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2,219,480

CENTRIFUGAL CONTROL FOR IGNITION TIMER

Filed July 22, 1937

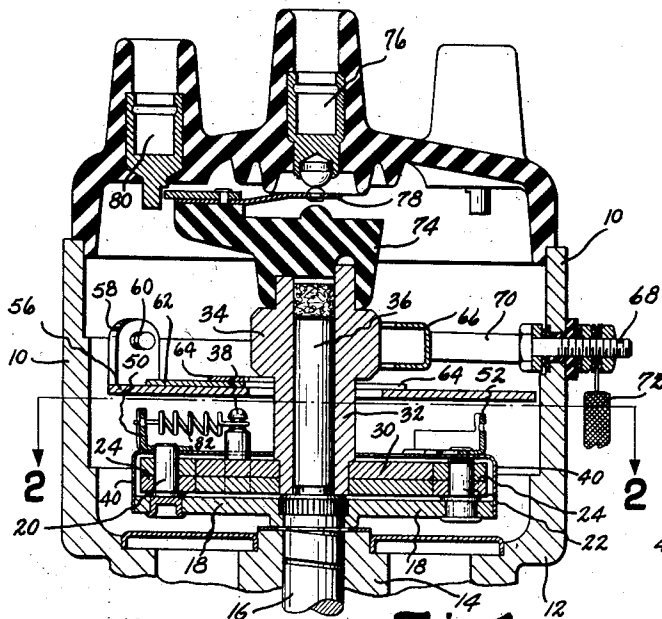


Fig. 1

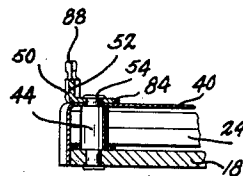


Fig. 3

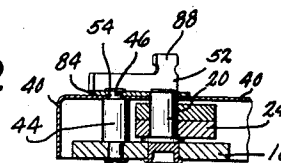


Fig. 4

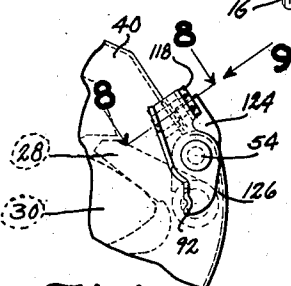


Fig. 7

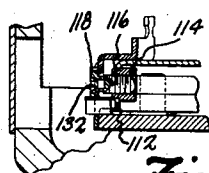


Fig. 8

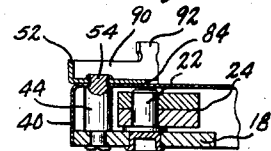


Fig. 5

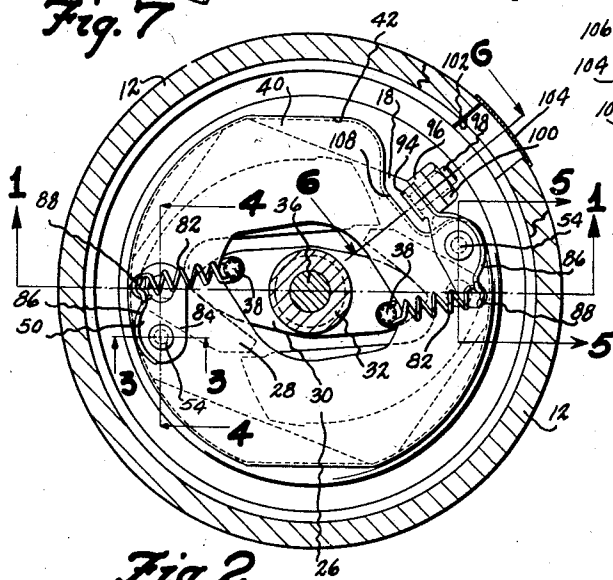


Fig. 2

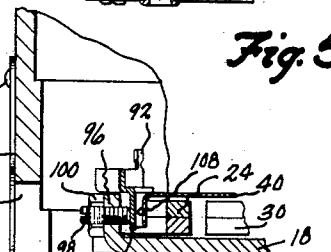


Fig. 6

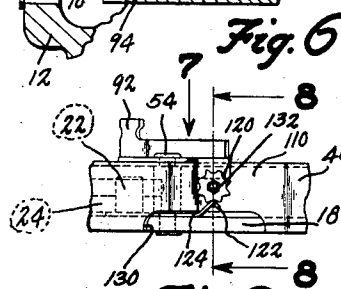


Fig. 9

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CENTRIFUGAL CONTROL FOR IGNITION
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16 Claims. (Cl. 64—25)

This invention relates to speed responsive mechanism for controlling the time of igniting a fuel charge in internal combustion engines.

