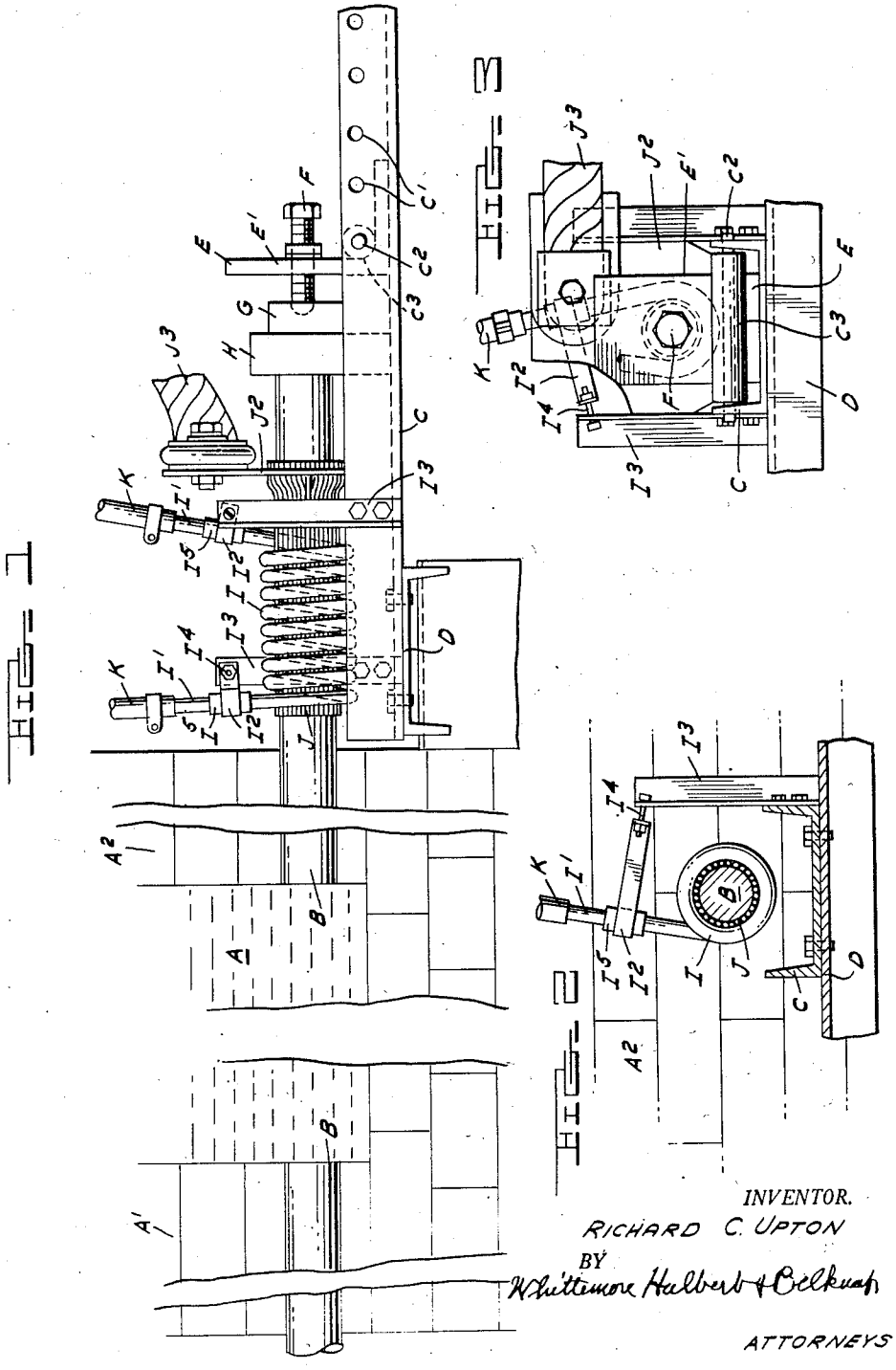
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FUSED BATH ELECTRICAL FURNACE

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FUSED BATH ELECTRICAL FURNACE

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The invention relates to electrical furnaces of the fused salt bath type. It is the object of the invention to obtain a construction in which the electrodes may be continuously replaced without interruption of the operation of the furnace. It is a further object to reduce the heat losses due to outward thermal conduction through the electrodes. With these objects in view the invention consists in a construction in which the electrodes extend into the bath from below the surface thereof to project only a limited distance therein. The invention further consists in means for intermittently advancing the electrodes as the inner end portion thereof wastes away and further in the more specific construction as hereinafter set forth.

In the accompanying drawings:

Fig. 1 is a sectional elevation showing a portion of an electrical heat treating furnace of the fused bath type.

Fig. 2 is a section on line 2—2, Fig. 1.

Fig. 3 is an end elevation of the electrode and its connections.

In the construction of electrical furnaces of the fused salt bath type the electrodes extend into the bath to introduce the electrical energy thereinto. Usually contact between the electrode and the bath is of considerable area for the passage of a relatively large current volume at relatively low voltage. While there are certain advantages resulting from such extended contact area there are also detrimental features, such as the necessity of shutting down the furnace when renewal of the electrodes is required. Also, loss of energy through outward thermal conduction of the electrodes is excessive. With my improved construction only the inner end portions of the electrodes contact with the bath which greatly reduces the extent of contact area. This reduces loss due to outward thermal conduction but requires a higher voltage for the introduction of the required electrical energy. Further saving is effected by reducing the diameter of the electrodes and still further increasing the voltage. As there are no obstructions at their inner ends the electrodes may be advanced into the bath as they waste away and this advancement may be continued by successive end abutting sections of electrodes and without interruption in the operation of the furnace.

