C. LE G. FORTESCUE.

TRANSFORMER.

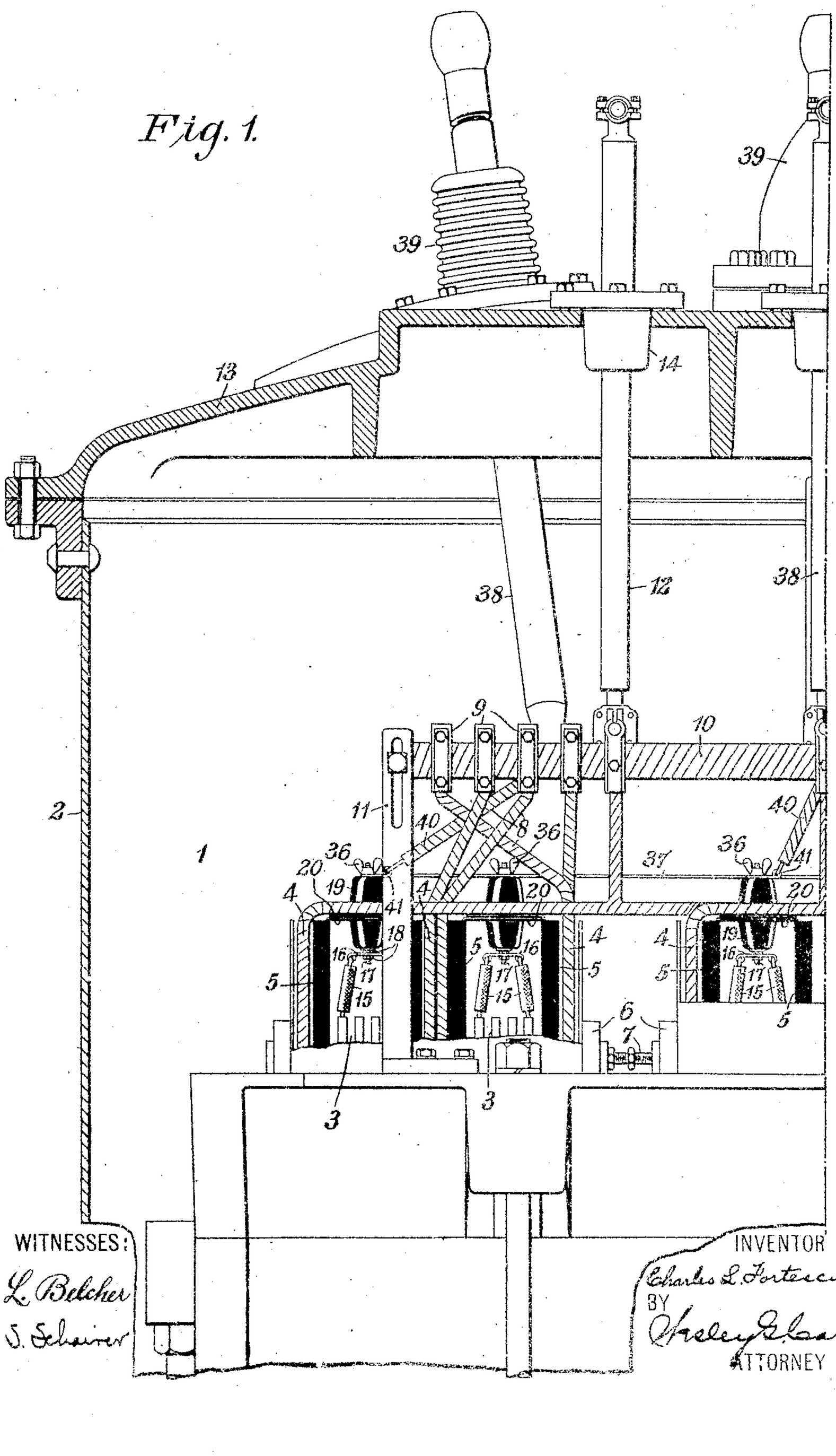
APPLICATION FILED JULY 6, 1908.

996,755.

Patented July 4, 1911.

3 SHEETS—SHEET 1.

Fig. 1.



