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71 Applicant: **NORSK HYDRO A.S.**
Bygdoy Allé 2
N-0257 Oslo 2(NO)

72 Inventor: **Nebell, Hans Georg Tidemann**
Arnulf Overlands veg 159
N-0764 Oslo 7(NO)
Inventor: **Skatvedt, Fredrik**
Stromstangveien 8C
N-1335 Snaroya(NO)

74 Representative: **Allen, Oliver John Richard et al**
Lloyd Wise, Tregear & Co. Norman House
105-109 Strand
London, WC2R 0AE(GB)

54 **Arrangement of busbars on large, transversely disposed electrolysis cells.**

57 A potline for the electrolytic production of aluminium comprises rows of reduction cells with the cells arranged transversely in each row, each cell having at least one conductor (R) projecting through the bottom of the cell for each carbon cathode block. About half of the electric current is conducted to a cathode collector busbar (B1) and the other half to another collector busbar (B2). The cathode collector busbars (B1,B2) are disposed underneath the cell adjacent each of its long sides. Electric current from the collector busbar (B1) which is disposed at the largest distance from the next cell in the row, is conducted to the next cell via two busbars (K1,K6) provided at the short ends of the cell and via one or more pairs of busbars provided underneath the cell. The two busbars (K1,K6) at the short ends of the cell may have a cross section enabling them to conduct about twice as much current as each of the busbars being provided underneath the cells.

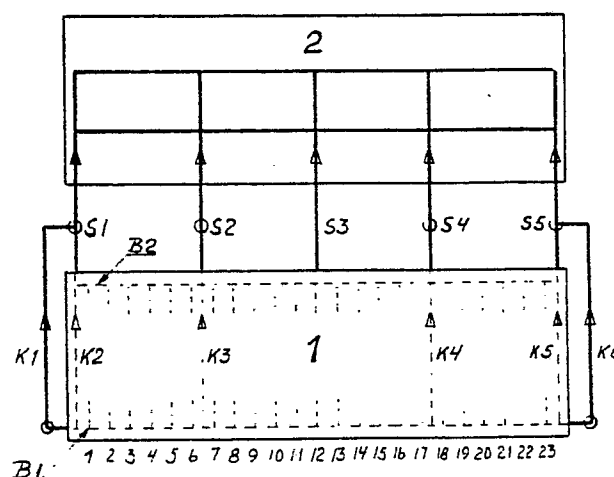


Figure 2

ARRANGEMENT OF BUSBARS ON LARGE, TRANSVERSELY DISPOSED ELECTROLYSIS CELLS

This invention relates to an aluminium potline comprising rows of reduction cells with the cells arranged transversely in each row and more particularly to a potline having the current conducted through the bottom of the cells.

Commonly the cells in an aluminium potline are arranged in rows as mentioned above. The distance between the rows, or rather the distance from the centre line of one row to an other is from 30 to 50 metres. Advantageously the cells are arranged in two or more, equal number of rows in which extra busbars for the return current are avoided. The current in two neighbouring rows flows in opposite directions.

A major problem with large aluminium potlines in which electric current of up to 300 kA is used is that the rows of reduction cells magnetically influence each other. The molten metal forming the cathode at the bottom of each cell is influenced by electromagnetic forces due to the current being conducted through the metal. To compensate for the unwanted, vertical magnetic field vector caused by the dominant neighbouring row, more electric current is normally conducted around or under the short end of the cells facing the neighbouring row of cells than the other short ends. This is a well known method which is already patented. With the known solution it is thus possible to produce a vertical magnetic field which is symmetrical about the longitudinal axis as well as the transverse axis of each cell. However, the absolute values of the magnetic field will easily rise above 30 Gauss, in some cases more than 100 Gauss.

Also, this known solution requires an appreciable number of busbars to be used, with the result that investment costs are increased.

