Dec. 21, 1954 A. E. BURCH 2,697,762

CIRCUIT BREAKER FOR AN IGNITION MECHANISM

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Fig. 1

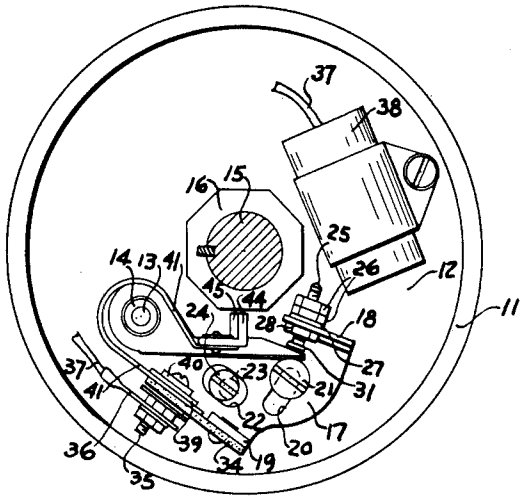


Fig. 3

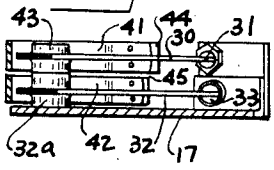
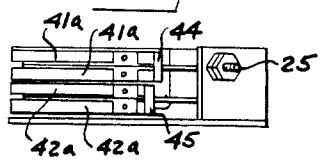


Fig. 4



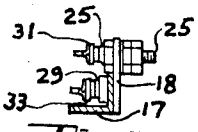


Fig. 5

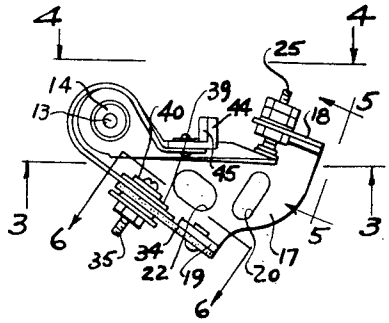


Fig. 2

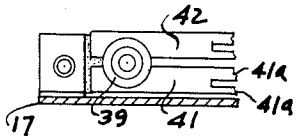


Fig. 6

INVENTOR.
ARTHUR E. BURCH.

BY

Thos. J. Donnelly

ATTORNEY.

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CIRCUIT BREAKER FOR AN IGNITION MECHANISM

Arthur E. Burch, Detroit, Mich., assignor to Machined Parts Corporation, Detroit, Mich., a corporation of Michigan

Application October 9, 1951, Serial No. 250,487

4 Claims. (Cl. 200—30)

My invention relates to a new and useful improvement in a circuit breaker for an ignition mechanism adapted for use primarily on internal combustion engines for periodically making and breaking a circuit.

The invention embodies a structure whereby a pair of movable arm ignition points is used instead of the conventional single ignition point, thus providing all the advantages of dual point ignition systems by the simple installation of a twin ignition point set. These dual ignition point movable arms are adapted for engaging two stationary contact points on a single breaker plate. The dual movable arm igniton points are mounted on a single post which is mounted within the distributor plate housing. Each ignition point rockable arm carries a contact point on its free end, and moves into and out of engagement with two stationary contacts on a single ignition point breaker plate.

It is an object of this invention to provide twin ignition point operation without modification of the regular distributor plate, by providing a twin ignition point system that will fit in the exact location, using the same ignition post and the same adjustment screws as the conventional single ignition point. Unlike other dual point systems this invention can be installed as a replacement, or used in regular production without disturbing the cam bearing shaft, or any of the adjustments relating thereto and avoiding damages commonly resulting in the removal and replacement of the timer shaft.

The advantages of this invention are numerous resulting primarily in longer ignition coil saturation period and higher secondary voltage potentials. The result is invariably better all weather starting and the over-lap principle involved in this invention provide higher coil saturations for top speeds and more reliable continued ignition performance.

The invention also includes the use of the cam follower rubbing block so arranged that the opening of the twin ignition points are not only independent and more rapid but also causes one ignition point to open in advance of the other and one ignition point to close in advance of the other. There is approximately fifteen degrees when both ignition points are closed thus providing not only a longer coil saturation period, but also a more positive electrical circuit.

