Sept. 18, 1945. H. L. FUSTON 2,384,828

IGNITION BREAKER

Filed Dec. 30, 1941

Fig. 1

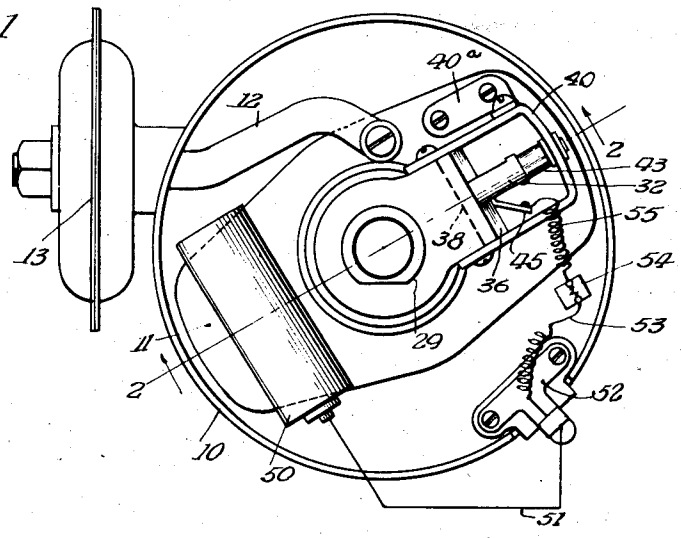


Fig. 2

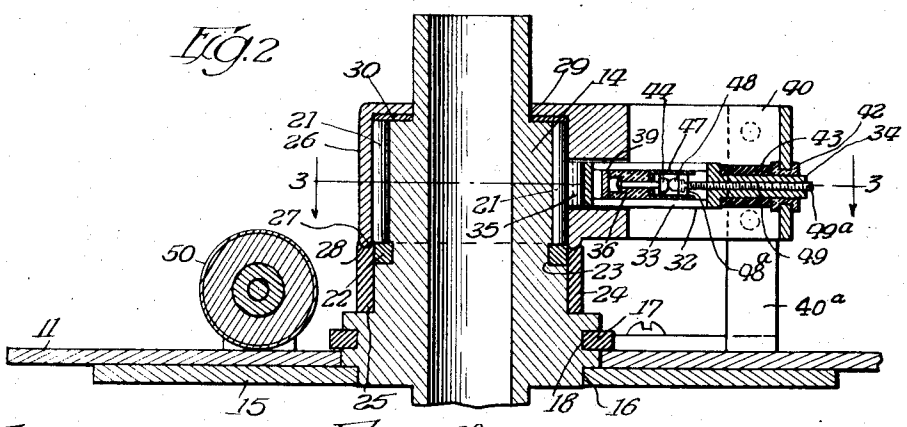


Fig. 4

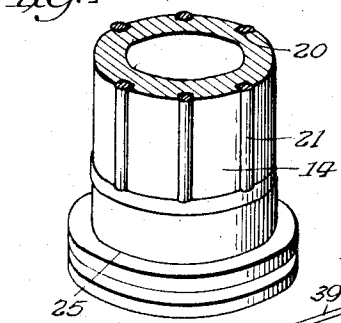


Fig. 5

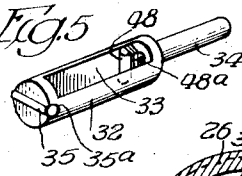


Fig. 3

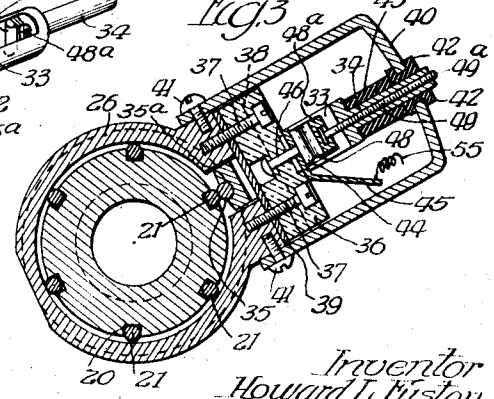
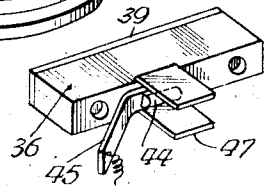


Fig. 6



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2,384,828

IGNITION BREAKER

Howard L. Fuston, Oak Park, Ill.

