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SPRING BRUSH FOR ROTATING PARTS

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FIG. 1

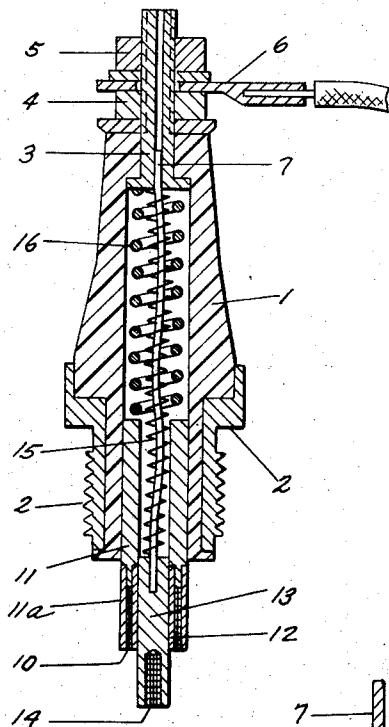


FIG. 2

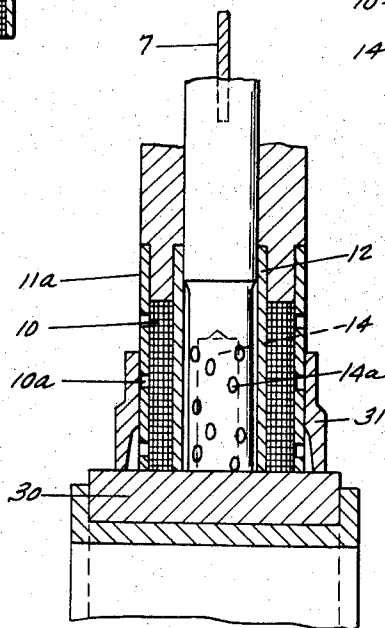
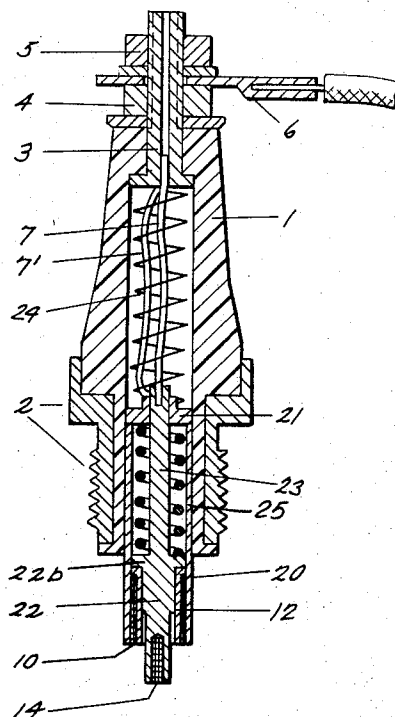


FIG. 3

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SPRING BRUSH FOR ROTATING PARTS

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9 Claims. (Cl. 339-5)

This invention relates to an improved brush construction for making an electrical connection to a rotating member and more specifically relates to a brush construction which includes two brushes which have different periods of vibration so that at least one brush will form a current-carrying connection to a rotating member even though the brushes bounce.

Accordingly, the primary object of this invention is to provide a dependable source of current for a rotating member.

Another object of this invention is to provide at least two brushes having different periods of vibration so that at least one of the brushes contacts a collector ring during operation.

A further object of this invention is to provide scraper means which sweeps an oil layer on a collector ring in front of the brushes.

These and other objects of this invention will become more apparent from the following description when taken in conjunction with the drawings in which:

Figure 1 shows a longitudinal section of a holder for two brushes which are arranged independently of one another.

Figure 2 shows a longitudinal section of a holder for two brushes which are arranged to be dependent upon one another.

Figure 3 shows an enlarged cross-sectional view of the brush portion of Figure 1 with the brushes engaging a collector ring and further illustrates the manner in which an oil scraper cooperates with the brushes.

As will be more fully described, the invention provides a first and second parallel connected and concentrically arranged brush which are biased to engage a collector ring under different biasing forces so that the brushes bounce according to different frequencies. Accordingly, if one of the brushes bounce, the other will still be engaged, and an arc will not be drawn by the bouncing brush.

In the first embodiment of Figures 1 and 3, the brushes are biased independently of one another while in the embodiment of Figure 2, the brushes are biased in a dependent manner.

