Dec. 29, 1925. 1,567,978

F. G. NIECE

ROTARY SPARK GAP

Filed March 24, 1920 2 Sheets-Sheet 1

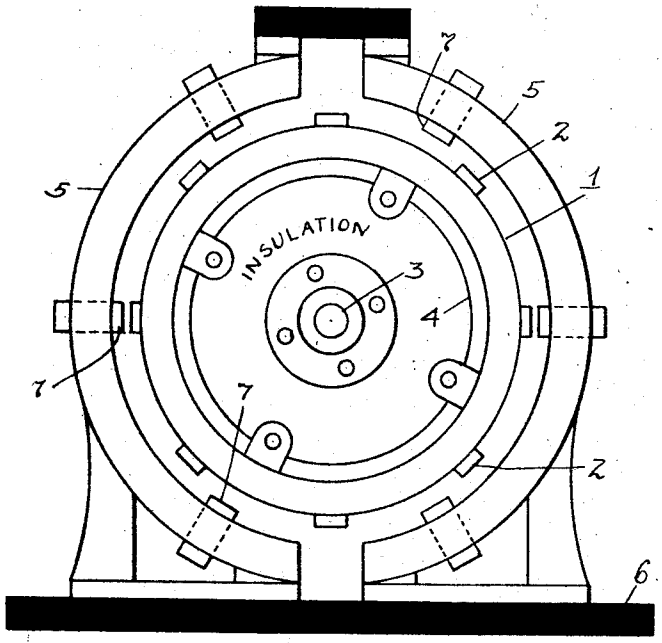


Fig. 1

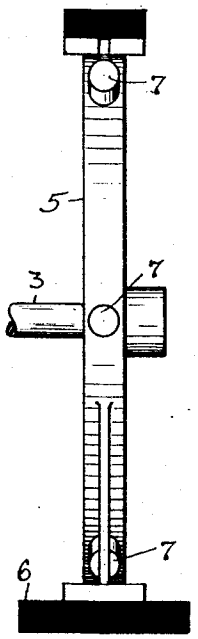


Fig. 2

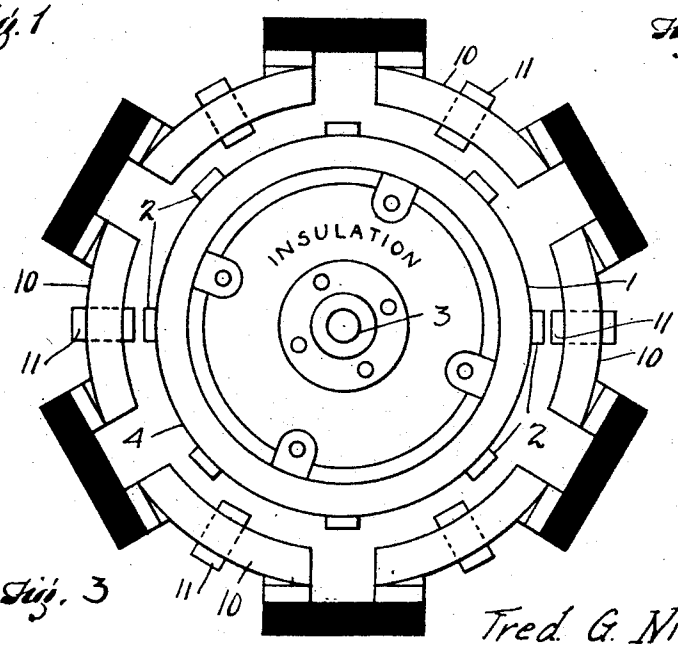


Fig. 3

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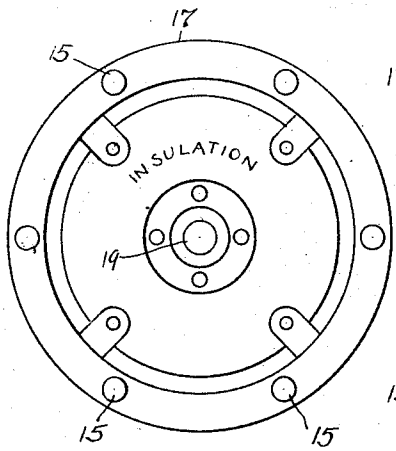


Fig. 5

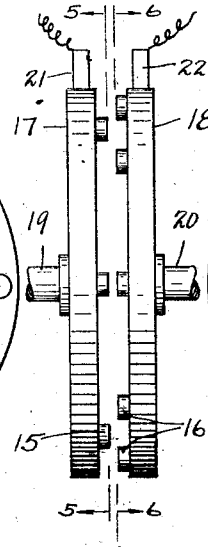


Fig. 4.

