April 12, 1932. E. J. VON HENKE 1,853,101

ELECTRIC WELDING MACHINE

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Fig. 1.

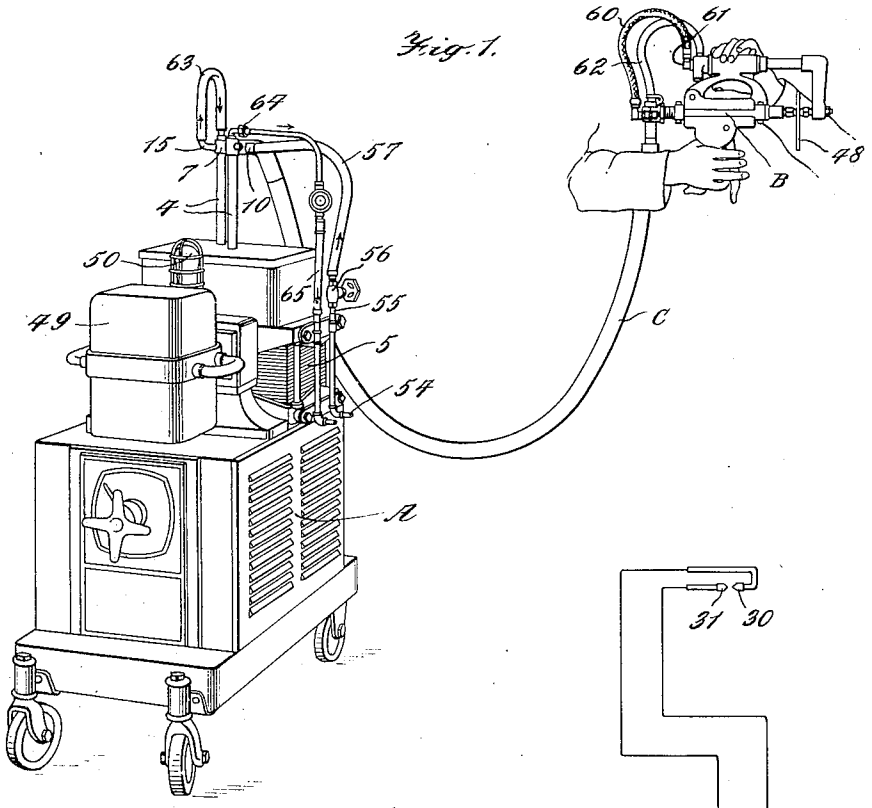

Fig. 7.

