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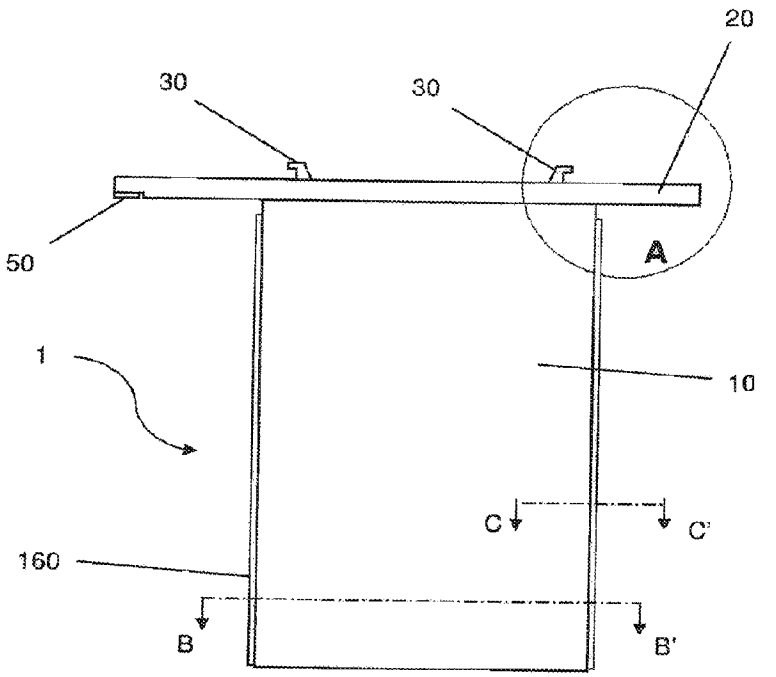
(54) Titre : PROTECTION LATERALE POUR UNE CATHODE DE CELLULE ELECTROLYTIQUE POUR LA PRODUCTION DE ZINC METALLIQUE

(54) Title: SIDE PROTECTION FOR AN ELECTROLYTIC CELL CATHODE FOR METALLIC ZINC PRODUCTION



(57) Abrégé/Abstract:
The present utility model relates to an improvement in side protection 160 for the cathodes 1 used in the process of electrodeposition of metallic zinc in electrolytic cells 3, the cathode 1 comprising a plate 10, having a given thickness (e_c) and first and second side edges (17), and a rod (20) attached to the upper part of the plate (10), wherein the side protection comprises a profile (60) with a given thickness (e_p) and securing means of the profile to the first and second side edges (17) of the plate (10), the working width of the zinc deposition surface (L_Z) being equal to the surface width of the plate (L_T).

scope of the present utility model or equivalents thereof, encompassed by the appended claims and their equivalents.

CLAIMS

1. Side protection (160) for a cathode (1) of an electrolytic cell (3) for the production of metallic zinc, the cathode (1) comprising a plate (10), having a given thickness (e_c) and first and second side edges (17) and a rod (20) attached to the top plate (10), the side protection characterized in that it comprises a profile (60) having a given thickness (e_p) and profile securing means (60) to the first and second side edges (17) of the plate (10), the working width of the zince deposition surface (L_Z) being equal to the surface width of the plate (L_T).

2. Side protection (160) for a cathode of an electrolytic cell for the production of metallic zinc, according to claim 1, characterized in that the thickness (e_p) of the side protection profile (60) is equal to the thickness of the plate (10).

3. Side protection (160) for a cathode of an electrolytic cell for the production of metallic zinc, according to claim 1, characterized in that the thickness (e_p) of the side protection profile (60) is less than the thickness (e_c) of the plate (10).

4. Side protection (160) for a cathode of an electrolytic cell for the production of metallic zinc, according to claim 1, characterized in that the thickness (e_p) of the side protection profile (60) is higher than the thickness (e_c) of the plate (10).

5. Side protection (160) for a cathode of an electrolytic cell for the production of metallic zinc, according to claim 1, characterized in that the securing means (60) of the side protection (160) to the side edges (17) of the plate (10) comprise one of adhesion by bonding, adhesion by welding and bonding or a combination thereof.

