

Feb. 26, 1924.

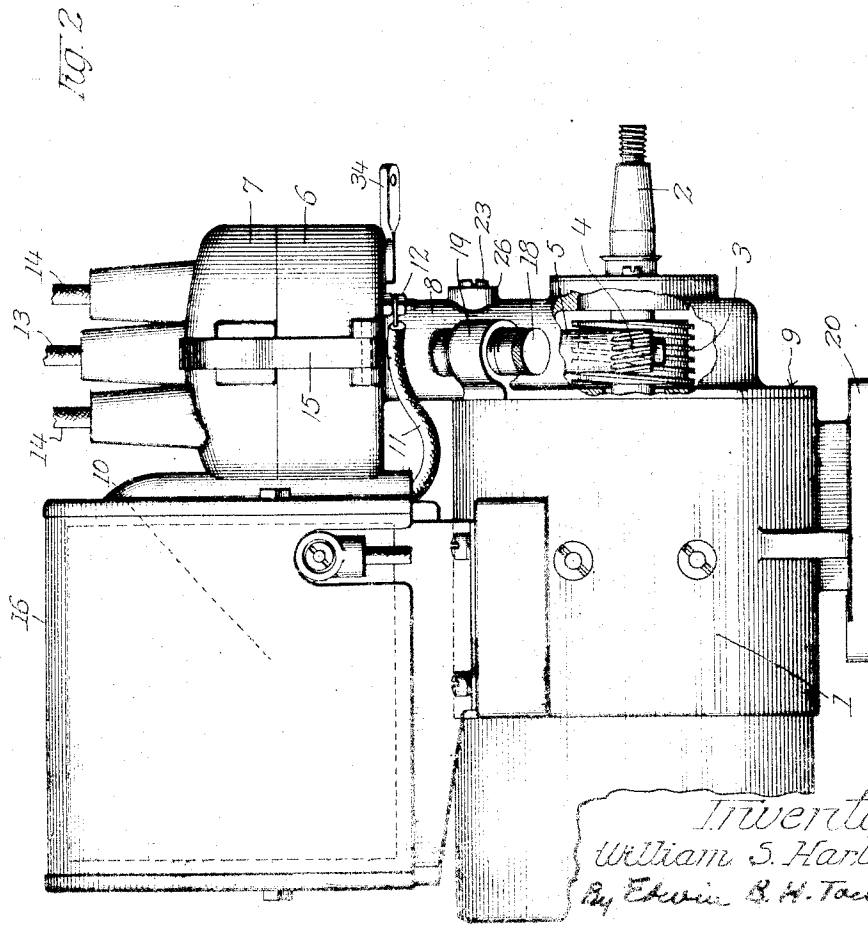
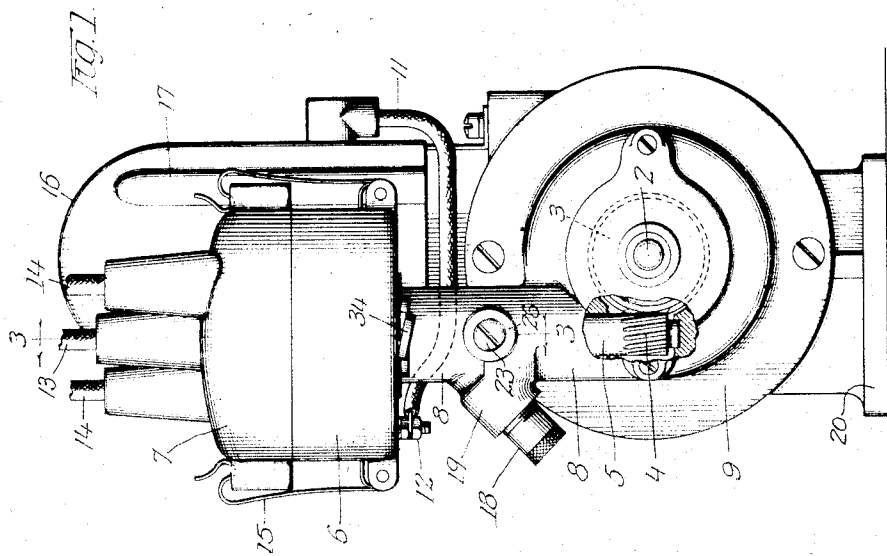
1,485,353

