

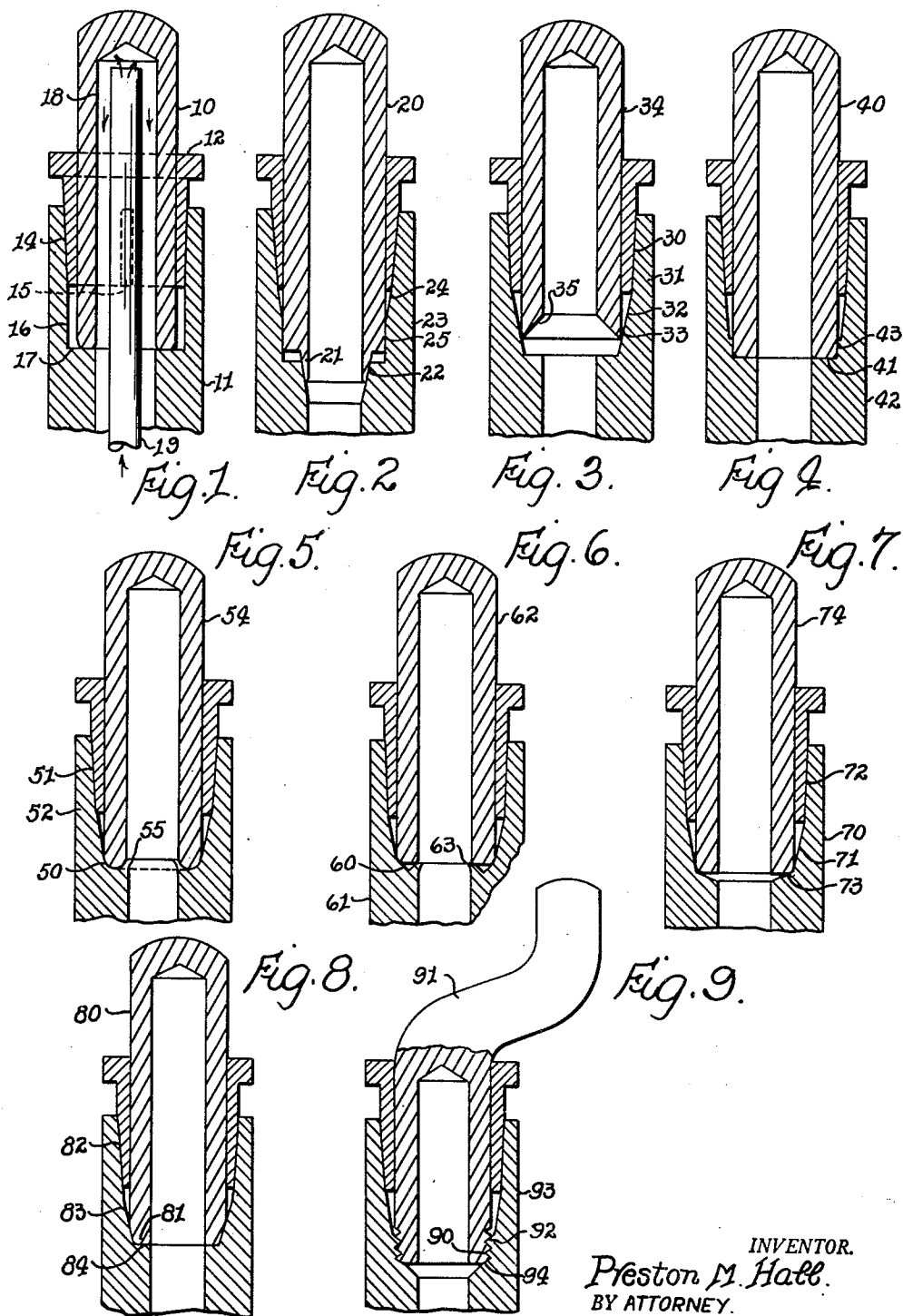
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ELECTRODE HOLDER

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ELECTRODE HOLDER

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4 Claims. (Cl. 219—4)

This invention relates to electrodes of the type commonly used in resistance spot-welding, and relates more particularly to the water cooling of such electrodes. It is common to make these electrodes hollow and to supply water to the interior thereof through a pipe extending into the electrode but spaced from the sides of an axial opening therein. Effective circulation of the cooling water is thus ensured.

