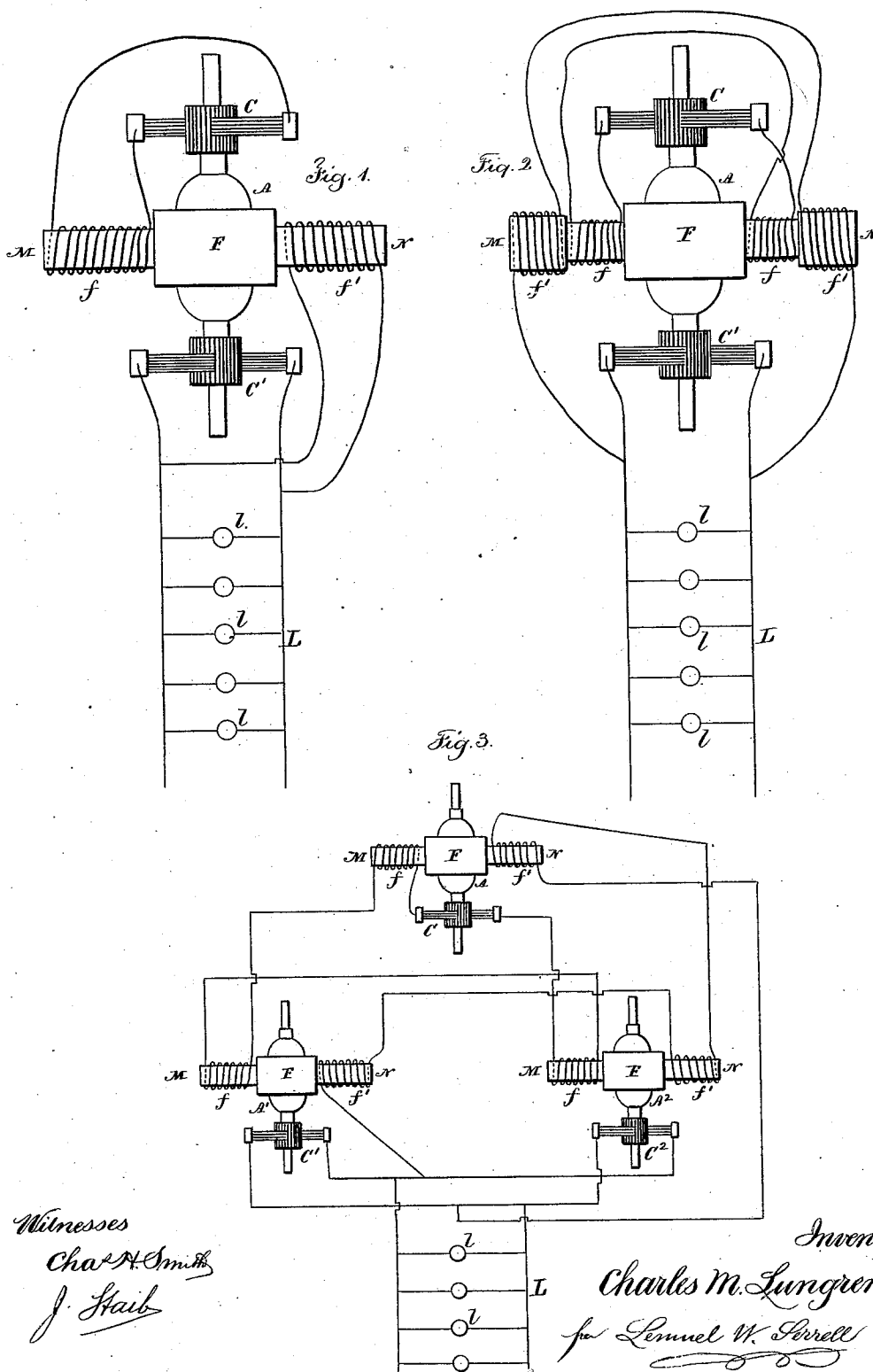


(No Model.)

C. M. LUNGREN.
DYNAMO ELECTRIC MACHINE.

No. 294,892.

Patented Mar. 11, 1884.



Witnesses

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UNITED STATES PATENT OFFICE.

CHARLES M. LUNGREN, OF NEW YORK, N. Y.

DYNAMO-ELECTRIC MACHINE.

SPECIFICATION forming part of Letters Patent No. 294,892, dated March 11, 1884.

Application filed November 22, 1882. Renewed August 14, 1883. (No model.)

To all whom it may concern:

Be it known that I, CHARLES MARSHALL LUNGREN, of the city and State of New York, have invented an Improvement in Dynamo-Electric Machines, of which the following is a specification.

