(No Model.) 2 Sheets—Sheet 1.

W. D. SANDWELL.

DYNAMO ELECTRIC MACHINE.

No. 405,507. Patented June 18, 1889.

Fig. 1.

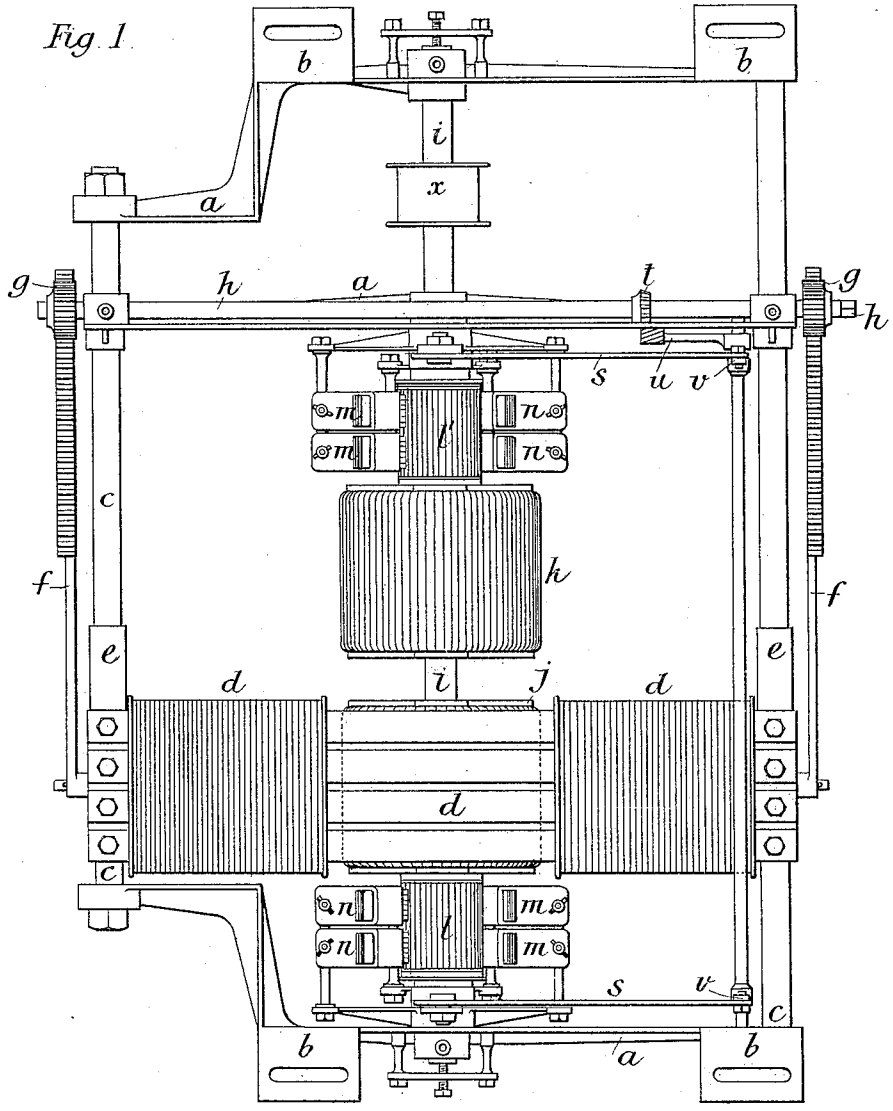
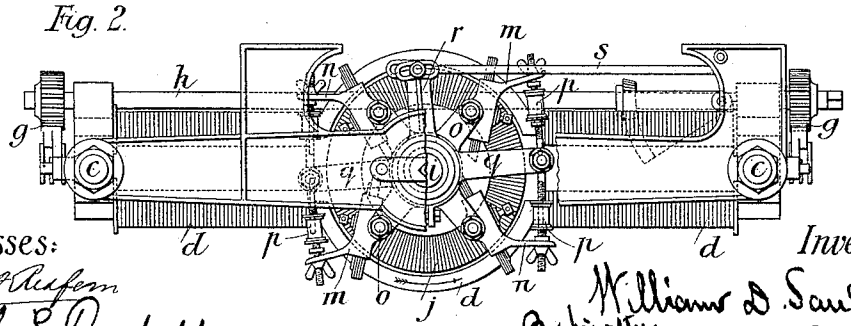


Fig. 2.



Witnesses:

G. Ruffem

John E. Bousfield.

