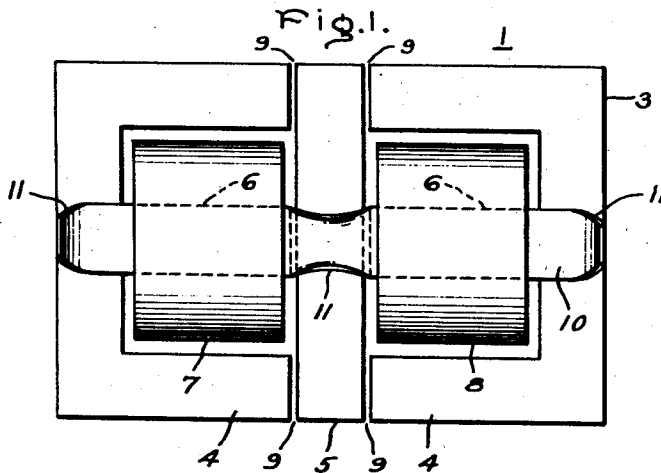
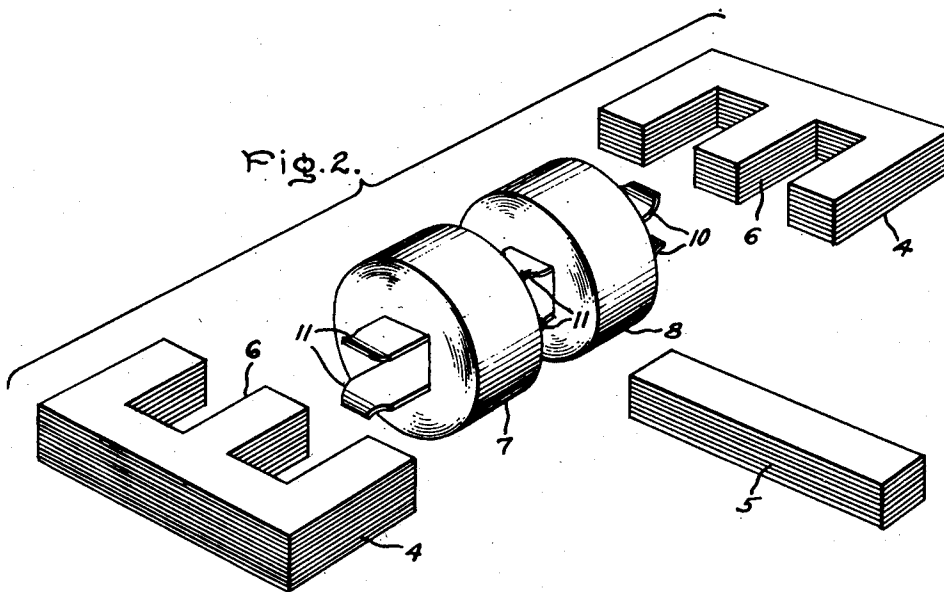
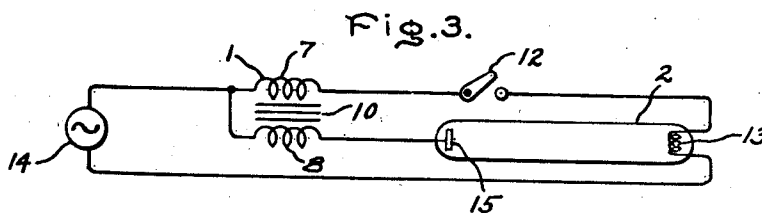


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BALLAST CONSTRUCTION
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BALLAST CONSTRUCTION

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3 Claims. (Cl. 171-242)

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This invention relates to electric induction, apparatus and more particularly to a ballast for an electron discharge device.

Since an electron discharge device possesses what is called a negative resistance characteristic, that is, once the device starts to conduct its resistance decreases, means must be incorporated in the electrical circuit for limiting the flow of current through the device. Normally, such means is provided by incorporating into the circuit an inductive ballast which limits the circuit current without decreasing, in any appreciable manner, the circuit efficiency. It may be necessary also in initiating the operation of the electron discharge device to provide a voltage which is of greater magnitude than that supplied by the line. Therefore, transforming means, in the case just mentioned, must be incorporated in the circuit.

This invention accomplishes the dual purposes of current limiting and a voltage transformation in a circuit containing an electron discharge device by utilizing a ballast which may be constructed of three main sections. In a preferred form of the invention two E-shaped members are disposed with their legs extending toward each other and may be separated by an I-shaped member. Mounted on a central leg of each of the E-shaped members may be a reactor coil. Physically the E and I-shaped members may not be in contact with one another and an air gap or its equivalent may be maintained separating the members of the core. Thus, the magnetic coupling between the two E-shaped members is negligible and the electric induction device, as described, would achieve only the desired ballasting.

In order to insure the necessary voltage transformation, means are provided for magnetically coupling the two reactor coils which are mounted on the E-shaped members. As disclosed by this invention, this is accomplished in a novel and ingenious manner by providing two substantially I-shaped magnetic strips which are mounted perpendicular to the main I-member and pass through the window of the coils mounted on the central leg of the E-shaped members. Not only is magnetic coupling provided by the I-shaped strips, but their use eliminates the necessity for any further clamping of the core.

