

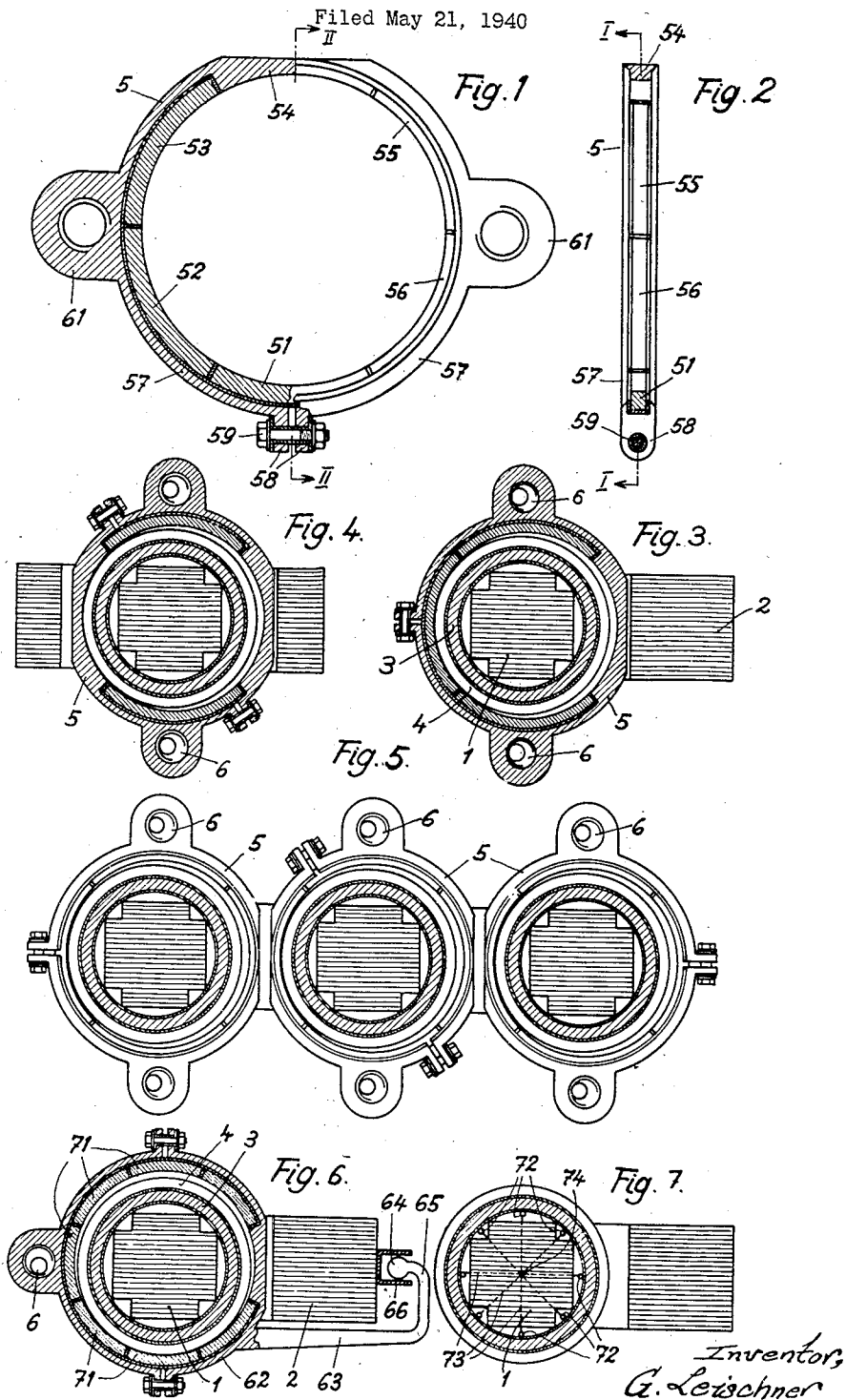
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G. LEISCHNER

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REGULATING TRANSFORMER

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Inventor,  
G. Leischner

By *Glascock Downing & Sebold*  
ATTORNEYS

## UNITED STATES PATENT OFFICE

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## REGULATING TRANSFORMER

George Leischner, Bonigen, near Interlaken,  
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2 Claims. (Cl. 171—119)

This invention relates to a current collector for transformers of the kind shown and described in the co-pending application Ser. No. 291,625, filed August 23, 1939, i. e., for transformers having an electrically subdivided current collector cooperating with the regulating winding.

An object of the invention is to equip the current collector with at least one contact element which, formed as a clamping strap, serves to hold the other elements of the collector together. This construction allows of this contact element being made relatively thin at the place of its electric effect.

If this contact element be put into juxtaposition with the return flux path of the transformer, the length of flux path is shortened and thus a saving of iron and weight and a reduction of the over-all dimensions is obtained.

