No. 854,311. PATENTED MAY 21, 1907

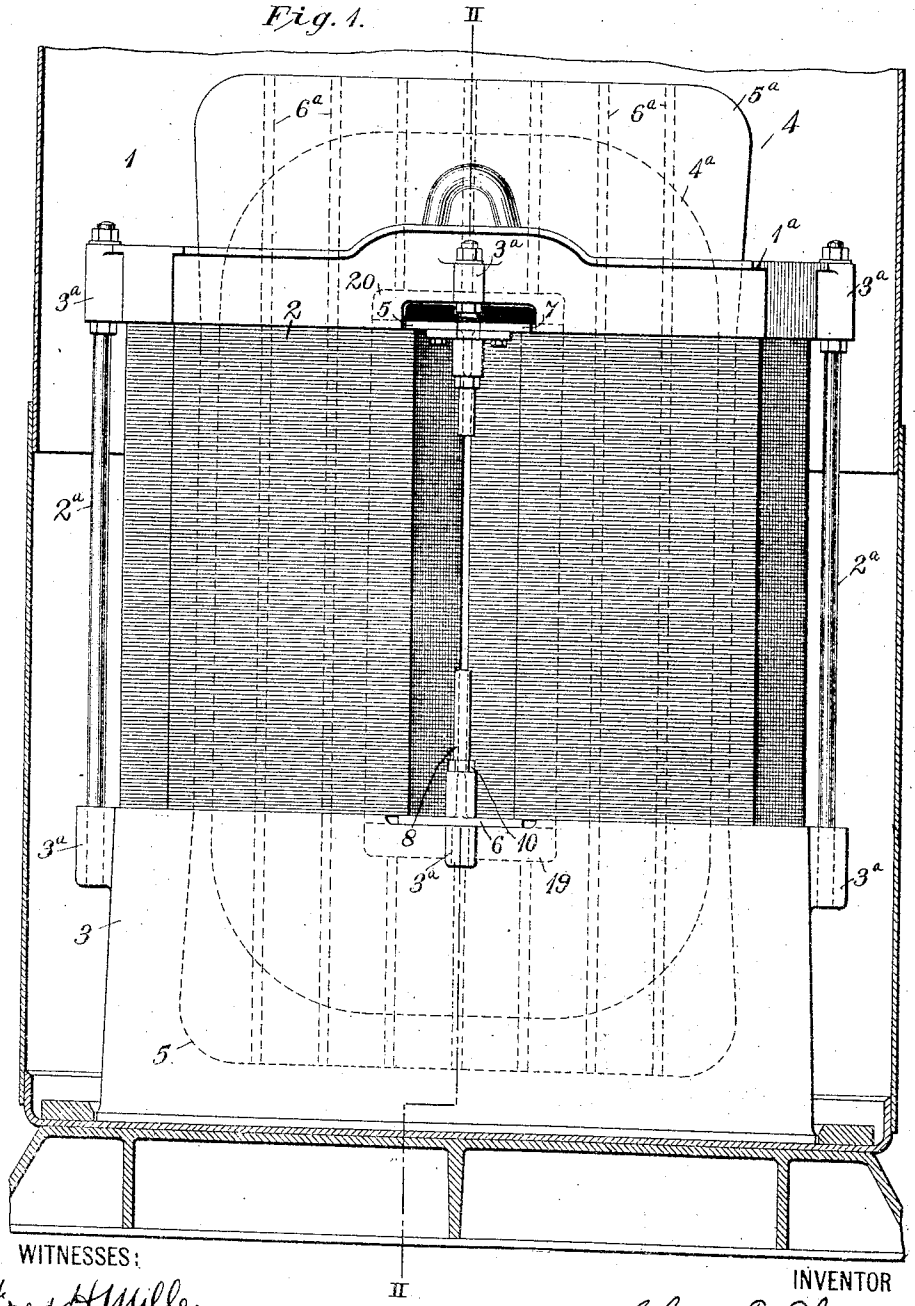
C. E. SKINNER.

TRANSFORMER COIL SUPPORT.

APPLICATION FILED SEPT. 13, 1905.

3 SHEETS—SHEET 1

Fig. 1.



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No. 854,311 PATENTED MAY 21, 1907.