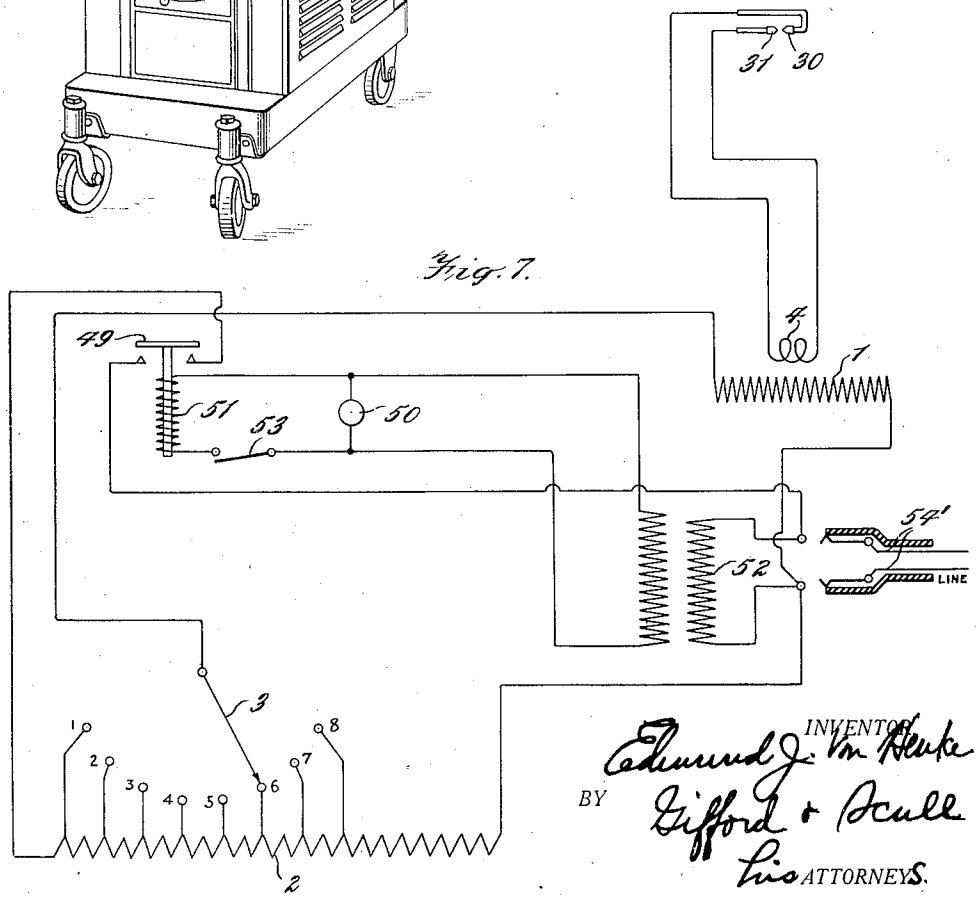

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Fig. 3.

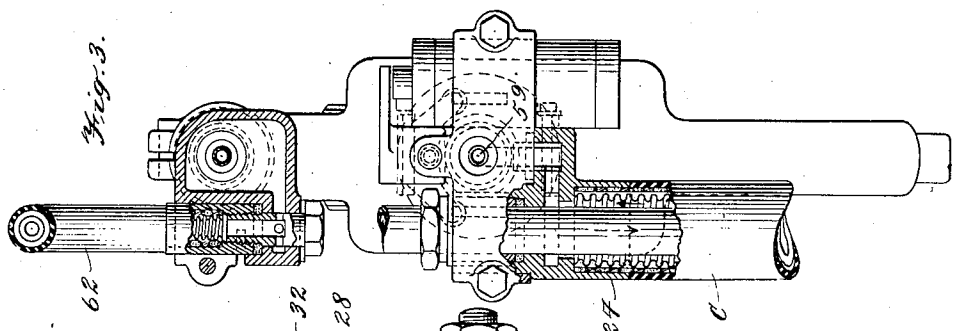

Fig. 2.

