March 22, 1927. 1,622,164

H. E. NORVIEL

IGNITION APPARATUS

Filed Aug. 12, 1924

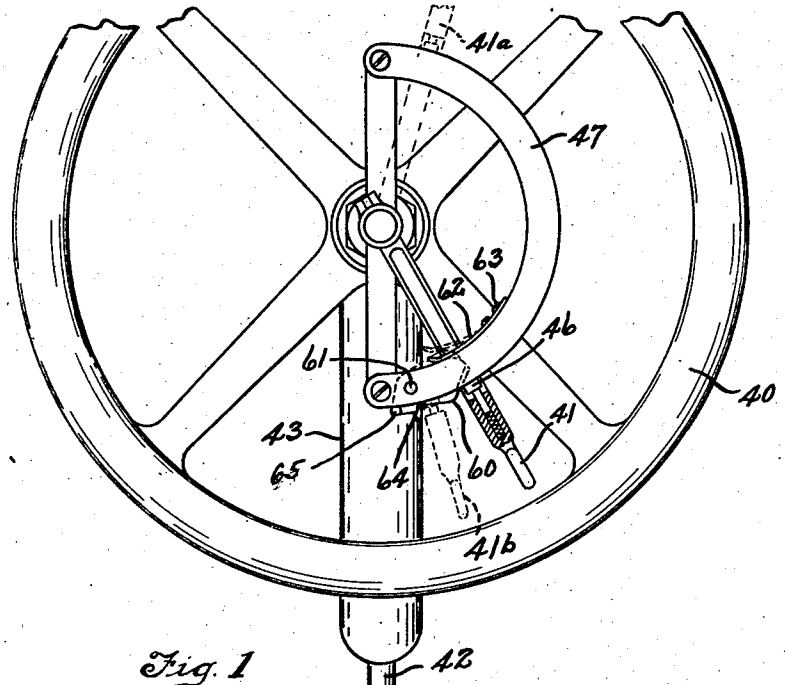


Fig. 1

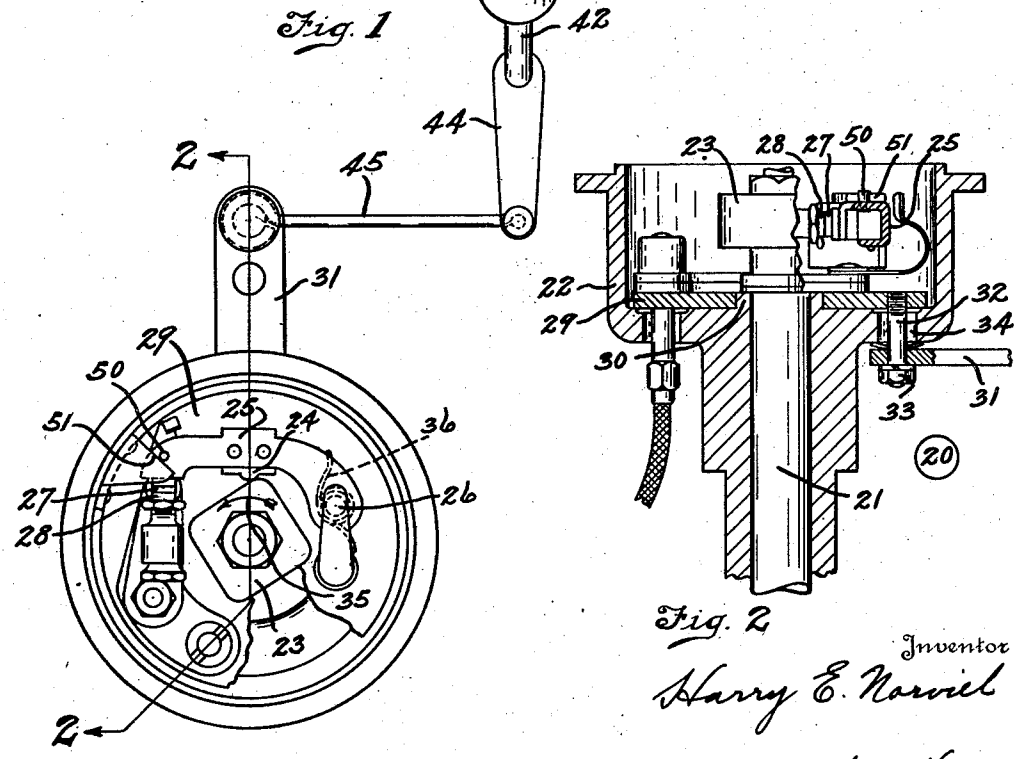


Fig. 2

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Patented Mar. 22, 1927. 1,622,164

UNITED STATES PATENT OFFICE.

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IGNITION APPARATUS.

Application filed August 12, 1924. Serial No. 731,690.