W. S. HARLEY

IGNITION APPARATUS

Filed Nov. 1, 1919

2 Sheets-Sheet 1



Inventor
William S. Harley
By Edwin B. H. Tamm, Jr.
Attorney

Feb. 26, 1924.

1,485,353

W. S. HARLEY

IGNITION APPARATUS

Filed Nov. 1, 1919

2 Sheets-Sheet 2

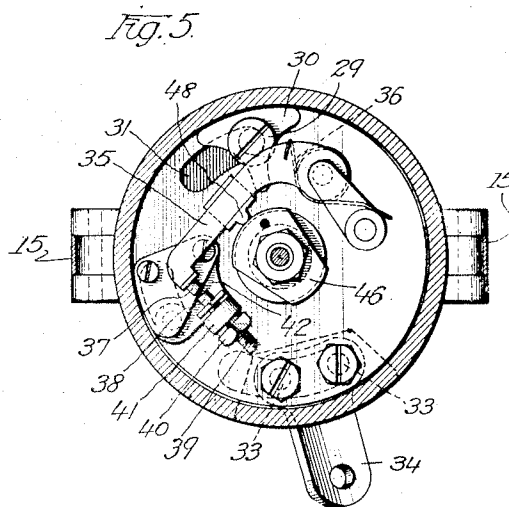
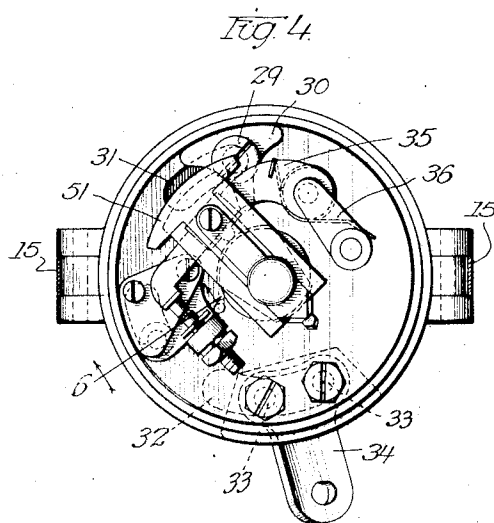
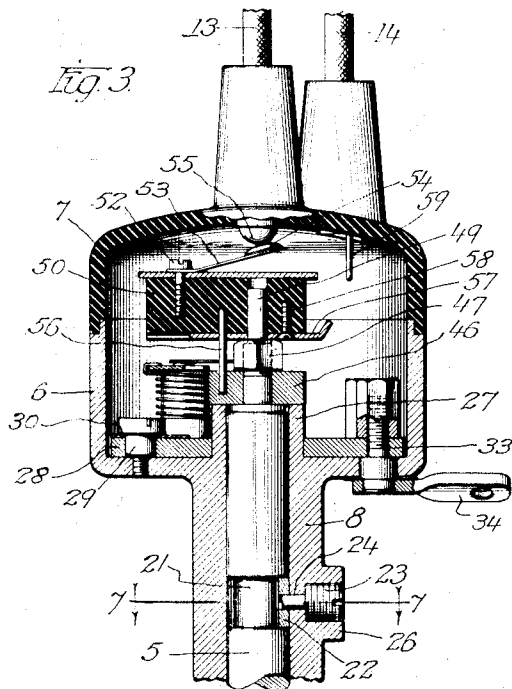


Fig. 7

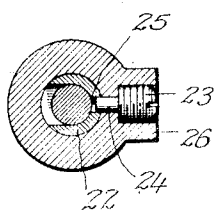


Fig. 6

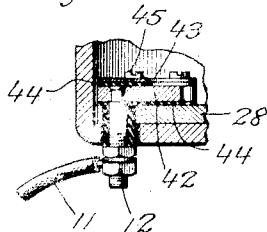
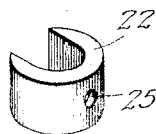


Fig. 8



Inventor
William S. Harley
By Edwin B. N. Tower Jr. Atty.