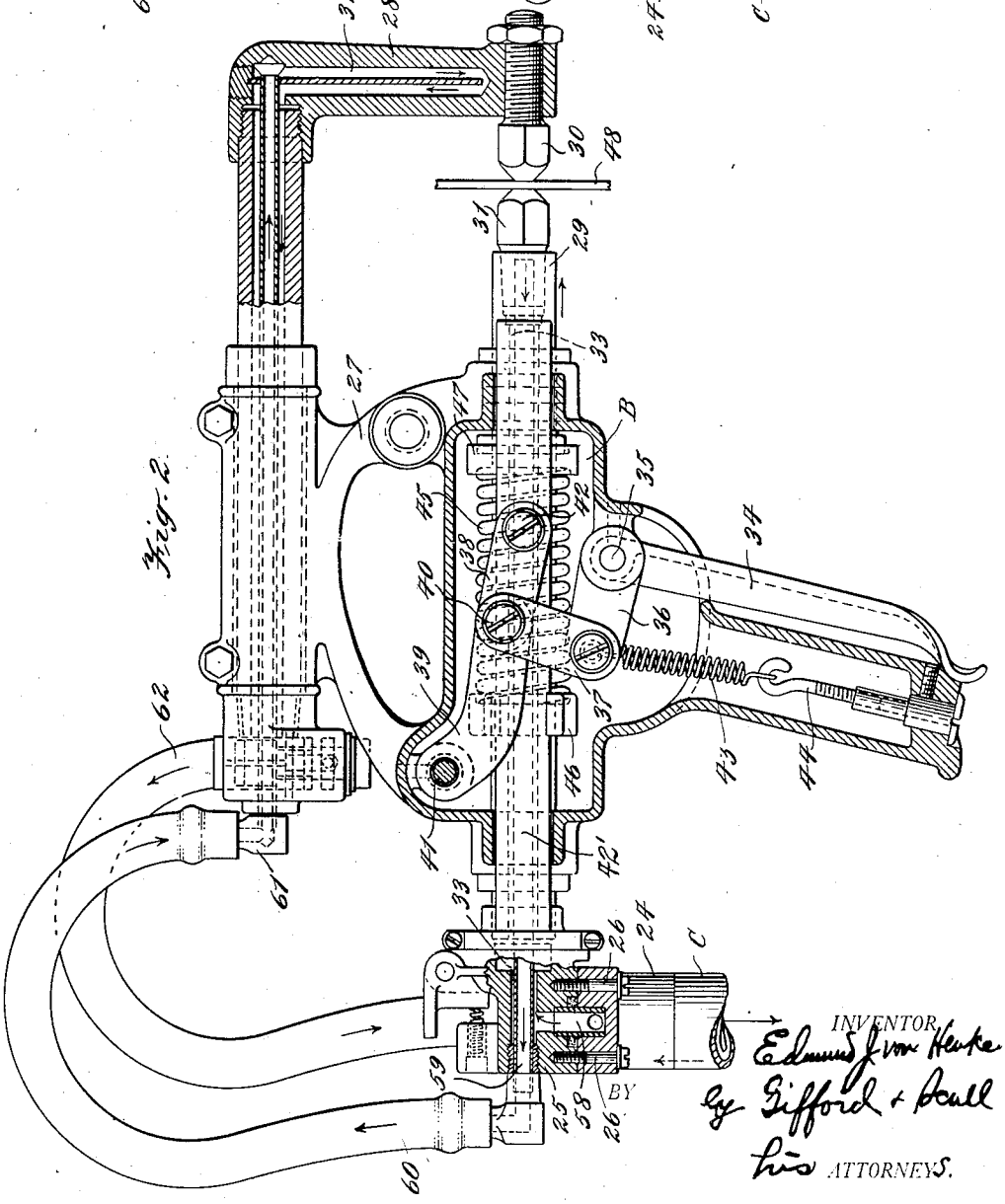

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Fig. 4.

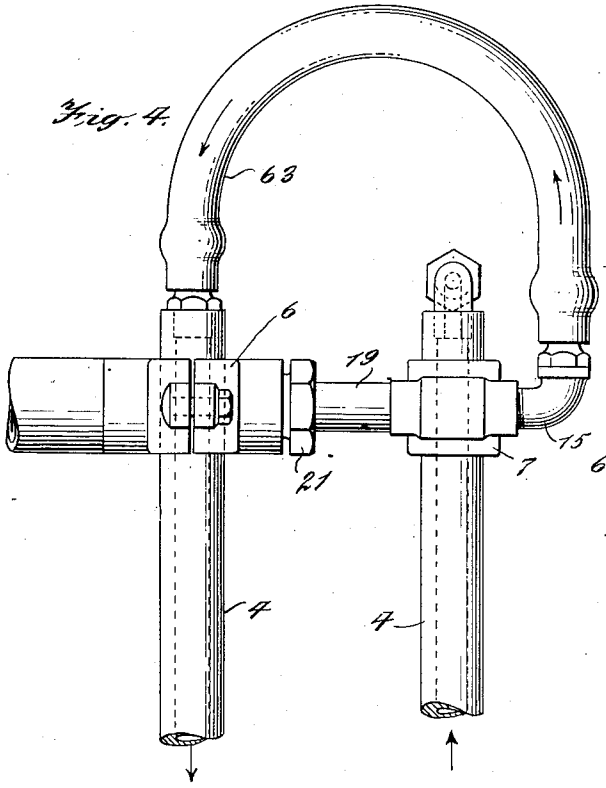


Fig. 5.

