

May 27, 1924.

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1,495,657

CURRENT COLLECTING DEVICE

Filed Feb. 20, 1923

Fig. 1.

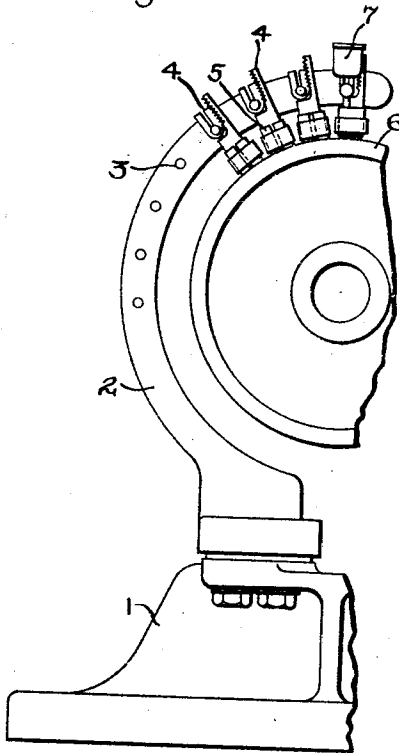


Fig. 2.

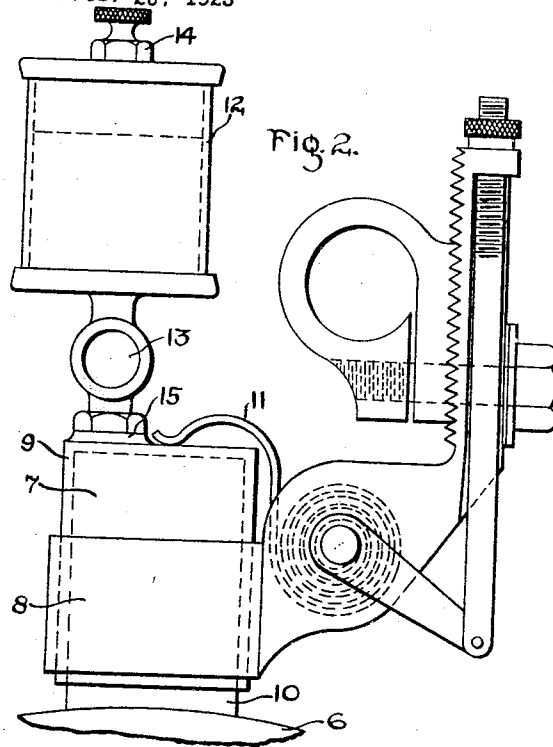
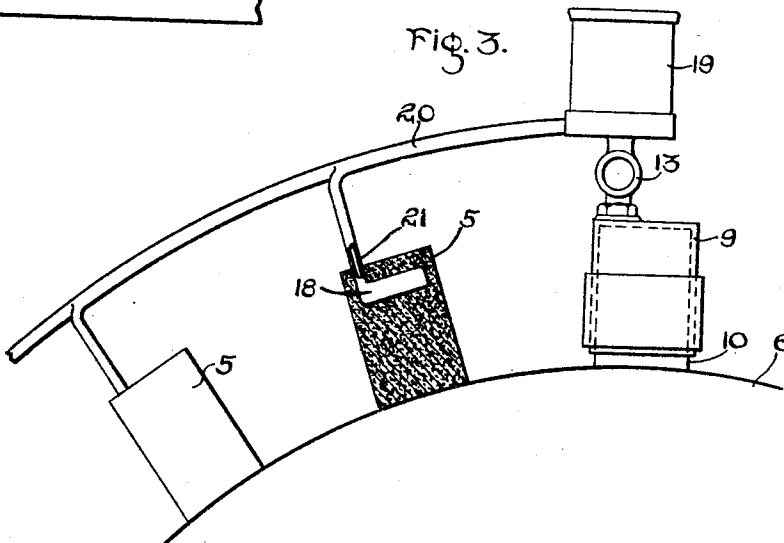


Fig. 3.



