April 13, 1943. J. A. DORAN 2,316,156

CONTACT BREAKER DEVICES

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Fig:2.

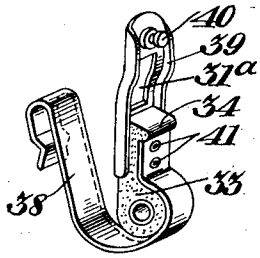


Fig:1.

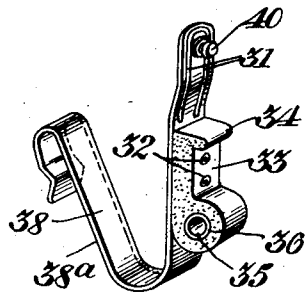


Fig:3.

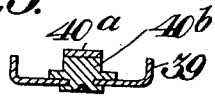
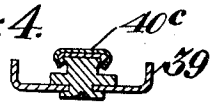


Fig:4.



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Fig. 5.

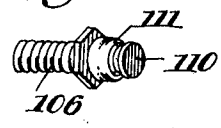


Fig. 6.

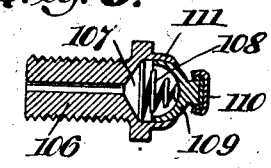


Fig. 9

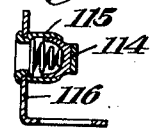


Fig. 7.

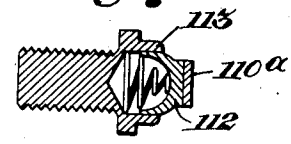


Fig. 8.

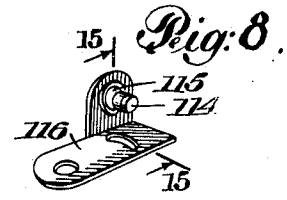
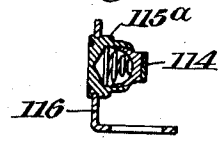


Fig. 10



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UNITED STATES PATENT OFFICE

2,316,156

CONTACT BREAKER DEVICE

James A. Doran, Providence, R. I.

Application September 25, 1939, Serial No. 296,368

5 Claims. (Cl. 200—19)

This invention relates to improvements in contact breaker devices and has for an object the provision of contacts devised to give better performance and long life.

Another object of the invention is to provision of a method of constructing contact points of the best materials obtainable, and at a lower final cost.

A further object of the invention is the provision of and improvised breaker arm of light weight and superior strength.

Another object of the invention is the provision of contact points having self-aligning universal joints between the points and their supports.

Other objects will be apparent to those skilled in the art upon perusing the following specification.

The usual construction of a breaker arm includes a metal base with an insulated bumper block riveted thereto, an insulated fulcrum bushing, and a steel lever spring riveted to the metal base. Such riveted bumper block frequently becomes loose because the shock of repetitive bumping is a strain on the rivet, furthermore the steel spring offers resistance to the flow of current, thus necessitating the addition of a strip of copper, to increase conductivity.

My improved breaker arm has a body of fibre or other insulating material, provided with a bore for a metal fulcrum at one end, and an integral bumper projection at the other end. Attached to this body, preferably by rivets, is a metal extension, which carries the contact, the extension being preferably channel shape, with stiffening ribs, and having an opening to reduce air resistance thereby increasing the speed of the return stroke, and also facilitating the desired air circulation for keeping the contacts cool. An actuating lever spring preferably of non-ferrous alloy, such as phosphor bronze having a high copper content, is riveted to the other side of the body; the rivets securing the spring and the extension to the body do not bear any bumping shock as is the case in breaker arms of the prior art, and therefore do not work loose. If desired the extension arm and spring may be formed integral. The insulation body permits use of a metal bushing for the fulcrum bearing, and the novel breaker arm thus has the advantage of a metal bearing which gives long life and quicker return stroke because of lower friction, while also providing improved insulation of the breaker arm contact from the fulcrum pin.

