Sept. 22, 1959 D. J. BORODIN 2,905,665

PLATING MACHINE

Filed March 5, 1957 2 Sheets-Sheet 1

FIG. 1

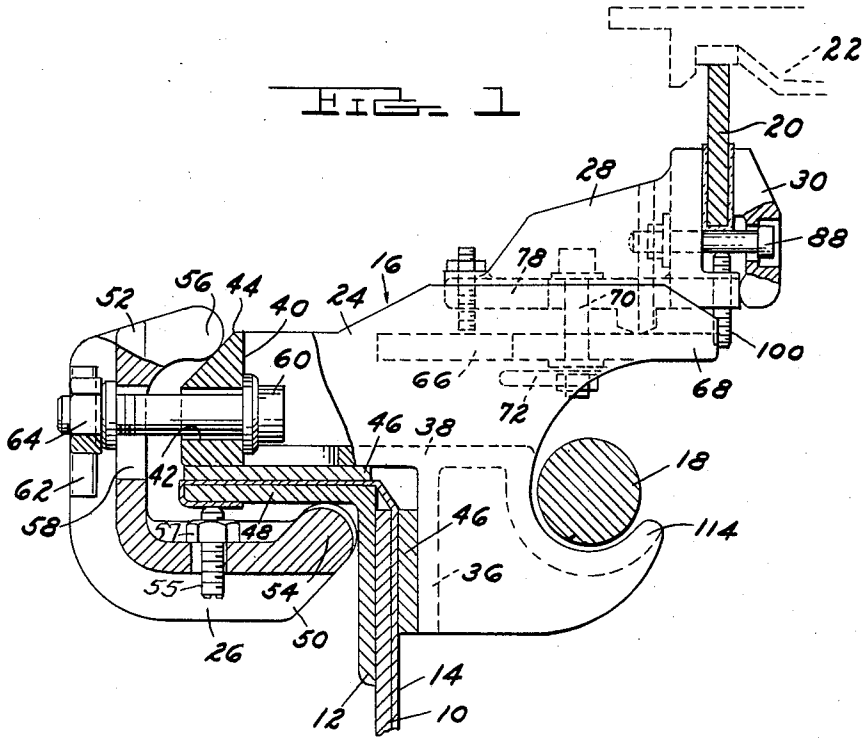
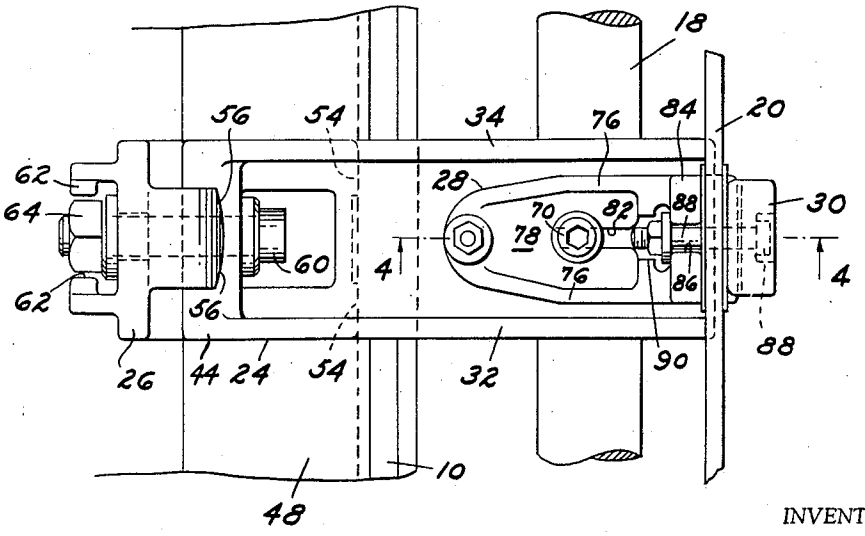


