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CIRCUIT BREAKER

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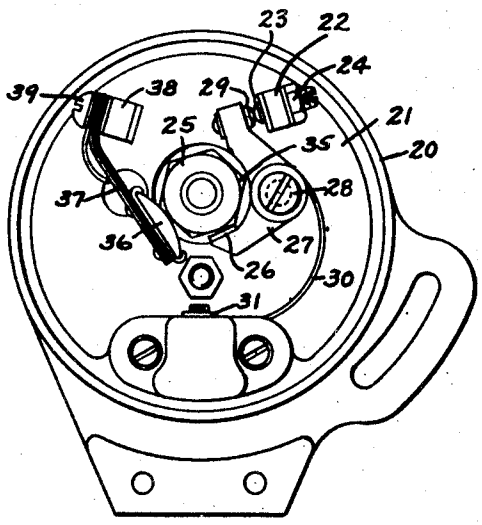


Fig. 1

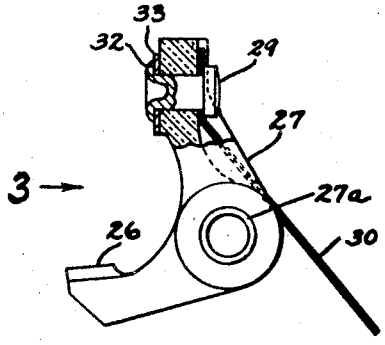


Fig. 2

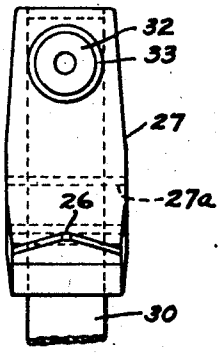


Fig. 3

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CIRCUIT BREAKER

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7 Claims. (Cl. 200—30)

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This invention relates to circuit interrupters and more particularly to the circuit interrupters for an ignition unit for use with an internal combustion engine. The ignition unit comprises a pivoted circuit breaker lever operated upon by an operated cam and carrying a contact engageable with a relatively stationary contact which can be adjusted with respect to the breaker lever for the purpose of adjusting the amount of separation of the contacts produced by the cam. It is well known that the amount of separation of the contacts in an ignition unit determines the operating efficiency. It is also well known that the contact points erode with use and the space between the contacts increases provided that the wear on the rubbing block provided by the lever is less than the erosion of contacts. Heretofore it has been the practice to pivot the breaker lever on one side of the cam and to have the contacts on the other side and to provide a wearing surface on the lever which engages the cam that is less than the wear on the contact points. By this arrangement numerous adjustment of the contacts must be made due to the fact that the gap between the contacts increases as the contacts erode.

Obviously, if the lever and contacts are constructed properly so that the wear of the contacts and the wear of the lever are equal, the space between the contacts when separated will remain the same at all times.

An object of the present invention is to provide a timer mechanism wherein the shift of ignition timing due to wear of the contacts is substantially eliminated.

Another object of the present invention is to provide a novel circuit breaker bell crank lever made of insulating material and having one arm which is in engagement with the operated cam so constructed that it will wear at the same rate as the erosion of wear of the contacts. This object is accomplished by having both contacts crowned on the face and by having the end of the arm in contact with the cam wedge-shaped, the wedge shaped end being properly proportioned so as to compensate for the wear of the contacts.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein a preferred embodiment of the present invention is clearly shown.

In the drawings:

Fig. 1 is a plan view of an ignition timer having a single circuit breaker lever embodying the present invention.

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Fig. 2 is an enlarged plan view of the circuit breaker lever as appears in Fig. 1.

Fig. 3 is a plan view of the lever looking in the direction of arrow 3 in Fig. 2.

Referring to Fig. 1 20 designates an ignition timer housing supporting a plate 21. An upwardly extending projection or lug 22 is supported by the plate in which may be mounted a threaded contact 23 capable of being turned therein to effect variations in timing if desired. The contact 23 has a crown or convex contacting surface. The contact 23 is locked in adjusted position by a nut 24. The housing 20 encloses a centrally disposed engine driven shaft which carries a cam 25 which operates upon a wedge shaped lip or cam engaging member 26 formed integrally with a lever 27. The lever comprises a body in the form of a bell crank composed of suitable insulating material. The lever 27 is provided with a metal bushing 27a and is mounted on a pivot pin 28 and one of the arms is formed to provide the wedge-shaped lip 26 while the other arm carries a contact 29 having a crown or convex contact surface which cooperates with the adjustable contact 23. The lever 27 is light in weight and responds quickly to the influence of the cam 25 and a leaf spring 30. The spring 30 has one end electrically connected with the contact 29 while the other end is electrically connected to a terminal 31. The contact 29 is riveted over as at 32 over a washer 33 to hold the spring 30 to the lever 27. When the spring is fixed to the terminal 31 it is so tensioned and arranged that the contacts 23, 29 are held normally closed until opened by lobes 35 provided by cam 25. The lobes 35 of the cam cooperate with the cam engaging member or lip 26 to periodically interrupt the primary circuit of the magneto in the well known way. The lobes 35 of the cam 25 are lubricated by a pad 36 saturated with a suitable lubricant such as oil or grease. The pad is fixed to one end of a leaf spring assembly 37. The other end of the spring assembly is secured to a lug 38 by a screw 39. The spring assembly 37 is so formed that when same is in position it will bias the pad 36 against the lobes 35.

