

- [54] CLAMPING DEVICE FOR ANODE RODS**

- [75] Inventor: **Frederik Willem Siegmund,
Bilthoven, Netherlands**

- [73] Assignee: **N.V. Nederlandse Kraanbouw Mij,**
Utrecht, Netherlands

- [22] Filed: Feb. 9, 1971**

- [21] Appl. No.: 113,944

- [52] U.S. Cl..... 269/93, 269/94, 269/229,
269/237

- [51] Int. Cl. B25b 5/08

- [58] **Field of Search**..... 269/43, 47, 221,
269/232, 321 W, 94, 90, 230, 235, 237-239,
127, 128, 93

- [56]
- References Cited**

UNITED STATES PATENTS

3,093,369	6/1963	Duclaux.....	269/221
2,076,207	4/1937	Powell	269/43 X
2,122,898	7/1938	Swartz	269/232
2,137,737	11/1938	Wenzel	269/47 X
2,359,530	10/1944	Rose	269/43
2,398,962	4/1946	Randrup	269/47 X
2,408,560	10/1946	Keehn.....	269/232 X
3,312,460	4/1967	Kaufman.....	269/43 X
3,502,317	3/1970	Killerby	269/43
3,568,562	3/1971	Harwood	269/47 X

1,630,659	5/1927	Hacker.....	269/236 X
1,694,474	12/1928	Lainer.....	269/128

FOREIGN PATENTS OR APPLICATIONS

1,815,048	7/1969	Germany.....	269/321 W
1,083,783	9/1967	Great Britain.....	269/47

Primary Examiner—Granville Y. Custer, Jr.