6. Side protection (160) for a cathode of an electrolytic cell for the production of metallic zinc, according to any of claims 1 to 5, characterized in that the plate (10) is an aluminum plate.

7. Side protection (160) for a cathode of an electrolytic cell for the production of metallic zinc, according to any of claims 1 to 5, characterized in that the profile (60) is a profile of polymeric material.

ABSTRACT

"SIDE PROTECTION FOR AN ELECTROLYTIC CELL CATHODE FOR METALLIC ZINC PRODUCTION"

The present utility model relates to an improvement in side protection 160 for the cathodes 1 used in the process of electrodeposition of metallic zinc in electrolytic cells 3, the cathode 1 comprising a plate 10, having a given thickness (e_c) and first and second side

edges (17), and a rod (20) attached to the upper part of the plate (10), wherein the side protection comprises a profile (60) with a given thickness (e_p) and securing means of the profile to the first and second side edges (17) of the plate (10), the working width of the zinc deposition surface (L_Z) being equal to the surface width of the plate (L_T).

SIDE PROTECTION FOR AN ELECTROLYTIC CELL CATHODE FOR METALLIC ZINC PRODUCTION

TECHNICAL FIELD

[0001] The present invention refers to an improvement in a cathode used in the electrodeposition process of metallic zinc in electrolytic cells, specifically, the side protection for cathodes that are used in the process of electrodeposition of metallic zinc.

BACKGROUND

[0002] One of the processes used to obtain metallic zinc is electrodeposition. The apparatus used in this process is basically composed of a tank containing zinc sulfate in a dilute acidic aqueous solution in which are alternately inserted anode and cathode. The submission of these to an electrical potential difference causes migration of zinc ions from the solution to the cathode surface, where they form a layer of metallic zinc in each face of the aluminum plate which forms part of the cathode that remains immersed in the solution contained in the tank. After a certain deposition time the cathodes are removed from the tank and zinc layers are detached therefrom and metallic zinc is obtained.

[0003] In case the zinc layer deposited on each side of the plate joined the contour of the layer deposited on the opposite side, the removal of the cathode zinc would be difficult and very costly. To prevent this from occurring protections are placed on either side of the aluminum plate, which prevent the zinc layer on one side of the plate is united, through the edge, to the opposite layer. The function of these protections is to avoid contact between the two sides of the zinc deposited on the surface of the cathode.

[0004] These protections are composed basically of profiles of polymeric material that are set in the side of the aluminum plate. With technology currently in use, these profiles have a U-shaped section and are embedded in the plate's edges. The resistance over time for fixing these profiles to the plate is critical due to the high corrosion power of the solution in which they are immersed and to the stresses (lateral pressure and possible impacts) that they receive every time the cathode is removed therefrom for the removal of zinc.

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[0005] The fastening is done by means of friction (pressure of the profile flaps on the edge of the plate), adhesion (application of glues and special resins) and mechanical fixing (groove in the plate in which a 'tooth' of the profile or through pins that cross the plate and the flaps of the profile). These methods of attachment may or may not add up.

[0006] In all cases there is always an overlap of the profile flaps with the main surfaces of the plate and these overlapping portions have the purpose of securing the profiles to the plate.

SUMMARY

[0007] The present invention refers to an electrolytic cell cathode for the production of metallic zinc which features a side protection with a new geometry and a new fastening concept that increases the area of metallic zinc deposition and reduces the probability of collision or interference.

[0008] Therefore, one object of the present invention is to provide an electrolytic cell cathode with side protection which inevitably covers part of the surface of the aluminum plate, reducing the area of the zinc deposition surface.

[0009] Yet another object of the present invention is to provide an electrolytic cell cathode with a side protection that does not protrude to the surface of the aluminum plate, facilitating the withdrawal of the zinc and decreasing the probability of collision or interference that causes the detachment of said protection.

[0010] The objectives of this invention are achieved by the provision of a side protection for a cathode of an electrolytic cell for the production of metallic zinc, the cathode comprising a plate having a given thickness and first and second side edges and an attached rod at the top of the plate, the side protection comprising a profile having a given thickness and means for fixing the profile to the first and second side edges of the plate, the working width of the surface of zinc deposition being equal to the surface width of the plate.

