July 19, 1960 C. L. JULIAN ET AL 2,945,923

IGNITION DISTRIBUTOR

Filed July 28, 1955 3 Sheets-Sheet 1

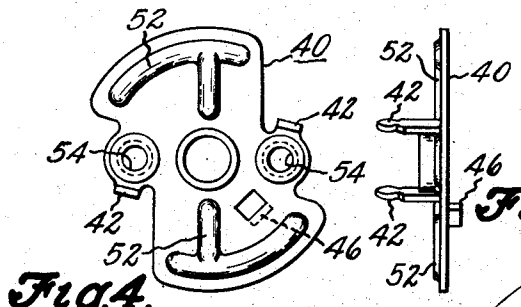


Fig.4.

Fig.5.

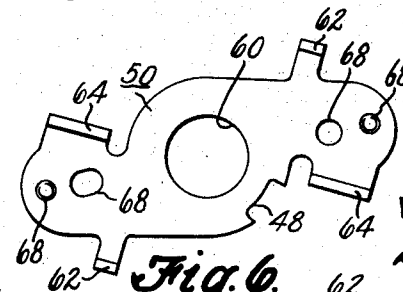


Fig.6.

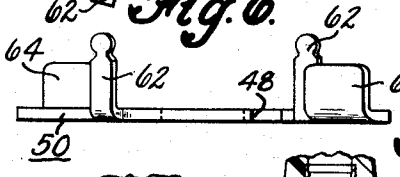


Fig.7.

Fig.1.

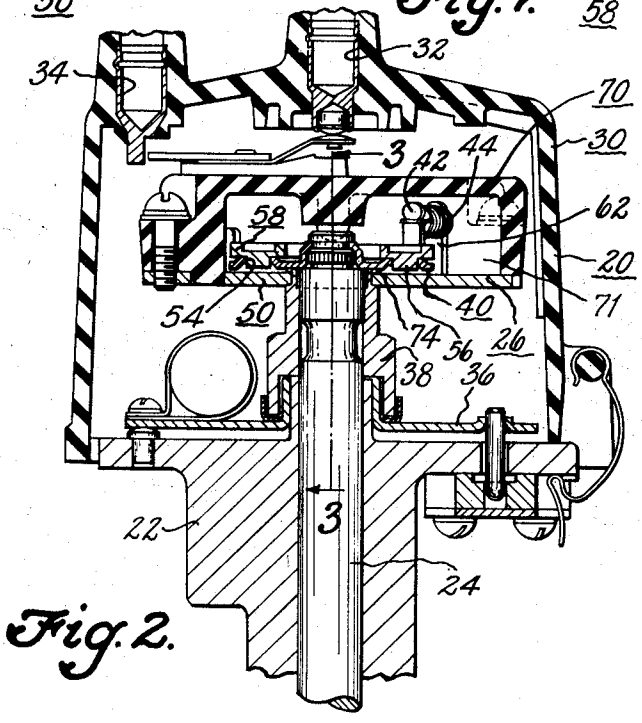


Fig.2.

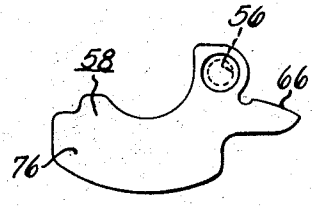


Fig.8.

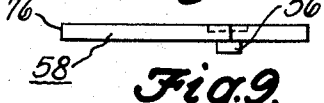


Fig.9.

INVENTORS
CLARENCE L. JULIAN
BY KEITH W. EPPLY
JAMES C. NORRIS
John I. Marvin
ATTORNEY

July 19, 1960 C. L. JULIAN ET AL 2,945,923

IGNITION DISTRIBUTOR

Filed July 28, 1955 3 Sheets-Sheet 2

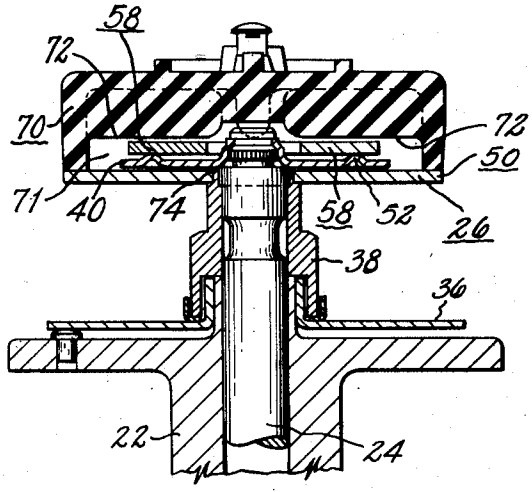


Fig. 3.

