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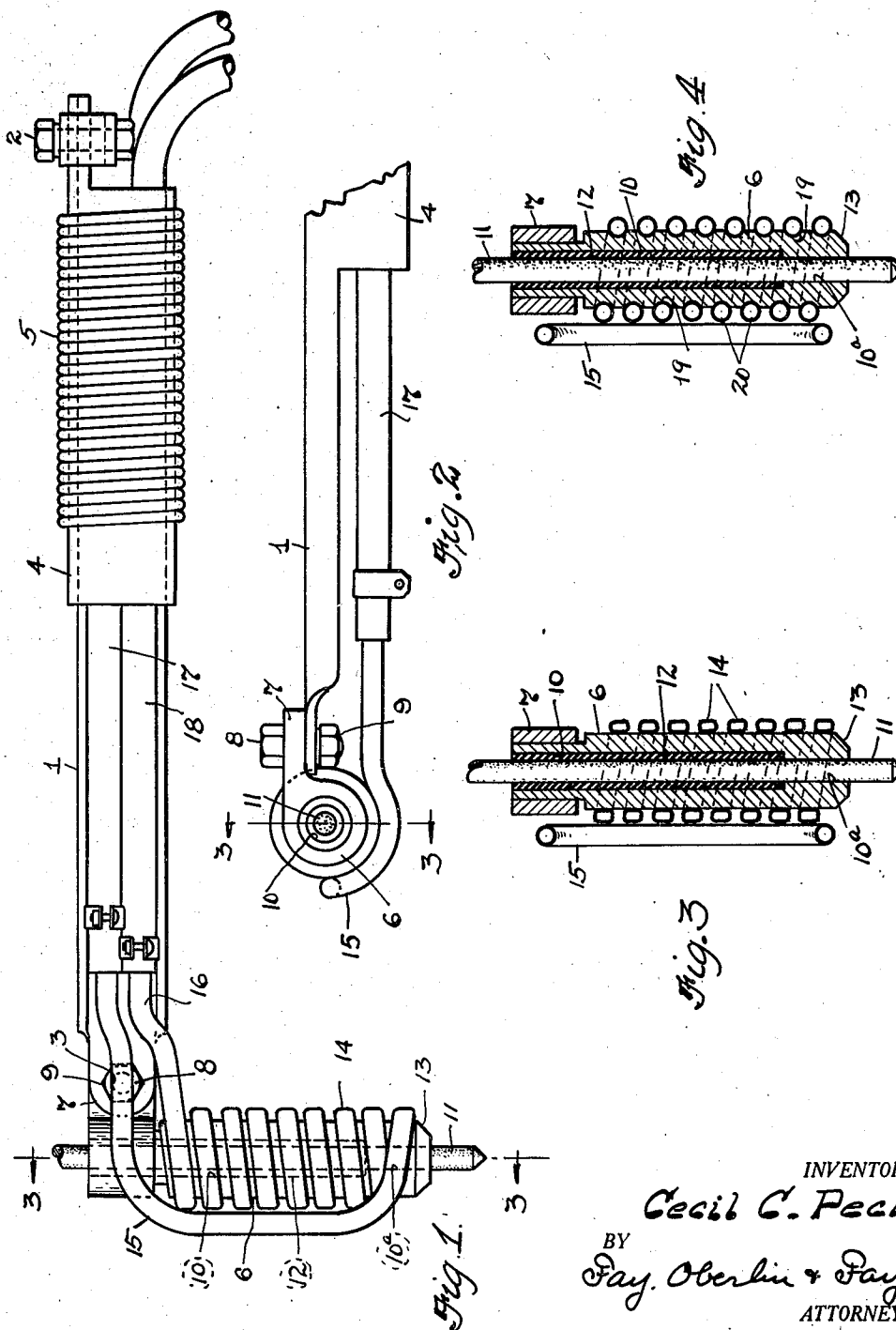
1,577,489

C. C. PECK

ELECTRODE HOLDER

Filed April 11, 1925

2 Sheets-Sheet 1



INVENTOR.