[0010a] According to an aspect of the invention is a side protection for a cathode of an electrolytic cell for the production of metallic zinc, the cathode comprising a plate having a given thickness (e_c), first and second side edges and a rod attached to the plate,

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wherein the side protection comprises a profile having a given thickness (e_P) and profile securing means to the first and second side edges of the plate, and wherein a working width of a zinc deposition surface (L_Z) being equal to a surface width of the plate (L_T).

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The invention can best be understood from the following detailed description in accordance with the attached figures, wherein:

[0012] FIGURE 1 is a side cross-sectional view of an electrolytic cell.

[0013] FIGURE 2 is a front view of the prior art cathode.

[0014] FIGURE 2A is a detailed view of the cathode side protection of the prior art.

[0015] FIGURE 2B is a cross-sectional view along the side protection cathode B-B' line of the prior art.

[0016] FIGURE 2C is a cross-sectional view along the side protection cathode C-C' line of the prior art.

[0017] FIGURE 3 is a front view of the cathode in accordance with the present invention.

[0018] FIGURE 3A is a detailed view of the cathode side protection of the present invention.

[0019]FIGURE 3B is a cross-sectional view along the cathode B-B‘ line with the side protection of the present invention.

[0020] FIGURE 3C is a cross-sectional view along the C-C' line of the cathode with the side protection of the present invention.

[0021] FIGURE 3D is a cross-sectional view along the C-C' line of the cathode with another example of side protection of the present invention.

[0022] FIGURE 3E is a cross-sectional view along the C-C' line of the cathode with yet another example of the side protection of the present invention.

DETAILED DESCRIPTION

[0023] With further reference to Figure 1, shows an electrolytic cell 3 containing a plurality of cathodes 1 and a plurality of anodes 2 that are arranged alternately and immersed in an electrolytic solution 4.

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[0024] Figure 2 shows a cathode 1 among the plurality of cathodes of the prior art shown in Figure 1. Each cathode 1 comprises a plate 10, preferably made of aluminum, and a rod 20 fixed to this plate 10.

[0025] A copper contact 50 is further welded to the rod 20 to perform the electric rod driving 20 for the electrical supply system of the electrolytic cell 3. The upper part of the rod 20 further comprises claws 30 responsible for assisting in the withdrawal of the cathode 1 from inside the electrolytic cell 3.

[0026] A side protection with a U profile 40 is attached to the first and second side edges 17 of the plate 10, as can be understood from the detail illustrated separately in Figure 2A.

[0027] As can be seen from Figures 2A to 2C, the side protections 40 act to physically isolate zinc buildup in a face 11 from the zinc buildup of the other face 12 of the plate 10, thus preventing the formation of a single body, which would in turn prevent such removal without damaging the zinc plate 10.

[0028] Figures 3 through 3E of the present application show a new side protection model 160 provided with a profile 60 which eliminates the need for side flaps 13 and 14 of the U-shaped profile of the side protections 40 and, therefore, the overlap of the faces 11, 12 of the plate 10. The fixation is done only at the first and second side edges of the plate 17. The securing means of the profile 60 to the first and second side edges to be used include adhesion fixation using special adhesives or resins, fixation by welding or engagement or by a combination of said fastening means. In the present invention, the profile 60 of the side protections 160 is preferably made by polymeric material. However, other insulating materials may be used in the manufacture of said side protections.

[0029] The thickness of the plate e_c is determined by the distance between the surfaces 11 and 12 of the plate 10 while the thickness of the profile e_p is determined by the distance between the surfaces 15 and 16 of the profile 60 of the side protection 160. As can be seen from the Figures 3B to 3E, the thickness e_p is equal to the thickness e_c. However, it should be noted that the thickness of the profile of the side protection e_p and may be either greater or lesser than the thickness e_c of the plate 10, without harming the objectives of the present model.

[0030] Figures 3C to 3E illustrate distinct shapes that the side protection profile 160 may assume depending on the plate 10 used for making the cathode.

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As can be seen from Figure 3C, for a side-by-side plate 17 having a longitudinal groove 17, the profile 60 assumes a T shape, obviously always noting that the working width of the zinc deposition surface L_Z is always equal to the width of the plate L_T.

[0031] For a plate 10 having a flat side edge 17, as can be seen in Figure 3D, the profile 60 assumes a rectangular shape, also taking into account the requirement of the working width of the zinc deposition surface L_Z to be equal to the surface width of the plate L_T.

