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V. E. HEIL ET AL
IGNITION BREAKER

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Fig. 1

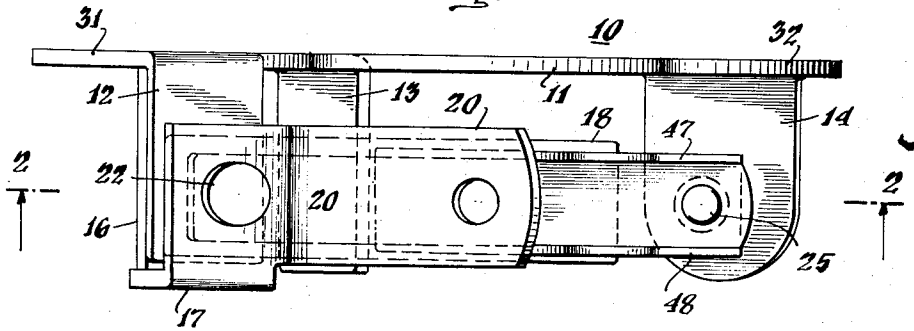
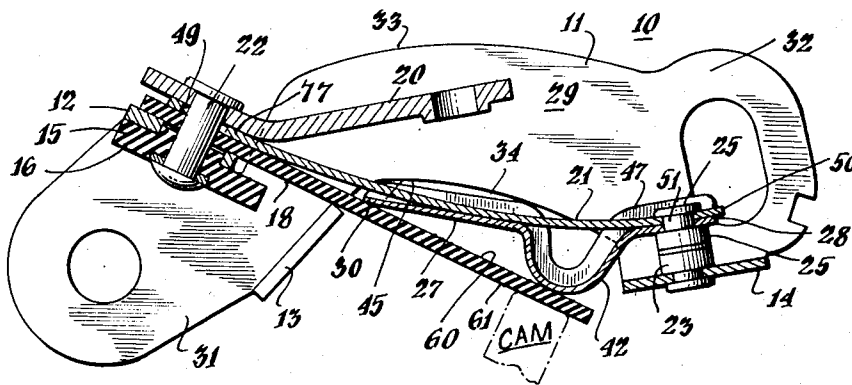
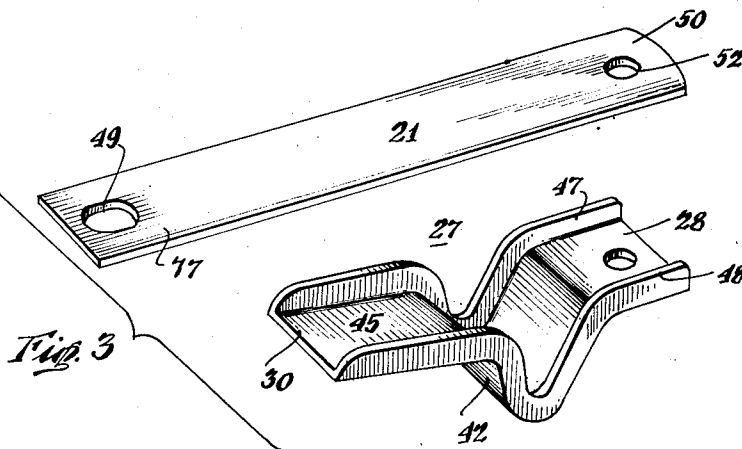


Fig. 2



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IGNITION BREAKER

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9 Claims. (Cl. 200—30)

This invention relates to periodic circuit breakers, particularly circuit breakers used by ignition timers for internal combustion engines.

The prime consideration in timer systems is to provide contact breakers wherein the alignment of contacts during the operation of the system is maintained substantially without variation and wherein any undesirable variation in effectively rotationally centering the contact arm during the process of opening and breaking contact is avoided.

It has been found that the fulcrum type circuit breaker possesses great advantages in providing an exact contact alignment and that such circuit breakers are able to maintain the angular position of an ideal pivoted type of breaker arm having no clearance on the pivoted bearings. The present invention, moreover, is an improvement on the fulcrum type ignition breaker assemblies heretofore known in that it lowers the costs thereof for use in several types of magneto applications.

