June 3, 1969 W. H. MASHBURN 3,448,312

METALLIC WOOL PELLET BRUSH ASSEMBLY FOR SLIP RINGS, COMMUTATORS OR THE LIKE

Filed Nov. 22, 1965

FIG. 1

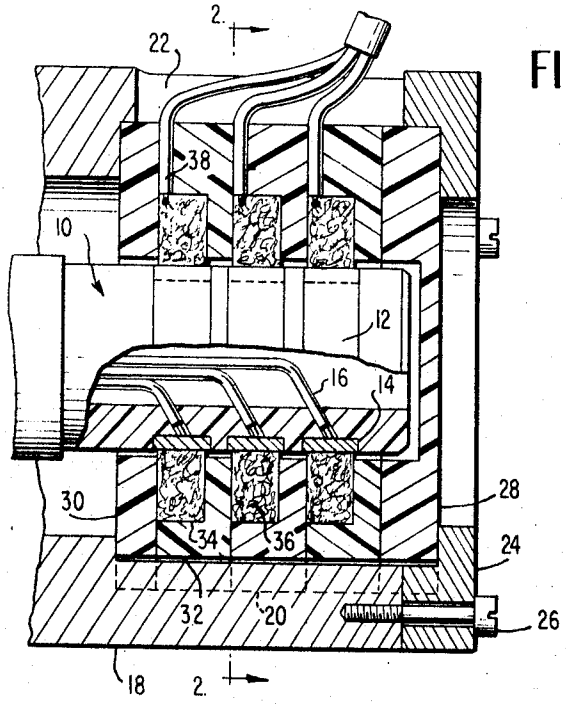


FIG. 3

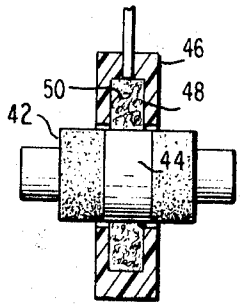


FIG. 4

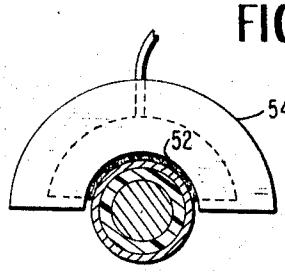


FIG. 2

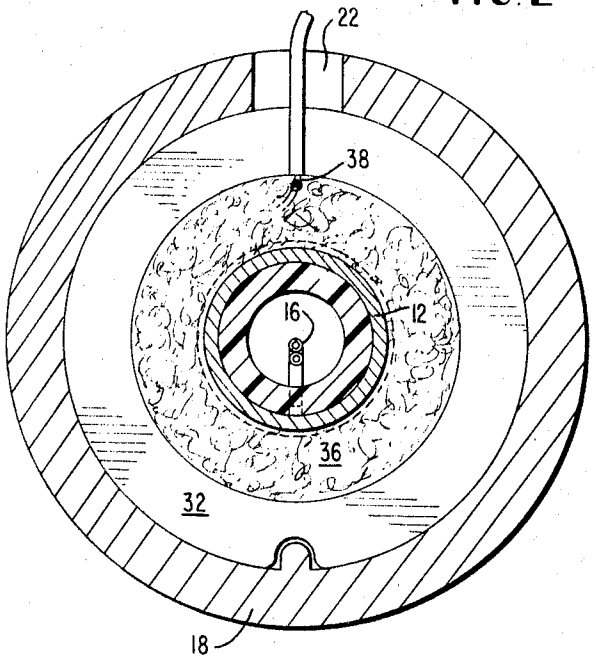


FIG. 5

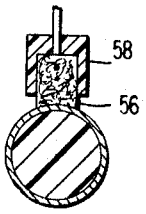
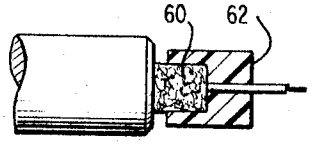


