Nov. 2, 1937. J. MORELISSE 2,097,770

TRANSFORMER

Filed Jan. 21, 1937

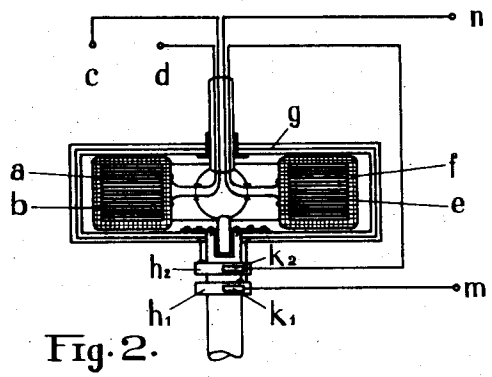


Fig. 2.

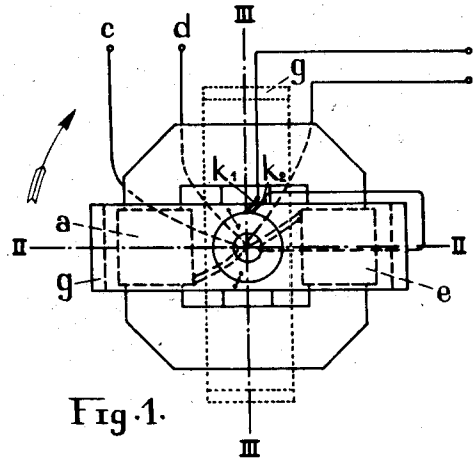


Fig. 1.

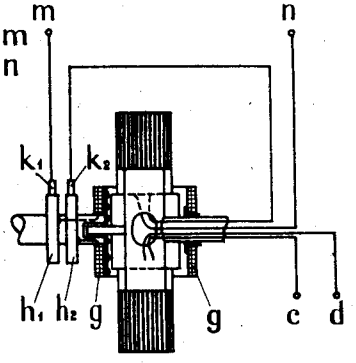


Fig. 3.

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TRANSFORMER

Jan Morelisse, Amsterdam, Netherlands

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In the Netherlands January 25, 1936

1 Claim. (Cl. 171—119)

My invention relates to transformers and more especially to a single-phase transformer which is particularly adapted for use in electrical welding.

It is an object of my invention to provide a transformer of this kind which allows obtaining in a particularly simple and efficient manner a uniform regulation of the current in the secondary winding within a predetermined range.

Hitherto in electric welding in order to be able to regulate the current it has been proposed to connect in series with the primary winding on one limb or with the secondary winding on the other limb of a single-phase welding transformer of the core type an auxiliary winding which embraces the yoke of the transformer and is provided with tappings. In this way, however, only a step-by-step regulation of the current, corresponding to the number of tappings, is obtained, so that it is not always possible to adjust the current to the correct value which will as a rule lie between two successive tappings.

One has therefore also attempted to obtain a more continuous current regulation by providing a movable magnetic shunt in the form of a transformer limb.

In one constructional form of a transformer of this type one transformer winding is arranged on one or several of the fixed limbs, whilst the other winding is arranged on one or more of the fixed limbs and also on the movable limb. This arrangement however involves the disadvantage that the stray field passes through iron, whereby the time constants become greater than if the stray field were to pass through air, which is unfavourable for a welding transformer, on account of the short-circuits, the extinction and re-ignition of the arc, which occur in welding.

There has further become known a shell transformer which may be adjusted to different voltages between a maximum position and a minimum negative value by sub-dividing one of the two windings into a part which is wound on the middle limb and two parts which are wound, symmetrically with respect to this middle limb, on a displaceable transverse limb. By displacing this transverse limb a continuous change of voltage is obtained. This however involves the disadvantage, that the displaceable windings are included in the magnetic circuit, so that, in dependency upon the position of the transverse limb, a voltage is induced in these windings, which will increase or decrease the no-load voltage. Now, if the circuit is adjusted for a small current, that is a low voltage, the no-load voltage will be reduced, whereby the striking of the arc is rendered more difficult, whilst, owing to the small current, it will become difficult to keep the arc burning.

According to the present invention all these difficulties are overcome in that in a single-phase welding transformer of the core type, in which an auxiliary winding embracing the transformer yoke is connected in series with the primary winding on one limb or with the secondary winding on the other limb, the auxiliary winding can be rotated for adjustment relative to the yoke of the transformer about an axis perpendicular to the surface of the yoke.

In the drawing affixed to this specification and forming part thereof a transformer embodying my invention is illustrated diagrammatically by way of example.

In the drawing

Fig. 1 is an elevation.

Fig. 2 a section on the line II—II and

Fig. 3 a section on the line III—III of Fig. 1.

Referring to the drawing, there is disposed on the limb *a* of the yoke of the transformer the primary winding *b* which ends in the two terminals *c* and *d*. On the limb *e* is arranged the secondary winding *f*, with which is connected in series the auxiliary winding *g* which can be rotated for adjustment about the yoke. The connection between the secondary winding *f* and the auxiliary winding *g* is formed by the slip rings h_1 and h_2, on which slide the brushes k_1 and k_2 through an arc of 180° when the auxiliary winding *g* is turned, which may then occupy the intermediate position shown in dotted lines in Fig. 1. The brush k_1 associated with the slip ring h_1 which is connected to one end of the auxiliary winding *g*, is connected to the secondary terminal *m*. The brush k_2 associated with the slip ring h_2 which is connected to the other end of the auxiliary winding *g*, is connected to one end of the secondary winding *f*, the other end of which is connected to the other secondary terminal *n*. In this way the auxiliary winding is thus connected in all positions in series with the secondary winding.

The auxiliary winding which embraces both the primary and the secondary winding, can be turned in a known manner by means of a hand wheel (not shown) from the position shown in full lines in Fig. 1 through an angle of 90° in the direction indicated by the arrow into the position shown in dotted lines and then through a further 90°.

In the position shown in Fig. 1 there is gen-

erated in the loaded state in the auxiliary winding an E. M. F. which emanates from the stray fields of the transformer. Provided the winding direction of the auxiliary winding is such that this E. M. F. is directed oppositely to that in the secondary winding, then the reduction of the current produced in the secondary winding due to this E. M. F. will be at its maximum.

When the position of the auxiliary winding is that shown in dotted lines, the stray fields which now run parallel to the auxiliary winding will produce no E. M. F. therein, so that for this reason there will be no reduction in the current in the secondary winding. During the movement of the auxiliary winding from the position shown in full lines into that shown in dotted lines its influence on the secondary winding gradually diminishes, whilst, on the rotary movement being continued, this influence increases again just as gradually, but in the opposite sense, until after a rotation through 90° a maximum is reached again.

In this way it is possible to obtain with very simple means an altogether uniform regulation of the current in the secondary winding from a maximum value below to a maximum value above the calculated value.

The same effect is obtained, when the direction of winding of the auxiliary winding is the opposite of the aforesaid assumption, whilst a series connection may exist with the primary, instead of with the secondary winding, or when a two-phase or a three-phase primary winding is provided.

I wish it to be understood that I do not desire to be limited to the exact details of construction shown and described for obvious modifications will occur to a person skilled in the art.

I claim:

A regulable single-phase transformer of the core type comprising in combination, a yoke, a primary winding and a secondary winding on said yoke, and an auxiliary winding embracing said yoke and connected in series with one of said windings, said auxiliary winding being arranged to be rotated for adjustment about said yoke about an axis perpendicular to the surface of said yoke.

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