Assistant Examiner—Neil Abrams

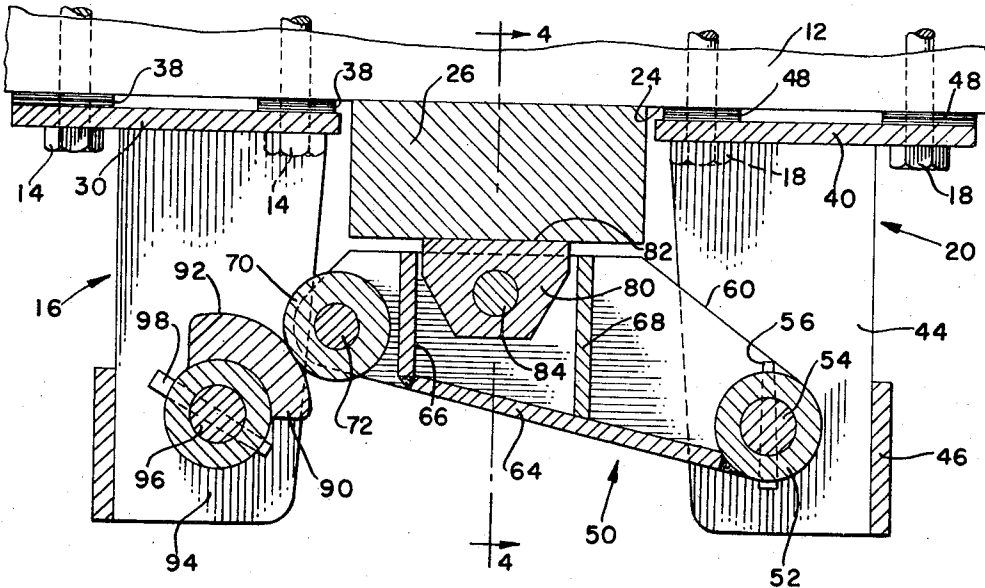
Attorney—Snyder & Butrum

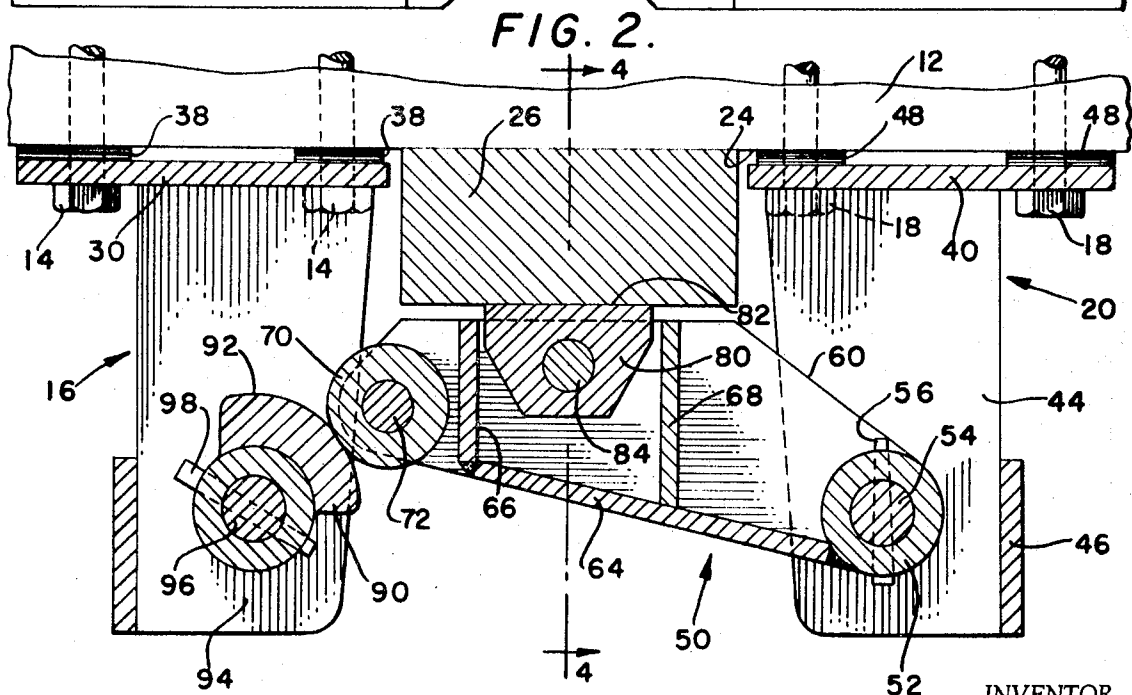
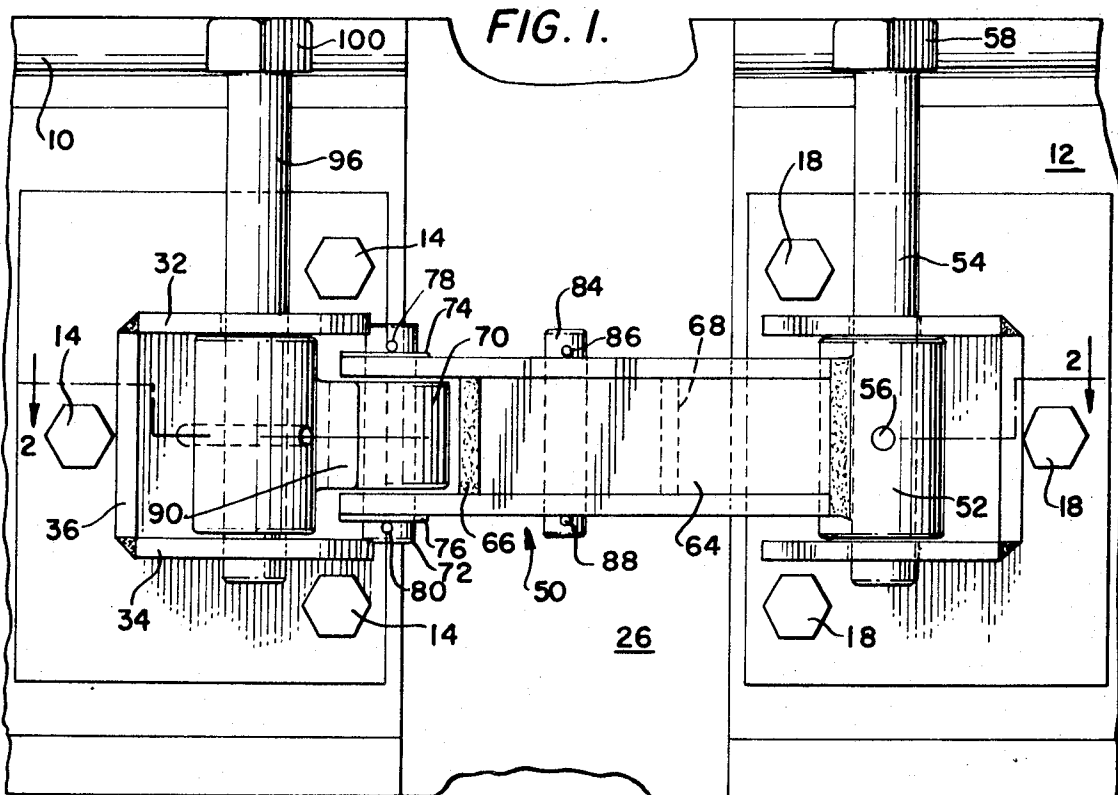
[57]