It is an object of this invention to provide means for altering the time of cut-in of speed responsive control mechanism.

Another object of this invention is to provide means for adjusting the spring tension of centrifugal control mechanism.

Another object of this invention is to provide means in an ignition timer for adjusting the point of automatic cut-in of ignition advance by speed responsive means without disrupting operative assemblies.

Still another object of this invention is to provide centrifugal mechanism for the control of ignition timing, that is embodied within a housing, and made accessible for adjustment through the wall of the housing, without disturbing any of the parts of the operable assembly.

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

In the drawing:

Fig. 1 is a vertical sectional view of an ignition timer-distributor incorporating the instant invention, it being a view substantially as indicated by the line and arrow 1—1 of Fig. 2.

Fig. 2 is a transverse sectional view through the ignition timer substantially as indicated by the line and arrows 2—2 of Fig. 1.

Fig. 3 is a fragmentary view, with parts shown in section, substantially as indicated by the lines and arrows 3—3 of Fig. 2 and Fig. 4.

Fig. 4 is a sectional view substantially as indicated by the lines and arrows 4—4 of Figs. 2 and 3.

Fig. 5 is a sectional view similar to Fig. 4, it being a view substantially as indicated by the line and arrows 5—5 of Fig. 2.

Fig. 6 is a fragmentary sectional view substantially as indicated by the line and arrows 6—6 of Fig. 2.

Fig. 7 is a fragmentary view in plan, illustrating a modification of the tension adjusting means, it being a view substantially as indicated by the arrow 7 of Fig. 9.

Fig. 8 is a fragmentary sectional view of the same, substantially as indicated by the lines and arrows in Figs. 7 and 9.

Fig. 9 is a fragmentary elevational view, sub-

stantially as indicated by the arrow 9 in Fig. 7, and the line and arrows 9—9 in Fig. 8.

In ignition timers for automotive engines, it is now common to provide centrifugal mechanism, that couples a driving shaft with a circuit breaker actuating cam, in such a manner that the cam will be driven with the shaft, and that the angular relation between the shaft and cam will be altered in accordance with variations of shaft rotation. With an attempt to alter the timing so as to obtain the greatest efficiency from the fuel consumed, it is the practice to advance the cam with respect to the driving shaft as the speed of the driving shaft increases. For the greatest efficiency it is essential that the centrifugal mechanism begin to advance the cam upon the shaft at certain relative speeds of the shaft. However, due to slight discrepancies in the contributing parts as manufactured, several ignition timers when finally assembled, though their contributing parts be made by the same tools, and with the same degree of care, the completed assemblies will vary as to the point in the speed curve at which the centrifugal mechanisms will cut-in and begin to advance the cam with respect to the driving shaft. Careful study of the situation, and calibration of the operative functions of the timer elements, disclose that this variation of cut-in for specific units, may cover a range of 4 to 6 degrees of advance at the same speeds of engine rotation. This means that the automobile manufacturer, though he specifies that the ignition timer shall have a cut-in, or in other words begin to advance the timing in response to speed, at some specific engine speed, he may expect to find on test and calibration, if the vehicle is equipped with a timer of the prior art, that the cut-in actually takes place so much below or above the specified speed to effect as much as 2 or 3 degrees variation in timing on either side of the desired timing curve.

Applicants have discovered that the manufacturer's specification can be critically complied with by constructing the ignition distributor, or the centrifugal mechanism therefor, in accordance with the disclosure herein presented. The manufacturer's specifications are satisfied, and the objects herein stated are accomplished, by fashioning a centrifugal control mechanism for the circuit breaker actuating cam that embraces an adjustable spring support, whereby the point of cut-in of the centrifugal fly-weights can be adjusted. It has been discovered, that though the centrifugal mechanism may embrace a plurality of fly-weights, each of which is spring op-

posed to an in position, or to a position of rest, it is sufficient to provide an adjustable spring support for one of the fly-weight restricting springs. Sufficient adjustment of the spring tension, restraining the outward movement of the fly-weights, can be accomplished by the single adjustable spring support so as to effect a satisfactory adjustment of the point of cut-in for the entire centrifugal assembly.