Referring to Figs. 2 and 3 the lever 27 is shown on an enlarged scale. The lever comprises a block of insulating material in the form of a bell crank. The insulating material can be machined to the desired formation. It is to be understood the bell crank can be molded from a plastic compound of insulating qualities and have an insert, including a lip 26, of good wearing qualities embedded in the arm of the bell crank which is adapted to en-

gage the cam. In either case the lip **26** which engages the cam lobes **35** should be wedge shaped or otherwise proportioned so that the cam engaging part **26** will wear at the same rate as the contacts **23, 29** erode. The angle of the wedge may be an obtuse angle, but it has been found that good results can be obtained by having the sides diverge toward each other so that they form an angle of substantially 156°. The sides forming the obtuse angle terminate short of the apex thereof to provide a flat surface substantially 1/32" in width, said flat surface being parallel with the axis of the breaker lever.

It is obvious that since the wear of the wedge shaped lip **26** is equal to the erosion of the contacts **23, 29** there will be no substantial change in the gap between the contacts resulting from wear of the wear pieces.

As has been set out heretofore the surfaces of the contacts **23** and **29** are convex in formation therefore it will be apparent that as the contacts wear down the area of the contact increases and the rate of wear decreases. This is also the case with the cam contacting surface **26** when the end wears down the area, due to its wedge shape, increases and the rate of wear decreases.

While the embodiment of the present invention as herein disclosed, constitutes a preferred form it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. An ignition timer apparatus comprising in combination; a stationary contact; a pivoted lever carrying a contact cooperating with the stationary contact said contacts being subjected to wear during operation thereof; a cam member rotatable with respect to the lever; and a wear piece carried by the lever and engaging the cam member so that rotation of the cam actuates the lever to open and close the contacts, said wear piece being so shaped that upon wear thereof progressively larger areas are subjected to the engagement with the cam member so that the wear piece will wear at substantially the same rate as the rate of wear of the cooperating contacts.

2. An ignition timer apparatus comprising in combination, a relatively stationary contact; a pivoted lever carrying a contact cooperating with the stationary contact, said contacts having convex surfaces that wear with use for providing progressively larger areas of contact surface; a rotatable cam; a wear piece carried by the lever and engaging the cam so that rotation of the cam actuates the lever to alternately engage and separate the cooperating contacts, said wear piece having a surface which engages the cam, said surface being so shaped that upon wear thereof progressively larger areas are subjected to engagement with the cam member whereby it wears at substantially the same rate as the wear rate of the contacts so that substantially no change in the gap between the contacts results from the wear thereof.

3. An ignition timer apparatus comprising in combination; a relatively stationary contact; a pivoted lever having two arms, one arm carrying a contact cooperating with the stationary contact, said contacts having surfaces which wear with use, said surfaces being such that as the area of contact increases the rate of wear decreases; a rotatable cam; and means carried by the other arm of lever and engaging the cam so that rotation of cam causes the contacts to open and close alternately, said means being so

shaped that upon wear thereof progressively larger areas are subjected to the engagement with the cam to compensate for the wear of said cooperating contacts.

4. A circuit interrupter comprising in combination; a fixed support; a circuit breaker lever having two arms extending in different directions from its axis pivotally supported on the support; a bracket carried by the support; cooperating contacts attached respectively to one arm of the lever and bracket, each contact having a convex surface engaged by the other which is adapted to wear upon use to change the relation of the contacting surfaces of the contacts and the distance of separation between the contacts; a rotary cam; a wear member attached to the other arm of the lever and engaging the cam, said cam member cooperating with the wear member to rock the lever to engage and separate periodically said contacts, said wear member having its wearing surface area so proportioned that it substantially compensates for the wear of the cooperating contacts so that no substantial change in the timing engagement of the contacts results from the wear of the contacts and the wear of the wedge-shaped member.

5. An ignition timer mechanism comprising in combination, cooperating contacts adapted to wear away by use for providing progressively larger areas of contact surface, one of said contacts being mounted on a movable member of insulating material while the other is mounted on a metallic stationary member; a metallic cam member; a wear part formed integral with the movable member and engaging the cam member so that rotation of said cam member rocks the movable member to engage and separate the contacts, said wear part being tapered to form an obtuse angle so that it will wear in proportion to the wear on the contacts whereby no substantial change in the timing of engagement and separation of the contacts results due to the rate of wear of the contacts and the rate of wear piece.

6. An ignition timer comprising in combination, a rotatable cam; a stationary contact having a convex surface; a rockable member of insulating material having two arms extending in different directions from its axis; a contact carried by one of the arms and having a convex surface engageable with the convex surface of the stationary contact; a wedge-shaped lip extending from the other arm and engageable with the cam to separate the contacts, said lip having wearing qualities which compensate for the wear of the contacts so that no change in timing of engagement and separation of the contacts results from the wear of the wear piece and the contacts; and bias means associated with the rockable member for holding the contacts normally closed.

7. An ignition timer comprising in combination; a rotatable cam; a stationary contact having a convex surface; a rockable member of insulating material having two arms extending in different directions from its axis; a contact carried by one of the arms and having a convex surface engageable with the convex surface of the stationary contact; a wear piece fixed to the other arm and engageable with the cam to separate the contacts, said wear piece having its wearing surface so proportioned that it compensates for the wear of the contacts; and spring means associated with the rockable member for

holding the contacts normally closed and the wear piece against the cam.

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