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A. C. RUSSELL

2,814,682

BREAKER POINT

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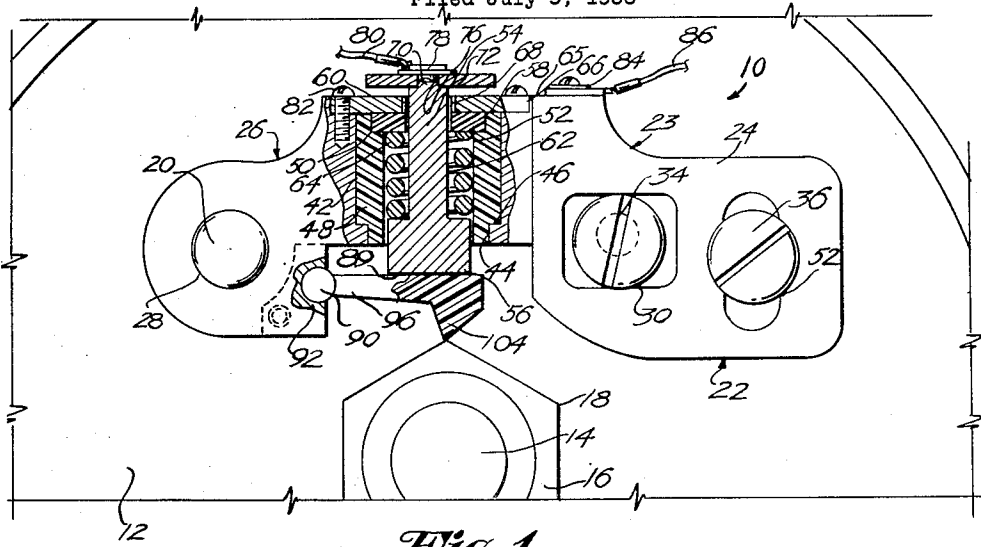


Fig. 1.

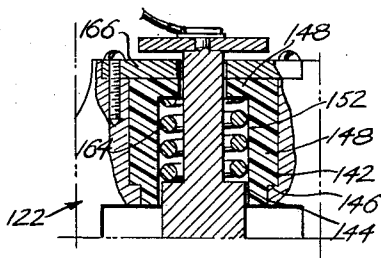


Fig. 2.

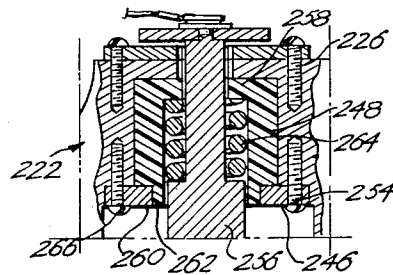


Fig. 3.

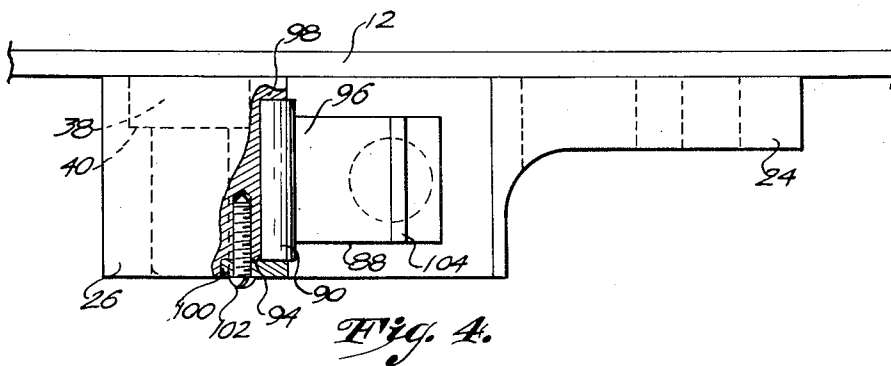


Fig. 4.

INVENTOR.
Andrew C. Russell
BY *Carl Hovey*
ATTORNEY

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BREAKER POINT

Andrew C. Russell, Shawnee, Okla.

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12 Claims. (Cl. 200—30)

This invention relates to internal combustion engines and, more particularly, to a breaker point assembly for use in the distributor mechanism conventionally forming a part of such an engine. The apparatus disclosed in this invention constitutes a further improvement over the breaker point apparatus set forth in my copending application, Serial No. 481,990, entitled "Breaker Point Apparatus," filed January 17, 1955, now Patent No. 2,769,046, patented October 30, 1956 of which this is a continuation-in-part.

The present breaker point assembly has all of the advantages of the above referred to breaker point apparatus, in addition to many others.

It is the most important object of this invention to provide a breaker point assembly having improved dwell time and wear-resisting characteristics, as in the breaker point apparatus of my aforementioned application, but which may be constructed with the main body portion thereof made of metal at a substantially reduced unit cost.