Application December 30, 1941, Serial No. 424,915

10 Claims. (Cl. 200—30)

This invention relates in general to a circuit breaking device commonly used with internal combustion engines.

An important object of the invention is in the provision of an improved circuit breaker in which pressure against the circuit breaker shaft is relieved and additional bearing surface is provided.

A further object of the invention is in the provision of a circuit breaker in which a quick break is insured and a longer period is provided between such breaks.

A still further object of the invention is to provide a rolling lift contact engagement between the parts, with an elimination of recoil, instead of a hit and bounce engagement.

Further objects of the invention are; in the provision of rotatable contact bars in connection with the breaker cam; to provide a contact member movable radially with respect to the cam; to provide a rotatable contact bar carried by the contact member; to provide for enclosing the contact bars of the cam for lubricating purposes; to provide an outer bearing for the contact member; to insure that the contact member will be kept in proper alignment and to prevent rotation thereof; and to insure alignment of the contact members.

Other objects of the invention will appear in the specification and will be apparent from the accompanying drawing, in which

Fig. 1 is a top elevation of a circuit breaker in accordance with this invention as applied to a well-known type of distributor;

Fig. 2 is a sectional view taken on the line 2—2 of Fig. 1;

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 2;

Fig. 4 is a perspective of a portion of the cam member;

Fig. 5 is a perspective of the movable contact member; and

Fig. 6 is a perspective of an insulating block and the fixed contact member.

This circuit breaker differs from the oscillating arm type in providing a contact member which moves radially in a mounting which surrounds the cam shaft and actually encloses the cam so that there is no continuous pressure of the contact making device against the cam shaft tending to deflect it or to distort and wear the bearings thereof. By mounting the contact maker for straight longitudinal movement, and preventing its rotation, a proper alignment of the breaker points is insured and a quick break is produced. By actuating the contact maker with a fibre bar rotatable in a recess in the cam member, wearing of the members is reduced, a sharp impact is effected and a longer period between circuit breaks is possible.

By making the contact bars of the cam and the movable breaker member both rotatable, and the bars of the breaker member as large or larger than the cam bars, a rolling lift engagement is made between them, instead of a hit and bounce contact which tends to produce chattering and pitting of the contact faces.

By using an elastic material for pressing the contact makers together, instead of a spring, this tendency to bounce is further reduced, as such material has little or no inertia. The cam contact bars may be either fixed or movably mounted.

Referring now more particularly to the drawing, the invention is shown in connection with certain parts of a distributor for an internal combustion engine, comprising a casing 10, an automatic spark advance plate 11, movable in the casing by means of an arm 12 extending from a pressure operating device 13 which form no part of the present invention. In the casing is a rotatable cam shaft 14 which may be substituted bodily for a similar cam shaft as now included in such ignition equipment. The present cam shaft differs from those now commonly used in the details of its construction, and the present invention relates to such details and to the construction of breaker mechanism in connection therewith.

The cam shaft is rotatably mounted in the plate 11 and is secured thereto against axial displacement by a plate 15 securely mounted in a shoulder 16 in the lower end of the cam shaft which is moved up against the under side of plate 11 and then a spring ring 17 is inserted in a groove 18, which engages the upper side of the plate 11 thereby holding the cam shaft in proper position but not interfering with its rotation in plate 11.

In the outer surface of the cam member are a number of spaced angular grooves or recesses 20 corresponding in number to the lobes or projections of a cam. These grooves are preferably rectangular and extend lengthwise of the cam member, and in each groove is seated a circular bar 21, preferably of fibrous material slightly less in diameter than the dimensions of the recess or groove so that it will rotate freely therein and provide space for lubricant. The depth of the recess or groove is such that the contact bar

21 will extend outwardly beyond the surface of the cam, the projections being such that the cam may be circular and the cam action requiring no contact therewith but only with the bars 21. In order to seat the bars in position a contact ring 22 is mounted in a groove 23 in the cam member at the lower ends of the bars 21 and to hold this ring in position a collar 24 is slipped over the ring at the outer side thereof abutting a shoulder 25 at its lower edge.

