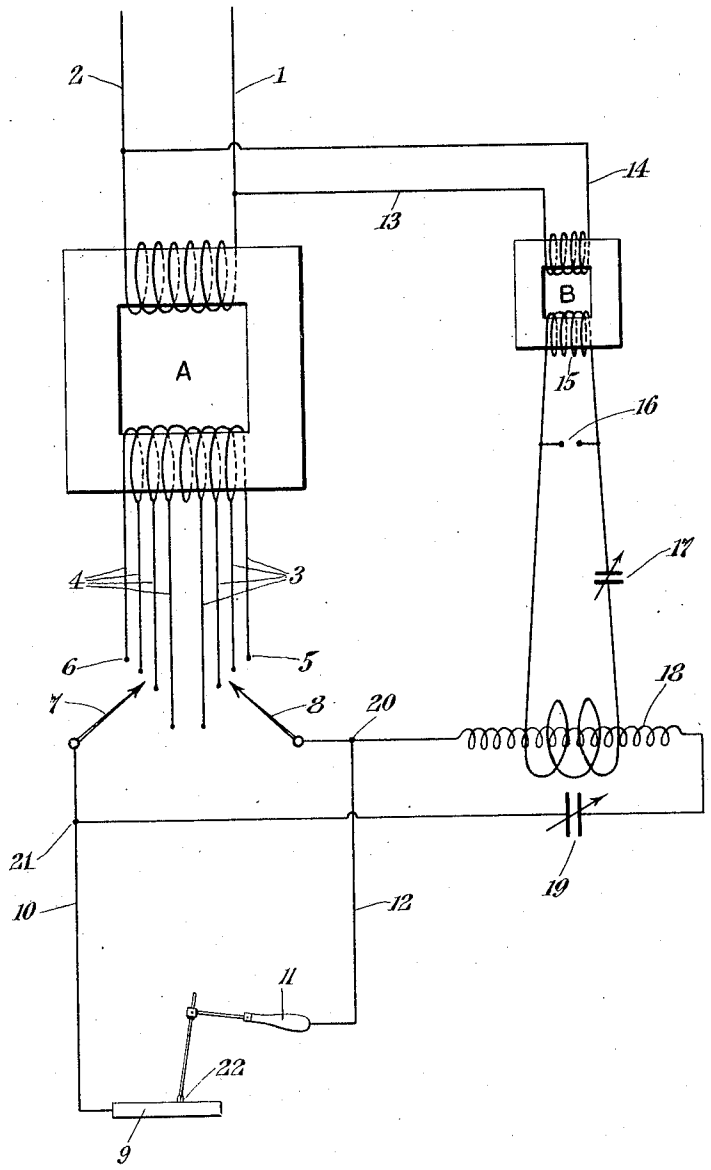
E. J. VON HENKE.

APPARATUS FOR AND METHOD OF WELDING.

APPLICATION FILED JAN. 18, 1919.

1,351,815. Patented Sept. 7, 1920.



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APPARATUS FOR AND METHOD OF WELDING.

1,351,815. Specification of Letters Patent. Patented Sept. 7, 1920.

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To all whom it may concern:

Be it known that I, EDMUND J. VON HENKE, a citizen of the United States, and residing at 5 Northern avenue, New York city, New York, and whose post-office address is the same, have invented certain new and useful Improvements in Apparatus for and Methods of Welding, of which the following is a specification.

My invention relates to apparatus for and method of welding. My invention is directed particularly to welding in which alternating current is used.

One of my objects is to produce a transformer which may be sold at a low price and one with which the welding operation may be carried out with minimum annoyance and with maximum efficiency.

In the usual methods of welding with alternating current, considerable amount of reactance is placed in the circuit, either as a separate reactance or by reason of a special design of the transformer. This reactance is provided for two reasons: first, to limit the flow of current, and second, to provide a higher starting voltage than is normally necessary for the arc. The result of the use of this high reactance is a very poor power factor when the secondary current is varied from full to light load. The necessity for such a provision as that above set forth entails a considerable amount of expense, and it is this expense that I overcome with my invention as hereinafter explained.

In the accompanying drawings forming a part of the specification is shown diagrammatically apparatus embodying my invention.

The apparatus comprises a main transformer A and an auxiliary transformer B. Both of these transformers are connected to the main source comprising lines 1 and 2. The secondary of the transformer A has taps 3 and 4 for giving varying voltages. These taps are brought out to terminals 5 and 6 to which are adapted to be connected arms 7 and 8. One of these contact arms, as for instance 7, is connected to the work 9 by wire 10, and the other, as for instance 8, is connected to the electrode 11 by wire 12. By bringing the arms 7 and 8 into contact with the proper terminal 5 or 6, voltage of the secondary is varied.

