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DUAL CIRCUIT BREAKER CONSTRUCTION

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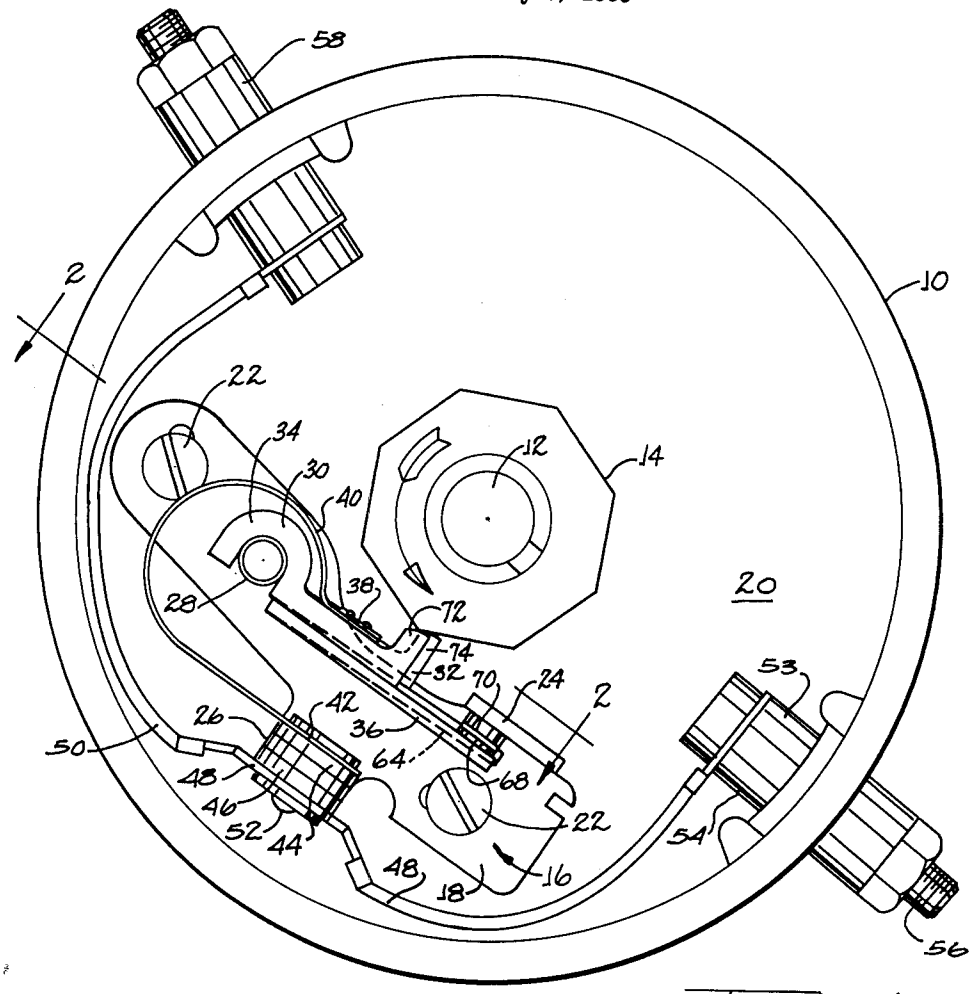

FIG 1

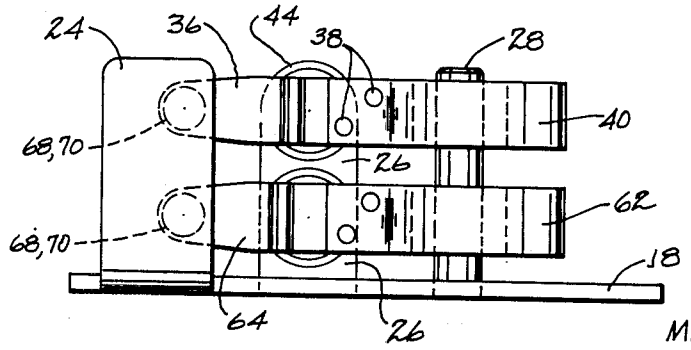

FIG 2

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DUAL CIRCUIT BREAKER CONSTRUCTION

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This invention relates to internal combustion engine spark timing mechanisms, and particularly to engine ignition systems employing dual point circuit breaker mechanisms.