[0032] Finally, as shown in Figure 3E, for a plate 10 with the lateral edge 17 having a longitudinal protrusion, the profile 60 assumes a C shape in the same way, having the working width of the zinc deposition surface L_Z equal to surface width of the plate L_T. Such a shape differs from the prior art profile 40 due to the fact that, as can be seen from Figure 2C, the working width of the zinc deposition surface L_Z will always be less than the surface width of the plate L_T.

[0033] It should be noted that the thickness of the side protection profile may be lesser or greater than the thickness of the plate 10, provided that the working width of the zinc deposition surface L_Z is equal to the width of the plate surface G_T.

[0034] Therefore, in any of the above situations, as can be seen from Figure 3B, when viewed in conjunction with Figures 3C to 3E, the working width of the surface of zinc deposition L_Z shall be equal to the surface of the plate L_T.

[0035] The novel type of side protection 160 therefore allows to eliminate the two key problems presented by the model currently in use, as illustrated in Figure 8 of the present application:

- removes the cover from the side protection of part of the main faces of the plate 10, allowing the entire surface of these available for zinc deposition. Thus, with this new arrangement, the side protection 160 of the present invention increases the amount of deposited zinc, increasing the productivity of the cathode 1 and, consequently, the electrolytic cell; and

- eliminates the protrusion of the side protections with respect to the surface of the plates 10 making the removal of zinc easier and reducing the risk of collision or interference causing the displacement thereof.

[0036] It should be noted that variations, modifications and alterations to the invention described herein are possible to those skilled in the art without

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departing from the spirit and scope of the present invention or equivalents thereof, encompassed by the appended claims and their equivalents.

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CLAIMS

1. Side protection for a cathode of an electrolytic cell for the production of metallic zinc, the cathode comprising a plate having a given thickness (e_c), first and second side edges and a rod attached to the plate,

wherein the side protection comprises a profile having a given thickness (e_p) and profile securing means to the first and second side edges of the plate, and wherein a working width of a zinc deposition surface (L_Z) being equal to a surface width of the plate (L_T).

2. The side protection for a cathode of an electrolytic cell for the production of metallic zinc according to claim 1, wherein the thickness (e_p) of the side protection profile is equal to the thickness of the plate.

3. The side protection for a cathode of an electrolytic cell for the production of metallic zinc, according to claim 1, wherein the thickness (e_p) of the side protection profile is less than the thickness (e_c) of the plate.

4. The side protection for a cathode of an electrolytic cell for the production of metallic zinc, according to claim 1, wherein the thickness (e_p) of the side protection profile is higher than the thickness (e_c) of the plate.

5. The side protection for a cathode of an electrolytic cell for the production of metallic zinc, according to any one of claims 1 to 4, wherein the profile securing means of the side protection to the first and second side edges of the plate comprise adhesion by bonding, adhesion by welding, or a combination thereof.

6. The side protection for a cathode of an electrolytic cell for the production of metallic zinc, according to claim 5, wherein said adhesion by bonding comprises using adhesives and/or resins.

7. The side protection for a cathode of an electrolytic cell for the production of metallic zinc, according to any one of claims 1 to 6, wherein the plate is an aluminum plate.

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8. The side protection for a cathode of an electrolytic cell for the production of metallic zinc, according to any one of claims 1 to 7, wherein the profile is a profile of polymeric material.