I have further improved the mounting and the construction of the contact points per se. The stationary contacts as heretofore used are either mounted on the head of an adjusting screw, or on an adjustable plate. In either case, the face of the contact is in a non-adjustable plane, so that there has always been difficulty in fitting the contact faces so as to maintain contact over the entire surface of both contactors. It has therefore been customary to dress the surfaces of the contact points with a stone or a file in the effort to obtain an even, square bearing in an endeavor to reduce resistance and distribute the arc over a large area. To ensure proper contacting I provide a spring pressed ball joint for the stationary contact point that is automatically adjusted into alignment by the blows from the oscillating contact point, thus keeping both contact faces always striking in the same plane.

While any standard contact material, such as tungsten may be used for the points, the metal should be non-corrosive, a good conductor, and should have a high melting point. Either platinum or gold is satisfactory, but I prefer to use platinum because of its more uniform ignition features, this metal being preferable to tungsten in every way except that it burns away faster, and so does not last as long. However, the use of such points in a transmuter for periodically reversing the current at points of zero current value, pitting, burning and wear are practically eliminated.

Referring to the accompanying drawings:

Figure 1 is a perspective view of one form of breaker arm;

Figure 2 is a view of a modified form of breaker arm;

Figure 3 and Figure 4 are sections through a breaker arm contact point showing different types of contact points;

Figure 5 is a perspective view of the universal type contact point;

Figures 6 and 7 are sections showing different types of universal contact points;

Figure 8 is a perspective view of a plate with universal type contact point mounted therein;

Figure 9 is a section on the line 15—15 of Figure 8; and

Figure 10 is a section similar to Figure 9 of a modified form.

It has been determined that the usual interrupted direct current carries particles of metal from the negative contact face to the positive contact face of the breaker points, eventually eating holes in the negative contact point and building up, in irregular formation, the positive contact point. This transfer of metal occurs

when the contacts are arcing while being opened. As a result of this the contact surfaces become so irregular and carbonized that the contact resistance is high and restricts current flow. With such reduced current the spark is weakened and a high speed, high compression engine misses.

Clean contacts of large surface deliver the maximum current and operate an engine at much higher speed without skipping. At high speeds, the duration of contact is such an infinitesimal period of time that it is exceedingly important to provide the best possible contact surfaces. Furthermore, the breaking of corroded contacts is not sufficiently decisive to produce the desired powerful hot spark at each spark plug.

My improved breaker arm, Figure 1, includes the insulating block 33 with a bumpjer projection 34 and a fulcrum bore 35, the bore having a metal bushing 36, a spring 38 being riveted to the block by rivets 37. The upper end of the spring carries contact 40 and has air passages 31 formed therein to facilitate the return motion of the breaker arm and to permit circulation of air therethrough.

The breaker arm Figure 2 has one end of the spring 38 riveted to the insulating block 33, and the other end is formed around the head of the block and adapted to be mounted under tension to a supporting post. The contact base 39 is preferably of channel shape and is secured to the opposite side of the block 33 by rivets 41 which also hold the spring 38. The extension 39 has an opening 31*a* to permit air circulation. Spring 38 is preferably made of a non-ferrous alloy having high conductivity and resilience.

Any standard contact material may be used, such as tungsten disk 40*a*, welded to a shank 40*b* which is riveted to the contact base, as shown in Figure 3. The opposite contact on the distributor plate may also be a tungsten disc welded to an adjustable body such as a screw or a bracket, or a tungsten disc mounted according to my novel self-aligning construction hereinafter described. However, platinum is an ideal material for contacts, as it is non-corrosive and produces a better spark. Since the transmuting of the current, as heretofore explained, preserves the life of the contacts, it is feasible to use a thin platinum shell 40*c* for each contacting face, as indicated in Figure 4.

The stationary contacts as ordinarily used in the prior art are mounted on the head of an adjusting screw or on an adjustable plate. In either case, the face is in a non-adjustable plane and there is therefore difficulty in obtaining a firm, square bearing of the two contacting surfaces. To insure this desired engagement I provide a universal joint for the stationary contact. Figure 5 is a perspective of a screw having such a universally jointed contact with platinum face, while Figure 6 is a sectional view of same. Figure 7 is a section of a similar screw base contact except that the contact face is shown as a tungsten disc welded to the spherical body.

