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Jukes

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[54] **VACUUM UNITS**

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[51] **Int. Cl.** **F02p 5/04**

[58] **Field of Search** ..... 123/117 A, 117 R, 146.5 A

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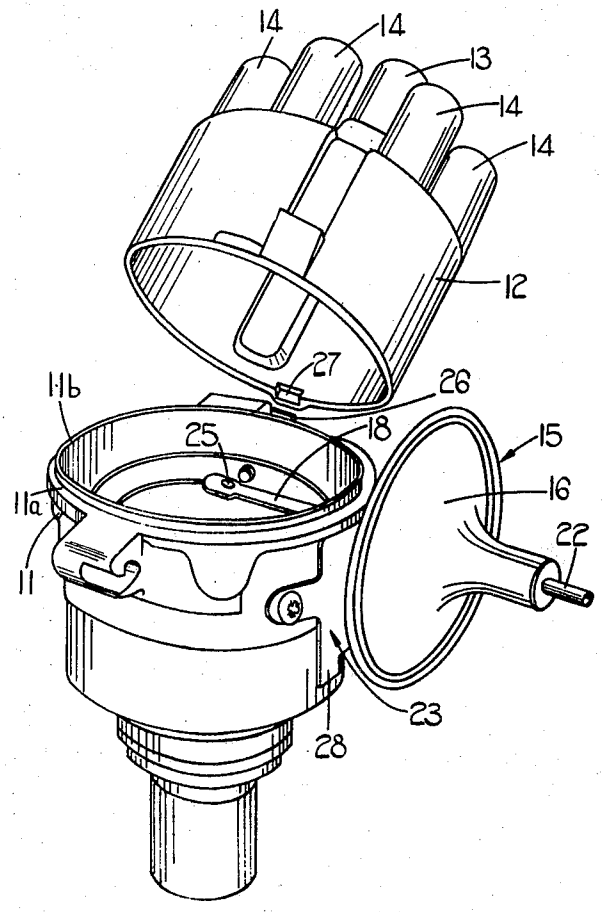
[57] **ABSTRACT**

A vacuum unit for an ignition distributor includes a housing which is divided internally into first and second chambers by a diaphragm. A connecting link for attachment at one end to the timing plate of the ignition distributor is connected at its other end to the diaphragm so as to move therewith. Secured to the housing of the unit is a bracket whereby the unit can be secured in position on the casing of the ignition distributor and the bracket is provided with a locating member. In use the locating member is engaged by the detachable insulating cap of the distributor, and so serves to locate the cap angularly in the desired position relative to the distributor casing. The connecting link is provided at said one end with means whereby the connecting link is coupled to the timing plate. Said connecting means is provided on the link by a shaping operation, and the position of said means is determined using the location member of the bracket as a reference point.