A contact making support 26 in the form of a collar is applied over the cam shaft enclosing the bars 21 and providing a space in which lubricant for the bars may be contained. The lower edge of the collar has a rounded projection 27 which is seated in a groove 28 at the upper edge of a retaining collar 24, and at the upper edge of the collar is a flange 29 extending to a reduced portion of the cam shaft, with a grease retaining washer 30 disposed between the upper ends of the bars 21 and the inner side of the flange.

Extending from one side of the collar is a bore in which a contact maker 32 is reciprocable on an axial line from the cam shaft. This contact member is preferably circular in form to fit and close the bore, and has a transverse opening 33 adjacent at one end and a reduced hollow internally threaded stem 34 at the other end, the base communicating with the interior of the opening 33. At the larger end which is closed, a rounded contact bar 35 is rotatably retained in a segmental circular recess 35a and is disposed parallel with the bars 21, which locates the opening 33 transversely of the collar so that a cross piece 36 of insulating material, such as fibre, is inserted through the opening and attached by means of fastening screws 37 and partially seated in a recess 38 of the collar at the sides of the bore 31. In order to strengthen the crosspiece a metal strip or reinforcement 39 may be inserted in the recess 38 at the bottom of the crosspiece 36. By this means the contact maker is slidably supported and prevented from rotation.

To mount the outer end of the contact maker a yoke 40 is secured at its ends to the outer sides of the collar 26 by fastening screws 41. At the outer end of the yoke is a bearing 42 through which the hollow stem 34 of the contact maker is slidable. Interposed between the inner side of the bearing and the enlarged portion of the contact maker is a resilient means such as a block or sleeve 43 of rubber or other elastic material which closes the electrical breaker connection and tends to force the contact maker in the path of the cam bars 21. Springs may be used, but rubber or an equivalent, or other elastic material is more advantageous as such materials have little inertia and no recoil.

Projecting from the inner side of the insulating crosspiece 36 is an electrical contact bar 44 preferably of tungsten or other suitable conducting material, the bar being mounted upon a contact strip 45 of copper or other conducting material, which extends angularly outward from one side therefrom and both secured into the crosspiece by a fastening screw 46 or rivet, or other suitable means. If desired, an insulating shield 47 preferably U shaped may also be secured by the same fastening means 46, which extends to opposite sides of the contact bar 44 to prevent lateral short circuits with the electrical contacts.

In the outer end of the opening 33 of the contact maker is the movable contact terminal of the circuit breaker comprising a contact bar 48 of conducting material such as tungsten or the like, carried by a support 48a movable but not rotatable in the opening 33. A threaded bar 49 extends through the hollow threaded portion 34 of the contact maker, and has a rotatable connection with the support 48a the bar having a screw terminal 49a at its outer end by means of which it may be adjusted with a screw driver for accurately setting the movable contact 48 to make an exact electrical connection with the fixed contact 44 when the contact maker is reciprocated.

With this construction the rotation of the cam shaft causes the contact maker 32 to be actuated each time one of the bars 21 engages a contact bar 35 at the end of the contact maker. At this time the contacts 44 and 48 are separated against the resilient action of spring 43 and a spark is produced in the well-known way for ignition purposes. The contact of the bars 21 and 35 is short and positive, and the engagement is in the nature of a rolling lift, which tends to cause a slight rotation of the bars rather than a frictional wiping contact, 21, thereby resulting in longer wear and smoother movement and operation. The bars 21 and 35 are easily replaced in their recesses if they become worn. In one form of the invention the bars 21 have a projection of approximately 43 thousandths of an inch from the surface of the cam, which is sufficient to produce a movement of the contact maker of 12 thousandths of an inch, whereas a perfect electrical break is obtained when the fixed and movable contacts are separated 3 thousandths of an inch.

