Nov. 13, 1962 B. T. STITES 3,063,153

BREAKER POINT GAP SETTING MEANS FOR IGNITION SYSTEM DISTRIBUTORS

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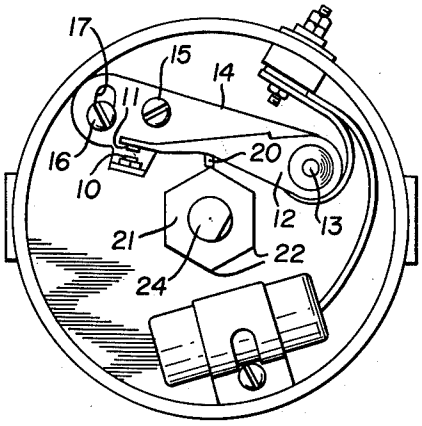


FIG. 1

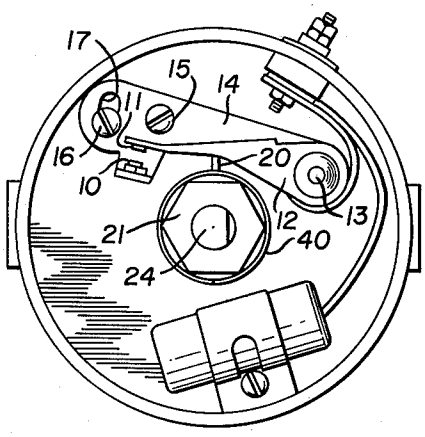


FIG. 2

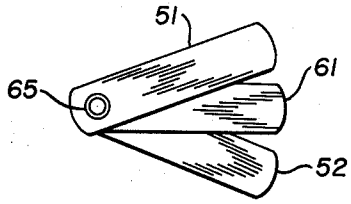


FIG. 4

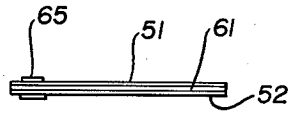


FIG. 3

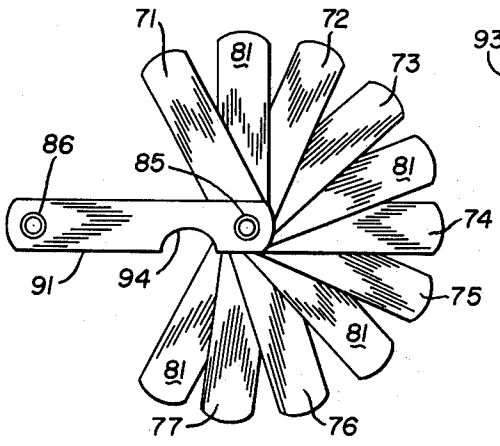


FIG. 6

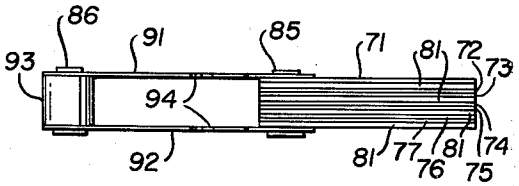


FIG. 5

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BREAKER POINT GAP SETTING MEANS FOR IGNITION SYSTEM DISTRIBUTORS

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This invention relates to tools for setting the gap between the points of ignition system distributors for multi-cylinder internal combustion engines of automobiles and the like.

The invention relates to that class of tools which provide means by which the spacing of the timing contacts may be effected in any position of the breaker cam so that the shaft of the breaker cam need not be rotated to one of several certain angular positions in order to accomplish the desired setting. Thus there is avoided the troublesome necessity of pushing the vehicle back and forth or briefly operating the starter in efforts to rotate the shaft of the breaker cam to the desired angular position.

Examples of tools of this general class are found in U. S. Patents 1,410,432, 2,453,774, and 2,838,842.