4 Claims, 3 Drawing Figures



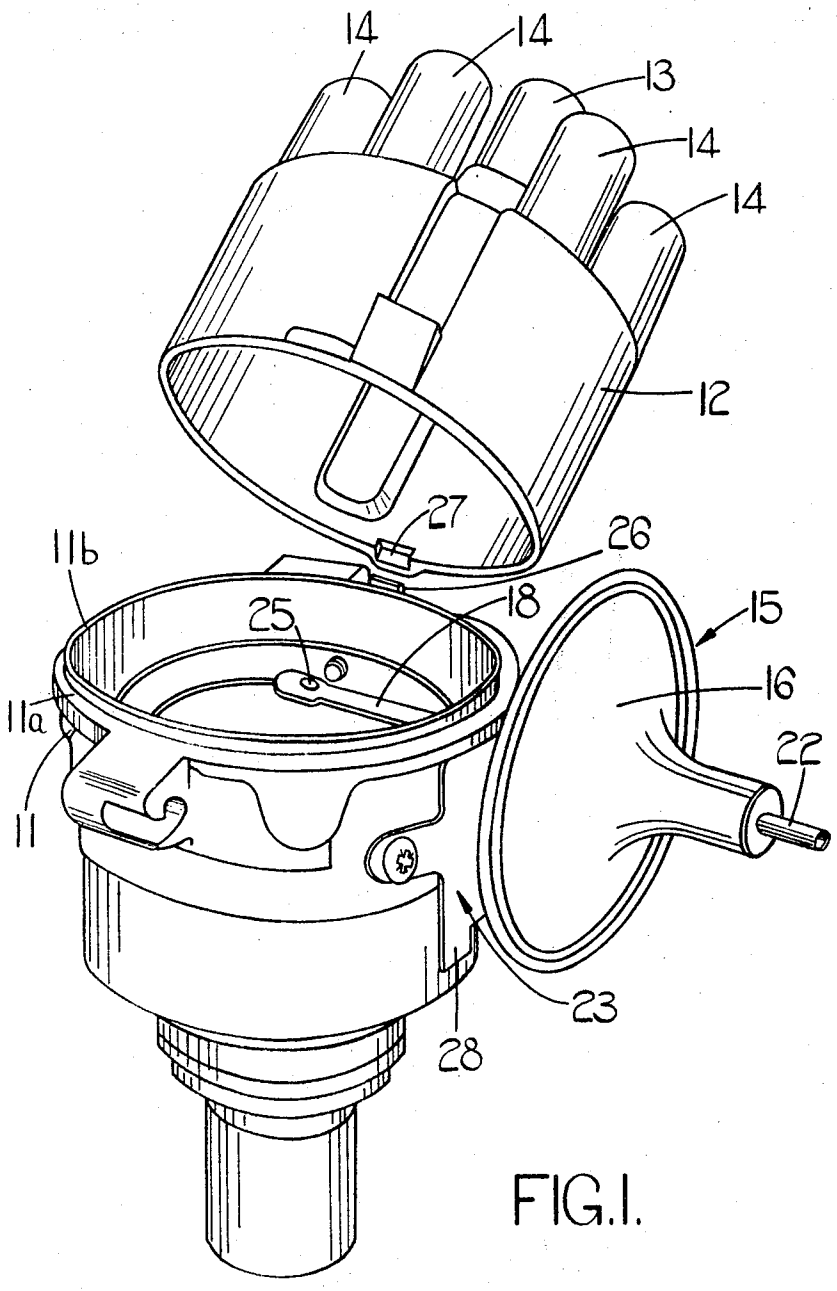


FIG.1.

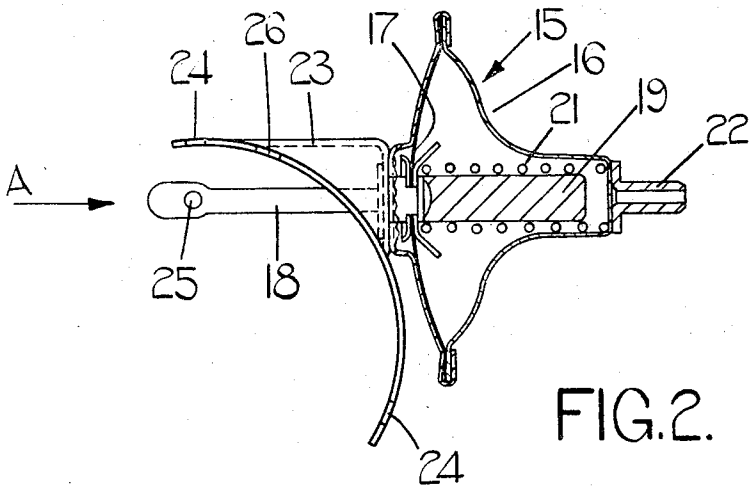


FIG.2.

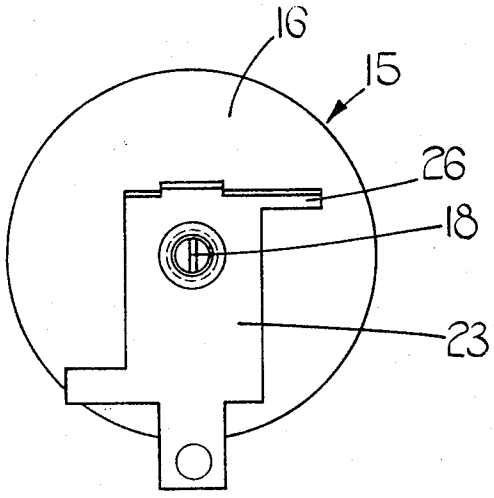


FIG.3.

VACUUM UNITS

This invention relates to vacuum units for internal combustion engine spark ignition system ignition distributors and to a method of manufacturing such units.