In the present invention the fulcrum has been bent up out of the metal base and there has been inserted a thin, longitudinal strip of phenolic insulation placed between the fulcrum and the breaker arm. This thin, phenolic insulator, held at one end on the fulcrum and remaining free on the other end, serves also to insulate the breaker arm from the base at both the stack and the fulcrum point, and, in addition, also serves as a rubbing block which is adapted to ride on the cam of the ignition timer. Thus, there has been provided a new type of rubbing mechanism including a strip of insulator material connected to the break arm assembly. This results in the great advantage of cost reduction, since by its novel construction there is obviated the expense of angle moulding, sawing and drilling and also the additional cost of attaching a rubbing block to an arm.

It thus becomes apparent that the novel construction hereinafter described provides a new and improved modification of the fulcrum type assembly known to provide great advantages in rapid contact make-and-break ignition timers without any loss of alignment or increase in contact erosion.

It is therefore an object of the present invention to provide novel improved circuit breaker mechanisms for ignition timers.

It is still another object of the present invention to provide an improved circuit breaker mechanism which is easy to assemble and has an improved efficiency operation.

It is another object of the present invention to provide a light weight improved circuit breaker arm mechanism which is easy to fabricate and utilize in circuit applications needing lower weight and increased efficiency for timers operating at higher frequencies.

Still another object of the present invention is to provide an improved ignition breaker arm assembly using the fulcrum principle and which is adapted to obviate the need of a separate rubbing block component assembly therein.

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A further object of the present invention is to provide an ignition circuit breaker arm mechanism having an improved construction which is lighter in weight, more economical to assemble and fabricate, and wherein the material and parts are of lower cost.

Another object of the present invention is to provide an ignition breaker arm means utilizing a fulcrum type principle which provides assembly procedures to attain reduced assembly costs.

The invention in another of its aspects relates to the novel features of the instrumentalities described herein for teaching the principal objects of the invention and to the principles embodied in these instrumentalities, whether or not these features and principles may be used in the said objects and/or in similar fields.

Other objects of the invention and the nature thereof will become apparent from the following description, considered in connection with the accompanying figures of the drawing and wherein like reference characters describe elements of similar function therein and where the scope of the invention is determined from the dependent claims.

Referring now to the drawing:

Fig. 1 is a top plan view of an embodiment of the improved fulcrum type breaker of the subject invention useful in showing the mounting of the contactor elements on the plate structure of the ignition circuit contact breaker;

Fig. 2 is a vertical, cross-sectional view of an embodiment of the fulcrum type ignition contact breaker adapted to illustrate the novel construction and arrangement of parts providing a breaker having exact contact alignment, while obviating the necessity for a separate rubbing block as heretofore used; and

Fig. 3 is a pictorial exploded view of the moving arm assembly of the ignition timer including a steel spring adapted to fit within the confines thereof to overlie the same and to place it under tension.

Generally speaking, the fulcrum type ignition timer of the present invention comprises, in combination, an assembly having means adapted to be connected to the timer of an internal combustion engine wherein said means includes an extension plate and an assembly side wall. The plate extends from the side wall at substantially right angles thereto and a plurality of slots are cut through the side wall for movably adapting the assembly to the timer. A bracket is connected to said assembly side wall and includes a terminal for an electrical connection. A steel spring, adapted to carry a rivet and a contact and to cooperatively make with a fixed contact, is also connected to said bracket assembly, which further includes an insulator strip acting as a rubbing block. A movable arm is placed beneath the steel spring with the tip end thereof resting against the insulator strip. The fulcrum arm is connected to the side wall of the assembly and is placed on the opposite side of the insulator strip beneath the tip end of the movable arm. The moving arm is thus adapted to move about the fulcrum on said strip, which also is adapted to be utilized as a rubbing block.