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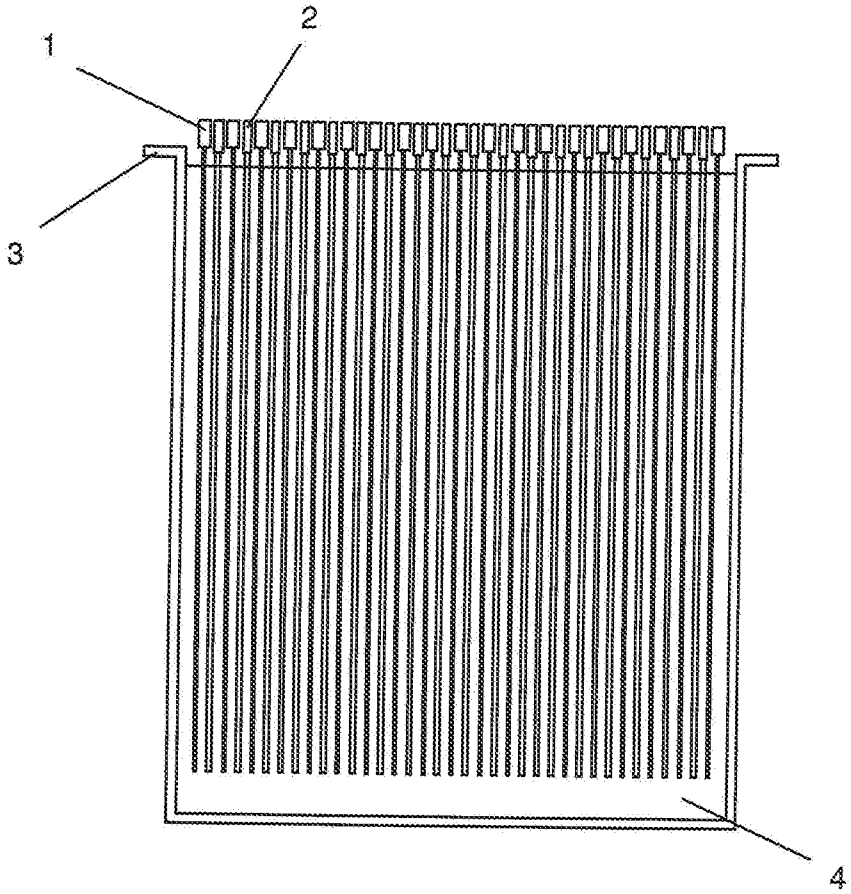