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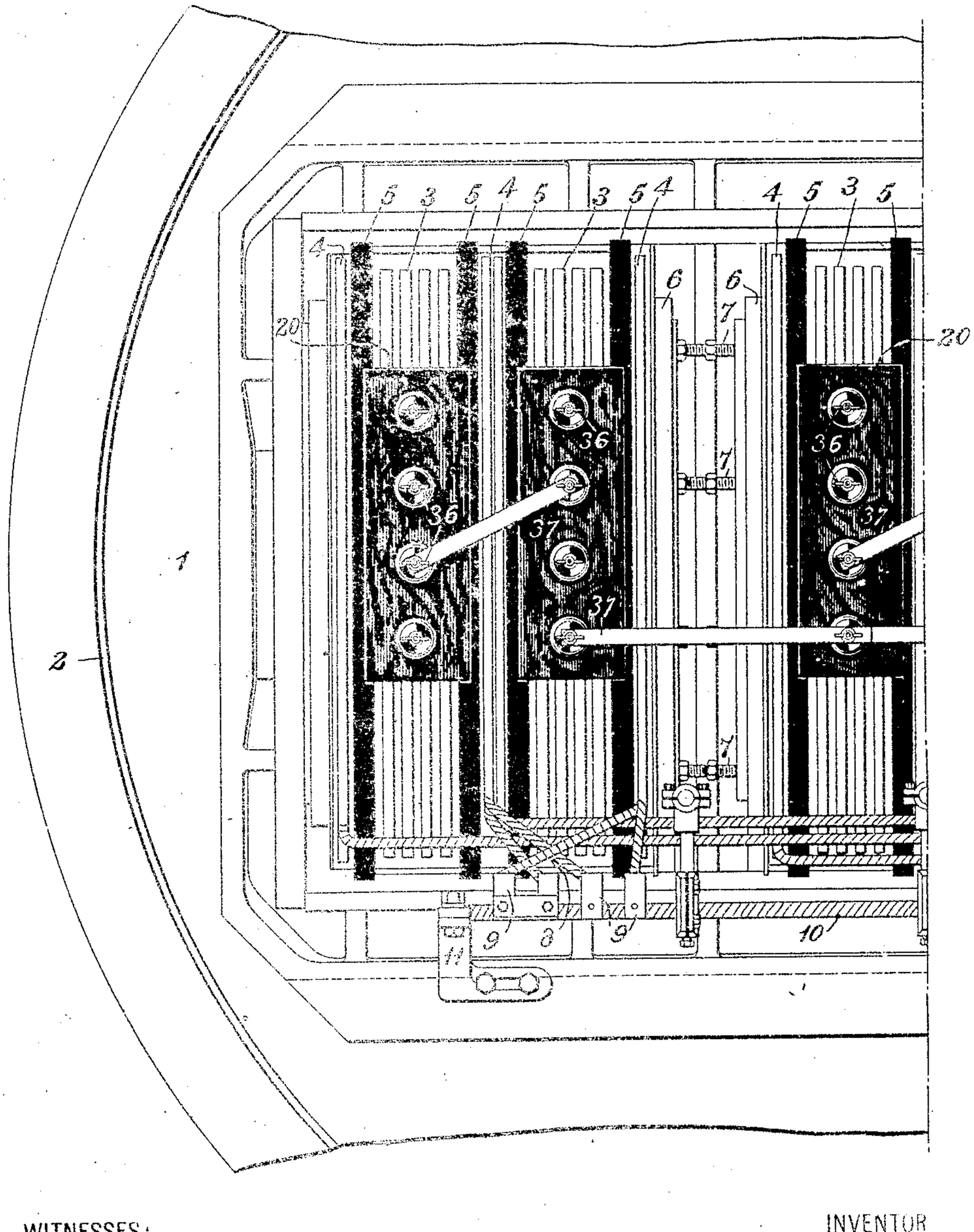
3 SHEETS—SHEET 2.

Fig. 2.



