March 28, 1944. M. R. HANNA 2,345,429

ELECTRIC CURRENT COLLECTOR

Filed Oct. 26, 1942

Fig. 1.

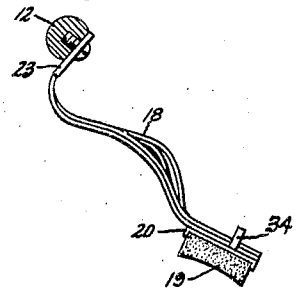


Fig. 2.

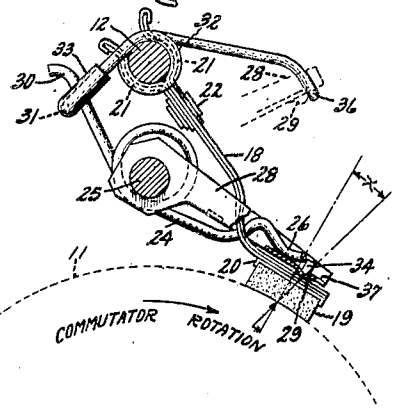


Fig. 3.

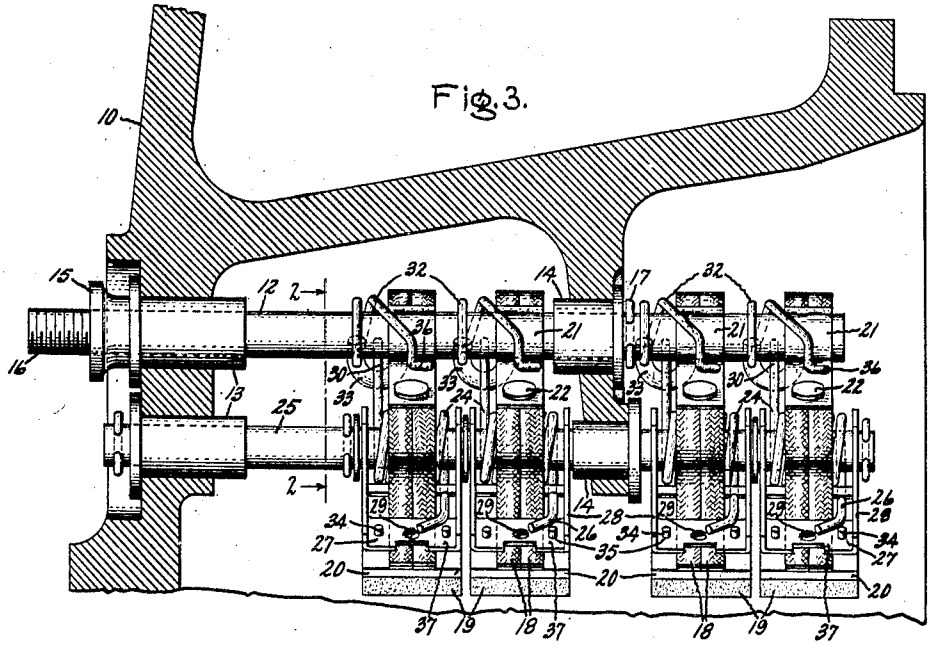
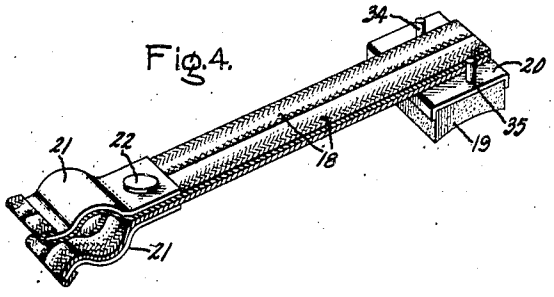


Fig. 4.



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2,345,429

UNITED STATES PATENT OFFICE

2,345,429

ELECTRIC CURRENT COLLECTOR

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Application October 26, 1942, Serial No. 463,322

4 Claims. (Cl. 171—324)

My invention relates to electric current collectors, such as are used with dynamo-electric machines which are provided with commutators or slip rings.

