(No Model.)

E. & F. W. HEYMANN.

REGULATOR FOR DYNAMOS.

No. 421,048. Patented Feb. 11, 1890.

Fig: 1

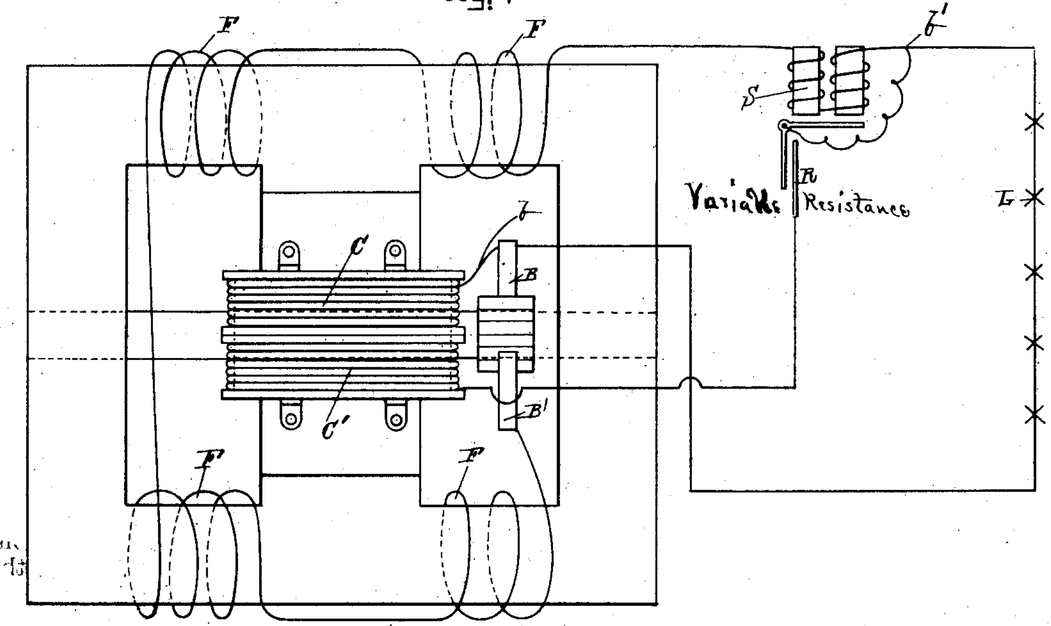
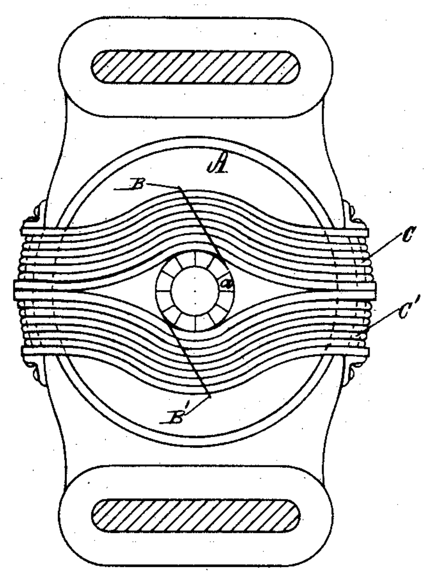


Fig: 2.



Witnesses.

Lauritz W. Möller.
Edward S. Black.

Inventor.

Edw. Heymann and
Frank William Heymann
by their attorney
J. E. Maynadier

UNITED STATES PATENT OFFICE.

EDWARD HEYMANN AND FRANK WILLIAM HEYMANN, OF BOSTON, ASSIGNORS TO JAMES E. MAYNADIER, OF TAUNTON, MASSACHUSETTS.

REGULATOR FOR DYNAMOS.

SPECIFICATION forming part of Letters Patent No. 421,048, dated February 11, 1890.

Application filed June 10, 1889. Serial No. 313,783. (No model.)