It is apparent, therefore, that the components herein are adapted to perform a multiplicity of functions and to eliminate the necessity for exact alignment assemblies while providing these exact alignment features. At the same time, the materials needed for other breaker arm construction of the fulcrum type are eliminated, substantially reducing the cost thereof. In addition, the weight of the breaker arm assembly is lessened, making the new and improved fulcrum type assembly construction hereinafter described adaptable for use in light weight magneto applications.

As shown in Figs. 1 and 2, the improved fulcrum type

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breaker comprises an assembly 10 including a side wall 11 having a lateral extension 12, a fulcrum bar 13 and a tongue extension 14. The side wall structure 11 has a configuration such as to define a middle curved section 29 interconnecting two end sections 31 and 32, each of which has an aperture cut therethrough for mounting purposes. The base has an upper surface 33 and a lower surface 34. At end 32 on lower surface 34 extending substantially 90° thereto is a flat tongue extension 14, suitably fabricated of metal, for carrying contact 23 thereon. Opposite thereto and extending from the upper surface 33, bent substantially at right angles thereto, is a flat, lateral extension 12. On one side 15 of lateral extension 12 an insulator pad 16, fabricated of a material such as phenol, is placed. On the other side of extension 12 is formed a phenolic insulator strip 18 which extends longitudinally toward extension 14. Over the insulator strip and above extension 12 is formed a terminal post comprising a thin strip of metal 20 and an integrally formed side wall 17, which serves to contain and align several components. Between the under side of one end of the terminal and adjacent the insulator strip is attached a spring 21. Spring 21, insulator strip 18, lateral extension 12 and terminal 20 are all gathered together and held by means of a rivet 22. As stated, tongue 14 is adapted to carry a contact 23 thereupon to mate with a contact 25 staked to spring 21, which is adapted to fit within the confines of a movable arm 27. One end 28 of movable arm 27 is staked to spring 21 at its contact carrying end and has contact 25 connected to the underside thereof. The other end 30 of movable arm 27 meets strip insulator 18 at a point directly above fulcrum bar 13 to form a pivot about which the movable arm 27, in cooperation with spring 21, is adapted to be angularly moved upon activation of strip 18 by the usual cam member included in an ignition timer system.

Referring to Fig. 3, there is shown the unique and novel construction of movable arm 27 as adapted to ride about the fulcrum 13 on insulator strip 18, and as further adapted to contain spring 21 thereupon and within side walls or lips 47 and 48 under proper stress and alignment. Movable arm 27 comprises a specially configured metallic form having a plurality of sections. It includes a first end section 30 and an end section 28 interconnected by a sinuated mid-section 42 having a general U-shaped configuration integrally joined to said sections, while hanging therefrom to place the convexity formed by the U-shaped section at a position lower than the other sections. The mid-section thus formed is adapted to be seated above the cam of the ignition breaker on the top surface 60 of the insulator strip 18, to be displaced when the cam meets the under side 61 of the insulator strip. This insulator strip, although being of thin cross-section, is enabled to act as a rubbing block. This is so because the mid-section of movable arm 27 places strip 18 into the necessary follower relationship with the actuating cam.

In order to place movable arm 27 under proper tension so as to rotate end 30 about the fulcrum arm 13, arm 27 has its surface 45 bounded by side lips 47 and 48 so as to form a cradle for receiving lower steel spring 21 on surface 45 within the confines of lips 47 and 48. The bowed stress is supplied spring 21 by staking it at one end 77 by means of a clamping rivet 22 passing through eyelet 49 cut therein and by staking the other end 50 to arm 27 at its end 41 via contact rivet 51 passing through eyelet 52.

In the operation of the fulcrum type ignition contact breaker, as heretofore described, the rubbing block constitutes the thin insulation strip which underlies the movable arm at its bent-down, U-shaped portion. The insulator strip further, at one end thereof, serves to insulate the arm from the base at both the stack and the fulcrum point.

This description of the novel fulcrum type ignition

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contact breaker is intended to be merely illustrative and not exhaustive of the scope of the invention, which is to be taken rather from the appended claims, together with the description in the specification.