This invention relates to electrical ignition apparatus for internal-combustion engines and more particularly to apparatus adapted for use with the automobile.

One of the objects of the invention is to open the ignition circuit manually without the use of an ignition switch. In the present invention this is accomplished by a movement of the spark control lever to a position beyond that of maximum retard. This movement of the spark control lever causes the contacts of the ignition timer to be maintained separated regardless of the position of the timer cam, thereby interrupting the ignition circuit independently of the operation of the engine. In order that the spark lever, which is usually mounted above the steering wheel of the automobile, may be used in a practical way for manually controlling the ignition circuit, a device is employed for abruptly adding mechanical resistance to the movement of the spark lever from its position of maximum spark retard into the position for maintaining the ignition circuit open. This additional resistance is in the form of a yielding stop which is spring-pressed into the path of movement of the spark control lever. Movement of the spark control lever against the stop will be a warning to the driver not to move the lever any further into the direction of spark retard unless the driver wishes to stop the engine.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred embodiment of one form of the present invention is clearly shown.

Fig. 1 of the drawings shows somewhat diagrammatically, an ignition timing control apparatus including the present invention. Fig. 2 is a sectional view taken substantially on the line 2—2 of Fig. 1.

Referring to the drawings: 20 designates as a whole, an ignition timer which includes an engine-driven shaft 21 rotatably supported by a housing 22 and carrying at its upper end a timer cam 23 for engaging the rubbing block 24 of a circuit-breaker lever 25. Lever 25 is pivoted at 26 and carries a contact 27 adapted to engage a stationary contact 28. The breaker lever 25 and the contacts 27 and 28 are supported for rotation about the shaft 21, upon a breaker lever 29 which is journaled upon a bearing boss 30 provided by the housing 22. A timer control lever 31 is attached to the breaker plate 29 by means of studs 32 and nuts 33, the studs extending through a slot 34 in the bottom of the timer housing 22. By means (not shown), but familar to those skilled in this art, the stationary contact 28 and the breaker lever 25 are connected in series with a battery and an ignition coil.

During the operation of the engine the cam 23 rotates in the direction of the arrow 35 in Fig. 1, intermittently to engage the rubbing block 24 and to separate the contacts 27 and 28. At each instance of separation of these contacts a sparking impulse will be induced in the ignition coil and this impulse is conducted in a well-known manner to the proper spark plug of the engine. The direction of rotation of cam 23 being counterclockwise, it is obvious that counterclockwise rotation of the breaker plate 29 will retard the spark, and that clockwise rotation will advance the spark. The lever 31 is operated from a position above the steering wheel 40 by a spark lever 41 which is connected with a rod 42 extending through the steering column 43 to which the wheel 40 is attached. By mechanism such as a lever 44, and a link 45 the rod 42 is connected with the lever 31. The lever 41 is yieldingly maintained in various positions of spark control by a spring pressed plunger 46 engaging the exterior periphery of a sector 47 which is mounted non-rotatably in the usual manner. When the lever 41 is in the full-line position in Fig. 1, a spark will be fully retarded, but the spring 36 which yieldingly urges the lever 25 toward the cam 23, will still be permitted to effect the engagement of contact 27 with contact 28. If the lever 41 is moved into the position 41^a in Fig. 1, the timer lever 31 will be moved into a position for effecting the maximum spark advance or the earliest timing of the ignition spark with relation to the operation of the engine.

In order to stop the engine, the lever 41 is moved in a clockwise direction beyond the position of maximum retard shown in Fig. 1 in full lines, to the dotted-line position 41^b. The movement of lever 41 into this position will cause the timer lever 31 and the breaker

plate 29 to move counterclockwise from the position shown in the drawings. This movement will cause a pin 50 carried by the breaker lever 25 to move counterclockwise and to move away from the cam 23 by reason of engagement of pin 50 with a camming lug 51 attached to the timer housing 22. By this means the contacts 27 and 28 are maintained separated independently of the operation of cam 23. Ignition for the engine will, therefore, be no longer provided and the engine will stop. To start the engine, the lever 41 is moved into the position shown in full lines or to any other position between maximum retard and maximum advance. The engine is cranked in the usual manner to draw a charge of fuel into the engine and to rotate the cam 23 to produce ignition.

In order to warn the operator so that he will not move the spark lever in a direction beyond that of maximum retard, unless he wishes to stop the engine, there is provided a stop lever 60 which is pivotally mounted upon the control sector 47 by a pin 61. The stop lever 60 is yieldingly urged into the path of movement of the plunger 46 by a spring 62 attached by screw 63 to the sector 47. The spring 62 by cooperating with the lever 60 with plunger 46, affords an added resistance to the movement of lever 41 from the position of maximum retard to engine-stopping position or ignition-opening position 41^b. The lever 60 is provided with a stop lug 64 which limits the clockwise movement of the lever 41.