Another important object of this invention is to provide such an improved breaker point assembly wherein the metallic, main body portion may be cast or otherwise suitably formed of inexpensive metal without need for close tolerances, and wherein the bearing means for all moving parts may be formed of molded nylon or the like to provide both extreme resistance to wear and the necessary control over tolerances for working parts, while the metallic body offers high resistance to breakage or damage from external impacts or forces.

Another important object of this invention is to provide such a breaker point assembly in which all of the moving and bearing parts thereof may be easily and quickly replaced without the necessity of discarding the whole unit.

Another important object of the invention is the provision of a cam actuated arm of molded nylon or the like swingably and replaceably mounted on the metallic body.

Another important object of this invention relates to the provision of a breaker point assembly in which one of the electrical contact elements of the switch portion of the unit is effectively insulated from the metallic body for mounting of the assembly directly on the base plate of the distributor mechanism by a non-conductive bearing within the body, the metallic body itself being grounded through its contact with the base plate.

Other important objects of this invention include the way in which the nylon bearing for the reciprocating, contact carrying rod is removably mounted in the body of the assembly and others which will be made clear or become apparent as the following specification progresses.

In the drawings:

Figure 1 is a top plan view of a breaker point assembly as contemplated by the present invention showing the assembly in an operative position with various parts in section for clarity of illustration and the distributor mechanism itself being shown fragmentarily;

Fig. 2 is a fragmentary, partially sectioned, top plan view of a modified form of the present invention showing

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another type bearing for the actuating rod of the contact element;

Fig. 3 is a fragmentary, partially sectioned, top plan view of another modified form of the present invention showing a third type of bearing for carrying the actuating rod of the contact element; and

Fig. 4 is a fragmentary bottom view of the assembly shown in Fig. 1, parts being broken away and shown in section.

In the drawing, the numeral 10 generally designates a conventional distributor mechanism, such as utilized in the internal combustion engine of automobiles, trucks, boats and the like, having a base 12 through which extends a rotatable shaft 14 carrying a polygonal cam 16 provided with a cam surface having a number of raised peripheral points 18. A breaker point pivot 20 also extends from base 12 of distributor mechanism 10 in spaced parallelism to shaft 14 and the axis of rotation of cam 16, pin 20 being normally utilized, when conventional breaker point assemblies are employed, for mounting a breaker point holding bracket.

The assembly of this invention comprises breaker point apparatus generally designated by the numeral 22 and includes a unitary, metallic, main housing 23, which includes an electrical switching mechanism carrying body 26 and an integral mounting bracket 24 which extends laterally therefrom. It is to be noted that body 26 has an elongated bore 28 adapted for receiving the pivot pin 20 mounted on base 12. Bracket 24 is provided with slots 30 and 32 for clearing eccentric adjusting screw 34 and mounting screw 36 respectively, which are utilized for adjusting and respectively, securing bracket 24 and in turn, the assembly 22 upon base 12 when pivot pin 20 is within bore 28.

Since the manner of mounting the pivot pin 20 upon base 12 of the distributor mechanism 10 forms no part of this invention, the same is not detailed in the drawing; however, the manner in which pin 20 extends from base 12 will be clear particularly from Fig. 4, it being understood that the enlarged portion 38 of pin 20 is received within an annular recess 40 in axial alignment with bore 28.

It is now obvious that by mounting the main body 26 of assembly 22 directly upon pin 20, extreme accuracy of placement is achieved with final adjustment of the positioning of assembly 22 relative to cam 16 being effected by swinging of assembly 22 about pin 20 before screws 34 and 36 are tightened upon mounting bracket 24.

Main body 26 is provided with a relatively straight, elongated bore 42 having its longitudinal axis substantially perpendicular to, but spaced from, the longitudinal axis of pin receiving bore 28. When the assembly 22 is in its operative position within mechanism 10, the longitudinal axis of bore 42 will be disposed substantially radially of the axis of rotation of cam 16.

Main body 26 is provided with an internal flange 44 extending inwardly into the bore at the end thereof adjacent cam 16 when the assembly 22 is disposed in an operative position, flange 44 presenting a shoulder 46 adapted for receiving one end of a bearing 48 formed of wear resistant, non-conductive material such as nylon or the like, and which has an annular notched-out portion 50 complementary with the flange 44 and shoulder 46. Bearing 48 has an elongated opening 52 there-through of sufficient diameter to clear an elongated rod 54 which is reciprocally received within the opening 52 and normally extends from the latter at both ends thereof. Rod 54 has an enlarged portion 56 adapted to slidably engage the walls of bearing 48 defining opening 52, it being noted that both opening 52 and rod portion 56 are

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preferably cylindrical in order to permit rotation of portion 56 relative to main body 26. Rod 54 is most suitably, although not necessarily formed of metal, and it is pointed out that nylon is satisfactory for forming bearing 48 because of the wear resistant characteristics of such plastic material and its low coefficient of friction.