ABSTRACT

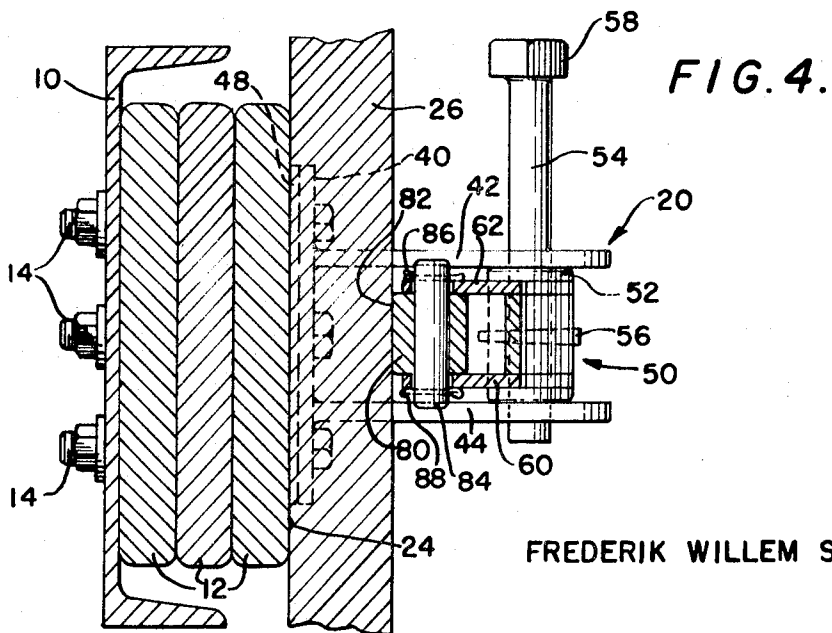
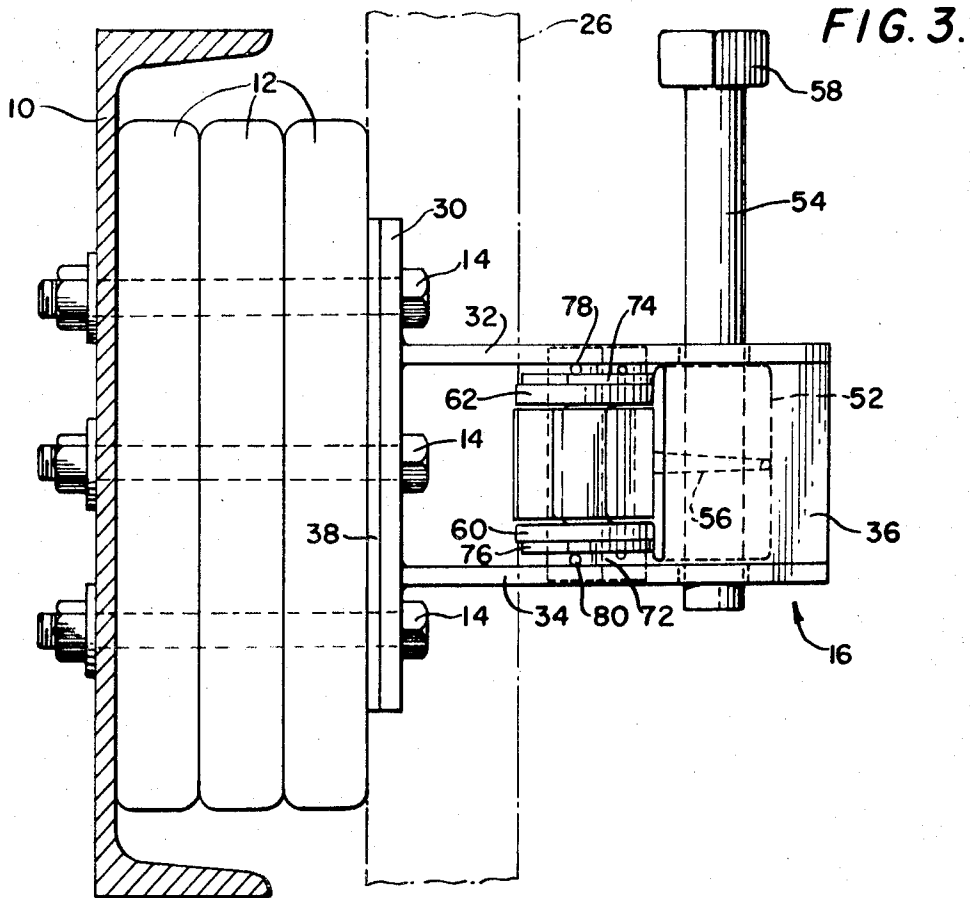
A conductive bus-bar means includes a flat vertical clamping surface. A clamping means includes a pair of spaced support brackets carried by the bus-bar means. A movable means is pivotally supported by one of said support brackets and a roller is carried at the outer free end thereof. A clamping member is pivotally supported by the movable means and includes a flat vertical clamping surface to engage an anode rod and clamp such rod between the clamping member and the bus-bar means. A cam means is rotatably supported by the other of the support brackets and engages the roller on the movable means. Separate and independent means are provided for selectively pivoting the movable means and rotating the cam means to move the clamping means into clamping position.

