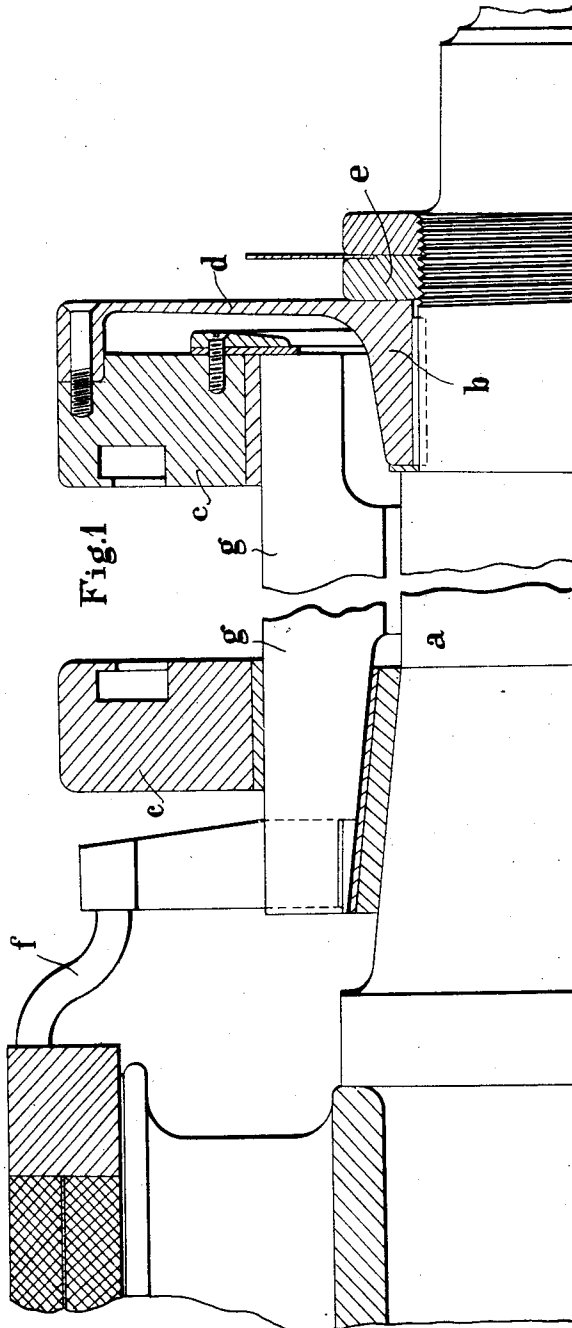


C. A. PARSONS & A. H. LAW.
 COMMUTATOR FOR DYNAMO ELECTRIC MACHINES.
 APPLICATION FILED APR. 19, 1909.

998,386.

Patented July 18, 1911.

5 SHEETS—SHEET 1.



ATTEST

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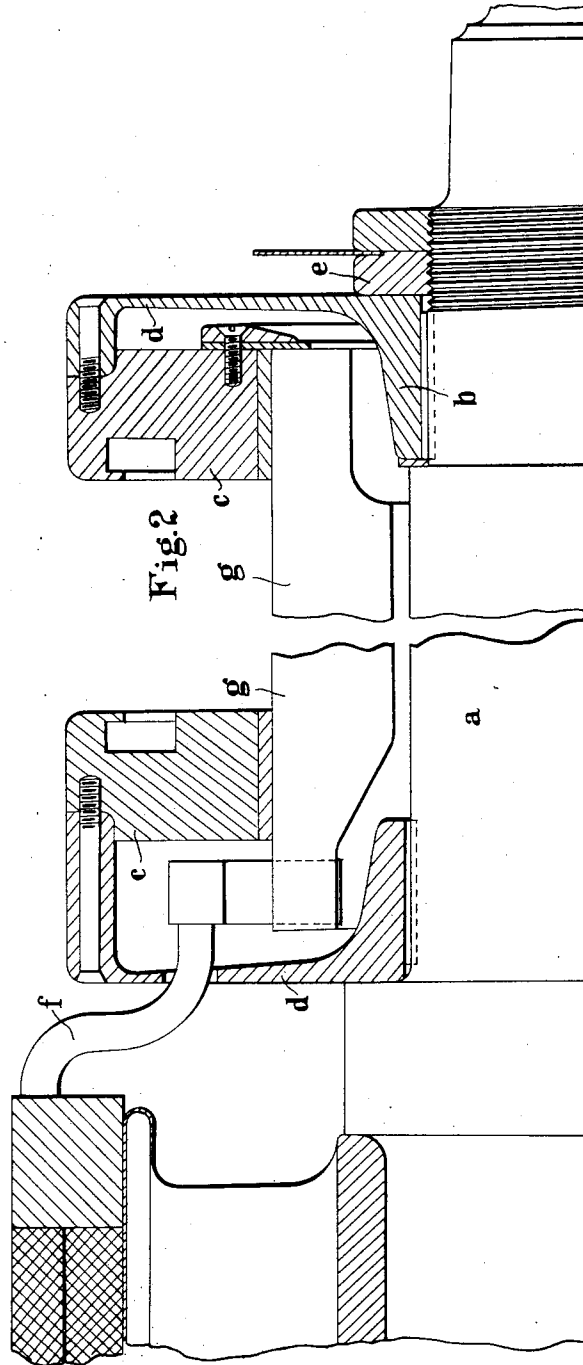
By Spear, Middleton, Donaldson & Spear
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5 SHEETS—SHEET 2.



