June 2, 1925. 1,539,878

M. E. SKINNER

TRANSFORMER BRACING

Filed May 12. 1919

Fig. 1.

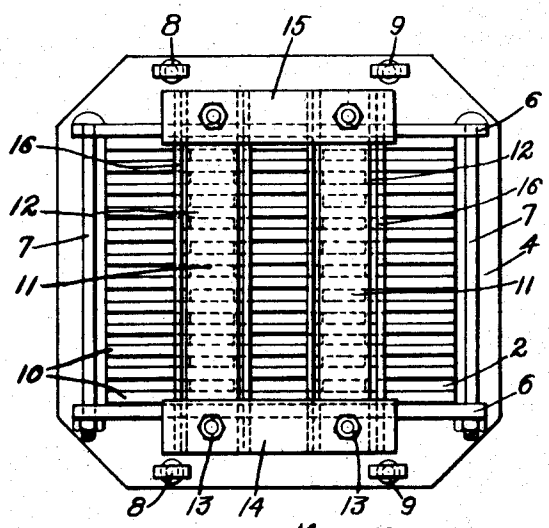
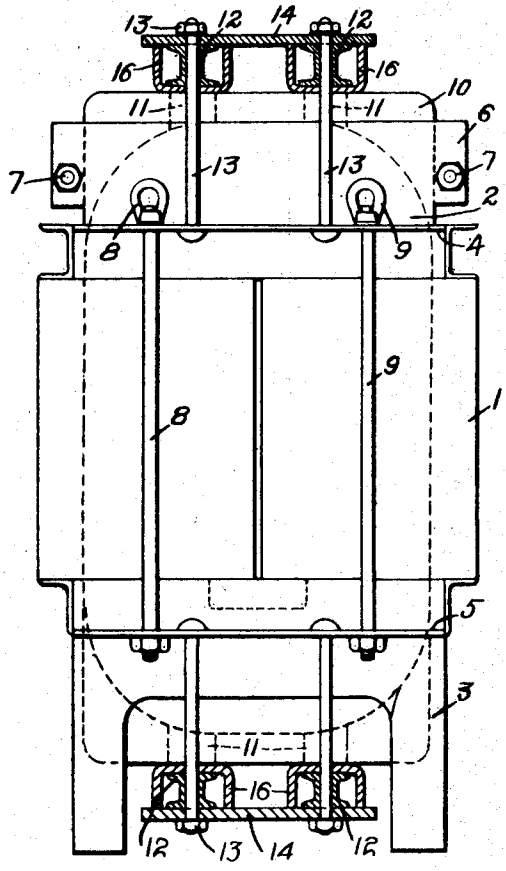


Fig. 2.



WITNESSES:

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UNITED STATES PATENT OFFICE.

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TRANSFORMER BRACING.

Application filed May 12, 1919. Serial No. 296,589.

To all whom it may concern:

Be it known that I, MERRILL 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 Bracings, of which the following is a specification.

My invention relates to transformers and it has especial relation to means for bracing the coils of apparatus of the character designated in such manner that the expansion or movement of the coils, under the action of heavy short-circuit stresses or otherwise, shall be prevented.

In the accompanying drawing, Fig. 1 is a plan view of a transformer structure in which my improved bracing means are employed; and Fig. 2 is an elevational view of the structure shown in Fig. 1.

Heretofore, the coils in apparatus of the character designated have been braced in such manner that they were adequately secured against movement in a horizontal direction. It was thought that bracing in a vertical direction was unnecessary, because the core itself supported the coils in a satisfactory manner. With the increase in the capacity of transformers, however, an increasing tendency for the coils to expand or move in the direction of their longer dimension has been noticed, and difficulty has been experienced in so designing the coils that they should be able to withstand the stresses imposed thereupon by short-circuits or otherwise and tending to displace them in a vertical direction. Again, in apparatus of this character, it is customary to interpose between the coils, barriers of insulating material which are of a greater length than the coils themselves and, therefore, extend somewhat above them. Such dimensions of the insulating barriers are necessary to preclude short-circuits between the edges of adjacent coils. Obviously, therefore, it is difficult to provide bracing means across the tops and bottoms of the coils, because of the insulating barriers extending above and below them. Again, the tendency for the coils to expand upwardly and downwardly is accentuated by the close restriction thereof in all horizontal directions.

I propose, therefore, to build up the ends of the coils with blocking members of such character and dimensions that bracing means may be disposed above and below the coils and urged towards them without abrading or otherwise injuring the insulating barriers which extend between them. The manner in which I accomplish this object, as well as other objects of my invention, will appear more in detail hereinafter.

Referring more particularly to the drawing, a core member 1, having coils 2—2 associated therewith, is shown as mounted on a base member 3. End frames 4 and 5 secured together by means of tie rods 8 and 9 and plates 6 secured by tie bolts 7 are employed to brace the coils against movement in a horizontal direction. Between the coils are positioned insulating barriers 10—10. It will be noted that the barriers 10 extend somewhat beyond the tops and bottoms of the coils 2. Block members 11—11 are positioned on the coil edges and are of such dimensions that they are flush with the tops and bottoms of the insulating barriers 10.

Extending in a direction transverse to the coil edges and resting upon the edges of the insulating barriers 10 and the blocking members 11—11, are beams 12—12 which are secured to, and urged toward, the end frames 4 and 5 by tie rods 13—13. Cross pieces 14 and 15 serve to strengthen the end bracing structure. As illustrated, the beams 12—12 are seated in channels 16—16 of insulating material, which serve to more efficiently electrically separate the coils from their associated bracing means. It is apparent that, by use of the blocking members interposed between the beams and the coils, the beams may be urged toward the coils by tightening the tie bolts 13 and the coils be thereby rigidly secured against any tendency to expand in a vertical direction.

While I have shown but one embodiment of my invention, it is apparent that many other modifications in a vertical bracing system may occur to those skilled in the art and I, therefore, desire that only such limitations shall be placed thereupon as are imposed by the prior art or by the scope of the appended claims.

I claim as my invention:

1. In a transformer, a core member, coils associated with the core member, insulating members between the coils and extending beyond the ends thereof, end-frame bracing means, additional bracing means comprising members extending across the tops and bot-

toms of said coils in a direction perpendicular to the planes thereof and secured to the end frames, and block members disposed between the coils and said last-named bracing means, whereby the effective lengths of the coils and the intermediate insulating members are made substantially equal.

2. In a transformer, a core member, coils inductively related thereto, end-frame bracing means, additional bracing means comprising members extending across the tops and bottoms of said coils in a direction perpendicular to the planes thereof and secured to the end frames, and insulating means between said last-named bracing means and the tops and bottoms of the coils.

3. In a transformer, a core member, coils inductively related thereto, end-frame bracing means, and additional bracing means comprising beams extending across the tops and bottoms of the coils in a direction perpendicular to the planes thereof, the ends of said beams being secured to the end frames.

4. In a transformer, a core member, coils inductively related thereto, end-frame bracing means, and additional bracing means comprising beams extending across the tops and bottoms of the coils in a direction perpendicular to the planes thereof, the ends of said beams being secured to the end frames, and blocking means between the coil tops and bottoms and the beams, whereby the short coils receive the same pressure as the relatively longer intermediate insulating members.

In testimony whereof, I have hereunto subscribed my name this 26th day of April 1919.

MERRILL E. SKINNER.