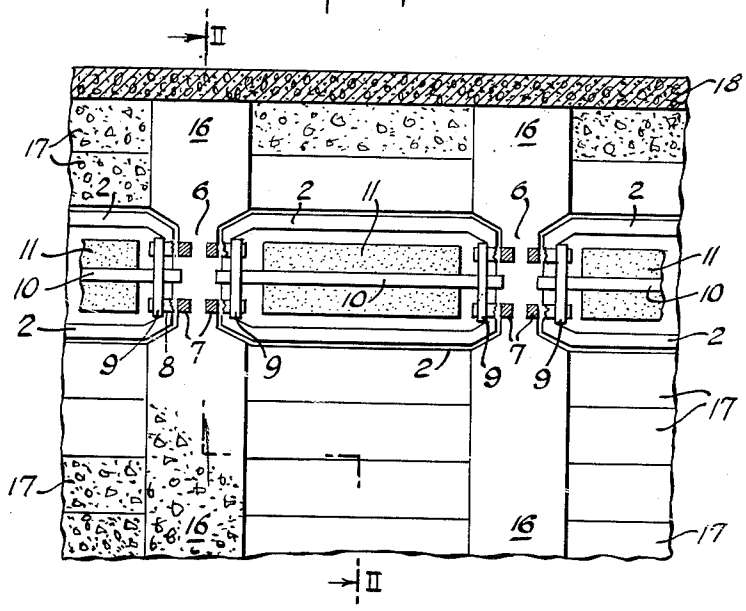
July 3, 1962 R. HEGLAND 3,042,604

FURNACES FOR ELECTROLYTIC PRODUCTION OF ALUMINUM

Filed March 27, 1961

Fig. 1.



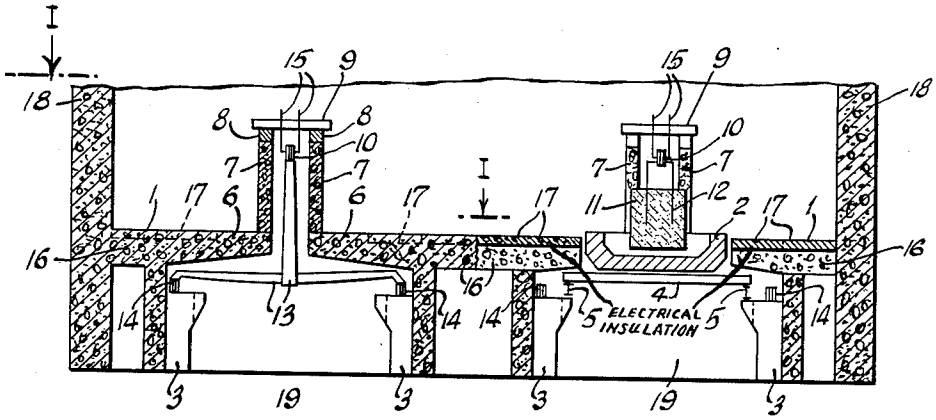


Fig. 2.

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FURNACES FOR ELECTROLYTIC PRODUCTION OF ALUMINUM

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8 Claims. (Cl. 204—244)

Electrolytic furnaces used in the production of aluminum from a fluoride melt by the usual processes include essentially rectangular pots arranged in straight rows in a furnace house and anode structures that include anodes dipping into the pots. The pots may be situated at floor level and are advantageously directly supported on foundations or brackets arranged under the floor.

The anode structures of the furnaces are generally supported on bearing members, such as for example trestles, arranged transversely to the longitudinal axes of the furnaces. These bearing members, however, tend to obstruct the servicing of the furnaces. In particular, crust-breakers are commonly provided to travel along the longitudinal sides from one furnace to the next and have arms which project into the pots to break the crusts, and the usual anode supports obstruct these crust-breakers.

It is known to mount each pot on a grate itself so supported by brackets in a basement chamber that the grate and pot can be lowered into the basement chamber and removed for repair. If the anode structures are carried by pillars also provided in the basement, these pillars prevent or obstruct the removal of the pots through the basement. To mount one such pillar on the floor of the furnace house between two furnaces is likewise unsatisfactory, as this is where the greatest thermal stresses are set up.

The problem is so to support the anodes that the furnace pots can readily be serviced and also removed for repair, and to avoid damage resulting from thermal stresses.

My present invention is concerned with a furnace house for furnaces used in the electrolytic production of aluminum and comprising rectangular pots arranged in straight rows and anode structures including anodes dipping into the pots, the tops of which are substantially at the level of the floor of the house.

According to my present invention each anode structure is supported between two adjacent pots by two pillars which extend upwards from two parts of the floor of the house separated from each other and projecting as cantilevers from the longitudinal passages on the floor between the pots in a row and which pillars lie between the vertical planes in which the longitudinal sides of the pots lie. The pots are preferably carried by brackets arranged in a basement chamber through which the pots are removable.

The preferred construction according to the invention will now be described in detail with reference to the accompanying drawings, in which:

FIGURE 1 is a plan, partly in section on the line I—I in FIGURE 2, of part of a furnace house; and

FIGURE 2 is a section through the whole width of the house, and is taken on the line II—II in FIGURE 1.

