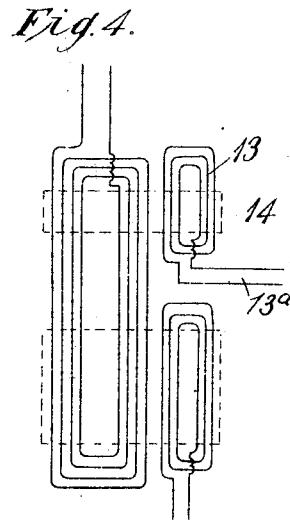
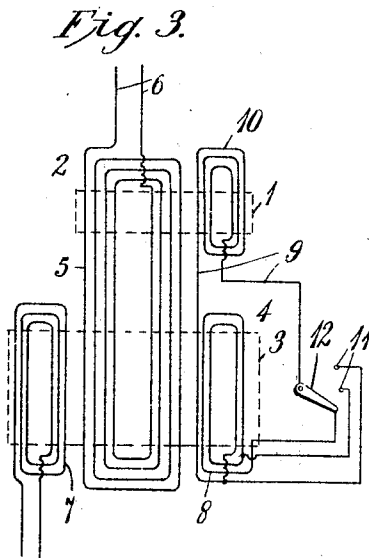
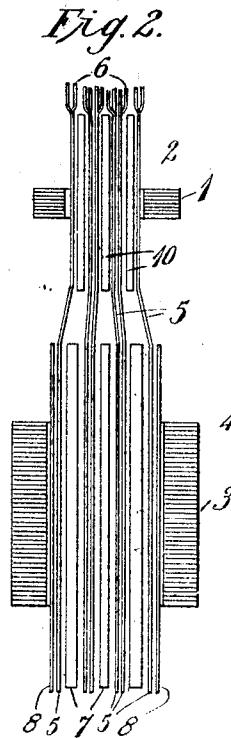
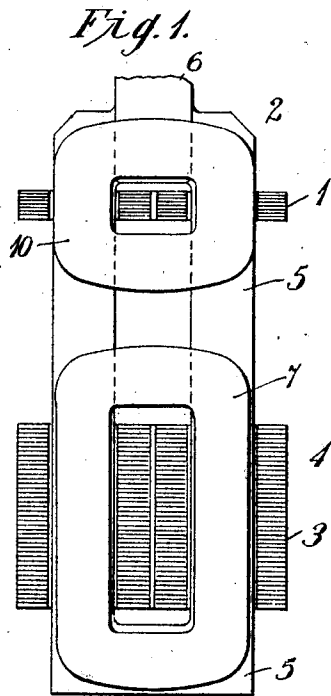


F. SIEBER.
TRANSFORMER.
APPLICATION FILED APR. 11, 1913.

1,140,920.

Patented May 25, 1915.



WITNESSES:

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TRANSFORMER.

1,140,920.

Specification of Letters Patent.

Patented May 25, 1915.

Application filed April 11, 1913. Serial No. 760,417.

To all whom it may concern:

Be it known that I, FERDINAND SIEBER, a subject of the Emperor of Austria-Hungary, and a resident of Vado Ligure, in Italy, have invented a new and useful Improvement in Transformers, of which the following is a specification.

My invention relates to alternating current transformers, and has particular reference to transformers which embody means for varying the voltages at their terminals.

It is usual to employ adjusting means for varying the active length of either the primary winding or the secondary winding or both of a transformer in order to vary the electromotive force at the terminals of the secondary circuit. It is difficult or impossible to obtain satisfactory results with apparatus of this character, where the currents are very large or the voltages very high, unless a great number of divisions are made in the active length of the winding or windings to be varied.

The object of my invention is to provide a transformer with a minimum number of stationary auxiliary coils by means of which the terminal voltages of the main windings may be varied without the manipulation of regulating devices which are subjected to high voltages or large currents or both.

My invention permits of a cheap type of construction and the use of a common tank, or other cooling arrangement, for both the main winding and the auxiliary winding. The weight of the active material, that is, the wire and the insulation of the windings used in the construction of the transformer built in accordance with my invention, will be greatly reduced over that utilized in transformers hitherto constructed for similar service.

My invention will be better understood in connection with the following description and the annexed drawings in which are shown several forms of transformers embodying my invention.