FIG. 2



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FIG. 3

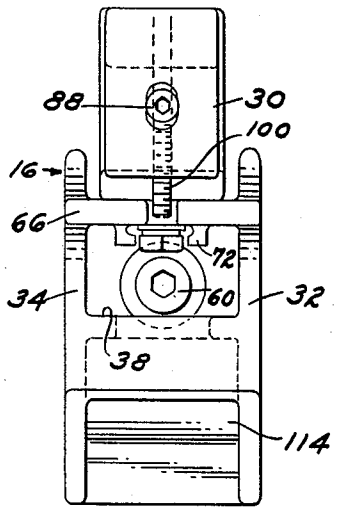


FIG. 4

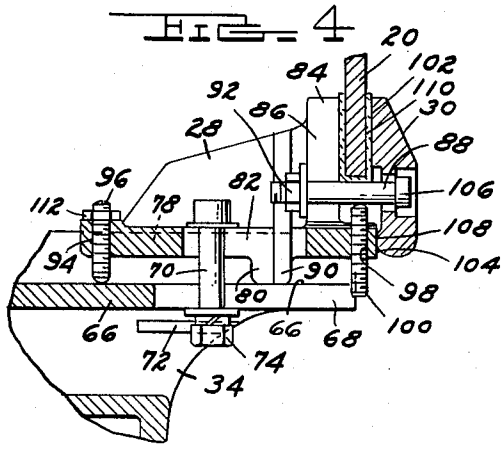
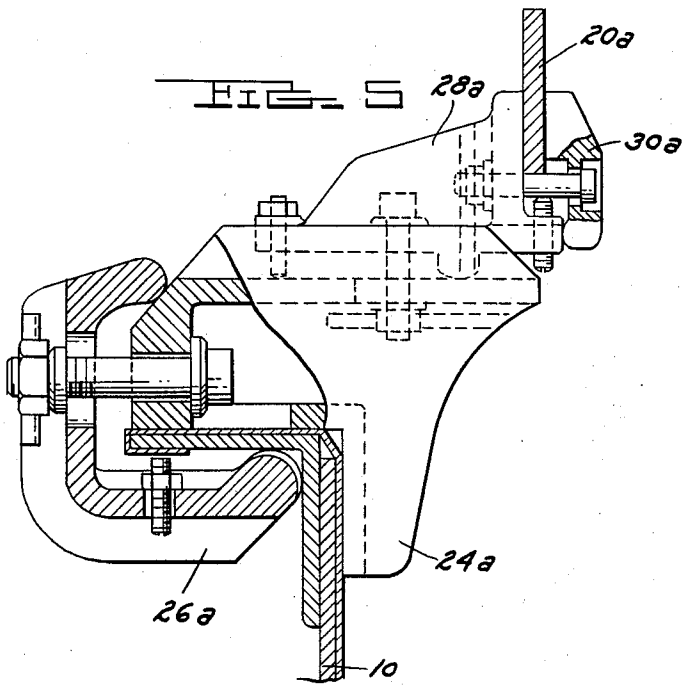


FIG. 5



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PLATING MACHINE

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Application March 5, 1957, Serial No. 644,116

21 Claims. (Cl. 204—198)

This invention relates to plating machines and has to do more particularly with a means for mounting cathode rails on a plating tank.

In many types of plating machines wherein the work pieces are caused to travel progressively from one tank to another, the work pieces are supported on carriers which in turn are slidably mounted on the cathode rails. In machines of this type, the cathode rails are usually mounted on the plating tanks by means of brackets that are attached to the side walls of the tanks at their upper edge. The cathode rails are usually arranged in pairs, and it is therefore important that the cathode rails are maintained in parallel relation and at the proper and same height throughout their extent. The numerous plating tanks of a plating machine are subject to variations in size due to manufacturing tolerances, thickness of the tank lining, etc.; and the side walls of the tanks are not always straight. Thus, cathode rail supporting brackets mounted on the upper side walls of plating tanks must incorporate some means of adjustment so that the rails supported thereby on opposite sides of the tank will be level, parallel and at the same height. In addition, the top contacting surface of the cathode rail must make perfect electrical contact with the shoes of the work carrier.