Means are provided through the timer housing wall for effecting adjustment of the movable spring support, such that it will not be necessary to even partially uncouple the centrifugal assembly or any other part of the operative assembly. Upon finding that the assembled adjustment is in error, the mechanism is allowed to come to rest, and the centrifugal assembly is rotated until the spring support adjusting means is aligned with the housing aperture, whereupon the adjustment is made without disturbing any part of the operable assembly.

With particular reference to the drawing 10 indicates the housing of a timer distributor whose bottom wall 12 provides a central boss 14, forming a bearing for a drive shaft 16. The shaft 16 carries a weight plate 18 that rotates therewith and supports pivot posts 20 and 22, upon each of which fly-weights 24 have a pivotal support. The fly-weights here comprise flat, hook-like members, wherein the pivotal point is situated at the bight of the member, so as to leave relatively massive portion of the weight 26 disposed and relatively equally spaced on opposite sides of the rotation center, with shorter and less massive cam portions 28, extending from the opposite side of the pivot point. Cooperating with the cam portion 28, there is a cam bar 30 mounted upon one end of a sleeve 32 carrying a circuit breaker operating cam 34. The cam assembly is piloted upon the drive shaft 16, by reason of which the upper end of the shaft is reduced in diameter as indicated at 36. When so positioned, the cam bar 30, which supports a pair of spring posts 38, is disposed with its end members lying over the weight base 18 and between the arms 28 and 26 of the fly-weights.

Disposed over the fly-weights and cam bar there is provided a holddown means, that comprises a shallow cup member 40, whose wall or skirt portion provides flats or stop portions 42 adapted to engage the end of the fly-weights when they fly outward to their limits, and thus define stops marking the limits of the timer advance by means of the centrifugal mechanism. The holddown means 40 is securely mounted upon the base plate 13 by means of spacer studs 44, secured to the base plate in close proximity to the pivot posts 20 and 22, the spacer studs being reduced in cross section at 46 to be received by appropriate apertures in the bottom wall of the holddown cup 40. The cup 40 is also apertured as at 46 to permit of assembling of the parts, and permit the extension of the spring post 38.

After assembling the centrifugal mechanism with the holddown plate, spring supporting means are affixed, which in this instance comprise clip members 50 and 52, disposed over the reduced portion 46 of the spacers, where they are retained as by riveting at 54.

Situated above the centrifugal mechanism, a circuit breaker supporting plate 56 is fixed to the wall of the timer housing 10 by lugs 58 and screws 60. Auxiliary plates 62 and 64 provide a pivotal support for a circuit breaker lever 66 having electrical communication with a terminal post 68

by means of a connector strap 70, the terminal 68 being insulatingly supported by bushings and washers through the housing wall 10, and for providing communication with electrical circuits by means of a lead 72. The circuit breaker 66 is adapted to be actuated by the cam 34, all as in the usual manner, and well known by those experienced in the art. The cam shaft 32 provides driving relation for a rotor 74 having constant communication with a central distributor terminal 76 through a spring urged contact 78, and adapted to come into close proximity to each one of a row of circular terminals 80, all as is the usual practice.

The spring supports 50 and 52 are adapted to support one end of fly-weight springs 82, each of which has a second support upon a spring post 38 carried by the cam bar 30, so that a contacting relation is urged between the faces of the cam bar 30 and the cam portions 28 of the fly-weights. Upon increasing speed of rotation of the shaft 16, a point will be reached where the mass of the fly-weights 26 will overcome the resistance offered by the springs 82, whereupon the cam 34 will be altered in its angular relation with respect to the base plate 13. In order to provide for accomplishing a definite point of cut-in of this fly-weight mechanism, one of the spring supports is provided with means for movement, or for varying the stress placed upon its respective spring.