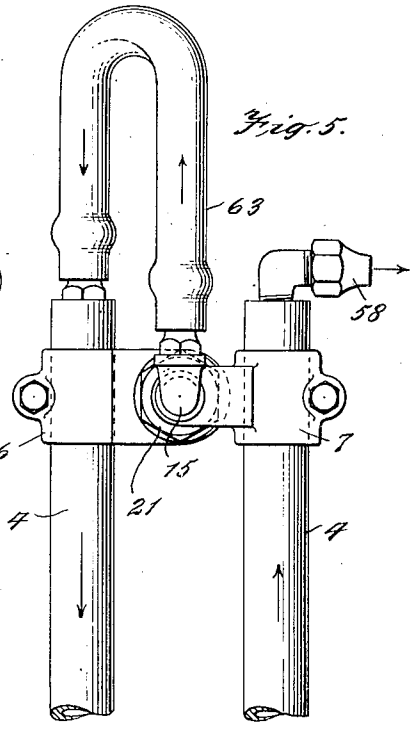
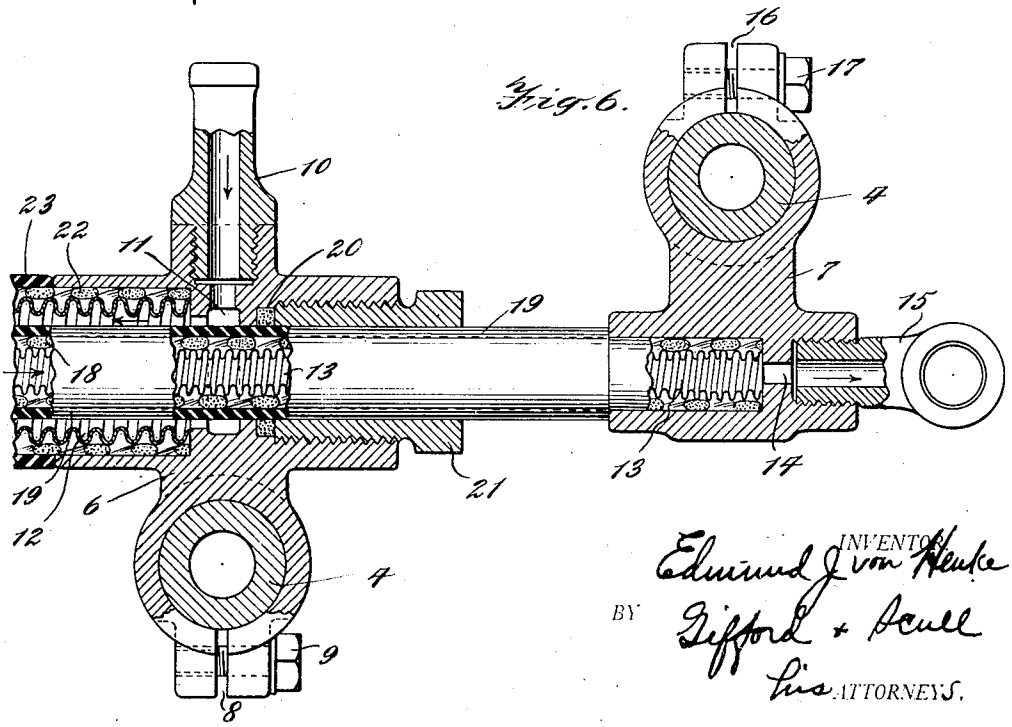


Fig. 6.



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UNITED STATES PATENT OFFICE

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ELECTRIC WELDING MACHINE

Application filed September 11, 1926. Serial No. 134,759.