The present invention provides for manually interrupting the ignition circuit to stop the engine without requiring the manipulation of a lever which is separate from the spark control lever. The invention, therefore, avoids the use of an ignition switch which is usually located on the instrument board of the automobile, and also eliminates the wiring connecting such switch with the ignition apparatus inclosed within the engine hood.

While the form of embodiment of the invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. Ignition controlling apparatus comprising, in combination, an ignition timer including a cam, a breaker lever operated intermittently by the cam, contacts separated by motion of the breaker lever, a spring for returning the contacts to engagement, a circuit-breaker plate carrying the breaker lever and contacts, and rotatable with respect to the cam; means including a manually operable lever for rotating the breaker plate in order to advance or retard the spark; means for preventing ignition and responsive to movement of the breaker plate to a location outside of its predetermined range of locations for spark timing control; and means for adding a noticeable mechanical resistance to the movement of the manually operable lever to a position outside of its normal range of movements.

2. Ignition controlling apparatus comprising, in combination, an ignition timer including a cam, a breaker lever operated intermittently by the cam, contacts separated by motion of the breaker lever, a spring for returning the contacts to engagement, a circuit-breaker plate carrying the breaker lever and contacts, and rotatable with respect to the cam; means including a manually operable lever for rotating the breaker plate in order to advance or retard the spark; means for preventing ignition and responsive to movement of the breaker plate in a direction of retard to a position beyond its predetermined full retard position; and means for adding a noticeable mechanical resistance to the movement of the manually operable lever to a position beyond its predetermined full retard position.

3. Ignition controlling apparatus for automobiles comprising, in combination, an ignition timer; a lever in convenient reach of the automobile driver for controlling the timer to advance and retard the timing of ignition; means responsive to a movement of said lever to a position beyond its normal range of spark-timing-control movement for rendering the ignition inoperative; and means for adding a noticeable mechanical resistance to the movement of said lever into position for rendering the ignition inoperative.

4. Ignition controlling apparatus for automobiles comprising, in combination, an ignition timer; a lever in convenient reach of the automobile driver for controlling the timer to advance and retard the timing of ignition; means responsive to a movement of said lever to a position beyond its normal range of spark-timing-control movement for rendering the ignition inoperative; and a stop member yieldingly urged into the path of movement of the lever to resist movement of the lever into position for rendering the ignition inoperative, said stop tending to limit movement of the lever beyond its normal range of spark-timing-control but yielding to the movement of the lever into said position whereby to increase abruptly the mechanical resistance to the movement of the lever into said position.

5. Ignition controlling apparatus for automobiles comprising, in combination, an ignition timer; a lever in convenient reach of the automobile driver for controlling the timer to advance and retard the timing of ignition; means responsive to a movement of said lever to a position beyond its normal range of spark-timing-control movement for rendering the ignition inoperative; and piv-

oted stop member and a spring urging the stop member into the path of movement of the lever, said stop member tending to limit movement of the lever beyond its normal range of spark-timing-control, said stop member having a surface oblique to the path of movement of the lever and engaged by a portion of said lever whereby the stop member is moved by said lever into a position permitting movement of said lever into position for rendering the ignition inoperative.

6. Ignition controlling apparatus for automobiles comprising, in combination, an ignition timer; a lever in convenient reach of the automobile driver for controlling the timer to advance and retard the timing of ignition; means responsive to a movement of said lever to a position beyond its normal range of spark-timing-control movement for rendering the ignition inoperative; and a movable stop member and a spring for urging the stop member into the path of movement of the lever to limit movement of said lever beyond its normal range of spark timing control, said stop member having a surface oblique to the path of movement of the lever and engaged by a portion of said lever whereby the stop member is moved by said lever into a position permitting movement of said lever into position for rendering the ignition inoperative, said stop member having also a non-yielding projection in the path of movement of a portion of said lever to positively resist further movement of the lever in the direction to render the ignition inoperative.

7. Ignition controlling apparatus for automobiles comprising, in combination, an ignition timer; a timer controlling lever; friction means for maintaining said lever in position comprising a sector providing a cylindrical surface, a plunger carried by the lever and spring urged into engagement with said surface; means responsive to a movement of said lever to a position beyond its normal range of spark-timing-control movement for rendering the ignition inoperative; and a stop member movably supported by the sector, and a spring carried by the sector for urging the stop member into the part of movement of the plunger to limit movement of said lever beyond its normal range of spark-timing-control, said stop member having a surface oblique to the path of movement of the plunger and engaged thereby whereby the stop member is cammed by the plunger into a position permitting movement of said lever into position for rendering the ignition inoperative.

8. Apparatus defined by claim 7 in which the stop member is provided with a non-yielding projection in the path of movement of the plunger to positively resist further movement of the lever in the direction to render the ignition inoperative.

In testimony whereof I hereto affix my signature.

HARRY E. NORVIEL.