FIG. 1

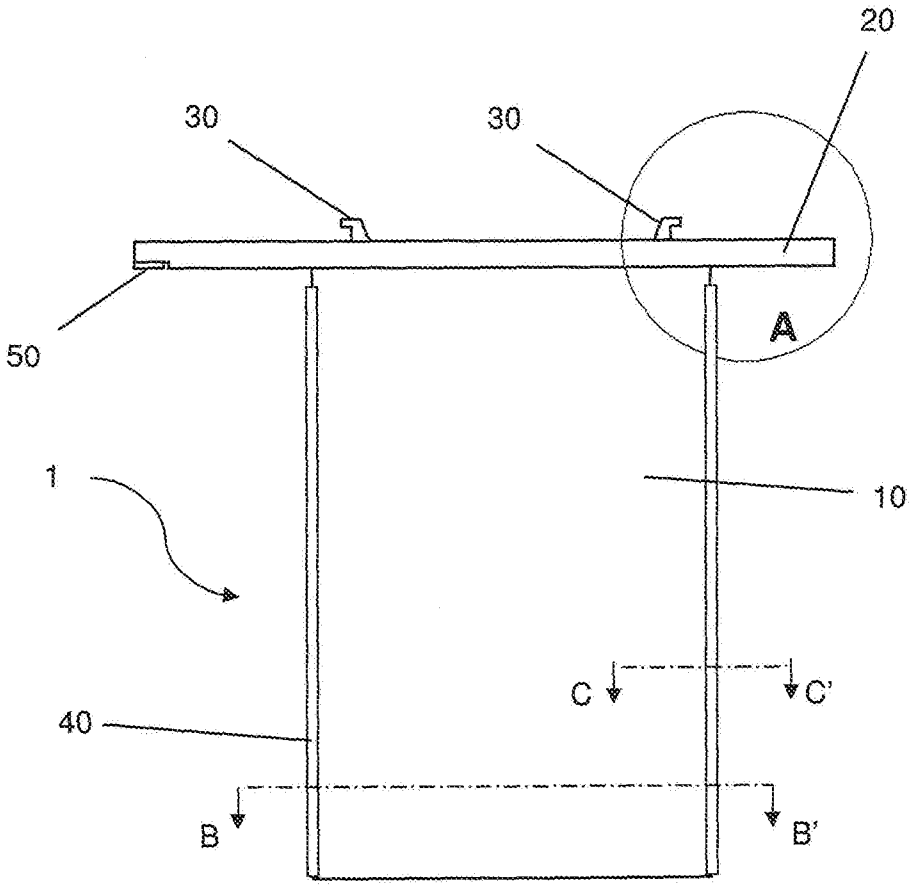


FIG. 2

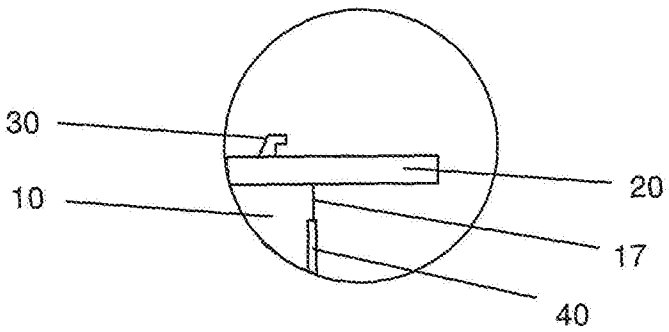


FIG. 2A
(DETALHE A)

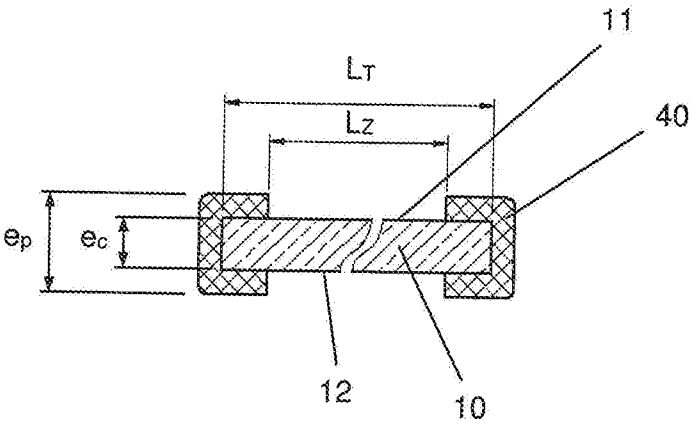


FIG. 2B
(SEÇÃO B-B')

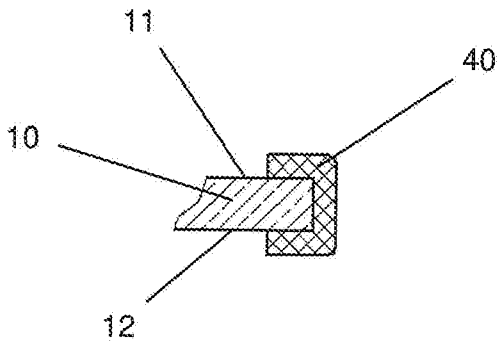


FIG. 2C
(SEÇÃO C-C')