These provisions incorporate specific fashioning of the form of the spring clips, in that they are fashioned of sheet metal to provide lightness of construction, and are thence bent into angular cross section to provide for rigidity of construction. As hereinbefore described, it is not necessary that both spring clips be of the adjustable type, though both of them may be adjustable if so desired. The illustrations in Figs. 3 and 4, show one form of the non-adjustable spring clips, wherein the member 50 comprises a flange 84 apertured to receive the end of the spacer stud 44 and also to receive the protruding end of the pivot post 20, after it extends through the holddown plate 40. Riveting of the end of the spacer stud 44 at 54 retains the clip in place. A second flange 86 is provided on the clip that stands upwardly to extend away from the holddown plate 40, and at a point substantially over the end of the protruding pivot post 20, it is prolonged and laterally notched to provide a spring receiving portion 88, substantially as illustrated in Figs. 2, 3 and 4.

The adjustable spring support is illustrated more in detail in Figs. 5 and 6, where the spring clip 52 is illustrated as having a body portion or flange that is apertured to receive the reduced portion of the spacer stud where it is loosely riveted at 54, and an upstanding flange 90 similarly ends in a spring receiving portion 92. The end of the spring receiving clip 52 opposite the spring receiving portion 92 is extended to provide a depending flange 94 that is adapted to be engaged by means for rocking the adjustable spring clip about its loose riveting connection on the spacer at 54.

In Figs. 2 and 6, one form of means is illustrated for moving the adjustable spring clip, in order to variably stress the spring force applied to the fly-weights, and for holding the spring support in the altered position. The means therein illustrated, constitute a lug 96 bent up from the base plate 13, and is apertured to receive a set screw 98 to be locked in adjusted position.

tion by a lock nut 100. It will be obvious from the showing here presented that running the screw 98 in or out will rock the spring clip about its pivot 54, and that in so doing, its respective spring 82 hooked on to the members 38 and 92, the latter of which is a part of the movable spring clip, will be variably stressed which in turn either adds to, or detracts from, the total spring restraining force applied to the outward movement of the fly-weights. A convenient means is provided for adjusting the set screw 98 and the lock nut 100, by providing an aperture 102 in the side wall of the timer housing 10, substantially in horizontal alignment with the clip moving means, and the aperture 102 during normal operation of the timer mechanism is closed up by a cover plate 104 pivotally supported by the housing 10, by a rivet or pin 106. Further provisions making for the adjustment of the spring clip, embrace a recessed or set-in portion of the holddown plate 40 to the extent indicated at 108, where clearance is provided between the depending skirt of the cup member and the supporting lug 96 to allow for the swing of the flange 94 for any adjustment that may be contemplated.

In Figs. 7, 8 and 9, a modification of the spring clip moving means is illustrated, and embrace the deformation of the holddown plate 40 depicting the form as illustrated at 110, where the depending flange 112 rigidly supports a tubular sleeve 114, threaded to receive a socketed set screw 116, providing a head 118 whose periphery is notched at 120 to receive a cross rib 122 of a spring detent 124. This may, for convenience, be secured against the base plate 18 by means of the spacer stud 44, and movement with respect to the base plate may be prevented by the crotched end 126 engaging the side walls of the pivot post 22. This will position the leaf spring 124 substantially within the depending skirt of the holddown means 40, the latter of which is notched at 130 to allow for the extension of the spring portion of the member to engage the notched head of the set screw positioned outside of the holddown means. The exposed end of the set screw 116 is provided with a non-rounded socket or recess 132 for reception of a special tool, insertable through the aperture 102 of the housing 10, by which adjustment of the screw may be accomplished. When in the assembled relation, the flanged head 120 engages against the depending flange 96 which follows the movement of the screw inward or outward as respects the bushing 14, and thereby pivots about the loose connection 54 to variably stress the attached spring 82 as has been hereinabove described. In either instance manipulation of the set screw 98 or 116 will operate to vary the tension of the respective spring and thereby provide means for controlling the point of cut-in of the centrifugal mechanism to the extent desired.

While the embodiment of the present 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. In an ignition timer for controlling the advance of timing of an internal combustion engine, a centrifugal mechanism comprising in combination, a rotatable plate, a cam oscillatable relative to the plate, flyweights for oscillating the cam upon alteration of plate rotation, spring means supported by the plate and cam for opposing action of the flyweights, and means for

altering the opposing force of said spring means, including a clip fixed to the plate supporting one end of a spring, and a set screw adapted to move the clip.