The screw 108, Figure 6, has a recess 107 in the head in which a spring 108 is mounted to resiliently yet firmly engage the spherical base 109 of a contact 110. The upper flange 111 of the recess is spun or turned over the spherical base to retain the base in the recess. With this construction the impacts of the breaker arm contact on the contact 110 cause the latter to assume the proper alignment, and the spring holds the latter in its aligned position. The spring acts as a resilient shock-absorber for protecting the contact points.

Any type of contact point may be used in this arrangement a tungsten disk 110*a* being shown in Figure 7, the base 112 of the tungsten point being recessed to receive the spring, and the sides of the base being rounded to be shiftable in the similarly rounded end 113 of the recess flange. When applying the universal contact to the conventional plate ordinarily employed as a fixed contact, as shown in Figure 8 and 9, the contact head 114 is held in a shell or tubular socket 115, which is locked to the plate 116 by spinning the end over, as shown. If desired, the socket member may be solid and riveted to the plate 116, as indicated at 115*a* in Figure 10.

The breaker contacts above described insure long life and perfect service under the arduous operating conditions of combustion engines as used for all purposes, including automobiles, trucks, boats, airplanes, various machinery, etc. The breaker contacts which are provided with means for automatically adjusting themselves to maintain a complete even bearing surface over the entire area of their contacting surfaces are especially advantageous for obtaining easy starting, smooth running, higher speed, more thorough combustion, longer life, and reduced labor time for cleaning the surfaces when they become carbonized.

It is obvious that the self-aligning contacts hereinabove described as applied to stationary supports, may also be applied to the breaker arms or other movable supports.

While I have described my improved breaker arms and self-adjustable contacts as adapted for use on ignition breaker points, I wish to have it understood that these contacts are equally advantageous for all kinds of electrical apparatus such as relays, remote switches, signal devices, etc., that require opening and closing of electric circuits. Thus the following claims are to be interpreted as covering all modifications that may properly come within the scope of this patent.

I claim:

1. In a breaker contact arm, an elongated body of insulating material, a bumper projection formed integral therewith and at a right angle to the longitudinal axis thereof, a pivot hole formed in said body, a metallic strip of spring material secured to said body and having one end projecting beyond said bumper projection, the other end of said strip projecting beyond the other end of said body and forming a spring lever, and a contact member carried by said strip adjacent to said first end, said bumper projection lying between said pivot hole and said contact member.

2. In a breaker contact arm, an elongated body of insulating material, a bumper projection formed integral therewith, a pivot hole formed in said body, said hole being spaced apart from said projection, a metallic bushing mounted in said hole, a metallic strip of spring material secured to said body and having one end projecting beyond said bumper projection, the other end of said strip projecting beyond said body and forming a spring lever, and a contact member carried by said strip adjacent to said first end, said bumper projection lying between said hole and said contact point and at substantially a right angle to the plane of the contact surface of said contact member.

3. In a breaker contact arm, an elongated body

of insulation material, a bumper projection formed integral therewith, a pivot hole formed in said body having its axis parallel to and spaced apart from said bumper projection, a channel member secured to said body and extending beyond said bumper projection, a contact member carried by said channel member near its extended end, and a ribbon like spring secured to said body, the means for securing said channel member and said spring to said body being positioned between said projection and said pivot hole.

4. In a breaker device, a contact member comprised of a base portion having a socket formed therein, a thin upstanding wall formed integral with said base portion and bordering the edge of said socket, a spherical shaped body adapted to be mounted in said socket and retained therein when said wall is spun over, a contact disc mounted on said body, and resilient means acting against said body within said socket for resiliently holding said body in any adjusted position.

5. In a breaker device, a contact member comprised of a base portion having a socket formed therein, a thin upstanding wall formed integral with said base portion and bordering the edge of said socket, a spherical shaped body adapted to be mounted in said socket and retained therein when said wall is spun over, a contact disc mounted on said body, and shock absorbing means confined within said socket and bearing against said body for normally maintaining said body in fixed relation with said body, and adapted to cushion the shocks produced when said contact member and a cooperating member strike together.

JAMES A. DORAN.