In the conventional dual point circuit breaker arrangement the distributor shaft cam surfaces are engaged with two separate breaker arms, each controlling a set of contacts. The breaker arms are related to one another in such manner that one set of contacts is opened prior to the other set of contacts with an overlapping period in which both of the contacts are closed. The two circuit breakers are arranged in parallel so that one circuit breaker opens the circuit and the other breaker closes the circuit. The arrangement is characterized by lack of corrosion scale or pitting of the contacts. Also, the current is enabled to better saturate the primary winding of the coil than in the case where only a single circuit breaker is employed. With the dual circuit breaker system the breaker contacts can be highly gapped which prevents excessive flashing and shortened service life.

In spite of the advantages of the dual circuit breaker arrangement over the conventional single circuit breaker arrangement the dual circuit breaker arrangement has suffered to a certain extent by reason of its higher cost. Thus, in the conventional dual circuit breaker arrangement each circuit breaker requires a separate mounting construction for the breaker arm, as well as a separate mount for each fixed contact and a separate mounting structure for the two leads to the individual breakers. Also, the separate breakers have been mounted on separate support brackets which have had to be adjusted with respect to one another in order to secure a proper timing. Such adjustments are time consuming, and have the possibility of working out of position so as to destroy the proper timing.

With the above factors in mind, it is a primary object of the present invention to provide a dual circuit breaker construction wherein the cost of manufacture and installation is reduced as compared with the cost involved in the conventional dual circuit breaker arrangement.

It is a further object of the invention to provide a dual circuit breaker structure wherein both breaker arms are fulcrumed on the same support element so that one breaker arm can never move out of adjustment with respect to the other breaker arm.

An additional object of the invention is to provide a dual circuit breaker arrangement wherein the components may be assembled together without possibility of improper adjustment of the parts.

A further object of the invention is to provide a dual circuit breaker arrangement wherein the leads can be economically mounted therein.

Other objects of this invention will appear in the following description and appended claims, reference being had to the accompanying drawings forming a part of this specification wherein like reference characters designate corresponding parts in the several views.

In the drawings:

FIGURE 1 is a plan view of one embodiment of the invention.

FIG. 2 is a view taken substantially on line 2—2 in FIG. 1.

Before explaining the present invention in detail, it is to be understood that the invention is not limited in its

application to the details of construction and arrangement of parts illustrated in the accompanying drawings, since the invention is capable of other embodiments and of being practiced or carried out in various ways. Also, it is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation.

Referring to the drawings, there is shown an internal combustion engine timing system including a distributor casing 10 rotatably mounting the distributor shaft 12. Shaft 12 carries the cams 14 which sequentially engage the breaker arms of the circuit breaker construction generally indicated by numeral 16.

Circuit breaker structure 16 comprises a bracket 18 secured to the grounded plate 20 by means of screws 22. Bracket 18 is provided with an integral upstanding wall 24, and a second integral upstanding wall 26. Projecting upwardly from bracket 18 is a post structure 28 which serves as a fulcrum for the two breaker arms 30 and 32. Arm 32 is positioned almost directly beneath arm 30 and is thus not completely visible in FIG. 1. However, arm 32 is contoured similarly to arm 30 and the description of arm 30 will therefore generally apply for a description of arm 32.

Breaker arm 30 comprises a fiber portion 34 and a metallic portion 36, the two portions being secured together by means of the metal rivets 38. Rivets 38 also extend through the end portion of a metallic leaf spring 40, said spring having its other end portion 42 engaged against an insulator 44 located on the upstanding arm 26 of bracket 18. A second insulator 46 may be provided for electrically isolating arm 26 from the lead 48. A rivet 52 is extended through the overlapped portions as shown in FIG. 1 to anchor the spring 40 relative to the arm 26 and to electrically interconnect the lead 48 with the spring. Lead 48 extends from a terminal structure 53 which may include insulator member 54 having a screw-type terminal 56 therein. The outer end portion of screw terminal 56 is adapted to receive the lead from the conventional spark coil (not shown).