WITNESSES:

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CURRENT-COLLECTING DEVICE.

Application filed February 20, 1923. Serial No. 620,121.

To all whom it may concern:

Be it known that I, CHARLES F. WAGNER, a citizen of the United States, and a resident of N. S. Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Current-Collecting Devices, of which the following is a specification.

My invention relates to current collecting devices and it has for its object to reduce the wear in brushes used in electrical machines and more particularly in brushes co-operating with slip-rings.

In the course of extensive investigations concerning collector-ring and brush wear, it has been found that the current distribution over the bearing surface of a brush is far from uniform, particularly in the case of solid metal-graphite brushes commonly used. To cite a particular case, a brush was divided into four equal insulated sections by means of mica strips parallel to the shaft and it was found that one of the sections at times took as much as 90% of the total current of the brush. The current distribution was quite erratic and spasmodic. When it is considered that brushes are commonly operated in commercial machines, at current densities as high as 200 amperes per square inch, assuming perfect contact over the entire surface, the harmful consequences attendant upon unequal current distribution may readily be perceived.

Recent tests have proved that the principal cause of imperfect contact between a brush and a collector-ring is a wedge-shaped air film or cushion which is formed by the rotation of the ring carrying an adhering layer of air, which is dragged under the brush. The wedge-shaped film under the brush forces the current into the trailing end of the brush and causes sparking at the leading end.

The object of my invention is to provide a current collecting device securing uniform current distribution under the brush by eliminating the wedge-shaped air film and replacing it with a pliable conducting layer, which at the same time reduces the abrasive action of the sliding surfaces to a minimum.

In the accompanying drawing,

Figure 1 is an end elevation of a portion of a rotary converter or other dynamo-electric machine, illustrating a current-collect-

ing device embodying my invention in a preferred form;

Fig. 2 is a more detailed view of the lubricating device of Fig. 1;

Fig. 3 is a view of a portion of a current-collecting device showing a modified form of my invention.

Upon a base portion 1 of a rotary converter or other machine is mounted a standard 2 that is provided with a plurality of outwardly extending studs 3 with attached brush holders 4 for maintaining brushes 5 in engagement with a slip-ring 6.

One of the brush holders, which may be of standard construction, is provided with a lubricating member 7 in place of a brush, as is shown in detail in Fig. 2. The brush holder, which is adapted to receive the lubricating member 7, comprises a box 9 and a felt pad 10 within the box co-operating with the collector ring, under a pressure exerted by a spring 11. An oil cup 12 with a sight gauge 13 and an oil-flow adjustment 14 is in threaded engagement with the top 15 of the box, and supplies lubricating oil to the surface of the slip-ring by means of the felt pad 10.

In operation, the oil is admitted at a proper rate to combine with dust composed of fine particles rubbed off of the brushes and collector ring, producing a conducting paste under each of the brushes. The brushes are thus, in effect, provided with a pliable contact surface, and the trouble arising from the wedge-shaped air-film is entirely avoided. At the same time, the abrasive wear is reduced to a minimum.

I have found that the brush wear in current-collecting devices embodying my invention averages .002 inches per hundred-hours run at a current density of 200 amperes per square inch, against an average wear of .004 inches in collecting devices of the usual type.

In Fig. 3, is shown a modified form of my invention comprising a collector ring 6 and a plurality of brushes 5, each of said brushes being impregnated with oil supplied from a distributing chamber 18 within the brush, the several distributing chambers being connected to a common oil reservoir 19 by means of a piping system 20. Individual branches of the piping system terminate in openings 21, leading to the individual distributing chambers 18 in the brushes.