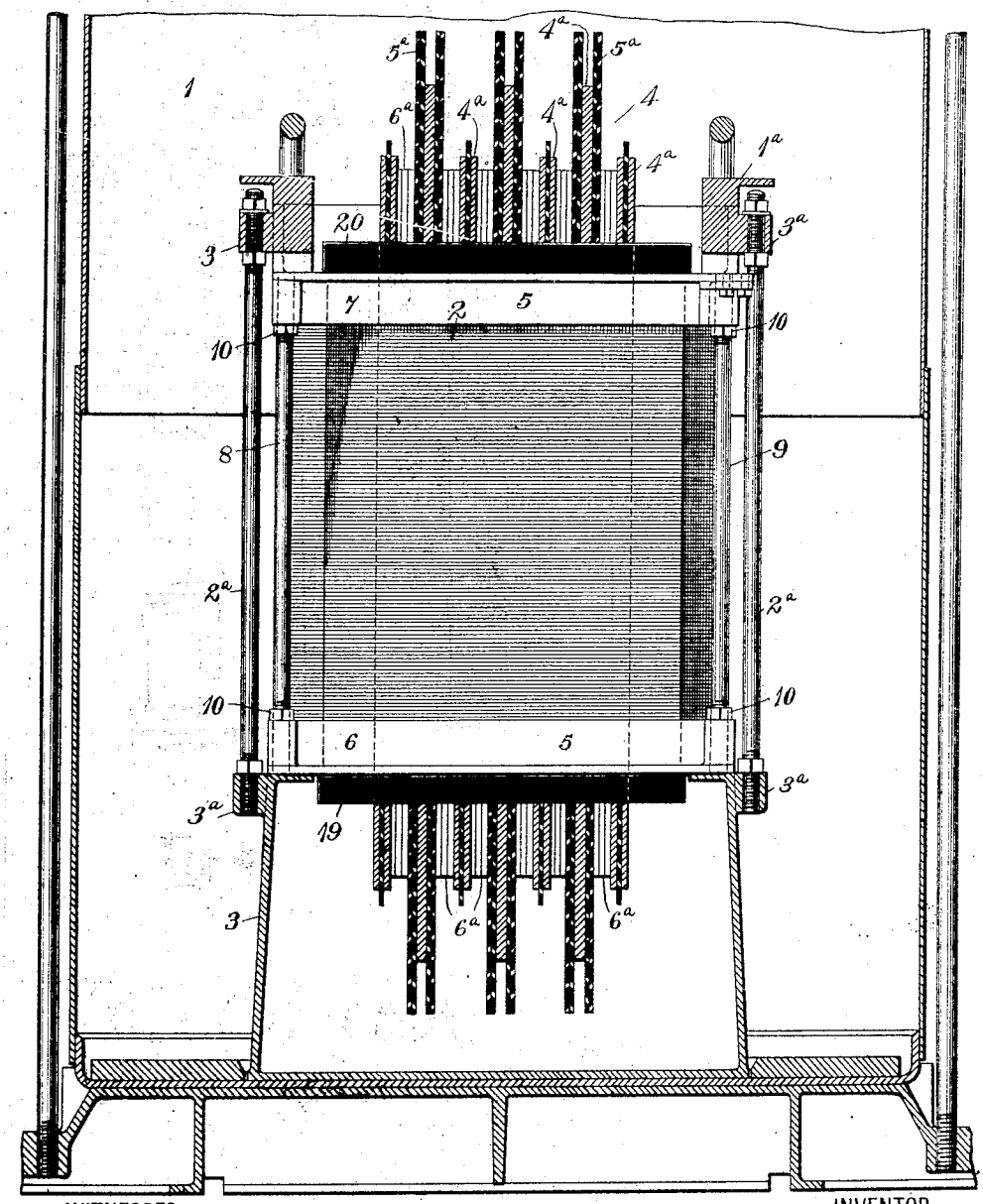
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3 SHEETS—SHEET 2.

Fig. 2.



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3 SHEETS—SHEET 3.

Fig. 3.

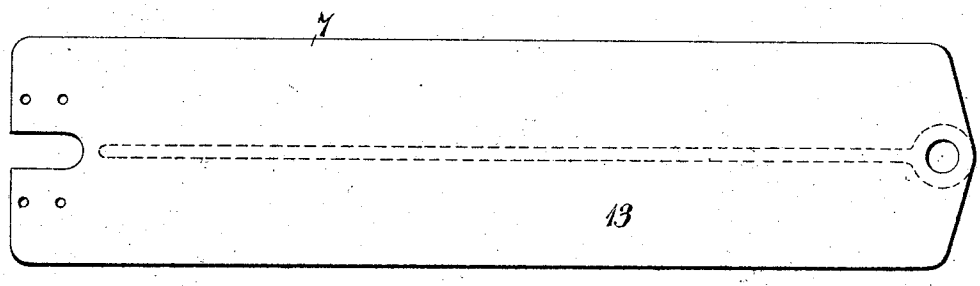


Fig. 4.