2. In an ignition timer, having a rotatable base with a cam oscillatable on the base and spring restrained flyweights for oscillating the cam, means for supporting the springs comprising in combination, a sheet metal clip adapted to receive one end of the spring, means pivotally supporting the clip from the base, and selective means for moving the clip on its support for altering the tension of the spring.

3. The combination set forth in claim 2, wherein the clip is angular in cross section, and has one flange fashioned into a spring post disposed substantially over the pivot point of the flyweights.

4. The combination set forth in claim 2, wherein the pivotal support for the clip comprises a spacer carried by the base and extends above the flyweights, and wherein the clip is loosely riveted to the end of the spacer.

5. The combination set forth in claim 2, wherein the pivotal support of the clip is substantially midway of its length, and the base provides a lug, said selective means comprising an adjusting screw carried by the lug and engageable with a part of the clip, adjustment of the screw moving the clip on its pivot.

6. The combination set forth in claim 2, wherein the clip provides oppositely extending flanges, one of which extends away from the base to receive the spring, and another of which extends towards the base to be engaged by the clip moving means.

7. In an ignition timer, having a rotatable base with a cam oscillatable on the base, and spring restrained flyweights for oscillating the cam, means for supporting the springs comprising in combination, spacers carried by the base and extending above the flyweights, clips secured to the ends of the spacers and extending over the flyweights, one of said clips having a flange extending toward the base, a set screw engageable with the flange and adapted to oscillate the clip about the spacer, and means for retaining the set screw in the selected position.

8. The combination set forth in claim 7, in which the set screw is supported by a lug struck up from the base, and a lock nut holds it in place.

9. In a timer having a circuit breaker and an engine operated cam for actuating the circuit breaker, the combination of means for altering the angular relation of the cam to the circuit breaker in response to engine speed, comprising, a drive shaft, a support provided by the shaft and rotating therewith, a pair of flyweights, a pivot post carried by the support for each flyweight, spacers on the support extending above the flyweights, holddown means for the flyweights carried by the spacers, a cam bar oscillatable on the shaft and spring urged to engage the flyweights, spring supports carried by the spacers, and springs anchored to the spring supports and the cam bar maintaining engagement of the flyweights and cam bar.

10. The combination set forth in claim 9, wherein the holddown means comprises a sheet metal cup inverted over the flyweights, and whose side walls provide stops for the outward movement of the flyweights, and wherein one of the spring supports comprises a sheet metal clip riveted to the spacer, and provides a spring post

extending above the holddown means, said spring support being shiftable to alter the spring force resisting the cut-in of one of the flyweights.

11. The combination set forth in claim 9, wherein the spring supports, comprise clips having spring attaching lugs disposed substantially over the pivot posts.

12. In spring balanced centrifugal mechanism, means for altering the spring tension comprising in combination, a base plate supporting flyweights, spring supports carried by the base plate, one of said spring supports being movable relative to the base plate, means fixed relative to the base plate for moving the spring support, and means for securing the spring support in the moved position.

13. The combination set forth in claim 12, wherein the securing means comprises a spring detent secured to the base plate, and a set screw with a notched head cooperating with the detent.

14. In an ignition timer, the combination comprising, a relatively stationary housing, a base plate and attached shaft rotatable therein, pivot posts carried by the plate, flyweights oscillatable on the pivot posts and spring urged to an in-position, spring supporting clips supported by and rotatable with the base plate, and means carried by the base plate for adjusting one only of the

spring clips, said housing being apertured to provide access to the spring adjustment when oriented therewith.

15. In an ignition timer, the combination comprising, a relatively stationary housing, a base plate including spring urged flyweights rotatable within the housing, spring supports carried by and rotatable with the base plate, and means including an aperture through the housing wall for adjusting one of the spring supports to vary the point of cut-in of the fly weights.

16. In an ignition timer, having a rotatable base with a cam oscillatable on the base, and spring restrained flyweights for oscillating the cam, means for supporting the springs comprising in combination, spacers carried by the base and extending above the flyweights, clips secured to the ends of the spacers and extending over the flyweights, one of said clips having a flange extending toward the base, a holddown plate disposed over the flyweights and having a flange portion extending in spaced relation to the clip flange, a set screw carried by one of the flanges and engageable with the other flange for oscillating the clip and a spring detent for holding the set screw in adjusted position.

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