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5 SHEETS—SHEET 3.

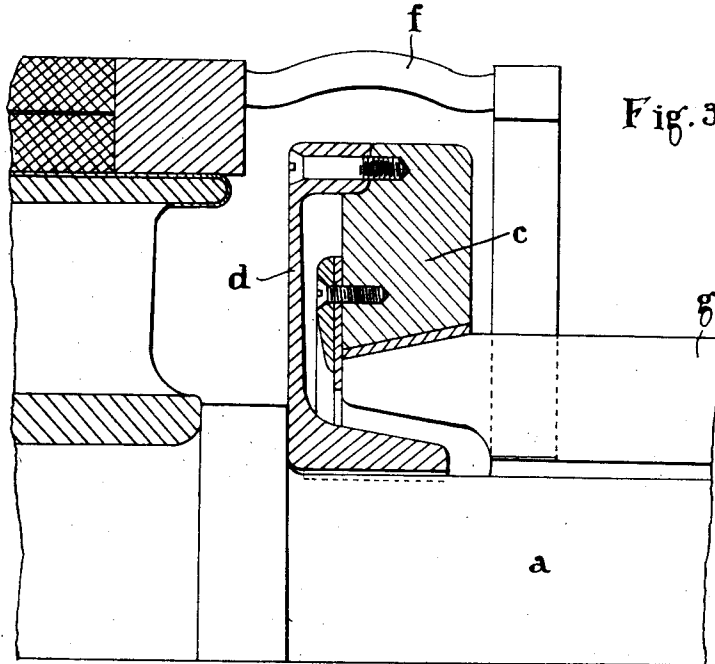


Fig. 3.

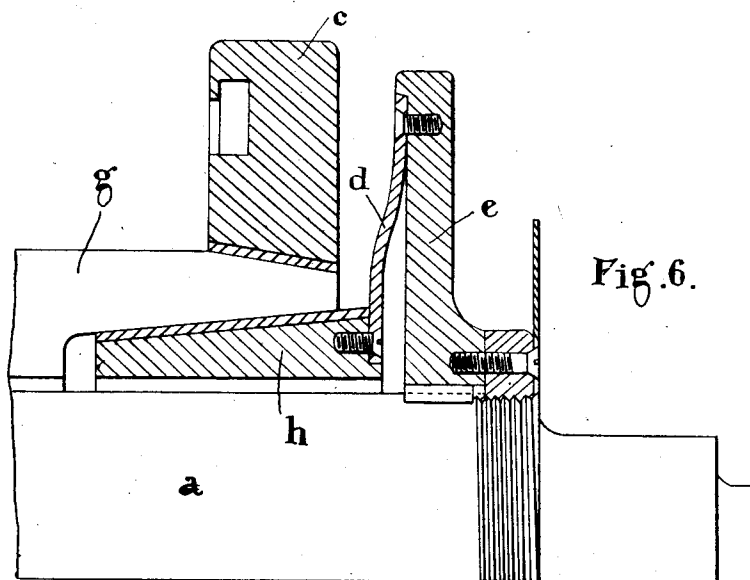


Fig. 6.