4 Claims, 4 Drawing Figures





INVENTOR
FREDERIK WILLEM SIEGMUND



INVENTOR
FREDERIK WILLEM SIEGMUND

CLAMPING DEVICE FOR ANODE RODS

BACKGROUND OF THE INVENTION

The present invention relates to a clamping device for anode rods which are used, for example, in the manufacture of aluminum.

The present invention relates to a clamping device of a type such as shown in U. S. Pat. No. 3,093,369 which enables an anode rod to be readily mounted and dismounted with respect to a conductive bus-bar means for changing the position of the anode rod or for replacing the rod if so desired.

Devices of this nature must provide very good electrical contact between the bus-bar means and the anode rod. In the past rather complicated structures have been employed utilizing screws, bolts and wedging devices. Such arrangements were difficult and time consuming to use and uniform clamping conditions were not always attained.

In the construction as shown in the aforementioned U. S. patent, the actuating means included two motion-transmitting means comprising a first means for producing rapid displacement in the form of toothed sectors and a second means in the form of a cam and roller arrangement. The toothed sectors required in this construction provide an undesirably complex and expensive structure.

SUMMARY OF THE INVENTION

In the present invention a pair of spaced support brackets are carried by a conductive bus-bar means. A movable means is pivotally mounted by one of the support brackets for movement about a vertical axis, the movable means having a roller supported at the outer free end thereof. Means is provided for selectively pivoting the movable means about said axis.

