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ELECTROLYTIC CELL

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Fig. 1.

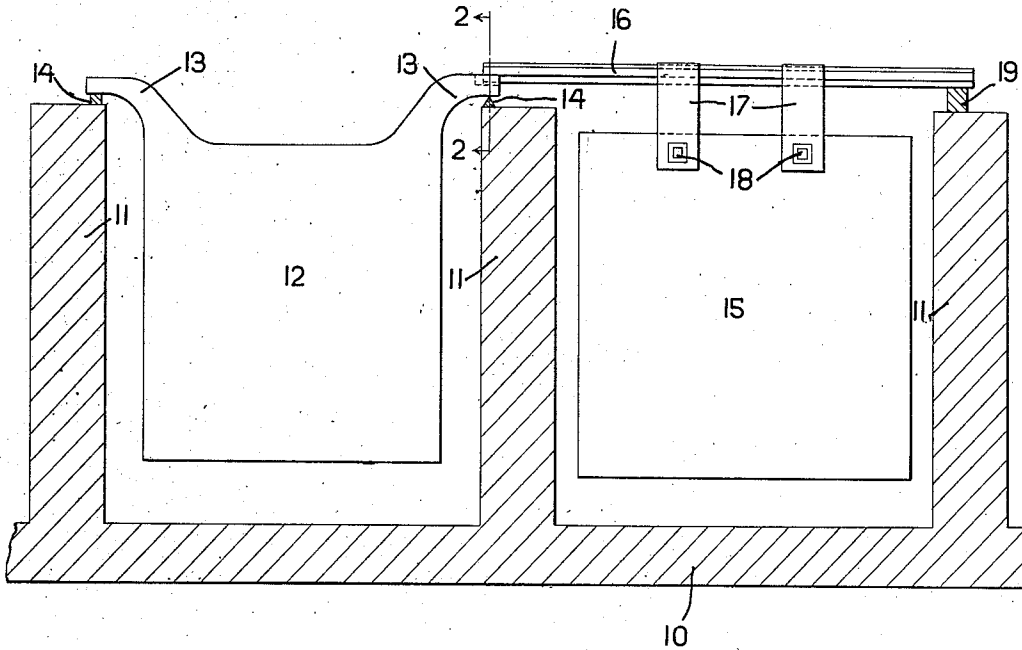
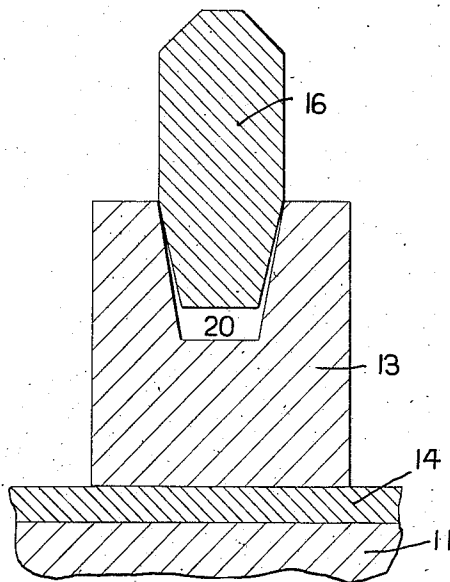


Fig. 2.



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ELECTROLYTIC CELL

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This invention relates to electrolytic apparatus, and more particularly to a new and improved means for conducting current to the electrodes of an electrolytic cell. A simplified construction is provided which allows the individual electrodes to be readily assembled and disassembled, whereas the voltage drop between the various joints is maintained extremely low.

In electrolytic apparatus such as that used in the refining of metals, the cells are frequently of large dimensions and heavy currents are employed for causing the metal to deposit on the cathodes, as for example, currents of the order of 12,000 amperes per cell. The electrodes themselves must be constructed large and heavy, and must be adapted to be readily changed as required. The voltage drop or I R drop for the extremely heavy currents employed will be considerable unless the resistance of all parts is maintained extremely low.

In accordance with the present invention, current is fed to the various electrodes by means of joints which are especially designed to reduce the resistance. The cooperating parts are so formed that a wedge action is obtained for causing a firm and intimate contact therebetween. The increase in weight of the cathode as the metal is deposited thereon is utilized for producing a sliding action between the various elements which automatically cleans the joints and prevents the resistance thereof from increasing due to accumulated dirt or impurities. A space is provided adjacent the sliding joint to permit the impurities or other accumulations to be removed and the joint itself to be washed when desired.

The invention also consists in certain new and original features of construction and combinations of parts hereinafter set forth and claimed.

Although the novel features which are believed to be characteristic of this invention will be particularly pointed out in the claims appended hereto, the invention itself, as to its objects and advantages, the mode of its operation and the manner of its organization may be better understood by referring to the

following description taken in connection with the accompanying drawings forming a part thereof, in which

Fig. 1 is a sectional view showing a pair of electrolytic tanks electrically connected in series, the anode of one tank being connected to the cathode of the adjacent tank; and

Fig. 2 is a section taken on the line 2—2 of Fig. 1 showing the sliding joint in detail.

