Sept. 10, 1940. A. J. JANSER 2,214,530

CIRCUIT BREAKER

Filed March 24, 1939

Fig. 1.

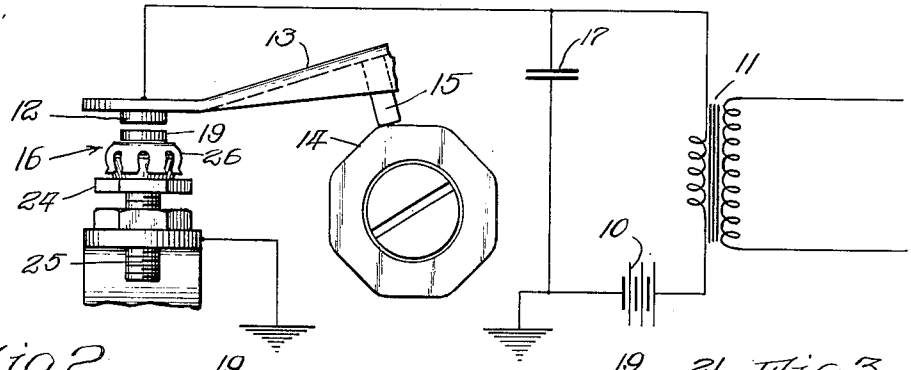



Fig. 2.

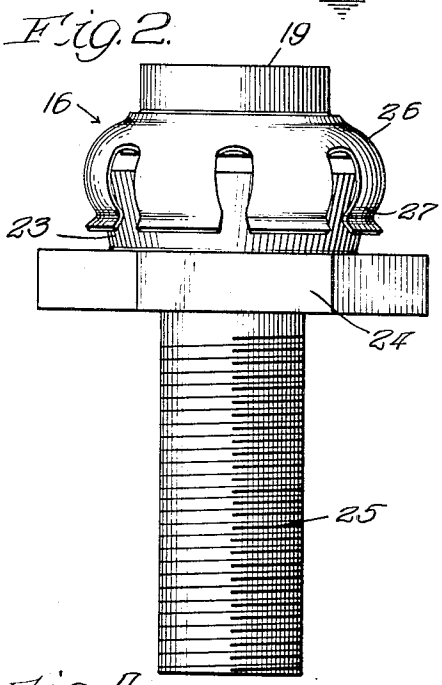



Fig. 3.

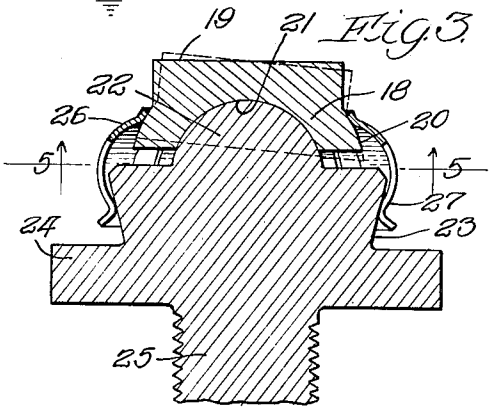



Fig. 4.

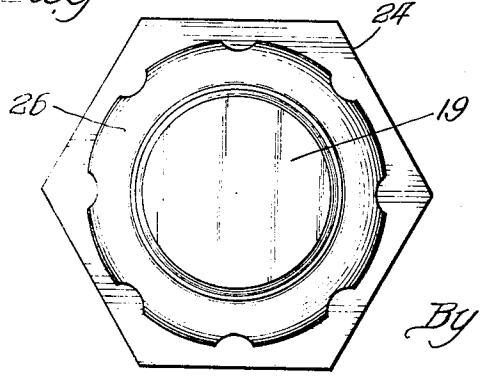
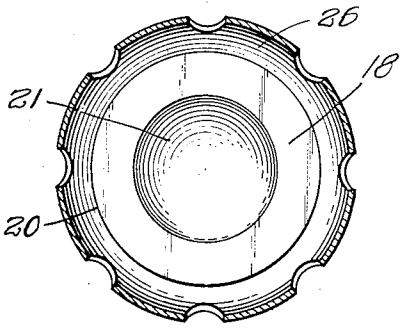



Fig. 5.




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# UNITED STATES PATENT OFFICE

2,214,530

## CIRCUIT BREAKER

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Application March 24, 1939, Serial No. 263,982

7 Claims. (Cl. 200—166)

This invention relates to a circuit breaker, and more particularly to a self-aligning circuit breaker element designed for use in the ignition system of an internal combustion engine.