Referring first to Figures 1 and 3, a brush holder 1 of insulating material is provided with a threaded portion 2 which can be received by a threaded opening in the housing of the member receiving the brush connection. The upper portion of holder 1 has an opening which receives a threaded metal insert 3 which is secured to the holder 1 by nut 4 and receives and secures an electrical terminal 6 by nut 5.

A flexible stranded wire 7 is electrically connected to the lower end of insert 3 and extends downwardly and is electrically connected to the concentrically arranged brushes 10 and 14. Each of brushes 10 and 14 preferably consist of a metal cloth of a phosphor-bronze wire which is contained within a metal jacket. Thus, a cylindrical metal sleeve 11 which is rigidly carried by holder 1 is terminated by cylindrical sleeves 11a and 12 which

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carry the wire cloth for brush 10. The sleeve 11a is provided with apertures such as aperture 10a which permits the flow of oil from the wire cloth enclosed thereby when the brushes are immersed in oil.

The inner sleeve 12 also operates to movably receive and guide the movement of conductive carrier member 13 which carries the wire cloth of brush 14 which is set into the lower cavity of brush carrier 13. Accordingly, conductor 7 which is connected to carrier 13 is also electrically connected to brush 10 through sleeve 12. As was the case for brush 10, oil may flow from the wire cloth of brush 14 through the openings 14a (Figure 3) when the brush is immersed in an oil environment.

Each of brushes 10 and 14 is biased downwardly for engagement with a collector ring such as ring 30 partially shown in Figure 3. In Figure 1, the brush 14 is biased by spring 15 which is seated at either end by insert 3 and brush carrier 13 respectively. Spring 15 is disposed within a relatively larger spring 16 which is seated between the top of sleeve 11 and insert 3. Springs 15 and 16 operate to bias their respective brushes into engagement with a ring as shown in Figure 3 and the springs have different force displacement characteristics whereby the bounce frequency of brushes 10 and 14 is different.

In the embodiment of Figure 1, the springs 15 and 16 are seen to be independent of one another. In the embodiment of Figure 2 where components identical to those of Figures 1 and 3 have been given like identifying numerals, the biasing springs are made dependent upon one another although the bounce frequency of the brushes is still different. In Figure 2, brush 10 is carried by a carrier sleeve 20 which has a cover 21. Cover 21 has an aperture therein which slidably receives the upper rod portion 23 of carrier 22 which carries brush 14. Carrier 22 further has an extending portion 22b which slidably engages the interior of sleeve 20. Thus, the carrier 22 is guided within sleeve 20 for axial motion with respect to sleeve 20. Brushes 10 and 14 are then individually electrically connected to terminal 6 by stranded conductors 7' and 7 respectively.

A first spring 24 is then positioned between insert 3 and the upper portion of cover 21 to serve as a bias for brush 10. That is, the spring 24 urges sleeve 20 downwardly. A second spring 25 is then positioned between the bottom of cover 21 and the carrier 22 to urge carrier downwardly with respect to cover 21. Note that since the position of cover 21 is dependent in part on the spring 24, the position and force applied to brush 14 is dependent upon both springs 24 and 25.

When the brush 14 is urged upwardly and flush with brush 10 because of engagement with a collector ring, the biasing force on brush 10 is dependent upon spring 24 alone when cover 21 is in a given position. However, the biasing force on brush 14 is the resultant force of both springs 24 and 25 since they are connected through the cover 21. Accordingly, brushes 10 and 14 bounce at different frequencies.

The structure of Figure 2 avoids the danger of hooking the two springs when they are concentrically arranged as in Figure 1 and since the conductors 7 and 7' come through a larger diameter spring, the danger of wearing of these conductors is reduced. Furthermore, springs 24 and 25 can be easily calibrated and are relatively short.

Either structure of Figures 1 or 2 can be adapted to receive an oil scraper for cleaning the collector ring area to be contacted. This is best seen in Figure 3 for the case of the brush of Figure 1 where a scraper 31 surrounds sleeve 10a and is fastened thereto, its lower end being flush with the lower end of brush 10. The scraper sleeve 31 can be of any conductive material such as brass, or could be of any non-conductive material.

In the foregoing, I have described my invention only in connection with preferred embodiments thereof. Many variations and modifications of the principles of my invention within the scope of the description herein are obvious. Accordingly, I prefer to be bound not by the specific disclosure herein but only by the appended claims.

