis B. Ehrlich, Toledo, and William G. Schneider, Maumee, Ohio, assignors to The Electric Auto-Lite Company, Toledo, Ohio, a corporation of Ohio

Application May 22, 1930, Serial No. 454,665

13 Claims. (Cl. 200—19)

This invention relates to ignition devices for use with internal combustion engines and more particularly to a combined timing and distributing mechanism employed in an ignition system for timing and distributing the ignition current for such an engine.

The invention contemplates the provision of an improved device of this character in which the time of occurrence of the ignition sparks may be manually or automatically advanced in accordance with the varying speed of an engine with which it may be used, the invention particularly embracing a simple construction of a governor control mechanism having a number of parts fabricated of metallic sheet material.

The invention further embraces the incorporation of suitable flexible means for connecting movable parts of the governor mechanism as to eliminate lost motion and aid in balancing uneven forces acting upon the parts and thus decrease noises during the operation of the device.

Still another object is the provision of simple and improved means for fixedly securing elements to a shaft so as to materially reduce the cost of manufacturing and at the same time producing a rigid and unitary structure.

Further objects and advantages are within the scope of this invention such as relate to the arrangement, operation and function of the related elements of the structure, to various details of construction and to combinations of parts, elements per se, and to economies of manufacture and numerous other features as will be apparent from a consideration of the specification and drawings of a form of the invention. To illustrate a practical application of the invention we have shown a timer and distributor and a governor mechanism used in connection therewith. The timer selected as an example is shown in the accompanying drawings and described hereinafter.

Figure 1 is a vertical sectional view of the timing and distributing device of our invention, certain parts being shown in full;

Figure 2 is a plan view of the mechanism shown in Figure 1 with the cap removed;

Figure 3 is a view showing the assembly of the automatic governor control mechanism;

Figure 4 is a top plan view of the parts shown in Figure 3;

Figure 5 is a fragmentary view showing a portion of the governor shaft and a supporting plate secured thereto;

Figure 6 is a top plan view of the parts shown in Figure 5;

Figure 7 is an enlarged fragmentary detail par-

tial sectional view showing the method of securing the governor supporting plate to the shaft;

Figure 8 is a plan view of the governor supporting plate per se;

Figure 9 is an elevational view showing a portion of the governor shaft;

Figure 10 is a detail sectional view through the governor shaft taken on the line 10—10 of Figure 9;

Figure 11 is a detail view of the lost motion eliminating means forming a part of our invention.

Referring to the drawings in detail, the operative parts of the combined timing and distributing mechanism of our invention are suitably enclosed within a cup-like housing 5 having a downwardly extending portion 6, the cup-like portion of the housing 5 supporting a distributing cap or cover 8, the housing 5 being preferably supported by means of the portion 6 which is adapted to be carried by a part of an engine mechanism (not shown), with which the device may be used. The portion 6 also affords an elongated bearing surface for a drive shaft 10, the latter being provided with a suitable means 11 for establishing a driving connection with an engine with which our device may be used. The distributor cap 8 is preferably fabricated by suitable insulating material and is detachably mounted upon the casing 5 being secured thereto by means of a pair of resilient clips 12 pivoted upon brackets 13 secured to the housing 5.

The housing 5 is separated into 2 compartments by means of a plate 14, the plate being held in place by a pair of screws 15, the latter being threaded into projections 16 forming parts of the brackets 13. The brackets 13 serve a dual purpose of providing a securing means for the plate 14 and supports for the resilient clips 12. The shaft 10 is adapted to fixedly carry a support or plate 18. The method and means of securing support 18 to shaft 10 will be hereinafter explained in detail. The plate is provided with pins 20 forming pivotal supports for governor weights 21, each weight being formed of a plurality of metallic laminations which are held together by means of rivets 22. These weights are normally held at their innermost or normal positions by means of contractile springs 24, the inner ends of the springs being looped over pins 25 carried by the weights, the outer ends being secured to clips 26 riveted or otherwise fastened to the support 18. The upper end of shaft 10 loosely receives a cam member 28 to which is secured a transversely extending flanged plate 30, the latter having slots

31 into which project pins 32 carried by the governor weights 21. The slots in the plate 30 are so arranged that outward movement of the weights 21 cause the pins 32 to traverse the slots and at the same time rotate the cam member 28 relative to the shaft 10, the purpose of which will be hereinafter explained.