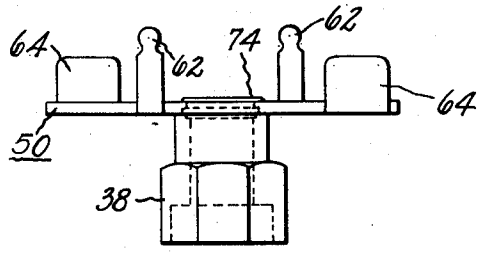


Fig. 10.

INVENTORS
CLARENCE L. JULIAN
BY KEITH W. EPPLY
JAMES C. NORRIS
John T. Marsh
ATTORNEY

July 19, 1960 C. L. JULIAN ET AL 2,945,923

IGNITION DISTRIBUTOR

Filed July 28, 1955 3 Sheets-Sheet 3

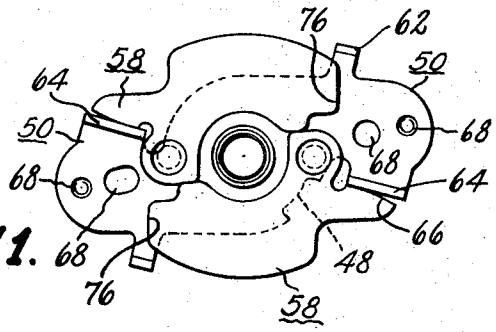


Fig. 11.

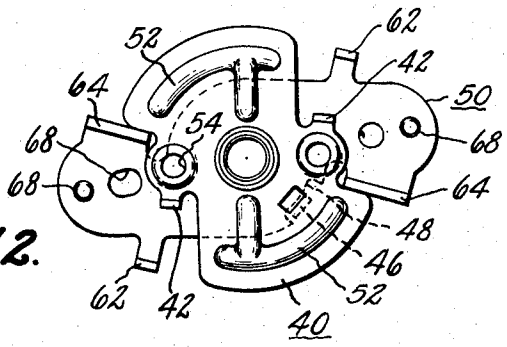


Fig. 12.

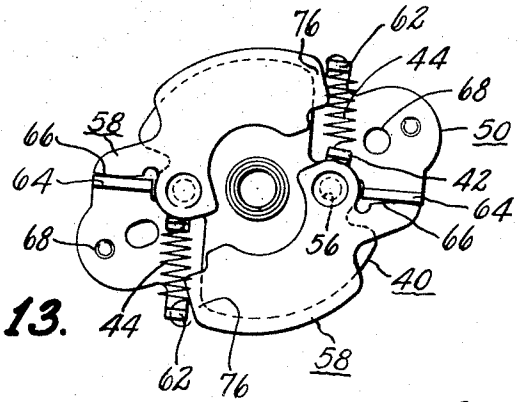


Fig. 13.

INVENTORS
CLARENCE L. JULIAN
BY KEITH W. EPPLY
JAMES C. NORRIS
John T. Mowrin
ATTORNEY

United States Patent Office 2,945,923
Patented July 19, 1960

2,945,923

IGNITION DISTRIBUTOR

Clarence L. Julian and Keith W. Epply, Anderson, and James C. Norris, Pendleton, Ind., assignors to General Motors Corporation, Detroit, Mich., a corporation of Delaware

Filed July 28, 1955, Ser. No. 524,916

4 Claims. (Cl. 200—31)

This invention relates to ignition timer distributor units for internal combustion engines and is particularly concerned with the class of ignition timer distributor units that have speed responsive mechanisms for changing the angular relationship between a cam and a circuit breaker.

It is among the objects of the present invention to provide an ignition apparatus which is efficient, reliable in operation and can be produced at a low cost. This object is materialized by forming the individual weights of the distributor with a contoured cam surface and integral projections which provide points of pivot for the weights when the projections are received in openings in the weight plate of the centrifugal advance mechanism.

Another object of the present invention is to enclose centrifugal advance mechanism of a distributor with the distributor rotor and to provide integral ribs on the interior of the closure portion of the rotor which ribs are disposed to prevent displacement of the centrifugal weights from the point of pivot on the weight plate of the advance mechanism.

A further object of the present invention is to integrally form a flat cam surface on the base plate and spring anchors on the weight and base plates of a centrifugal advance mechanism of a distributor so as to considerably reduce the cost of manufacture of the distributor.

A still further object of the present invention is to provide a cam surface of predetermined contours on the weights of the distributor and to arrange the weights relative to the cam and weight plates so that the weights when moved by centrifugal force will exert a direct pushing action rather than a pulling action on the cam lugs which are integrally formed on the cam plate of the centrifugal mechanism.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein preferred embodiments of the present invention are clearly shown.

