Jan. 14, 1958 C. W. RAINEY 2,820,115

ROCKING DISTRIBUTOR

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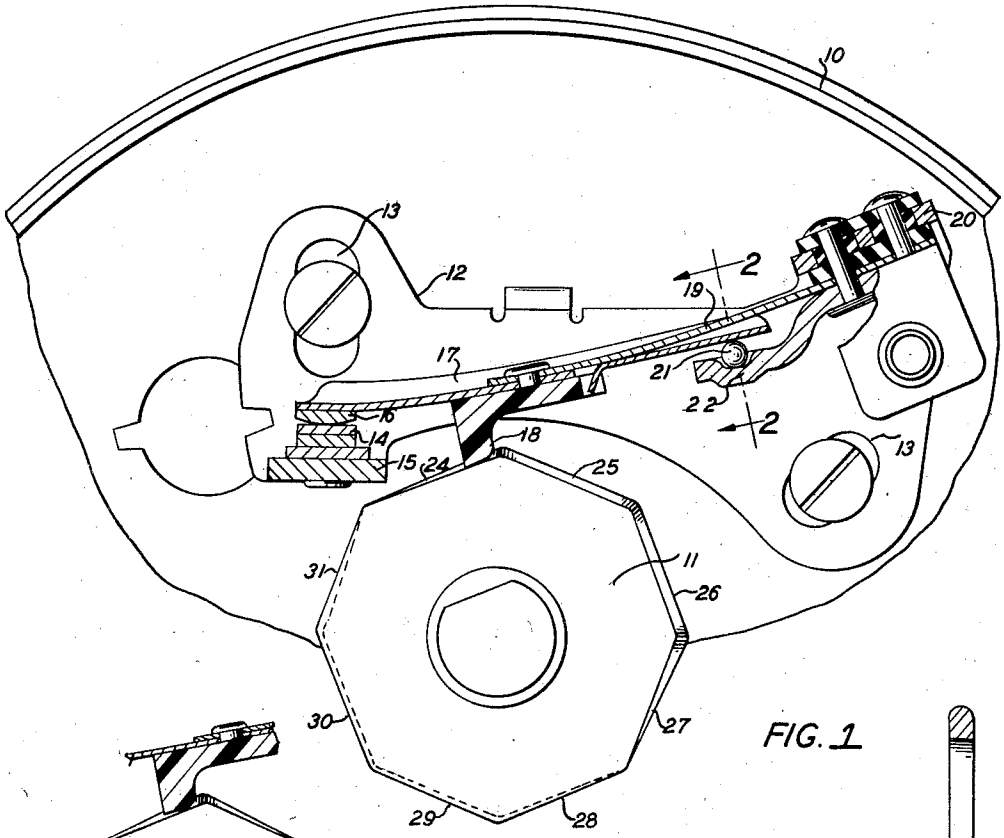



FIG. 1

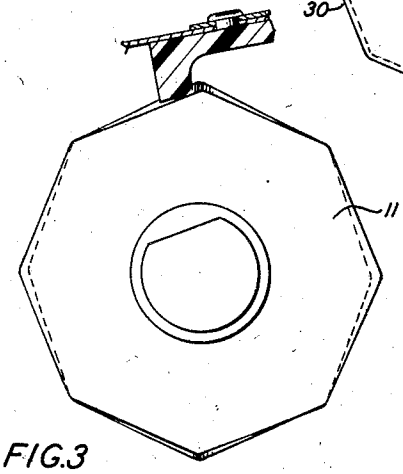



FIG. 3

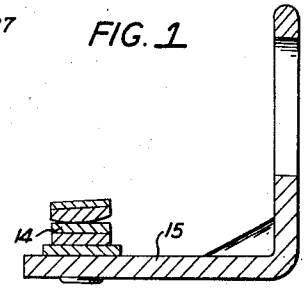



FIG. 4

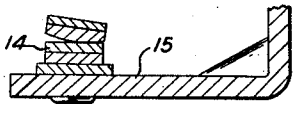



FIG. 5

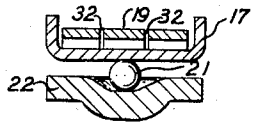



FIG. 2

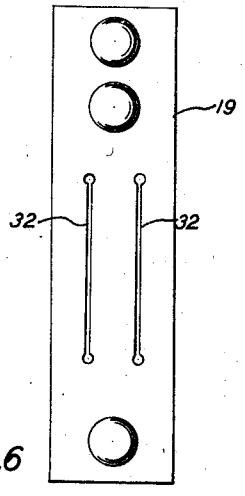



FIG. 6

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# ROCKING DISTRIBUTOR

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8 Claims. (Cl. 200—30)

This invention relates to internal combustion engine ignition apparatus. It is specifically directed to an apparatus employed for repetitiously opening and closing the contact points which generate the high tension spark for the actual ignition of the fuel charge.

