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J. G. WELLINGS

2,476,787

CURRENT TRANSFORMER

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Fig. 1.

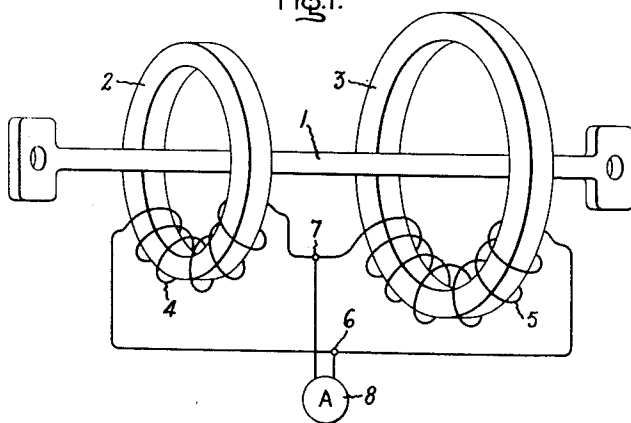


Fig. 2.

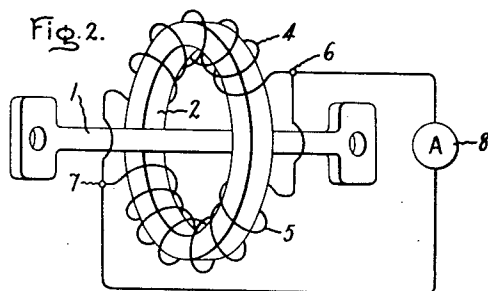
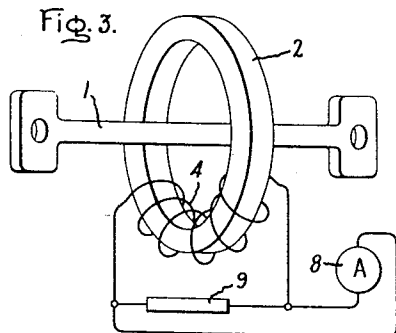


Fig. 3.



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UNITED STATES PATENT OFFICE

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CURRENT TRANSFORMER

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2 Claims. (Cl. 171-95)

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This invention relates to current transformers and more particularly to current transformers having a high ratio of primary current to output current.

In such transformers, there is required a large number of secondary turns with the result that a high open circuit output voltage is developed which necessitates the provision of adequate insulation for the secondary turns.

In accordance with this invention, the secondary winding of the current transformer has many less turns than are necessary to provide the desired ratio and it is permanently shunted by a circuit element so as to divert from the output circuit the excess current in the secondary winding with the result that the output current is in the desired ratio to the primary current while at the same time the open circuit output voltage is very much less than in a conventional current transformer of this same effective ratio.

An object of the invention is to provide a new and improved transforming system.

Another object of the invention is to provide a current transforming system having relatively high ratio of primary current to output current and a relatively low open circuited voltage.

The invention will be better understood from the following description taken in connection with the accompanying drawing and its scope will be pointed out in the appended claims.

In the drawing, Fig. 1 illustrates diagrammatically a preferred embodiment of the invention, and Figs. 2 and 3 illustrate modifications.

Referring now to the drawing, and more particularly to Fig. 1, the transformer is shown by way of example as comprising a bar type primary winding 1 with which is associated a double core, the two parts being indicated at 2 and 3. A secondary winding 4 is mounted on core 2 and another secondary winding is mounted on core 3, and these secondary windings are serially connected with additive polarity in a closed circuit. The junctions of the secondary windings form output terminals 6 and 7 between which any suitable load device may be connected such, for example, as an ammeter 8.

The number of turns on the secondary windings 4 and 5 are many times less than the number normally required for providing the desired high ratio primary current to output current in a conventional current transformer. The secondary windings 4 and 5 also have a different number of turns so that a difference current flows in the load circuit connected between output terminals 6 and 7. Because of the relatively low

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number of turns of each secondary winding, the open circuit output voltage of the transformer is very much less than would be the case with a conventional transformer having the same effective ratio. The difference in number of turns of the secondary windings is so selected that the difference current which flows in the load device 8 will be the proper fraction of the primary current.

The following numerical example will make clearer the above description. Assume, for example, that an overall current transformation ratio of 5000:5 is required. With a normal current transformer using a single turn primary, a secondary winding employing 1000 turns would be required in order to obtain 5 amperes output with 5000 amperes in the primary. In the present invention, however, the current ratio between the one turn bar primary 1 and the secondary 5 may be 5000:50 while the corresponding ratio for the secondary 4 may be 5000:55 so that the difference between the 50 and 55 amperes flowing in the respective secondary windings, i. e., 5 amperes, is delivered to the load device 8.

Thus, by the expedient of providing two transformers of different ratio with a common primary winding, the number of secondary turns on each transformer is approximately one-tenth the number required for a conventional transformer with the result that the open circuit secondary voltage is reduced to approximately one-tenth of what it would be in a conventional transformer. Insulation difficulties are thus materially reduced.

It is not essential, however, to employ two separate cores and in the modification shown in Fig. 2 the secondary windings 4 and 5 are mounted on the same core, the connections being the same as in Fig. 1.

Furthermore, it is also not essential to the invention in its broader aspects to have two secondary windings and in the modification shown in Fig. 3, the secondary winding 4 is permanently shunted by an impedance 9 of such a value that if, for example, the secondary winding carries 50 amperes when the primary winding carries 5000 amperes, then the shunt 9 can be proportioned to divert 45 amperes from the output circuit so that the load 8 will carry 5 amperes and the desired ratio of 5000:50 will be obtained.

While there have been shown and described particular embodiments of the invention, it will be obvious to those skilled in the art further changes and modifications can be made without departing from the invention and therefore it is

aimed in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A current transformer having a predetermined relatively large ratio of primary current to secondary current and a relatively low open circuit output voltage comprising, in combination, a magnetic core means, a primary winding thereon, a pair of serially connected secondary windings thereon, and a pair of output terminals connected respectively to the junctions of said secondary windings, each of said secondary windings having many less turns than are necessary to provide said ratio, the secondary windings having a difference in turns sufficient to produce a difference current which bears the proper relation to the primary current to produce said ratio.

2. A current transformer having a predetermined relatively large ratio of primary current to output current and a relatively low open circuit output voltage comprising, in combination, a

pair of magnetic cores, a primary winding common to both of said cores, a pair of serially connected secondary windings mounted respectively on said cores, and a pair of output terminals connected respectively to the junctions of said secondary windings, each of said secondary windings having many less turns than are necessary to provide said ratio, the secondary windings having a difference in number of turns sufficient to produce a difference current which bears the proper relation to the primary current to produce said ratio.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,640,554	Peters	Aug. 30, 1927
1,971,207	Boyajian et al.	Aug. 21, 1934
2,137,878	Kramer	Nov. 22, 1938