A potline for the electrolytic production of aluminium in accordance with the invention comprises rows of reduction cells with the cells arranged transversely in each row, each cell having at least one conductor projecting through the bottom of the cell for each carbon cathode block within the cell, and in which about half of the electric current is conducted to one cathode collector busbar and the other half to another collector busbar and is characterised in that the cathode collector busbars are disposed underneath the cell adjacent its long sides, and that electric current from the collector busbar which is disposed at the largest distance from the next cell in the row, is conducted to said next cell via two busbars provided at the short ends of the cell and via one or more pairs of busbars provided underneath the cell, whereof the two busbars at the short ends of the cell have a cross section enabling them to conduct about twice

as much current as each of the busbars being provided underneath the cells.

This results in the improved running of the reduction cells by reducing the absolute value of the vertical magnetic field to a minimum level. Further, it eliminates the magnetic influence from the dominant neighbouring row of cells and reduces the number of busbars used, thereby lowering investment costs.

Each cell in the potline may be provided with two busbars underneath the cell which are preferably positioned close to the short ends of the cell.

Alternatively four busbars may be provided underneath the cell with two of these busbars (K2,K5) preferably disposed at the short ends of the cell, whereas the two other busbars (K3,K4) are each preferably disposed in the middle between the short ends and the transverse axis of the cell.

The invention will now be described by way of example only with reference to the accompanying drawings in which:

Fig. 1 shows a vertical section of a reduction cell with the electric current output through the bottom.

Fig. 2 shows schematically the busbar arrangement for these cells as seen from above.

During the electrolytic process electric current is led from an anode A through the electrolytic bath and the melted metal M and further down through a carbon cathode C to two cathode steel bars I, two cathode bars I being provided for each carbon block. Normally the steel bars I project through the sides of the cells, but in this embodiment an electric conductor R, made of copper or steel, is welded on to the middle of each cathode steel bar I. The current is conducted through the bottom of the cell via conductors R and flexible conductors F to current collector busbars, B1, B2.

The number of cathode carbon blocks disposed, in parallel, in each cell depends upon the width of the carbon blocks. In large electrolysis cells the number may be up to 26; in this example 23 are shown (see Fig. 2).

One of the collector busbars B1 is disposed directly below the long side of the cell, and projects outwards for about 0,5 metre from the short ends of the cell. The other collector busbar B2 is disposed similarly on the other side of the cell.

Although the collector busbars B1, B2 in this embodiment are arranged directly below the long sides of the cells, theoretical calculations have shown that the collector busbars may be disposed somewhat on the outside of the cathode cells, preferably 0,5 metre from the sides.

Part of the electric current collected in the collector busbar B1 is conducted to cell No. 2 via two busbars, K1 and K6, which are disposed at each end of the cells, at about the same height as or a bit lower than the molten metal in the cell, (see Fig. 2, Cell No. 2). The rest of the current is conducted to the collector busbar B2 via 4 busbars, K2, K3, K4 and K5 underneath the cell and then to the next cell via raiser busbars S1, S2, S3, S4 and S5.

The current distribution in the six busbars K1-K6 conducting electric current from the collector busbar B1 is, according to the invention, primarily dependent upon the size of the cross sections of the busbars K1 to K6. If the rows of cells are positioned far enough apart from one another, for instance 50 metres or more, the cross sections of the busbars K1 and K6 ought to be twice the size of the cross section of the busbars K2, K3, K4 and K5. This will give an electric current in the busbars K1 and K6 which is twice the size of current in the busbars K2 to K5, and the current distribution will give a very favourable magnetic field.

By using mathematical models for calculating the current distribution in all of the busbars of the busbar arrangement and the magnetic field in the metal cathode in the cells, it is possible to accurately calculate the cross sections which will give the most favourable magnetic field.

A potline as described herein provides low maximum absolute values for the vertical magnetic field which is below 10 Gauss for the whole anode. Simultaneously, the cells are completely compensated for the magnetic influence of the dominating neighbouring row and the number of busbars required is reduced.

Claims

1. A potline for the electrolytic production of aluminium comprising rows of reduction cells with the cells arranged transversely in each row, each cell consisting of a plurality of carbon cathode blocks and having at least one conductor projecting through the bottom of the cell for each carbon cathode block within the cell, and in which about half of the electric current is conducted to one cathode collector busbar and the other half to another collector busbar, characterised in that the cathode collector busbars (B1, B2) are disposed underneath the cell adjacent each of its long sides, and that electric current from the collector busbar (B1) which is disposed at the largest distance from the next cell in the row, is conducted to said next cell via two busbars (K1, K6) provided at the short ends of the cell and via one or more pairs (K2, K3, K4, K5) of busbars provided underneath the

cell, whereof the two busbars (K1, K6) at the short ends of the cell have a cross section enabling them to conduct about twice as much current as each of the busbars being provided underneath the cells.