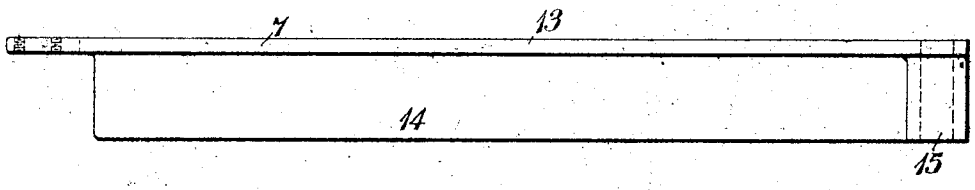


Fig. 5.

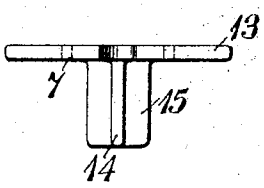


Fig. 6.

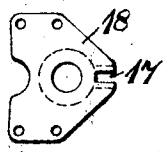
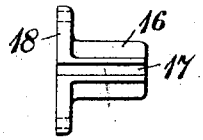


Fig. 7.



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UNITED STATES PATENT OFFICE.

CHARLES E. SKINNER, OF WILKINSBURG, PENNSYLVANIA, ASSIGNOR TO WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

TRANSFORMER-COIL SUPPORT.

No. 854,311. Specification of Letters Patent. Patented May 21, 1907.

Application filed September 13, 1905. Serial No. 278,385.

To all whom it may concern:

Be it known that I, CHARLES E. SKINNER, 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-Coil Supports, of which the following is a specification.

My invention relates to electrical transformers and has special reference to means for supporting the coils of transformers of the shell type, in which the laminated core or shell is assembled about the coils.

The object of my invention is to provide means for supporting the coils of a transformer, independently of its laminated core or shell, that shall be simple and rigid in construction and adjustable in use and that shall effectually maintain the shape and relative positions of the coils under mechanical and electro-magnetic strains.

The coils of shell type transformers, as heretofore constructed, have sometimes become distorted or displaced when subjected to excessive currents by reason of short-circuits in the winding or across the line supplied therefrom, since they were supported directly upon their laminated cores, which could not be made sufficiently rigid to prevent such distortion. A distortion of this nature may materially damage the transformer, since the coil insulation is usually destroyed and the voltage ratio rendered inaccurate.

The coil support of my invention provides for the effective maintenance of the coil relations and the shape and insulation of the winding under adverse conditions, and comprises a plurality of beams, which are thrust through the coils and which are forced apart and against the opposite interior surface of the assembled coils by separating rods. The beams are of sufficient length to allow the separating rods to be located near their ends without interfering with the laminated core and also to allow the assembled coils to be supported by the frame from a hollow core base.

In the accompanying drawings, Figure 1 is a side elevation of a transformer embodying my invention, Fig. 2 is a sectional elevation on the line II—II of Fig. 1, and Figs. 3, 4, 5, 6 and 7 are detail views of the coil support shown in Figs. 1 and 2.

Referring to the drawings, the transformer 1 comprises a laminated core or shell 2, which is assembled upon a base 3, and a winding 4 comprising a plurality of coils 4^a which are held rigidly in position by a supporting frame 5. The laminated core structure 2 is clamped rigidly to the base 3 by means of a crown casting or frame 1^a and tie bolts 2^a which are spaced equally about the structure and engage projections 3^a from the base and crown castings. The coils 4^a are separated by insulating plates 5^a of fullerboard or other suitable material, and spacing strips 6^a which permit a circulation of insulating fluid between the coils. The frame 5 is supported upon the base 3 and may be constructed in various ways, but I prefer the construction disclosed in the accompanying drawings, which comprises a plurality of T-beams 6 and 7 that are forced apart by separating rods 8 and 9.