Because of the more rapid opening of the ignition points the tendency of ignition point burning is greatly reduced, and the over-lap action in this invention allows for wider original point setting. The combination of the more rapidly opening ignition points, and the wider original settings allow for greatly increased ignition point life. The over-lap principle further protects the ignition points, for when one point opens the circuit and the other one closes the circuit the electrical load is divided.

Other objects will appear hereinafter.

It is recognized that various modifications and changes may be made in the detail of structure illustrated without departing from the invention and it is intended that the present disclosure be considered but the preferred embodiment.

Forming a part of this application are drawings in which:

Fig. 1 is a top plan view of the invention showing it installed,

Fig. 2 is a top plan view of the invention detached from the distributor housing,

Fig. 3 is a view taken on line 3—3 of Fig. 2,

Fig. 4 is a side elevational view of the invention taken on line 4—4 of Fig. 2,

Fig. 5 is a fragmentary elevational view taken on line 5—5 of Fig. 2,

Fig. 6 is a fragmentary sectional view taken on line 6—6 of Fig. 2.

In the drawings I have shown the invention used with a distributor or timer housing **11** having a supporting plate **12** positioned therein. Projecting upwardly from the supporting plate **12** is a stud or shaft **13**, embraced by the sleeve **14** of suitable insulating material. Extending into the housing is the timer shaft **15** carrying the timer cam **16**. The supporting plate **12** is an electrical conductor and is grounded and positioned on the plate **12**, in electrical contact therewith, is the metal plate **17** projecting upwardly from which are the spaced apart lugs **18** and **19**. The plate **17** is provided with an elongated slot **20** through which is extended a screw **21** threaded into the supporting plate **12**. A slot **22** is formed in the plate **17** and extending through this slot **22** and threaded into the plate **12** is a screw **23**, which carries the cam **24**, so that, upon loosening the screw **21** and rotating the screw **23**, the plate **17** may rock on the axis of the stud or shaft **13**, so that the relative position of the plate **17** and the cam **16** may thus be adjusted. Projected through the lug **18** is a contact **25** on which are threaded the lock nuts **26** bearing against the washer **27** at one side of the lug **18** and a nut **28** is positioned on the contact **25** at the opposite side of the lug **18**, thus electrically connecting the contact **25** to the ground. Mounted below the contact **25**, in spaced apart relation thereto on the lugs **18**, in electrical connection therewith, is a contact **29**, these contacts being preferably in vertical alignment with each other.

A metallic rockable arm **30** is provided with a hub **43** fitting over the insulation sleeve **14** so as to rock on the axis of the stud **13**. This arm **30** is formed of electrical conductive material, preferably copper, and is provided at its free end with a contact **31** adapted for engaging the contact **25**. Positioned below the arm **30** is a similar arm **32** having a hub **32***a* which embraces the insulating sleeve **14**, so that the arm **32** may rock on the axis of the stud or shaft **13** as a pivot. This arm **32** carries at its free end the contact **33** adapted for engaging the stationary contact **29**.

Secured to the lug **19** is a plate **34** of insulating material. Extended through this plate **34** is a screw **35** which serves as a terminal to which may be secured one end of the cable **37** which connects to one end of the condenser **38**.

The electrical connections in a distributor of this type are well known and are not illustrated in detail. The commonly accepted form of electrical connection consists in connecting one side of a battery, the other side of which is grounded, through a switch to a primary coil and thence to one side of a condenser, the other side of which is grounded and thence to the rockable arms or movable contacts. Consequently when the movable contacts **31** and **33** are in engagement with their respective contacts the circuit will be made and will not be broken until both of the contacts **31** and **33** move out of engagement with their respective contacts.