An object of my invention is to provide an improved current collector of the type used for providing electrical contact with a commutator or slip ring.

Another object of my invention is to provide an improved electric contact brush of the type used as a current collector in dynamo-electric machines.

Further objects and advantages of my invention will become apparent and my invention will be better understood from the following description referring to the accompanying drawing, and the features of novelty which characterize my invention will be pointed out with particularity in the claims annexed to and forming part of this specification.

In the drawing, Fig. 1 is a side elevational view of a brush embodying features of my invention; Fig. 2 is a sectional view taken along line 2—2 of Fig. 3 illustrating an embodiment of my improved current collector; Fig. 3 is a side elevational view partly broken away, of a dynamo-electric machine end shield provided with an embodiment of my improved current collector; and Fig. 4 is a perspective view of the embodiment of my improved contact brush shown in Figs. 2 and 3.

Referring to the drawing, I have shown an embodiment of my improved electric current collector mounted in an end shield 10 of a dynamo-electric machine and adapted to supply current to a commutator 11 schematically illustrated by a dotted line in Fig. 2. The current collector includes a plurality of contact brushes to which current is supplied from a source of electric power supply through a terminal stud 12 mounted in the end shield 10 and supported therein by a pair of electrically insulating bushings 13 and 14 arranged in openings in the end shield 10. The terminal stud 12 is held in position by a nut 15 which threadedly engages the outer end 16 thereof and by a cotter pin 17 which extends through the stud 12 on the inner side of the bushing 14. The source of electric power supply is adapted to be connected to the stud 12 by securing a terminal to the threaded end 16 thereof, and current is supplied from the stud 12 to a contact brush through a pigtail or flexible electrical conductors 18 formed of four braids of electrically conductive material which are secured to a brush contact element 19 by a terminal plate or cap 20 arranged over one end of the contact element 19. The contact element 19 may be made of any suitable material, such as silver-graphite, and the pigtail 18 forms a good electrical contact with the terminal plate 20 by being welded to the outer side thereof. The end of the pigtail 18 opposite the contact element 19 is provided with a pair of flexible clamping fingers 21 which are secured to the braided conductors of the pigtail 18 by any suitable means, such as a rivet 22, and the ends thereof are secured to the pigtail 18 as by soldering along the outer edges thereof. These fingers 21 are formed with curved central portions, and the outer ends are flared apart, so that the inner surfaces of the braids of the pigtail 18 within the curved portions of the fingers 21 are formed on a smaller diameter than the diameter of the terminal stud element 12. Good electrical contact is formed between the terminal stud 12 and the pigtail 18 by merely pushing the fingers 21 over the stud 12 to clampingly secure the pigtail to the stud. In some installations the vibration may require a more secure contact between the pigtail 18 and the stud 12 and this may be obtained by providing a terminal plate 23 soldered or otherwise suitably secured to the outer ends of the pigtail 18 and secured to the terminal stud 12 by a screw as shown in Fig. 1.

The brush contact element 19 is adapted to be biased into good electrical contact with the commutator 11 by a coil spring element 24 which is loosely arranged about a mounting stud 25 supported by insulating bushings 13 and 14 in openings in the end shield 10. An end 26 of the spring 24 is adapted to press against the contact element 19 and is bent angularly over a transversely extending pressure plate portion 27 of a U-section pressure finger member 28. Each of the two side portions of the pressure finger 28 is formed with an opening therein arranged over the supporting stud 25 to provide a pivotal mounting for the pressure finger on this stud. Pressure is applied to the pressure plate portion 27 of the finger by the spring 24 and to the brush 19 for biasing the brush toward the commutator through a spherical or rounded surface pressure contact point element 29 which permits the brush to move or rock in all directions to follow the commutator surface very closely. This contact point 29 is located substantially so that the force resulting from the radial reaction of the commutator against the brush combined with the frictional drag on the brush due to the rotation of the commutator, referred to the cen-

