

BRUSH STAGGER on COMMUTATORS

In order that the copper wear resulting from the brush friction may be uniform on the whole surface of a commutator, it would be necessary that the covering rate of the brushes be the same on all parts during the full rotation.

This is a theoretical condition and, in fact, it is not workable. However, there is a quite satisfying solution which is to stagger the brushes laterally and by pairs, with a distance of $a/2$, according to the *Fig. 1* below:

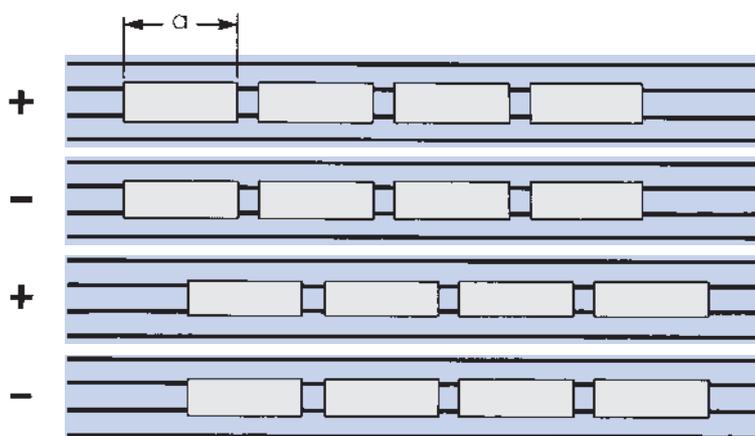


Fig. 1

By this method, the intervals between the brushes, for each pair of lines, are covered systematically by the brush pairs of the following and preceding lines.

On the other hand, in placing in the same track two brushes successively positive and negative, in order that each track may be covered by an equal number of brushes for each polarity, a frequent cause of apparition of stripes on the commutators is suppressed.

This ordering of brushes on the commutator surface is called **staggering** or axial or lateral staggering. It can always be done except in special cases of amplidynes here after. But this operation, easy to make, can be undertaken only on new commutators or renovated by the usual ways of grinding (lathe, grinding wheels, abrasive stone, etc...) according to the Technical Note STA AE 16-16.

On long commutators or underload machines, on which brushes have been suppressed to readjust the charge in the brushes remaining, the pairs of lines can be staggered symmetrically by $a/2$ on each side of a middle line to cover the whole commutator.

This ordering, advisable on machines with at least 8 poles, corresponds to the Fig. 2 below, which represents the remaining brushes.

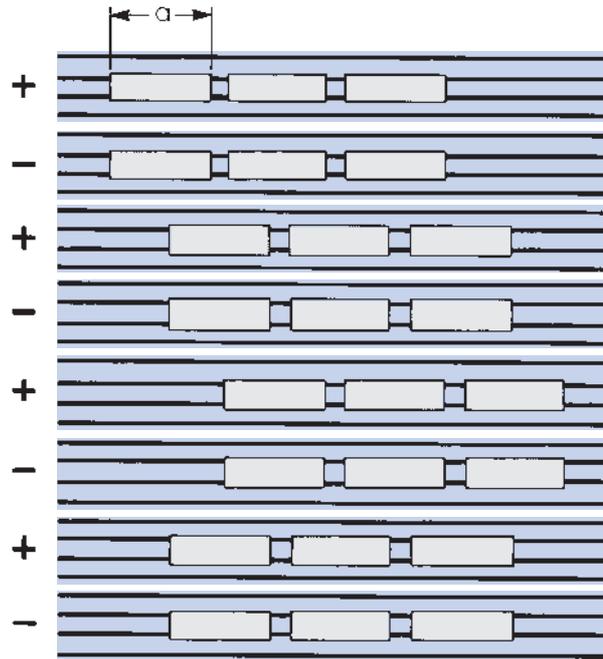


Fig. 2

Note: The same recommendation may be made for machines with brushes staggered tangentially (overlapping).

PARTICULAR CASE of the AMPLIDYNES

The amplidyne (or similar type of machines) is a generator designed to amplify a current with a greatly reduced time response.

Its principle relies essentially on the effect of armature inductive reactance in a machine the magnetic circuit of which is well below saturation.

In practice, the amplidyne is presented in the form of a bi-pole generator with four brush arms as shown in Fig. 3 below:

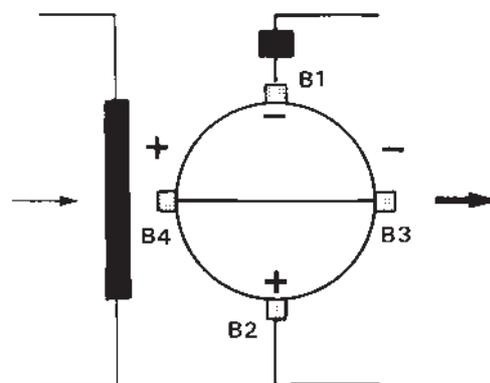


Fig. 3

- two brush-arms B1 B2, connected to the external circuit, are placed on the collector, perpendicularly to the axis of the main poles of the machine.
- two brush-arms B3 B4 are in quadrature with B1 B2 and are short circuited.

It follows that with this connection the polarities are not alternated around the commutator as for standard generators; on amplidynes the brush arms are grouped in pairs as shown in *Fig. 1*.

As a result, the normal rules for brush stagger (as explained in STA n° 9 F) do not apply here.

In the particular case of the amplidyne, it is advisable to stagger the arms alternately as shown in *Fig. 4* and not in pairs as for standard machines.

With this arrangement the area swept by the brushes should be uniformly worn.

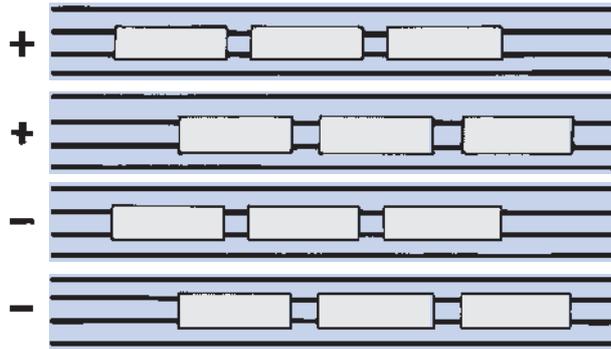


Fig. 4

Note also that the amplidyne with its very special working conditions (short, heavy current impulses and long periods of no load running) imposes difficulties for brush operation. Experience has shown that the Electrographitic sandwich brushes "grey" which usually have a good skin control are well adapted to this application.

We recommend our S - EG 34 D and S - EG 389 P grades for amplidynes.





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LE CARBONE-LORRAINE
Applications Electriques
10, RUE ROGER DUMOULIN
F-80084 AMIENS Cedex 2
FRANCE

R.C.S. Nanterre B 572 060 333

SIEGE SOCIAL : Immeuble La Fayette - LA DÉFENSE 5
TSA 38001
F-92919 PARIS LA DÉFENSE CEDEX
FRANCE

Tél. : + 33 (0)3 22 54 45 00
Fax : + 33 (0)3 22 54 46 08

<http://www.CARBONELORRAINE.com>