

No. 889,989.

PATENTED JUNE 9, 1908.

W. H. THOMPSON.
TRANSFORMER REGULATOR.
APPLICATION FILED JUNE 25, 1906.

Fig. 1.

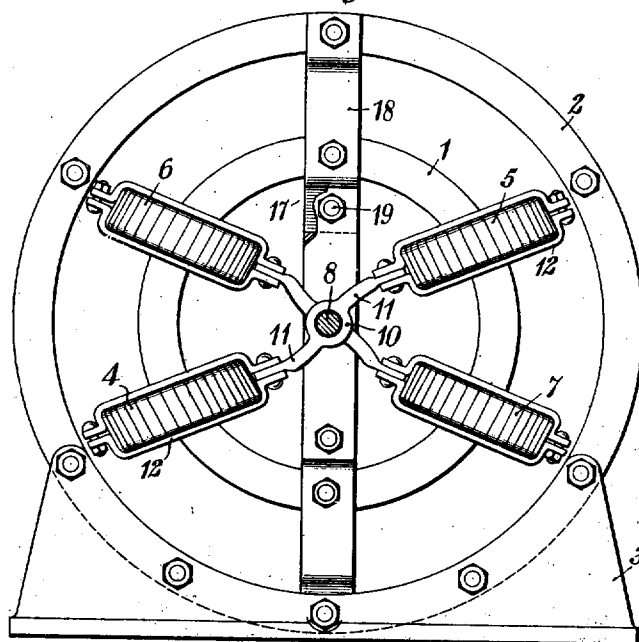
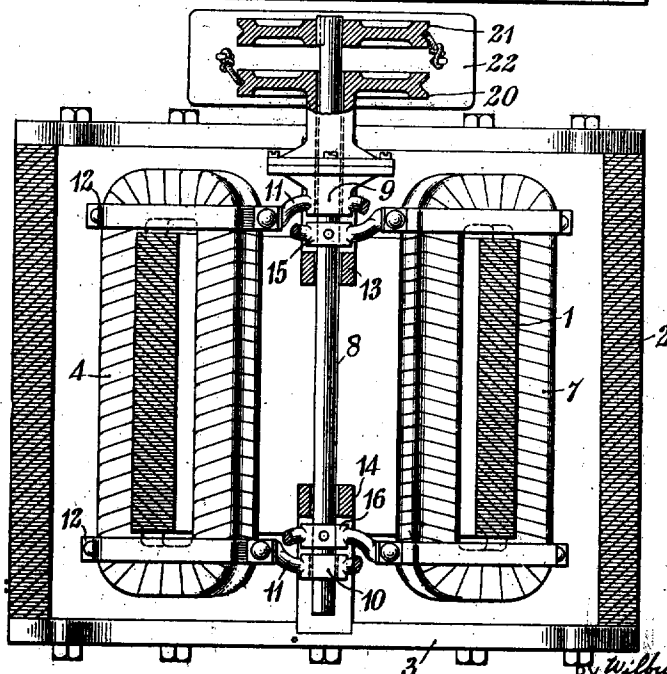


Fig. 2.



WITNESSES:

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WILBUR H. THOMPSON, OF WILKINSBURG, PENNSYLVANIA, ASSIGNOR TO WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

TRANSFORMER-REGULATOR.

No. 889,989.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, WILBUR H. THOMPSON, a citizen of the United States, and a resident of Wilkinsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Transformer-Regulators, of which the following is a specification.

My invention relates to alternating current transformers which are adapted to regulate the electromotive forces or the currents in the circuits in which they are connected.

The object of my invention is to provide a simple and durable regulating transformer that shall automatically maintain a constant current in the circuit in which it is connected and that shall comprise a coil arrangement and a magnetizable core structure of such character that the secondary coils will be so separated from the primary coils as to avoid the primary magnetic flux under short-circuit or other abnormal conditions.

A constant current regulating transformer, such as is employed in an arc light circuit or in similar relations usually comprises a stationary core member having relatively movable coils, at least one of which is movable along the core member. With this arrangement, considerable difficulty and expense is involved in providing a mechanical arrangement which is suitable for so mounting the movable coils as to avoid excessive frictional resistance to the coil movement.

In order to avoid the aforesaid and other objections to the constant current regulators of the prior art, I provide a hollow cylindrical core member upon which movable coils are mounted in pairs, at the extremities of radial arms which are so movably mounted that their axis of rotation coincides with the axis of the cylinder. The cylindrical core member is supported at diametrically opposite sides and means are provided for normally holding adjacent coils located between the points of support close together, so that the coils are permitted to rotate through an angle of substantially 90°. When the coils are in their normal positions, the magnetic flux induced in the core by the primary winding, which comprises a pair of diametrically opposite coils, passes through the other pair of coils. If a short-circuit occurs or the current is abnormally increased for any reason, the two sets of coils are separated, by reason of the increased repelling force ex-

erted between them, and move from a position substantially midway between the points of support to a position close to the supports, in which substantially all the flux induced by the primary coils returns through leakage paths without passing through the secondary coils.

My invention is illustrated in the accompanying drawings, in which

Figure 1 is an end elevation of a regulator constructed in accordance therewith, and Fig. 2 is a view, partially in plan and partially in section, of the regulator shown in Fig. 1.