Inventor:

William D. Sandwell

By his attys

White Rw + Prosch

N. PETERS. Photo-Lithographer, Washington, D. C.

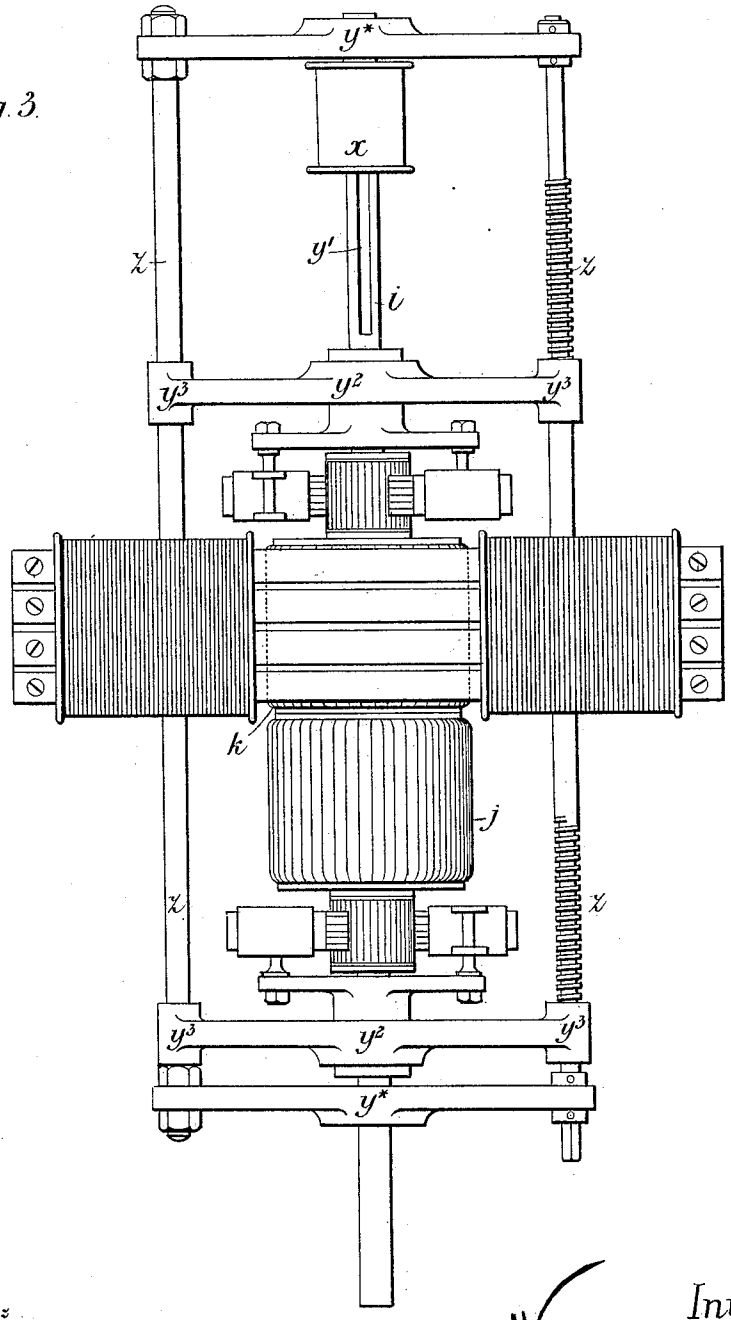
(No Model.) 2 Sheets—Sheet 2.

W. D. SANDWELL.

DYNAMO ELECTRIC MACHINE.

No. 405,507. Patented June 18, 1889.

Fig. 3.



Witnesses:
G. J. Redfern
John E. Bousfield.

Inventor:
William D. Sandwell.
By his attys
Whittaker & Prevost

N. PETERS, Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

WILLIAM DANTON SANDWELL, OF HERNE HILL, COUNTY OF SURREY, ENGLAND.

DYNAMO-ELECTRIC MACHINE.

SPECIFICATION forming part of Letters Patent No. 405,507, dated June 18, 1889.

Application filed February 13, 1889. Serial No. 299,744. (No model.) Patented in England October 25, 1887, No. 14,542; in Germany March 14, 1888, No. 45,153; in Belgium March 30, 1888, No. 81,241; in France March 31, 1888, No. 189,706; in Italy June 30, 1888, XXII, 23,317, XLVI, 392; in Spain July 13, 1888, No. 8,158; in Austria-Hungary August 9, 1888, No. 14,830 and No. 31,608, and in Canada February 14, 1889, No. 30,776.

To all whom it may concern:

Be it known that I, WILLIAM DANTON SANDWELL, a subject of the Queen of Great Britain, residing at Herne Hill, in the county of Surrey, England, have invented new and useful Improvements relating to Dynamo-Electric Machines and to Electric Motors, (for which Letters Patent have been granted to me as follows: in Great Britain, No. 14,542, dated October 25, 1887; in Germany, No. 45,153, dated March 14, 1888; in Belgium, No. 81,241, dated March 30, 1888; in France, No. 189,706, dated March 31, 1888; in Italy, Vol. XXII, No. 23,317, Vol. XLVI, No. 392, dated June 30, 1888; in Spain, No. 8,158, dated July 13, 1888; in Austria-Hungary, Nos. 14,830 and 31,608, dated August 9, 1888, and in Canada, No. 30,776, dated February 14, 1889,) of which the following is a specification.

My invention relates to dynamo-electric machines and to electric motors.

In using an electric motor it is well known that after a time the armature will become heated. For this reason two machines are frequently employed, so that after the armature of one machine has become heated it may be allowed to stand while it cools, the other machine being employed in the meantime. This arrangement, however, is disadvantageous, and chiefly for the reason that it is very expensive.

