ABSTRACT: Pitting of the ignition contacts of an ignition distributor is avoided by effecting relative displacement or wiping action between the fixed and movable contacts. The wiping action is achieved by shifting the breaker arm axially on its pivot shaft in response to variations in the intake manifold pressure of the associated internal combustion engine. The contacts may therefore be associated with a distributor which does not employ manifold or vacuum advance characteristics. When the breaker arm pivot shaft is parallel to the distributor rotor shaft, provision of helically extending lobes on the distributor cam will also effect advance-retard characteristics in response to axial movement of the breaker arm on its pivot shaft. Alternatively, with a distributor cam having lobes extending parallel to the axis of the rotor shaft, inclination of the pivot shaft for the breaker arm likewise effects the advance-retard characteristics. In all arrangements, axial shifting of the breaker arm on its pivot shaft effects a wiping action between the fixed and movable contacts.
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POINT CONTACT MOUNTING FOR ILLNITION

DISTRIBUTORS

BACKGROUND OF THE INVENTION

In the usual induction coil system used for firing the spark plugs of an internal combustion engine, a fixed ignition point contact is associated with a breaker arm carrying a further contact and the breaker arm is pivoted on a shaft so that make and break of the contacts is established by engagement between the rubbing block on the breaker arm and the distribu-
tor cam. It is well known that in such systems, the contact points pit or corrode rather rapidly so that frequent replace-
ment of the contact points is required. This problem persists
despite the fact that ignition points contemporarily
are made of relatively exotic materials which resist the pitting
or corroding to a greater extent than materials which have
been previously used. To minimize this pitting or corroding, it
has previously been suggested to incorporate a separate
mounting for the breaker arm which is controlled by the usual
vacuum advance diaphragm associated commonly with igni-
tion distributors so that as the breaker arm is moved with
respect to the distributor cam to effect the requisite advance-
retard characteristics, it also causes movement of its contact
point with respect to the fixed contact point so point so that a
wiping or rubbing action is attained between the fixed and
movable points. Such prior arrangements have, however, been
restricted to use in conjunction with vacuum advance distribu-
tors.

BRIEF SUMMARY OF THE INVENTION

The present invention is directed to an arrangement so as to
obtain a wiping action between the fixed and movable con-
tacts of ignition point contact arrangement which is not
restricted to use in conjunction with a vacuum advance dis-
tributor and therefore may be used with any desired type of

In essence, the present invention involves the utilization of a
breaker arm mounted on a pivot shaft therefor and which is
axially shiftable on such pivot shaft so as to effect relative wip-
ing action between the fixed and movable contacts of the igni-
tion point system. The axial shifting of the breaker arm is ef-
ected by a desired mechanism which will periodically effect
such shifting and, conveniently, the actuating mechanism may
take the form of an actuator such as a bellows or diaphragm
controlled by the negative pressure in the intake manifold of
an internal combustion engine and suitably linked to
mechanism for effecting the axial shifting or the breaker arm
as aforesaid.

In addition to the above, by shifting the breaker arm in a
path parallel to the rotor shaft of the distributor and providing
helically extending cam lobes on the distributor cam, the
aforementioned wiping effect between the fixed and movable
contacts is effected simultaneously with advance-retard ef-
fet.

Alternatively, the pivot shaft for the breaker arm may be
inclined with respect to the rotor shaft and the cam lobes con-
nventionally formed, i.e., parallel to the axis of the rotor shaft
whereby axial shifting of the contact arm breaker arm on the pivot
shaft which is inclined as aforesaid will effect requisite ad-

BRIEF DESCRIPTION OF THE DRAWING FIGURES

FIG. 1 is a plan view showing the breaker plate and cam of
an ignition distributor and illustrating the ignition points and
the mechanism for shifting the breaker arm according to the
present invention;

FIG. 2 is a partial view illustrating a form of the invention

FIG. 3 is a view similar to Figure 2 but showing a modified
form of the invention;

