March 19, 1946. G. J. WOREL 2,396,909

WEAR COMPENSATING DEVICE FOR DISTRIBUTOR VACUUM CONTROL

Filed Oct. 7, 1942

Fig. 1

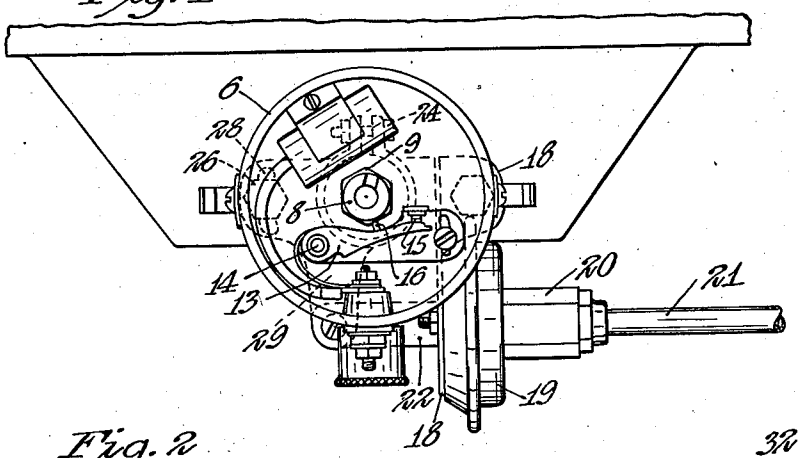


Fig. 2

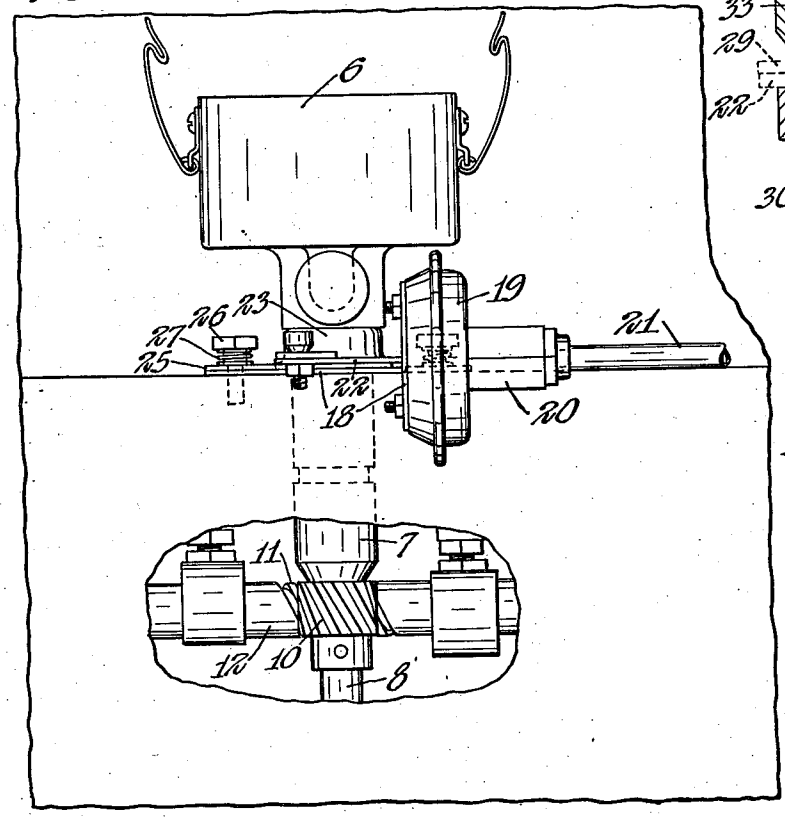
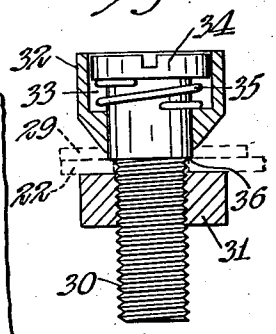


Fig. 3



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WEAR COMPENSATING DEVICE FOR DISTRIBUTOR VACUUM CONTROL

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4 Claims. (Cl. 287—101)

This invention relates to spark distributor vacuum controls for internal combustion engines and more particularly to wear compensating devices therefor.