The transformer may be assembled in the usual manner, by suspending the coils approximately in position within the hollow base and then assembling the laminated core within and around the coils upon the base, except that the beam 6 is placed in position before the laminations are placed within the assembled coils, the beam 7 being forced into place on top of the core next to the upper surface of the opening in the assembled coils. Instead of letting the coils rest upon the core 2, the rods 8 and 9, which project through holes in the ends of the beams 6 and 7, are provided with nuts 10, by which the two T-beams may be forced apart until the coils are raised so that the lower, inside surface of the winding is brought firmly against the lower beam 6. A rigid supporting frame is thus provided which is entirely independent of any settling or warping of the core 2 and which is capable of withstanding any tendency on the part of the coil to become distorted or to move out of place. Spacing blocks or plates 19 and 20, of wood or other insulating material, may preferably be interposed between the coils and the flat, outer surfaces of the T-beams, in order that

the coils may not be short-circuited when pressure is applied.

Each of the beams 6 and 7 comprises a flat base 13 which engages the inner surfaces of the coils and a central, longitudinal web 14 which is substantially perpendicular to the base.

The beam 6 is provided with a hollow boss 15 at each end, through which the separating rods project, and the beam 7 is similarly supplied, except that the hollow boss 16 at one end is detachable so that it may more readily be inserted between the assembled laminæ and the winding. The detachable boss 16, which is illustrated in Figs. 6 and 7, is provided with a suitable notch 17 that engages the web 14 on the beam 7 and with a base 18 which is clamped to the base 13 near its extremity.

The transformer may be provided, in the usual manner, with a containing tank or housing 21 which may be filled with oil or other suitable insulating fluid.

Although I have shown and described a specific coil support comprising a single pair of beams and separating rods, I desire that my invention shall not be restricted to such an arrangement, but that any suitable means for accomplishing the same result in connection with any well known type of transformer shall be included within its scope.

I claim as my invention:

1. An extensible frame for supporting transformer coils that comprises a plurality of supporting beams and separating rods therefor.

2. An extensible frame for supporting transformer coils that comprises an upper and a lower supporting beam and a plurality of rods which engage said beams near their ends.

3. In a transformer, the combination with a magnetizable shell or core and a winding therefor, of means for supporting said winding independently of said shell or core.

4. In a transformer, the combination with a magnetizable shell or core, a winding and a supporting base therefor, of means for supporting said winding from said core base independently of said shell or core.

5. In a transformer, the combination with a magnetizable shell or core and a winding therefor, of an extensible frame for supporting said winding independently of said shell that comprises a plurality of supporting beams and separating rods therefor.

6. In a transformer, the combination with a magnetizable core and a winding therefor, of an extensible frame for supporting said winding independently of said core that is placed within the assembled coils of said winding and extends beyond said coils.

7. In a transformer, the combination with a magnetizable shell or core, a winding and a supporting base therefor, of an extensible frame for supporting said winding independently of said shell or core that is placed within the assembled coils of said winding and is supported by said core base.

8. In a transformer, the combination with a magnetizable shell or core, a winding and a supporting base therefor, of an extensible frame for supporting said winding independently of said shell that comprises an upper beam which engages the upper surface of the opening in said assembled winding, a lower beam that rests on said core-supporting base, and a plurality of separating rods which force said upper and lower beams apart.

9. In a transformer, the combination with a winding comprising a plurality of coils, of means for maintaining the relative positions of said coils.

10. In a transformer, the combination with a magnetizable core and a winding therefor comprising a plurality of coils, of means for supporting said winding independently of said core and for maintaining the relative positions of the coils.

11. In a transformer, the combination with a winding comprising a plurality of coils, of an extensible frame for maintaining the relative positions of said coils.

12. In a transformer, the combination with a magnetizable core and a winding therefor comprising a plurality of coils, of an extensible frame for supporting said winding independently of said core and for maintaining the relative positions of said coils.

13. In a transformer, the combination with a winding comprising a plurality of coils, of an extensible frame for maintaining the relative positions of said coils that comprises a plurality of supporting beams and separating rods therefor.

14. In a transformer, the combination with a magnetizable core and a winding therefor comprising a plurality of coils, of an extensible frame for supporting said winding independently of said core and for maintaining the relative positions of said coils that comprises a plurality of supporting beams and separating rods therefor.

In testimony whereof, I have hereunto subscribed my name this 7th day of September 1905.

CHARLES E. SKINNER.

Witnesses:
I. L. GRIFFITH,
BIRNEY HINES.