The interrupter contacts are supported upon the plate 14 the latter carrying an L-shaped bracket 34 having a threaded opening adapted to receive the threaded end of a relatively stationary contact member, the latter being adjustable and capable of being locked in adjusted position by means of a lock nut 37. The contact 36 is adapted for engagement with a contact 38 supported upon one end of an arm 39 pivoted upon a pin 40 also supported by the plate 14. The arm 39 is suitably insulated from the pin 40 by means of an insulating member 41, the arm being urged toward the contact member 36 by means of a spring 42 and a current conducting member 43, one end of these members being secured to the arm 39 in the manner not shown, the other ends being fixedly secured by means of a screw 45 to a terminal member 46 suitably insulated from the plate 14. The breaker arm 39 is provided with a suitable lug or cam follower 47 preferably of insulating material which is adapted to be intermittently engaged by the lobes of the polygonal shaped cam member 28 in a manner particularly illustrated in Figure 1. Obviously each lobe of the cam engaging the lug 47 causes the contact 38 to be separated from the stationary contact 36, this separation acting to interrupt the primary circuit in the usual well known manner.

Mounted upon an extension 50 forming a part of the cam member 28 is a current distributing member 52 preferably fabricated of insulating material and carrying a current distributing member 53. The high tension connection from the usual ignition coil (not shown) is brought to the center terminal 55 from whence the current is distributed through the member 53 to the several terminals 56 corresponding in number to the cylinders of the internal combustion engine with which my device may be used.

The method and means of securing a governor supporting plate 18 to the shaft 10 will now be described. This means is particularly illustrated in Figures 7 to 10 inclusive wherein the shaft 10 is provided with a cylindrical shoulder portion 60, the shoulder portion being preferably formed with arcuate indentations or feather splines 61, this operation being preferably performed by means of a tool (not shown) adapted to be brought into engagement with the shouldered portion of the shaft 10. The tool travelling longitudinally with the shaft forms the indentations or depressions 61 and at the same time carries the severed metal to form a plurality of projections or shoulders 62 adjacent the terminus of the depressions 61 as particularly illustrated in Figures 9 and 10. The plate 18 is formed with an opening which is complementary to the exterior periphery of the recessed portion and which is adapted to be snugly received thereon, the plate being positioned against projections 62 as shown in Figure 7.

Obviously the irregular contour of the connection between the plate 18 and shaft 10 prevents any relative movement between these parts. A portion of the shoulder 60 which projects above the plate 18 is then swaged or ring-staked as illustrated at 63 thus fixedly securing the plate 18 upon the shaft 10.

In the operation of a governor controlled igni-

tion system the intermittent actuation of the breaker arm by the cam lobes causes a "hunting" action of the governor mechanism because of the unbalanced forces set up when the cam lobes come into contact with the breaker arm and in leaving the same. Moreover this sets up a hammering action causing excessive noise in the governor and cam advancing mechanism. In order to eliminate these difficulties we have provided in the device of our invention a resilient member 57 one end of which is provided with a hook 58 which embraces an end portion of the slot 41, the member encircling the shaft 10 and having its other end terminating in a rectilinear portion 59 which is adapted for engagement with one of the pins 32 secured to one of the governor weights 21 as illustrated in Figures 4 and 11. In the form shown it will be obvious that the portion 59 of the resilient member 57 always urges the pin 32 engaged thereby toward a clockwise direction while the hook portion 58 engaging the plate 30 urges the latter in a counter-clockwise direction. By this means it will be apparent that any lost motion existing between the plate 30 and the pins 32 will be taken up or absorbed so that the uneven torque or "hunting" action is eliminated as well as any noises caused thereby.

In the operation of our device it will be obvious from the foregoing description that the shaft 10 being rotated in synchronism with an internal combustion engine of which our device is adapted to be used, rotation of the shaft carrying with it the cam 28 which operates to intermittently break the primary circuit through the interrupter contacts 36 and 38, the secondary current being suitably distributed by means of the conductor 53, carried by the distributor arm 52. As the speed of the engine increases, the governor weights 21 tend to pivot outwardly about the pins 20 and the pins 32 traversing the slots 31 in the plate 30 causes the cam member 28 to be proportionately advanced in accordance with the engine speed so as to correspondingly advance the time of firing the charges in the cylinders of the engine. As the weights 21 move outwardly dependent upon variation of speed, the resilient member 57 will absorb any lost motion between the moving parts so as to prevent noises arising from operation of the movement of parts. In order to modify the rate of spark advance of the device, the contour and shape of the slots 31 may be changed to vary the rate and amount of movement of the cam member 28 relative to the shaft 10.

It is apparent that, within the scope of the invention modifications and different arrangements may be made other than is herein disclosed, and the present disclosure is illustrative merely, the invention comprehending all variations thereof.