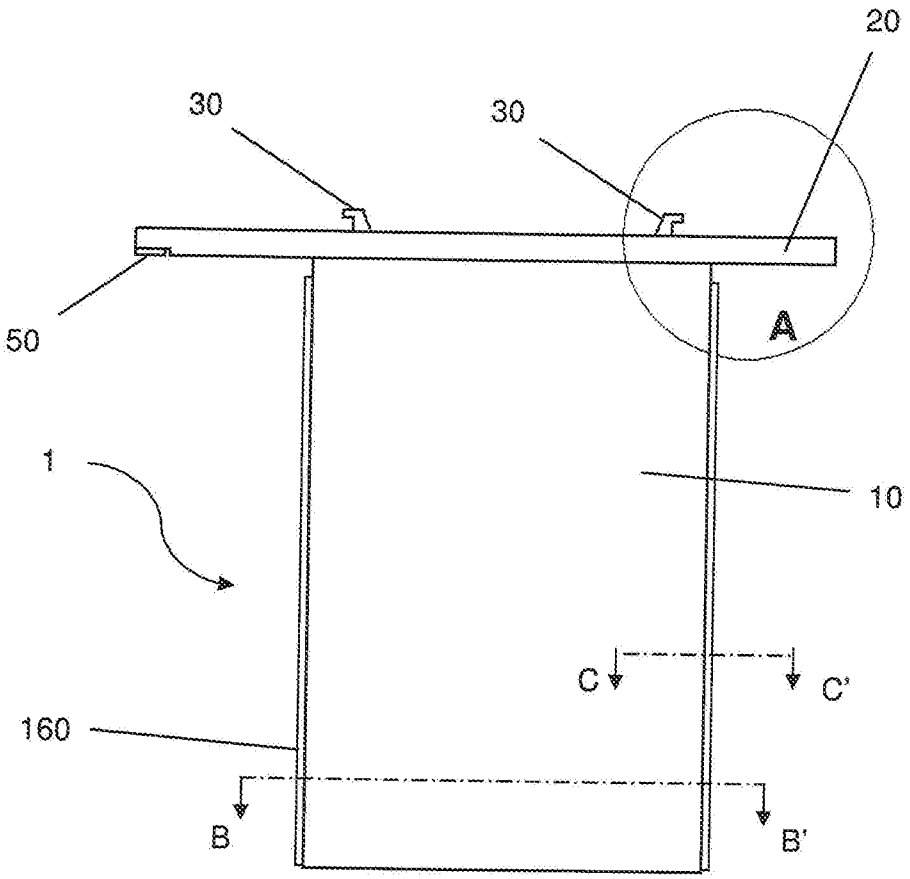


FIG. 3

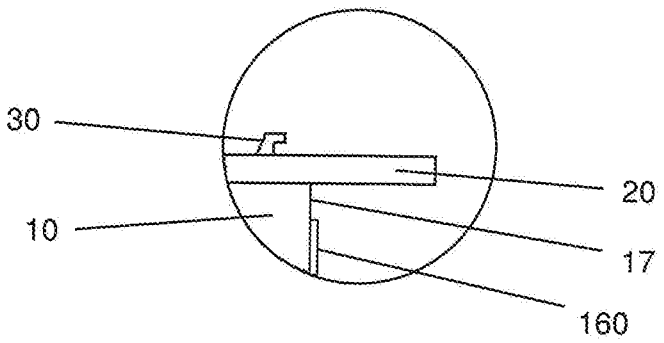


FIG. 3A
(DETALHE A)

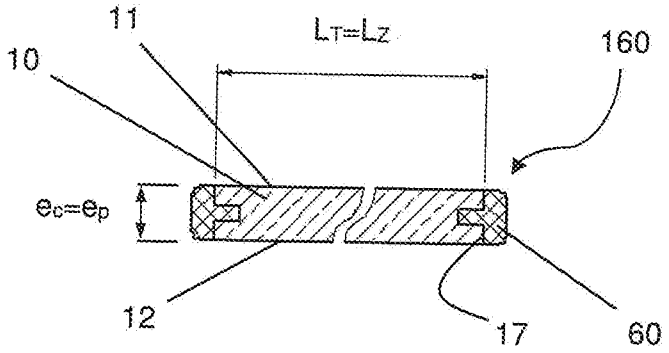


FIG. 3B
(SEÇÃO B-B')

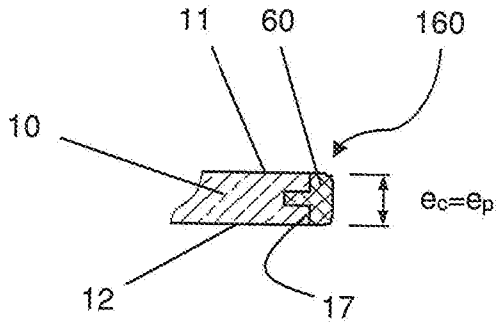


FIG. 3C
(SEÇÃO C-C')