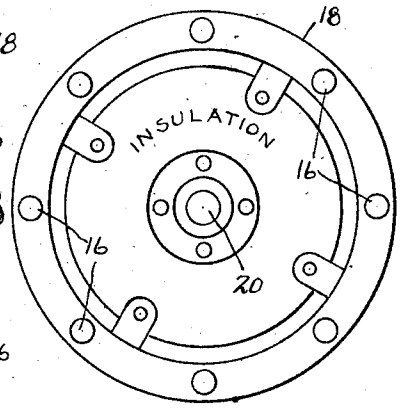


Fig. 6.

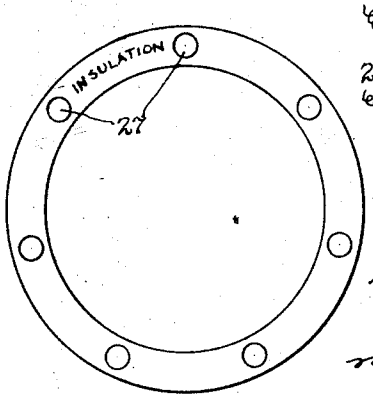


Fig. 9

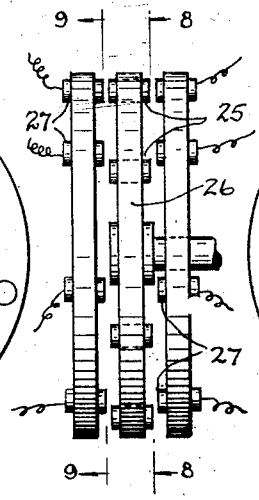


Fig. 7.

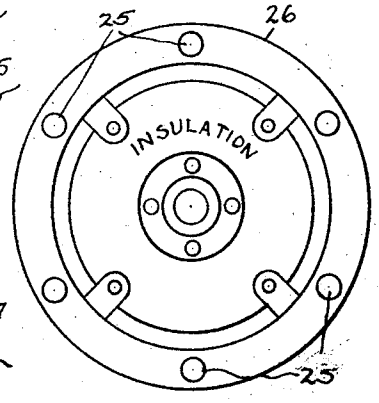


Fig 8

Inventor

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Patented Dec. 29, 1925. 1,567,978.

UNITED STATES PATENT OFFICE.

FRED G. NIECE, OF CLEVELAND, OHIO.

ROTARY SPARK GAP.

Application filed March 24, 1920. Serial No. 368,393.

To all whom it may concern:

Be it known that I, FRED G. NIECE, a citizen of the United States, and a resident of Cleveland, county of Cuyahoga, and State of Ohio, have invented a new and useful Improvement in Rotary Spark Gaps, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

The object of the present invention is the provision of a circuit making and breaking device of the type commercially known as rotary spark gaps, in which overheating and unnecessary wear may be to a large extent eliminated by successively changing the contacts between which the current jumps.

To the accomplishment of the foregoing and related ends, the invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims, the annexed drawing and the following description setting forth in detail certain mechanism embodying the invention, such disclosed means constituting, however, but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawing:—

Fig. 1 is a front elevation of one approved form of my improved rotary spark gap: Fig. 2 is a side view of the same as viewed from the left in Fig. 1: Fig. 3 is a side elevation similar to that of Fig. 1, but showing a modified form of construction: and Figs. 4, 5 and 6, and Figs. 7, 8 and 9 respectively illustrate two other modifications.

Referring first of all to the construction shown in Figs. 1 and 2, the rotating element is in the form of a ring or annulus 1 of suitable conducting material, such ring carrying a plurality of spark points or contacts 2 equidistantly spaced about its periphery. The ring is mounted on a suitable driving shaft 3 by means of an insulating disk 4, said shaft being, if desired, the spindle of a suitable electric motor (not shown), so as to require no separate bearing support.

Surrounding ring 1 is a second ring split in two sections 5, 5, that are insulated from each other and from the common supporting base 6 that need not be described in detail. These outer ring parts, which it will thus be seen are stationary, like the rotary ring 1, carrying a plurality of contacts or spark points 7 equidistantly spaced about the circumference of such outer ring, regarded as an entirety, and projecting inwardly therefrom so as to properly clear the points 2 on said rotary ring as the latter revolves.