The terminal **35** is a screw which is in engagement with the metallic washers **40** and **39**. This washer **39** bears against the ends of the metallic springs **41** and **42**, so as to securely clamp the ends of these springs against the plate **34** of insulation. Each of the springs **41** and **42** is slitted to provide a pair of parallel spaced apart extending portions **41** and **42***a* respectively. These spaced apart portions are doubled upon the main body and extended at their terminal portions parallel to the arms **30** and **32**, the arms projecting through the slit. It will be noted that these springs are doubled around the pivoted ends of the arms **30** and **32** so that there is thus established electric contact between the arms **30** and **32** and the terminal **35**. Secured to the free end of the upper spring portions **41** is a rubbing block **44** of insulating material and secured to the free ends of the lower spring portions **41** and **41***a* is a rubbing block **45** of insulating material. As clearly shown in Fig. 4 the rubbing block **44** is ahead of the rubbing block **45**. In the form illustrated in Fig. 1 the cam **16** would move clockwise so that the con-

tact 31 would move out of engagement with the contact 25 while the contact 33 would remain in engagement with its contact 29. A further rotation of the cam 16 would then engage the rubbing block 45 so as to move the contact 33 out of engagement with its contact 29. As the rotation of the cam 16 continues the contact 31 would return into engagement with its contact 25 while the contact 33 is still out of engagement with its contact 29. By this construction I obtain an overlap. The contacts 44 and 45 are mounted at a point positioned inwardly of the free end of the arm a distance substantially one-third the length of the arm, so that there is thus obtained a two to one ratio. By adopting the overlap principle the saturation period of the ignition coil is increased and by employing the substantially two to one ratio the gap may be widened. Where a single pair of contacts is used a wide gap could not be resorted to because of the consequent shortening of the saturation period. Consequently it is necessary, where a single pair of contacts is used on an ignition system, to maintain the gap at a minimum so that the contacts will move into engagement with each other in order to provide the necessary period of saturation. A very common setting of the contact points is with a maximum gap of .014. When, after use, through wear of the various parts, this gap is reduced to .012 a very inefficient engine operation will result, requiring readjustment of the contact points. Where the wide gap is used, which becomes possible with the mechanism herein set out, the variation of that gap does not have such an effect on the engine operation. For instance, with the present invention a common initial setting would be with a gap of .022. Where the initial setting of the gap is .014, a reduction of this gap immediately becomes noticeable when the gap is reduced a couple of thousandths of an inch. With the present invention the variation of the gap may be brought from .022 down to .014 before departing from the initial efficiency obtained by a gap setting of .014. The disadvantages of the wide gap arrangement, so far as the length of the saturation period is concerned are compensated for by the closing of the other set of points, or in other words, by the overlap of the two sets of points.

In an ignition system where a single pair of points is used the breaker plate is mounted on a stud or shaft 13 in the manner illustrated in the drawings herein. A conversion to a dual or twin ignition may be easily effected by the present invention. It would be but necessary to remove the breaker plate and the rockable arm embodying two points from the supporting plate and replace it with the present breaker plate, the rockable arms engaging over the single post. Thus there is provided a structure which lends itself to quick and easy removal and replacement of the points in a distributor or an ignition system. The breaker plate 17 may be removed and replaced without in any manner disturbing the established adjustments and without requiring the removal of the shaft 15.

Experience has shown that where it is necessary to remove the shaft 15 a considerable labor consumption is involved because of the necessity of removing the driving gear and other associated parts.

Experience has also shown that frequently the mechanism is thrown out of adjustment and various parts become damaged in such removal and replacement. Consequently with the present invention considerable labor saving is encountered, in replacement of the ignition points and a simple and effective structure is provided to obtain the efficiency referred to and which results primarily from the overlap and the two to one ratio. Economy as well as operational advantages are obtained by using a single post for mounting the pair of contact bearing arms.

In the construction illustrated adjustability of only one pair of contacts may be resorted to and in the drawings I have shown the lower contact 29 as being in fixed relation to the supporting lug 18. The upper contact 25, however, is adjustable. In arranging the mechanism for use the plate 17 would be mounted as shown in Fig. 1 and the screw 21 loosened. A rotating of the screw 23 would effect a rotation of the cam 24 in the slot 22, so that the plate 17 may swing on the stud 13 as an axis so that the rubbing blocks may be adjusted inwardly or outwardly of the cam 16. By loosening the lock nuts 26 the screw 25 may be threaded in one direction or another to move the contact 28 inwardly or outwardly from the supporting lug 18. When the proper adjustment is obtained the screw 28 would be screwed tightly against the lug 18 and the lock nuts 26 would be set tight to retain the adjustment. This affords a means for obtaining the fine adjustment necessary in a mechanism of this type.