My invention relates to electric welding machines and particularly to portable welders and parts therefor.

There are many places in the modern factory where portable welders are almost indispensable to high efficiency in factory production. It is not always possible to carry the work to the welder and therefore it becomes essential to carry the welder to the work.

I have devised a portable welder which has many features of novelty, thereby rendering it efficient and useful, particularly in the automobile factories.

My invention will be better understood by reference to the following description taken in connection with the accompanying drawings, in which:—

Fig. 1 is a perspective view of the complete welder;

Fig. 2 is a view partly in section of the head;

Fig. 3 is a fragmentary view showing certain parts in section;

Fig. 4 is a view of the water connections;

Fig. 5 is a view of the same parts shown in Fig. 4 at an angle of 90° therefrom;

Fig. 6 is a section of a portion of the flexible conductors and water connections therefor; and

Fig. 7 is a diagram of the electrical circuits.

Broadly considered, the welder consists of a transformer A, a head B and a flexible conductor C. In detail, the transformer consists of a primary 1, an auto coil 2, with taps 1—8 and an adjustable conductor 3 for connection with any one of the taps. The transformer, insofar as the primary and core are concerned, is of the usual construction. The secondary 4 consists of the desired number of turns of hollow pipe of conducting material. In this particular instance, the secondary is provided with three turns. This hollow pipe extends down through and around the core 5 of the transformer, as shown in Fig. 1. Connected with the ends of the secondary conductor are connectors 6 and 7 of conducting material. As shown in Fig. 6 one end of the connector 6 is split at 8 and a bolt 9 passed through the same to clamp the end of the secondary 4 in the connector. The connector is also provided with a nipple 10 through which water flows into a channel 11 which communicates with the interior of the flexible conductor 12. The flexible conductor 13 also passes through the connection 6 and enters an opening in the connector 7 which in turn communicates with a nipple 15. One end of the connector 7 is split at 16 and a bolt 17 is threaded into this connector and acts to clamp the end of the secondary 4 in place.

One of the important features of my invention is the flexible conductor which conveys the energy from the transformer secondary to the welding electrodes. This conductor will now be described. It consists of two conductors 12 and 13, with the conductor 13 inside the conductor 12 and preferably concentric therewith. The conductors 12 and 13 are preferably made of corrugated copper tubing and are flexible in all directions. These two conductors are kept in spaced relation to each other by braided wire 18 which is placed around the conductor 13, between it and the flexible insulating material 19. The material 19 is preferably a flexible tube of any known construction, usually consisting of canvas and partially vulcanized rubber. The end of the conductor 13 is fastened in the connector 7 by any suitable means such as soldering. Or it may be sweated in position.

A rubber ring 20 is placed around the tube 19, and a packing nut 21 when screwed down on said ring forms a water tight connection.

Conductor 12 is surrounded by braided wire 22, and around this is placed a flexible tube 23 of the same construction as that of the tube 19. The end of the conductor 12 is fastened in the connector 6 by soldering or sweating.

Fig. 2 shows the other end of the flexible conductor C and its connection with the welding head. The conductor is soldered or sweated into the connector 24 which is bolted to the head 25 by bolts 26.

The head comprises a frame 27 by which are carried two electrode holders 28 and 29. Electrodes 30 and 31 are held in the electrode

holders. The holders may be of any suitable material, preferably copper, and are provided with channels 32 and 33, respectively. A cooling liquid such as water is circulated through these channels for cooling the electrodes as will be explained in detail later.