Cecil C. Peck

BY

Fay, Oberlin & Fay -
ATTORNEYS

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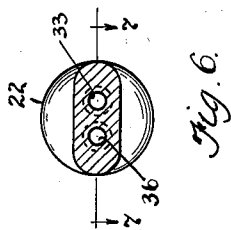
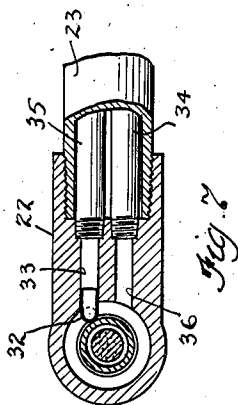
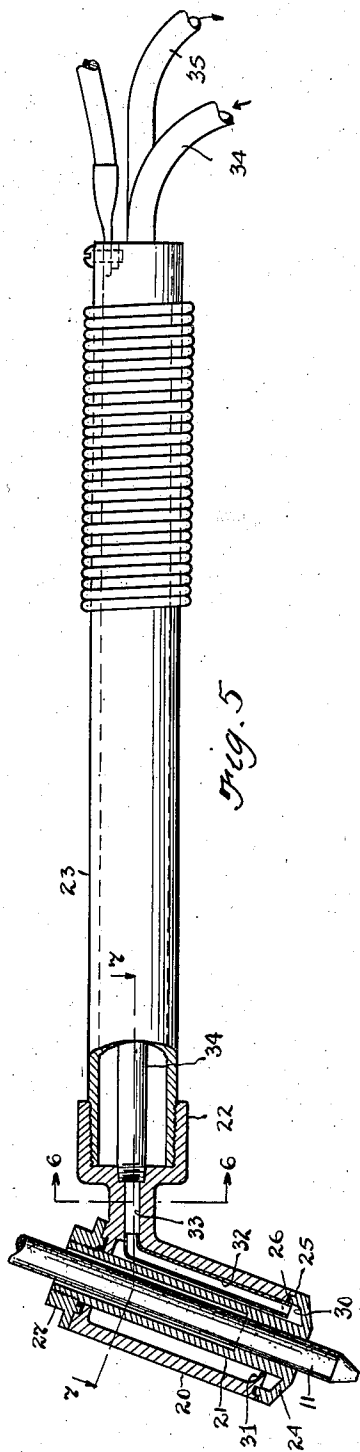
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE.

CECIL C. PECK, OF CLEVELAND, OHIO, ASSIGNOR TO THE LINCOLN ELECTRIC COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

ELECTRODE HOLDER.

Application filed April 11, 1925. Serial No. 22,443.

To all whom it may concern:

Be it known that I, CECIL C. PECK, a citizen of the United States, and a resident of Cleveland, county of Cuyahoga, and State of Ohio, have invented a new and useful Improvement in Electrode Holders, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

In the use of the electric arc for metal working or for analogous operations, wherein the electrode is moved about by hand, considerable difficulty has been encountered in providing a satisfactory holder for such electrode, particularly where the latter is in the form of a carbon pencil. It is necessary, of course, that the holding implement should permit the operator to grasp the same at a point not too far removed from the working end of the electrode. A very high degree of temperature, however, is developed at the point where the arc is thus struck and ordinary heat insulating means are either to be cumbersome or else inadequate for the proper protection of the user. Furthermore, the pencil, if exposed to the air, tends to oxidize and so waste away for a considerable distance back from the operating point.

One object of the present invention, accordingly, is to provide an improved form of electrode holder of portable type wherein means are incorporated for cooling both the implement and the portion of the pencil back of its operating point, so that the implement may be handled without discomfort and the body of the pencil be prevented from reaching an oxidizing temperature. A further object is to so construct the holder that the current passing therethrough to the electrode or pencil will be required to traverse the latter the shortest possible distance.

To the accomplishment of the foregoing and related ends, the invention, then, consists of the means hereinafter fully de-

scribed and particularly pointed out in the claims, the annexed drawing and the following description setting forth in detail certain mechanism embodying the invention, such disclosed means constituting, however, but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawing:—

Fig. 1 is a side elevation of an electrode holder embodying my present improvements; Fig. 2 is a broken plan view thereof; Fig. 3 is a vertical transverse section taken on the plane indicated by the lines 3—3, Figs. 1 and 2; Fig. 4 is a sectional view, similar to that of Fig. 3, but showing a modification in construction; Fig. 5 is a side elevation similar to Fig. 1, but showing still a further modification; and Figs. 6 and 7 are transverse sectional views of the latter taken on the planes indicated by the lines 6—6 and 7—7, respectively, Fig. 5.

In the form of the device illustrated in Figs. 1, 2 and 3, the main element is a longitudinally extending body member 1 formed of aluminum or other metal of high electrical conductivity, aluminum being preferred because of its relatively light weight. One end of said member 1 is provided with mechanical lead connections 2 of familiar form, while the other end is formed with a transverse opening 3 to permit the attachment thereto of the electrode holder proper, as will be presently described. The portion of body member 1 adjacent lead connections 2 is made of hollow cylindrical cross-section and of proper diameter to be conveniently grasped by the hand of the operator. Such handle portion 4 furthermore desirably has wrapped about it one or more layers of asbestos rope 5 to insure thorough heat insulation.

