April 16, 1935. M. MALLORY 1,998,379

IGNITION GOVERNOR

Filed Jan. 4, 1934

Fig. 1.

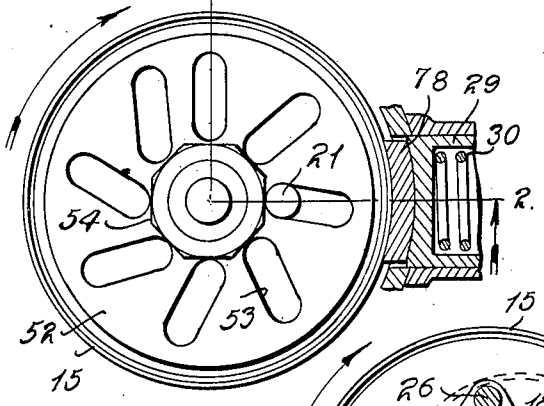


Fig. 3.

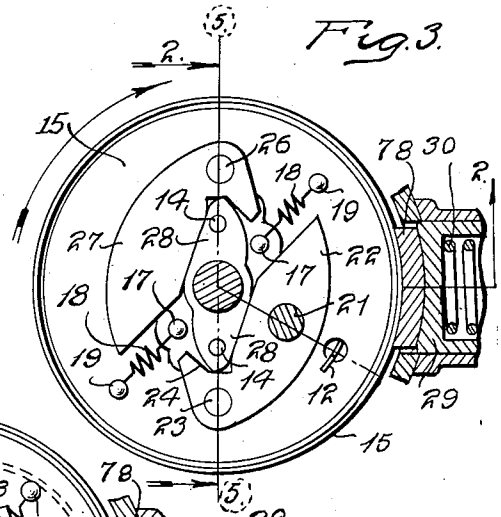


Fig. 4.

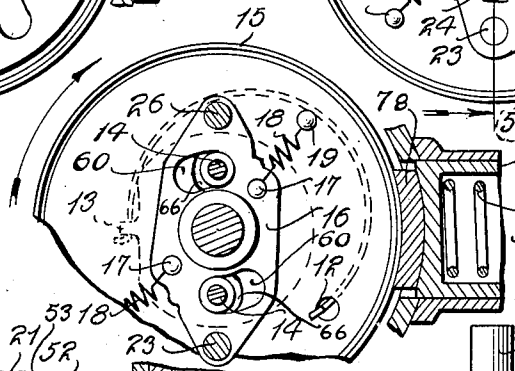


Fig. 2.

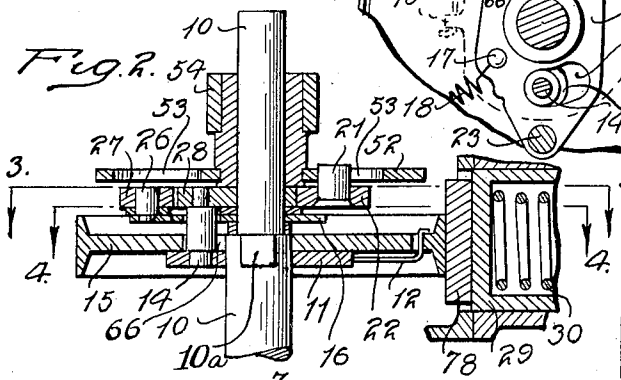


Fig. 9.

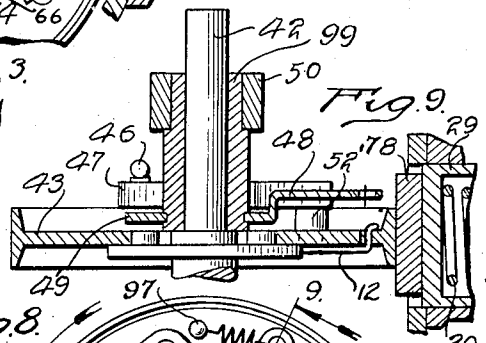


Fig. 6.