2. A potline according to Claim 1, characterised in that two busbars (K2, K5) are provided underneath the cell and that the two busbars are positioned close to the short ends of the cell.

3. A potline according to Claim 1, characterised in that four busbars are provided underneath the cell and that two of these busbars (K2, K5) are disposed at the short ends of the cell, whereas the two other busbars (K3, K4) are each disposed in the middle between the short ends and the transverse axis of the cell.

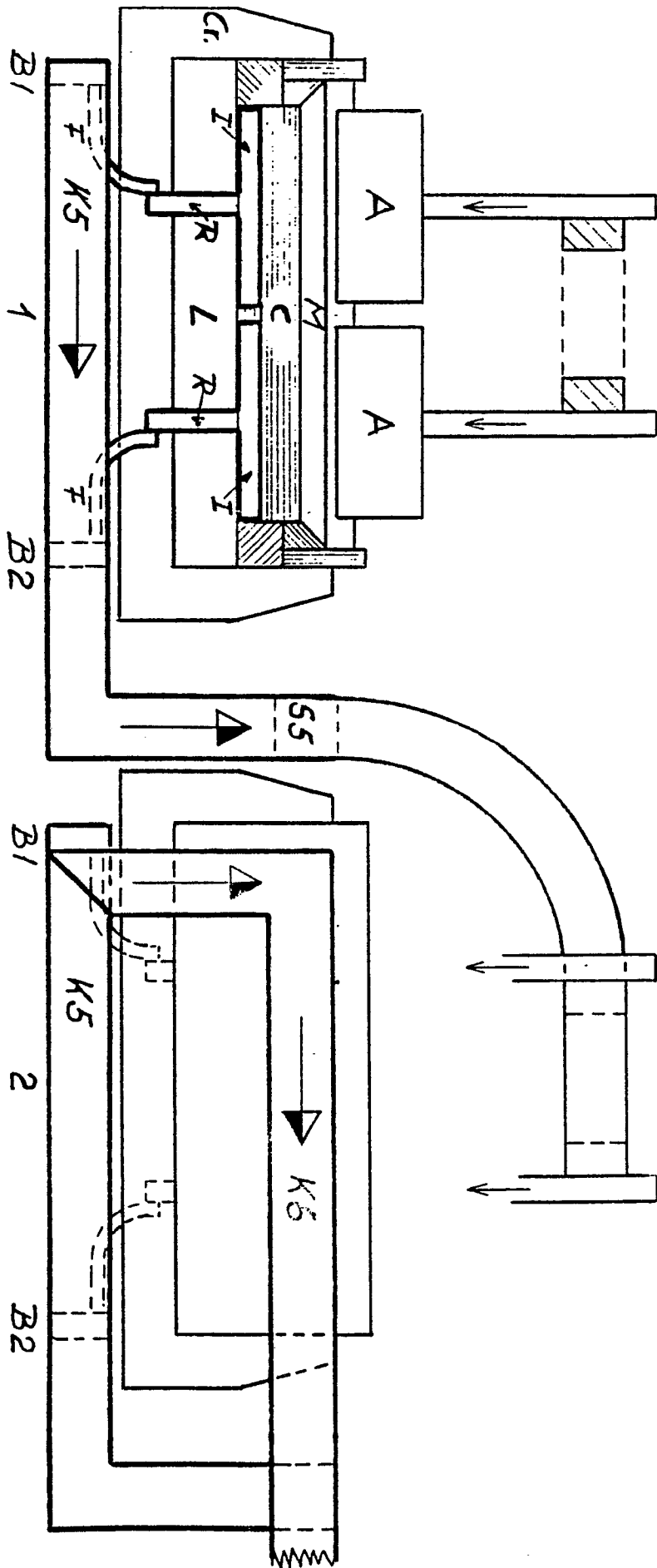


Figure 1.