One feature of this invention is that it provides an improved self-aligning element adapted to maintain proper contact relationship with another circuit breaker element; another feature of this invention is that it is of very simple yet rugged construction; a further feature is that the construction and arrangement is such that a self-aligning element of the type here disclosed can be used to replace conventional fixed points in any type of ignition system; a still further feature of this invention is that it permits considerable freedom of movement while maintaining good mechanical and electrical contact; other features and advantages of this invention will be apparent from the following specification and the drawing, in which:

Figure 1 is a representation, partly schematic, of a circuit breaker embodying this invention in the ignition system of an engine; Figure 2 is a side elevation of the self-aligning contact point and the supporting means therefor; Figure 3 is a sectional view of the apparatus shown in Figure 2; Figure 4 is a top plan view of the same apparatus; and Figure 5 is a transverse sectional view along the line 5—5 of Figure 3.

It has long been recognized that, in order to repeatedly break a circuit having a substantial current flow therein without undue destructive effect on one of the circuit breaker elements, the density of current flow per unit area should be kept as small as possible. In the contact points commonly used in the ignition system of an automobile engine, for example, the two points or circuit breaker elements are made with flat contact faces adapted to make contact with each other over a substantial area. Any advantage of this large contact area is lost, however, unless contact is made throughout the full area. Where the relationship of the points with respect to each other is fixed, as has heretofore been conventional practice, the points frequently contact only at one edge.

In order to obviate this disadvantage, various attempts have been made to provide a self-aligning ignition point. None of the points heretofore designed have been commercially successful, however, all of them having various defects and objections. For example, some such points have been supported in such a way that destructive arcing took place between the point and the support with respect to which it was movable. This, of course, merely transferred the place where the destructive arcing occurred, rather than curing it. Other self-aligning points have been designed which, when carefully and precisely made by hand, were satisfactory; but which were so constructed and arranged that they could not be successfully made by ordinary manufacturing methods.

The self-aligning point here disclosed by me has all of the advantages of universal movement; is light in weight; is simple, consisting of only three parts; provides a firm support and engagement at all times between the movable contact point and its supporting means; is adapted for use where any present-day ignition point is being used; and is conveniently and readily manufactured. My device comprises a contact member with a contact face, a supporting member adapted to engage the contact member in such a way as to permit universal movement thereof while it is supporting it, and a ring adapted to encircle and engage portions of both of such members to maintain them in the desired relationship.

Referring more particularly to Figure 1, an ignition system of the conventional type commonly found in automobile engines is illustrated. A battery 10 has one side thereof grounded, as to the automobile frame, and the other side connected to the primary of a step-up transformer or spark coil 11, the secondary of this coil being adapted to supply sparking current to the spark plugs of the engine. The other side of the primary is here shown as connected to one of a pair of contact elements, this element being here identified as 12 and being shown as mounted on a breaker arm 13 of conventional type, reciprocated by the action of a cam 14 on the rubbing block 15. The other circuit breaker contact element, here designated in general as 16, is grounded. As the cam 14 rotates, the points alternately contact and separate from each other to make and break the ignition circuit; at each break of the circuit a spark would be caused to jump the points of a plug to effect the desired combustion of the charge in a cylinder of the engine. A condenser 17 minimizes arcing at the points or contact faces.

The self-aligning portion 16 of the circuit breaker is shown in more detail in Figures 2 to 5. In the embodiment here disclosed it comprises an upper movable contact member having a body portion 18 and a contact face 19. As may be best seen in Figure 3, the body portion of this contact member has an external outwardly and

downwardly sloping surface 20, which is preferably an annular partial surface of a sphere; and an internal concavity having a surface 21 which is spherical.

When directions are spoken of herein, as where it is said that the surface 20 slopes outwardly and downwardly, it will be understood that this is with reference to the position of the parts shown in the drawing herewith. These words are to be construed broadly enough to cover any corresponding shapes or surfaces, regardless of the particular position in which they may be found.

The supporting member for the contact member is here shown in the form of a stud adapted to be fastened in a threaded opening in a plate of the distributor head; but the support may, of course, be of any other desired general type, as for example a rivet adapted to be mounted in the movable breaker arm.