To all whom it may concern:

Be it known that we, EDWARD HEYMANN and FRANK WILLIAM HEYMANN, both of Boston, in the county of Suffolk and State of Massachusetts, have invented a new and useful Regulator for Armatures, of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 is a diagrammatic view of our regulator; and Fig. 2, a view showing the field-magnets, armature, commutator-brushes, and coils, the field-magnets being in section.

Our invention is based upon controlling the electro-motive force in the armature-coils by means of a shunt-circuit so arranged as to act by induction upon the armature-coils, a variable resistance in that shunt-circuit being adjusted from time to time to regulate the difference of potential between the terminals of the work-circuit.

In the drawings, A represents the armature of a dynamo; *a*, its commutator; B B′, its brushes; F F, the coils of its field-magnets, and L lamps or other load. The regulating-coils C C′ are in the shunt-circuit *b* C C′ *b*′. When at full load, the resistance R is so large that the shunt-circuit *b* C C′ R *b*′ is practically open, so that there is little or no current in that shunt-circuit. If one of the lamps L be switched out, the current in the work-circuit B L F F B′ will tend to increase; but if the resistance R in the shunt-circuit be reduced the current in the work-circuit will be thereby kept constant, for the reason that the current through coils C C′ will so reduce the electro-motive force of the armature-coils as to make the difference of potential between the brushes B B′ suitable for giving the desired current in the work-circuit. Consequently, if the resistance R be reduced whenever the resistance in the work-circuit is reduced and in the proper proportion, the current in the work-circuit B L F F B′ can be maintained constant, and this with proper economy for practical purposes. In the case already described the difference of potential between the brushes B B′ or between the junctions *b b*′ requires to be varied in order to keep the current constant in spite of variations in the resistance of the load; but in case of a constant-potential machine the object is to keep the difference of potential between the brushes B B′ constant whatever the resistance of the load, and consequently the current may vary. In this case under full load the resistance R in the shunt-circuit *b* C C′ R *b*′ is at the maximum, as before; but when one lamp is cut out the resistance of the load is thereby increased, and the tendency is in that case to increase the difference of potential between the brushes B B′; but that difference of potential can be maintained constant by decreasing the resistance R as the resistance of the load is increased.

We have not shown the details of construction of the resistance R, nor means for varying it, as these will be plain to all skilled in the art without description. The usual way is by means of an electro-magnet or a solenoid, as indicated in the diagram, Fig. 1, at S. The current in the work-circuit depends, of course, upon the difference of potential between the terminals of that circuit and the resistance of that circuit, and my regulator acts upon the principle of keeping the difference of potential such as to give the current desired whatever may be resistance at any given moment. The greatest possible difference of potential between the brushes B B′, assuming that the speed and the field are constant, is obtained when the resistance R in the shunt-circuit *b* C C′ R *b*′ is infinite and when there can be no current through that shunt-circuit; but by decreasing resistance R the difference of potential between the brushes B B′ can be regulated either by so lessening it as to keep the current in the work-circuit constant or by preventing it from rising where the difference of potential is to be kept constant. On the other hand, when the resistance R is at the minimum the difference of potential between the brushes B B′ is at the minimum; but by increasing resistance R the difference of potential can be regulated, either by so raising it as to keep the current in the work-circuit constant or by preventing it from falling where the difference of potential is to be kept constant.

It will be seen that the shunt-circuit *b* C C′

R b' is not a mere shunt—that is, as if the regulating-coils C C′ were not present—for if the coils C C′ were absent the current through b R b' would be vastly more than it ever can be through b C C′ R b'—that is to say, the coils C C′ regulate the electro-motive force of the coils of the armature and also set up a counter electro-motive force, which not only lessens the current through b C C′ R b', but also regulates the difference of potential between the brushes B B′.

What we claim as our invention is—

The regulator above described, consisting of the regulating-coils C C′ about the armature and the variable resistance R, the coils and the resistance being in a shunt around the main circuit and combined with the dynamo and its main circuit, substantially as described.

EDWARD HEYMANN.
FRANK WILLIAM HEYMANN.

Witnesses:
H. C. YOUNG,
JOHN R. SNOW.