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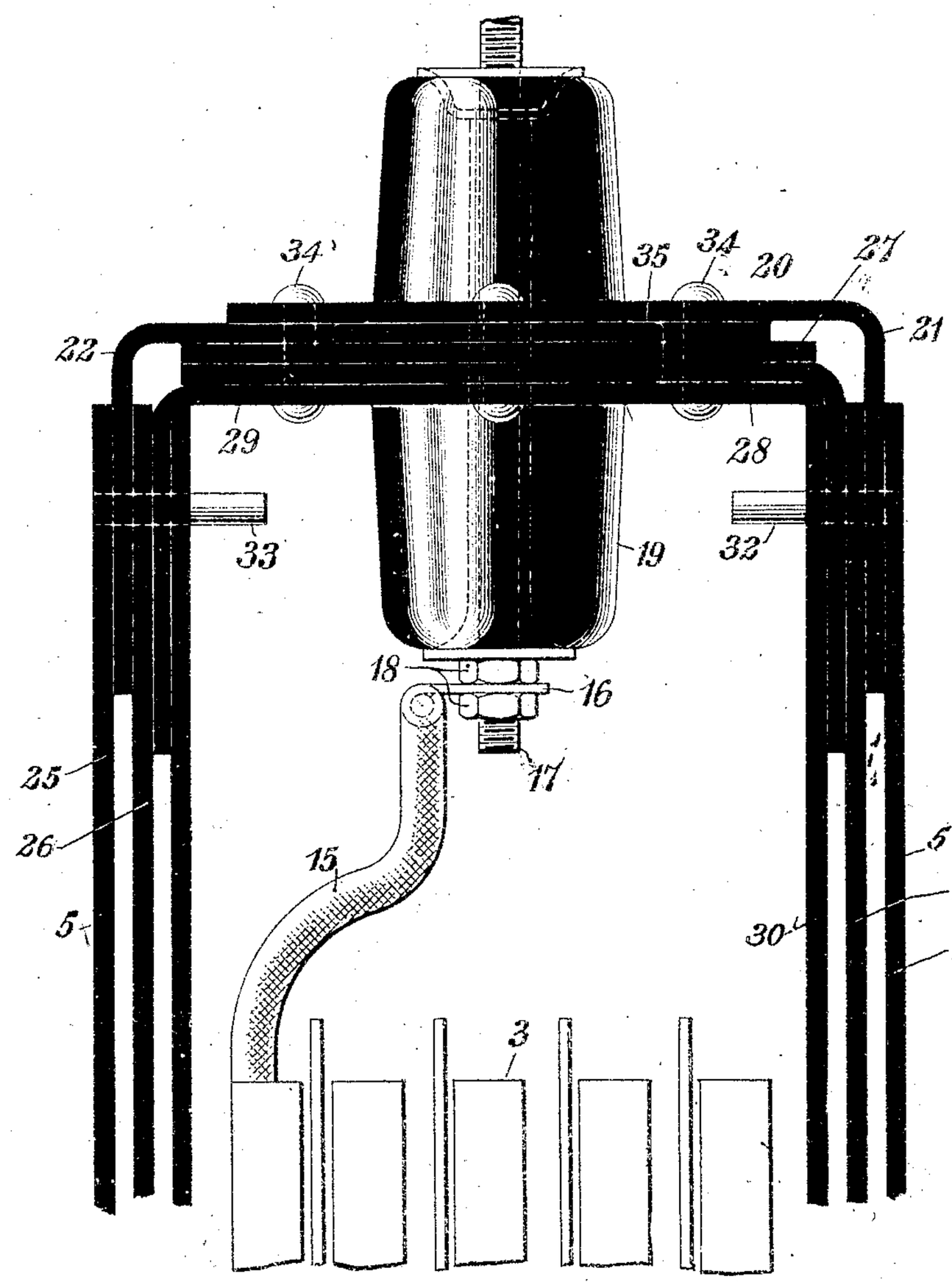
3 SHEETS—SHEET 3

Fig. 3.



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UNITED STATES PATENT OFFICE.

CHARLES LE G. FORTESCUE, OF WILKINSBURG, PENNSYLVANIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, OF EAST PITTSBURG, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

TRANSFORMER.

996,755 Specification of Letters Patent. Patented July 4, 1911.

Application filed July 6, 1908. Serial No. 442,199.

To all whom it may concern:

Be it known that I, CHARLES LE G. FORTESCUE, a subject of the King of Great Britain, and a resident of Wilkinsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Transformers, of which the following is a specification.

My invention relates to electrical transformers and particularly to means for supporting, insulating and interconnecting the internal terminal leads of transformers of large capacity and high potential.

The object of my invention is to provide a simple and effective means for so supporting and insulating the internal terminal leads of high potential transformers as to preclude the possibility of mechanical interference and consequent production of short circuits, and also to effectively support and insulate the conductors utilized for interconnecting the high tension coils corresponding to different phases, in case the invention is applied to polyphase transformers.

In the accompanying drawings, Figure 1 is a view in side elevation of a portion of a transformer embodying my invention, the casing being shown in section. Fig. 2 is a plan view of a portion of the transformer partially illustrated in Fig. 1, the cover of the casing being removed. Fig. 3 is a detail side elevation of a portion of one set of primary coils, a terminal therefor and a terminal bridge which supports and insulates the same.