The transformer B is connected across the main line 1—2 by conductors 13 and 14. The secondary 15 of this transformer has connected across it a spark gap 16 and in series with it is connected a condenser 17. The secondary is placed in inductive relation to a coil 18. In series with the coil 18 is a condenser 19, and the terminals of the coil 18 are connected in multiple with the contact arms 7 and 8 at 20 and 21. Being connected at 20 and 21 likewise places this coil 18 in parallel with the arc point 22. The parts are so designed in the transformer B that the voltage of the line 1—2 is stepped up and by reason of the action of the spark gap 16 and condenser 17 very much higher frequency voltage is induced in the coil 18 than exists in the main line or in the transformer A or its secondary, which supplies the arc. This causes a relatively high voltage high frequency current of the coil 18 by reason of its connection across the arc point 22. The transformer B is so designed as to have relatively small power but is constantly connected across the line and across the arc point so as to produce or strike the main heating arc which is then supplied with power from the secondary of the transformer A. The condenser 19, among other things, prevents current flowing from the wires 10 and 12 into the circuit of the coil 18 for the reason that the frequency of the current in the circuit 10—12 is not sufficient to permit it to pass through the condenser whereas current induced in the coil 18 is such that it will readily pass through the condenser 19.

From the foregoing, it will be seen that I have provided an apparatus or system in which no large amount of separate reactance is necessary nor in which it is necessary to provide a large amount of internal reactance in the transformer A beyond the amount necessary to stabilize the arc.

The high frequency high voltage current for starting the arc may be produced by any suitable arrangement, either from the same source as shown or from a separate source, or by any of the well known means for producing current of the above character. The arrangement which I have shown is merely for the purposes of illustration but I am by no means to be limited to the exact arrangement shown.

From the foregoing, it will be seen that by means of the transformer A a large volume of welding current is available at low voltage and low frequency, and by reason of the transformer B and its connections

a high frequency high voltage current is provided and permanently connected across the arc point for the purpose of establishing and sustaining the arc, it being the fact that in welding operations the arc constantly tends to extinguish. By my arrangement the arc is reëstablished from a high voltage source of little power thereby avoiding a large rush of current; and this high voltage is constantly available and therefore acts to instantaneously reëstablish the arc without in any way depending upon some automatic apparatus to open or close the circuit. By this arrangement the least possible annoyance is experienced and the maximum is obtained because of the possibility of avoiding the high reactance in the main transformer or its circuit which in usual systems is causing low power factors without producing any beneficial effect as far as the actual welding operation is concerned.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In welding apparatus, a main source for the welding arc, and an auxiliary source for starting the arc permanently connected in parallel with the arc and of higher frequency than the main source.

2. In welding apparatus, a main source for the welding arc, an auxiliary source for starting the arc permanently connected in parallel with the arc and of higher frequency than the main source, and means preventing leakage of power from the main circuit to the auxiliary circuit.

3. In apparatus for alternating current welding, a main transformer for welding power, an auxiliary transformer for starting the welding arc, means permanently connected to the welding electrodes for increasing the frequency of the current of the auxiliary transformer and means preventing the flow of current from the main transformer to the auxiliary transformer.

4. In alternating current welding apparatus, means for supplying a large low voltage low frequency current for the welding arc and means for continuously supplying a small high voltage high frequency current for maintaining the arc.

5. In alternating current welding apparatus, means for supplying a large low voltage low frequency current for the welding arc, means for continuously supplying a small high voltage high frequency current for maintaining the arc and means preventing the welding current passing into the high frequency circuit.

6. In welding apparatus, a transformer having a low voltage secondary for supplying the welding arc, an auxiliary source of high frequency and relatively high voltage permanently connected across the arc point and a condenser in the circuit of said auxiliary source.

7. In welding apparatus, a main transformer having a low voltage secondary for supplying the welding arc, an auxiliary transformer connected to the same source as said main transformer, means in the secondary of said auxiliary transformer for increasing the frequency of its output, a high voltage winding connected across the arc point and in inductive relation to the auxiliary transformer, and a condenser in series with the winding.

8. In welding apparatus, a main transformer having a low voltage secondary for supplying the welding arc, an auxiliary transformer connected to the same source as said main transformer, means in the secondary of said auxiliary transformer for increasing the frequency of its output, and a high voltage winding connected across the arc point and in inductive relation to the auxiliary transformer.

9. In welding apparatus, a main transformer for supplying the welding arc, an auxiliary transformer for constantly supplying a high voltage across the arc point and a condenser in the high voltage circuit.

10. In welding apparatus, a main transformer for supplying the welding arc, and an auxiliary transformer for constantly supplying a high voltage across the arc point.

11. The method of maintaining a welding arc which consists in applying constantly a high frequency relatively high voltage current to strike the arc and a low frequency relatively low voltage current for sustaining the arc.

12. The method of maintaining a welding arc which consists in constantly supplying a high voltage current of small volume to the arc point and constantly supplying a low voltage low frequency current of large volume to the arc point to produce the weld.

In testimony whereof, I have signed my name to this specification.

EDMUND J. VON HENKE.