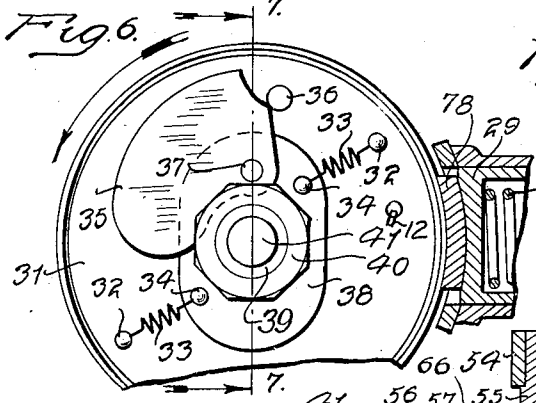


Fig. 8.

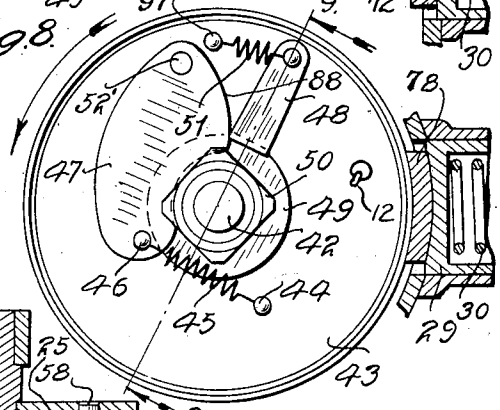


Fig. 7.

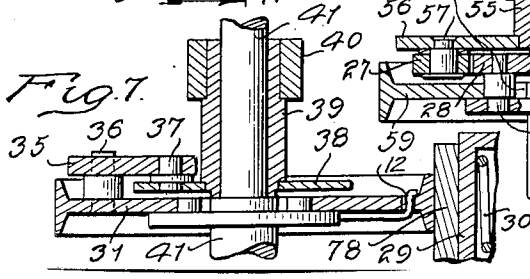
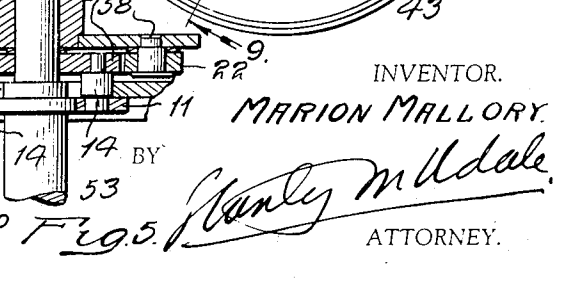


Fig. 5.



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UNITED STATES PATENT OFFICE

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IGNITION GOVERNOR

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Application January 4, 1934, Serial No. 705,240

8 Claims. (Cl. 64—90.5)

The object of this invention is to advance the ignition with engine speed and to simplify the cam timing mechanism, and, at the same time to permit variation in load to modify the advance due to speed acting alone.

Figure 1 is a plan view looking down a completely assembled governor and spark control mechanism.

Figure 2 shows a cross-sectional elevation in which the section follows the plane 2—2 of Figure 1.

Figure 3 shows a plan view taken on plane 3—3 of Figure 2.

Figure 4 shows a plan view taken on plane 4—4 of Figure 2.

Figure 5 is a modified sectional elevation taken on plane 5—5 of Figure 3 with the governor weights suspended from the cam plate instead of being supported from below as shown in Figure 2.

Figure 6 shows a plan view of a modified form of the governor shown in Figures 1 to 5.

Figure 7 shows a cross-sectional elevation taken on plane 7—7 of Figure 6.

Figure 8 shows a plan view of another alternative construction.

Figure 9 shows a cross-sectional elevation taken on plane 9—9 of Figure 8.

In the Figures 1, 2, 3 and 4:—

10 is the driving shaft and 54 (Fig. 2) is the ignition timing cam which is driven thereby as follows:—

Shaft 10 drives a plate 11 on which are mounted two pins 14—14. A portion of the shaft 10 may be flattened, as at 10a, to secure the plate 11 against rotation relative to the shaft. These pins 14—14 project through slots 60—60 in the governor control plate 16. After passing through this slotted plate 16, the pins 14—14 engage with the cam plate 28. This cam plate 28 is shown in Fig. 3 and rotates with the driving plate 11 and shaft 10.

The centrifugal weights 27—22 are pivotally mounted on the pins 26—23, which pins are mounted on the governor control plate 16. The weights engage with the cam plate 28 as shown in Fig. 3. The face 24 of weight 22 rolls over the face of the cam plate 28 and the weight 27 has a similar action.

