July 28, 1925. 1,547,497

T. M. HUNTER

LOW VOLTAGE HEAVY CURRENT TRANSFORMER

Filed Feb. 15, 1924

Fig. 1

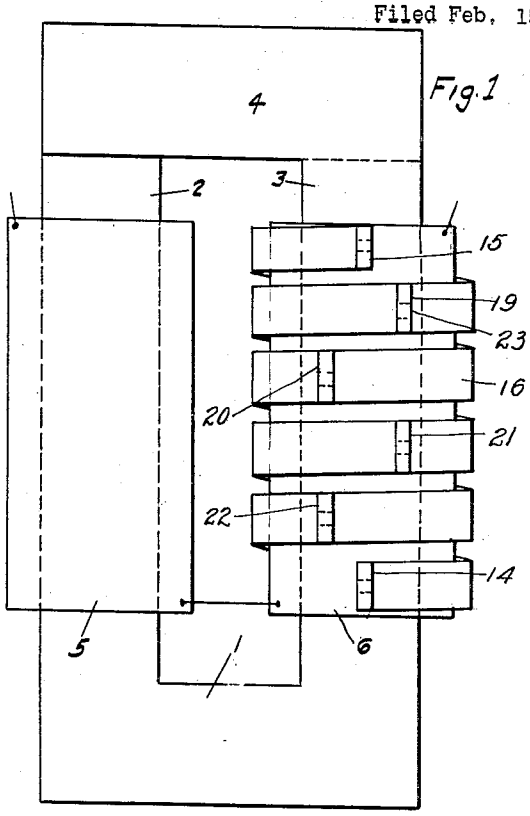


Fig. 2

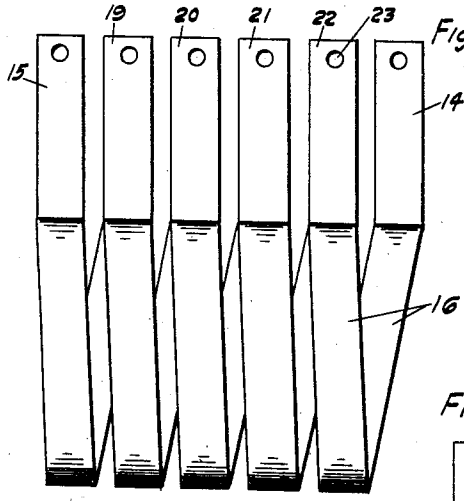


Fig. 3

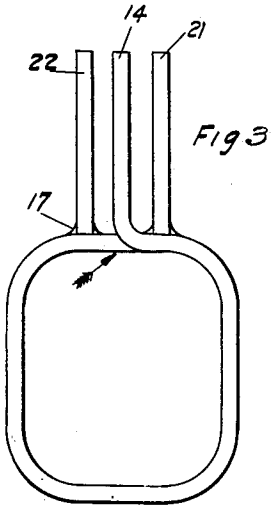
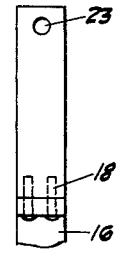


Fig. 4



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LOW-VOLTAGE HEAVY-CURRENT TRANSFORMER.

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To all whom it may concern:

Be it known that I, THOMAS M. HUNTER, a citizen of the United States, residing at Newark, in the county of Essex, State of New Jersey, have invented certain new and useful Improvements in a Low-Voltage Heavy-Current Transformer, of which the following is a description, reference being had to the accompanying drawing and to the figures of reference marked thereon.

This invention relates to the design of a low voltage heavy current transformer. Such transformers are used for butt welding and other purposes where a low voltage heavy alternating current is required.

The principal object of my invention is to provide a transformer which shall be efficient in its operation and one that is simple and hence cheap to construct.

My invention will be best understood by reference to the attached drawing, wherein:

Figure 1 is a view of a transformer of the prior art;

Figure 2 shows the construction of my improved form of secondary winding;

Figure 3 being an end view of Fig. 2; and

Figure 4 is a modified form of a detail hereinafter referred to.