A vacuum unit according to the invention includes a housing divided internally into first and second chambers by a diaphragm, a connecting link secured at one end to the diaphragm and extending from the first chamber for connection, in use, to the timing plate of an ignition distributor, and a bracket secured to the housing and whereby the unit can be secured in position on the casing of an ignition distributor, the bracket being provided with a locating member engageable, in use, by the detachable insulating cap of the distributor, so as to locate the cap angularly in the desired position on the distributor casing.

Preferably the bracket is so shaped as to permit two alternative positions of the unit relative to the casing of the distributor, one position providing clockwise rotation of the timing plate of the distributor as the connecting link is withdrawn by the unit in use, and the second position providing anti-clockwise rotation of the timing plate as the connecting link is withdrawn in use, the bracket being provided with a pair of location members for the distributor cap one of the pair being operative in said one position of the bracket and the other of the pair being operative in the second position of the bracket.

Conveniently the bracket is detachably secured to the distributor casing by means of screws.

The invention further resides in a method of manufacturing a vacuum unit including a housing divided internally into first and second chambers by a diaphragm, a connecting link secured at one end to the diaphragm and extending from the first chamber for connection in use to the timing plate of a distributor, and a mounting bracket provided with a locating member for locating, in use, the distributor cap, the method including performing a shaping operation to provide on the connecting link means whereby the link can be coupled to the distributor timing plate in use, the shaping operation being performed after assembly of the unit and the position, on the link, at which said means is provided being determined utilizing the location member of the bracket as a reference point.

Desirably said means is a hole in the link through which in use a pin extends to connect the link to the distributor timing plate.

In a further aspect the invention resides in an ignition distributor for use in the spark ignition system of an internal combustion engine, the distributor including, a hollow casing, a contact breaker assembly mounted for angular adjustment within the casing, a vacuum unit secured to the casing, through the intermediary of a bracket, the unit including a connecting link connecting a diaphragm of the unit to said contact breaker assembly, and an insulating cap closing said casing and carrying high tension terminals of the distributor, the bracket of the vacuum unit being provided with a location member which mates with the insulating cap to locate the cap angularly with respect to the casing.

Preferably the periphery of the casing which engages the cap is unbroken as permitted by the provision of the cap location on the bracket.

One example of the invention is illustrated in the accompanying drawings wherein:

FIG. 1 is a perspective view of an ignition distributor with parts thereof omitted for clarity,

FIG. 2 is a sectional view of the vacuum unit shown in FIG. 1, and

FIG. 3 is a view in the direction of arrow A in FIG. 2.

Referring to the drawings, the ignition distributor includes a hollow metal casing **11** within which is journalled a cam shaft (not shown). Supported within the casing is a contact breaker assembly (not shown) part of which is angularly movable about the axis of the cam shaft in the usual manner to effect alteration in the ignition timing of the distributor. Engageable with the casing **11** of the distributor is an insulating cap **12** which when in position closes the casing **11**, and which carries a centrally disposed high tension input terminal **13** and a plurality of generally equi-angularly spaced high tension output terminals **14**. The cam shaft carries at its upper end a rotor arm which is permanently electrically connected to the input high tension terminal **13**, and which rotates with the cam shaft of the distributor to distribute high tension sparking pulses to the output terminals **14** in turn.

Secured to the casing **11** is a vacuum unit **15** which controls adjustment of the angular position of the contact breaker assembly of the distributor in the usual manner. The vacuum unit **15** comprises a housing **16** formed from two pressed steel parts inter-connected at their peripheries. Trapped between the peripheries of the pressed steel parts of the housing **16** is the periphery of a flexible diaphragm **17** which divides the housing internally into first and second chambers. Secured to the diaphragm **17**, and extending through the wall of the first chamber is a connecting link **18**, and positioned within the second chamber and also secured to the diaphragm is a plunger **19**. Acting between the diaphragm **17** and the wall of the second chamber is a spring **21** which urges the diaphragm **17** to move in a direction to reduce the volume of the first chamber. A connecting union **22** is provided on the wall of the second chamber whereby the second chamber can be placed in communication with a source of vacuum. The first chamber is open to atmosphere, and so as the pressure within the second chamber is reduced then the diaphragm **17** and accordingly the plunger **19** and connecting link **18** are moved against the action of the spring **21**.