Figure 1 is a diagrammatic view, in elevation and in section, of a transformer constructed in accordance with my invention; Fig. 2 is a sectional side view of the same; Fig. 3 is a diagram showing the electrical circuits of the transformer of Figs. 1 and 2, and Fig. 4 is a modification of the electrical circuits shown in Fig. 3.

An auxiliary core 1 of a supplemental

transformer 2 is located in close proximity to a core 3 of a main transformer 4, proper precautions being taken to magnetically insulate the cores from each other. A main secondary winding 5 which is common to both transformers consists of coils which embrace the cores 1 and 3, and its terminals 6 may be connected directly to a secondary supply circuit. A primary winding 7 of the main transformer 4 is sub-divided into separate coils and interspersed between various other coils upon the same core in a manner well known in the art.

Referring to Figs. 1, 2 and 3, an auxiliary winding 8 is placed upon the main transformer core 3 and is connected by leads 9 to a regulating winding 10 which is mounted upon the core 1 of the supplemental transformer 2. The auxiliary winding 8, comprising separate coils, is provided with a number of taps connected to terminals 11 of an adjusting switch 12, which is connected between the auxiliary winding 8 and the regulating winding 10.

The secondary winding 5 which embraces the cores 1 and 3 is cut by the flux generated in each core, and the value of the electromotive force generated therein is, therefore, dependent upon the vectorial sum of these two fluxes. By operating the switch 12, the voltages supplied to the regulating winding 10 may be varied, which, in turn, varies the value of the magnetic flux in the auxiliary core 1. The secondary winding 5, being cut by this flux, in addition to the flux in the main transformer core 3, permits of the adjustment of the voltages impressed upon the terminals 6 in order to obtain the required value of the supply voltage of the secondary circuit. By the arrangement described above, I have used only four windings and have eliminated the necessity of switching operations being performed upon windings that are subjected to high voltages and large current values, in order to vary the voltage impressed upon the secondary circuit.

In place of using an auxiliary winding 8 upon the main transformer core 3 for supplying current to the regulating winding 10, as shown in Fig. 3, an independent source of energy 13^a may be connected to a regulating winding 13 on a supplemental transformer 14 for delivering exciting current thereto, as shown in Fig. 4.

It will be readily understood that modifi-

cations may be made in my invention without departing from the spirit thereof, and I desire that only such limitations shall be imposed as are indicated in the appended claims.

I claim as my invention:

1. In a transforming apparatus, the combination with a main transformer comprising a core, a secondary winding and an independent auxiliary winding, of a supplemental transformer magnetically insulated from the main transformer and comprising a core, a secondary winding and an independent regulating winding, the said secondary windings comprising coils which embrace both of the said cores.

2. In a transforming apparatus, the combination with a main transformer comprising a core, a primary winding, a secondary winding and an independent auxiliary winding, of a supplemental transformer comprising a core, an independent regulating winding and a secondary winding, the said secondary winding comprising coils which embrace said cores, and said auxiliary and regulating windings forming a closed electrical circuit.

3. In a transforming apparatus, the combination with main and supplemental transformer cores and a primary winding for the main core, which are magnetically insulated from each other, of a secondary winding comprising coils each of which embraces said cores, and a regulating winding independent of said main primary winding for

varying the value of the magnetic flux in said supplemental transformer core.

4. In a transforming apparatus, the combination with main and supplemental transformer cores which are magnetically insulated from each other, of a secondary winding comprising coils each of which embraces said cores, an independent auxiliary winding located on the main transformer core, an independent regulating winding located on the supplemental core and connected in an isolated closed circuit with said auxiliary winding, and means for varying the active length of the said auxiliary winding.

5. In a transforming apparatus, the combination with a supplemental transformer core having an independent regulating winding, of a main transformer core which is magnetically insulated from the supplemental transformer core, a primary winding therefor, a secondary winding common to said cores, an independent auxiliary winding in inductive relation with the main transformer core and in an isolated closed circuit with said regulating winding, and means for varying the active length of the winding of the isolated circuit.

In testimony whereof, I have hereunto subscribed my name this 27th day of March 1913.

FERDINAND SIEBER.

Witnesses:

HENRY HASPER,
WOLDEMAR HAUPT.