G. S. NEELEY.

COMMUTATOR BRUSH.

APPLICATION FILED JAN. 21, 1915.

1,166,923.

Patented Jan. 4, 1916.

Fig. 1

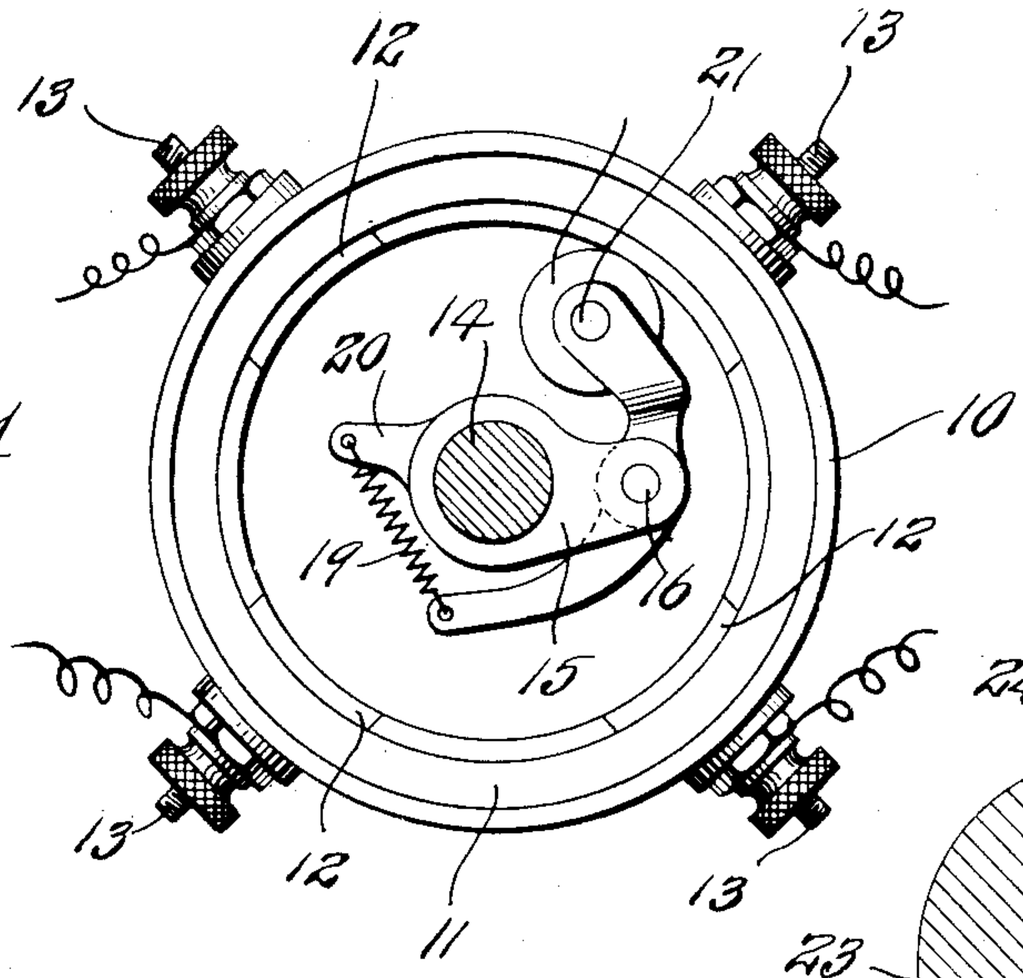


Fig. 4

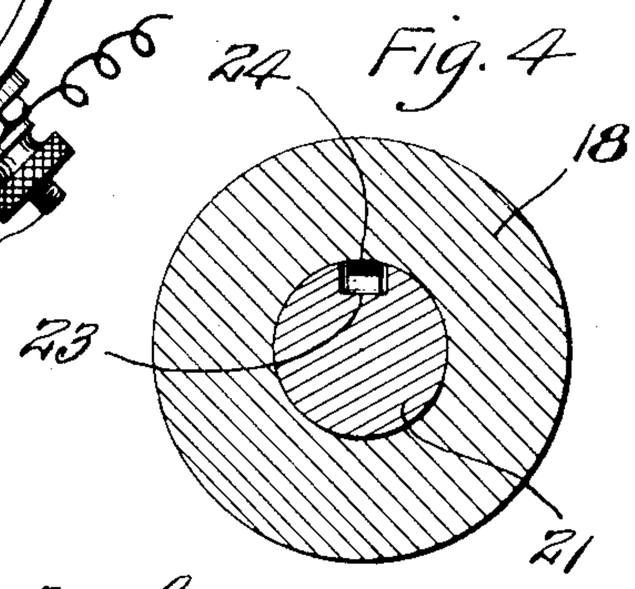


Fig. 2

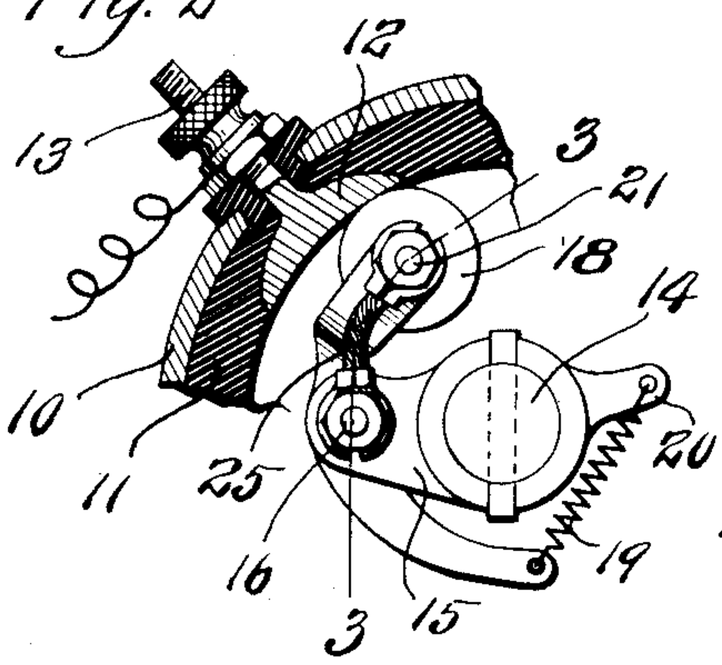


Fig. 3

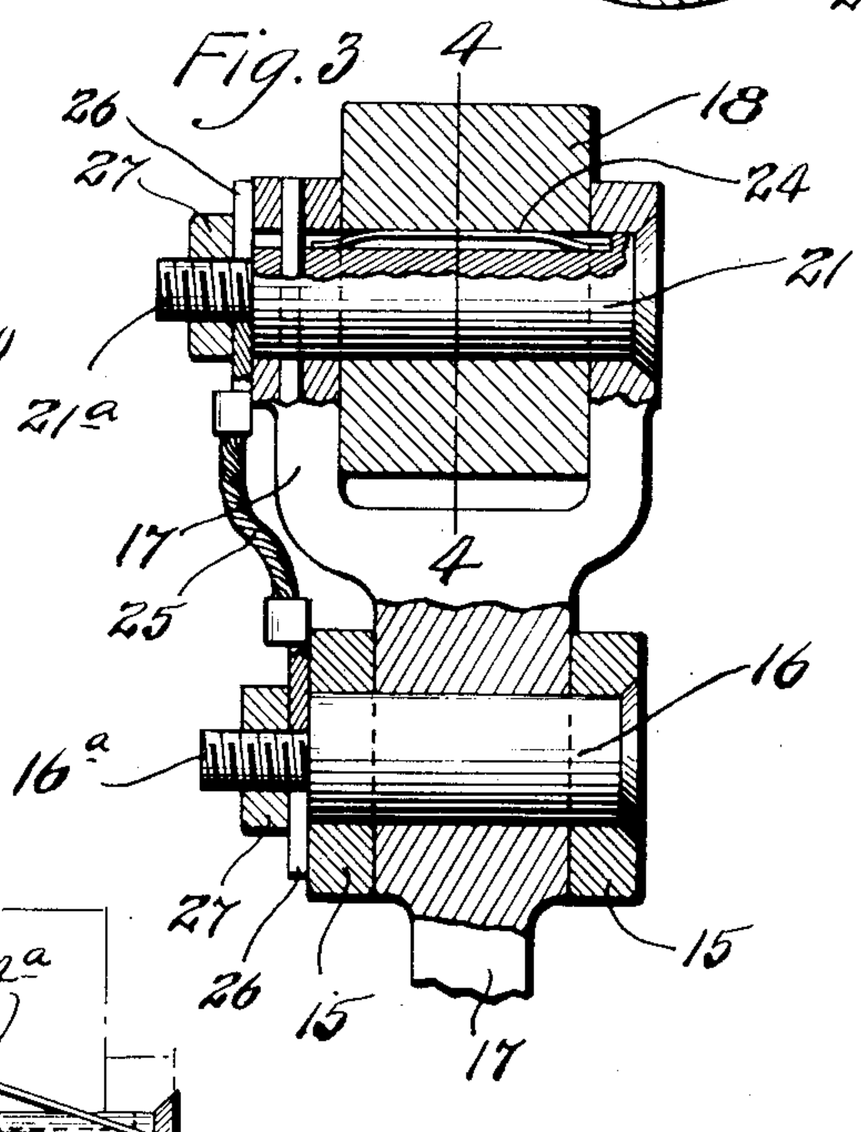


Fig. 5

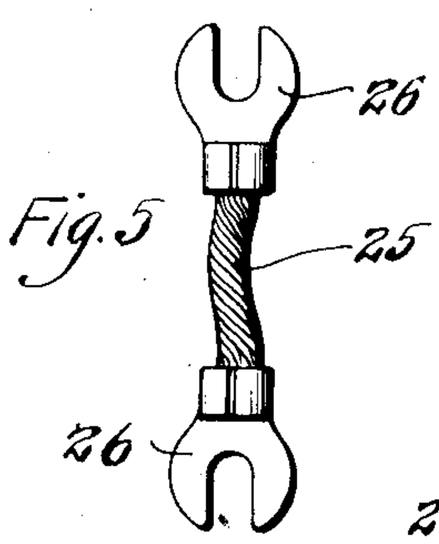
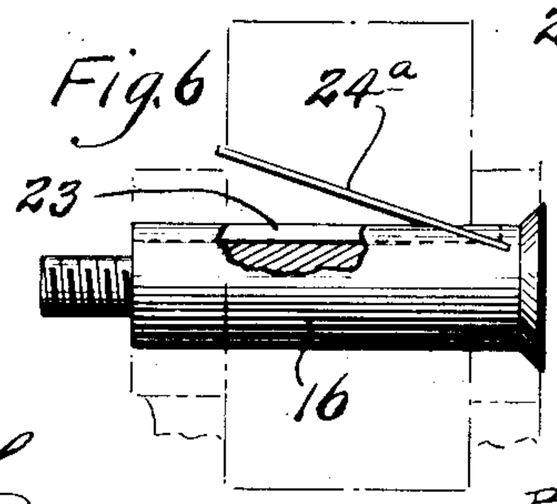


Fig. 6



Witnesses
Wm. James
W. P. Smith

Inventor
George S. Neeley
By F. H. Cormack, Atty.

UNITED STATES PATENT OFFICE.

GEORGE S. NEELEY, OF ST. LOUIS, MISSOURI, ASSIGNOR OF ONE-HALF TO THOMAS O. MOLONEY, OF ST. LOUIS, MISSOURI.

COMMUTATOR-BRUSH.

1,166,923. Specification of Letters Patent. Patented Jan. 4, 1916.

Application filed January 21, 1915. Serial No. 3,498.

To all whom it may concern:

Be it known that I, GEORGE S. NEELEY, a citizen of the United States, residing at the city of St. Louis, State of Missouri, have invented a certain new and useful Improvement in Commutator-Brushes, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a view looking at the inside of a commutator with which my improved brush is associated. Fig. 2 is a sectional view of a portion of a commutator and showing my improved brush associated therewith. Fig. 3 is an enlarged detail sectional view taken approximately on the line 3—3 of Fig. 2. Fig. 4 is a vertical section taken approximately on the line 4—4 of Fig. 3. Fig. 5 is an elevational view of the flexible conductor forming a part of my invention. Fig. 6 is an elevational view of a pin or shaft for the roller brush of my improved commutator and showing a modified form of contact spring.

My invention relates generally to commutators, such as are usually employed in connection with multiple cylinder internal combustion engines, and more particularly to the rolling brush which is operated to make electrical contact with the plates or segments which are arranged within the commutator housing.