The governor control plate 16 is anchored by means of the two radial springs 18—18 to the friction disc 15. This disc 15 is also connected with the driving plate 11 through the circumferential spring 12. (See Figs. 2 and 4.) The relative movement permitted between 15 and 11 is determined by the clearance of the slot 66 in the disc 15, through which slot the pin 14 passes on its way from the driving plate 11 to the cam plate 28. The springs 18—18 are stretched between the pins 17—17 located on the governor control plate 16, and the pins 19—19 located on the friction disc 15. 12 is anchored to 11 at 13.

On one of the governor weights is a pin 21, which engages with one of the slots 53 in the plate 52 which is locked to the timing cam 54, which cam controls the time of ignition in a well-known way. (See my co-pending case, Serial #538,187, filed May 18, 1931.)

The friction disc 15 engages with the friction pad 78, which is pressed against 15 by means of the piston 29 and the coil spring 30. This piston is operated by the inlet vacuum as described in my Patent #1,896,714, issued February 7, 1933.

In Fig. 5, the weights 27—22 are suspended from the plate 56, which is made solid with the cam 54 by means of the piece 55. Governor weight pins 57—58 project down from 56 and provide pivots for the centrifugal weights 22—27, which engage with the cam plate 28 exactly as the weights 22—27 do with the cam plate 28 in Fig. 3. A friction disc 59 is provided corresponding to the disc 15 of Figs. 1, 2, 3 and 4. The cam plate 28 is connected to the driving plate 11 by the pins 14 as in Figs. 1, 2, 3 and 5, and the plate 56 is advanced directly by the movement of the pins 57—58, because in this construction there is no slotted plate 52 with slots 53. A similar direct motion without the intervention of a slotted plate is obtained in the constructions shown in Figs. 6, 7, 8 and 9.

In Figs. 6 and 7, a centrifugal weight 35 is shown pivoted at 37 to the plate 38, which is made solid with the bushing 39, which, in its turn, is made solid with the ignition timing cam 40. 35 engages with the pin 36 on disc 31.

The plate 38 is anchored to the friction disc 31 by means of the two radial springs 33—33, which are stretched between the pins 34 and 32, 34 being mounted on the plate 38, and 32 on the friction disc 31.

The spring loading means, shown in Figs. 6 and 7, is substantially the spring loading means used in Fig. 5.

In Figs. 8 and 9, a weight 47 is pivoted on the pin 52', which pin is mounted on the friction disc 43. The centrifugal weight 47 is loaded by the spring 45, which spring is anchored to the friction plate 43 by means of the pin 44, and is connected to the weight 47 by the pin 46.

A bent plate 49 is rigidly connected to the

cam 50 through the connecting piece 99. The portion 48 of this plate 49 rolls against the cam face 88 of the weight 47, being held firmly against the face 88 by means of the spring 51, which spring is anchored to the friction plate 43 by the pin 97.

Operation

In Figures 1, 2, 3 and 4:—

The weights 21, 22 fly out and roll on the cam plate 28, thus advancing the control plate 16 and stretching the springs 18—18. At the same time, the pin 21 on the weight 22 engages with one of the slots 53 in the plate 52, which has been selected to give the desired angular rate of advance to the cam 54. Thus the total advance of the circuit breaker cam 54 with reference to the shaft 10, or in other words the total spark advance, is equal to the advance of the governor control plate 16 on the shaft, caused by the cam action of the weights 22, 27 against the edge of the plate 28, plus the advance of the plate 52 with reference to the plate 16, caused by the inclination of the selected slot 53 with reference to the path of the pin 21 as the weights swing outwardly about their pivots 23, 26. Meanwhile, the tension of the spring 18 has by its distortion from a true radius subjected the friction disc 15 to a circumferential component, which overcomes this circumferential spring 12 and causes a "hop" in the governor characteristic, which is the feature characterizing another application, Serial Number 703,705, filed December 23, 1933.

In the event that the engine throttle is wide open, the depression in the inlet manifold is destroyed and the piston 29 pushes 78, which is usually a leather pad, against the friction disc 15, and thus puts the spring 12 out of action as the drag imposed by the friction and the spring 30 makes the pin 14 close up the gap in the slot 66. This feature is also the subject of the application referred to above. After the "hop" referred to has taken place, the centrifugal force continues to act on the weights 22–27, which continue to roll over the cam plate 28, and the point of contact between the weights and the plate continues to approach the axis and hence the springs 18—18 offer an increasingly stiff restraining influence and so complete with the tendency of the centrifugal force, which increases with the square of the speed to overwhelm the spring.

