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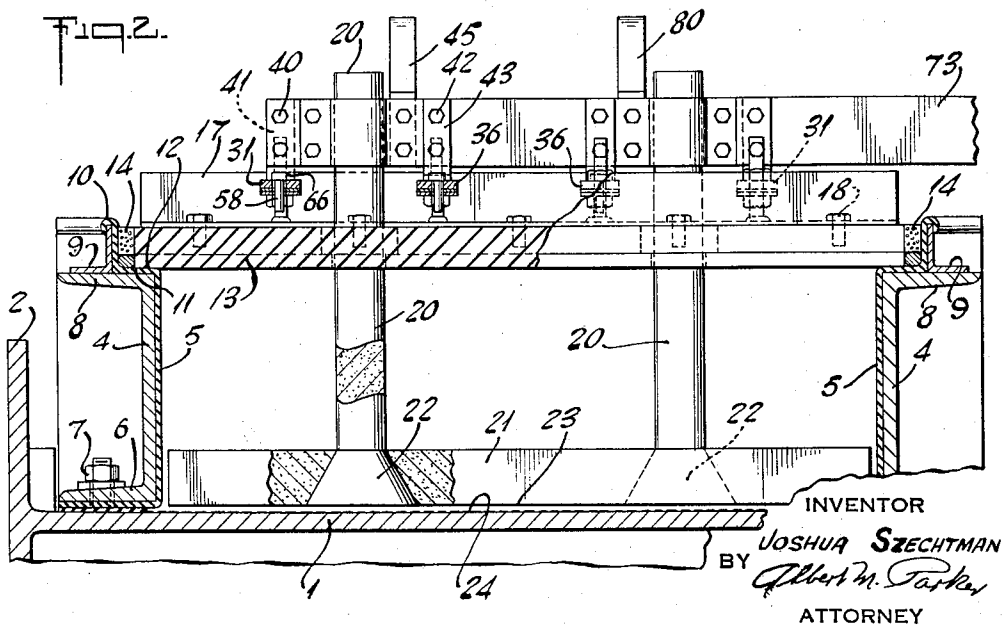
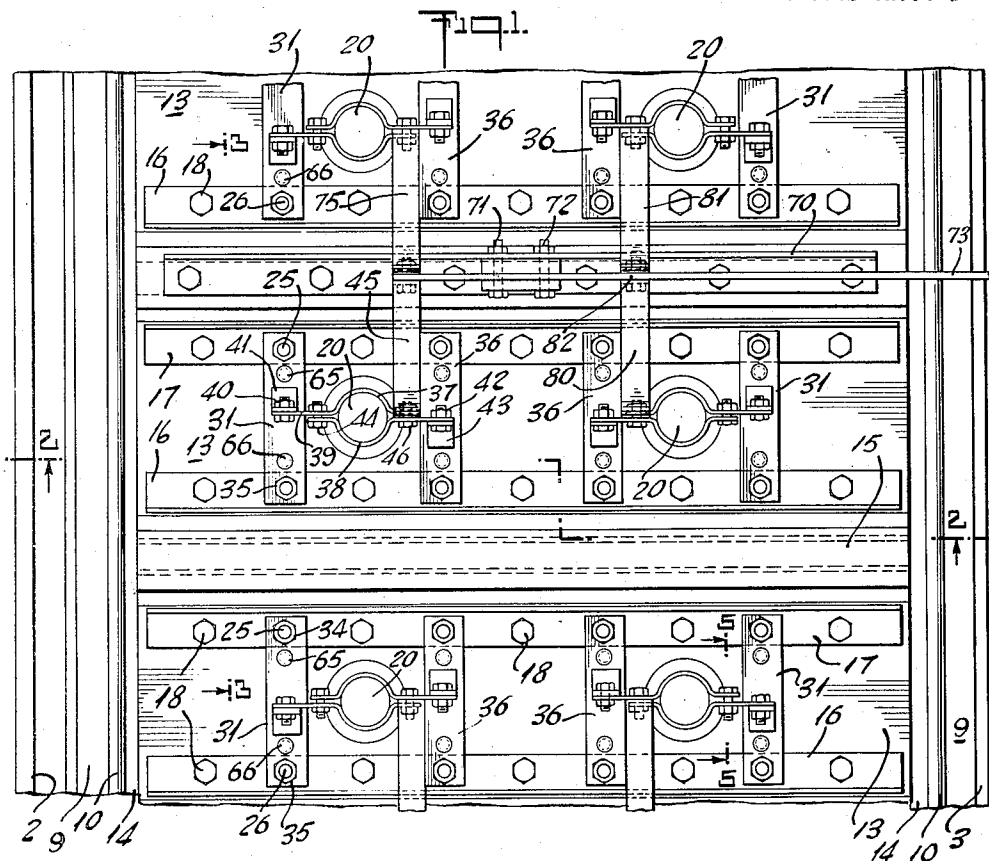
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ADJUSTABLE SUPPORTS FOR ANODES