A clamping member is pivotally supported by the movable means and includes a flat vertical clamping surface to engage an anode rod. the pivotal mounting of the clamping member enables the clamping member to adjust to the configuration of the anode rod and provides a relatively large flat clamping surface which reduces the pressure per unit area on the anode rod.

A cam means is rotatably supported by the other of said support brackets for movement about a vertical axis and is adapted to engage the aforementioned roller. Separate means is provide for independently selectively rotating the cam means into and out of clamping position.

With the arrangement of the present invention, the movable means and the clamping member carried thereby may be swung into and out of operative clamping position by a first actuating means while the cam means is moved into and out of clamping position by a second actuating means, the two independent actuating means enabling the clamping and unclamping operations to be carried out very quickly and effectively while providing extremely simple and economical means for carrying out the functions of the invention.

The arrangement of the present invention eliminates the necessity of providing numerous screws, bolts or wedges for clamping the anode rod in position as has been a common practice in the prior art, and furthermore the necessity of providing toothed sectors as discussed in connection with the aforementioned U. S. patent is also eliminated.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan view partly broken away illustrating a clamping device according to the present invention; FIG. 2 is a sectional view taken substantially along line 2—2 of FIG. 1 looking in the direction of the arrows;

FIG. 3 is a side view of the structure shown in FIG. 1 looking from the lefthand side thereof; and

FIG. 4 is a sectional view taken substantially along line 4—4 of FIG. 2 looking in the direction of the arrows.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings wherein like reference characters designate corresponding parts throughout the several views, a channel member 10 supports a conductive bus-bar means comprising three electrically conductive members 12 held in the assembled relationship shown by a first plurality of nut and bolt assemblies 14 extending through suitable holes formed there-through, nut and bolt assemblies 14 also serving to support a first support bracket indicated generally by reference character 16. A second plurality of nut and bolt assemblies 18 also extend through suitable holes provided in members 12 for maintaining the bus-bar means in the operative position illustrated. Nut and bolt assemblies 18 also serve to hold a second support bracket indicated generally by reference character 20 in the operative position illustrated.

As seen in FIG. 4, the outwardly facing surface 24 of the outermost member 12 of the bus-bar means defines a flat vertical clamping surface 24 against which one face of an anode rod 26 is adapted to be clamped in operative position.

Support bracket 16 includes a vertical plate 30 and pair of horizontal plates 32 and 34 rigidly secured to plate 30 as by welding or the like, a plate 36 being interconnected between the outer ends of plates 32 and 34 as by welding. The position of the support bracket may be adjusted toward and away from the bus-bar means by interposing suitable shims 38 between plate 30 and the bus-bar means.

Bracket 20 includes a vertical plate 40 having a pair of spaced horizontal plates 42 and 44 rigidly secured thereto, a plate 46 being connected between the outer ends of plates 42 and 44. The position of bracket 20 may be adjusted toward and away from the bus-bar means by interposing suitable shims 48.

A movable means is indicated generally by reference character 50 and includes a generally cylindrical portion 52 snugly received on the lower end of a shaft 54 and connected for rotation therewith by a tapered pin 56 extending through aligned holes in the cylindrical portion and the shaft. The shaft extends upwardly and has at the upper end thereof an enlarged polygonal head 58 for receiving suitable means for rotating the shaft for selectively pivoting the movable means about the axis of the shaft. This shaft may be manually moved as by gripping head 58 with a wrench or the like, or the shaft may be power driven from a remote position if so desired.

The movable means includes a pair of horizontally disposed vertically spaced plates 60 and 62 which are rigidly secured as by welding to cylindrical portion 52. Vertically extending spacer plates 64, 66 and 68 as

seen most clearly in FIG. 2 are mounted between horizontal plates 60 and 62 to retain plates 60 and 62 in proper spaced relationship and to reinforce the movable means.

A roller 70 is carried at the outer free end of the movable means and is mounted on a shaft 72 extending through suitable holes provided in plates 60 and 62. A pair of washers 74 and 76 are disposed about pin 72 and cotter pins 78 and 80 extend through suitable diametrically extending holes formed in pin 72 to hold the roller assembly in operative position.