Among previous proposals for tools of this class is the proposal to provide a cylindrical sleeve or ring of a known wall thickness and of an inside sleeve radius equal to the uniform radius from the center of the breaker cam shaft to the high points of the breaker cam for the distributors to be set. Such a ring, when temporarily placed on the breaker cam to hold the cam follower or wiper block in an abnormally raised position, temporarily establishes a predetermined fixed position for the associated movable breaker point without reference to the angular position of the associated breaker cam. However, such predetermined fixed position is displaced from the normal fully open position in the direction of increased opening and by an amount which corresponds to the wall thickness of the cylindrical sleeve or ring multiplied by the ratio of the respective distances from the pivot of the arm carrying the movable breaker point to (1) the movable breaker point and (2) the breaker cam follower or wiper block.

Such amount of displacement of the predetermined fixed position established by the cylindrical sleeve or ring from normal full open position of the movable breaker point must be taken into account by extra feeler gauge thickness. A gauge which is to be used to set a variety of point gap settings for different distributors to be encountered obviously must provide a plurality of feeler gauge means differing in respective thicknesses by the differences between the desired point gap settings of the different distributors to be encountered. These respective thicknesses cannot be the same as the desired point gap settings because the previously mentioned amount of displacement from normal full open position of the movable breaker point must be taken into account by extra thicknesses of the feeler gauge means.

Feeler gauge means satisfying the above requirements have heretofore been so costly to manufacture as to preclude commercial acceptance. This has defeated the successful retail marketing of feeler gauge means for setting the points on all cars of a given make, as through car dealers, even though such market generally requires the capability to set only two or three different gap settings on breaker cams of one or two different given diameters. Even those portions of such market which require the capability to set only one gap size cannot economically be exploited without the support of complementary sales in portions of the market requiring the capability to set a plurality of sizes.

In the case of feeler gauge means satisfying the above-mentioned requirements and furthermore capable of setting all or a large majority of the seven generally established gap settings which are likely to be encountered, a great additional drawback is the unacceptable bulk and height of stacking of the gauge leaves. If the drawbacks of cost, bulk and height of stacking can be avoided, feeler gauge means of this class are particularly appropriate for sale to repair shops and mechanics who encounter a great variety of desired gap settings and breaker cam diameters, and they may be sold in conjunction with a variety of sleeves or rings of different inside diameters but the same wall thicknesses in order to be useable for all or most of the possible combinations of desired gap settings and breaker cam diameters.

The marketing of individual gauge sets each adapted to handle one of the possible variety of gauge sizes has been theoretically possible but has not been economically feasible because of the severe inventory and handling problems involved in stocking units corresponding to an acceptable majority or all of the seven most widely used standard gap sizes in domestic cars. Such problems are greatly magnified when it is contemplated that a plurality or all of the five standard breaker cam diameters of domestic cars are likely to be encountered in the field, and that additional gap sizes and cam diameters may assume importance in connection with domestic cars or in connection with foreign cars, trucks, farm equipment, marine engines, stationary machinery and other applications.

An important object of the present invention is to provide feeler gauge means satisfying the above requirements while avoiding the above drawbacks. One more particular advantage of the invention in certain important aspects is the satisfaction of the above requirements while providing also the capability to set all or a large majority of the seven generally established gap settings which are encountered in the field.

A particular object of the invention is to provide feeler gauge means satisfying the above requirements and at the same time capable of conventional use as feeler gauges when occasion may arise. This capability enhances the usefulness and the saleability of devices embodying the invention.

FIGURE 1 is a plan view of a conventional distributor with the cover and rotor removed and the movable breaker point shown in normal full open position.

FIGURE 2 is a view similar to FIGURE 1 showing a cylindrical ring or sleeve inserted on the breaker cam to temporarily establish a pre-defined fixed position which is displaced in the direction of increased opening from the normal full open position shown in FIGURE 1. The rotative position or angular position of the breaker cam in FIGURE 2 is slightly advanced from the position shown in FIGURE 1 to most clearly illustrate that establishment of the pre-defined fixed position is independent of and without reference to the angular position of the breaker cam.

FIGURE 3 is a side elevation of feeler gauge means illustrating one aspect of the invention.

FIGURE 4 is a plan view of the feeler gauge means shown in FIGURE 3 with the leaves being spread in order to more clearly show the arrangement thereof.

FIGURE 5 is a side elevation of feeler gauge means illustrating another important aspect of the invention.