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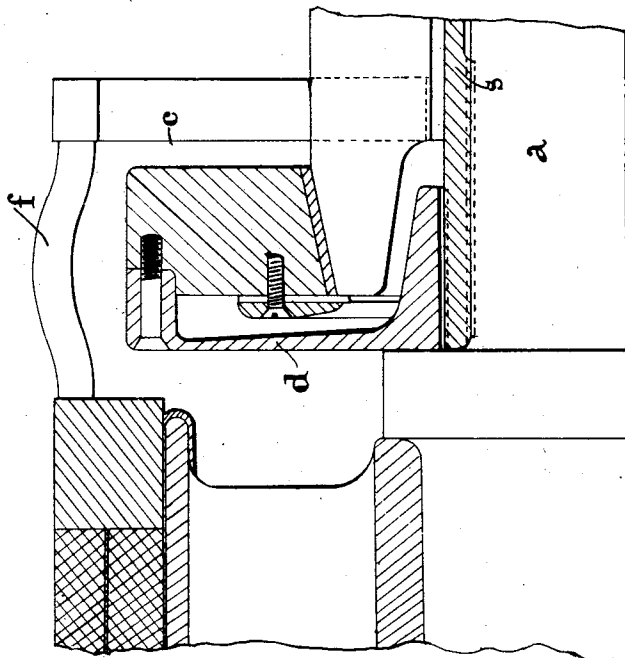
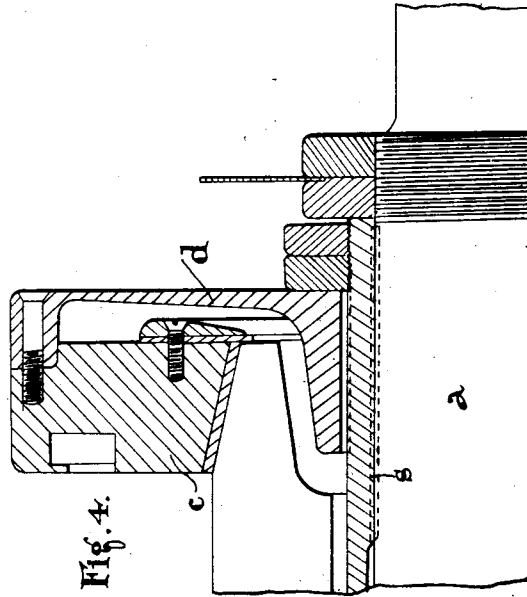
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 APPLICATION FILED APR. 19, 1909.

998,386.

Patented July 18, 1911.

5 SHEETS—SHEET 4.



ATTEST.

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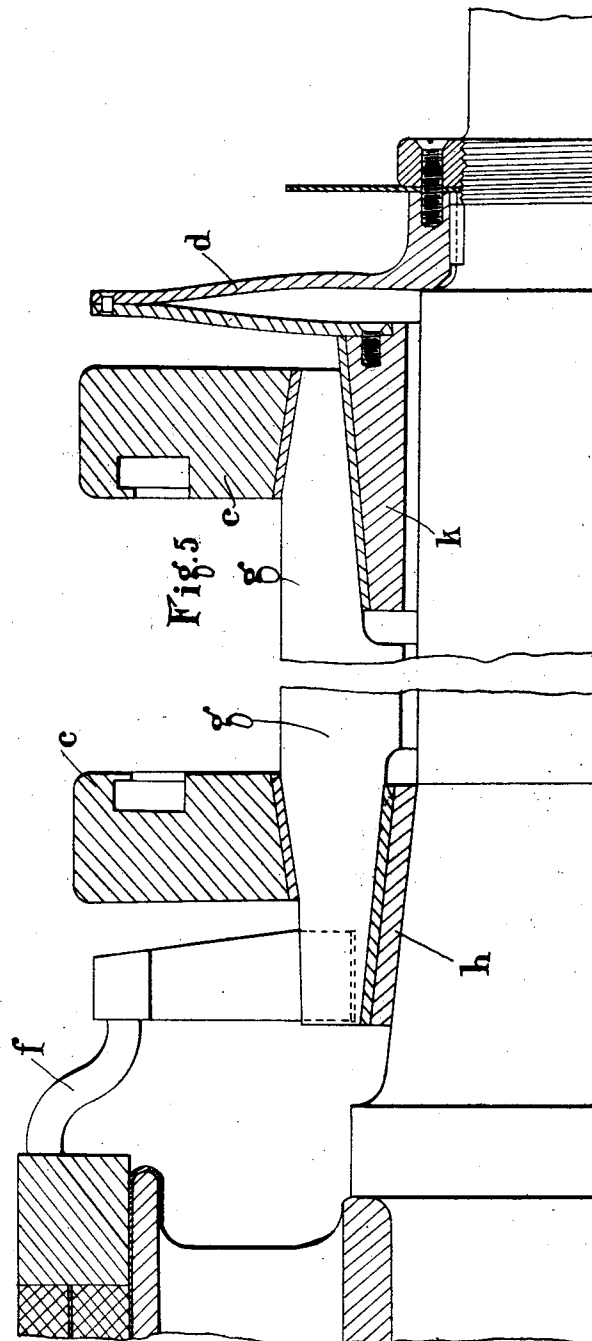
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5 SHEETS—SHEET 5.