It is an object of the present invention to provide a cathode rail mounting bracket assembly that incorporates the necessary adjustable features and at the same time is of very economical manufacture.

More specifically, the invention contemplates a cathode rail mounting bracket assembly that consists of several castings so designated that except for two tapped holes, no machining whatever is required on the castings; and, at the same time, a wide range of very accurate adjustment is possible. Thus, the plating tanks of the machine may all be arranged in place as required and thereafter the cathode rails mounted thereon and properly adjusted by means of the mounting brackets of the present invention.

In the drawings:

Fig. 1 is a fragmentary sectional view through a tank of a plating machine showing the cathode mounting bracket assembly of the present invention partly in section.

Fig. 2 is a fragmentary top view of the arrangement illustrated in Fig. 1.

Fig. 3 is an end view of the mounting bracket.

Fig. 4 is a sectional view taken along the lines 4—4 in Fig. 2.

Fig. 5 is a fragmentary sectional view through a plating tank showing a cathode mounting bracket of the present invention of slightly modified form.

Referring to Fig. 1, a portion of the side wall of a plating tank is illustrated at 10. Along its upper edge, the side wall 10 has a reenforcing angle iron 12 attached thereto. The tank may have a non-corrosive lining as indicated at 14. The bracket assembly of the present invention is generally designated 16 and is arranged for supporting an anode bar 18 and a cathode rail 20. In

the machine illustrated, carriers 22 are arranged for sliding movement on rail 20. It will be appreciated that there will be a similar arrangement on the opposite side of the tank so that the work carrier 22 spans two rails 20.

The mounting bracket of the present invention comprises four main components, a main supporting bracket 24, a heel clamp 26 for clamping bracket 24 on the tank, a rocker bracket 28 for supporting rail 20 and a rocker clamp 30 for clamping rail 20 to rocker bracket 28. All of these members are formed as castings and except for two threaded holes referred to hereinafter, none of these castings require any machining whatever. Supporting bracket 24 is fashioned with a pair of side walls 32 and 34 which impart rigidity to the casting. This casting also includes a vertical web portion 36 and a horizontally extending web portion 38. At its outer end, bracket 24 is formed with a boss 40 extending between side walls 32, 34. Boss 40 is provided with a cored hole 42 and an inclined top face 44. Bracket 24 is adapted to be seated on the angle 12 at the upper edge of the plating tank as illustrated. If desired, a pair of pads 46 may be used for seating webs 36 and 38 so that the bracket will seat firmly against the side wall 10 of the tank and the horizontal leg 48 of angle iron 12. The use of pads 46 is optional. Clamp 26 is formed with a pair of perpendicularly related legs 50 and 52, the leg 50 terminating in a pair of spaced rounded bearing portions 54 and the leg 52 terminating in a single rounded bearing portion 56. The leg 52 of clamp 26 is fashioned with a cored opening 58 to receive a clamping screw 60 and is fashioned with ribs 62 on its side walls for trapping a nut 64 at the outer end of screw 60.

In assembly, support bracket 24 is arranged on the upper edge of the tank as illustrated; and clamp 26 is arranged in position so that the bearing portions 54 seat solidly within the inside corner of angle 12 and bearing portion 56 engages the inclined surface 44 of bracket 24. Thereafter, screw 60, which is a socket head screw, is passed through the openings 42 and 58 and is rotated to thread nut 64 on the end thereof. As the screw 60 is tightened, bracket 24 is drawn tight up against the side wall of the tank; and, at the same time, since bearing portions 54 fulcrum about the inside corner of angle 12 and bearing portion 56 bears downwardly at an angle on bracket 24, bracket 24 is also caused to seat firmly on the top face of angle 12. If desired, an additional clamping screw 55 threaded through a nut 57 trapped on leg 50 of clamp 26 may be utilized. This construction of bracket 24 and clamp 26 enables the bracket assembly to be rigidly mounted on the tank.