This invention has been perfected to enable such contacts to operate at very high speeds while propelled by a comparatively light spring pressure.

This invention is found useful in that it permits a greater tolerance of manufacturing irregularities without interfering with the proper operation of the finished mechanism. This invention is further useful in that it causes a larger portion of the contact area to be employed for the actual current interrupting operations and hence extends the life of the contacts. This application contains subject matter also found in application Serial Number 580,316, filed April 24, 1956, in the name of E. C. McRae.

This mechanism is fully explained below in conjunction with the figures of drawing in which,

Figure 1 is a plan view of a distributor employing the invention, and

Figure 2 is a cross section of a portion of the apparatus taken on the line 2—2 of Figure 1, and

Figure 3 is a plan view of a form of cam embodying the instant invention, and

Figure 4 is an enlarged view of the contacts employed in this invention in one position, and

Figure 5 is a similar view of these contacts in another position, and

Figure 6 is a plan view of a spring member useful in constructing this invention.

Referring to Figure 1, the distributor mechanism is supported within a housing 10. Cam 11 rotates within housing 10 and supplies the driving force to open and close the contact points. The actual contact making and breaking apparatus comprises base 12 which is supported in distributor housing 10 and is secured by fastening means inserted through oblong openings 13. These openings are made oblong to permit adjustment of base 12 with respect to cam 11. This permits the spacing of the contact points to be accurately set.

Base 12 is preferably fabricated as a sheet metal stamping and is provided with a turned up ear 15 upon which is mounted stationary contact point 14. Movable contact point 16 is carried by rigid contact carrying arm 17 which is preferably fabricated in the form of a channel to secure adequate rigidity and lightness. Contact carrying arm 17 carries rubbing block 18 which bears directly upon cam 11 and imparts an oscillatory motion to contact carrying arm 17. Contact carrying arm 17 is securely fastened to spring 19 which in turn is secured to ear 20. Ear 20 may also be economically formed by turning up a portion of base 12. Contact carrying arm 17 must be insulated electrically from base 12. This is readily accomplished by insulating spring 19 from ear 20. However, any desired structure may be used as long as



contact carrying arm 17 is not in electrical contact with base 12.

A bracket 22 is positioned adjacent the end of movable contact carrying arm 17 which is remote from movable contact point 16. The face of bracket 22 is approximately parallel to the correesponding face of contact carrying arm 17. The face of bracket 22 adjacent contact carrying arm 17 is embossed to receive and confine bearing member 21 which in the preferred form of the invention is a bearing ball. While the embossing which accommodates this bearing member has been shown in the bracket 22 it is to be understood that either the bracket of the contact arm, or both may be so formed.

Bracket 22 has been shown insulated from ear 20. This is necessary if bearing member 21 comprises any of the usual electrically conductive metals. However, if bearing member 21 be made non-conductive, bracket 22 need then not be insulated from base 12. Any equivalent construction which prevents conduction of electricity from contact carrying arm 17 to base 12 through bearing member 21 is acceptable.

Spring 19 is most economically fabricated from flat stock. To exert a force tending to urge movable contact arm 17 against stationary contact 16, this spring must be assembled bent into an arc convex towards rigid arm 17. This spring 19 tends to rotate contact carrying arm 17 clockwise. This turning moment is resisted by bearing member 21.

The fact that spring 19 is in the form of an arc while the contact points are closed and changes its form to an arc of shorter radius when the contact points open causes a slight but definite longitudinal relative motion between contact carrying arm 17 and bracket 22. The substantially complete elimination of friction between bracket 22 and contact carrying arm 17 by bearing member 21 enables this apparatus to function at higher speeds without increasing the tension in spring 19 and so increasing wear on the rubbing block.

Figure 2 which is a cross section through the structure shown in Figure 1 taken along the line 2 depicts the bearing structure supporting that portion of arm 17 intermediate ear 20 and rubbing block 18. Bearing ball 21 which is inserted between bracket 22 and contact carrying arm 17 permits contact carrying arm 17 to oscillate longitudinally. Bearing ball 21 also permits the torsional oscillation of spring 19.

Reverting to Figure 1 it will be noted that the structure of cam 11 is unique. The ordinary distributor cam has its faces all parallel to the axis of the shaft upon which it rotates. In the case of the cam depicted in Figure 1 these faces are in some instances deliberately canted from the parallel. For example, faces 24, 25, 26 and 27 are canted so that these faces if extended would intercept the axis above the plane of the paper while faces 28, 29, 30 and 31 are canted in the opposite direction so that these faces if extended would meet below the plane of the paper.

Figure 3 also demonstrates a unique cam but one in which the canting of the cam faces goes through a complete cycle for each four lobes.