Filed July 23, 1954

2 Sheets-Sheet 1



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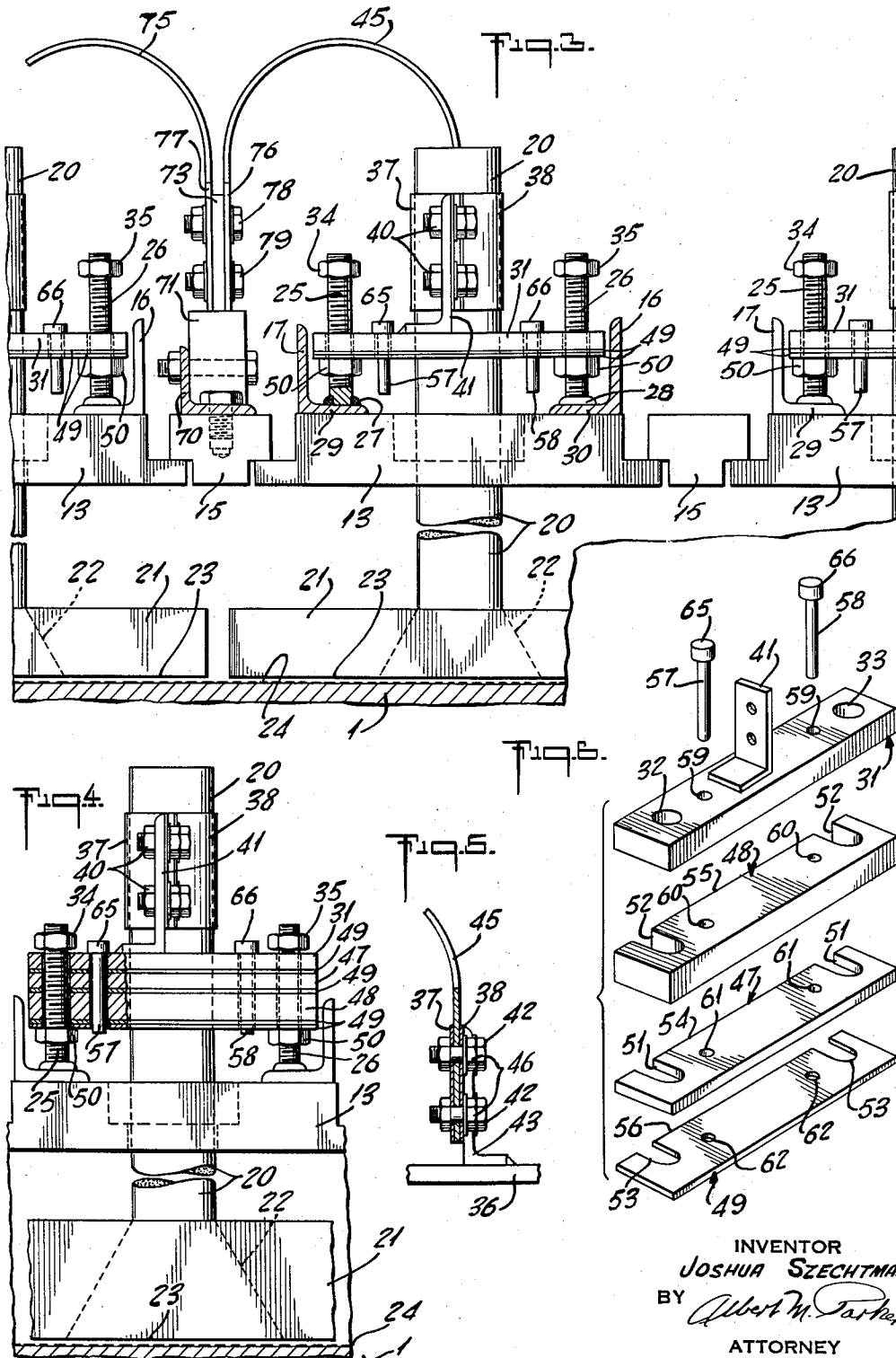
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ADJUSTABLE SUPPORTS FOR ANODES

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5 Claims. (Cl. 204—225)

This invention relates to the mounting of anodes for electrolytic cells and is more particularly concerned with means for readily adjusting the position of such anodes in such cells.