UNITED STATES PATENT OFFICE.

WILLIAM S. HARLEY, OF MILWAUKEE, WISCONSIN, ASSIGNOR TO HARLEY-DAVIDSON MOTOR CO., OF MILWAUKEE, WISCONSIN, A CORPORATION OF WISCONSIN.

IGNITION APPARATUS.

Application filed November 1, 1919. Serial No. 335,003.

To all whom it may concern:

Be it known that I, WILLIAM S. HARLEY, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented new and useful Improvements in Ignition Apparatus, of which the following is a specification.

This invention relates to ignition apparatus.

10 An object of this invention is to provide a unitary structure embodying the main elements of the ignition apparatus.

A further object is to provide a casing for the timer and distributor which forms an integral part of the generator.

A further object is to provide a timer with a connection to a generator, permitting the removal of the distributor shaft and the arm thereon as a unit from the timer casing.

20 A further object is to provide an efficient means for securing a timer shaft in a casing to permit rotary motion and prevent longitudinal movement.

A further object is to provide an efficient means for releasably securing a timer shaft in a casing to permit rotary motion and prevent longitudinal movement.

A further object is to provide an efficient means for securing a timer shaft against longitudinal movement and for releasing said shaft at will.

A further object is to provide a timer and distributor which are easily accessible.

A further object is to provide an ignition apparatus of simple and durable construction.

Other objects will appear.

The views of the drawings are as follows:

Figure 1 is a front elevation partly in section of the ignition apparatus.

Figure 2 is a side elevation of the ignition apparatus.

Figure 3 is a section on the line 3—3 of Fig. 1 showing the timer and distributor mechanism.

Figure 4 is a plan view of the timer and distributor mechanism with the cap removed.

Figure 5 is a view similar to Fig. 4 with the distributor removed.

Figure 6 is a section on the line 6—6 of Fig. 4.

Figure 7 is a section on the line 7—7 of Fig. 3.

Fig. 8 is a detail of the shaft retaining collar.

Figs. 1 and 2 show the assembled apparatus and will first be described. The low tension generator 1 is driven from the engine through a suitable train of gears or similar mechanism by means of a shaft 2 at one and one-half times the engine speed. Rigidly mounted on the shaft 2 is spiral gear 3 which meshes with a second spiral gear 4 formed on the vertical shaft 5. The gear ratio is such that the shaft 5 is driven at one-half engine speed. This vertical shaft carries the cam for operating the interrupter, or circuit breaker, and the distributor which will later be described. The interrupter and the distributor mechanism are carried in a casing 6 and are covered by means of a bakelite cap 7 which carries the high tension terminals. The casing 6 and the bearing 8 for the vertical shaft 5 are formed integral with the front plate 9 of the generator frame.

Upon the upper portion of the generator frame is mounted a transformer 10 which transforms the low tension generator current into high tension current suitable for ignition purposes. One terminal of the generator is grounded and the other terminal passes to one terminal of the low tension side of the transformer (not shown). The other terminal of the low tension side of the transformer is indicated at 11 and passes to the binding post 12 of the timing mechanism. One terminal of the high tension side of the transformer is grounded (not shown), and the other terminal is connected to the central lead 13 in the distributor cap. The other two leads 14 are connected with the spark plugs in the cylinders, the engine, in this case, being a two cylinder, four cycle engine.

The distributor cap 7 is removable from the casing 6 and is held in position thereon by means of the spring fasteners 15 which hold the cap in close contact with the casing 6 and make a rainproof connection therewith.