Secured to the wall of the first chamber of the housing **16** is a mounting bracket **23**. The mounting bracket **23** is also formed as a metal pressing, and is shaped to engage the cylindrical outer surface of the casing **11** of the distributor. The casing of the distributor is provided with an aperture through which the connecting link **18** extends, and at its ends the bracket **23** is provided with holes **24** for the reception of fixing screws. The connecting link **18** is provided adjacent its free end with a pierced hole **25** through which, in use, extends a pin carried by the movable part of the contact breaker assembly. Thus the connecting link **18** couples the diaphragm **17** of the vacuum unit to the movable part of the contact breaker assembly, so that as the diaphragm **17** moves in accordance with fluctuations in pressure in the second chamber of the unit **15** then the contact breaker assembly is moved angularly to adjust the ignition timing of the distributor in accordance with the

pressure fluctuations. In the conventional manner, the second chamber of the vacuum unit communicates with the inlet manifold of the internal combustion engine utilising the ignition distributor.

As previously stated, the bracket **23** is shaped to engage the cylindrical outer surface of the casing **11.** The axis of the vacuum unit **15** is not radially disposed with respect to the curvature of the bracket **23,** and so the connecting link **18** extends within the casing **11** of the distributor adjacent the inner wall of the casing. It will be appreciated, that the vacuum unit can be engaged in two alternative positions with the casing **11.** Considering the distributor in plan view, the vacuum unit **15** can be engaged in a first position so that withdrawal of the connecting link moves the contact breaker assembly clockwise (FIG. 1) and alternatively, by rotating the vacuum unit **15** together with the bracket **23** through 180° the unit can then be engaged with the casing in such a manner that again considering the distributor in plan, withdrawal of the connecting link **18** moves the movable part of the contact breaker assembly in an anti-clockwise direction. Thus the same vacuum unit **15** and casing **11** can be used for distributors where clockwise movement is called for, as well as for distributor where anti-clockwise movement is called for.

As with conventional ignition distributors, it is essential that when the cap **12** and casing **11** are engaged, then the cap **12** and accordingly the terminals **14** are in predetermined angular positions with respect to the casing **11** and the components carried by the casing. In order to locate the cap **12** in the correct position with respect to the casing **11** the bracket **23** is provided with an upstanding locating member **26** which projects upwardly, and which is received in a corresponding recess **27** in the inner wall of the cap **12.** In order to locate the cap **12** in a direction transverse to the axis of the distributor the casing **11** is provided with a circumferential shoulder **11***a* and an upstanding wall **11***b* having an external diameter substantially equal to the internal diameter of the cap **12.** Since the locating member **26** is provided on the bracket **23** then the shoulder **11***a* and the wall **11***b* can be unbroken, so enhancing the resistance of the junction between the cap and the casing, to ingress of contaminants.

Since the bracket **23** is arranged, as described above to provide two alternative mounting arrangements, then the bracket **23** is formed with a second locating member **28** which is not in use, in the arrangement shown in FIG. **1.** However, it is to be appreciated that in an anti-clockwise distributor the location member **28** would engage the cap **12** and the location member **26** would not be in use.

When the vacuum unit **15** is assembled, the free end of the connecting link **18** is left plain. Thus the whole of the unit including the bracket **23** is assembled, and with the diaphragm **17** in a rest position to which it is urged by the spring **21,** the hole **25** is pierced in the end of the connecting link **18.** The piercing operation is the last operation which is performed on the vacuum unit, and the position of the hole **25** in the link **18** is determined using the location member **26** as a fixed reference point. Thus the hole **25** is pierced in the connecting link **18** at a predetermined distance from the locating member **26** with the diaphragm **17** in its rest position, and so tolerances involved in the manufacture of the vacuum unit are not incorporated in the positioning of the hole **25** in relation to the locating member **26.** This feature is of particular importance in that it minimises the build up of tolerance errors within the ignition distributor. Since the hole **25** and the locating member **26** are accurately positioned with respect to one another, then the cap **12** and of course the terminals **14** of the cap **12,** will be accurately positioned relative to the hole **25.** The hole, as previously described, receives a pin whereby the connecting link **18** is coupled to the contact breaker assembly of the distributor and so the cam follower of the contact breaker assembly will accurately be positioned relative to the terminals **14.** The cam shaft of the distributor engages the cam follower and at certain points known conveniently as break points the cam causes the contacts of the contact breaker assembly to open thereby causing generation of a sparking pulse which is supplied by way of the terminal **13** of the cap **12** to the movable high tension electrode of a rotor arm carried by the cam shaft. The path of rotation of the electrode as the cam shaft rotates takes the electrode close to the terminals **14** in turn. When a sparking pulse is generated it is conducted by the electrode to the nearest terminal at that instant and it will be appreciated that conventional distributors have sufficient accuracy to ensure that the terminals **14** receive sparking pulses in the desired sequence. However to ensure this the electrode of the rotor arm requires to have a relatively large arcuate length and also to avoid the possibility of distribution of the pulse to the wrong terminal **14,** the angular spacing between the terminals **14** is relatively large thus necessitating a cap of large diameter.