The furnace house shown has side walls **18** spanned by a floor **1** which lies above a basement chamber **19**. Two rows of furnace pots **2** containing fluoride melts into which anodes **11** dip are disposed at the level of the floor **1** in holes left in the floor, and each is carried on a grate **4** which projects laterally to rest on I-girders **5**.

These I-girders themselves rest on brackets **3**, which are constructed so that the pots can be lowered between the brackets **3** and removed for repair or replacement. The way in which the pots may thus be lowered is described in detail in United States Patent No. 2,874,103.

The floor **1** comprises reinforced concrete brackets **16** cast in situ and having cantilever extensions **6**. The brackets **16** are spanned by preformed concrete or grid elements **17** in the form of slabs. The extensions **6** extends towards each other between the furnaces, but in order to allow expansion and contraction to occur freely they are not joined together.

This freedom to move is particularly important as the highest temperatures outside the pots are set up between adjacent pots.

There are four pillars **7** between each pair of adjacent pots in a row, two for each pot. Each cantilever projection **6** carries two of these pillars, one for each pot. The four pillars all lie between the vertical planes in which the sides of the anodes **11** lie. They therefore constitute no obstruction to a crust-breaker travelling along the sides of the furnaces.

The pillars **7** are connected in pairs by longitudinal beams **8**, to form a pillar means on each cantilever projection **6** comprising two pillars side by side spaced along the longitudinal axes of the pots **2**. These longitudinal beams **8** in turn support transverse beams **9**. One or both ends of each beam **9** is free to move on the longitudinal beams to accommodate thermal expansion and contraction, but of course the beams **9** must be prevented from falling off the beams **8**.

Each anode **11** is suspended through current-supply bolts **12** from an anode carrier **10** which in turn is suspended by spindles **15** from the beams **9** so that the anode and anode carrier can be raised and lowered as a unit. The anode carrier is preferably constructed from an aluminum alloy of high strength and high electrical conductivity, and serves simultaneously as a conductor. For the latter purpose it is connected to bus bars **14** lying under the pots on the brackets **3** by conductors **13** at the ends of the pots.

The pillars **7** and the brackets **16** are made of reinforced concrete. Stray currents and short circuits between the pots through the reinforcements may be prevented by electrically insulating the overlapping ends of the rods of the reinforcements in the pillars from the reinforcements in the floor. Such insulation (e.g. of rubber) may also be provided at other places. For the same purpose the preformed concrete or grid elements **17** are separated from the brackets **16** by a layer of insulating material. The expansion space between two cantilever projections **6** can be bridged by an electrically insulated slab.

The anode structures shown can be used with both prebaked and self-baking anodes.

What I claim is:

1. In a furnace house for furnaces used in the electrolytic production of aluminum,the combination comprising a floor provided with a plurality of openings, generally rectangular pots in said openings respectively having their tops substantially at the level of the floor and arranged in a straight row extending along aligned longitudinal axes of the pots, said floor including parts in the form of cantilevers extending transversely of said longitudinal axes from anchorages towards regions between successive pots in the row, each pair of cantilevers which extend from opposite directions towards the corresponding region being spaced at said region, anodes dipping into the pots, and structures for supporting said anodes, each structure being located in the corresponding region between adjacent pots in the row and sup-

porting the anodes in said adjacent pots, said structure including a pair of pillar means extending upwardly from the cantilevers respectively at said corresponding region and located between the vertical planes of the longitudinal sides of the pots permitting servicing of the pots along their longitudinal sides by the travel of servicing devices, such as crust-breakers, along said longitudinal sides from one pot to the next without obstruction from said pillar means.

2. In a furnace house for furnaces used in the electrolytic production of aluminum, the combination as described in claim 1, wherein each of said pillar means comprises two upright interconnected pillars spaced along a direction substantially parallel to the longitudinal axes of the pots.

3. In a furnace house for furnaces used in the electrolytic production of aluminum, the combination as described in claim 1, wherein each of said pillar means comprises two upright pillars arranged side by side and spaced along a direction substantially parallel to the longitudinal axes of the pots, and wherein each of the anode supporting structures at a corresponding region comprises a longitudinal beam on the two pillars of each pillar means interconnecting said two pillars, and two transverse beams from which the anodes are suspended supported on the two longitudinal beams of the latter anode supporting structure, each of said transverse beams having at least one end free to move on one of the longitudinal beams supporting the latter transverse beam to accommodate expansion and contraction.

4. In a furnace house for furnaces used in the electrolytic production of aluminum, the combination as

described in claim 1, wherein the furnace house includes a basement chamber below the floor, through which the pots are removable, and wherein brackets are provided in said basement chamber to support the pots.

5. In a furnace house for furnaces used in the electrolytic production of aluminum, the combination as described in claim 1, wherein said pillar means are located between the vertical planes of the sides of the anodes.

6. In a furnace house for furnaces used in the electrolytic production of aluminum, the combination as described in claim 1, wherein the pillar means and the cantilevers are made of reinforced concrete and the reinforcements are electrically insulated from one another.

7. In a furnace house for furnaces used in the electrolytic production of aluminum, the combination as described in claim 1, wherein the floor comprises concrete brackets cast in situ and including said cantilever parts, and wherein said floor also comprises preformed slabs spanning the brackets.

8. In a furnace house for furnaces used in the electrolytic production of aluminum, the combination as described in claim 1, wherein the two pillar means at each region are located between the extreme adjacent ends of adjacent pots separated by the latter region.

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