Aug. 17, 1965 J. W. CALDWELL 3,201,739

BRUSH ASSEMBLY FOR ROTATABLE SHAFT

Filed Aug. 17, 1962

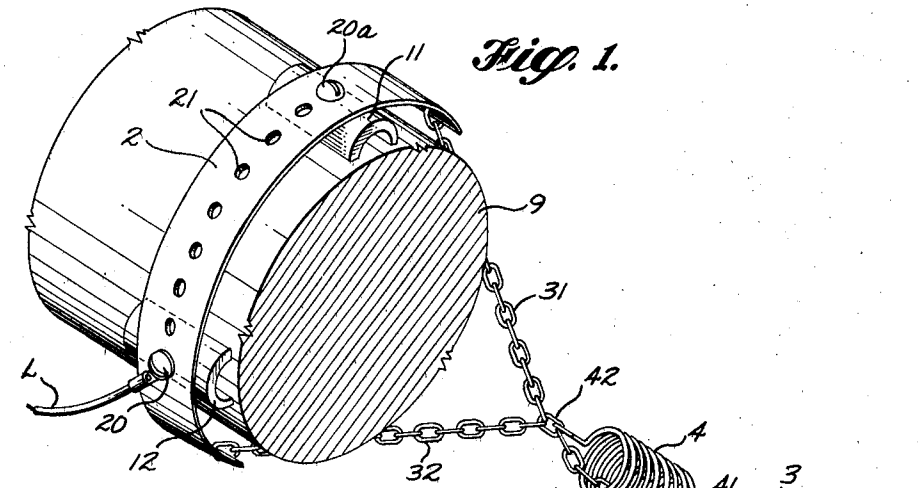


Fig. 1.

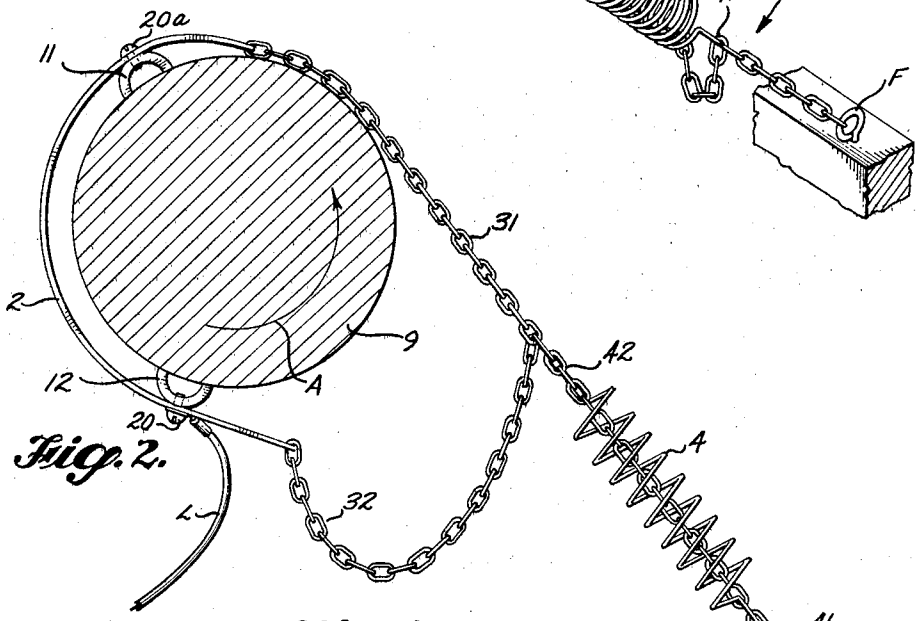


Fig. 2.

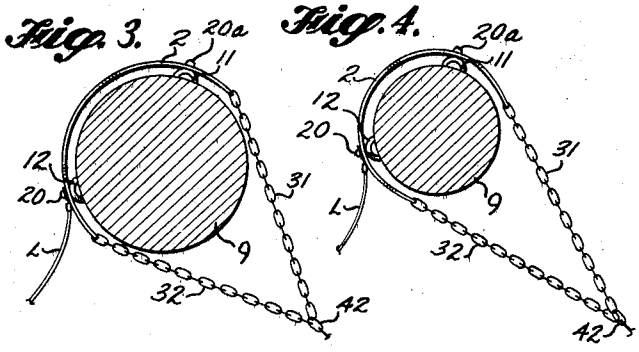


Fig. 3.

Fig. 4.

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United States Patent Office 3,201,739 Patented Aug. 17, 1965

3,201,739

BRUSH ASSEMBLY FOR ROTATABLE SHAFT

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Filed Aug. 17, 1962, Ser. No. 217,571
2 Claims. (Cl. 339—5)

The present invention relates to the transmission of an electric current between a rotative shaft and a fixed lead. It might be used to transmit current by way of two or more leads to and from separate rings carried by a rotating shaft, but in the form shown is of simpler construction, affording a means of transmitting current between a single fixed lead and rotating shaft to be grounded thereby, such as might be used in a boat engine.

It is an object to provide a device of the general nature indicated, which will be of simple, relatively inexpensive construction, having sufficient flexibility to effect transmission to or from shafts of varying diameters.

In addition, no special mounting arrangement for the current transmitting means is required; it can be mounted at any convenient point along the shaft, and in relation to a shaft already installed. It maintains steady electric contact and pressure of the brush or brushes with the shaft throughout any normal change in its speed of rotation. In the preferred form the installation includes means yieldable to a limited extent, hence the device is protected against damage or failure in the event the brushes should stick to the shaft, as they might after a somewhat extended period of non-use.