FIG. 6



INVENTOR

WILLIAM H. MASHBURN

BY Hughes, Rothwell, Nixon

Zinn & Macpeak

ATTORNEYS

United States Patent Office 3,448,312
Patented June 3, 1969

3,448,312

METALLIC WOOL PELLET BRUSH ASSEMBLY FOR SLIP RINGS, COMMUTATORS OR THE LIKE

William H. Mashburn, Blacksburg, Va., assignor to Electro-Tec Corp., Ormond Beach, Fla., a corporation of New Jersey

Filed Nov. 22, 1965, Ser. No. 508,893
Int. Cl. H01r 39/39; H02k 13/10
U.S. Cl. 310—239
6 Claims

ABSTRACT OF THE DISCLOSURE

A brush assembly including a metallic wool brush having the shape of a toroidal pellet. The metallic wool mass comprising the brush is arranged to have a high natural resilience which constitutes the sole biasing means for forcing the brush against the cooperating slip ring and thereby maintaining good electrical contact between the brush and the slip ring.

This invention relates to improvements in brush assemblies and particularly to a brush assembly employing metallic wool pellets in various forms to function as a flexible contact between the rotating and stationary elements of a slip ring, commutator assembly, or the like.

Brushes are commonly used with slip rings, commutators or the like to provide an electrical connection between rotating and stationary members. For slip rings these brushes usually include a silver graphite tip on the end of a beryllium copper leaf spring or a metallic gold alloy wire. Both of these prior art type brushes have distinct inherent disadvantages. First, adjustment is critical for satisfactory operation and secondly the limited brush contact area requires high contact pressure and resulting high wear rate. As wear increases, particularly in the case of silver or graphite brushes, contact pressure decreases sometimes introducing excessive noise. Establishing equal brush force between each brush in a multiple brush assembly is difficult because of the spring back and memory. Many brushes of the prior art type are delicate and easily damaged in handling and installation. Shock and vibration as well as high speed and generation of electrical noise present problems with conventional brushes.

A metallic wool brush improves on certain limitations of the conventional brush assembly. First, the many contacts of metallic wool brush greatly reduce noise and reduce the contact pressure which results in longer wear and less heat, therefore allowing higher speeds. The greater number of effective contacts also allows high current capacities compared with equivalent size conventional brush. Certain of these factors have been recognized in the prior art, utilizing matted molybdenum wire in coherent form as a brush, see U.S. Patent 2,939,977.

However, one feature which is unique in the metallic wool pellet brush assembly of this invention is the elimination of separate biasing means and reliance upon the inherent resiliency of the metallic wool pellet. The wool pellet is supported in a stationary brush support and by determining the dimensions of the brush support and the density, the brush pressure is automatically established and is not subject to spring back or memory or to tolerance in establishing a brush angle. Neither is it likely to be changed in handling or installation. Because of this low pressure and low wear, the brush pressure will be constant for a much longer time than with conventional pressures. The metallic wool pellets can and preferably do surround a ring, such as a slip ring, so that upon high shock and vibration open circuits will not occur as with conventional brushes or single contact brushes. Assembly is greatly simplified since the brushes can be simply stacked like washers in the preferred embodiment.

Other features of the invention will be pointed out in the following description and claims and illustrated in the accompanying drawings, which disclose by way of example, the principle of the invention and the best mode which has been contemplated of applying that principle.

In the drawings:

FIG. 1 is a longitudinal sectional view through a slip ring and brush assembly utilizing the concept of this invention;

FIG. 2 is a sectional view taken along line 2—2 of FIG. 1;

FIG. 3 is a longitudinal sectional view through another form of brush and brush holder;

FIG. 4 is a transverse sectional view showing a further embodiment in accordance with this invention;

FIG. 5 is a transverse sectional view showing an additional embodiment; and

FIG. 6 is a longitudinal sectional view showing a still further embodiment.

Referring to FIGS. 1 and 2, a slip ring assembly **10** may be of the type disclosed in the Pandapas Patent 2,696,570, and includes a plurality of conductive rings **12** electroplated within grooves **14** with the electrodeposit electroplated directly to conductive leads **16**.