What I claim is:

1. In a circuit breaker for an ignition mechanism adapted for use with a housing having a metallic supporting plate in said housing and a rotatable cam in said housing, and a post projecting upwardly from said supporting plate off-set from the axis of said cam: a swingable metallic plate supported by and in electrical connection with said supporting plate and having an opening formed therein adjacent one end for reception of the said post for swingably mounting said plate on said post; a supporting lug projecting upwardly from one face of said swingable plate adjacent its free end; a pair of spaced apart electric contacts carried by said lug; a pair of rockable arms each rockably mounted at one of its ends on said post; an insulating sleeve on said post for insulating said arms therefrom; an electric contact carried on the free end of each of said arms, each of said contacts engaging one of the contacts on said lug and independently rockable into and out of engagement with its contact on said lug; a second lug projecting upwardly from said swingable plate intermediate the ends thereof; a supporting plate of insulating material mounted on said second-named lug; an electric terminal carried by said insulating plate; and a spring connected to said terminal and engageable with said arms for normally maintaining the said several contacts in engagement and electrically connecting said arms to said terminal.

2. In a circuit breaker for an ignition mechanism adapted for use with a housing having a metallic supporting plate in said housing and a rotatable cam in said housing, and a post projecting upwardly from said supporting plate off-set from the axis of said cam; a swingable metallic plate supported by an in electrical connection with said supporting plate and having an opening formed therein adjacent one end for reception of said post for swingably mounting said plate on said post; a supporting lug projecting upwardly from one face of said swingable plate adjacent its free end; a pair of spaced apart electrical contacts carried by said lug; a pair of rockable arms each rockably mounted at one of its ends on said post; an insulating sleeve on said post for insulating said arms therefrom; an electric contact carried on the free end of each of said arms, each of said contacts engaging one of the contacts on said lug and independently rockable into and out of engagement with its contact on said lug; a second lug projecting upwardly from said swingable plate intermediate the ends thereof; a supporting plate of insulating material mounted on said second-named lug; an electrical terminal carried by said insulating plate; and a spring connected to said terminal and engageable with said arms for normally maintaining said contacts in engagement and electrically connecting said arms to said terminal; and a rubbing block intermediate the ends of each of said arms engageable with the periphery of said cam for, upon rotation of the cam, effecting an independent rocking of said arms.

3. A device of the class described, comprising a metal plate having an opening formed therethrough adjacent one end thereof; a metallic lug projecting outwardly from one face of said plate adjacent the opposite end thereof; a pair of spaced apart electric contacts carried by said lug and in electric connection therewith; a second lug projecting outwardly from said face of said plate intermediate the ends thereof; an insulating plate secured to said lug and projecting outwardly therefrom; a pair of metallic arms; a hub on one end of each of said arms; a tubular insulating sleeve in said hubs; an electric contact on the opposite end of each of said arms, said contacts on said arms being in alignment with the contacts of said lug and each engaging one of the contacts on said lug; a spring member secured to said insulating plate and terminal and doubled upon itself to extend around the hub of said arms in engagement therewith for normally maintaining the contacts on said arms in engagement with the contacts on said lug; and electrically connecting said arms to said terminal; and a rubbing block intermediate the ends of each of said arms for, upon receiving a thrust, effecting a movement of the arm for disen-

gaging the arm contact with its contact mounted on said lug.

4. A device of the class described comprising a metallic plate having an opening formed therethrough adjacent one end thereof; a metallic lug projected outwardly from one face of said plate adjacent the opposite end thereof; a pair of spaced apart electric contacts carried by said lug and in electric connection therewith; a second lug projecting outwardly from said face of said plate intermediate the ends thereof; an insulating plate secured to said lug and projecting outwardly therefrom; a pair of metallic arms; a hub on one end of each of said arms; a tubular insulating sleeve in said hubs; an electric contact on the opposite end of each of said arms, said contacts on said arms being in alignment with the contacts of said lug and each engaging one of the contacts on said lug; a spring member secured to said insulating plate and doubled upon itself to extend around the hub of said arms in engagement therewith for normally maintaining the contacts on said arms in engagement with the contacts on said lug; and electrically connecting said arms to said terminal; and a rubbing block intermediate the ends of each of said arms for, upon receiving a thrust, effecting a movement of the arm for disengaging the arm contact with its contact mounted on said lug, said spring having slots in which a portion of the arms engage and said metallic plate having elongated slots formed therein.

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