In the particular embodiment of the supporting member illustrated herewith an upwardly extending convex portion 22 is provided with a partial spherical shape. This portion is adapted to be partially received in the concavity in the contact member, as may be best seen in Figure 3. The radius and centers of curvatures of the outer surface of the convex portion 22 and the surface of the concavity 21 should be the same, so that the surfaces engage each other through a large area. The convex portion should include more of a sphere than the concavity, so that there will be room for a limited universal movement of the contact member. The previously described partial spherical surface 20, moreover, should be concentric with the spherical surfaces just mentioned, although of larger radius.

Beneath the convex portion 22 the supporting member is provided with an annular outwardly extending shoulder; and below this shoulder it tapers downwardly and inwardly to provide the external surface 23. Beneath this there may be a conventional polygonal portion 24 to enable ready adjustment by a wrench, and a threaded portion 25.

In order to maintain the two members in proper relationship during operation I have provided a ring 26 of spring metal. This ring encircles a portion of both of said members; and is adapted to contact the outwardly and downwardly extending surface 20 on the contact member and the inwardly and downwardly extending surface 23 on the supporting member to urge the two members together and maintain them in the desired relationship. The fact that the surface 20 is spherical in shape, and concentric with the point about which the contact member rotates, enables relatively easy universal movement of the contact member to enable perfect self-alignment of the contact face 19 with the cooperating contact face of another ignition point. The fact that the surface 23 on the supporting member is downwardly and inwardly sloping causes the edge of the ring contacting it to always tend to move downwardly, so that the tendency is to always urge the two members tightly together.

In the particular ring here shown I employ an upper solid or annular portion and lower finger portions, as 27. These portions are arched, so that both edges of the ring have a lesser diameter than the central part thereof. This insures proper cooperation with the sloping surfaces to secure the desired action. Moreover, the fact that the lower edge of the ring consists of separated parts or fingers enables a greater effective change of diameter, so that the ring may be slipped down over the top edge of the surface 23 during assembly without permanent distortion thereof.

All pounding during operation is taken between two solid parts of considerable area, the outer surface of the convex portion 22, and the inner surface of the concavity 21. A tight electrical contact or connection of considerable area is thus always maintained between the movable contact member and its supporting member; and the support being over a large area there is little or no wear. The spring metal ring provides very effective yet compact means for maintaining the parts in the desired relationship while permitting the desired limited universal movement therebetween.

While I have described and claimed certain embodiments of my invention it is to be understood that it is capable of many modifications. Changes, therefore, in the construction and arrangement may be made without departing from the spirit and scope of the invention as disclosed in the appended claims, in which it is my intention to claim all novelty inherent in my invention as broadly as permissible, in view of the prior art.

I claim:

1. Apparatus of the character described, including: a contact member having a body portion and a contact face; a supporting member adapted to engage said body portion to support said contact member for limited universal movement, said members having external surfaces which face in divergent directions; and a ring of spring material having its center portion of greater diameter than its end portions and adapted to engage said external surfaces of both of said members to yieldingly urge them together, whereby they are maintained in the desired relationship while limited movement therebetween is permitted at all times.

2. Apparatus of the character claimed in claim 1, wherein said ring includes an annular portion adapted to engage the surface of one of said members and finger portions adapted to engage the surface of the other of said members.

3. Apparatus of the character claimed in claim 1, wherein said ring comprises an annular portion and a plurality of finger portions, said ring being of spring material and said finger portions being arched to provide a substantial effective change of diameter of the ends thereof.

4. Apparatus of the character described, including: a contact member having a body portion and a contact face, said body portion having an outwardly and downwardly extending external surface; a supporting member adapted to engage said body portion to support said contact member for limited universal movement, said supporting member having an inwardly and downwardly extending external surface; and a ring adapted to engage both of said external surfaces and arranged to urge said members together and maintain them in the desired relationship, the ring being of spring material and the portions thereof contacting said surfaces being of smaller diameter than the center portion thereof.

5. Apparatus of the character claimed in claim 4, wherein the external surface of said body portion is an annular portion of a spherical surface.

6. Apparatus of the character described, including: a contact member having a body portion

and a contact face, said body portion having internal and external concentric partial spherical surfaces; a supporting member having a convex partial spherical surface, adapted to engage the internal surface of said body portion to support said contact member for limited universal movement, and an inwardly and downwardly extending external surface; and a ring of spring material adapted to engage the external surfaces of both of said members to urge them together to maintain them in the desired relationship, the center portion of said ring being of greater diameter than the edge portions.

7. Apparatus of the character claimed in claim 6, wherein said ring includes an annular portion adapted to engage the surface of one of said members and finger portions adapted to engage the surface of the other of said members.

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