April 7, 1953

C. W. RAINEY

2,634,343

CURRENT INTERRUPTING DEVICE

Filed Aug. 11, 1950

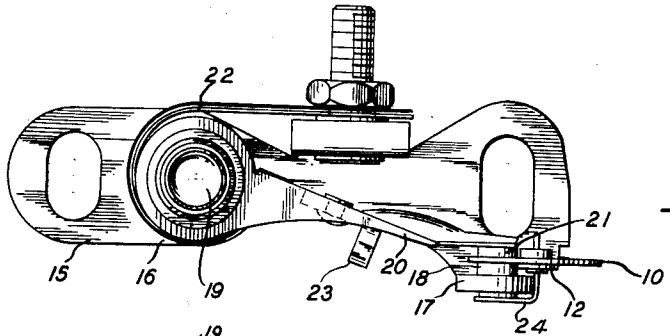


FIG. 1

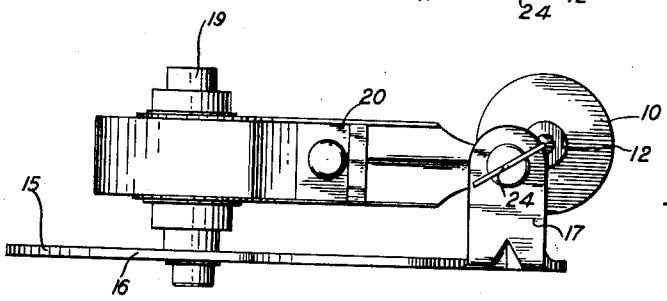


FIG. 2

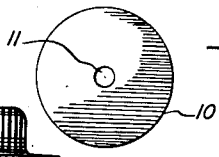


FIG. 3

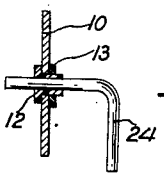


FIG. 4

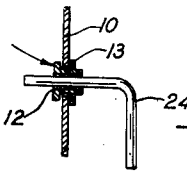


FIG. 5

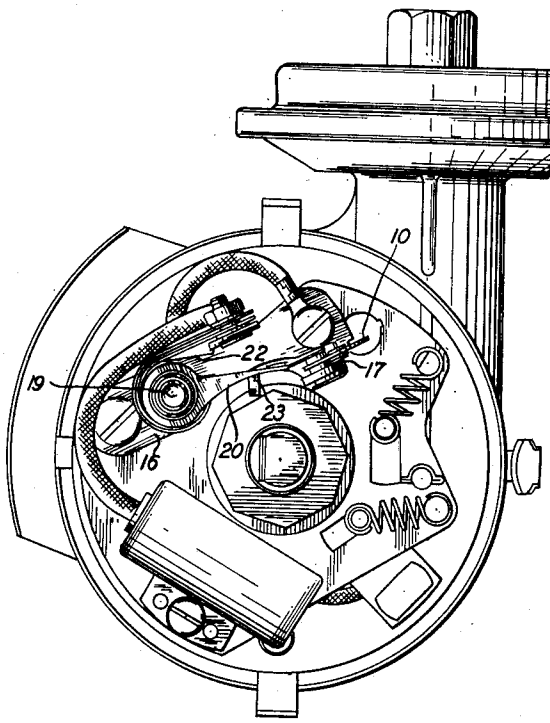


FIG. 6

C. W. RAINEY
INVENTOR.
E. C. McRae
BY J. L. Faulkner
L. H. Oster
ATTORNEYS

Patented Apr. 7, 1953

2,634,343

UNITED STATES PATENT OFFICE

2,634,343

CURRENT INTERRUPTING DEVICE

Challenor Walters Rainey, Dearborn, Mich., assignor to Ford Motor Company, Dearborn, Mich., a corporation of Delaware

Application August 11, 1950, Serial No. 178,940

4 Claims. (Cl. 200—30)

1

This invention is directed to the electrical arts and more specifically to devices which are required to continuously, rapidly, and repetitiously interrupt electric currents either in inductive or non-inductive circuits.

In any device which is required to rapidly and continuously interrupt and re-establish the flow of an electric current, trouble is encountered at the faces doing the actual breaking of the circuit. These troubles are traceable to arcing, pitting, overheating, sticking, oxidation, and transfer of metal from one contact face to the other. The instant invention has been evolved in an effort to circumvent these difficulties.

This invention will be particularly described in connection with the distributor of an internal combustion engine but is by no means so limited since it may be used wherever a similar problem of current interruption exists. An example of such is the vibrators conventionally used to produce a pulsating direct current suitable for transformation to give the high voltage direct current needed to operate radio reception apparatus from a low voltage storage battery source.

This invention is probably best understood from a study of the drawings in which

Figure 1 is a plan view of a distributor current interrupting device embodying the invention.

Figure 2 is an elevation view of the same device.

Figure 3 is an elevation of a metal disc employed in the invention.