Certain models of automobiles manufactured by the Chevrolet Motor Company have automatic spark timing adjusting means controlled by the increase of decrease of negative pressure in the fuel intake manifold of the engine. In general they include a pressure responsive device connected to the movable spark distributor casing to shift the casing with a resultant advancing or retarding of the spark. If the engine is laboring for instance the vacuum will decrease in the intake manifold and the pressure responsive device will shift the distributor casing to retard the spark. When the vacuum in the intake manifold increases the spark will be advanced by the pressure responsive device.

The distributor casing has a torque arm connected thereto and extending outwardly therefrom and the pressure responsive device has a movable arm forming a part thereof, said arm being pivotally connected to the torque arm on the distributor casing. It is well known that intake manifold pressures fluctuate very frequently with a resultant frequent movement of the pressure responsive device and the pivotal connection between its arm and the torque arm on the distributor casing. This frequent movement causes wear in the pivotal connection between the two arms and even a slight amount of wear will affect the necessary definite relationship between engine timing and intake pressure so that the timing is thrown off and the intended saving of fuel through the use of the vacuum control is nullified.

It is, therefore, an object of my invention to provide a pivotal connection between the arm or link on the pressure responsive device and the torque arm on the distributor which will automatically compensate for wear in the pivotal connection so that the proper pivotal axes of the two arms in the connection will be maintained in coincidence in alignment.

A more specific object of the invention is to provide a wear compensating device which is relatively simple to manufacture and install and which will not materially increase the cost of producing the distributor control.

These and other objects and advantages of the invention will more fully appear from the following description made in connection with the accompanying drawing, wherein like reference characters refer to the same parts throughout the views, and, in which:

Fig. 1 is a top plan of an internal combustion engine distributor with the cap removed and with the vacuum control connected thereto;

Fig. 2 is a side elevation of a portion of an internal combustion engine showing the distributor with the cap removed, the vacuum control and a portion of the engine cam shaft; and

Fig. 3 is an enlarged view partially in section and partially in dotted lines of the pivotal connection between the vacuum control and the distributor torque arm.

In Figs. 1 and 2 there are illustrated portions of an internal combustion engine indicated generally at A. Suitably supported by the engine is a rotary distributor casing 6. The distributor casing 6 has a reduced downward extension 7. The casing extension 7 has a longitudinal bore therethrough and in said bore is positioned a distributor rotor or shaft 8. This rotor extends upwardly to the enlarged upper portion of the distributor casing 6, as indicated best in Fig. 1. On the upper end of the rotor shaft 8 is a distributor cam 9. On the lower end of said shaft 8 is a gear 10 meshing with a worm 11 on the engine cam shaft 12.

Pivotally supported by the distributor casing 6 and within the same is a breaker arm 13 swinging about a pivot 14. At the opposite end of the breaker arm 13 is a pair of breaker points 15 one of which is on the breaker arm 13 and the other of which is stationarily supported by the distributor casing 6, as is well known to those skilled in the art. A fiber cam follower 16 is supported by the breaker arm 13 and adapted to ride upon the cam 9. Of course, rotation of the distributor rotor or shaft 8 and cam 9 will cause alternate separation and contacting of the breaker points 15 to make and break the ignition circuit to the spark plugs of the engine.

As is also well known in the art if the distributor casing 6 is partially rotated it will also shift the position of the breaker arm 13 and either retard or advance the timing of the spark supplied to the fuel mixture in the cylinders of the engine.

Suitably supported from the internal combustion engine A by a bracket 18 is a pressure responsive device 19 in the form of a diaphragm within a casing. The details of the diaphragm are not shown since the pressure responsive device is of a conventional type. One side of the pressure responsive device 19 is provided with a pipe connection 20, and said connection 20 is in

turn connected to a line 21 whose other end is in communication with the intake manifold of the engine. Extending from the opposite side of the pressure responsive device 19 is a link or arm 22 whose right-hand end is connected to the diaphragm within said pressure responsive device.