In the drawings:

Figure 1 is a plan view of a distributor embodying the present invention with the distributor cap and rotor removed.

Figure 2 is a vertical longitudinal sectional view of the distributor with the rotor and cap installed, taken substantially along the line 2—2 in Figure 1.

Figure 3 is a vertical longitudinal sectional view taken along the line 3—3 in Figure 2 showing the ribs on the distributor rotor which maintain the weights of the advance mechanism in position.

Figures 4 and 5 are plan and elevational views, respectively, of the weight plate for a distributor according to the present invention.

Figures 6 and 7 are plan and elevational views of the advance plate for the distributor advance mechanism according to the present invention.

Figures 8 and 9 are plan and elevational views, respectively, of the weights for the advance mechanism according to the present invention.

Figure 10 is an elevational view showing the advance plate as secured to the breaker cam mechanism.

Figure 11 is a plan view showing the weights in a normal position on the weight plate.

Figure 12 is a plan view of the advanced mechanism showing the arrangement of the weight and advanced plate with the weights and springs removed.

Figure 13 is a view of the parts of the advanced mechanism showing the arrangement of parts when the weights have been pivoted by centrifugal force.

Referring to the drawings, the numeral **20** designates a distributor which is similar to that shown on application Serial Number 400,024, which has been assigned by the inventors to the assignee of the present invention. The distributor **20** comprises a housing **22**, which has a shank which provides a bearing for the ignition timer shaft **24**, the lower end of which is connected to a driven mechanism, not shown, to drive the shaft **24** in synchronism with the engine. The distributor **20** is provided with a centrifugal advanced mechanism **26** and a vacuum advance mechanism **28**. The internal parts of the distributor are enclosed by a molded cap **30** which has conventional coil **32** and spark plug **34** terminals. The vacuum advance mechanism **28** is responsive to engine suction and is arranged to move the breaker plate **36** so that the breaker points, not shown, may be moved relative to breaker cam **38**.

Referring to Figures 4 and 5, the weight plate **40**, which is preferably formed by punching or stamping a thin sheet metal, is formed to have a central opening which will permit the weight plate **40** to be secured to the knurled end of shaft **24** and a pair of lugs **42** which extend to provide anchors for one end of the springs **44**. The weight plate **40** is also provided with a suitably located stop **46** which will be received in slot or notch **48** in the base plates **50** shown in Figures 6 and 7. The weight plate **40** is also provided with the ridges **52** which are formed as shown in Figure 4 to provide a bearing surface for the weights **58** when the parts are assembled. Included also in the weight plate **40** are a pair of spaced apertures **54** which are adapted to receive the projections **56** on the weights **58** and provide a pivot therefor.

The base plate **50** is formed with an enlarged central aperture **60** which will surround the extension of shaft **24** and permit the base plate **50** to be secured to cam **38** as in Figure 10. The base plate **50** is also preferably formed of thin sheet metal to have a pair of spaced lugs **62** which provide the anchor for the other end of springs **44** and a pair of spaced lugs **64** which provide the cam surface which is engaged by the contoured cam surface **66** on weights **58**. Two pairs of openings **68** are also suitably located in base plate **50** so that the rotor body **70** may be suitably secured to the base plate **50** and enclose the centrifugal advance mechanism.

The rotor body **70** is preferably molded to have an internal chamber **71** which is closed by the base plate **50** and which has a plurality of ribs **72**. These ribs **72** are preferably oriented at 90° from one another and are spaced from the weights **58** so as to permit free pivotal movement thereof relative to the weight plate **40** and base plate **50** while limiting vertical movement of the weights **58**.

When the parts of the advance mechanism are assembled, the shaft **24** is telescoped within the cam **38** so that the weight plate, which is secured to shaft **24**, bears upon the turned lip **74** which is formed on cam **38** to secure the cam **38** to base plate **50**. This lip **74** provides a bearing surface for weight plate **40** so that it will freely move on plate **50**. The weights **58** have integrally formed projections **56** and a cam surface **66**. The cam surface

66 has a predetermined contour which is determined by the characteristics of the engine on which the distributor is to be installed. The weights 58, when installed in the advance mechanism, are positioned relative to the base plate 50 and weight plate 40 by inserting the projections 56 within apertures 54 of the weight plate 40. After the weights are in position, the springs 44, which also have predetermined characteristics as determined by the engine characteristics, are tensioned and anchored on lugs 62 on base plate 50 and lugs 42 on weight plate 40 to cause the cam surface 66 to ride upon the flat surface of lugs 64.