Bracket 24 is also fashioned with a second horizontal web 66 extending between side walls 32, 34 below the upper edges thereof. Web 66 is cored to provide a central slot 68 therein (Fig. 4) to accommodate a clamping screw 70. The side walls 32, 34 are fashioned with ribs 72 below slot 68 to trap a nut 74 threaded on the lower end of screw 70.

Rocker bracket 28 is also fashioned with a pair of side walls 76 and a horizontal web portion 78. The web portion 78 is fashioned with a foot 80 by means of which bracket 28 is rockably supported on the web 66 of bracket 24. Web 78 is cored to provide a slot 82 (Fig. 4) through which the screw 70 may be passed. At its outer end, bracket 28 is fashioned with a vertically extending jaw portion 84 which is vertically slotted as at 86 (Fig. 2) to accommodate a clamping screw 88. The side walls 76 of bracket 28 are fashioned with vertical ribs 90 for trapping the nut 92 on the end of screw 88. Adjacent its outer end, web 78 is provided with a threaded opening 94 to receive an adjustment screw 96; and adjacent its inner end, web 78 is provided with a second threaded opening 98 to receive an adjustment screw 100.

Rocker clamp **30** is fashioned with a vertically extending clamp portion **102** at its upper end and with a rounded bearing portion **104** at its lower end. It is cored as at **106** to provide an opening to receive screw **88** which is preferably of the socket head type. Clamp **30** is arranged on bracket **28** with the rounded bearing portion **104** fulcrumed against the inner end face **108** of web **78** so that when screw **88** is tightened, the cathode rail **20** is clamped firmly between jaws **84** and **102**. Rail **20** may be insulated from the remainder of the structure by means of an insulator **110**. The vertical position of rail **20** can be adjusted by turning screw **100**. The upper edge of this screw engages the shank of screw **88** on which rail **20** is supported. The opening **106** and the vertical slot **86** permit vertical movement of screw **88**.

The position of the rails **20** transversely of the tank walls is adjustable by reason of the slot **62** in web **66** and the slot **82** in web **78**. These slots enable shifting of the rocker bracket **28** in a direction inwardly or outwardly of the tank wall. It will be appreciated that if the tank wall is bowed or warped slightly, then the two legs of angle **12** may be not be perfectly vertically and horizontally disposed. To compensate for this so that the rails **20** will lie in an absolutely vertical plane, bracket **28** is adapted to be rocked on web **66** about foot **80** by adjustment of screw **96**. When rail **20** is properly located, screw **70** is tightened and jam nut **112** is also tightened to firmly hold the rail in its adjusted position. It will be observed that by forming the various castings so that the nuts on clamp screws **60**, **70** and **88** are trapped, the castings are not unnecessarily large and the operation of mounting and adjusting the bracket is simplified.

In the case of an electrified machine, support bracket **24** is fashioned with an arcuate horn **114** for supporting the anode bar **18**. In Fig. 5, there is illustrated a cathode rail mounting bracket assembly for use on a non-electrified machine. This assembly includes a support bracket **24***a*, a heel clamp **26***a*, a rocker bracket **28***a* and a rocker clamp **30***a*. Support bracket **24***a* is not fashioned with a horn such as shown at **114** in the previous embodiment described. Thus, the rail **20***a* can be located closer to the tank wall **10** than is the case in the previous embodiment. Therefore, bracket **24***a* is generally the same in construction as bracket **24** except that it is shortened in length. In other respects, the embodiment illustrated in Fig. 5 is the same as that shown in Figs. 1 through 4.

Thus, it will be seen that I have provided a mounting bracket assembly for a cathode rail on a plating tank the design of which makes for economy in manufacture since the only machining required is in connection with the threaded holes **94** and **98** and which, at the same time, provides the wide range of adjustment required to compensate for variation in plating tanks. The component parts are all formed as castings; but in view of the design, a very accurate adjustment of the cathode rails can be accomplished.