A second terminal structure is provided at 58 for connection with a second line leading from the spark coil, the arrangement being such that the two terminal structures 53 and 58 are connected in parallel with each other. Terminal structure 58 connects to a lead 50 which extends into electrical connection with the leaf spring 62 for the lower circuit breaker arm 32. A rivet and two insulators (similar to the elements 52, 44 and 46 shown in FIG. 1) are employed for connecting the conductor 50 to the spring 62, these elements also serving to mount the spring on the upstanding arm portion 26. Spring 62 is of generally the same curvature as spring 40, and is directly below spring 40 so that it is not visible in FIG. 1. As previously noted, the lowermost circuit breaker arm is positioned directly below circuit breaker arm 30, the lower circuit breaker comprising a fibrous portion substantially directly beneath fibrous portion 34, and a metallic portion 64 substantially directly beneath metallic portion 36. Each of the metallic arm portions 36 and 64 carries a contact button 68 registering with a contact button 70 carried on the upstanding arm 24. It will be appreciated that there are provided two sets of contacts, with each set of contacts being opened and closed by its cooperating breaker arm.

Each breaker arm is provided with an extension 72 or 74 adapted to engage the cam surfaces 14 during high speed rotation of shaft 12. The arrangement is such that the upper breaker arm has its portion 72 engaged by the cam lobe slightly before engagement of the extension 74 on the lower breaker arm. As each extension is engaged by the cam surface its breaker arm is moved away from the axis of shaft 12 so as to open its contact at 68. The

spacing or offsetting of the extensions 72 and 74 causes the contacts controlled by the lower breaker arm to be opened after opening of the upper set of contacts.

The initial current flow through the apparatus takes place via the terminal structure 53, lead 48, spring 40, the upper set of contacts 68 and 70, arm 24, the flat portion of bracket 18, and the grounded plate 20. When both sets of contacts are closed part of the current from the coil primary flows through terminal structure 58, conductor 50, lowermost spring 62, the lowermost breaker arm portion 64, the lowermost set of contacts, bracket portions 24 and 18, and grounded plate 20. During the period when the lower breaker arm contacts are closed and the upper breaker arm contacts are opened, the entire current from the coil flows through the terminal structure 58.

The arrangement is such that the lower set of contacts open the circuit, and the upper set of contacts close the circuit so that corrosion, scale or pitting of the contacts is avoided. The overlapping closed period is such as to provide a good electrical circuit such as to obtain a satisfactory coil saturation with the provision of a hot high voltage spark after collapsing of the magnetic field in the coil core.

It will be noted that with the illustrated arrangement both of the circuit breaker arms are fulcrumed on a single post 28. Also, only a single support arm 24 is provided for the two fixed contacts, and a single upstanding arm 26 is only required to mount the two leaf springs 40 and 62 and the leads 48 and 50. The arrangement of parts is characterized by a simplicity of construction which lends itself to manufacture at relatively low cost. Also, since both circuit breaker arms are fulcrumed on the same post structure the extensions 72 and 74 are at all times correctly positioned relative to one another so as to obtain the proper timing. This is in contrast to the usual dual circuit breaker arrangement wherein the individual circuit breaker arms are mounted on separate bracket structures requiring precise adjustment relative to one another.

While a specific bracket structure and arrangement has been shown in the drawings, it will be appreciated that modification thereof may be made while still operating within the teachings of the invention as defined in the accompanying claims.

I claim:

1. In an ignition timing circuit the combination comprising a circuit breaker structure including a bracket having first and second upstanding walls; a post structure carried on said bracket and extending parallel to the upstanding walls; first and second circuit breaker arms fulcrumed at points on said post structure spaced from each other and from the bracket structure so that each arm is free to pivot on the post structure without frictional interference from the other arm or bracket structure; a first leaf spring anchored at one of its ends on said first wall and having its other end connected with the first breaker arm for supporting it on the post structure; a second leaf spring having one of its ends anchored on said first wall and having its other end connected with the second breaker arm for supporting said second breaker arm on the post structure; a contact carried by each of said breaker arms in alignment with a portion of the second wall; and a contact carried on the second wall in alignment with each of said first-mentioned contacts.

2. The combination of claim 1 wherein each of the circuit breaker arms comprises a one-piece molded element defining a U-shaped socket engageable with the post structure, a flat wall portion extending from said socket, and a cam-engageable projection extending angularly from the flat wall portion; each of said breaker arms further comprising an elongated metallic contact mount positioned against one surface of the flat wall portion; each of said leaf springs having a portion thereof engageable with another face of its respective flat wall portion; and the combination further comprising electrically conductive fastener means extending through each leaf spring, its flat wall portion, and contact mount whereby to electrically and mechanically connect the leaf spring with its breaker arm.

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