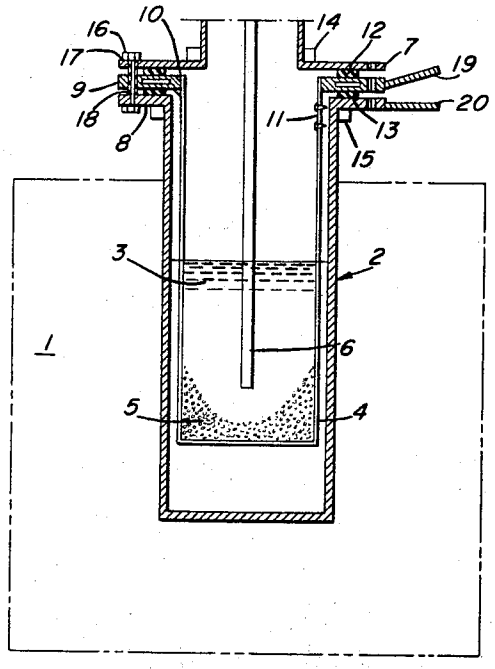
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DEVICE FOR MOLTEN SALT ELECTROLYSIS

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DEVICE FOR MOLTEN SALT ELECTROLYSIS

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In some devices for the electrolytic production of metals in a bath of molten salts, the metal deposits on the surface of a basket which forms the cathode; likewise, in some metal refining processes, the impure metal used as the soluble anode is placed in a basket through which the current is supplied to said soluble anode. The object of such an arrangement is to allow the produced metal or the remaining impurities to be withdrawn from the bath and the soluble anode to be refilled with scraps of crude metal.

Such devices comprise in a furnace a cell containing the bath of molten salts and provided with a current inlet. Usually, a basket, sensibly less deep than the cell, comprises at its top several lugs with a hole each. When the basket is set in an empty cell or in a cell containing a molten bath, bolts passing through one lug each are screwed in blind threaded bosses welded in the cell. These bolts at the same time ensure the bearing of the basket and the electric contact between cell and basket. Such an arrangement presents many disadvantages. The electric contacts between cell and basket become rapidly bad owing to the heating they undergo and to the molten bath splashings. The bosses render the cell building complex and increase the risks of tightness defects; then it is difficult to keep the cell under vacuum or to maintain a controlled atmosphere therein. Setting up and more particularly removing the basket are long and uneasy operations. And lastly, the cell happens to be electrically connected to the basket; when said basket acts as the anode it may participate in the electrolysis.

The applicant has been able to avoid these disadvantages, including cell metal dissolution if said cell is at the anode potential, by modifying the current supply to the basket and said basket shape.

The electrolysis cell according to the invention comprises an electrode basket connected directly or through lugs, by welding or by bolts, to a flange, generally of the same diameter as the upper flange of the external cell, inserted between the flange of said cell and the lower flange of its lid and fitted together with said flanges by means of electrically insulating joints and bolts.

The invention is explained in details in the following description of FIGURE 1:

1 is the heating furnace wherein the electrolysis device is placed. **2** is the cell containing the bath of molten salts **3**. Basket **4** constituting one electrode or current supply contains in **5** the metal to be treated or the metal produced; **6** is the other electrode; **7** is the flange of the lid or of any other device placed on the working cell. On its upper part cell **2** comprises a flange **8**, basket **4** is connected according to the invention to a flange **9** provided with current supplies **19** either directly by welding, as represented in **10** on the left part of the figure, or as represented on the right part of the figure, through lugs **11** welded or bolted on flange **9** and on basket **4**. If the latter solution is chosen, the number of the lugs depends in practice on the intensity of the current to be supplied to the basket.

Between flanges **8–9** and **9–7** there are respectively two

electrically insulating sealing joints **13** and **12**. It will be advantageous to use joints formed of two concentric plates of insulating material between which is inserted a toroidal joint of rubber or of flexible synethetic material. To protect these materials against the effect of the high temperature prevailing in the device, flanges **7** and **8** are cooled down, for instance by water circulations **14** and **15**. Bolts **16** passing through the different flanges are provided with washers **17** and with insulating sheaths **18**.

In another way of carrying out the invention, cell **2** bears a current supply **20** which permits its bringing to a potential different from that of electrode basket **4** thanks to an auxiliary current source unrepresented on the figure.

The invention device may also be used in processes for producing certain metals by reduction of one of their oxidized components in a molten salt bath submitted to an electric current. Then the electrode basket works as a cathode; generally the metal is deposited thereon as irregular grains called "sponge."

The use of the invention device constitutes also an improvement to the refining processes of many metals, in particular metals of Groups IV, V, VI, VII of the Periodic Table, by molten salt electrolysis between an anode formed of unrefined metal and a cathode on which the refined metal is deposited. Thus in an apparatus comprising two cells according to the invention linked together by their lower parts, the applicant has obtained a diminution of the global voltage of 10 to 60% thanks to the constant quality of the electrical connection between inlet terminal **19** and basket **4**, through said connection has been ensured by four lugs **11** instead of eight lugs bolted on the wall of cell **2**. Moreover, as cell **2** is not at the basket potential, the applicant could use a cell of ordinary steel, and however completely avoid the presence of iron in the metal deposited on the cathode. At last, the dismounting of the piece placed above cell **2**, by mere removal of bolts **16**, released at the same time basket **4** thus easily removed to be cleared of the remaining impurities and refilled with scraps of the metal to be treated.

I claim:

1. In an apparatus for electrolysis in a molten salt bath including a cell adapted to contain a molten salt bath, said cell having an outstanding flange at its upper end, a lid member for said cell having a lid member flange adapted to be secured to said cell flange, a foraminous basket constituting an anodic electrode within said cell, a cathode disposed axially within said anodic electrode and separate means connecting said anodic electrode and said cathode to a source of unidirectional direct current, the improved apparatus construction wherein said means connecting said anodic electrode to such source of current comprises an annular flange, electrically conductively secured to the upper edge of said basket, and a current supply member electrically and mechanically connected to said annular flange, said annular flange being positioned between said outstanding cell flange and said lid member flange, and electrically insulating sealing gaskets between said lid member flange and said annular flange and between said annular flange and said cell flange whereby said basket is electrically insulated from said lid member and from said cell, said cell and lid cooperating to provide a partitionless electrolysis space.

2. The improved apparatus construction defined in claim **1**, wherein the cell is electrically connected to a source of current and thus becomes cathodic with respect to the basket, thereby avoiding an electrolytic corrosion of the cell.

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