As the operation of this circuit breaker is short and quick, it produces a longer time interval between the circuit breaks which is of considerable advantage in the operation of a condenser 50 usually mounted on the plate 11 within the housing. The condenser is grounded on the plate and is connected by a conductor 51 with an insulated terminal 52 and thence by conductor 53 through a fuse 54 and a conductor 55 to the contact strip 45. The other terminal 48 being grounded, the condenser is connected in a short connection between the terminals 44 and 48, in a well known manner. The sharp break and the improved time interval produced by the action of the circuit breaker improve the condenser action and cause a fatter and hotter spark. By inserting a fuse directly into the circuit of the condenser and locating the fuse within the distributor housing, the breaker contacts are protected against sparking and the fuse is easily available for repair or replacement.

Although this circuit breaker is particularly described as it relates to an internal combustion engine, it may have a more general use for ignition devices or as a circuit breaker wherever it may be applied.

I claim:

1. In an ignition breaker, a rotatable cam member having longitudinal grooves in its outer surface, a rotatable circular contact bar in each groove with a portion projecting therefrom, a collar member confining and enclosing bars in the grooves, and a movable contact member carried by the collar engaged by the projecting portions of the bars.

2. An ignition breaker comprising a rotatable cam member having spaced longitudinal surface grooves, a circular contact bar rotatable in each groove, a collar relatively fixed but surrounding the cam member and confining the bars in the grooves, and a contact member movable in the

collar and engaged by said contact bars, the bars being rotatable in the grooves by such engagement.

3. In an ignition breaker a rotatable cam member having longitudinal grooves in its outer surface, a contact ring seated in the cam member in the lower ends of the grooves, a circular contact bar rotatable in each groove and projecting partially therefrom a collar sealed at its lower edge with the cam member and surrounding the contact bars in their grooves, a flange at the upper end of the collar overlying the bars and the upper ends of the grooves, a grease seal between the flange and the cam member, and a movable contact member carried by the collar and engaged by the bars as the cam member is rotated relatively to the collar.

4. In an ignition breaker, a cam member having recesses extending lengthwise in the outer surface, contact bars rotatably seated therein, a collar surrounding the member and forming a lubrication retainer for the bars, the lower edge of the collar having a lubrication sealing engagement with the member, the upper edge of the collar having a flange overlying the upper ends of the bars, a lubrication sealing washer between the flange and bars, the collar having a radial bore extending from the lubrication retainer, and a contact stem movable in the bore when engaged by the bars and closing the bore against the escape of lubrication.

5. In an ignition breaker, a cam member, a collar thereon having a radial bore, a stem slidable in the bore, and movable by said member, a transverse opening through the stem, a contact member carried by the stem, a fixed contact engaged thereby, and a cross piece secured to the collar and extending through said opening.

6. In an ignition breaker, a cam member, a supporting member having a bore extending normal to the can member, a contact member movable in the bore and to engage the cam, a fixed contact engaged by said contact member, an insulating block for the fixed contact which holds the contact member against rotation as it moves in the block, and resilient means tending to hold the contact member against the fixed contact.

7. In an ignition breaker, a cam member, a collar extending around the cam having a radial bore, a contact maker slidable in the bore, a yoke extending outwardly from the collar having an outer bearing for the contact maker, a transverse opening through the contact maker, an insulating crosspiece secured to the collar and extending through the contact maker opening, a fixed contact on the crosspiece, a movable contact on the contact maker, and resilient means between the contact maker and the yoke tending to keep the fixed and movable contacts together.

8. An ignition breaker structure according to claim 7, in which the contact on the contact maker is located in the outer end of the transverse opening and is adjustable by means of a screw extending through the outer bearing of the yoke.

9. An ignition breaker according to claim 7 in which the said fixed and movable contacts are both located in the opening of the contact maker, and an insulating guard secured to the crosspiece extends at both sides of said contacts.

10. An ignition breaker according to claim 7, in which the crosspiece is strengthened at its base by a metal strip which also extends through the opening in the contact maker, the fixed contact being located at the outer side of the crosspiece between the ends thereof opposite the radial bore.

HOWARD L. FUSTON.