ATTEST.

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UNITED STATES PATENT OFFICE.

CHARLES ALGERNON PARSONS AND ALEXANDER HENRY LAW, OF NEWCASTLE-UPON-TYNE, ENGLAND; SAID LAW ASSIGNOR TO SAID PARSONS.

COMMUTATOR FOR DYNAMO-ELECTRIC MACHINES.

998,386.

Specification of Letters Patent. Patented July 18, 1911.

Application filed April 19, 1909. Serial No. 490,933.

To all whom it may concern:

Be it known that we, CHARLES ALGERNON PARSONS and ALEXANDER HENRY LAW, subjects of the King of Great Britain and Ireland, residing at Heaton Works, Newcastle-upon-Tyne, in the county of Northumberland, England, have invented certain new and useful Improvements in and Relating to Commutators for Dynamo-Electric Machines, of which the following is a specification.

This invention relates to supports for commutators of dynamo electric machines.

It has been found that with large dynamo electric machines and particularly those running at high speeds it is a difficult matter to support the commutator in such a way as to allow of free expansion and at the same time to prevent all danger of the commutator becoming loose on its supports and causing vibration. Many arrangements have been proposed for the purpose of allowing longitudinal expansion of the commutator relatively to the shaft, for instance, coned supports held in position by nuts with or without springs or the like. Owing to the small amount of movement caused by the expansion these sliding surfaces are very liable to jam or otherwise become fast owing to dirt, rust or other causes, thus causing the shaft to bend; or on the other hand it has been found that in some cases the sliding surfaces are apt to wear and become so loose that there is a certain amount of play between the two surfaces with the result that the commutator runs out of true and causes vibration.

The object of the present invention is to support the commutator or other part to which the invention is applied in such a manner that it can expand without danger of jamming or becoming loose or throwing undue stresses on the shaft.

The invention consists in providing means for allowing the commutator bars held by appropriate anti-centrifugal means to expand longitudinally without the use of sliding metallic surfaces, by supporting one or both ends on a suitable structure other than said anti-centrifugal means which possesses considerable strength radially and is capable of deformation in an axial direction, the axially elastic portion of the structure being relieved from all centrifugal stresses.

The invention consists more specifically in supporting one or both ends of the commutator on which the bars are held concentrically by shrinking rings by a comparatively thin diaphragm rigidly connected to the shaft on which the commutator is carried.

The invention further consists in the improved forms of commutator hereinafter described.

Referring to the accompanying drawings:—Figures 1 to 6 show sections of commutators mounted according to this invention.

In carrying the invention into effect according to one modification the commutator bars are disposed around the armature shaft in the usual manner, insulation being placed between the rings and the commutator bars.

As shown in Fig. 1 on the outer end of the shaft, *a*, there is provided a steel diaphragm, *d*, on a strong hub, *b*, which is threaded over the armature shaft and keyed thereon. The diaphragm, *d*, is bolted or otherwise attached firmly to the outer one of the anti-centrifugal rings, *c*, shrunk or fitting on the commutator bars, *g*, and thus supports the outer end of the commutator. The hub of the diaphragm is held in position by means of a nut, *e*, preferably so placed as to exert a constant pressure on the commutator toward the armature windings. The inner end of the commutator may be similarly supported by a diaphragm with holes in it to pass the commutator connections as shown in Fig. 2 or the connections may be carried outside the diaphragm as in Fig. 3, or the commutator may be supported on a cone in the usual way. The flexible diaphragm or diaphragms may be mounted on a sleeve, *s*, threaded and keyed on to the shaft as shown in Fig. 4, inside the commutator at one or both ends so as not to bend the shaft under any circumstances.

According to the modification of this invention shown in Fig. 5 the commutator bars are held axially by cones, *h*, *k*, the cone, *h*, at the inner end of the commutator being formed on the armature shaft while the cone, *k*, at the outer end of the shaft is attached to a diaphragm so that it is capable of longitudinal motion, insulation being placed between the commutator bars and the cones. The diaphragm may be either single

or may be formed of a narrow V-shape in cross section so that both sides are to a certain extent flexible, or if desired the diaphragm may be firmly mounted at its edges
 5 on a strong metal plate *e*, threaded on the armature shaft as shown in Fig. 6, the cones in this case being attached firmly to the central part of the diaphragm. As in the former case if preferred both cones may be
 10 supported by flexible diaphragms. The cones may be either single or double ones as may be preferred and either internal or external to the commutator.