What we claim is:

1. A governing device for ignition means of an internal combustion engine, the combination of a cam member; a relatively movable weight; guiding means for said weight cooperating with said cam member; and resilient means interposed between said weight and said guiding member for eliminating lost motion between the parts.

2. A governing device for ignition means of an internal combustion engine, the combination of a cam member; a pivotally mounted weight; guiding means for said weight fixedly secured to said cam member; and resilient means engageable with said weight and said guiding means for eliminating lost motion between the parts.

3. A governing device for ignition means of an internal combustion engine, the combination of a cam member; a pivotally mounted weight; a slotted guiding member for said weight fixedly secured to said cam member; resilient means normally opposing movement of said weight; and a second resilient member connected to said guiding means and adapted for engagement with said weight for eliminating lost motion between the parts.

4. A governing device for ignition means of an internal combustion engine, the combination of a shaft; a support fixedly secured to said shaft; a cam member carried by said shaft and capable of movement relative thereto; a weight pivotally carried by said support; means connecting said weight with said cam member whereby movement of said weight causes relative rotation of the cam with respect to said shaft; and a resilient member interposed between said weight and said cam member for eliminating lost motion between the parts.

5. In combination, a member having a portion of non-circular cross-section, said portion having a recess terminating in a projection; a second member having an opening of a contour corresponding substantially to said non-circular portion, said second member adapted to be snugly received upon said first member; said projections forming stop means for limiting relative movement of one member with respect to the other and means on the non-circular portion adapted to embrace and fixedly secure said members together.

6. In combination, a shaft having a plurality of recesses and radial projections integrally formed thereon constituting a mutilated positioning flange; a member having an opening of a contour mating with said recesses; and means formed on said shaft whereby said shaft and member are held in fixed relation against said mutilated flange.

7. In combination, a member having recesses terminating in projections integrally formed thereon forming a plate positioning flange; a plate having an opening of a contour corresponding substantially to said recesses, said plate being secured upon said member by distorting a portion of said member.

8. In combination, a member having recesses terminating in radial projections integrally formed thereon forming a mutilated positioning flange; a second member having an opening of a contour mating with said recesses, said second member embracing said first member; and means formed on one of said members to fixedly secure said members together.

9. The method of making a joint between two members which consists in forming on one of the members an irregularly projecting flange by displacing portions of the metal of its periphery to produce recesses terminating into projections; of forming another member with an opening which conforms to the recessed portions of the first member; of passing one member through the opening of the other so that movement in one direction is stopped by the engagement of

one member with projections formed on the other; and of distorting a portion of the first mentioned member into engagement with a face of the second member to fixedly retain the members together.

10. The method of making a joint between metallic members which consists in indenting the outer surface of one member; of carrying the indented metal to form spaced shoulders; of forming another member with an opening having projections which correspond to the indentations formed on the first member; of passing one member through the opening of the other causing the engagement of the spaced shoulders with the surface of the second member for stopping the movement of said members toward each other; and of swaging the portion adjacent to the indentations of the first mentioned member into engagement with the surface of the second member for retaining the members in fixed relationship.

11. A method of producing a joint between metallic members which consists in forming a plurality of projections at the periphery of one member by indenting and simultaneously moving the severed metal, thus producing longitudinal recesses terminating into projections; of forming another member with an opening of a contour which corresponds to recessed portions of the first member; of placing the recessed portion of one member into the opening of the other member so that one side of said member is stopped by its engagement with the integrally formed projections; of swaging the peripheral portions adjacent to the recesses into engagement with the surface of the other member whereby rotary and longitudinal movement between the members is prevented.

12. In combination a metal shaft of substantially circular cross-section having a plurality of peripheral longitudinal recesses, the termini of which form radial projections extending beyond the diameter of the recessed portions of said shaft; a plate having an opening of a contour mating with the recessed portions of said shaft, said radial projections adapted to engage one face of said plate for defining the position of said plate with respect to said shaft, a portion of said shaft being swaged to engage the other face of said plate to hold the parts in fixed relationship.

13. In combination a metal shaft having longitudinally recessed portions, said shaft being formed with a plurality of integral radial projections formed of displaced metal forming the recessed portions of said shaft, the faces of said projections lying in a common plane at right angles to the axis of said shaft; a plate having an opening of a contour mating with the recessed portion of said shaft, said radial projections adapted to engage one face of said plate for defining the position of said plate with respect to said shaft, a portion of said shaft being swaged to engage the other face of said plate to hold the parts in fixed relationship.

LOUIS B. EHRLICH.

WILLIAM G. SCHNEIDER.