Electrolytic cells employed for the decomposition of solutions of alkali metal compounds using mercury, flowing along the bottom of the primary cell section, as a cathode commonly have a plurality of anodes. These anodes are usually composed of a plate-like element supported from above by a stem, or stems. The plate-like elements have their bottom surfaces parallel to the surface of the mercury and spaced a short distance above it. An aqueous solution of the alkali metal, commonly a halide such as sodium chloride to be decomposed, is present in the cell and the anode plates and parts of the stems carrying them are immersed in such solution. A thin layer of the solution thus occupies the space between the upper surface of the mercury and the bottom surface of the anode. D.C. current passed through the anodes, through the thin layer of solution and to the mercury cathode serves to decompose the solution.

Extreme care must be taken to prevent any direct contact between the anode and cathode, as a heavy current is flowing through the cell and they would of course short circuit it. Nevertheless, as the operation of the cell continues, the anode plates and their stems are consumed from the bottom face of the cell upwards. This increases the space between the bottom surface of the plates and the mercury until it becomes too great for effective operation. It is, accordingly, necessary to lower the plate from time to time and to do so while the operation of the cell continues.

Heretofore, the mounting of the stems carrying the plates has incorporated provision for the making of such adjustments, but such provision has been by the employment of means which have been cumbersome and time consuming to actuate, while, at the same time, being fraught with the possibility of causing a short circuit. Generally, such prior art adjustments have involved the turning of various nuts or bolts which could not all be done at once to the same extent, thus involving the possibility of the plate tilting to a sufficient extent to cause a short circuit. The disadvantages of any such adjusting arrangements are obvious and rather striking, but until the advent of the instant invention no straightforward solution to the problem has been devised.

The invention construction completely solves the prior art problems and does so in a simple and straightforward manner. It enables the downward adjustment of the plates to be made without any interruption in the operation of the cell; enables this to be done in a quick, simple manner and precludes the possibility of the plate being lowered or tilted to a position where a short circuit could occur. The construction is an economical one and there is an economy of labor in using it, inasmuch as the necessary adjustments can be made simply and quickly but still with greater precision than was the case in prior art constructions.

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Accordingly, the general object of the invention is to improve upon the adjustable mounting of anodes for electrolytic cells.

Another object is to simplify the adjustment of anodes for electrolytic cells.

Another object is to improve upon the adjustable mounting of anodes for electrolytic cells.

Another object is to provide for quickly making the exact same adjustment in the vertical position of a plurality of stems supporting the anode plate for electrolytic cells.

A further object is to eliminate the necessity of turning any adjusting member, or members, in the course of adjusting the various positions of anodes for electrolytic cells.

A still further object is to combine the clamping of the anode stems in a suitable holder with the making of a tight connection for the electrical conduit bringing current to the stems.

A still further object is to combine such clamping with a mounting of the stem for vertical adjustment.

Further and more detailed objects will in part be obvious and in part be pointed out as the description of the invention, taken in conjunction with the accompanying drawing proceeds.

In that drawing:

Fig. 1 is a fragmentary plan view of the top and cover of an electrolytic cell equipped with anode supports in accordance with the invention.

Fig. 2 is a vertical section thereof taken on line 2—2 of Fig. 1 and looking in the direction of the arrows.

Fig. 3 is a fragmentary vertical section taken on line 3—3 of Fig. 1 and looking in the direction of the arrows.

Fig. 4 is a part elevation and part vertical section of one of the stem supports viewed as in the Fig. 3 form, but prior to the making of any downward adjustment.

Fig. 5 is a fragmentary vertical section of the combined support for the electrode and connector for the conduit in accordance with the invention; and

Fig. 6 is an exploded perspective view of a set of adjusting plates or shims in accordance with the invention.

Referring to Figs. 1 and 2, it will be seen that the invention has been illustrated as applied to an electrolytic cell construction as illustrated in my co-pending application Serial No. 390,194, filed November 4, 1954, entitled Wall Structures for Electrolytic Cells, now Patent No. 2,820,755. It is to be understood, however, that such showing is merely for illustrative purposes and that the invention is in no way limited to use with a cell so constructed, but, on the contrary, is capable of being used with a wide variety of cell constructions.