Figures 4 and 5 show contact points 14 and movable contact point 16 in two separate contacting positions as dictated by the particular torsional position assumed by rubbing block 18 working upon the several cam faces.

Figure 6 demonstrates a desirable but not necessary structure of spring 19 in which are provided slots 32 to increase the torsional flexibility of the spring without substantial sacrifice of flexural rigidity.

From the above drawings it will be apparent that contact carrying arm 17 and movable contact point 16 will be torsionally oscillated as rubbing block 18 passes over the several planes making up the lobes of cam 11. This

torsional movement is especially accommodated by slits 32 in spring 19 and bearing ball member 21. As can be seen from Figures 1, 4 and 5, the contacting face of movable contact point 16 is actually a radius. As this movable contact point 16 is torsionally vibrated the actual point of contact between movable contact point 16 and stationary contact point 14 will shift over the surface of the contact points. This distributes impact wear and arcing damage and substantially enhances the life of these points.

It is to be understood that this invention is not to be limited to any given outline of cam as long as the device includes canted cam surfaces together with a support for the movable contact point which permits such canted surfaces to torsionally oscillate and hence shift the point of contact of the contact points.

I claim as my invention:

1. A distributor mechanism comprising a fixed contact, a moving contact, a contact carrying arm supporting said moving contact and a cam capable of imparting substantially only radial and torsional motion to said contact carrying arm and movable contact, said contact carrying arm being capable of both flexural and torsional oscillation and said cam having at least one face which is not parallel to the axis of the cam whereby a torsional oscillation of the contact carrying arm is secured and the locus of contact between the fixed and movable contact points is varied.

2. A distributor mechanism comprising a fixed contact, a moving contact, a contact carrying arm supporting said moving contact, a spring biasing and supporting the contact carrying arm and a cam capable of imparting motion to said contact carrying arm and movable contact, said contact carrying arm being supported by the spring so as to be capable of both flexural and torsional oscillation and said cam having at least one face which is not parallel to the axis of the cam whereby a torsional oscillation of the contact carrying arm is secured and the locus of contact between the fixed and movable contact is varied, and said carrying contact arm being supported in part on a bearing ball member.

3. A distributor mechanism comprising a fixed contact, a moving contact, a contact carrying arm supporting said moving contact, a spring biasing and supporting the contact carrying arm and a cam capable of imparting motion to said contact carrying arm and movable contact, said contact carrying arm being supported by the spring so as to be capable of both flexural and torsional oscillation and said cam having at least one face which is not parallel to the axis of the cam whereby a torsional oscillation of the contact carrying arm is secured and the locus of contact between the fixed and movable contact is varied, said spring being longitudinally divided to enhance its torsional flexibility.

4. A distributor mechanism comprising a fixed contact, a moving contact, a contact carrying arm supporting said moving contact and a cam capable of imparting substantially only radial and torsional motion to said contact carrying arm and movable contact, said contact carrying arm being capable of both flexural and torsional oscillation and said cam having a plurality of its faces which are not parallel to the axis of the cam and canted so that the movable contact carrying arm simultaneously oscillates flexurally and torsionally and completes one torsional oscillation for each revolution of the cam, whereby the locus of contact between the fixed and movable contact points is varied.



5. A distributor mechanism comprising a fixed contact, a movable contact, a contact carrying arm supporting said movable contact capable of both flexural and torsional oscillation and means for imparting both flexural and torsional oscillation to said contact carrying arm whereby the locus of contact between the fixed and movable contacts is varied.

6. In a distributor mechanism for internal combustion engines the combination comprising, a fixed contact, a movable contact for engaging said fixed contact, a contact carrying arm supporting said movable contact capable of both flexural and torsional oscillation, and means for imparting both flexural and torsional oscillation to said contact carrying arm to open and close said contact points and to vary the locus of contact between said fixed and movable contacts whereby a larger portion of said contact points are employed for actual current interrupting operations and the life of said contacts is extended.

7. A distributor mechanism comprising a fixed contact, a movable contact, a contact carrying arm supporting said movable contact capable of motion in a direction substantially perpendicular to the longitudinal axis of said arm and of torsional oscillatory motion about said longitudinal axis and means for imparting motion to said contact carrying arm and said movable contact in a direction substantially perpendicular to the longitudinal axis of said arm and simultaneously imparting a torsional oscillatory motion to said contact carrying arm and said movable contact about said longitudinal axis whereby the locus of contact between the fixed and movable points is varied.

8. A distributor mechanism comprising a fixed contact, a movable contact, a contact carrying arm supporting said movable contact, a spring supporting in part and biasing said contact carrying arm, said contact carrying arm being supported in part by a bearing ball member, said contact carrying arm being supported by said spring and said bearing ball member so as to be capable of both flexural and torsional oscillation and means for imparting both flexural and torsional oscillation to said contact carrying arm whereby the locus of contact between the fixed and movable contacts is varied.

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