The mounting bracket assembly described herein also facilitates and expedites considerably the assembly of the plating machine. In the first place, it will be appreciated that when assembling the rails to the tank, no machining whatever, such as drilling holes and the like, is required either in the rails, the brackets or the tanks. Furthermore, when the tanks are initially fabricated at a point remote from the machine itself, the rail sections can be mounted thereon so that in final assembly when the tanks are arranged on the machine, all that is necessary is a final adjustment of the rails to bring them into proper alignment and to assure full surface contact between the shoes on the carriers and the top faces of the carrier rails.

In addition, it will be observed that the present design of mounting bracket simplifies the problem of insulating the cathode rails from the remainder of the assembly. The clamping faces of clamp **30** and the clamping portion **48** of bracket **84** are relatively large flat surfaces. Thus, the provision of the insulator **110** effectively insulates rail **20** from the bracket assembly. Since this insulator is subjected only to compression, the possibility of failure and shorting is eliminated.

I claim:

1. Means for mounting a work supporting cathode rail on a plating tank having an upper edge provided with an outwardly extending flange defining a corner portion at the upper edge of the tank having generally vertically and horizontally disposed bearing faces, comprising a support bracket having a pair of generally perpendicularly related faces adapted to seat against said bearing faces at the top corner of the tank, a clamp having a pair of bearing portions arranged to engage one against said bracket and the other against the tank, a screw disposed between said bearing portions and interconnecting said bracket and clamp and adapted when tightened to rigidly mount said mounting bracket on the tank, a rail bracket movably supported on said mounting bracket and shiftable thereon in a direction toward and away from said clamp, releasable means for clamping said rail bracket on said support bracket in adjusted, fixed position, said rail bracket having a generally vertically extending clamp face, a clamp movably mounted on said rail bracket and having a generally vertically extending clamp face disposed generally parallel to and spaced from the clamp face of the rail bracket, said clamp faces being adapted to engage opposite faces of a rail disposed therebetween and means for drawing the clamp face of the clamp toward the clamp face of the rail bracket to clamp a rail therebetween, said rail bracket being fulcrumed on said support bracket for pivotal movement about a horizontal axis generally parallel to the plane of said clamping faces and including threaded means acting between said rail bracket and said mounting bracket for adjusting the pivotal position of said rail bracket.

2. The combination called for in claim 1 wherein said threaded means comprises a generally vertically extending screw threaded on said rail bracket with its lower end engaging said mounting bracket.

3. The combination called for in claim 1 wherein said clamp means for releasably clamping the rail bracket on the mounting bracket are disposed between said screw and the pivotal axis of said rail bracket.

4. In a plating machine wherein a work supporting cathode rail extends longitudinally over the plating tanks, means for adjustably mounting the rail on the tank comprising a support bracket mounted on the tank and having a generally horizontally disposed face, a rail bracket having a foot portion rockably supported on said generally horizontally disposed face of said mounting bracket, an adjusting screw spaced from said foot portion and arranged between said mounting and rail brackets for adjusting the pivotal position of said rail bracket, means for clamping the rail bracket in fixed position on said mounting bracket as determined by said adjusting screw, said rail bracket being provided with means for clamping a work supporting cathode rail thereon.

5. The combination called for in claim 4 wherein said means for clamping the rail bracket on the mounting bracket comprises a generally vertically disposed clamp screw interconnecting said brackets and disposed between said foot portion and said adjusting screw.

6. The combination called for in claim 5 wherein said brackets are provided with vertically registering openings through which said clamp screw extends, at least one of said openings being elongated in a direction transversely of the tank wall to permit adjustment of the rail inwardly and outwardly of the tank wall.

7. The combination called for in claim 4 wherein said means for clamping the work rail on said rail bracket comprises a clamp having a generally vertically disposed clamping face, said rail bracket also having a generally

vertically disposed clamping face and means releasably securing said clamp on the rail bracket to clamp the rail between said clamping faces.

8. The combination called for in claim 7 including an adjusting screw on said rail bracket extending vertically between the planes of said clamping faces for adjusting the vertical position of the rail.