With the ordinary dynamo-machine—that is, a machine in which field-magnets are placed in the working-circuit—the current generated varies in accordance with the variations in the resistances in the line-circuit when these resistances are arranged in multiple arc. In such a circuit—containing incandescent lamps, for instance—the resistance is increased when lamps are cut out, less current flows through the circuit, and the field is proportionally cut down. When lamps are added, the reverse takes place, the resistance decreasing and the current increasing. Such an arrangement has the disadvantage, however, that unless the external resistance is comparatively low the field-magnets will not become charged. In working with incandescent lamps of high resistance, therefore, quite a number must be in circuit before the machine will generate a current, and hence this arrangement is not satisfactory in operating such lamps. The field has therefore been heretofore placed in a shunt-circuit, and its strength varied in accordance with the demands in the working-circuit by inserting or removing resistance in this shunt-circuit. These resistances have been operated both by hand and by means of various devices operated by the current.

It is the object of my present invention to provide a dynamo-machine which will respond automatically to the variations of resistance in a multiple-arc working-circuit, so that the power required will be proportional to the work to be done. I accomplish this object by providing two distinct circuits around the cores of the field-magnets, as is done in the invention for which Letters Patent of the United States were granted to C. D. Haskins and myself July 11, 1882, No. 260,866; but I arrange the circuits so that the effect is the opposite of that there shown. One of these circuits is always closed, and constitutes one of the magnetizing-coils of the field. The other, instead of including the

lights or other working devices, as in the previous invention, is a shunt-circuit from the multiple-arc circuit, in which the lights or other working devices are placed. These opposed circuits, being for the purpose of varying the strength of the field in accordance with the variations in resistance in the working-circuit, may be applied in any way which will accomplish this object. The coils may be wound as shown in Figure 1, so that the magnetic effects oppose each other, or they may be wound differentially, as in Fig. 2.

My invention may be applied to one machine with double commutators, or to two or more machines arranged so as to constitute one generator.

In Fig. 1, F represents the polar portion of the U-magnets M N. A is the armature, and C and C' the commutators. Part of the coils or helices on the armature A are led to the commutator C, and the others to the commutator C'. The current generated in the former is passed through the coils *f* around the legs of the magnet M, and that generated in the latter is sent through the multiple-arc circuit L, in which are placed the lamps or other working devices, &c. From this latter circuit a shunt-circuit is taken and passed around the legs of the magnet N through the coils *f'* in a direction opposed to the current through the coils *f*.

In Fig. 2 the opposing coils on the field-magnets are shown wound differentially with regard to each other and over both magnets. The current from the commutator C is in this case passed through coils wound over the legs of both magnets M N, and that shunted from the working-circuit is likewise passed around the legs of both magnets, but in a reverse direction to the other current. These two field-coils may be proportioned in both cases so that the field will be without magnetism when the light or working circuit is open; but I prefer to make the relation of these coils such that under the above condition the field will be feebly charged. As working devices are introduced in the circuit L the resistance of this circuit becomes less, and consequently less of the current taken off at the commutator C' will pass through the shunt-circuit *f'*, and the field F will be magnetized in proportion to the ex-

cess of current passing through the coils f over that circulating in the coils f' . To apply this construction to a number of machines, so as to make them equivalent to one generator, it is only necessary to join the field-circuits of all the machines, so that they (the field-circuits) are common to them all, and therefore subject to the same conditions. Such an arrangement is shown in Fig. 3. The current generated in the armature A is passed around the field-magnets of each machine. The like poles of the two machines shown having commutators C' and C'' are connected together, and the current generated in their armatures A' and A'' sent through the multiple-arc circuit L . The shunt-circuit f' is passed around the field-magnets of each machine, as shown. A number of machines arranged in this way will then act precisely the same as the one machine with two commutators.

I claim as my invention—

1. The combination of two or more dynamo-electric machines with two circuits and a shunt to one of the circuits, the first of such circuits passing through one field-helix of each generator, and through one or more of the armature-helices, the second circuit passing through one or more armature-helices through the ex-

ternal working-circuit and a shunt through reactionary helices in the field-magnets, substantially as specified. 30

2. In a dynamo-electric generator with an external circuit and resistances in multiple are, two circuits, both of which pass through the field-helices differentially, and through armature-helices, one of which circuits is electrically distinct from the working-circuit, and the other of which is a shunt-circuit from the working-circuit, substantially as specified. 35

3. In a dynamo-electric machine, two independent circuits, one of which has a shunt-circuit, the first circuit passing through an armature-helix, and through one of the field-helices, the other circuit through an armature-helix and the working-circuit, and the shunt therefrom passing through a helix of the field, so as to set up reactionary magnetism in proportion to the resistance in the working-circuit, substantially as specified. 40 45

Signed by me this 6th day of October, A. D. 1882. 50

C. M. LUNGREN.

Witnesses:

HAROLD SERRELL,
GEO. T. PINCKNEY.