We claim:

1. An ignition contact breaker comprising, in combination, an assembly having a side wall adapted for adjustable relation to a timing cam, a movable contact arm having a contact, said arm adapted to be motivated by said cam, a fixed contact adapted to cooperate with said contact on said arm, an extension formed as part of said assembly, a spring attached to said arm placing stress thereon, fastening means holding said arm in fixed relation to said extension, an insulating strip held between said spring and said extension, said insulating strip resting on a fulcrum and extending substantially tangent to said cam to rest between said cam and said arm to insulate said arm from said cam while also forming a wear-resisting surface for bearing against said cam so as to move said arm on rotation of said cam.

2. An ignition contact breaker comprising, in combination, an assembly having a side wall adapted for adjustable relation to a timing cam, a movable contact arm having a contact, said arm adapted to be motivated by said cam, a fixed contact adapted to cooperate with said contact on said arm, an extension formed as part of said assembly, a spring lying against said arm placing stress thereon, fastening means holding said arm in fixed relation to said extension, an insulating strip resting on a fulcrum and held between said spring and said extension extending laterally therefrom, said insulating strip being substantially tangent to said cam to rest between said cam and said arm to insulate said arm from said cam while also forming a wear-resisting surface for bearing against said cam so as to move said arm on rotation of said cam.

3. An ignition contact breaker comprising, in combination, a mounting plate having a side wall, said side wall having means for adjustably moving said plate in relation to a cam operating with respect to said breaker, a movable contact arm having a contact at an end thereof, stack means connecting an end of said arm to said plate, means extending from said side wall carrying a fixed contact thereon, said latter contact being placed opposite said contact on said movable arm and adapted to mate therewith, a spring held in said stack and connected to said movable arm for placing stress thereon, a second extension connected to said plate, a fulcrum bar also extending therefrom, an insulating strip held between said spring and said second extension, said insulating strip extending substantially tangent to said cam to rest on said fulcrum bar between said cam and said arm, said strip insulating said arm from said cam while also forming a wear-resisting surface for bearing against said cam, said cam adapted on rotation to move said arm on said fulcrum bar for making and breaking electrical contact between said contacts of said breaker.

4. A fulcrum type ignition contact breaker comprising, in combination, assembly means adapted to be connected to the timer of an internal combustion engine, said assembly means comprising an extension and a side wall, said extension bent from said side wall at substantially a right angle thereto, a plurality of apertures cut through said side wall for adjustably adapting said assembly to said distributor, a stack connected to said assembly side wall including a terminal, a spring with one end held by said stack having a contact at a free end thereof, a fixed contact cooperating therewith, an insulator slab for said stack, an insulator strip acting as a rubbing block, fastening means holding all the components in the stack together, a moving arm placed beneath said steel spring, a tip end of said arm resting against said insulator strip, and a fulcrum connected to said side wall placed on the opposite side of said insulator strip beneath said tip end

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of said movable arm, the moving arm thus being movable about said fulcrum upon the lift of said insulator strip.

5. A fulcrum type ignition contact breaker comprising, in combination, assembly means adapted to be connected to the timer of an internal combustion engine, said assembly means comprising an extension and a side wall, said extension bent from said side wall at substantially a right angle thereto, a plurality of apertures cut through said side wall for adjustably adapting said assembly to said distributor, a stack connected to said assembly side wall including a metal terminal having a bent side piece, a stressed spring with an end held in stack and having a rivet passing through its free end to hold an upper contact, a lower contact cooperating therewith, an insulator block for said stack, an insulator strip on said block acting as a rubbing block, a rivet staking all the components in the stack together, a moving arm placed beneath said steel spring, a tip end of said arm resting against said insulator strip, and a fulcrum connected to said side wall placed on the opposite side of said insulator strip beneath said tip end of said movable arm, the moving arm thus being movable about said fulcrum upon the lift of said insulator strip.