In Fig. 5, the action is similar to that described in Figs. 1, 2, 3 and 4, except that the spring 12 and piston 29 have been omitted for the sake of simplicity.

In Figs. 6 and 7, the weight 35 flies out and engages with the pin 36, and thus rotates the cam plate 38 and advances the ignition. The two radial springs 33 act to restrain the advance and the cam surface of the weight 35, engaging with pin 36, causes an increasingly great restraining action on the rotation of the governor weight around the pin 37 to be imposed by the springs 33—33.

In Figs. 8 and 9, the weight 47 flies out and stretches the spring 45; meanwhile the spring 51, which is a relatively light spring, causes the cam 50 to rotate with and to follow after the rotation of the weight 47 around its pivot 52' on the plate 43.

Figs. 6, 7, 8 and 9 are shown with the vacuum control 29, 30 and 78 acting in conjunction with the circumferential spring 12.

What I claim is:—

1. In an ignition governor, a driving shaft, a cam and a plate both rigidly connected to said shaft, a governor control plate rotatably mounted on said shaft, a pair of governor weights pivotally mounted on said control plate and engaging said cam to advance the control plate with the weight pivots as the weights move under the influence of centrifugal force, ignition timing means adapted to be advanced by such movement of the weights, spring means resisting the advance of said control plate, and means for progressively increasing the distance between the weight pivots and the points of engagement of the weights with said cam, as the weights are thus moved.

2. In an ignition governor, a driving shaft, a driving plate mounted thereon, ignition timing means concentric therewith, a driven plate in fixed relation to the timing means, a concentric governor control plate, a centrifugal governor weight pivotally mounted on said control plate and operable to advance the driven plate according to the speed of rotation, and substantially radial spring means acting between the driving plate and the governor control plate to oppose the centrifugal force.

3. In an ignition governor, a driving shaft, a driving plate mounted thereon, ignition timing means concentric therewith, a driven plate in fixed relation to said timing means and having a plurality of slots, a plurality of centrifugal governor weights located between said driven and driving plates, a governor control plate upon which said weights are pivotally mounted, substantially radial springs acting between the governor control plate and said driving plate, a cam mounted on the driving shaft adapted to engage with said governor weights, and a single driving means mounted on one of the governor weights and engaging one of the slots in the driven plate.

4. In an ignition governor, a driving shaft, a driving plate mounted thereon, a second plate loosely mounted on the driving shaft and concentric with the driving plate, yieldable driving means for said second plate and rigid driving means therefor, the latter being operative after the second plate has moved a limited number of degrees relative to the driving plate, ignition timing means, a driven plate fixed with reference to the timing means and having a plurality of timing slots, a plurality of centrifugal governor weights located between the driving and driven plates, a governor control plate upon which said weights are pivotally mounted, substantially radial springs extending between said second plate and the governor control plate, a cam mounted on the driving shaft and adapted to be engaged by said governor weights, and a single driving means on one of the governor weights and engaging one of the slots in said driven plate.

5. An ignition governor for internal combustion engines, comprising a driving plate, a driving cam in fixed relation thereto, a driven plate, a governor weight control plate, a plurality of governor weights mounted on said control plate, said control plate and weights being located between the driving and driven plates and the weights engaging between the cam and the driven plate to advance the latter, and means including a radial spring acting between said control plate and said driving plate.

6. An ignition governor for internal combustion engines, comprising a driving plate, a driving cam in fixed relation thereto, a driven plate, a governor weight control plate located between

the driving and driven plates, a governor weight pivotally mounted on said governor weight control plate and engaging said cam, and spring means acting between the control plate and said driving plate.

7. An ignition governor for internal combustion engines, comprising a driving plate, a driving cam in fixed relation thereto, a driven plate, a governor weight control plate located between the driving and driven plates, a governor weight pivotally mounted on said control plate and engaging said cam, and means including a radial spring connecting the control plate to said driving plate.

8. An ignition governor for internal combustion engines, comprising a drive shaft, a driving plate in fixed relation thereto, a second plate, a governor weight pivotally mounted thereon, means including a tension spring connecting the second plate to the driving plate, and a projection from the driving plate adapted to engage the governor weight at a progressively increasing distance from the governor weight pivot as the weight swings outwardly.

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