

(No Model.)

W. S. MOODY.
STATIONARY TRANSFORMER.

No. 539,876.

Patented May 28, 1895.

FIG. 1.

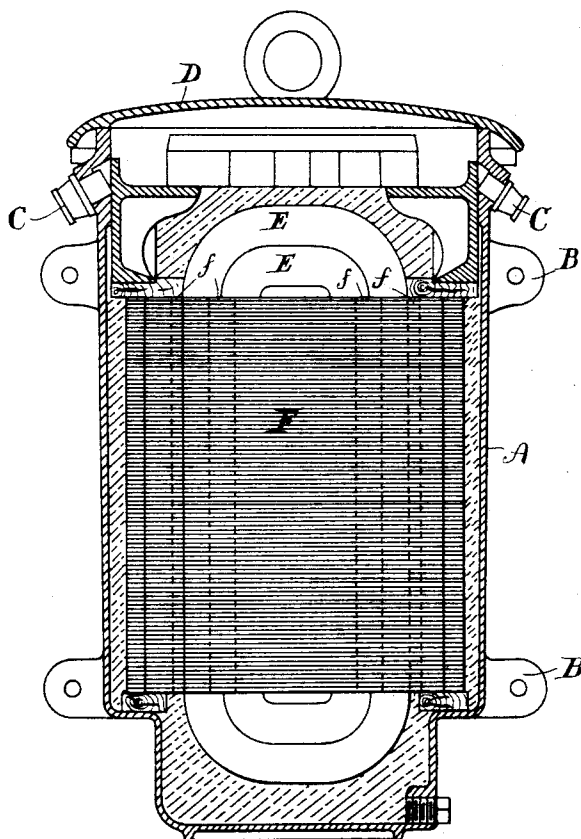


FIG. 2.

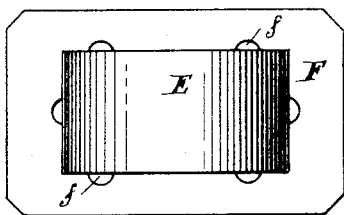
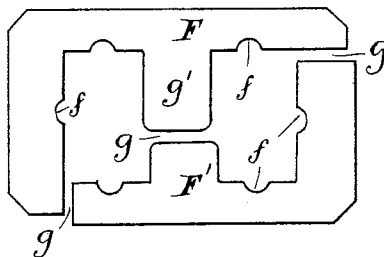


FIG. 3.



WITNESSES.

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UNITED STATES PATENT OFFICE.

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STATIONARY TRANSFORMER.

SPECIFICATION forming part of Letters Patent No. 539,876, dated May 28, 1895.

Application filed May 15, 1894. Serial No. 511,282. (No model.)

To all whom it may concern:

Be it known that I, WALTER S. MOODY, a citizen of the United States, residing at Lynn, in the county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Stationary Transformers, of which the following is a specification.

My invention relates to transformers of the stationary type; and has for its object to provide a form of punching or lamina for the core of the transformer which shall permit of the ready circulation of the oil commonly used for insulation in such constructions.

In transformer punchings as usually arranged there is no provision for the circulation of the oil. It has been customary to provide spacing blocks, which are inserted between groups of laminæ; but this construction is objectionable because it takes up part of the space necessary for the iron of the core, because it impairs the magnetic circuit, and because it uses more wire than would otherwise be necessary in getting the number of turns required for the ratio of transformation. These objections are obviated by my invention, which is illustrated in the following drawings, in which—

Figure 1 is a section of a transformer having my improved laminated core. Fig. 2 is a top plan view of the coils and core of such a transformer, and Fig. 3 is a plan view of a single one of the laminæ in the form which I prefer.

Fig. 1 shows a common form of transformer, in which A is the case; B B, the lugs for attaching it to any stationary object; C C, the thimbles for the conducting wires; D, the top of the casing; E E, the coils in the primary and secondary; F, the laminations, and *f* the channels for the circulation of oil made by my invention. This construction however I do not claim as my invention except as hereinafter pointed out.

Referring now to Fig. 3, I illustrate the preferred arrangement of the laminæ. Therein F is one of the punchings which I prefer to employ. F' is a second of substantially like pattern, the two being joined after the coils are wound and slipped upon the part *g'* of the punching G at the lines *g g*. Upon the

inner edge of each lamina I cut notches, registering, so that when the coils are in place, as shown in Fig. 2, they form uninterrupted channels in which the oil may circulate by convection to carry off the heat of the coils. 55

The construction Fig. 2 differs from that of Fig. 3 in that the transformer core therein shown is constructed of a bundle of outer laminæ with an inner laminated core which carries the coils, each lamina having, as before, cut-a-way portions or notches F, which form the essence of my invention, arranged upon the edges adjoining the coils. 60

Laminæ formed of complete encircling sheets, like that shown in Fig. 2, may be interspersed with other laminæ divided into parts, such as those shown in Fig. 3, the notches F in each of course registering, as before, to form channels or ducts for the passage of the cooling fluid. This construction 70 is, in fact, the one which I prefer to employ, a number of laminæ like Fig. 3 being grouped together and then one or several like Fig. 2, or such laminæ may be alternated, the advantage being that the transformer core is bound more firmly together and the forcing apart of the laminæ F, Fig. 3, by the coils, or otherwise, is prevented, while at the same time succeeding laminæ have lapping joints which improve the magnetic circuit. 80

It will not suffice as a substitute for my invention to use laminæ having openings or holes punched or formed therein which afford channels for the cooling fluid, but which do not allow such fluid to circulate near to the coils, as it is not so essential that the iron laminæ themselves be kept cool as it is that the copper coils be not allowed to heat. In fact, a high temperature of the iron is advantageous provided that at the same time the copper coils are kept cool, since both the loss by hysteresis and that by eddy or Foucault currents in the iron are less at high temperatures, while the temperature of the copper must be kept low to prevent danger to the insulation and increase of loss by increase of its resistance, and this condition is the preferred one in the use of a transformer constructed according to my invention. 95

Fig. 2 may also represent a transformer 100

core built up of laminæ each of which consists of a single piece of metal with two openings therein to receive the coils, but this is not so good a construction as the former, as
5 the coils are not so readily put in position.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. A transformer having a core composed of laminæ having registering notches upon their
10 inner edges, forming oil channels in combination with primary and secondary windings arranged within the core.

2. As a new article of manufacture, separable punchings for the core of a transformer,
15 having notches upon their inner edges, the notches adapted to register and thus form

channels for the circulation of oil between the coils and the core, as set out herein.

3. The means for increasing the efficiency of an electrical apparatus wherein are asso- 20
ciated copper coils or windings and an iron core subjected to rapid changes of magnetism, consisting in raising the temperature of the iron to decrease the losses due to hysteresis and Foucault currents and artificially cooling 25
the copper coils to prevent their attaining the temperature of the iron.

WALTER S. MOODY.

Witnesses:

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ROBERT SHAND.