In the various views, 1 illustrates the core of a transformer shown as being made up of U-shaped laminations having limbs 2 and 3 which are closed by a yoke 4. On the limb 2 is placed one coil 5 of the primary winding, the other coil 6 being disposed on the limb 3. So far as applicant is aware, the transformers constructed for the purpose above indicated, have had the secondary winding constructed of U shaped members usually of cast copper, the limbs of which are insulated in any suitable manner. These U shaped members are then slipped over one of the primary coils and connections from one member to the other completed by a cross-bar screwed or bolted to the ends of the U shaped members. Where taps were desired, it has been the practise to provide some sort of a stud tapped at both ends so as to make connection with the end of the U shaped member as well as to make connection at the outer end of the stud. This construction necessitates doing a certain amount of machine work on the faces of the studs as well as the U shaped members. Furthermore it introduces into the secondary circuit, as will be seen, quite a number of joints which are very apt to become loosened due to the strains put on the winding and the vibrations which are inherent in alternating current transformers.

In order to get away from these difficulties, I have designed the secondary from a continuous strip of good conducting material, preferably soft copper that is rectangular in cross section. This complete secondary is shown in Figs. 2 and 3, the winding starting with the terminal 14 and ending with the terminal 15. As shown in Fig. 2, each turn of the winding is provided with a tap. These taps are preferably made from the same bar stock as the secondary 16 and are set endwise, preferably on the top part of the turns of the secondary as indicated in Fig. 3, and are welded thereto as indicated at 17 or they may be attached to the turns as shown in Fig. 4 wherein two pins 18 are used to project through the turns 16, being riveted on the inside and sweated thereto. I prefer to arrange these taps alternately in different planes so that for example taps 19 and 21 are in the same plane, but are offset from the end turns 14 and 15, which are in another plane, and the taps 20 and 22 being in still another plane, thereby giving plenty of room to attach the terminals through the medium of the holes 23 in the tapped conductors or the end terminals. The taps, however, may be arranged diagonally across the top part of the secondary turns in the direction indicated by the arrow in Fig. 3.

While I have shown taps on each of the turns whereby different voltages may be obtained, it will be understood that the number of taps and their location with respect to the turns may be varied to suit the particular job which is to be taken care of by the transformer. After the secondary winding has been all completed with its taps and insulation, if any is desired other than the insulation which may be on the outer part of the primary coil, it is slipped over one of the primary coils in about the same position as in the former type of secondary winding, as shown in Fig. 1, and the yoke 4 is then properly put into position. By using only one secondary coil associated with only a portion of the primary, I obtain a transformer having considerable reactance, so that when the turns of the secondary are momentarily short-circuited as

they are for some classes of work, such as butt welding, no damage is done to the transformer.

While I am aware that butt welding transformers have been used with a heavy conductor as a continuous winding, I believe I am the first to associate taps, especially in the manner provided, for these heavy secondary turns and I, therefore, do not wish to be limited except as limited by the scope of the appended claims.

Having thus described my invention, what I claim is:

1. In a transformer of the class described, a divided primary winding on the core, a continuous single layer secondary winding formed from one piece of good electrical conducting material having substantially a uniform cross section throughout its length and adapted to be passed over one portion of the primary, said secondary having taps, of substantially the same cross sectional area as the secondary, welded thereto.

2. In a transformer of the class described, a divided primary winding on the core, a continuous single layer secondary winding associated with one part of the primary, said secondary comprising a relatively few number of turns rectangular in cross section and having taps of substantially the same cross section as the secondary welded to each turn of the secondary in staggered relationship, as and for the purpose described.

3. In a transformer of the class described, a core, a primary winding on the core, a continuous secondary on the core, a section through said secondary being rectangular in shape, said secondary having taps consisting of rectangular shaped bars set on end on the flat outer surface of any secondary turn desired and fastened to said turn.

4. In a transformer of the class described, a core, a primary winding on the core, a continuous secondary on the core, a section through said secondary being rectangular in shape, said secondary having taps consisting of rectangular shaped bars set on end on the flat outer surface of any secondary turn desired, and securely fastened to said turn, said taps being set alternately in different planes.

5. In a transformer of the class described, a core, a primary winding on the core, a continuous secondary on the core, a section through said secondary being rectangular in cross section, said secondary having taps consisting of rectangular shaped bars set on end on the flat outer surface of any secondary turn desired, and securely fastened to said turn, said taps being set on the turns intermediate the end turns so as to lie in a plane or planes different from that of the end terminals.

In testimony whereof, I affix my signature.

THOMAS M. HUNTER.