ter of the brush, passes substantially through the point of contact 29, as indicated in Fig. 2. This places the contact point 29 slightly to one side of the center of the pressure plate 27 toward the trailing edge of the brush, as the average coefficient of friction is equal to the tangent of the angle x which determines the location of the point 29 as explained. With this arrangement the brush exerts substantially uniform pressure against the commutator at both the leading and trailing edges and will have an essentially even rate of wear. This is possible mainly because of the relatively short brush. The pressure of the spring 24 is obtained by engagement of the outer end 30 of the spring 24 with a curved end 31 of a supporting spring 32, which is loosely mounted about the terminal stud 12. In order to prevent the passage of current through the springs 32 and 24, an insulating sleeve 33 is arranged over the curved end 31 of the spring 32 to insulate these two springs from each other. The contact element 19 is held in its desired position with respect to the pressure finger 28 by a pair of locating pins 34 arranged one on each side of the braided pigtail element 18 and secured to the contact element 19 by being affixed to the upper side of the terminal plate 20. These pins 34 are adapted to extend through openings 35 formed in the pressure plate 27 of the pressure finger member 28.

When it is desired to inspect or replace a contact brush member, the pressure finger 28 may be lifted to the position shown in the dotted lines in Fig. 2, and an inturned end 36 of the spring 32 away from the insulated end 31 may be hooked under a tab 37 formed on the outer edge of the pressure plate 27 to hold the pressure finger away from the commutator. This construction provides a contact brush which may be very readily replaced or removed for inspection merely by lifting the pressure finger 28 as stated above, which releases the pins 34 from the socket holes 35 in the pressure finger, and disconnecting the end of the pigtail 18 which is clamped about the terminal stud 12 merely by exerting a slight pull on the pigtail or by unscrewing the terminal 23 from the stud 12. A brush also may be very easily placed in position by merely snapping the clamped end 21 of the pigtail 18 over the terminal stud 12 or screwing the terminal 23 to the stud and then placing the contact element 19 in position on the commutator with the pins 34 arranged in sockets 35 of the pressure finger 28.

While I have illustrated and described particular embodiments of my invention, modifications thereof will occur to those skilled in the art. I desire it to be understood, therefore, that my invention is not to be limited to the particular embodiments disclosed, and I intend in the appended claims to cover all modifications which do not depart from the spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. An electric current collector including a contact element, a flexible electrical conductor having one end thereof secured to said contact element, a pair of locating pins secured to said contact element arranged one on each side of said flexible electrical conductor, and resilient contact element biasing means including a spherical contact surface pressure element slightly on the trailing side of the center of said contact element providing for movement of said contact element about said spherical surface and for biasing said contact element toward a current collecting member.

2. An electric current collector including a pressure finger, a contact element, a terminal plate secured to said contact element at one end thereof, a pair of locating pins arranged on said terminal plate for cooperation with said pressure finger to locate said contact element relative to said pressure finger, means including a spherical contact surface on said pressure finger providing for movement of said contact element about said spherical surface, and resilient means for exerting a biasing pressure on said contact element by said pressure finger through said spherical surface.

3. An electric current collector including a pressure finger, a contact element, a terminal plate secured to said contact element at one end thereof, a flexible electrical conductor having one end thereof secured to said contact element by means of said terminal plate, a pair of locating pins arranged on said terminal plate one on each side of said flexible electrical conductor for cooperation with said pressure finger to locate said contact element relative to said pressure finger, and means including a spherical contact surface on said pressure finger slightly on the trailing side of the center of said terminal plate providing for movement of said contact element about said spherical surface.

4. An electric current collector including a pressure finger having a pair of pin openings therein, a contact element, a terminal plate secured to said contact element at one end thereof, a flexible electrical conductor having one end thereof secured to said contact element by means of said terminal plate, a pair of locating pins arranged on said terminal plate one on each side of said flexible electrical conductor and extending through said openings in said pressure finger to locate said contact element relative to said pressure finger, means including a spherical contact surface on said pressure finger providing for movement of said contact element about said spherical surface, and resilient means for exerting a biasing pressure on said contact element by said pressure finger through said spherical surface.

MAX R. HANNA.