6. A fulcrum type ignition contact breaker comprising, in combination, assembly means adapted to be connected to the timer of an internal combustion engine, said assembly means comprising an extension and a side wall, said extension bent from said side wall at substantially a right angle thereto, a plurality of apertures cut through said side wall for adjustably adapting said assembly to said distributor, a stack connected to said assembly side wall including a metal terminal, a bowed spring having an end attached thereto, said spring having a contact attached to a free end by means of a rivet, a fixed contact cooperating therewith, an insulator block for said stack, an insulator strip on said extension extending longitudinally acting as a rubbing block, fastening means holding the components in said stack together, a moving contact carrying arm placed beneath said bowed spring, said arm having a curved portion therein with a tip end of said arm resting against said insulator strip, and a fulcrum connected to said side wall placed on the opposite side of said insulator strip beneath said tip end of said movable arm, the moving arm thus being movable about said fulcrum upon the lift of said insulator strip.

7. A fulcrum type ignition contact breaker comprising, in combination, assembly means adapted to be connected to the timer of an internal combustion engine, said assembly means comprising an extension and a side wall, said extension bent from said side wall at substantially a right angle thereto, a plurality of apertures cut through said side wall for adjustably adapting said assembly to said distributor, a stack connected to said assembly side wall including a metal terminal, a bowed spring having an end connected to said stack, a contact rivet passing through a free end thereof, a fixed contact cooperating therewith connected to a tongue extending from said side wall, an insulator block in said stack, an insulator strip also included in said stack acting as a rubbing block, said strip extending toward said fixed contact, a bolt staking the components of said stack together, a moving arm having a U-shaped dependency placed beneath said bowed spring, a tip end of said arm resting against said

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insulator strip, and a fulcrum connected to said side wall placed on the opposite side of said insulator strip beneath said tip end of said movable arm, the moving arm thus being movable about said fulcrum upon the lift of said insulator strip.

8. A fulcrum type ignition contact breaker comprising, in combination, assembly means adapted to be connected to the timer of an internal combustion engine, said assembly means comprising a bent lateral extension and an assembly side wall, said extension integrally joined to said side wall at substantially right angles thereto, a plurality of apertures cut through said side wall for adjustably adapting said assembly wall to said distributor, a stack connected to said assembly side wall including a terminal, a stressed spring connected to said stack at one end and having a rivet passing through its free end, a fixed contact cooperating therewith, a rectangular insulator block for said stack, a thin insulator strip acting as a rubbing block, a bolt staking all the components to said stack together, a moving arm having a sinuated portion placed beneath said steel spring, said arm having side lips for containing said stressed steel spring, a tip end of said arm resting against said insulator strip, and a fulcrum connected to said side wall placed on the opposite side of said insulator strip beneath said tip end of said movable arm, the moving arm thus being movable about said fulcrum upon the lips of said insulator strip by a moving cam.

9. A fulcrum type ignition contact breaker comprising, in combination, assembly means adapted to be connected to the timer of an internal combustion engine, said assembly means comprising a bent lateral extension and an assembly side wall having a top and a bottom side, said extension integrally joined to said side wall at substantially right angles thereto, a plurality of apertures cut through said side wall for adjustably adapting said assembly wall to said distributor, a mounting stack connected to said assembly side wall including a metal terminal, a stressed spring connected to said stack at one end and having a rivet for carrying a contact penetrating therethrough at a free end, a rectangular insulator block for said stack, a thin insulator strip on said block acting as a rubbing block, a bolt staking all the latter together, a fixed contact cooperating with said riveted contact, a U-shaped contact carrying movable arm placed beneath said steel spring, said arm having a sinuated portion and side lips for containing said steel spring, a tip end of said movable arm resting against said thin insulator strip, and a fulcrum arm connected to the bottom side of said assembly wall placed on the opposite side of said insulator strip beneath said tip end of said movable arm, the moving arm thus being movable about said fulcrum upon the lift of said insulator strip.

References Cited in the file of this patent

UNITED STATES PATENTS

1,475,819	Hartman	Nov. 27, 1923
2,063,320	Loudon	Dec. 8, 1936
2,559,568	Hooven	July 3, 1951
2,564,832	Clark	Aug. 21, 1951
2,652,462	Mallory	Sept. 15, 1953