The two sections 5 of said outer ring are of course connected with the respective leads of the circuit so that the current will be caused to jump from one or the other of said contacts 7 to an adjacently disposed contact 2 on ring 1, then from another such contact 2 to an adjacently disposed contact 7 on the other outer ring section 5. In the constructional form shown in Figs. 1 and 2 it will be observed there are eight such contacts or spark points 2 equidistantly disposed about ring 1, and six such contacts 7 equidistantly disposed about the two-part ring 5. Accordingly, the sparks across the gaps betwen the two members will spring between different contacts or points in succession, thus preventing overheating and unnecessary wear, each pair, following sparking, being allowed sufficient time to cool before current passes therebetween the next time. It will be understood that the number of contacts or points is a matter of indifference so long as the one member carries two or a multiple thereof, and the other carries three or a multiple thereof; or any other two consecutive numerals.

In the modified construction illustrated in Fig. 3 the inner ring 1 is a duplicate in its construction and mounting of the corresponding ring in the first described construction. However, the outer ring, instead of being divided simply into two parts, is shown as divided into six parts 10, respectively insulated from each other, and each carrying a contact or spark point 11. In this construction, oppositely disposed outer ring parts 10 may be connected in different circuits, with the result that current is allowed to flow through such circuits across the spark gaps created between contacts 11 and successively adjacently disposed contacts 2 on the rotating ring 1, thus permitting the use, in this instance, of three separate circuits in the same spark-gap, without interference.

Instead of disposing the electrodes in radial fashion as shown both in Figure 1 and Figure 3, I may arrange the same to pro-

ject laterally from the member carrying the same whether such member be rotatable or stationary. Thus, in Figs. 4, 5 and 6, I show two sets of electrodes 15 and 16 thus laterally projecting from the adjacent faces of two carrying members 17 and 18 respectively. Such carrying members are furthermore both rotatably mounted being carried by suitable spindles 19 and 20, respectively, just as the ring 1 is carried in the case of the two previously described constructions. The number of electrodes and their spatial disposition about the members carrying the same will be determined in accordance with the principle previously explained, the result being that a shifting of the spark gap occurs as the members are rotated. This would be true, of course, if only one member were rotated, but by rotating them both and in opposite directions, a more rapid make-and-break action is secured with the result that the capacity of the device is measurably increased. Current may be supplied to members 17 and 18 in any suitable manner as by brushes 21 and 22, shown diagrammatically in Fig. 4.

In the modification illustrated in Figs. 7, 8 and 9, while I utilize the feature of laterally disposed electrodes, only one set of these, viz, electrodes 25, are carried by the rotatable member 26. Instead, then, of having diametrically disposed pairs of stationary electrodes, as shown in Fig. 3, for example, I utilize pairs of stationary electrodes 27 transversely disposed of the plane of rotation of said electrodes 25. These electrodes are in pairs, each pair being, if desired, in a separate circuit and as an electrode 25 is brought in juxtaposition with any such pair, the gap is sufficiently shortened to permit the current to jump across. In this construction it is necessary to utilize only one-half as many rotating electrodes as in the construction of said Fig. 3, in order to handle the same number of circuits. Accordingly, the number carried by the rotatable member and the number of pairs stationarily mounted will differ only by one instead of two, as in the previously described construction, where the number of electrodes in the two sets respectively consist of two consecutive numerals multiplied by two.

The general mode of operation in all the foregoing modifications, or different constructional forms of my invention, is similar to that of a vernier, in that, as previously indicated, the number of equidistantly disposed electrodes on the one side differs from the number on the other side either by one, or by such numbers as are the products of two numbers, thus differing by one, when multiplied by two.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:—

1. In a device of the character described, the combination of a plurality of pairs of stationarily supported electrodes disposed in equidistantly spaced circular relation; and a plurality of pairs of rotatably supported electrodes disposed in equidistantly spaced circular relation, said stationary set comprising an odd number of pairs of electrodes, oppositely lying electrodes being of opposite sign, and said rotatable set comprising an even number of pairs of electrodes all electrically connected together.

2. In a device of the character described, the combination of a plurality of pairs of stationarily supported electrodes disposed in equidistantly spaced circular relation; and a plurality of pairs of rotatably supported electrodes disposed in equidistantly spaced circular relation, said stationary set comprising an odd number of pairs of electrodes oppositely lying electrodes being of opposite sign, with insulation interposed therebetween, said rotatable set comprising an even number of pairs of electrodes but a greater number of pairs than said stationary set, all the electrodes of said rotatable set being electrically connected together.

Signed by me this 13th day of March 1920.

FRED G. NIECE.