Bearing 48 is additionally provided with an annular recess at that end thereof remote from cam 16 and which is adapted to receive a nylon ring 58 having an annular perforation 60 of sufficient diameter to clear the reduced segment 62 of rod 54 therein. Rod 54 is yieldably biased toward cam 16 by virtue of a coil spring 64 surrounding segment 62 and bearing against enlarged portion 56 and ring 58 respectively.

Mounted on the face 65 of main body 26 is a metal retaining plate 66 having an opening 68 therein permitting the end 70 of rod 54 to extend therethrough. Secured to end 70 is an annular disc-like contact plate 72 which is adapted to contact plate 66 upon reciprocation of rod 54 in bearing 48. Plate 72 may be secured to the end 70 of rod 54 in any suitable manner such as by provision of an extension 74 of reduced diameter passing through the hole 76 in plate 72, the outermost end of extension 74 then being crimped over the plate 72. Electrical connection with plate 72 may preferably be made by the provision of a lug or the like 78 in contact with plate 72 and between the latter and the crimped portion of extension 74, lug 78 being provided with a conductor wire 80 connected therewith.

Plate 66 is preferably rectangular in shape and is secured to the face 66 of body 26 by a plurality of screws 82 threaded into main body 26. Because of the need of providing as much current flow through the breaker point assembly with the least resistance, it is desirable to construct both plate 66 and contact plate 72 of highly conductive material such as silver or the like. Also, means is provided for making an electrical contact with plate 66 which comprises a lug 84 secured to main body 26. It is obvious that since main body 26 and bracket 24 are all integrally constructed of metal, electrical connection is made through conductor wire 80 to plate 72 and thence through plate 66 to lug 84 and ground wire 86. Although provision of ground wire 86 is not absolutely essential since the assembly 22 is grounded to the base plate 12 by virtue of bracket 24 being secured thereto, it has been found that to provide an additional ground in the nature of wire 86, better current flow through the assembly is obtained.

Means for reciprocating rod 54 within bearing 48 may conveniently take the form of a cam arm 88 separate from the body 26 and swingably mounted thereon in a position to extend between the end 89 of rod 54 and cam 16. Arm 88 is provided with a cylindrical portion 90 on one end thereof which is received in a tubular passage 92 in body 26 and disposed with the longitudinal axis of cylindrical portion 90 substantially perpendicular to the longitudinal axis of rod 54. There is an opening 94 in body 26 communicating with passage 92, the width of opening 94 being less than the diameter of cylindrical portion 90, and is adapted for the reduced portion 96 of arm 88 to extend therethrough. From the foregoing it can be seen that while arm 88 is pivotally secured at one end thereof within the body 26, the arm 88 is free to swing about the axis of cylindrical portion 90 a limited number of degrees. Passage 92 preferably only extends partially through the body 26 and therefore, the segment 98 of body 26 forms a retaining wall at one end of passage 92 to restrain movement of cylindrical portion 90 in one direction while a removable plate 100 secured to body 26 over the outlet opening of passage 92 by a screw into body 26 prevents cylindrical portion 90 from being displaced from passage 92 in the opposite direction. Cam arm 88 is formed of highly wear resistant plastic material such as nylon and has a pointed extension 104 adapted to engage cam 16.

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It will now be apparent that the manufacture of assembly 22 involves only simple manufacturing procedures and a minimum expenditure of materials which results in greatly decreased costs while retaining all of the advantages of heretofore presented breaker point assemblies of this type. Since some parts or components thereof ordinarily wear out more readily than other portions or components thereof, the parts that wear out quickly in the now presented assembly may be replaced without disposing of the complete breaker point apparatus. In this particular it is to be noted that cam arm 88 may be replaced by simply removing screw 100 and retaining plate 102 from body 26, slipping cylindrical portion 90 out of passage 92 and then placing a new cam arm in position followed by replacement of plate 100.

Also, rod 54 and its bearing 48 may be easily and quickly replaced by removing retaining plate 66 and slipping a new bearing 48 into bore 42 and then placing another rod 54 in opening 52.

In Fig. 2 of the drawings there is shown a modified version of the now presented breaker point assembly which is identical in all components thereof to the assembly 22 as illustrated in Fig. 1 except that bearing 148 mounted in bore 142 and resting against the shoulder 146 of flange 144 has an integral flange 148 extending into the opening 152 at that end thereof adjacent contact retaining plate 166 and adapted to receive one end of coil spring 164. Therefore, upon removal of plate 166 the bearing 148 may be easily and quickly removed and a new one inserted.