The transformer 10 is housed within a cover 16, which is adapted to protect it from rain. The outgoing terminal of the high tension side of this transformer passes down the channel 17, formed in the cover 16, and

after passing the lower edge thereof, passes upwardly forming the central lead 13 in the distributor cap.

A grease cup 18 screws into a boss 19 and serves to oil the vertical shaft 5.

The entire mechanism is mounted upon a suitable base 20 whereby it may be bodily removed as a unit from the supporting structure.

Figs. 3 and 7 show the manner of rotatively securing the shaft 5 in position. The shaft 5 is provided with a reduced portion 21 around which fits a split collar 22, the outside diameter of which is substantially the same as that of the main portion of the shaft 5. In assembling the shaft 5, the collar 22 (Fig. 8) is slipped on the shaft, at the reduced portion 21, and the shaft and collar are slid downwardly into the bearing 8 until they occupy the position shown in Fig. 3. The screw 23, provided with a projection 24, is then screwed in place so that the projection 24 enters the recess 25 in the collar 22. The screw 23 is provided with threads which engage those formed in the boss 26, and the bottom of the screw engages the bottom of such recess, thereby definitely limiting the distance which the projection 24 extends into the collar 22.

Figs. 3, 5 and 6 show the distributing and timing mechanism and will now be described. The casing 6 is formed with a centrally positioned, upwardly projecting sleeve 27. A metal disc 28 is positioned in the bottom of the casing 6 and rotatively engages said central sleeve 27. This disc is held in place by means of a shouldered screw 29, which carries a spider spring 30 which bears upon the plate 28. In order to allow for a limited rotary motion of the plate 28 a slot 31 is provided therein, through which passes the shouldered screw 29. The bottom of the casing 6 is provided with a similar slot 32 through which passes threaded studs 33 which are rigidly clamped to the plate 28. The portions of the studs which extend downwardly below the casing 6 have riveted thereto an operating arm or ear 34 which is adapted to receive the mechanism for advancing or retarding the spark and communicates the motion of such mechanism to the plate 28. The plate 28 has pivoted thereon a lever, or cam follower, 35 which is inwardly pressed by means of a spring 36. The free end of this spring pressed cam follower, or pivoted lever 35, is provided with a contact 37 which engages, when in one position, a stationary contact 38 which together form a portion of the low tension circuit.

The stationary contact 38 is adjustably mounted by means of the screw 39 and jam nut 40 upon an ear 41 of the supporting base 42. This supporting base 42 is clamped to the disk 28 by means of a metal plate 43,

and is insulated from the upper metal plate and the disk 28 by means of insulating sheets 44. Through the upper metal plate 43 pass the screws 45 which are also insulated from the base 42, and are threaded into the plate 28 to thereby clamp the base 42 in place. A binding post 12 is riveted to the base 42 and is connected with the lead 11.

A cam 46 is mounted upon a reduced portion of the shaft 5 and is clamped in place by means of a nut 47. This cam 46 engages the projection 48 formed upon the pivoted arm 35 and serves to oscillate such arm twice during one revolution of the shaft 5. This serves to interrupt the low tension current at each working stroke of the cylinders. The point at which interruption occurs is determined by the position of the plate 28 which is moved or controlled by the ear 34. The upper portion of the shaft 5 has a reduced portion 49 which engages an opening in the insulating block 50. This insulating block has splined thereto a distributor segment 51 which is also fastened to the block by means of a screw 52. A spring 53 is held under the head of the screw 52 and in contact with the distributor segment 51 and has formed thereon, at its free end, a contact 54 which engages the central contact 55 in the distributor cap. The correct positioning of the distributor segment in reference to the cam 46 is secured by means of a pin 56 rigidly secured to the cam 46 which passes upwardly through a metallic member 57 which is splined to the bottom portion of the insulating block 50 and retained in such position by means of a screw 58.