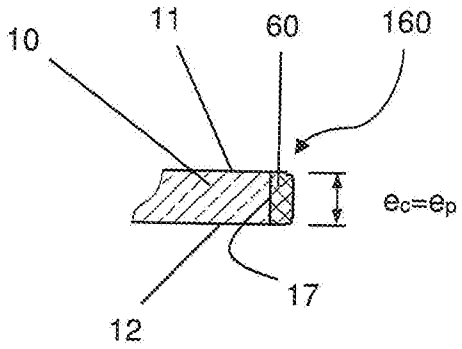


FIG. 3D

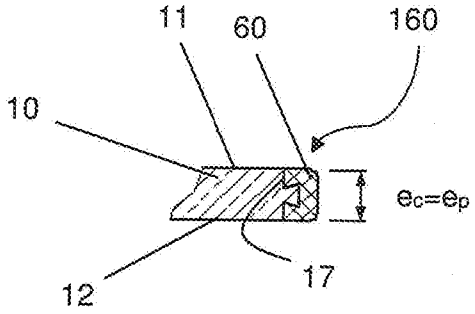
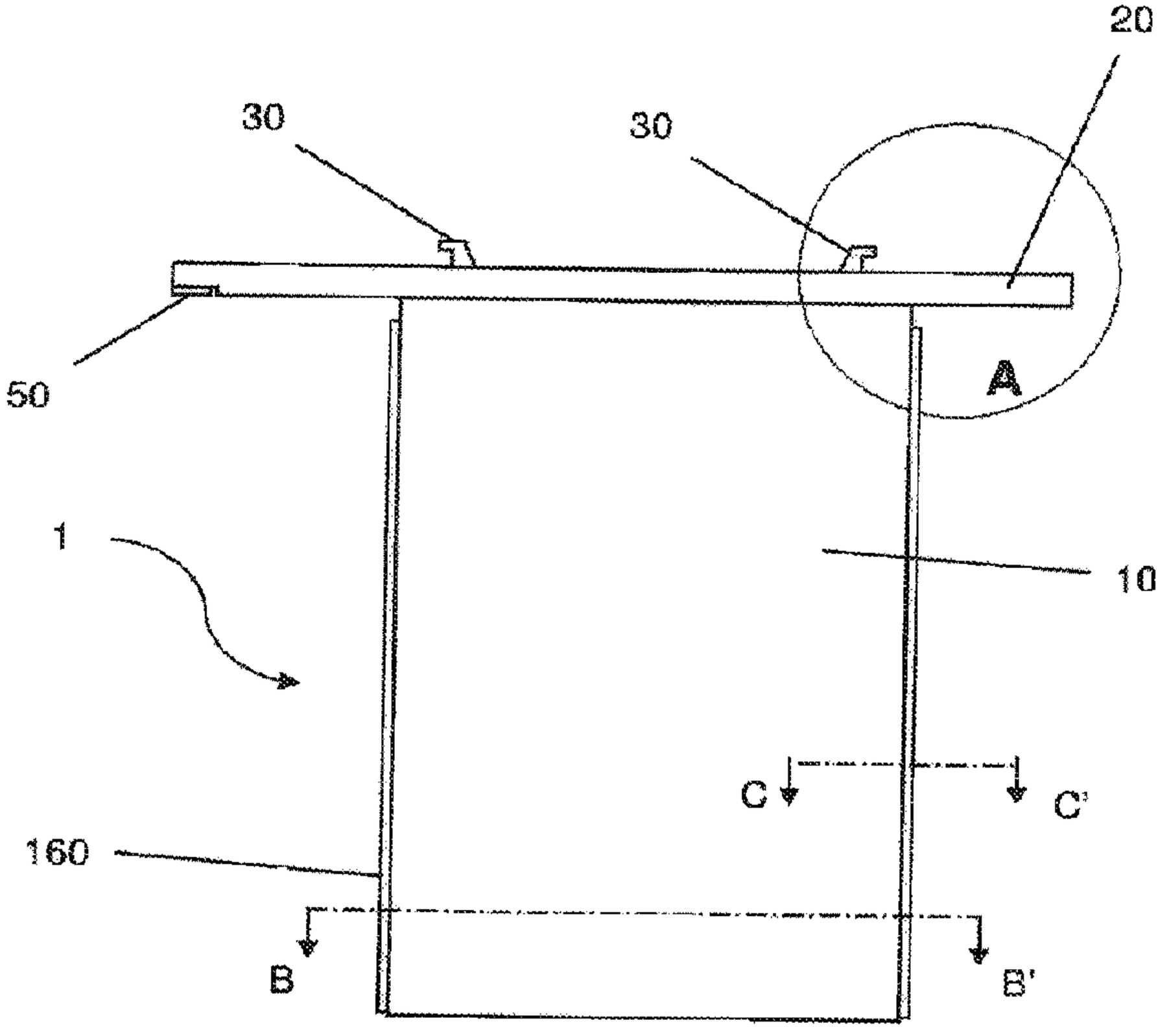


FIG. 3E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