In the present example, as described above, the heel of the contact breaker assembly is positioned relative to the terminals **14** with minimal inaccuracy owing to tolerances, and since the rotor arm is carried by the cam shaft, the electrode thereof is positioned accurately relative to the break point of the cam shaft. Thus the overall accuracy of the distributor is increased in such a manner that the necessary arcuate length of the rotor electrode is reduced and the spacing needed between the terminals **14** is also reduced, the reduction in terminal spacing leading to a reduction in the necessary diameter of the cap **12.**

The housing **16** and bracket **23** of the vacuum unit described above are formed from metal pressings. However, it is to be appreciated that these components can be formed also by die-casting techniques. Moreover, the arrangement has been described as being secured to the casing of the distributor by a pair of screws. It is to be appreciated that other securing means can be provided, and in an arrangement where it is not desired to provide the facility of replacing the vacuum unit then the bracket **23** could be welded or otherwise permanently secured to the casing. In the arrangement where screws are used to secure the bracket **23** to the casing **11** it is convenient to provide on a fixed mounting plate of the contact breaker assembly a pair of tags between which is received the shank of one of the fixing screws for the bracket **23,** the fixing screw constituting a stop to resist rotation of the mounting plate within the casing of the distributor.

Additionally the use of one or other of the fixing screws to locate the mounting plate facilitates assembly of the distributor since the required orientation of the plate relative to the casing is immediately apparent to the operator assembling the distributor.

One screw will provide the plate location in an anti-clockwise distributor and the other screw will provide the location in a clockwise distributor.

I claim:

1. A vacuum unit (as claimed in claim 1 wherein), for an ignition distributor, including a housing divided internally into first and second chambers by a diaphragm, a connecting link secured at one end to the diaphragm and extending from the first chamber for connection, in use, to the timing plate of an ignition distributor, and a bracket secured to the housing and whereby the unit can be secured in position on the casing of an ignition distributor, the bracket (is) being so shaped as to permit two alternative positions of the unit relative to the casing of the distributor, one position providing clockwise rotation of the timing plate of the distributor as the connecting link is withdrawn by the unit in use, and the second position providng anti-clockwise rotation of the timing plate as the connecting link is withdrawn in use, the bracket being provided with a pair of location members one or other of which is engageable, in use, by the detachable insulating cap of the distributor so as to locate the cap angularly in the desired position on the distributor casing, (for the distributor cap) oneof the pair being operative in said one position of the bracket and the other of the pair being operative in the second position of the bracket.

2. A vacuum unit as claimed in claim 1 wherein the bracket is detachably secured to the distributor casing by means of screws.

3. An ignition distributor including a hollow casing, a contact breaker assembly mounted for angular movement within the casing, a vacuum unit secured to the casing through the intermediary of a bracket the unit including a connecting link connecting a diaphragm of the unit to said contact breaker assembly, and an insulating cap closing said casing and carrying high tension terminals of the distributor, the bracket of the vacuum unit being (provided with a location member which mates with the insulating cap to locate the cap angularly with respect to the casing.) so shaped as to permit two alternative positions of the unit relative to the casing of the distributor, one position providing clockwise rotation of the timing plate of the distributor as the connecting link is withdrawn by the unit in use, and the second position providing anti-clockwise rotation of the timing plate as the connecting link is withdrawn in use, the bracket including a pair of location members one or other of which is engaged with said insulating cap of the distributor so as to locate the cap angularly in the desired position on the distributor casing, one of said pair of location members being operative in said one position of the bracket, and the other of the pair being operative in the second position of the bracket.

4. An ignition distributor as claimed in claim 3 wherein the periphery of the casing which engages the cap is unbroken as permitted by the provision of the cap location on the bracket.

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