Like reference characters denote like parts in the several figures of the drawings.

In the following description and in the claims parts will be identified by specific names for convenience, but they are intended to be as generic in their application to similar parts as the art will permit.

Referring to the drawings more in detail, a specific form of the invention has been disclosed for purpose of illustration, which comprises an electrolytic tank having a base and side walls which may be formed of insulating or of poorly conducting material, such as wood. Anode 12 is suspended in one tank section by means of a pair of arms 13, preferably formed integrally which rest on bars 14 supported by walls 11.

Cathode 15 is suspended in the second tank section from cathode bar 16 as by a pair of shrouds 17 passing over said cathode bar and secured to said cathode as by rivets or bolts 18. Cathode bar 16 is supported from pressure block 19 of insulating material which rests upon wall 11 and upon the adjacent arm 13 of anode 12 in the manner about to be described.

Cathode bar 16 may be formed with its lower portion wedge shaped, as shown more in detail in Fig. 2, and adapted to fit in a wedge-shaped groove in anode arm 13. The relation of the lower portion of bar 16 to said groove is such that a space 20 is normally provided between the bottom of said bar and the bottom of said groove for permitting the joint to be flushed out and allowing clearance for further wedging or sliding action to take place.

The wedge surfaces are preferably formed at a comparatively small angle to the vertical, in order that the lateral pressure exerted thereby will be considerably in excess of the vertical pressure produced by the weight of

the cathode. The surfaces should also be sufficiently long to prevent space 20 from being closed up during normal operation of the apparatus.

5 The angles of the sides of cathode bar 16 and of the groove in anode arm 13 are slightly different whereby a line contact is formed therebetween. This feature considerably increases the pressure due to the small area involved and assists cleaning the surfaces in the manner to be described.

10 The upper portion of the bar may be formed of any desired shape for cooperating with shrouds 17 and forming an intimate contact therewith. A bar of octagonal shape as shown in the drawings has been found to be satisfactory for this purpose although the invention is not limited thereto, and it is understood that the contact between shroud and the upper portion of the bar may be similar in form and action to that between the lower portion of the bar and the anode.

15 After the anode and cathode have been assembled as shown, the normal weight of the cathode will cause cathode bar 16 to firmly seat in the wedge-shaped groove in arm 13 and to assume the position shown in the drawing. The wedging action of the cooperating parts causes a high pressure to be exerted between the contacting surfaces which may be sufficient to cause a slight upsetting or abrading to take place. This wedging action assures an intimate contact being obtained.

20 As the cathode increases in weight due to metal which may be deposited thereon, bar 16 is caused to slide downwardly in arm 13 and in so doing to more firmly wedge itself therein. This sliding movement causes a sufficient abrasion of the surfaces to remove dirt or other impurities and to maintain the same in clean condition.

25 As a specific example, in a cell carrying 12,220 amperes the voltage drop due to the connection between the cathode bar and the anode arm decreased from the initial value of 2.7 millivolts to 2.2 millivolts after 14 days' use. It is evident, therefore, that the sliding type of joint described above has a resistance which is not only extremely low initially but actually reduces during use. In addition to this advantage, however, the bar is of simple shape which may be formed directly in a rolling mill, and the parts may be assembled and disassembled with a minimum amount of labor.

30 The invention has been shown as applied to a particular construction of cathode bar whereby a sliding action is obtained as the weight of the cathode is increased. It is not to be limited thereto, however, but may include various other means for obtaining this sliding action. The invention furthermore is not limited to the cathodes of electrolytic

cells but may be of general application where similar conditions obtain.

While certain novel features of the invention have been shown and described and are pointed out in the annexed claims, it will be understood that various omissions, substitutions and changes in the forms and details of the device illustrated and in its operation may be made by those skilled in the art without departing from the spirit of the invention.

What is claimed is:

1. In an electrolytic cell having an electrode, means for supporting said electrode and for applying current thereto comprising a bar having the lower portion of its sides tapered and a contacting member extending in a direction parallel to said bar and having a tapered, longitudinally extending groove adapted to receive said bar, said groove being of greater depth than the tapered portion of said bar whereby a clearance is provided and being extended longitudinally beyond said bar whereby cleaning is facilitated, the tapers of said groove and said bar being such that a wedging action is produced along a line extending longitudinally of said bar whereby the weight of the electrode causes a sliding movement between said bar and said groove for cleaning said surfaces and insuring a good electrical contact.

2. In combination with a pair of electrolytic cells having anodes and cathodes, means for supporting said cathode comprising a bar having the lower portion of its sides tapered to form a wedge, means for hanging said cathode from said bar, said anodes being provided with outwardly extending lugs, said lugs having longitudinally extending grooves with tapered sides adapted to receive the tapered surface of said bar, said groove being extended beyond and below said bar to facilitate cleaning and being adapted to exert a wedging action thereon whereby a firm mechanical contact is afforded due to the weight of the supported electrode.

In testimony whereof I have hereunto set my hand.

PAUL KRANZ AUBEL.