We claim:

1. A brush means for conducting electric current to a moving member, comprising a pair of electrically conductive brushes, means for supporting said brushes so as to engage said moving member, and means for individually biasing said brushes into said engagement comprising resilient elements having different periods of natural vibration wherein one of said brushes is in the form of a cylinder and the other of said brushes is disposed therein and movable axially with respect thereto, including an oil-scraper element surrounding said cylindrical brush element.

2. A brush means for conducting electric current to a moving member, comprising a pair of electrically conductive brushes, means for supporting said brushes so as to engage said moving member, and means for individually biasing said brushes into said engagement comprising resilient elements having different periods of natural vibration wherein one of said brushes is in the form of a cylinder and the other of said brushes is disposed therein and movable axially with respect thereto.

3. A brush means for conducting electric current to a moving member, comprising a pair of electrically conductive brushes, means for supporting said brushes so as to engage said moving member, and means for individually biasing said brushes into said engagement comprising resilient elements having different periods of natural vibration wherein one of said brushes is in the form of a cylinder and the other of said brushes is disposed therein and movable axially with respect thereto, said resilient elements comprising helical springs, one of said springs bearing against said cylindrical brush and the other of said springs bearing against the other brush.

4. A brush means for conducting electric current to a moving member, comprising a pair of electrically conductive brushes, means for supporting said brushes so as to engage said moving member, and means for individually biasing said brushes into said engagement comprising resilient elements having different periods of natural vibration wherein one of said brushes is in the form of a cylinder and the other of said brushes is disposed therein and movable axially with respect thereto, said resilient elements comprising helical springs arranged in serial order, one of said springs bearing on one of said brushes and said supporting means and the other of said springs having one end bearing against one of said brushes and the other end bearing against the other of said brushes.

5. A brush means for conducting electric current to a moving member, comprising a pair of electrically conductive brushes, means for supporting said brushes so as to engage said moving member, and means for individually biasing said brushes into said engagement comprising resilient elements having different periods of natural vibration wherein one of said brushes is in the form of a cylinder and the other of said brushes is disposed therein and movable axially with respect thereto, said brushes being comprised of metallic mesh material for conducting oil to said brushes.

6. A brush means for conducting electric current to a moving member, comprising a pair of electrically conductive brushes, means for supporting said brushes so as to engage said moving member, and means for individually biasing said brushes into said engagement compris-

ing resilient elements having different periods of natural vibration wherein one of said brushes is in the form of a cylinder and the other of said brushes is disposed therein and movable axially with respect thereto, said brushes being comprised of metallic mesh, and holder means encompassing each of said brushes so as to assure maintenance thereof in respective cylindrical shapes.

7. A brush means for conducting electric current to a moving member, comprising a pair of electrically conductive brushes, means for supporting said brushes so as to engage said moving member, and means for individually biasing said brushes into said engagement comprising resilient elements having different periods of natural vibration wherein one of said brushes is in the form of a cylinder and the other of said brushes is disposed therein and movable axially with respect thereto, holder means for said cylindrical brush comprising a pair of concentric metallic cylinders, said brush member comprising a metallic mesh element carried between said cylinders.

8. A brush means for conducting electric current to a moving member, comprising a pair of electrically conductive brushes, means for supporting said brushes so as to engage said moving member, and means for individually biasing said brushes into said engagement comprising resilient elements having different periods of natural vibration wherein one of said brushes is in the form of a cylinder and the other of said brushes is disposed therein and movable axially with respect thereto, holder means for said cylindrical brush comprising a pair of concentric metallic cylinders, said brush member comprising a metallic mesh element carried between said cylinders, the other brush comprising a plunger-like holder having a hollow portion open at one end, a brush element carried within said hollow portion, said brush element comprising a metallic mesh-like material, and oil-entry holes through said plunger-like holder from the exterior thereof to said hollow portion.

9. A brush means for conducting electric current to a moving member, comprising a pair of electrically conductive brushes, means for supporting said brushes so as to engage said moving member, and means for individually biasing said brushes into said engagement comprising resilient elements having different periods of natural vibration wherein one of said brushes is in the form of a cylinder and the other of said brushes is disposed therein and movable axially with respect thereto, holder means for said cylindrical brush comprising a pair of concentric metallic cylinders, said brush member comprising a metallic mesh element carried between said cylinders, the outermost of said cylinders having holes therein to provide access for oil to said brush element.

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