A brush support block **18** may include a reference rib **20** on one internal surface and an access opening **22** therein. An end cap **24** is secured by screws **26** or other means to close the end of the block and hold a plurality of stacked washers therein.

These washers include end washers **28** and **30** as shown in FIG. 1 and brush support washers **32**. These washers have an internal diameter slightly larger than the diameter of the slip ring and an external diameter of a size sufficient to fit in the brush block. A cut out in the external diameter corresponds with the reference rib **20** in order to prevent rotation of the washers. Each brush support washer includes a counterbored cavity **34** providing a space for receiving an annular metallic wool pellet **36**. Conductive leads **38** are electrically connected to the wool pellets, for example by soldering. This annular metallic wool pellet is of a size so that it fits into the cavity and bears upon the surface of the electrodeposited slip ring with a force due to the natural resilience of the metallic wool. The metallic wool pellet may be gold wool, although it is not limited thereto. By determining the inside diameter, outside diameter and the density of the metallic wool pellet within the cavity, the brush pressure is automatically established and is not subject to spring back and memory or to tolerance in establishing a brush angle. Further, the metallic wool pellet assembly is not likely to be changed in handling and installation and assembly is greatly simplified since the brushes can simply be stacked one upon another like washers. Since the pellets are completely surrounded by the washers, open circuits will not occur even in environments of high shock and vibration. Also, because of the low pressure and low wear brush pressure will be constant for a much longer time than with conventional brushes.

FIG. 3 illustrates a further embodiment of the invention in a simple form. There is a rotating member **42**, including a conductive surface ring **44** and surrounding the member is a stationary brush support **46** with a cavity **48**. Filling this cavity is a metallic wool pellet **50** which extends from the cavity to bear against the surface of the conductive ring **44**. It can be seen that the only biasing force of the metallic wool ring is the natural and inherent resiliency of the metallic wool material itself.

FIG. 4 illustrates a further embodiment in which there is a half cylindrical metallic wool pellet **52** supported in a half cylindrical support **54**.

FIG. 5 illustrates this invention wherein a button type brush uses a metallic wool pellet **56** in a support **58**. In FIG. 6 an end brush utilizes a metallic wool pellet **60** in a support **62**.

In all of the embodiments the brush has long wear with a constant brush pressure and is easily assembled and has a very good resistance to high shock and vibration.

While the invention has been particularly shown and described with reference to preferred embodiments thereof, it will be understood by those skilled in the art that the foregoing and other changes in form and details may be made therein without departing from the spirit and scope of the invention.

What is claimed is:

1. A brush assembly for establishing electrical connection to a rotating member such as a slip ring or the like, the brush assembly comprising:

(a) a stationary brush support means adjacent but spaced from the rotating member,

(b) means defining a brush holding cavity in the support means,

(c) a metallic wool pellet brush contained in the cavity and extending therefrom, said pellet being of toroidal shape and having an inside and outside surface, said inside surface maintaining contact with a substantial portion of the rotating member, the natural resilience of the metallic wool constituting the sole biasing means for the electrical contact between the brush and the rotating member.

2. A brush assembly as defined in claim **1**, wherein the metallic wool pellet is half toroid.

3. A brush assembly as defined in claim **1**, wherein the brush pellet is a closed toroid and surrounds the rotating member.

4. A brush assembly as defined in claim **3**, wherein there are a plurality of toroidal metallic wool pellet brushes and wherein the stationary brush support means includes insulating washers stacked against one another.

5. A brush assembly as in claim **4** wherein the washers include a counterbore which together with an adjacent washer form the brush holding cavity.

6. A brush assembly as defined in claim **1** wherein the brush is of metallic gold wool.

References Cited

UNITED STATES PATENTS

1,448,511	3/1923	Becker	310—248
2,939,977	6/1960	Forster et al.	310—248

ORIS L. RADER, *Primary Examiner.*

G. NUNEZ, *Assistant Examiner.*

U.S. Cl. X.R.

310—249, 251