The type of commutator to which my invention relates is generally used in connection with the engines of motor vehicles, and the brush associated with this type of commutator includes an arm which is fixed to a shaft, a second arm which is hinged or pivoted to the first mentioned arm, a contact roller carried by one end of the pivoted arm and a retractile spring which is connected to the end of the pivoted arm opposite the end which carries the rollers, and which spring is for the purpose of maintaining the roller with yielding pressure against the ring or surface on the commutator housing which is provided with the contact plates or segments.

Where the parts are properly constructed there is very little, if any, movement of the pivotally mounted arm upon its pivot pin or shaft, and it has been found that the electric current in passing from the pivoted arm to the fixed arm forms a thin shell or film of rust, which is of high non-conductivity around the pivot pin or shaft between said fixed and pivoted arms, which formation is due to electrolytic action, and also by reason of the fact that the parts are practically inactive with respect to each other. After this film or shell of highly non-conducting material has been built up, it prevents the free flow of current from one arm to the other, and as a result, said current takes the path of least resistance in accordance with natural laws and passes through the rear portion of the pivoted arm and from thence through the retractile coil spring to the fixed arm to which said spring is connected. This passage of current through the spring soon draws its temper by heating it and renders the same ineffective, and as a result augments the trouble as the roller brush is then not maintained with the proper degree of pressure against the face of the ring or surface which is provided with the contact plates or segments. This action causes the gas mixture in the internal combustion engine to "miss fire" and consequently reduces the efficiency of the engine in the ratio of the number of cylinders to the number of failures to explode the mixture by reason of unexploded charges of gas. Further, a brush roller which is mounted upon a pin or shaft carried by the outer end of the pivoted arm necessarily operates at a high rate of speed on the face of the ring provided with the segments or contact plates, and as a result, said roller and pin wear very rapidly, and where this wear is such that the roller is comparatively loose on the shaft, it necessarily follows that the electrical contact between the roller and shaft is occasionally broken, and, if such break occurs at a time when the roller is in contact with one of the segments or contact plates of the commutator ring, the result will be an open circuit in the sparking apparatus and consequently a miss of the spark and failure of ignition of the explosive charge in the corresponding engine cylinder.

I propose, and it is the principal object of my invention, to overcome the defects and objectionable results heretofore produced in commutators of the character to which my invention relates by providing a flexible conductor which serves as an

independent path for the electrical current from the pivoted roller brush carrying arm to the fixed arm and also arranging a resilient member between the pin or shaft on the pivoted arm and the roller brush, which resilient member forms a yielding rubbing contact between said pin and roller brush, thereby insuring perfect and continuous electrical contact between all of the parts that form the important functions in the ignition system.

With the foregoing and other objects in view, my invention consists in certain novel features of construction and arrangement of parts, hereinafter more fully described and claimed.

Referring by numerals to the accompanying drawings, 10 designates the commutator housing, 11 a ring of insulation within said housing, and located in said ring in the usual manner is a series of contact plates or segments 12, the same being provided with the usual binding posts 13. Projecting into the housing 10 is one end of a shaft 14 on which is fixed a short arm 15, one end of which is bifurcated and receives a pin or shaft 16, the same serving as a bearing for the brush roller carrying arm 17. One end of this last mentioned arm is bifurcated to received the brush roller 18 which operates in the usual manner upon the inner face of the ring 11 and the contact plates or segments carried thereby. In order to hold this roller firmly against the face of the ring 11 a retractile spring 19 is arranged between the rear end of arm 17 and a projection 20 on the fixed arm 15. All of the parts just described are of ordinary and well-known construction and I make no claim to the details of construction thereof.

The brush roller 18, which is preferably formed of hardened metal, is loosely mounted on a pin 21 which is seated in the bifurcated end of arm 17, and said roller rides directly upon the inner face of ring 11 and the contact plates seated therein. Formed in this pin 21 is a longitudinally disposed groove 23 and positioned therein is a flat spring 24, the ends of which are bowed slightly downward. The central portion of the spring yieldingly engages the face of the opening through the roller 22, thereby forming a rubbing contact which in addition to forming a perfect electrical connection between the pin 21 and roller 22 compensates for the wear between said parts and insures the engagement or contact of the roller 18 with the pin or shaft 21 under all conditions. It will be understood that the resiliency of the spring 24 exerts equal pressure upon the pin and roller, thus causing said roller to remain in contact with the pin at a point diametrically opposite the groove 23.

