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C. M. SUMMERS

1,859,115

MAGNETIC CORE

Filed Nov. 9, 1931

Fig. 1.

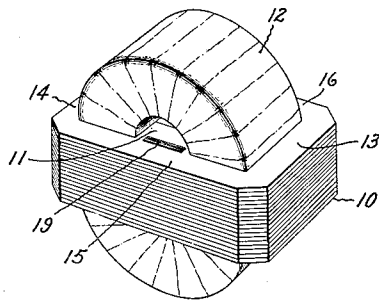


Fig. 3.

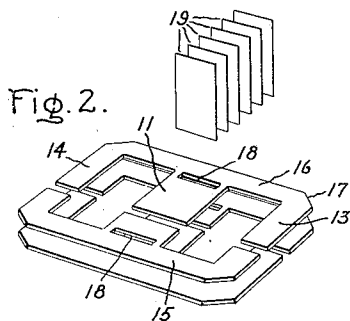
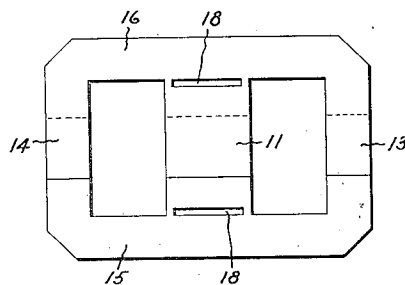


Fig. 4.



Inventor:

Claude M. Summers

by *Charles E. Tulla*

His Attorney.

UNITED STATES PATENT OFFICE

CLAUDE M. SUMMERS, OF FORT WAYNE, INDIANA, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK

MAGNETIC CORE

Application filed November 9, 1931. Serial No. 573,792.

My invention relates to electrical induction apparatus such as reactors and transformers, and more directly to magnetic cores for such apparatus. The electrical characteristics of such apparatus must often be within very narrow limits or the apparatus may not operate satisfactorily in the circuits in which they are intended to be used. The characteristics of some such circuits also vary because of manufacturing limitations although the circuits may be intended to be alike. For instance, it is not practically possible to produce electrical condensers in quantity without variations of several per cent in the capacities of the different units. Reactors which are to be used with such condensers in some circuits must have correspondingly different characteristics. The general object of the invention is to provide reactors, transformers and the like with an improved magnetic core constructed to permit convenient adjustment of the magnetic and electrical characteristics of the cores and their windings.

The invention will be better understood from the following description taken in connection with the accompanying drawings in which Fig. 1 shows a reactor constructed in accordance with the invention, and Figs. 2, 3 and 4 are views of parts of the magnetic core of the reactor shown in Fig. 1.

Like reference characters indicate similar parts in the different figures of the drawings.

The reactor shown in Fig. 1 of the drawings includes a magnetic core 10 having a winding leg 11 surrounded by a winding 12. Two outer legs 13 and 14 are connected to the ends of the winding leg 11 by yokes 15 and 16 to provide return magnetic paths for the magnetic flux in the winding leg. The core 10 is built up of magnetic laminations 17, each lamination being formed in two sections with the joints in the different laminations offset or staggered as shown in Figs. 2 and 4.

In order to permit the electrical characteristics of the reactor to be adjusted, one or more partial air gaps 18 are formed in the magnetic circuit of the core, two such gaps being shown in the drawings. Each of the non-magnetic gaps 18 is formed near an end

of the winding leg 11 so that it is readily accessible after the winding 12 has been assembled in position on the core. Each gap extends entirely through the core but only part way across the winding leg 11 so that the winding leg is connected integrally at both ends with the core yokes 15 and 16.

The presence of the non-magnetic gaps 18 in the magnetic circuit of the core increases the magnetic reluctance of the core and thus affects the electrical characteristics of the reactor. If a test of the reactor shows that it does not have the desired characteristics because of too high reluctance of the core, one or more magnetic inserts 19 are fitted into one or both of the gaps 18, the proper number of inserts being used to reduce the reluctance of the core to a value corresponding to the desired characteristics of the core. The inserts 19 are small, thin, magnetic sheets which may be cut or punched from larger stock sheets of the desired thickness. The width of each insert is preferably equal to the width of each gap 18 or a little less and the length of each insert is preferably equal to the thickness of the core 10. When the inserts 19 are in place in the gaps, they are at right angles to the direction of the core flux and their effect is to shorten the gaps and thus reduce the reluctance of the core. The inserts may be secured in place in the gaps by small pieces of any suitable non-magnetic material such as paper forced into the gaps with the inserts. The inserts may be removed and a different number of them placed in the gaps 18 if a change in the characteristics of the reactor is desired at any time.

The invention has been explained by describing and illustrating a particular form and application thereof, but it will be apparent that changes may be made without departing from the spirit of the invention and the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent of the United States is:
1. Electrical induction apparatus including a magnetic core having a gap extending partially across the magnetic circuit of the core, the core extending integrally past

least one side of said gap, and a magnetic insert secured in said gap to reduce the magnetic reluctance of the core.

2. Electrical induction apparatus including a magnetic core having a gap extending partially across the magnetic circuit of the core, the core extending integrally past at least one side of said gap, and a thin magnetic sheet insert secured in said gap at a right angle to the direction of the core flux to reduce the magnetic reluctance of the core.

3. Electrical induction apparatus including a magnetic core having a winding leg, a winding surrounding said winding leg, said winding leg having a gap near one end thereof and extending partially across the leg, the leg extending integrally past at least one side of said gap, and a magnetic insert secured in said gap to reduce the magnetic reluctance of the core.

4. Electrical induction apparatus including a magnetic core having at least one gap extending partially across the magnetic circuit of the core, the core extending integrally past at least one side of each gap, and magnetic sheet material secured in each gap to reduce the magnetic reluctance of the core to a value corresponding to desired apparatus characteristics.

In witness whereof, I have hereunto set my hand.

CLAUDE M. SUMMERS.

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