The electrode holder 29 is movable with respect to the holder 28 by the following mechanism: An operating handle 34 is pivotally mounted on the frame at 35. The bell crank 36 is pivotally connected with a link 37. The link 37 connects with links 38 and 39, all three of which are pivotally connected together at 40. The link 39 is pivoted to the frame at 41 and the link 38 is pivotally attached to the electrode holder 29 at 42 through slide bars 42'. A spring 43 connects at one end with the bell crank 36 and at the other end to an adjustable hook 44 carried by the frame. A coil spring 45 surrounds the electrode holder 29 between slide bars 42' and tends to move the electrodes 30 and 31 into contact with work between them. One end of the spring 45 is fixed to the slide bars 42' by a member 46 and the other end is connected with the electrode holder 29 by a member 47.

When it is desired to separate the electrodes 30 and 31, the handle 34 is rotated in a counter clockwise direction. When it is desired to move the electrodes into engagement with the work 48, the handle 34 is rotated in a clockwise direction which straightens out the toggle 38—39. This moves the slide bars 42' to the right and puts the electrode 31 into engagement with the work. Any further movement of the toggle is taken up by the spring 45, which is compressed by relative movement between slide bars 42' and holder 29.

Referring to Figs. 1 and 7, it will be noted that a clapper switch 49 is provided for controlling the primary circuit of the transformer and a pilot lamp 50 is provided for the purpose of indicating when the energy is on the welder. The pilot lamp 50 and the actuating coil 51 of the clapper switch are supplied with energy through the transformer 52. An operating switch 53 is provided in the circuit between the lamp 50 and coil 51.

I will now trace the flow of cooling fluid through the parts to be cooled. Water enters through the nipple 54 (Fig. 1) and passes up through a pipe 55 provided with a valve 56. It then passes through a flexible hose 57 to the nipple 10, through the passage 11 to the interior of the conductor 12 (Fig. 6), and thence to the tool shown in Fig. 2. From the outer conductor the liquid passes through the passage 58, through the electrode holder 29 and then back through the passage 59 to the flexible conductor 60, thence to the nipple 61 of the electrode holder 28, thence through the channel 32 back to the flexible conductor 62, thence to the inner conductor 13 to the nipple 15. From the nipple 15 the liquid is conducted through the flexible pipe 63 to the secondary conductor 4. It passes through the secondary 4 up to the nipple 64 and out through the pipe 65.

From the foregoing it will be seen that the cooling fluid passes first through the conductor C to and through the electrode holders, back through the conductor C, and thence through the secondary of the transformer, thereby cooling all of these parts so as to keep their temperature down to the desired amount.

By reason of the arrangements above described, I produce a portable welder which may be moved from place to place on the carriage, which, when connected with a power circuit, may be used for welding any desired parts of an automobile or other article in an efficient and expeditious manner; the flexible conductor connecting the transformer with the welding head avoids any unbalancing from an electrical standpoint because of the fact that the two conductors, 12 and 13, are one inside the other and held concentric with respect to each other, thereby avoiding all magnetic and other inductive effects which, with the large current used, would be a serious problem.

Notwithstanding all of the advantages above mentioned which are secured by my invention, I have succeeded in producing a simple, economical and compact machine.

Further advantages will be appreciated by those skilled in the art.

I claim:

1. A flexible conductor for high current density comprising two corrugated hollow conductors, one inside the other, flexible insulating means for separating said conductors from each other and means for supplying cooling fluid to said conductors.

2. A flexible conductor for high current density comprising two corrugated hollow conductors, one inside the other, flexible insulating means for separating said conductors from each other and means for supplying cooling fluid to said conductors separately.

3. A flexible electrical conductor consisting of two hollow concentric flexible fluid-tight conductors, connectors on the ends of said conductor, said connectors having channels communicating with the interiors of said concentric conductors and means for insulating said conductors from each other.

4. In combination, two flexible tubular members disposed one within the other and each formed of electrical conducting material, flexible insulating means disposed between said members, flexible insulating means covering the outer member, and connections to said members for supplying cooling fluid thereto.

5. In combination, two flexible tubular members disposed one within the other and

each formed of electrical conducting material, and a flexible tube of insulating material disposed between said members and spaced from the outer one, said tube and said outer member forming between them a channel for the flow of cooling fluid.

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