The leads 14 terminate in pins 59 which project downwardly into the center of the distributor cap 7. The distributor segment 51 passes close to these pins 59 as it rotates and serves to allow the high tension current to jump to the pins 59 and thereafter pass to the respective spark plugs in the cylinders. The shifting of the plate 28 to adjust the timing of the spark does not affect the timing of the passage of the distributor segment 51 by these pins 59 and therefore does not interfere with the proper distribution of the high tension current.

The position of the cam and of the distributor segment is fixed relative to each other and may, as a unit, be adjusted by loosening the nut 47 and moving the cam to the desired position and then tightening the nut 47. By this means exact adjustment of both the distributor and cam relative to the position of the engine pistons may be secured.

The timing and distributing mechanism may be readily removed from the casing 6 by removing the cap 7, the screw 29, the threaded pins 33, the screw 23, the lead 11, and lifting the disc 28 bodily out of the casing 6.

Obviously other structures may be devised which will embody the invention herein set forth.

What I claim is:

5 1. In an ignition apparatus, the combination of an electric generator having a housing and an armature shaft journaled therein, a distributor having stationary contacts and a rotatable contact segment, a casing
10 for the distributor supported by the generator housing, a shaft for the distributor segment journaled in a bearing integral with casing and housing, a gear on the armature shaft, and a gear on the distributor shaft
15 adapted to mesh with the other gear, the distributor shaft, and the segment and gear thereon being removable as a unit through the casing.

2. In an ignition apparatus, the combination of an electric generator having a housing and a horizontally disposed armature shaft journaled therein, a timer having a pair of contacts and a rotatable operating cam therefor, a casing for the timer, a vertically disposed bearing between the casing and the housing integrally connected thereto, a shaft mounted in the bearing and carrying at its upper end the timer cam, and having at its lower end a gear, and a
30 gear on the armature shaft with which the timer shaft gear is adapted to engage, the timer shaft and cam and gear being removable as a unit by longitudinal movement through the casing.

3. In an ignition apparatus, a distributor casing, a vertically disposed shaft extending into said casing and having a contact member mounted thereon, a circumferential groove in the shaft, a tubular bearing for the shaft from which it is removable axially, a collar positioned within the groove and removable with the shaft from the bearing, and means for connecting the collar to the bearing so as to hold the shaft against
45 longitudinal displacement.

4. In combination, a casing, ignition apparatus therein, a rotatable shaft for operating said ignition apparatus, a tubular bearing for said shaft, the shaft and
50 bearing being assembled and disassembled

by longitudinal movement of one with respect to the other, said shaft having a circumferential groove therein, and a radially movable member secured to the bearing and extending into the groove
55 so as to hold the shaft against longitudinal displacement.

5. In combination, a casing, ignition apparatus therein, a rotatable shaft for operating said ignition apparatus, a bearing
60 therefor, a circumferential groove in said shaft, a collar fitting in the groove and removable from the bearing with the shaft by the longitudinal movement of the latter, and a radially movable member carried by the bearing and engageable with the collar to hold the shaft against longitudinal displacement.

6. In an ignition apparatus, the combination of a timer and distributor casing, an operating shaft extending therein, and a rotatable mounting for said shaft comprising a tubular bearing, a groove in said shaft, a collar positioned within said groove, and means engaging said collar to hold the shaft
75 against longitudinal movement in said bearing.

7. In combination, ignition apparatus, an operating shaft therefor, a casing for said apparatus slidably fitting said shaft, and means for holding said shaft against longitudinal displacement comprising a reduced portion intermediate the ends of the shaft and a removable collar positioned within said casing and encircling said reduced portion of the shaft.
85

8. A unitary ignition apparatus comprising a generator having a main body portion, a transformer carried thereby, said body portion being provided with a base adapted for attachment to a support, a casing formed integral with a part of the body portion, and an interrupter and distributor housed within said casing, whereby the apparatus as a whole is bodily removable from said
95 support.

In witness whereof, I have hereunto subscribed my name.

WILLIAM S. HARLEY.