It is the general object of my present invention to provide improved means for sealing the electrode in its holder and thus preventing the escape of water from the cooling system.

A further object is to provide sealing means so constructed that pressure applied to an electrode during a welding operation will more firmly seat and seal the electrode.

Preferred forms of the invention are shown in the drawing, in which

Fig. 1 is a sectional front elevation of an electrode and holder which show a preferred form of my improved sealing construction;

Figs. 2 to 8 inclusive are similar views of modified constructions; and

Fig. 9 is a sectional front elevation showing a sealing construction particularly adapted to an offset electrode.

Referring particularly to Fig. 1, I have shown an electrode 10 secured in a holder 11 by a slightly conical holder bushing 12 adapted to be forced into a corresponding slightly conical recess 14 in the holder 11. The lower portion of the bushing 12 is slotted as indicated at 15, so that the bushing may be compressed as it is forced into the holder, with a resultant firm grip on the cylindrical outer surface of the electrode 10.

The conical recess 14 preferably has a cylindrical extension 16 terminating at a shoulder 17. The lower end of the electrode 10 is preferably provided with rounded inner and outer edges and directly engages the shoulder 17 when the electrode is forced into the holder by the usual application of heavy welding pressure.

The electrode 10 is also provided with a cylindrical axial opening 18, and a pipe 19 conducts cooling water to the upper end of the electrode, the flow being indicated by arrows. The pipe 19 is substantially smaller than the opening 18, so that it is well spaced from the side walls thereof. Cooling water is thus permitted to enter the electrode through the pipe 19 and to return through the annular space between the pipe 19 and the side wall of the recess 18.

The seating of the electrode squarely against the shoulder 17 prevents leakage of water from

the cooling system, and the more pressure that is applied to the electrode, the more firmly the electrode is seated and the more effective is the water seal.

The particular means shown in Fig. 1 for securing the electrode 10 in the holder 11 is not claimed in this application, as it forms the subject matter of a copending application Serial No. 524,410, filed by me February 29, 1944. In the constructions shown in Figs. 2 to 9, the means for clamping the electrode in the holder is or may be the same as shown in Fig. 1 and no further explanation of this clamping means appears necessary.

Figs. 2 to 9 particularly disclose modified constructions by which a water-tight seal is provided between the electrode and the holder. In these figures, the pipe 19 is omitted for the sake of clearness, but it will be understood that such a pipe is to be used as above described.

In Fig. 2, the lower end of the electrode 20 is provided with a tapered conical end flange 21 which seats in a corresponding conical recess 22 in the holder 23. Furthermore, the conical recess 24 in the holder 23 is provided with a cylindrical extension 25 in which the lower end of the electrode 20 is a close sliding fit. Consequently a double seal is provided, first by engagement of the flange 21 with the wall of the recess 22, and second by engagement of the lower end of the electrode 20 with the wall of the recess extension 25.

In the construction shown in Fig. 3, the slightly tapered recess 30 in the holder 31 is provided with a more abruptly tapered extension 32 which is engaged by the lower edge 33 of the electrode 34. Close engagement of the edge 33 with the conical wall of the recess extension 32 is facilitated by countersinking the lower end of the electrode, as indicated at 35, to provide a relatively thin and slightly yielding lower edge or corner.

In the construction shown in Fig. 4, the lower end of the electrode 40 seats against a shoulder 41 in the holder 42 and also fits snugly against the side wall of a cylindrical recess 43. This provides another construction in which a double seal is secured—first by engagement of the end of the electrode 40 against the shoulder 41, and second—by engagement of the periphery of the electrode against the side wall of the cylindrical recess 43.