The electrode holder 6 is of general cylindrical form, its upper end being provided with an offset ear 7 apertured to match the opening 3 in body member 1, so that said holder may be secured to the body member in desired angular relation by means of bolt

8 and nut 9, as will be readily understood. Said holder 6 is pierced with a central aperture 10 that extends its entire length and is of uniform diameter save for the portion 10^a immediately adjacent the outer or free end of the holder, which is smaller in diameter than the remaining longer portion of such aperture. The diameter of such portion 10^a in fact is such as to provide close fitting contact with the electrode 11, shown as consisting of a cylindrical carbon pencil, when such electrode is inserted in the holder. In order to guide as well as properly support the pencil 11, a sleeve or bushing 12 of fiber, or equivalent electrical insulating material, is fitted in the main portion of opening 10 to the bore of such sleeve, being of approximately the same diameter as the aperture portion 10^a.

As a result of the foregoing construction, it will be seen that the electric current entering the main body 1 of the device by way of connections 2 will flow into the electrode proper only at the lower extremity of holder 6. Such current, in other words, has no occasion to traverse any considerable extent of the pencil within the holder and the consequent resistance heating effect is confined to such comparatively short length of the electrode. It will further be noted that the lower extremity 13 of the holder is beveled so that it is unnecessary for the electrode to project any great distance beyond such holder.

Surrounding the holder and in close fitting surface contact therewith is a spiral tubular coil 14, preferably of copper, the lower end 15 of such coil being bent upwardly alongside and parallel with the axis of the coil and thence being bent at approximately right angles and carried for a short distance parallel with the upper end alongside the body member 1 of the holder. The extremities of the respective tube ends are suitably connected with flexible tubular conduits 17 and 18 that extend thence through the hollow handle 4 to a point removed from the immediate field of use of the device where one such conduit, preferably conduit 17, is connected with a pressure water supply and the other is allowed to discharge to waste. It will be understood, of course, that any suitable cooling medium may be circulated through the conduits 17 and 18 and the coil 14.

As shown in Figs. 1, 2 and 3, the tube that comprises coil 14 is of slightly flattened section in order to increase the area of contact between same and the holder 6, the exterior surface of the electrode being that of a plain cylinder. In Fig. 4, on the contrary, the surface of the latter is formed with a spiral groove 19 in which the coil 20, here of circular section, lies.

Instead of employing a coil, a cooling

chamber closely surrounding the holder may be otherwise provided as for example by means of a shell 20 (see Figs. 5, 6 and 7) that is spaced the proper distance from the electrode holder 21. In the modified construction in question, the holder differs in the first place from the one previously described in that it is rigidly instead of adjustably secured by means of an integral threaded sleeve 22 to the tubular handle member 23. In the second place, said holder is formed at its lower end with a flange 24 that is rabbeted to form a tight fitting joint 25 with the lower end of shell 20, a packing ring 26 being furthermore interposed to insure against leakage. The upper end of the holder extends through the corresponding end of the shell and is externally threaded to receive a nut 27 whereby the two parts in question may be secured together. In the third place, it will be noted that the insulating sleeve or bushing between the holder and electrode is omitted, the interior wall of the holder being simply spaced from the electrode 11 except at the lower end of the holder with which alone the electrode is in contact.

The inner face of flange 24 is provided with an annular recess 30 that forms in effect a continuation of the annular chamber between the holder 21 and shell 20. However, such recess is very nearly closed off from the remainder of such chamber by means of an inwardly directed flange 31 at the lower end of the shoulder, as clearly shown in Fig. 5.

The cooling fluid is first led into such annular recess 30 by means of a duct 32 which extends from flange 31 to a cored out passage 33 in the handle attaching sleeve 22. A flexible tubular conduit 34 is connected with such passage 33 through which a cooling fluid is supplied, and another similar conduit 35 is connected with a second passage 36 that opens directly into the upper end of the annular chamber between shell 20 and the electrode holder 21.

From the foregoing construction, it will be evident that the cooling fluid entering by way of conduit 34 will be initially supplied to the annular recess 30 at the tip of the electrode holder from which it will escape to the constricted opening left between flange 31 and such holder. The fluid thence rises in the annular chamber and escapes by way of passage 36 and conduit 35. The constriction provided by flange 31 insures that the recess 30 will at all times contain such cooling fluid and the latter is moreover caused to circulate around the holder in order to escape from such recess.