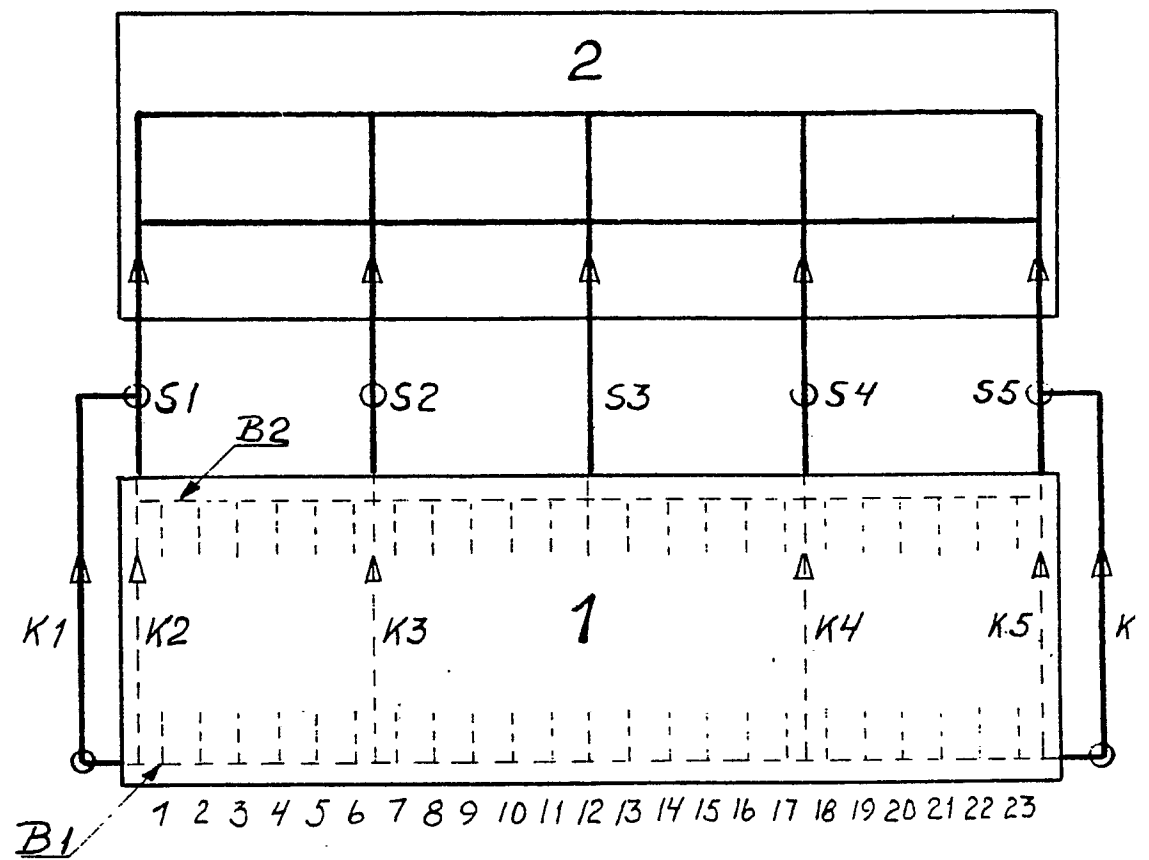


Figure 2



DOCUMENTS CONSIDERED TO BE RELEVANT			EP 89305150.8
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
A	<u>GB - A - 2 147 610</u> (PECHINEY) * Abstract; fig. 1 * --	1, 2	C 25 C 3/16
A	<u>US - A - 4 194 958</u> (NEBELL) * Abstract; fig. 2, 3 * --	1	
A	<u>CH - A - 641 209</u> (ALCAN) * Abstract; fig. * --	1	
A	<u>EP - A1 - 0 097 613</u> (SCHWEIZERISCHE ALUMINIUM) * Abstract; fig. 2 * ----	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			C 25 C
The present search report has been drawn up for all claims			
Place of search VIENNA		Date of completion of the search 12-09-1989	Examiner LUX
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	