In the cell shown, a cross section thereof appears in the form of an I beam providing a cell bottom 1 with upstanding outside portions 2 and 3. The actual operating side walls 4 of the cell are shown as being U-shaped in cross section, being provided with an interior liner 5 and having their bottom sides 6 bolted down at 7 to the base 1. The liner 5 commences between the portion 6 and the base 1 and extends up the wall 4 and over the top portion 8 to a bracket 9. It continues up the vertical portion of that bracket and is turned over the upper end thereof at 10 where it is secured in place.

A longitudinal seat 11 is provided for supporting the ends 12 of the plurality of cover members 13. The space between the ends of the cover member 13 and the upwardly terminating portion of the liner is filled with suitable gasketing material 14 to provide a gas tight joint. This gasketing may be of any suitable material, or combination of materials. As here shown it consists of a combination of a rubber member backed up by a suitable packing. The construction at both sides of the cell is identical, so only one side is described in detail.

The longitudinal extent of the cell is covered by a plurality of the transverse cover members 13 which are spaced apart by spacing and closing strips 15. The members 13 and the strips 15 are preferably formed of hard rubber, or other insulating material. Right angle bracket members 16 and 17 extend along either side of the members 13 throughout the length thereof and are suitably secured in place by a plurality of bolts 18 which, as seen in Figure 2, extend into but not through the members 13. The bracket members 16 and 17 may be tied together at their ends by cross straps usable as handles extending across between them.

As here shown, each member 13 is perforated at spaced positions for the passage therethrough of the stems 20 of the anode supports. The lower ends of these stems are suitably formed for supporting the anode plate 21 and for making good electrical contact therewith. The engagement here is by way of frusto conical ends 22 on the stems 20 which are received in mating recesses in the plate 21. For more detailed showing of this relationship, attention is directed to my co-pending application Serial No. 390,193 entitled Anodes for Electrolytic Cells, filed November 4, 1953. It is to be understood, however, that the instant invention is in no way limited by any particular mounting relationship of plate and stem, since any properly effective mounting could be substituted for that here shown. What is to be noted, however, is that no part of the stem extends below the bottom surface 23 of the plate 21. If it did so there would be too much likelihood of it extending through the layer of brine between the surface 23 and the mercury 24, thus contacting the mercury and short circuiting the cell.

As already indicated, the plate is consumed, hence the thickness of it decreases, in the course of the operation of the cell and this takes place from the bottom upwards. Nevertheless, if properly located the plate remains fully effective until its thickness is reduced to a fraction of what it was originally. It is, accordingly, desirable to be able to lower the plate from time to time during the operation of the cell and while the cell is actually in operation so as to maintain that operation fully effective by maintaining the space between its bottom surface 23 and the mercury 24 at the dimension required. This is simply and efficiently done in accordance with the invention by the mounting about to be described.

Referring in particular to Figs. 3 and 4, it will be seen that a pair of stud bolts 25 and 26 have their lower ends welded, or otherwise suitably secured, at 27 and 28 to the base portions 29 and 30 of the angle brackets 16 and 17. These stud bolts extend up a substantial distance and are bridged across by a mounting plate 31 shown in detail in Fig. 6. From that showing it will be seen that the plate 31 is perforated at 32 and 33 for the reception of the bolts 25 and 26. These perforations are of sufficient size for the plate to be able to slide up and down on the bolts. Nuts 34 and 35 are here shown as applied to the upper ends of the bolts. They are not essential though they may be used if desired and could serve to keep the plate 31 from riding up off the top of the bolts 25 and 26. Furthermore, they could serve to keep the plate and any shims lying beneath it down in desired position.

Referring to Fig. 1, it will be seen that plates 31 are located at one side of the upper ends of the stems 20, while matching plates 36, in all respects the same as the plates 31 with the exception of the position of the supporting brackets thereon, are mounted at the other side of the stems 20. Again, the mounting of the plates 36 is by means of stud bolts positioned and engaged by the plate in the same manner as the stud bolts 25 and 26.

The stems 20 are supported in the desired vertical position and electric current is conducted to them by pairs of conducting straps 37 and 38. The strap 37

starts with a straight portion 39 which is bolted at 40 to the upright portion of the bracket 41. The strap continues into a semi-circular portion which embraces one side of the upwardly extending portion of the stem 20.