Referring to the drawings, the transformer regulator illustrated, comprises a pair of concentric hollow cylindrical core members 1 and 2, a base 3 and a plurality of movable coils 4, 5, 6 and 7. Coils 4 and 5 are supported at opposite sides of a shaft 8 by bearings 9 and 10 which are provided with projecting arms 11 to which coil clamps 12 are attached. The center line of the shaft 8 coincides with the axis of the cylinder 1 and is rotatably mounted in stationary bearings 13 and 14. Bearings 15 and 16, which correspond to the bearings 9 and 10, are keyed to the shaft 8 and support the coils 6 and 7. The coils 4 and 7 may constitute the primary and coils 5 and 6 the secondary winding of the transformer regulator.

The core members 1 and 2 are maintained in a constant relative position, and are supported from the base 3 by a clamping frame 17 comprising cross strips 18 which are fastened together by longitudinal bolts 19. In this way, a free rotation of the coils is permitted through an angle of substantially 90°. The bearing 9 is provided with a sheave or pulley 20 and another similar pulley 21 is keyed to the shaft 8. The coils 4 and 6, and 5 and 7 are normally held close together in a position substantially midway between the cross strips 18 by means of a weight 22 which is suspended from cables or chains that are coiled in opposite directions about the pulleys 20 and 21 and are attached thereto. The tendency of the coils to repel each other is thus overcome, under normal conditions, by the weight, the coils themselves being statically balanced but when the current in the secondary circuit exceeds a predetermined amount the repelling force exceeds the force exerted by the weight and the coils 4 and 6 and 5 and 7 are respectively separated from

each other by a distance which is dependent upon the current traversing the secondary circuit. When the two sets of coils are close together, substantially all of the magnetic flux induced by one of the coils passes through the adjacent secondary coil, but as the two coils are separated only a small part of the flux tends to pass through the secondary coils and, consequently, the current flowing is decreased.

The core member 2 reduces the reluctance of the magnetic leakage circuit so that the primary coils act as an inductive resistance when the secondary coils are separated from them. Thus the current in the secondary circuit is automatically kept at a substantially constant value. In order to insure a like movement of both coils when they separate, a single weight is so attached to both of the pulleys 20 and 21 as to exert opposite and equal forces tending to effect rotation.

Variations in the arrangement of details may be effected within the scope of my invention.

I claim as my invention:

1. In a regulating transformer, the combination with a stationary hollow cylindrical and magnetizable core, of a plurality of symmetrically disposed coils which are mounted to revolve around the axis of the core and each of which surrounds the core wall.

2. In a regulating transformer, the combination with a hollow cylindrical core member, of a shaft the center line of which substantially coincides with the axis of the cylinder, and pairs of coils which surround the core wall and are supported by the shaft.

3. In a regulating transformer, the combination with a hollow cylindrical core member, a shaft the axis of which substantially coincides with the axis of the cylinder, and pairs of coils which surround the core wall, of means for rotatably mounting the coils upon the shaft.

4. In a regulating transformer, the combination with a pair of concentric, magnetizable cylinders, and a supporting base therefor, of two pairs of coils which longitudinally surround the inner magnetizable cylinder wall and are mounted to revolve about its axis.

5. In a regulating transformer, the combination with concentric magnetizable cylinders and a shaft mounted at their common axis, of coils which longitudinally encircle

the inner cylindrical core wall and are mounted to revolve around the shaft.

6. In a regulating transformer, the combination with a pair of concentric magnetizable cylinders, supporting means therefor, and a shaft the center line of which coincides with the common axis of the cylinders, of two pairs of coils that constitute primary and secondary transformer windings and longitudinally surround the inner cylinder wall, and means for supporting the coils for revolution around the core axis.

7. In a regulating transformer, the combination with a pair of concentric magnetizable cylinders, and a shaft mounted at their common axis, of two pairs of coils that longitudinally surround the inner cylinder wall and project in substantially radial planes from the shaft, and means for exerting a force which tends to keep the corresponding coils of the two pairs together.

8. In a regulating transformer, the combination with a hollow cylindrical coil member, supports attached thereto at diametrically opposite sides, and a shaft mounted to coincide with the axis of the cylinder, of two pairs of coils that longitudinally surround the core wall and are mounted on the shaft, and means for exerting a force which tends to keep the corresponding coils of the two pairs close together and at a point substantially midway between said supports.

9. In a regulating transformer, the combination with concentric magnetizable cylinders, a supporting base therefor which engages the inner cylinder only at diametrically opposite points, and a shaft the center line of which coincides with the common axis of the cylinders, of two pairs of coils which longitudinally surround the inner magnetizable cylinder wall, one pair of which is movably mounted on the shaft and the other pair of which is keyed to the shaft, two similar pulleys one of which is adapted to drive the movably mounted coils and the other of which is keyed to the shaft, and means for exerting a force which tends to keep the corresponding coils together and in a position substantially midway between the supports.

In testimony whereof, I have hereunto subscribed my name this 20th day of June, 1906.

WILBUR H. THOMPSON.

Witnesses:

BIRNEY HINES.

VERYL B. BRIGGTON.