9. The combination called for in claim 7 wherein said clamp extends generally vertically and has its lower end fulcrumed against a vertically extending portion of said rail bracket, said means for securing the clamp on a rail bracket comprising a screw extending horizontally through said clamp and a portion of said rail bracket.

10. The combination called for in claim 9 wherein said screw supports the rail between said clamping faces, said screw being shiftable vertically to adjust the height of the rail and an adjusting screw threaded vertically through a portion of said rail bracket with its upper end engaging the underside of said clamp screw for shifting the clamp screw and the rail supported thereby vertically.

11. The combination called for in claim 4 wherein said mounting bracket is provided with a horn spaced below said rail and between the rail and the side wall of the tank and an anode bar supported by said horn.

12. In a plating machine of the type wherein a work supporting cathode rail extends longitudinally over the tanks, the tanks being provided with a horizontally outwardly extending ledge portion at the upper edge of its side walls, means for adjustably mounting the rail on the tanks comprising a mounting bracket member having a pair of generally perpendicularly related flanges, one of which is disposed on said ledge portion and the other against the inner face of the tank side wall, said bracket member having a face portion inclined downwardly and outwardly relative to said ledge portion, a clamp member having a bearing portion engaging the inside corner between said ledge portion and tank wall and a second bearing portion engaging said inclined face portion of said bracket member, said bracket and clamp members having horizontally aligned openings therein disposed in a plane between said two bearing portions, means extending through said aligned openings for drawing said bracket member and clamp member towards each other whereby to securely clamp said flanges against the inner face of the tank side wall and the top face of said ledge portion, respectively, and means on said bracket member for shiftably supporting said rail.

13. The combination called for in claim 12 wherein said first bearing portion is fulcrumed at said inside corner whereby to permit said second bearing portion to ride along said inclined face portion of said bracket member.

14. The combination called for in claim 13 wherein said means for drawing the bracket and clamp members together comprises a screw having a nut threaded thereon, the head of the screw engaging one of said members and the nut engaging the other of said members, the portion of said member engaged by the nut being fashioned to prevent rotation of the nut.

15. The combination called for in claim 12 wherein said means for shiftably supporting the rail comprises a rail bracket member rockably supported on said mounting bracket member for pivotal movement about an axis generally parallel to the side wall of the tank, means for adjusting the pivotal position of said rail bracket member, said two bracket members having vertically aligned openings therein, a clamp screw extending through said vertically aligned openings and rigidly securing said rail bracket member on said mounting bracket member and a clamp member on said rail bracket member for clamping the rail thereon.

16. The combination called for in claim 15 wherein said means for adjusting the pivotal position of said rail bracket member comprises a generally vertically extending screw on said rail bracket member having one end engaging said mounting bracket member, said screw for clamping the rail bracket member on the mounting bracket member being disposed intermediate the pivotal axis of said rail bracket member and said last mentioned screw.

17. The combination called for in claim 15 wherein at least one of said last two mentioned openings is elongated in a direction transversely of the tank wall to permit shifting of the rail bracket member inwardly and outwardly of the tank wall.

18. The combination called for in claim 15 wherein said rail bracket member is provided with a generally vertically extending clamp face, said means for clamping the rail on said rail bracket member comprising a clamp member having a generally vertically extending clamp face disposed generally parallel to said first mentioned clamp face, said last mentioned clamp member and said rail bracket member having horizontally aligned openings therein, a screw extending through said openings for clamping the rail between said clamp faces.

19. The combination called for in claim 18 wherein said two last mentioned clamp screws are provided with a head at one end and a nut at its opposite end, the head engaging one of the respective members and the nut engaging the other of the respective members, the members engaged by said nuts being fashioned to prevent rotation of the nuts.

20. The combination called for in claim 19 wherein said bracket members and said clamp members are formed as castings.

21. The combination called for in claim 20 wherein said openings in said clamp and bracket members are cored apertures.

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