A clamping member 80 is provided with a flat vertical clamping surface 82 adapted to engage one face of the anode rod 26. The clamping member is pivotally mounted on the movable means and is supported for pivotal movement about the axis of vertical pin 84 which extends through suitable holes provided in plates 60 and 62 of the movable means. Pin 84 is retained in operative position by a pair of cotter pins 86 and 88 which extend through suitable diametrically extending holes provided in pin 84.

A cam means 90 includes an outer cam surface 92, the cam means being fixedly secured as by welding to a cylindrical member 94 which in turn receives a shaft 96. Cylindrical member 94 is secured to shaft 96 for rotation therewith by means of a tapered pin 98 extending through suitable holes provided in the cylindrical member and the shaft. Shaft 96 extends upwardly and is provided with an enlarged polygonal head 100 whereby the cam means may be selectively independently rotated either manually by means of a wrench or the like or it may be power driven from a remote location if so desired.

As seen in FIG. 2, the distance of the outer cam surface 92 from the axis of rotation of shaft 96 increases in a counter clockwise direction so that clamping force will be applied to roller 70 when shaft 96 and cam means 90 is rotated in a clockwise direction.

The contour of the cam means is so selected that the clamping means is self-locking when the clamping position as illustrated in FIG. 2. It is apparent that when it is desired to release the clamping mechanism from the clamping position shown, the cam means can be rotated in a counter clockwise direction and the movable means swung away from the anode rod.

As this invention may be embodied in several forms without departing from the spirit or essential characteristics thereof, the present embodiment is therefore illustrative and not restrictive, and since the scope of the invention is defined by appended claims, all changes that fall within the metes and bounds of the claims or that form their functional as well as conjointly cooperative equivalents are therefore intended to be embraced by those claims.

What is claimed is:

1. In combination with a bus bar assembly having a flat, substantially vertical clamping surface against

which one side of a flat-sided anode rod is adapted to be clamped,

a pair of substantially horizontal support brackets disposed on opposite sides of said clamping surface in horizontally spaced, straddling relation thereto; first pivot pin means rotatably carried by one of said brackets for pivotal motion about a vertical axis parallel to said clamping surface;

elongate clamping means fixed at one end to said first pivot pin means for movement toward and away from a position bridging between said support brackets in outwardly spaced relation to said clamping surface;

second pivot pin means rotatably carried by the other support bracket about a vertical axis parallel to that of said first pivot means;

cam means fixed to said second pivot pin means for urging said elongate clamping means when in said bridging position thereof, forcibly toward said clamping surface about the axis of said first pivot pin;

said clamping means including a second flat clamping surface adapted to engage that side of an anode rod opposite to the side thereof engaged with the clamping surface of the bus bar assembly; and

first actuating means coaxial with the pivot axis of said first pivot pin means and upstanding from and connected to said first pivot means for rotating said first pivot pin means independently of rotation of said second pivot pin means and second actuating means coaxial with the pivot axis of said second pivot pin means and upstanding from and fixed to said second pivot means for rotating said second pivot pin means independently of rotation of said first pivot pin means, whereby an anode rod may be positionally gripped by operation of said first actuating means while the second actuating means is operated to effect camming and release of said cam means.

2. In the combination as defined in claim 1 wherein said elongate clamping means includes an elongate member fixed at one end to said first pivot pin means and a roller at the other end of said elongate member engageable by said cam means.

3. In the combination as defined in claim 2 wherein said elongate clamping means also includes a clamping member pivotally carried by said elongate member about an axis parallel to said clamping surface of the bus bar assembly, said clamping member defining said second flat clamping surface.

4. In the combination as defined in claim 1 wherein said elongate clamping means also includes a clamping member pivotally carried by said elongate member about an axis parallel to said clamping surface of the bus bar assembly, said clamping member defining said second flat clamping surface.

* * * * *