My invention, as illustrated in the drawings, is applied to a three-phase high potential transformer 1 which is located in a receptacle 2 containing sufficient oil to submerge the transformer cores and coils. The transformer section for each phase comprises two sets of high tension coils 3 and three sets of low tension coils 4, the several sets being separated from each other by insulating barriers 5, and adjacent transformer sections being spaced apart and supported by means of frame plates 6 and bolts 7, substantially as shown in the Patent No. 854,309, granted to the Westinghouse Electric & Manufacturing Company on an application filed by E. G. Reed.

The low tension coils 4 are suitably connected and interconnected by means of flexible conductors 8 the ends of which are clamped to terminal blocks or plates 9, the latter being supported upon a suitably insulated and approximately horizontal bar 10, the ends of which are attached to standards 11 in such manner as to be vertically adjustable thereon. The connection of the low tension terminal blocks or plates 9 to the circuit external to the transformer is made by means of suitably insulated rods or wires 12 which project out from the cover of the casing and are insulated therefrom by suitable insulating bushings 14.

The high tension coils 3 of each group are connected by means of flexible insulated lead wires 15 to the ends of a metal clip 16, and this clip is fastened to the inner end of a vertical conducting rod 17 by means of nuts 18, the rods being mounted in an insulating tubular bushing 19 made of porcelain or other suitable non-conducting material. The bushings for each group of high tension coils are supported by a bridge 20 of inverted U-shape and composed of a plurality of superposed sheets or plates of insulating material. The bridge comprises two outer angular plates 21 and 22, the vertical portions of which project, respectively, between plates 23 and 24 of one side barrier and the plates 25 and 26 of the other side barrier, a middle plane plate 27 and two inner annular plates 28 and 29, the vertical portions of which project, respectively, between plates 24 and 30 of one side barrier and plates 26 and 31 of the other side barrier. The interleaved portions of plates 21, 28, 23, 24, and 30 may be fastened together by pins 32 or otherwise and the corresponding portions of plates 22, 29, 25, 26, and 31 may be fastened together by similar means 33. The top portions of the bridge plates may be fastened together by rivets 34 and may be suitably cut away to receive the bushing 19 and its flange 35. The screw-threaded upper end of the bolt 17 pertaining to each bushing 19 is provided with a thumb-nut 36 in order to clamp the end of a connecting strip 37 in position, the strips 37 for making desired electrical connections between the coils pertaining to each phase and those for interconnecting the coils pertaining to the different phases being fastened to the de-

sired terminal bolts by means of the thumb-nuts.

Connections between the high tension coils 3 and the external circuit are made by means of insulated wires 38 which project through the cover 13 and are insulated therefrom by bushings 39, the inner ends 40 of which are bent to the desired angle and connected by means of suitable clips 41 and the proper thumb-nuts 36 to the corresponding terminal bolts 17, the inner angular portions 40 of the wires being provided with insulating sleeves, as indicated.

It can be seen from the foregoing description, in connection with the illustration, that the terminal bridges 20 are so constructed and mounted in position, independently of the transformer casing, as to thoroughly insulate the terminals which they support from each other, and that they also afford rigid supports for the terminal bolts and bushings so that no mechanical or electrical strains can produce any displacement of the parts to cause short circuits or other disturbances.

My invention may, of course, be applied to a single-phase transformer or to a transformer having a greater or a less number of high tension terminal leads than I have here shown, and the specific details shown and described are, of course, susceptible of further variations within considerable limits, without departing from the spirit and scope of my invention.

I claim as my invention:

1. A transformer comprising a plurality of coils, insulating barriers between the coils and terminal-supporting bridges extending between the barriers.

2. A transformer comprising a plurality of coils, insulating barriers between the coils, bridges extending between the barriers and interlocked therewith, and terminal devices supported by the bridges.

3. An electrical transformer having its high tension and low tension coils separated by multiple insulating barriers and terminal-supporting bridges composed of overlapping plates the ends of which are interleaved with the barrier plates.

4. An electrical transformer having its high tension and low tension windings separated by laminated insulating barriers and laminated terminal bridges having their ends projecting between the barrier laminæ.

5. An electrical transformer having insulating barriers between its high and low tension coils and a terminal bridge of inverted U-shape attached to and supported by the barriers.

In testimony whereof, I have hereunto subscribed my name this 30th day of June, 1908.

CHARLES LE G. FORTESCUE.

Witnesses:
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Birney Hines.