Figure 4 is a sectional view of this disc with the insulating grommets in place.

Figure 5 is a sectional view of a mechanical modification of the structure shown in Figure 4.

Figure 6 is a plan view of a conventional automotive distributor with the cap removed and incorporating the instant invention.

The vital element in this invention is shown most clearly in Figures 3 and 4 and more particularly in Figure 4. In Figures 3 and 4 the numeral 10 identifies a metallic disc. This disc is preferably, although not necessarily, made of tungsten or similar refractory conductive metal. This disc 10 is provided with a central aperture 11 (Figure 3) for a purpose which will be obvious as the description proceeds. As shown in Figure 4, disc 10 is associated with insulating grommet 12. This grommet may be made of any easily fabricated and durable insulating material such as nylon or Bakelite. Figure 4 also shows an insulating washer 13 mounted upon insulating grommet 12 to prevent axial displacement of disc 10 with respect to insulating grommet 12. While in the drawing, grommet 12 and

2

washer 13 have been shown as separate members, it may well be in practice that disc 10 can be placed in a mold and grommet 12 and washer 13 molded about disc 10 in a single piece.

As shown in Figures 1 and 2, the current interrupting apparatus or breaker is generally indicated at 15 and comprises a bracket 16 terminating in a contact supporting ear 17, supporting stationary contact 18 and rocker post 19. Rotatably mounted on rocker post 19 but electrically insulated therefrom is rocker arm 20 which supports at its outer end movable contact 21 which is aligned with and abuts stationary contact 18. Rocker arm 20 is urged by spring 22 to rotate clockwise and press movable contact 21 against stationary contact 18. Intermediate the ends of rocker arm 20 is mounted rubbing block 23 which bears against the distributor cam and serves to actuate the rocker arm 20.

Disc 10 is mounted upon supporting member 24 so that the faces of disc 10 are parallel to the faces of stationary contact 18 and movable contact 21 and between the faces of these contacts. Supporting element 24 is in turn supported upon ear 17. The bore in grommet 12 is sized so that it makes a loose running fit on supporting member 24 which serves as a shaft upon which grommet 12 and disc 10 revolve.

Figure 5 demonstates a mechanical variant of the structure shown in Figure 4. In this structure a definite radial clearance is provided between support 24 and grommet 12 in excess of that necessary for a running fit. Similarly axial and radial clearances are provided between the disc 10 and grommet 12 and washer 13. Under certain circumstances, this loose type of fit provides superior rotational qualities as compared to the structures shown in Figure 4. It is also helpful to bias the assembly of the disc 10 and grommet 12 eccentrically in the direction shown by the arrow in Figure 5. Any of many possible spring structures may be used for this purpose and the direction of its action should be skewed with regard to the axis of disc 10.

In the operation of the distributor, when the circuit through the breaker contact points 18 and 21 is open the space between these contacts significantly exceeds the thickness of disc 10. When the distributor cam (Figure 6) permits the clockwise movement of rocker arm 20, a solid electrical contact is made from stationary contact 18 to disc 10, from disc 10 to movable contact 21, and hence to rocker arm 20.

This structure has been found to produce during operation a slow but continuous rotation of

disc 10 and grommet 12 about supporting member 24. The utility of this rotation is at once evident inasmuch as there is so presented a fresh contact surface to each of the contacts continuously. This results in much cooler operation of the contacts and minimizes all of the troubles enumerated above. In addition, wear or deterioration on disc 10 is not serious, hence this disc may be readily and economically replaced.

Applicant is unaware of the exact cause of this rotation. It is thought that in the case of an automotive distributor of the type described at least a part of the turning movement may be derived from the slight looseness inherent in the mounting of rocker upon rocker post 19. However, applicant does not wish to be bound by any theory as to the cause of such rotation.

I claim as my invention:

1. An internal combustion engine distributor comprising a pair of cooperating contacts arranged to repetitiously interrupt the low tension current, a metallic axis mounted parallel to and spaced from the axis of said contacts, and a conducting disc rotatably mounted on said axis and between the faces of said contacts.

2. An internal combustion engine distributor comprising a pair of cooperating contacts arranged to repetitiously interrupt the low tension current, a metallic axis mounted parallel to and spaced from the axis of said contacts and a conducting disc rotatably mounted on said axis and between the faces of said contacts, said conducting disc being insulated from the axis.

3. An internal combustion engine distributor comprising a pair of cooperating contacts arranged to repetitiously interrupt the low tension current, a metallic axis mounted parallel to and spaced from the axis of said contacts and a conducting disc rotatably mounted on said axis and between the faces of said contacts, said conducting disc being supported on said axis through an insulating grommet.

4. The structure recited in claim 3 in which a substantial radial clearance is provided between the grommet and axis and in which substantial axial and radial clearance is provided between the grommet and the disc.

CHALLENOR WALTERS RAINEY.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,223,143	Briggs	Apr. 17, 1917