FIGURE 6 is a plan view of the feeler gauge means shown in FIGURE 5, with the leaves being spread in order to more clearly show the arrangement thereof.

The conventional distributor shown in FIGURE 1 includes a fixed breaker point **10** and a movable breaker point **11**. The movable breaker point **11** is carried on a breaker point arm **12**, which in the particular assembly is pivoted as at **13** to a breaker point mounting plate **14**. The breaker point mounting plate **14** is pivoted by a

screw 15 to the body of the distributor. The pivotal position of the mounting plate 14 may be adjusted by loosening and retightening of a screw 16 which is received in a slot 17 formed in the mounting plate 14. While the screw 16 is loosened, the mounting plate 14 is pivoted a slight amount around the screw 15 to adjust the normally fixed position of the fixed breaker point 10. It is this adjustment which accomplishes the desired full open gap setting of the breaker points.

The breaker point arm 12 carries a cam follower or wiper plate 20 and is urged in a direction to establish following relationship of the cam follower 20 with the breaker cam 21.

The high points 22 of the breaker cam 21 are spaced a uniform distance from the axis of the cam shaft 24 associated with the breaker cam 21 and govern the normal full open position of the movable point 11.

In setting the full open position of the gap between the points 10 and 11, it is necessary that the point 11 be located at a predetermined fixed position such as its normal full open position or a predetermined fixed position displaced a known amount from the normal full open position. It is the latter alternative that applies in devices of the type to which the present invention relates.

In FIGURE 2 the breaker point 11 is shown as displaced in a direction of increased opening from the known full open position shown in FIGURE 1 by insertion of a cylindrical split ring or sleeve 40 having an inside sleeve radius equal to the radial distance from the center of the cam shaft to the high points 22. Such displacement is in an amount which corresponds to the wall thickness of the sleeve or ring 40 multiplied by the value of the ratio of the respective distances from the pivot 13 to (1) the movable breaker point 11 and (2) the cam follower 20.

Such amount of displacement of the movable breaker point 11 from the normal full open position thereof must be taken into account by feeler gauge means employed in setting the normally fixed position of the breaker point 10 in order to establish the desired full open gap setting.

Marketing requirements generally are such that there must be provided tools capable of accomplishing two or three different gap settings on breaker cams of one or two different given diameters. Obviously therefore there must be provided a plurality of feeler gauge means differing in respective thicknesses by the difference between the desired gap settings of the different distributors to be encountered. As previously mentioned, these respective thicknesses cannot be the same as the desired point gauge settings because the previously mentioned amount of displacement from normal full open position of the movable breaker point must be taken into account by extra thickness of the feeler gauge means.

It will be understood that, instead of the distributor shown in FIGURES 1 and 2, other distributors may be encountered which are generally similar to the distributor shown in FIGURES 1 and 2 but which require different gap settings, and perhaps also have different radial spacings of the breaker cam high points from the axes of the associated cam shafts.

According to the present invention, an assembly of feeler gauge leaves are provided having a variety of thicknesses which are the same as the variety of desired point gap settings but with additional adapter leaf means interspersed among the feeler gauge leaves and also pivoted thereto in stacked relationship. Each feeler gauge leaf is immediately adjacent an adapter leaf means. Accordingly, the adapter leaf means may take a part in defining necessary feeler gauge thicknesses for a plurality of gap settings by being combined with different feeler gauge leaves adjacent thereto. To this end the adapter leaf means comprises one or more adapter leaves having thicknesses which correspond to the previously described amount of displacement of the predetermined fixed position established by the sleeve 40 from normal full open position.

Thus, in FIGURES 3 and 4 is illustrated an assembly of feeler gauge leaves 51 and 52 having a variety for example of only two thicknesses which are the same as and correspond to a variety of only two different desired point gap settings to be encountered in a given make of automobile. These thicknesses may be, say .016 and .022 inch which cover all gap settings for all models of one popular make of car for some years back. Interspersed between the feeler gauge leaves 51 and 52 is an adapter leaf 61 having a thickness corresponding to the thickness of the ring 40 multiplied by the ratio of the respective distances from pivot 13 to (1) the movable breaker point 11 and (2) the cam follower 20. It will be understood that such feeler gauge means may be packaged and sold together with, for example two rings in the case of a given make of car which has a variety of two point gap settings in different models and a variety of two sizes of cams.