Similarly, the strap 38 is bolted at 42 to the upwardly extending portion of a right angle bracket 43 secured to the upper surface of the plate 36. The bolting at 40 and 42, as illustrated in Figs. 2, 3 and 4, is preferably effected by two vertically spaced bolts, rather than by a single one.

Clamping of the stem 20 between the curved portion of the straps 37 and 38 is effected at one side of the stem by bolting the end of the strap 38 to the straight portion of the strap 39, as shown at 44. At the other side of the stem, the end of the strap 37 and the straight portion of a strap 38 have the downturned end of the conduit strip 45 seated between them and these parts are all bolted together at 46. Again, it is preferable that a plurality of vertically spaced bolts be employed at the positions 44 and 46 to not only clamp the stem 20 tightly, but also to make a tight connection with the end of the conduit strip 45.

The conduit strip 45 and its position between the portions of the straps 37 and 38 is shown in detail in Fig. 5. From that showing it will be seen that the strip 45 is of a flexible nature, preferably being formed of braided wire so that it will give as desired when the stem 20 is moved. It will be readily apparent that the clamping of the stem in this manner not only holds it rigid, but also makes good contact for passage of electric current thereto from the straps 37 and 38.

Considering the provision of the invention construction for the lowering of the anode plate 21 as the same decreases in thickness, attention is directed to the showing in Figs. 4 and 6. From the Fig. 4 showing, it will be seen that the plate 31 carrying the bracket 41 is positioned close to the top of the stud bolts 25 and 26, and so mounts the stem 20 in an upward position. This upward position is effected and maintained by the interposition of a set of shim plates 47, 48 and 49 beneath the mounting plate 31. As here shown there is one each of the plates 47 and 48 but several of the thin size 49.

The lower of these shim plates, here shown as one of the thin shims 49, rests on nuts 50 mounted on the stud bolts 25 and 26. The nuts 50 are set at the desired critical position to locate the plate carried by the stem at the desired vertical position above the mercury, depending on the combined thickness of the set of shim plates. The set of shim plates shown is for illustrative purposes, it of course being understood that sets of different numbers of shim plates, having different thicknesses, may be used as required. Regardless of the thickness and number, however, the shim plates will be formed as illustrated in Fig. 6 where only one plate 49 is shown, though a plurality of these thin plates is seen spaced throughout the set in Fig. 4.

From the Fig. 6 showing, it will be seen that each of the shim plates 47, 48 and 49 have the same overall outline as the plate 31, but, instead of merely being perforated at 32 and 33 to receive the stud bolts, they are formed with U-shaped recesses 51, 52 and 53 for the same purpose, extending into them from their edges 54, 55 and 56. Thus, the shim plates can be slid in and out from beneath the plate 31. All that needs to be done to effect such sliding when desired is to remove a pair of locating pins 57 and 58 from the aligned sets of perforations 59, 60, 61 and 62, formed in the plates. The shanks of the pins 57 and 58 are dimensioned to be slidably received in such perforations and their enlarged heads seat on the upper surface of the plate 31, as seen in Figs. 3 and 4. These pins not only serve to properly locate the shim plates, but also serve to prevent their removal until the pins are lifted out.

From the foregoing, it will be readily apparent that when a cover section 13 of the cell is set up ready to

be put into use with a new anode plate 21 carried thereby, a suitable number of shims of suitable thickness is mounted on the bolts 25 and 26 beneath the plate 31 and is held in that position by the pins 57 and 58. As the operation of the cell proceeds and the plate 21 becomes reduced in thickness, the operator merely needs to lift out the pins 57 and 58, remove the desired shim plate and replace the pins. This enables the plates 31 to be lowered and consequently lowers the stems 20 and the anode plates 21. Nothing is left up to the judgment of the operator, no time consuming or possibly inaccurate adjustment of nuts or bolts is required and no dangerous tilting of the anode plate can take place. Nevertheless, the proper spacing between the bottom of the anode plate and the surface of the mercury can be readily restored when needed.