The chief object of my present invention is to obtain all the advantages of two machines at a lower cost than heretofore; and to this end it comprises the improvements as hereinafter described.

According to my said invention I employ two armatures in combination with one set of field-magnets, so that after one armature is heated it can be replaced by the other. In practice I find it very advantageous to move the magnets relatively to the armatures; but it is obvious that I can also move the armatures relatively to the magnets. The magnets or the armatures may be moved by any suitable means—for instance, by screw-gearing or by racks and pinions.

In addition to the advantages hereinbefore mentioned, the present invention possesses the further advantage that the armature which is not in use is not inclosed within the field-magnets, so that the air is free to circulate around the same, whereby the cooling takes place more rapidly than would otherwise be the case.

To enable my invention to be clearly understood, I will describe how it may be carried into practice by reference to the accompanying drawings, in which—

Figure 1 is a plan of a motor constructed according to my invention, and Fig. 2 is an end view of the same. Fig. 3 is a plan view illustrating the modification of my invention wherein the armatures are adapted to be moved relatively to the field-magnets.

a is the frame of the motor, which frame has brackets *b* (by means of which the motor can be suspended or upon which it is supported) and slide-bars *c*.

d d are the field-magnets, which at their ends are provided with sockets *e*, adapted to slide upon the bars *c*, and *f f* are rack-bars, which are connected with the said field-magnets and in engagement with rack-pinions *g g* on a shaft *h*, so that when the said shaft is rotated the field-magnets can be caused to slide upon the bars *c* in one or other direction, as desired.

i is the armature-shaft, which carries two armatures *j k*, the said shaft being supported in bearings in the frame *a*.

l l' are the commutators of the armatures *j k*, respectively, and *m m n n* are sets of brushes adapted to bear upon the same, the brushes *m m* being designed to make contact with their respective commutators when the armatures are rotating in one direction and the brushes *n n* when they are rotating in the opposite direction.

It will be noticed that each commutator has two sets of brushes in connection with it, so as to enable the armatures to be rotated in opposite directions, if desired; but it is obvious that only one set of brushes is necessary when rotation is only required in one direction. In case either armature becomes

incapacitated, the provision of two sets of brushes enables the remaining armature to be rotated in both directions.

In order to allow of placing one or other of the sets of brushes in contact with the commutators, as desired, the brushes *m m n n* of each commutator are mounted upon a four-armed bracket *o*, fixed to the frame of the machine, and extensions on the brush-carriers are connected by links *p p* to two arms *q q* of a three-armed lever having a slight rotary movement relatively to the shaft *i*. The other arm *r* of the said three-armed lever is connected with a rod *s*, through the medium of which the three-armed lever can be moved. When the rod *s* is moved in one direction, the brush-carriers and their brushes are caused to oscillate upon their pivots, thus moving one set of brushes into contact with the commutator and the other set out of contact, and vice versa.

The movement of the three-armed lever may be produced by any desirable means. As shown in the drawings, however, the movement is effected automatically at the same time that the field-magnets are being moved from one armature to the other. The movement in this case is effected through the medium of a pinion *t*, engaging with the tooth-sector *u*, secured to a shaft *u'*, upon which are fixed two levers *v*, attached at their free ends to the rods *s s* of the respective commutators.

The modification of my invention wherein the armatures and their shaft are movable relatively to the field-magnets is illustrated in Fig. 3. In this figure the armature-shaft is supported in bearings in the brackets y^*, and is connected with the driving-pulley *x* by means of a spline-joint *y'*. The armatures *j k* are mounted in a sliding frame y^2, having the extensions y^3, which slide upon the rods *z z*. One of these rods is screw-threaded, so that by rotating the same the sliding frame with the armature can be moved.

I would observe that I do not confine myself to the employment of any particular construction of armature and field-magnets, as such constructions may be varied as desired.

Although I have described my improvements as applied to electric motors, it is to be understood that they are also applicable to dynamo-electric machines.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. In an electric motor, the combination, with the field-magnets, of two armatures, the said magnets and armatures being the one movable with respect to the other, substantially as described.

2. In an electric motor, the combination, with the movable field-magnets, of two armatures for the same, substantially as described.

3. In an electric motor, the combination, with the field-magnets, of two armatures, the said magnets being movable longitudinally of the armature-shaft, substantially as described.

4. In an electric motor, the combination, with the field-magnets and two armatures for the same, said magnets being movable longitudinally of the armature-shaft, of a commutator for each armature, each commutator being provided with two sets of brushes, substantially as described.

5. In an electric motor, the combination, with the field-magnets and two armatures for the same, said magnets being movable longitudinally of the armature-shaft, of a commutator for each armature, each commutator being provided with two sets of pivoted brushes, the brushes of one set being connected to those of the other set, whereby a movement of one set into position withdraws the others, substantially as described.

WILLIAM DANTON SANDWELL.

Witnesses:
G. F. REDFERN,
JOHN E. BONSFIELD.