Another modification of the instant invention is shown in Fig. 3, wherein all the component parts of assembly 222 are identical with those shown in Fig. 1 except that inwardly extending flange 246 is formed of an annular disc 260 having an opening 262 of sufficient diameter that bearing 248 extends between flange 246 and the enlarged portion 256 of rod 254. Also, bearing 248 has an inwardly extending flange 258 presenting a shoulder for receiving one end of coil spring 264. Disc 260 is secured to body 226 by virtue of a plurality of screws 266 into body 226.

It can now be seen that there is presented a distributor breaker point assembly in which the component parts thereof may be constructed of stamped parts without any necessity of expensive molding or forming operations and which may be quickly and easily assembled by workers not possessing high degrees of skill, thus resulting in a marketable assembly at a minimum of cost per unit.

Having thus described the invention what is claimed as new and desired to be secured by Letters Patent is:

1. A breaker point assembly for use with an internal combustion engine having a distributor mechanism including a grounded, electrically conductive base and a rotatable grounded, electrically conductive cam, said assembly comprising, in combination, a body of electrically conductive material having an elongated bore therethrough, means on said body adapting the same for mounting on said base in electrically conductive relationship with the latter and with the longitudinal axis of the bore disposed substantially radially to the axis of rotation of the cam; a tubular bearing of insulating material mounted within the bore; an elongated, electrically conductive rod reciprocably carried by the bearing and normally extending beyond both ends of the bore; an electrically non-conductive arm separate from the body, shiftable mounted thereon and adapted for extending between and oppositely engaging the cam and one end of the rod for translating the rotary motion of the former into reciprocatory motion of the latter; means for yieldably biasing the rod in one direction toward the cam; a stationary plate of electrically conductive material having an opening therein of sufficient dimension to clear said rod; means mounting the plate on the body in electrically conductive relationship with the latter and on the surface of the body

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remote from the cam, the opposite end of the rod extending through said opening and beyond the plate; a movable, electrically conductive, contact element; means mounting the element on the rod in electrically conductive relationship with the latter adjacent said opposite end of the rod and for reciprocation therewith, said element being disposed to engage the plate in electrically conductive relationship with the latter when the rod is reciprocated in said one direction and to move out of engagement therewith when the rod is reciprocated in the opposite direction; means for making an electrical connection with the plate; and means for making an electrical connection with the element.

2. In an assembly as set forth in claim 1 for use with an engine having a distributor mechanism including an electrically grounded base of electrically conductive material, wherein said body is adapted for mounting in electrically contacting relationship with said base, presenting a circuit path through the body from the plate to said base.

3. In an assembly as set forth in claim 1, wherein said element is annular and is disposed to engage the plate throughout a continuous zone of the latter circumscribing said opening when the rod is reciprocated in said one direction.

4. In an assembly as set forth in claim 1, wherein there is provided an elongated passage in the body, the longitudinal axis of the passage being spaced from and perpendicular to the axis of said bore, there being an elongated opening in the body communicating with and extending longitudinally of the passage, said passage being adapted for receiving one end of the arm with the remainder of the latter extending through the opening.

5. In an assembly as set forth in claim 4, wherein said one end of the arm within the passage is a cylindrical element, said cylindrical element being pivotally received within the passage, the width of the opening being less than the diameter of the cylindrical element for retaining the latter against passage through the opening.

6. In an assembly as set forth in claim 5, wherein the width of said opening is greater than the corresponding dimension of that portion of the arm passing therethrough

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to permit limited swinging movement of the arm relative to the body.

7. In an assembly as set forth in claim 4, wherein there is provided structure on the body at each end of the passage for maintaining the cylindrical element therein and preventing any substantial shifting of same longitudinally of the passage.

8. In an assembly as set forth in claim 7, wherein one of said structures is a removable plate.

9. In an assembly as set forth in claim 1, wherein said body is provided with a flange means extending into the bore at one end of the latter presenting a shoulder for engaging one end of the bearing to hold the bearing against displacement in said one direction relative to the body.

10. In an assembly as set forth in claim 9, wherein said plate is removably mounted on the body and, when on the body, engages the opposite end of the bearing to hold the latter against displacement in said opposite direction relative to the body.

11. In an assembly as set forth in claim 9, wherein said bearing has a tubular extension on one extremity thereof extending between the flange means and the rod for insulating the latter from the body, the internal diameter of the extension being substantially equal to the external diameter of that portion of the rod therewithin to provide a bearing surface for the latter.

12. In an assembly as set forth in claim 11, wherein the opposite extremity of the bearing is provided with an internal, annular recess, and there is a ring of insulating material received within the recess and disposed against the plate, the internal diameter of the ring being substantially equal to the external diameter of that portion of the rod therewithin to provide a bearing surface therefor.

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