In the construction shown in Fig. 5, an annular groove 50 is formed at the lower end of the conical recess 51 in the holder 52, and the annular lower end of the electrode 54 is rounded in cross section to correspond to the groove 50. The inner upper portion 55 of the grooved part of the holder

is offset inwardly to avoid the very thin sharp edge which would otherwise form the inner boundary of the annular groove 50. The pipe which introduces the cooling water is to clear the edge 55 sufficiently to avoid interference with the flow of water in the cooling system.

The construction shown in Fig. 6 is similar to that shown in Fig. 5, except that the annular groove 60 in the holder 61 is V-shaped in cross section. The lower end of the electrode 62 engages the sides of the V-shaped groove 60 at two separated points, thus again providing double sealing engagement. That portion 63 of the holder forming the inner boundary of the groove 60 is thickened and offset inwardly for the purpose described with reference to Fig. 5.

In Fig. 7, the holder 70 has a more sharply inclined recess portion 71 at the lower end of the conical recess 72, and this portion 71 terminates in a relatively flat but slightly conical end surface or shoulder 73. The lower end of the electrode 74 is rounded as to its outer corner and is seated approximately at the point where the shoulder 73 meets the side wall of the recess portion 71.

In Fig. 8, the lower end of the electrode 80 is beveled as indicated at 81, and the lower end of the holder recess 82 has a more sharply tapered portion 83 fitting the beveled end 81 of the electrode and terminating in a shoulder 84 against which also the electrode is seated. A further form of double seal is thus provided.

In Fig. 9, the lower end 90 of the offset electrode 91 is threaded to engage a threaded portion 92 of the holder 93. The extreme lower end of the electrode is also beveled to seat against a conical shoulder 94 in the holder 93. With this construction, an effective seal is attained by firmly screwing the electrode 91 into the holder 93 and this operation is facilitated by the offset construction of the electrode.

In all of these constructions, it will be seen that the electrode may be quickly and easily removed from the holder by first loosening the holder bushing, as 12, and by then slightly tapping the electrode sidewise. This will easily loosen the electrode, even in such forms as shown in Figs. 2 and 4 in which the outer wall of the lower end of the electrode is snugly engaged. Obviously the

electrode shown in Fig. 9 is readily loosened by unscrewing the same.

Having thus described my invention and the advantages thereof, I do not wish to be limited to the details herein disclosed, otherwise than as set forth in the claims, but what I claim is:

1. A resistance welding electrode and holder in which coating surfaces of the electrode and holder engage to provide an effective liquid seal, said holder having a locking element and said electrode having substantial lateral clearance with respect to the outer end of the holder to facilitate separation of the parts after said locking element is removed from locking position.

2. In a welding mechanism, an electrode, a holder, and a locking element to secure said electrode in said holder, said holder having a shoulder coacting with the inner end of the electrode to form a liquid seal between the electrode and holder, and said electrode also firmly engaging an inner side wall portion of said holder adjacent said shoulder but having substantial clearance with respect to the outer end portion of the holder after the locking element is removed from operative position.

3. In a welding mechanism, an electrode, a holder, and means to secure said electrode in said holder, the inner end of said electrode being rounded and convex, said holder having a shoulder coacting with the inner end of the electrode to form a liquid seal between the electrode and holder, and said shoulder having an annular concave groove to receive the rounded and convex inner end of said electrode.

4. In a welding mechanism, an electrode, a holder, and a locking device to secure said electrode in said holder, said holder having a sealing surface engageable with the extreme inner end of said electrode to provide an effective liquid seal, and said electrode being of substantially less outside diameter than the inside of the outer end of said holder and being readily laterally displaceable relative to said holder after said locking device is removed from operative position, whereby said electrode may be easily removed from said holder.

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