It will be obvious that combinations of the
 15 above described arrangements may be made and that the details of construction may be varied considerably, the main advantages of the structures described being that the commutator bars and shrink rings together form
 20 a self-contained unit in itself resistant to centrifugal forces which unit can be handled or otherwise dealt with as one piece; and which, with or without additional coned supports internal to the commutator bars, is
 25 hereinafter referred to as a commutator shell the functions of resisting the centrifugal force on the bars and of elastically connecting the bars to the shaft being moreover to a certain extent antagonistic, are in-
 30 trusted to separate members or parts, each designed suitably for the particular function performed.

Having now described our invention what we claim as new and desire to secure by Letters Patent is:—

35 1. In combination a shaft, a self-contained commutator shell composed of members including an operative set of commutator bars and anti-centrifugal means co-acting there-
 40 with together with separate means for connecting said shell to said shaft said means including a member elastic longitudinally of said shaft said member being rigidly attached on the one hand to said shell and on
 45 the other to said shaft.

2. In combination a shaft, a self-contained commutator shell composed of members including an operative set of commutator bars and shrink rings co-acting therewith to-
 50 gether with separate means for connecting said shell to said shaft said means including a member elastic longitudinally of said shaft said member being rigidly attached on the one hand to said shell and on the other to
 55 said shaft.

3. In combination a shaft, a self-contained commutator shell composed of members including an operative set of commutator bars and anti-centrifugal means co-acting there-
 60 with together with separate means for connecting said shell to said shaft said means including a resilient disk said disk being rigidly attached on the one hand to said shell and on the other to said shaft.

65 4. In combination a shaft, a self-contained

commutator shell composed of members including an operative set of commutator bars and anti-centrifugal means co-acting there-
 70 with together with separate means for retaining said shell co-axial with said shaft said means including a member elastic longitudinally of said shaft said member being rigidly attached on the one hand to said shell and on the other to said shaft.

5. In combination a shaft, a self-contained
 75 commutator shell composed of members including an operative set of commutator bars and shrink rings co-acting therewith together with separate means for retaining said shell co-axial with said shaft said means
 80 including a member elastic longitudinally of said shaft said member being rigidly attached on the one hand to said shell and on the other to said shaft.

6. In combination a shaft, a self-contained
 85 commutator shell composed of members including an operative set of commutator bars and anti-centrifugal means co-acting therewith together with separate means for retaining said shell co-axial with said shaft
 90 said means including a resilient disk said disk being rigidly attached on the one hand to said shell and on the other to said shaft.

7. In combination a shaft, a self-contained
 95 commutator shell composed of members including an operative set of commutator bars, anti-centrifugal means co-acting therewith and a coned support internal to said bars together with separate means for connecting
 100 said shell to said shaft said means including a member elastic longitudinally of said shaft said member being rigidly attached on the one hand to said shell and on the other to said shaft.

8. In combination a shaft, a self-contained
 105 commutator shell composed of members including an operative set of commutator bars, anti-centrifugal means co-acting therewith a coned support for one end of said shell separate means for connecting the other end
 110 of said shell to said shaft said means including a member elastic longitudinally of said shaft said member being rigidly attached on the one hand to said shell and on the other to said shaft.

9. In combination a shaft, a self-contained
 115 commutator shell composed of members including an operative set of commutator bars, anti-centrifugal means co-acting therewith a coned support for one end of said shell separate means for connecting the other end
 120 of said shell to said shaft said means including a member elastic longitudinally of said shaft said member being rigidly attached on the one hand to said shell and on the other to said shaft.

10. In combination a shaft, a self-contained
 125 commutator shell composed of members including an operative set of commutator bars and anti-centrifugal means co-acting
 130

therewith together with separate means for
connecting said shell to said shaft said means
including a resilient disk and a rigid sup-
port therefor mounted on said shaft and
5 rigidly attached to the circumference of said
disk said disk being attached also rigidly to
said shell.

In testimony whereof, we affix our signa-
tures in presence of two witnesses.

CHARLES ALGERNON PARSONS.

ALEXANDER HENRY LAW.

Witnesses:

FREDERICH JORDON HAY BEDFORD,

WILLIAM SHEARER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."