FIG. 4 is a view similar to FIGS. 3 and 2 but showing a still

FIG. 5 is a partial view illustrating a form of the invention

Referring now more particularly to FIG. 1, reference
caracter 10 therein indicates the conventional breaker plate
of an ignition distributor which mounts, in usual fashion, a
fixed contact point 2, cooperating with a movable contact
point 3 carried on the breaker arm 4 having an insulated boss
portion pivotally received on the shaft 8 which, as shown in
FIG. 2, is suitably anchored to the breaker plate 1. In an en-
tirely conventional manner, the breaker arm 4 is provided
with a leaf spring 5 abutting the insulator piece 6. Normally to

The breaker arm 4 carries a rubbing block 8 which is
adapted to be selectively engaged by the lobes of the cam to
make and break the contacts 2,3 in entirely conventional
fashion. In conventional vacuum advance distributors, the en-
tire breaker plate is rotatable about the axis of the rotor shaft
to which the cam 7 is affixed and a diaphragm actuator
mounted on the housing of the distributor is provided with a
suitable link or rod connected to the breaker plate for rotating
the breaker plate with respect to the rotor shaft to effect the
ignition advance-retard characteristics as is well known in the
art.

In accord with the present invention as shown in FIGS. 1
and 2, the breaker plate 1 is fixed and the cam 7 may be actu-
ated to impart the desired advance-retard characteristics by a
conventional centrifugal mechanism. As shown in FIG. 2, the
insulated hub of the breaker arm 4 is of an axial length sub-
stantially less than the pivot shaft 8 therefor and a suitable
removable washer member 8' is fixed to the free end of the
pivot shaft 8 and provided a seat for a compression spring 9
received in and seating within a recess in the corresponding
end of the breaker arm boss. The opposite end of the breaker
arm boss bears against an insulated bushing 10 having a
reduced diameter portion 10a and diamentically opposed
protrusions 10b. The breaker plate is provided with upstand-
ting tabs 13 and 14 mounting therebetween a pivot shaft 12
upon which a bellcrank 11 is pivotally received, one arm of
the bellcrank 11 being hinged as indicated by the reference
characters 11a to straddle the reduced diameter portion
10a of the bushing 10 and upon which the protuber-
ces or protrusions 10b bear under the action of the com-
pression spring 9. The other end 11b of the bellcrank 11 is
fixed to a stub shaft 11 which is provided with a transverse
bore receiving and anchoring to the inner end of a link 15. A
U-shaped sheet metal or like toothed cam member 17 is
disposed as shown and the teeth thereon as is illustrated in
FIG. 1 cooperate with a protrusion on a washer member 19
surrounding the shaft or link 15 so as to bear against the
compression spring 16 and thereby vary the initial compression
therein. The opposite end of the compression spring 16 bears
up a suitable actuator to which the link 15 is also secured.
Such actuator may take the form of a diaphragm similar to the
diaphragm used for ordinary vacuum advance actuators for
ignition distributors. In response to increasing negative pressure
in the intake manifold of the internal combustion engine, the
link 15 is moved in the direction of the arrow F in FIGS. 1 and
2 whereby to rock the bellcrank 11 about its pivot 12 and thus
cause axial shifting of the breaker arm 4 along the shaft 8 in
opposition to the compression spring 9. The compression spring 9 of course returns the breaker arm to the FIG. 2 posi-
tion when the intake manifold pressure is at ambient at-
mospheric pressure.
With the above arrangement, it will be appreciated that normal fluctuations in the intake manifold pressure will cause the breaker arm to shift axially back and forth along the shaft and thereby cause a relative slipping action between the movable contacts and the fixed contact whereby to minimize the normal pitting or corroding action which takes place between the breaker points of an ignition distributor mechanism.

With reference now to FIG. 3, wherein a modified form of the invention is shown, it will be seen that the bellcrank 11 in this case bears against an insulated button 10' seated within the open free end of the boss of the contact breaker arm which, in this case, extends beyond the pivot shaft 8 as shown. Otherwise, the action is identical with that described in conjunction with FIGS. 1 and 2.

The arrangement shown in FIG. 4 illustrates a pair of breaker arms 4 and 4' which are bridged by an actuator plate 20 extending between the hub portions of the breaker arms 4 and 4' which are received on the pivot shafts 8 and 8'. In this case, the bellcrank 11 is provided with a finger portion 11' engaging the plate 20 so as to shift the breaker arm in unison along their shafts 8 and 8' in the direction of the arrow of FIG. 4.