The feeler gauge means illustrated in FIGURES 5 and 6 is capable of setting all or a large majority of the seven different desired point gap settings which are likely to be encountered without any problems of bulk or height of stacking of the gauge leaves. Such typical gap settings that are likely to be encountered are as follows (in inches): .013; .015; .016; .017; .020; .022; 0.25. In corresponding sequence the feeler gauge leaves 71–77 in FIGURE 6 may be arranged, the leaf 71 having a thickness of .013, the leaf 72 having a thickness of .015, etc.

Interspersed between the feeler gauge means 71–77 are a plurality of adapter leaves 81, all of the same thickness with each adapter leaf being separated from the next closest adapter leaf by no more and no less than two of the feeler gauge leaves 71–77. The adapter leaves are, of course, of a thickness corresponding to the previously described amount of displacement of the predetermined fixed position of the movable breaker point of the distributor to be set, which predetermined fixed position is established by a sleeve or ring which sets over the breaker point as above described.

The feeler gauge means shown in FIGURES 5 and 6 is provided with a housing in the form of side members 91 and 92 and an end spacer 93. Finger and thumb cutouts 94 may be provided for greater ease in manipulating.

The feeler gauge means of FIGURES 3 and 4 and of FIGURES 5 and 6 may be held in assembled position by pivots comprising eyelet or sleeve fasteners of a well known type and indicated by the reference numerals 65 in FIGURE 5 and 6. A similar fastener 86 holds the spacer 93 in position.

It will be clear that any one of the feeler gauge leaves 51, 52, 71–77 may be used as conventional feeler gauges when occasion arises.

The invention is not restricted to the slavish imitation of each and every one of the details described above which have been set forth merely by way of example with the intent of most clearly setting forth the teaching of the invention. Obviously, devices may be provided which change, eliminate or add certain specific structural details without departing from the invention.

What is claimed is:

1. In tools for setting points of any one or more of a number of ignition system distributors each having a plurality of breaker cam high points which are a uniform distance from the axis of the associated cam shaft with said uniform distance in each distributor being, among such number of distributors, one of from one to several given radial distances, and each distributor having a breaker point arm carrying a movable breaker point which is movable to a normal full open position governed by said breaker cam high points, said breaker point arms being mounted for pivoting movement with the ratio of the

respective distances from each pivot of a breaker point arm to (1) the associated movable breaker point and (2) the associated breaker cam follower having a given value, and among which distributors are represented a variety of desired point gap settings, said tools being of the type which provide from one to several cylindrical sleeves all of the same accurately defined wall thickness and having from one to several inside sleeve radii equal to said from one to several given radial distances, said from one to several sleeves being provided for temporary placement on said breaker cams to each temporarily establish a pre-defined fixed position for the associated movable breaker points without reference to the angular position of the breaker cams, said predetermined fixed position being displaced from said normal full open position in the direction of increased opening and by an amount which corresponds to the wall thickness of said at least one cylindrical sleeve multiplied by the value of the aforesaid ratio, the improvement which comprises an assembly of feeler gauge leaves having a variety of thicknesses corresponding to said variety of desired point gap settings, said feeler gauge leaves being pivoted to each other in stacked relationship, adapter leaf means

stacked among said feeler gauge leaves and also pivoted thereto with each feeler gauge leaf being immediately adjacent adapter leaf means, said adapter leaf means having a thickness which corresponds to the aforesaid amount of displacement of the predetermined fixed position established by the sleeve from normal full open position.

2. In tools for setting points of ignition system distributors, an assembly of feeler gauge leaves having a variety of thicknesses corresponding to a variety of desired point gap settings for different distributors to be encountered, and a plurality of adapter leaves of the same thickness interspersed among said feeler gauge leaves with each said adapter leaf being separated from the closest other adapter leaf on either side thereof by no more and no less than two of said feeler gauge leaves.

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