Other objects and features of my invention will be apparent as the following description proceeds, reference being had to the drawing in which:

Fig. 1 is partly a top view and partly a section on line I—I of Fig. 2,

Fig. 2 is a section on line II—II of Fig. 1, illustrating an embodiment of the current-collector according to my invention,

Fig. 3 shows the application of the current-collector on a transformer of the kind shown in application Serial No. 291,625, with one return flux path,

Fig. 4 is a view similar to Fig. 3 but of a transformer with two return paths,

Fig. 5 relates to a three phase transformer provided with variously shaped current collectors according to the invention,

Fig. 6 is a horizontal section through the middle plane of a transformer of the kind shown in application Ser. No. 291,625, provided with a collector according to the invention, this transformer being further represented in

Fig. 7 by a section through the lower end of the winding in order to show the distribution of the segment-connections.

The regulating transformer shown in Fig. 3 has a core 1 and a single return path 2. The primary winding 3 is formed as a cylindrical winding and the regulating winding 4 as a single-layer winding with bare surface. The electrically subdivided current collector 5 is a ring. The inside diameter of the collector 5 is somewhat larger than the outside diameter of the regulating winding 4. With the aid of eccentrically arranged and synchronously rotating spindles 6, held in insulated bearings not shown, the collector 5 is moved in a winding-motion along

the surface of the regulating winding. This collector can, therefore, successively make contact with all the points of the regulating winding. Up till now only such details of the transformer of the kind disclosed in application Ser. No. 291,625 have been described, which are necessary for the comprehension of the present invention, some embodiments of which are now described as follows:

The contact ring 5 shown in Figs. 1 and 2 is formed of six segments 51, 52, 53, 54, 55 and 56 lying in juxtaposition to each other. The segment 54 has, at both ends, circularly curved and channel-shaped extensions 57 provided with flanges 58, so as to form a clamping strap when connected by a bolt 59. The other segments, placed in the channels of the extensions 57, are separated from one another by means of insulating layers. The electric connections required (not shown) are effected by means of flexible cables. The spindles 6, adapted to produce the switching motion, pass through the lugs 61 which are arranged on the extensions 57. The segment 54 may be relatively narrow. The width of the current collector may, at this spot, be reduced to a minimum. If the flattening, resulting from this reduction, is turned towards the magnetic return path of the transformer, and so to say, parallel to the adjacent surface of the same, as is shown, for instance, in Fig. 3, then this return path may be considerably nearer to the main core. By this arrangement a saving of iron and weight and a reduction of the outer dimensions is achieved.

In the example of Fig. 4 two segments of the current collector have been used for forming the clamping strap. Therefore, two flattenings may also be provided for and utilized.

These two embodiments may also be used simultaneously in the same transformer, for instance, in a three-phase transformer as shown in Fig. 5. There the current collector with the two part clamping strap is used on the middle limb. The single segments can, as may be required, be connected with each other by means of flexible cables. This is well known to anyone skilled in the art and need not be described in detail.

In Figs. 6 and 7 a regulating transformer is shown in which, for moving the current collector, a single spindle 6 is provided. In order to allow of this, the segment 62, formed as a two-part clamping strap comprises an arm 63 ending in a hook 65 which carries a ball 64. This ball 64 is guided in a channel 66 fastened to the magnetic return path. In this way, and provided that the current collector is well guided on the spindle,

the ball 64 allows of the switching motion of the collector. In this embodiment the current-collector is an eight-part collector. Each of the contact segments 71 is connected by means of a flexible cable (not shown) with the terminals 72 of the cross lines 73, said terminals being arranged in the lower part of the transformer. Said cross lines lead to the point 74 which is the one point of junction of the secondary circuit.

What I claim is:

1. In a regulating transformer, a magnetic core, a regulating winding on said core having turns forming a substantially cylindrical outer surface, a ring-shaped collector surrounding said winding, means for moving said ring collector longitudinally of the winding and eccentrically thereof into engagement with the outer surface of said winding, said ring-shaped collector comprising a segment-shaped contact element, integral arcuate extensions carried by said contact element, a plurality of segment-shaped contact members mounted within said arcuate extensions, means insulating said contact members from each other and from said contact element and from said extensions, and means drawing the

extensions towards each other to clamp the contact members within said extensions.

2. In a regulating transformer, a magnetic core, a regulating winding on said core having turns forming a substantially cylindrical outer surface, a ring-shaped collector surrounding said winding, means for moving said ring collector longitudinally of the winding and eccentrically thereof into engagement with the outer surface of said winding, said ring-shaped collector comprising a segment-shaped contact element, integral arcuate extensions carried by said contact element, a plurality of segment-shaped contact members mounted within said arcuate extensions, means insulating said contact members from each other and from said contact element and from said extensions, means drawing the extensions towards each other to clamp the contact members within said extensions, a return magnetic circuit for said core arranged adjacent the surface of said winding, and said contact element having a flat surface between the winding and said return magnetic circuit.

GEORGE LEISCHNER.