It should be noted that this invention is not limited to the core construction previously described or to ballasting devices.

It is an object of this invention to provide a new and simple ballasting means for an electron discharge device which achieves a voltage transformation as well as limiting the circuit current.

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It is another object of this invention to provide a new and simple means for magnetically coupling the core members of an electric induction apparatus.

It is the further object of this invention to provide such magnetic coupling means which achieves also the clamping of the core sections as a unit.

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 is a plan view of a particular embodiment of this invention as applied to the construction of a ballast for an electron discharge device. Fig. 2 is an exploded perspective view of the embodiment of this invention illustrated in Fig. 1. Fig. 3 is a circuit diagram illustrating a circuit application of this ballasting means.

Referring now to the drawing, there is shown therein, by way of example, a ballast 1 which may be used in cooperation with a germicidal lamp 2 and which provides not only the necessary current limiting action but also the increase in voltage necessary for initiating the operation of the lamp 2. The ballast has a core 3 which is constructed of two E-shaped members 4 which are separated from one another by an I-shaped member 5. The E-shaped members 4 are so disposed as to have their legs extending toward each other and mounted respectively on the central leg 6 of each of the E-shaped members is a reactor or ballasting coil 7 and 8.

It will be noted upon examination of the figures that an air gap 9, or the magnetic equivalent of an air gap, is maintained which separates the E-shaped members 4 from the centrally located I-shaped member 5. Thus, since the reluctance of a magnetic flux path which includes both reactor coils 7 and 8 will be quite high, the coupling between the coils on the E-shaped core members 4 is practically negligible.

In order to achieve the prescribed step-up in voltage necessary for starting the operation of the germicidal lamp 2, the coupling between the two ballasting coils 7 and 8 is increased, and this is achieved by the utilization of magnetic strips 10 which are mounted between the coils 7 and 8 and the central leg 6 of the E-shaped members 4 and are perpendicular to the I-shaped core member 5.

Not only do the magnetic strips 10 provide the necessary coupling, but their use eliminates the need for any further core clamping means.

The magnetic strips 10 of which two are used

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to achieve proper magnetic coupling and core clamping—one being mounted on either side of the core 3, are substantially I-shaped and have flared portions 11 at the ends and in the middle to allow for ease in assembling the ballast 1 as shown in Fig. 3.

In Fig. 3 which is a circuit diagram showing the application of this invention in the ballasting of a germicidal lamp 2, the line voltage, which may be of a standard value such as 118 volts, is stepped up to a voltage of approximately 150 volts which is necessary for reliable starting of the lamp 2. The cathode 13 of the lamp 2 is connected through the switch 12 and the cathode ballasting coil 7 across the power source 14. The anode 15 of the lamp 2 is conductively secured to the anode ballasting coil 8 which is connected to the power source side of the coil 7. Thus, it can be seen that when the switch 12 is closed current flows through the cathode 13 causing it to heat up. The anode to cathode voltage is approximately the sum of the line voltage and the transformer voltage due to the presence of the magnetic strips 10 which couple the coils 7 and 8 so that coil 7 acting as a primary winding induces voltage in coil 8 acting as a secondary winding. This voltage is sufficient to initiate conduction through the lamp 2. Once the lamp has started to operate the switch 12 may be opened for a lower voltage may be used to maintain conduction and the continued current flow from the cathode 13 to the anode 15 is such as to maintain the cathode at a high enough temperature for lamp operation.

While there has been shown and described a particular embodiment of this invention, it will be obvious to those skilled in the art that various changes and modifications can be made therein 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. Electric induction apparatus comprising, a magnetic core composed of a pair of E-shaped members being disposed with their legs extending toward each other, an I-shaped member separating said E-shaped members and being perpendicular to the legs of said E-shaped members, at least one electrically conductive coil mounted on the central leg of each of said E-shaped members, said coils being magnetically coupled and said core being held together as a unit by strips of magnetic material which are mounted between said coils and said central legs of said E-shaped mem-

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bers, said strips being perpendicular to the longitudinal axis of said I-shaped member and having their center portions in contact with opposite sides of said I-shaped members.

2. In combination, two open magnetic circuit core members, a separate reactor coil on each of said core members, a common magnetic core member which effectively closes the magnetic circuits of said first mentioned core members independently of each other, and means for clamping said core members together as a unit and also providing a predetermined amount of electromagnetic coupling between said coils comprising at least two relatively thin strips of magnetic material on opposite sides of said core members having separated portions thereof wedged between said coils and their respective core members and having an intermediate portion in contact with said common core member.

3. In combination, two laminated open magnetic circuit core members, a separate reactor coil on each of said core members, a common laminated magnetic core member which effectively closes the magnetic circuits of said first mentioned core members independently of each other, and means for clamping said core members together as a unit and also providing a predetermined amount of electromagnetic coupling between said coils comprising a pair of relatively thin strips of magnetic material having separate portions thereof wedged between said coils and the opposite sides of their respective core members, and having intermediate portions in contact with said common core member, said strips of magnetic material being in contact with the outer lamination of said core members whereby said strips also serve to clamp the laminations of said core members together.

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