From the above arrangement of parts, it is obvious that as shaft 24 rotates, the end portions 76 of weights 58 will move, because of centrifugal force, outwardly. This movement of the weights will cause the cam surface 66 to directly bear against the flat surface of lugs 64 and cause the base plate 50 to rotate relative to weight plate 40. This relative movement of the plates 40 and 50 will cause the angular position of cam 38 to shift relative to shaft 24 while the parts are rotating. When the centrifugal force exerted by shaft 24 on weights 58 has reached a predetermined amount, the stop means or lug 46 will engage one of the ends of the slot 48 and limit the relative movement of plates 40 and 50. The centrifugal force upon the weights is constantly opposed by the tension of springs 44 which constantly urge the parts to resume their normal positions as shown in Figures 11 and 12 of the drawings.

While the embodiments of the present invention as herein disclosed, constitute preferred forms, it is to be understood that other forms might be adopted.

What is claimed is as follows:

1. In a distributor for an internal combustion engine having; an engine driven shaft, a breaker point assembly, a cam for actuating said breaker point assembly and a cap having spaced terminals therein, a speed responsive means for coupling said shaft and cam and altering the angular relationship between said shaft and cam in response to the rotation of said shaft, said means comprising; a weight plate fixed to said shaft, a base plate fixed to said cam, said weight plate having; a pair of spaced apertures therein, a raised portion on one surface and a pair of spaced lugs integrally formed thereon extending upward from said surface, said base plate having two pairs of spaced upstanding lugs integrally formed therewith, a pair of weights each having; a surface in engagement with the raised portion on said weight plate, a surface of predetermined contour in engagement with one of the lugs of said base plate and a lug integrally formed on said weight extending into an aperture in said weight plate to provide a pivotal connection therebetween, a pair of springs each extending under tension between a lug on said weight plate and the other of said pair of lugs on the base plate for constantly urging said weight plate, base plate and weights to a predetermined normal position and a distributor rotor having a cavity therein enclosed by said base plate, said rotor being secured to said base plate and having a rib portion in said cavity arranged for maintaining the pivotal connection between said weights and weight plate.

2. An ignition timer comprising in combination; a circuit breaker, a cam for actuating said circuit breaker, an engine driven shaft, and a speed responsive means coupling the shaft and cam and adapted to alter the angular relation between the shaft and the cam, said means including; a weight plate connected to said shaft having a pair of spaced apertures therein and integral bearing means formed as projecting ribs, a stop means and a pair of spaced spring anchor lugs, a base plate secured to said cam, said base plate having; a means for supporting a distributor rotor means having a cavity with ribs therein, a pair of spaced cam surfaces, a pair of spaced spring anchor lugs and a means for cooperating with said stop means for limiting rotation between said weight plate and base plate, a pair of weights each disposed to ride upon said bearing means on said weight plate and having; a cam surface of predetermined contour in engagement with the cam surface on said base plate and an integral projection extending into a respective aperture in the weight plate and held therein from movement away from said weight plate by the ribs of said rotor and providing a pivotal connection between said weight plate and weight, and a pair of springs each carried by an anchor lug in the base plate and weight plate and arranged for constantly opposing the pivotal movement of said weights on said base plate.

3. In a device of the character described, a distributor rotor having an electrical contact and a chamber therein closed by a base plate, the combination comprising; a weight plate in said chamber located above said base plate, a pair of weights having integral projections disposed in apertures in said weight plate, and a plurality of ribs integral with said rotor and located within said chamber for maintaining said projections from displacement from said apertures, said weights being located between said ribs and said weight plate.

4. A centrifugal mechanism for a distributor having a drive shaft and a breaker cam that is rotatable with respect to the drive shaft comprising, a weight plate fixed to said drive shaft having spaced openings and having integral ribs formed in its top surface, a base plate fixed to said breaker cam, a rotor member having an internal chamber secured to said base plate having internal downwardly extending ribs with marginal edges that are spaced from the upper rib surface of said weight plate, a pair of weight members each having an integral pin fitting in the respective openings of said weight plate, said weights being positioned between the rotor ribs and the weight plate and resting on said weight plate ribs, said base plate having portions engaging said weights, and spring means interposed between said base plate and said weight plate.

References Cited in the file of this patent

UNITED STATES PATENTS

357,862	Sheldon	Feb. 15, 1887
1,029,026	Newman	June 11, 1912
1,556,909	Burgher	Oct. 13, 1925
2,024,630	Davis	Dec. 17, 1935
2,115,462	Hittle	Apr. 26, 1938
2,306,549	Louis	Dec. 29, 1942
2,657,035	Hartman	Oct. 27, 1953
2,699,657	Vogel	Jan. 18, 1955
2,754,384	Atkinson	July 10, 1956
2,769,047	Hartzell et al.	Oct. 30, 1956

FOREIGN PATENTS

770,316	France	June 25, 1934