No further description of the manner of use of my improved electrode holder is deemed necessary since the use of a device of this sort is in general well understood.

The several adjustments and the mode of operation of the novel parts comprising the device will, moreover, be readily understood from the foregoing description thereof. The device has been subjected to severe practical tests without the handle 4 becoming uncomfortably warm; in fact, the usual protective mitten may be discarded, if desired. Furthermore, due to the fact that the electrode holder is positively cooled to its very tip, and in particular in that portion through which electrical contact is had with the carbon pencil 11, the latter is prevented from becoming heated except at its exposed working extremity. The life of the pencil is correspondingly prolonged and the operation, whatever its character, in which the electric arc is being utilized, is materially facilitated.

In conclusion it should be noted that holder 6 in the case of the first described form of the device, as well as holder 21 in modified form, will require to be made not only of a metal that is a good conductor of electricity but also one having a high thermal conductivity. For practical reasons I prefer to use hard drawn copper, although aluminum may be used and silver would be still better but is too costly.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the method herein disclosed, provided the step or steps stated by any of the following claims or the equivalent of such stated step or steps be employed.

I therefore particularly point out and distinctly claim as my invention:—

1. In a device of the character described, the combination of a body member provided with a handle at one end; an electrode holder secured to the other end of said body member, said holder being formed with an aperture adapted to receive an electrode pencil; a cooling chamber closely surrounding said holder; and connections for said chamber passing through said handle.

2. In a device of the character described, the combination of a body member provided with a handle at one end; an electrode holder secured to the other end of said body member said holder being formed with an aperture adapted to receive an electrode pencil and having electrical contact at its outer end only with the latter; a cooling chamber closely surrounding said holder; and connections for said chamber passing through said handle.

3. In a device of the character described, the combination of a body member provided with a handle at one end; an electrode holder secured to the other end of said body member, said holder being formed with an aperture adapted to receive an electrode pencil and having electrical contact at its

outer end only with the latter; and a cooling chamber closely surrounding said holder, said chamber being arranged and constructed to conduct the cooling fluid initially to such contact end of said holder; and connections for said chamber passing through said handle.

4. In a device of the character described, the combination of a body member provided with a handle at one end; an electrode holder angularly adjustably secured to the other end of said body member, said holder being formed with an aperture adapted to receive and hold an electrode pencil; a cooling chamber in the form of a coil closely surrounding said holder; and flexible connections for said coil carried by said body member.

5. In a device of the character described, the combination of a body member provided with a hollow handle at one end; an electrode holder angularly adjustably secured to the other end of said body member, said holder being formed with an aperture adapted to receive and hold an electrode pencil; a cooling chamber in the form of a coil closely surrounding said holder; and flexible connections for said coil passing through the hollow handle of said body member.

6. In a device of the character described, the combination of a body member provided with a handle at one end; an electrode holder angularly adjustably secured to the other end of said body member, said holder being formed with an aperture adapted to receive and hold an electrode pencil; a bushing of electrical insulating material fitted in the aperture in said holder and preventing electrical contact between the latter and such pencil except adjacent the free end of said holder; a cooling chamber in the form of a coil closely surrounding said holder; and flexible connections for said coil carried by said body member.

7. In a device of the character described, the combination of a body member provided with a handle at one end; an electrode holder secured to the other end of said body member, said holder being formed with an aperture adapted to receive an electrode pencil and having electrical contact at its outer end only with the latter; a cooling chamber in the form of a coil closely surrounding said holder, and connections for said coil, said connections being arranged to conduct the cooling fluid initially to the end of the coil adjacent such contact end of said holder.

8. In a device of the character described, the combination of an electrode holder formed with an aperture adapted to receive an electrode pencil and having electrical contact at its outer end only with the latter, and a cooling chamber closely surrounding said holder, said chamber be-

ing arranged and constructed to conduct the cooling fluid initially to such contact end of the holder.

9. In a device of the character described, the combination of an electrode holder formed with an aperture adapted to receive an electrode pencil and having electrical contact at its outer end only with the latter, a cooling chamber in the form of a coil

closely surrounding said holder, and connections for said coil, said connections being arranged to conduct the cooling fluid initially to the end of the coil adjacent such contact end of said holder.

Signed by me, this 10th day of April, 1925.

CECIL C. PECK.