FIG. 5 shows somewhat diagrammatically a further embodiment of the invention which in this case, achieves not only the aforementioned relative wiping or rubbing action between the fixed and movable contacts, but also effects advance-retard characteristics as the breaker arm is axially shifted along its pivot shaft. In FIG. 5, the lobe 21a of the distributor cam 21 is helically extending as indicated and the rubbing block 22 of the associated breaker arm 4'' is correspondingly angled as illustrated. The bellcrank associated with the breaker arm 4'', which may be identical with the FIGS. 2 or 3 embodiments described, shifts the breaker arm 4'' in the direction of the arrow F, so as to achieve not only the aforementioned wiping action but also to advance the make and break opening of the contacts with respect to the angular disposition of the rotor shaft to which the cam 21' is fixed.

The same effect may be achieved by inclining the pivot shaft 23 for the breaker arms 4''' and 4''' as shown in FIG. 6 with respect to the axis of the rotor shaft, the distributor cam 24, in this case, having its cam lobes extending parallel to the axis of the shaft S in conventional fashion. By virtue of the inclination of the pivot shaft 23, the actuating mechanism in imparting motion to the breaker arms in the direction of the arrow F in FIG. 6 also cause the rubbing blocks 25 of the breaker arms to shift in the direction of the arrow F, relatively to the cam and thereby advance the make and break relationship between the fixed and closed contacts of the ignition distributor points.

Thus, by utilizing a manifold vacuum actuator for the bellcrank 11 in FIGS. 5 and 6, not only is the wiping action achieved, but also the automatic advance-retard motion is established.

What is claimed is:

1. In an ignition distributor having a rotor shaft, a cam driven by said shaft, and a breaker plate adjacent the level of said cam, in combination,
a fixed ignition point contact carried by said breaker plate,
a breaker pivot shaft on said breaker plate,
a breaker arm pivotally mounted on said pivot shaft having a contact remote therefrom for make and break engagement with said fixed contact and having a rubbing block engageable by said cam, and
means for shifting said breaker arm axially of said pivot shaft to cause relative movement between said fixed contact and said breaker arm contact for cleaning the contacts and for varying the ignition timing as a function of the vacuum as responsive to a function of the engine load.

2. In the ignition distributor as defined in claim 1 wherein said pivot shaft is parallel with said rotor shaft.

3. In the ignition distributor as defined in claim 1 wherein said pivot shaft is inclined with respect to the axis of said rotor shaft whereby said axial shifting of said breaker arm also effects change in the make and break timing of said contacts for cleaning the contacts and for varying the ignition timing as a function of the vacuum as responsive to a function of the engine load.

4. In the ignition distributor as defined in claim 1 wherein said cam is provided with lobes extending helically of the axis of said rotor shaft whereby said axial shifting of the breaker arm also effects change in the make and break timing of said contacts.

5. An ignition distributor comprising a rotatable cam, a fixed ignition contact and a breaker arm, said breaker arm being pivotally mounted remote from said fixed contact and having a contact engaging said fixed contact, said breaker arm also including a rubbing block engageable by said cam for pivoting said breaker arm in a predetermined plane away from said fixed contact, and
means for shifting said breaker arm back and forth perpendicular to said plane to effect relative wiping action between said contacts.

6. An ignition distributor as defined in claim 5 wherein said cam includes a bellcrank engaging said breaker arm and a link for oscillating said bellcrank.

7. In the ignition distributor as defined in claim 6 including a compression spring bearing against said breaker arm in opposition to said bellcrank.

8. The ignition distributor as defined in claim 5 wherein said breaker arm is shifted parallel to the axis of said cam, said cam having helical lobes whereby said shifting of the breaker arm also effects variation in the ignition advance characteristic of said contacts.

9. The ignition distributor as defined in claim 5 wherein said breaker arm is shifted along an axis inclined with respect to the axis of said cam, said cam having lobes parallel to its axis whereby said shifting of the breaker arm also effects variation in the ignition advance characteristic of said contacts.