Reverting to Figs. 1 and 3, it will be seen that alternate ones of the closing and filling strips 15 have elongated right angle bracket members 70 thereon, comparable to the bracket members 16 and 17. At their mid-point, the vertical portion of the brackets 70 have supporting blocks 71 bolted thereto, as shown at 72, which blocks support the lead strip 73 extending from the power line along the side of the cell, (not shown). At its remote end the lead strip 73 has the downturned end of the connector 45 engaged with one side thereof and the downturned end of the comparable connector 75, for one of the anode stem mountings of the adjacent cover member, engaged with the other side thereof. These downturned ends 76 and 77 are tightly secured to the lead strip 73 by a plurality of bolts, as at 78 and 79. Similarly, the connectors 80 and 81 for the adjacent pair of anode supports carried by the cover members are bolted to the sides of the lead strips 73 at the position 82. It is to be noted that the leads 80 and 82 engage the supporting straps for their anode stem at the opposite side of their anode stems from the engagement by straps 45 and 75. That is merely for symmetry of design and save for this mere reversal, the parts are the same in each instance. Also, it is apparent that since adjacent pairs of cover members are hooked up to one lead strip, the alternate filler strips will be devoid of lead strips, as is clearly seen from the showing of Fig. 3.

Though in the showing in the accompanying drawing and in the foregoing description certain common mechanical expedients for clamping and connecting have been shown and described, it is, of course, to be understood that this showing and description, as well as the showing and description of other common expedients is for illustrative and not limiting purposes. Alternatives of such expedients would readily suggest themselves to those skilled in the art and may be employed in place of those here disclosed without departing from the spirit and scope of the invention as defined in the accompanying claims.

Speaking more generally, since certain changes may be made in the above construction and different embodiments of the invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

Having defined my invention, what I describe as new and desire to secure by Letters Patent is:

1. In electrolytic cell construction, an anode plate, an upstanding conducting and carrying stem secured to said plate and extending upwardly therefrom, said stem being formed of the same material as that of said plate, an electrical contact member conductively secured to said stem, and supporting means carried by the cell for supporting said stem in desired vertical position, said supporting means including a supporting member directly

engaging said electrical contact member, a pair of mounting posts for mounting said supporting member for free vertical movement, and a series of slidably removable shims positioned beneath said supporting member engaging said posts, with means for mounting said removable shims for the carrying of said supporting member thereon whereby said anode may be carefully lowered to the desired controlled extent by removal of said shims during the operation of said cell.

2. In electrolytic cell construction, an anode plate, an upstanding conducting and carrying stem secured to said plate and extending upwardly therefrom, said stem being formed of the same material as that of said plate, an electrical contact member conductively secured to said stem, and supporting means carried by the cell for positioning said anode in accurate horizontal position in said cell, said supporting means including a supporting member mounted on a pair of vertical posts, means for mounting said electrical contact member directly on said supporting member, a series of readily laterally removable shims positioned beneath said supporting member and means for mounting said removable shims for the carrying of said supporting member thereon whereby said anode may be incrementally lowered in a controlled manner by removal of said shims while said cell remains in operation.

3. Electrolytic cell construction as in claim 2 wherein said anode plate is carried by a pair of stems and each of said stems has an electrical contact member and each electrical contact member is carried by supporting means.

4. In electrolytic cell construction, an anode including a plate and a supporting stem therefor, said stem being secured to said plate at the lower end thereof and extending upwardly therefrom, an electrical contact member in the form of strap means engaging said stem and being conductively secured thereto and means for supporting said anode in vertically adjustable position, said means including a pair of vertical posts on which is mounted a vertically movable supporting member directly engaging said strap means and secured thereto, a series of readily laterally removable shims positioned beneath said supporting member and means for mounting said shims in said supporting position whereby said anode is solely supported by said electrical contact member and said support is vertically adjustable in controlled increments.

5. In anode supporting means for electrolytic cells, a pair of spaced vertically slidable supports, an anode including an anode plate and a mounting stem, said mounting stem being secured to said plate and extending upwardly therefrom, said anode stem being positioned between said supports and electricity conducting and clamping means engaging said anode stem to mount the same in desired vertical position, said clamping means including a pair of strap members formed to embrace said stem therebetween and each of said strap members having an outwardly extending portion, one of said portions engaging one of said slidable supports and terminating at the same and the other of said outwardly extending portions engaging the other of said vertically slidable supports and terminating at the same, said clamping means being the sole support for said stem whereby each stem of the plurality in an electrolytic cell can be individually adjusted in operation.

References Cited in the file of this patent

UNITED STATES PATENTS

2,104,678	Sorenson	June 4, 1938
2,328,665	Munson	Sept. 7, 1943
2,599,363	Bennett	June 3, 1952
2,617,762	Basilewsky	Nov. 11, 1952
2,627,501	Gardiner	Feb. 3, 1953