Instead of employing one central oil reser-

voir, it is obvious that individual oil supplies may be utilized. Furthermore, it is possible for the oiling pad and the impregnated brushes to be employed either separately or together, their combined use being indicated in Fig. 3. The essential feature of my invention is that enough oil shall be supplied to prevent the formation of the wedge-shaped air film hereinbefore mentioned, and to provide a good conducting paste or mixture at the contacting surfaces of the brushes and the slip ring.

Various other changes may be made without departing from the spirit of my invention and it is my desire that the accompanying claims shall be construed to cover all modifications which are fairly comprehended by the language thereof.

I claim as my invention:

1. A current-collecting device, comprising a collector ring, a solid brush member co-operating therewith, and means for producing a pliable conducting layer between the collector ring and the bearing surface of the brush member.

2. A current-collecting device, comprising a revolving collector ring, a solid brush member co-operating therewith, and oil-saturated electrically non-conducting means positively contacting with said collector ring, adapted to produce a pliable conducting oily layer between the collector ring and the bearing surface of the brush member.

3. A current-collecting device, comprising a revolving collector ring, a solid non-flexible brush member co-operating therewith, and oil-saturated electrically non-conducting means contacting with said collector ring, adapted to produce a pliable conducting layer between the collector ring and said brush member, said layer consisting of particles of conducting material suspended in an oil film.

4. In a current-collecting device, the combination of a revolving collector ring, a solid brush member co-operating therewith, and an oil-saturated electrically non-conducting means positively contacting with said collector ring, adapted to apply a lubricating material to the surface of said collector ring, in such quantities as to combine with rubbed-off particles of said collector ring and said brush member and thereby form a conducting pliable oily layer under the surface of the brush member.

5. In a current-collecting device, the combination of a revolving slip-ring, a brush member co-operating therewith, and a lubricating device comprising an oil-saturated electrically non-conducting pad-like member, positively contacting with, and rubbing on said slip-ring, adapted to produce a pliable oily conducting layer between the col-

lector ring and the bearing surface of the brush member.

6. In a current-collecting device, the combination of a revolving slip-ring, a brush member co-operating therewith, and a lubricating device, comprising an oil-saturated electrically non-conducting pad-like member, contacting with the surface of said slip-ring and adapted to apply oil thereto, and a holder encasing and adjustably holding said pad-like member with a yielding contact against said slip-ring.

7. In a current-collecting device, the combination of a revolving slip-ring, a solid brush member co-operating therewith, and a lubricating device comprising an oil-saturated electrically non-conducting pad-like member in rubbing contact with the peripheral surface of said slip-ring and adapted to apply oil thereto, a holder encasing and adjustably holding said pad-like member with a yielding contact against the peripheral surface of said slip-ring, and an oil container adapted to supply oil to said pad-like member in such quantities as will combine with rubbed-off particles of said slip-ring and said brush member, to form a conducting pliable layer under the bearing surface of said brush member.

8. In a current-collecting device, the combination of a slip-ring, a solid brush member cooperating therewith and contacting with the peripheral surface thereof, means for impregnating said brush member with oil, an oil distributing device for supplying oil to said impregnating means, and an auxiliary lubricating device comprising an oil-saturated electrically non-conducting pad-like member in rubbing contact with the peripheral surface of said slip ring, adapted to apply oil thereto, and a holder encasing and adjustably holding said pad-like member in yielding contact against the peripheral surface of said slip-ring.

9. In a current-collecting device, the combination of a revolving slip-ring, a solid brush member contacting with the peripheral surface of said slip-ring, said brush member having a closed oil chamber therein, an independent oil-supply reservoir and means for connecting said chamber to said reservoir, adapted to permit a flow of oil from said reservoir to said chamber, said chamber being adapted to distribute oil throughout said brush member and to the contacting end thereof by percolation, thereby forming a pliable conducting layer between the periphery of the slip-ring and the contacting end of the brush member.

In testimony whereof, I have hereunto subscribed my name this 5th day of February 1923.

CHARLES F. WAGNER.