As shown in Fig. 1, A is an electrical heat treating furnace of the fused bath type having opposite retaining walls A′ and A^2. B are electrodes extending through apertures in said walls, preferably directly opposite and in registration with each other. These electrodes need not project into the bath to any considerable extent beyond the inner surfaces of the retaining walls and, therefore, present only limited surface contact with the bath. As they waste away the electrodes may be intermittently advanced inward and such operations may be continued indefinitely. As specifically shown, the means for advancing the electrodes into the furnace includes a beam C, such as a channel beam, which extends outward from the furnace wall beneath the electrode and which is anchored at its inner end to a supporting frame D. Adjustably secured within this channel member is an angle member E, the

vertical flange E′ of which extends upward in rear of the outer end of the electrode. A screw F threadedly engaging the flange E′ bears against a metallic block G, which in turn bears against an insulator block H, which contacts the end of the electrode. The sides of the channel bar are provided with a series of spaced registering apertures C′ through which a pin C^2 may be passed and a bushing C^3 sleeved on this pin is located in the angle of the member E to retain it in its adjusted position. Thus, the screw F is used for adjusting the electrode as its inner end wastes away and when the limit of adjustment of said screw is reached the pin C^2 is withdrawn and the member E′ adjusted into registration with another pair of the apertures C^3. The pin is then reinserted and the screw used as before for further adjustment of the electrode. There is, however, a portion of the electrode projecting outward from the wall between the same and the innermost position of adjustment E′, F, G, and H. On this portion is mounted the means for supplying the electrode with electrical energy and for dissipating the heat thermally conducted outward by the portion of the electrode within the wall A′. The latter is necessary to prevent leakage of the fluid bath out through the clearance in the wall surrounding the electrode and the cooling must be sufficient to congeal the fluid while still within the wall. This specific construction of this current supplying and cooling apparatus is not a part of the instant invention but generally it is constructed as follows:

Surrounding this outer portion of the electrode is a helical coil I of tubing, leaving an accurate space between the same and the electrode. This space is occupied by a series of metallic conductors J extending longitudinally of the electrode and at their outer ends connected by a plate J′ with a flexible electrical conductor cable J^2. The helical coil is resilient and the convolutions thereof are normally of a diameter to permit of adjustment of the electrode longitudinally within the coil and conductors J. If, however, the opposite ends of the coil are angularly adjusted about its axis in a direction to wind up the helix, this will produce clamping pressure against the conductors J and through them against the electrode B. Such adjustment is provided for by tangential extensions I′ of the opposite end convolutions of the coil, links I^2 extending laterally from the upper ends of said extensions, posts I^3 extending upward from the beam C, and screws I^4 between said posts and links for adjusting the latter. By this construction the coil I and conductors J may be firmly clamped against the electrode to provide good electrical and thermal conduction and whenever it is necessary to adjust the electrode this clamping pressure may be released by the screws I^4. Insulators I^5 between the extensions I′ and the links I^2 prevent loss of electrical current through this connection. The helix is connceted by flexible conduits K to any suitable source of cooling fluid to be passed through the coil.

With the construction as above described operation of the furnace may be continued without interruption under substantially uniform conditions for a much longer period of time than with constructions heretofore used.

What I claim as my invention is:

1. In an electrical furnace of the fused salt bath type, an electrode extending through an aperture in a bath wall into the bath from below the upper surface thereof to contact therewith through only the limited surface area of the inner end portion of said electrode not greatly in excess of the cross section, means for advancing said electrode as said end portion wastes away to project said inner end portion only slightly into said bath, means for supplying current to said electrode at sufficiently high voltage to introduce the required electrical energy for heat generation to maintain the bath at desired temperature, in which

said current supplying means, together with heat dissipating means, surrounds the portion of the electrode outside the bath wall with freedom for longitudinal adjustment of said electrode therethrough, and means for clamping said surrounding means to said electrode to form good electrical and thermal conductivity therebetween.

2. The construction as in claim 1 in which said electrode is formed in aligned sections having end contact with each other, said advancing means engaging the outermost of said sections.

3. The construction as in claim 1 in which the diameter of the electrode is relatively small to correspondingly reduce the area of contact with the bath and the cross section available for thermal conduction, thereby minimizing heat loss.

4. The construction as in claim 1 having a channel beam extending outward from the bath wall and provided with a series of spaced apertures in the opposite walls thereof, and adjustment means for advancing the electrode including an angle member having its base portion within said channel, and a vertical portion extending upward in rear of said electrode, a pin passing through aligned apertures in said side walls of said channel, a bushing on said pin engaging the angle of said angle member to hold the latter in a position of adjustment along said beam, a screw in said vertical flange for pressing against the end of the electrode to adjust the same, and insulating means between said screw and electrode.

5. In an electrical furnace of the molten salt bath type in which the molten sale is heated by passage of electrical current through it as a resistor, a well for containing the

molten salt having side and bottom walls, an electrode extending through one of said walls with the inner end approximately flush with the inner wall and in contact with the molten salt below the upper surface thereof, the outer end of said electrode projecting beyond the outside of said wall, means for supplying current to said electrode at its outer end at sufficiently high voltage to introduce the required electrical energy for heat generation to maintain the molten salt at the desired temperature, heat dissipating means for said electrode, said current supplying means together with said heat dissipating means being in contact with the portion of the electrode outside said wall with freedom for longitudinal adjustment of said electrode relative thereto, means for advancing said electrode as the end in contact with the molten salt wastes away so as to maintain said inner end approximately flush with the inner wall, and means operative after each longitudinal adjustment of said electrode for clamping said current supplying means and said heat dissipating means to said electrode to form good electrical and thermal conductivity therebetween.

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