One end of the pin or shaft 21 is reduced in diameter and threaded as designated by 21^a, said reduced threaded end projecting beyond the arm 17 on one side and likewise the pin or shaft 16 is provided with a reduced threaded portion 16^a, which projects beyond the side of the arm 15.

To establish a positive and at the same time flexible connection between the pins or shafts 16 and 21, I provide a short section of flexible metallic cord or cable 25, the ends of which are provided with contact plates 26, the same being perforated or slotted so as to engage the reduced threaded ends of the pins 16 and 21 and being locked thereto by means of nuts such as 27, which are positioned on the reduced threaded portions 16^a and 21^a.

It will be understood that when the commutator is new or first placed in service, the current passes directly from shaft 14 through arm 15 to pin 16 and from thence through arm 17 to roller 22 and from thence to the contact plates or segments 12. Under normal conditions and when the inner surface of the ring 11 and segments 12 are smooth there is very little, if any, movement of the arm 17 upon the pin or shaft 16 and in a short time, a thin film or shell of non-conducting material is built up in the joint between said pin 16 and arm 17. In time, this film or shell becomes sufficiently thick to cause the current to pass through spring 19 in traveling from arm 15 to arm 17, and as a result, said spring is rendered ineffective thereby ceasing to maintain the brush roller 22 in contact against the ring 11 and contact plates 12.

The location of the flexible metallic conductor between the pins 21 and 16 forms a positive metallic connection between said pins so that when current is prevented from passing arm 15 through pin 16 to arm 17, it will pass directly from pin 16 to pin 21 through said flexible conductor.

The spring 24 when placed in the groove 23 is under tension, and therefore, normally exerts pressure equally upon pin 21 and roller 22, thereby causing said roller to always maintain electrical contact with the pin 21 at a point opposite the groove 23 even though said pin and roller become worn to a considerable degree or such as to affect the proper operation of the device. In some instances it may be found desirable to utilize a flat spring 24^a and to attach one end thereof in any suitable manner to the pin 21, said spring being normally arranged at an angle so that when bent downward tension is imparted thereto and which tension results in yielding pressure between the pin 21 and brush roller carried thereby.

A device of my improved construction is comparatively simple, can be easily and cheaply installed, and is very effective in maintaining at all times, perfect electrical

contact between the operating parts of a commutator utilizing a spring-held arm which carries a brush roller.

It will be readily understood that minor changes in the size, form and construction of the various parts of my improved commutator brush can be made and substituted for those herein shown and described, without departing from the spirit of my invention, the scope of which is set forth in the appended claims.

I claim:

1. In a commutator, a rotating member, an arm having an axis on said member, a roller having an axis on said arm, and means independent of said member, arm, and roller for forming a positive electric connection between the axes of said arm and roller.

2. In a commutator, the combination with a rotating member, of an arm having an axis on said member, a brush roller having an axis on said arm, and a flexible metallic conductor connected directly to the axes of said roller and arm.

3. In a commutator, a rotating member, a pin seated therein, an arm pivotally mounted on said pin, a pin carried by said arm, a brush roller journaled on said last mentioned pin, and a flexible metallic conductor connecting said pins.

4. In a commutator, a pivoted arm, a pin seated in said arm, a roller journaled on said pin, and a resilient member arranged between the pin and roller.

5. In a commutator, a pivoted arm, a pin seated in said arm, a roller journaled on said pin, and yielding pressure means located between said pin and roller.

6. In a commutator, a pivoted arm, a pin seated in said arm, a roller journaled on said pin, and means interposed between the pin and roller for taking up the wear between said parts.

7. In a commutator, a pivotally mounted arm, a pin seated therein, a brush roller journaled on said pin, and a spring seated in said pin and bearing against said roller.

8. The combination with a commutator housing having contact plates, of a rotating member adjacent to said housing, a spring-held arm pivotally mounted on said rotating member, a pin seated in said arm, a roller journaled on said pin, yielding pressure means arranged between the pin and roller, and an electric conductor between said pin and the rotating member.

9. The combination with a commutator for an internal combustion engine, of an arm and a roller mounted individually upon an axis, and independent means for preserving a positive electrical contact between the axis of said arm and the said roller, substantially as described.

In testimony whereof I hereunto affix my signature in the presence of two witnesses, this 18th day of January, 1915.

GEORGE S. NEELEY.

Witnesses:
M. P. SMITH,
M. A. HANDEL.