The preferred construction is as shown in the accompanying drawings and as will be described hereinafter, but the invention is capable of embodiment in varied forms of construction, and the claims are to be construed in the light of the specification to include such varied forms, except as the contrary may specifically appear.

FIGURE 1 is an isometric view of the brush means arranged in relationship to a shaft, but with the shaft at rest, and with tension means which are associated with the brushes contracted and at rest.

FIGURE 2 is a transverse sectional view through the shaft, showing the relationship of the brush means and its immediate support during rotation of the shaft under conditions of abnormal brush seizure.

FIGURES 3 and 4 are views illustrating the manner in which the device is adaptable to different diameters of shaft.

The shaft **9** is intended to rotate, and may be rotative unidirectionally, or alternatively in opposite directions. The brush means of this invention preferably includes two or more wiper elements or brushes designated **11** and **12** to distinguish them, which are intended to contact the surface of the shaft and which are supported by an electricaly conductive band **2**. The band should be formed of a resilient metal curved to fit about a shaft but having its ends normally extending in a tangential direction to resist laterally inward deflection into contact with the shaft surface. These ends are engaged by a tension element **3**, which draws the band about the shaft and thereby draws the brushes **11** and **12** into contact therewith. In normal operation the tension element **3** and the band ends should remain out of contact with the shaft. An electric lead L is secured to the band in any suitable way, as by the binding post **20**, and thereby to the brushes.

The brushes **11** and **12** are secured to the band **2** preferably in a manner that will permit their adjustment one towards and from the other, lengthwise of the band. Preferably both are adjustable in order to permit maintaining

equal spacing between the brushes and the respectively adjacent ends of the band. Adjustment may be effected in various ways; the form of mounting shown comprises a series of holes **21** spaced lengthwise of the band **2** and receiving posts or mounting screws **20** and **20*a*** by means of which the brushes **12** and **11**, respectively, are secured to the band.

The brushes themselves are preferably of arch formation in cross section, with the ends of the arch bearing against the surface of the shaft **9**. They may be made of material of low frictional coefficient; for instance, elements made of internally lubricated sintered metal material such as those readily available on the market and referred to as Oilite elements. In the example they are formed as segments of a tubular section of this material.

The illustrated and preferred tension element **3** comprises a Y-shaped metal chain or cord which is fixedly anchored at any suitable point F, and which is branched at **31** and **32** to form a yoke connected to each of the opposite ends of the band **2**. A helical spring **4** interposed in the chain **3** as a normal tension link therein is stretched to a limited extent in the act of securing the base of the Y-shaped chain to anchor point F. This places a normal contact pressure on the brushes by drawing the band **2** into contractive relationship about the shaft. The spring ends are connected to spaced points **41** and **42** in the common leg of the chain **3**. These connecting points are spaced apart along the lineal extent of the chain such that under normal conditions the chain is held slack between them as a result of the spring tension. However if the brushes are seized to the shaft when the shaft rotates, as after a long period of idleness (FIGURE 2), the slack chain becomes taut and limits stretching of the spring **4**. This protects the spring against loss of tensile properties due to overstretching under these conditions. The action is the same in either direction of shaft rotation. Under normal conditions both brushes are maintained in contact with the shaft and with approximately equal pressures. When brush seizure occurs there may be momentary contact between the band and/or chain with the shaft until the slack length of chain limits extension of link **3** and jerks the brush free. However no harm is done by this brief contact.

It has been found that the device operates most satisfactorily if the brushes **11** and **12** are spaced by approximately 120 degrees about the shaft. This spacing can be obtained and maintained by shifting the brushes lengthwise of the band to the locations of whichever of the holes **21** will best achieve this 120 degree spacing. The manner in which the brush means thus adapts itself to shafts of different diameter is illustrated by comparison of FIGURES 3 and 4.

The assembly is simple and inexpensive, and easy to install and to adjust, even when applied to a shaft which is already installed and operating.

I claim as my invention:

1. Means for establishing electrical contact with a rotatable shaft comprising a resilient conductive band of generally arcuate configuration, a pair of brushes, means removably mounting said brushes at spaced points along said band, conductive means connected to said band for transmitting current to a stationary point, a flexible non-extensible Y-shaped element having its base fixedly anchored and its branched ends connected to the ends of the conductive band, and helical spring means connected between two spaced points on said non-extensible element to yield under tension to the extent permitted by the length of non-extensible element between said two spaced points.

2. Means for establishing electrical contact with a rotatable shaft comprising a resilient conductive band of

generally arcuate configuration having a plurality of holes spaced along its length, a pair of brushes, means removably mounting said brushes in a pair of said holes at spaced points along said band, conductive means connected to said band for transmitting current to a stationary point, a flexible non-extensible Y-shaped element having its base fixedly anchored and its branched ends connected to the ends of the conductive band, and helical spring means connected between two spaced points on said non-extensible element to yield under tension to the extent permitted by the length of non-extensible element between said two spaced points.

References Cited by the Examiner

UNITED STATES PATENTS

421,320	2/90	Schmidt et al.	310—238
1,082,571	12/13	Varley	310—244
2,554,169	5/51	Bergan	339—251 X
2,583,747	1/52	Potter	339—5 X
2,689,944	9/54	Curtis	339—9

FOREIGN PATENTS

13,612	1884	Great Britain.

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