A split ring 23 is positioned about the reduced downwardly extending portion of the distributor casing 7 and secured by a nutted bolt 24 shown in dotted lines in Fig. 1. Extending from one side of the ring 23 is an ear 25 which is secured to the engine by a bolt 26 having a compression spring 27 under its head. The ear 25 is provided with an arcuate slot 28 permitting said ring 23 and ear 25 to be shifted to some extent about the axis of the distributor casing 6 and the distributor casing would likewise be shifted due to the fact that ring 23 is clamped thereto.

A torque arm 29 extends outwardly from the ring 23 and the outer end of said torque arm 29 overlies the left-hand end of the link or arm 22 of the pressure responsive device 19. The ends of these two arms are apertured, the aperture in the arm 29 being frusto-conical and a pin 30 extends through the apertures in said arms 22 and 29 to constitute a pivot pin. The lower end of the pin 30 is threaded as shown in Fig. 3 and carries a nut 31. The upper end of the pin 30 is smooth and the smooth portion thereof extends through the torque arm 29. Slidably mounted on the smooth upper portion of the pin 30 is a frusto-conical wedge 32 which has a socket 33 in its upper portion about the head 34 on the pin or bolt 30. Between the head 34 and the bottom of the socket 33 is interposed an expansion spring 35. The spring 35 normally urges the frusto-conical portion of the wedge 32 into and partially through the opening formed in the torque arm 29.

When the pin or bolt 30 is inserted through the openings in the arms 22 and 29 the nut 31 is then turned on the lower threaded portion of the pin 30, the arm 22 on the pressure responsive device 19 lying between the nut 31 and a shoulder 36 formed on the pin 30. Thus arm 22 is tightly clamped and there is no movement between said arm and the pivot pin 30. Consequently, no wear takes place at this point. The torque arm 29, however, must necessarily move about the pivot pin whenever the pressure responsive device 19 is actuated but as wear occurs the frusto-conical wedge element 32 is pushed downwardly slightly by the spring 35, thus taking up the wear and maintaining the pivotal axes of arms 22 and 29 in constant alignment. If an ordinary pivot pin or bolt is used wear will occur and there will be a shifting of the pivotal axes of the two arms relative to each other, and this will change the degree of movement of the distributor casing 6 under given pressures and as a result will change the timing of the spark to a different ratio than the one desired. With my improved assembly, however, the degree of movement of the distributor casing 6 relative to certain pressures in the intake manifold will be the same at all times. Thus the effectiveness of the vacuum control or automatic timing adjustment will remain the same with the result that the saving of fuel through proper adjustment of timing will result throughout the life of the engine.

It will, of course, be understood that various changes may be made in the form, details, arrangement and proportions of the various parts without departing from the scope of my invention.

What is claimed is:

1. A device for accurately translating motion including, a rectilinearly movable element, an element mounted for precise swinging movement about a fixed pivot, said elements being adapted for pivotal interconnection, a device for connecting said elements to accurately translate the rectilinear movement of said first mentioned element into a pivotal movement, a portion of said device being removably yet rigidly clamped to one of said elements, the other of said elements having an aperture therethrough to receive a portion of said device, and said device including a spring pressed frusto-conical member seated in said aperture and exerting a thrust along the axis of the pivotal connection between said elements.

2. The structure in claim 1 and the adjacent ends of said elements being in overlapping relationship, and said frusto-conical member being disposed on the outer side of one of said elements and exerting a resilient force toward the other of said elements.

3. In a device of the class described, a pair of movable arms, each of said arms being adapted for movement through an exact predetermined distance, and a device connecting adjacent ends of said arms to transmit the motion of one arm to the other, a portion of said device being removably yet rigidly clamped to one of said arms, said connection including means for maintaining a constant relative positional relationship between said arms, and said means being automatically movable to counteract any tendency of said arms to change said constant relative positional relationship.

4. In a device of the class described, a pair of relatively movable arms, a device pivotally connecting adjacent ends of said arms, a portion of said device being fixed upon one of said arms and having a portion passing through the other of said arms, the latter arm being provided with an aperture having a frusto-conical wall defining the same, and said connecting device including a spring pressed frusto-conical member seated in said aperture and extending only partially through said arm.

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