

Sept. 7, 1965

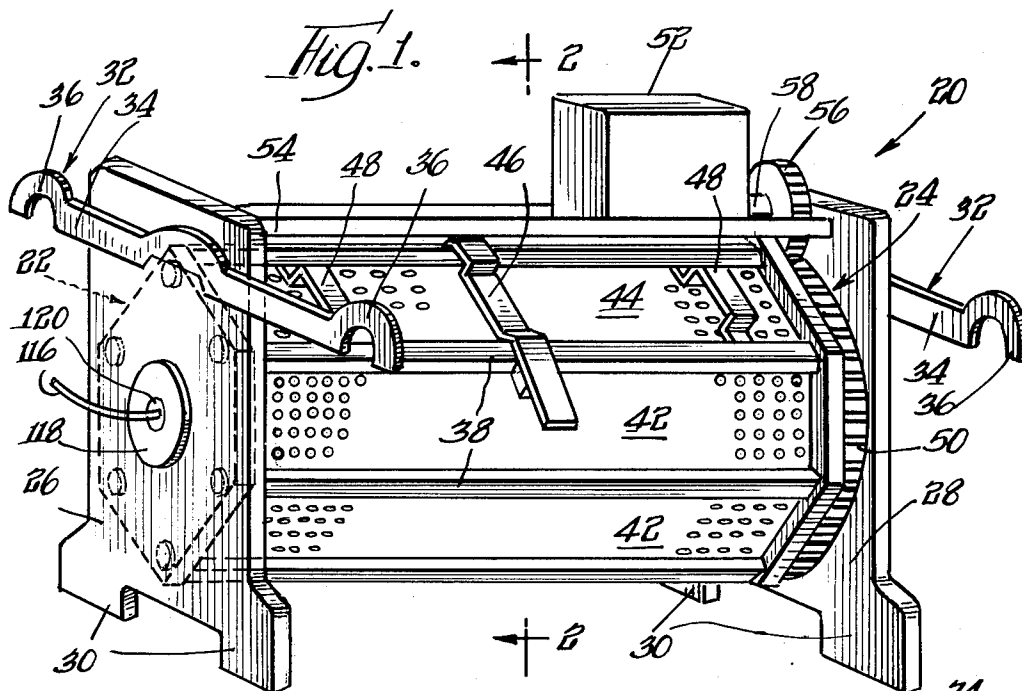
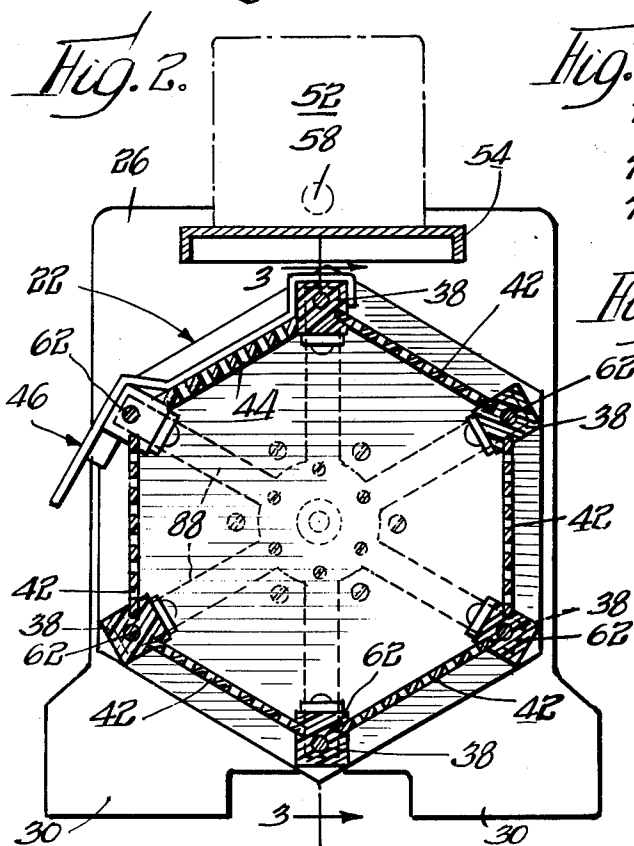
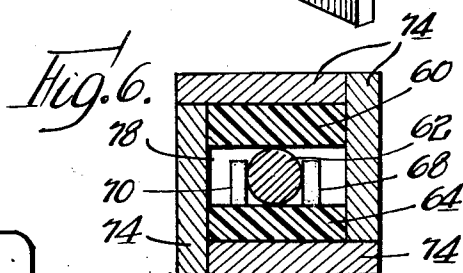
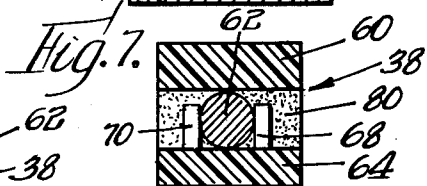
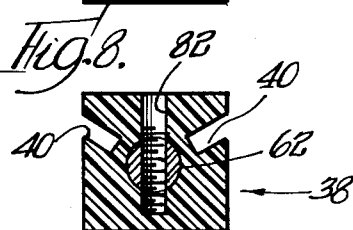
E. O. NEILSON

3,205,159

PORTABLE PLATING BARREL

Filed July 12, 1960

2 Sheets-Sheet 1



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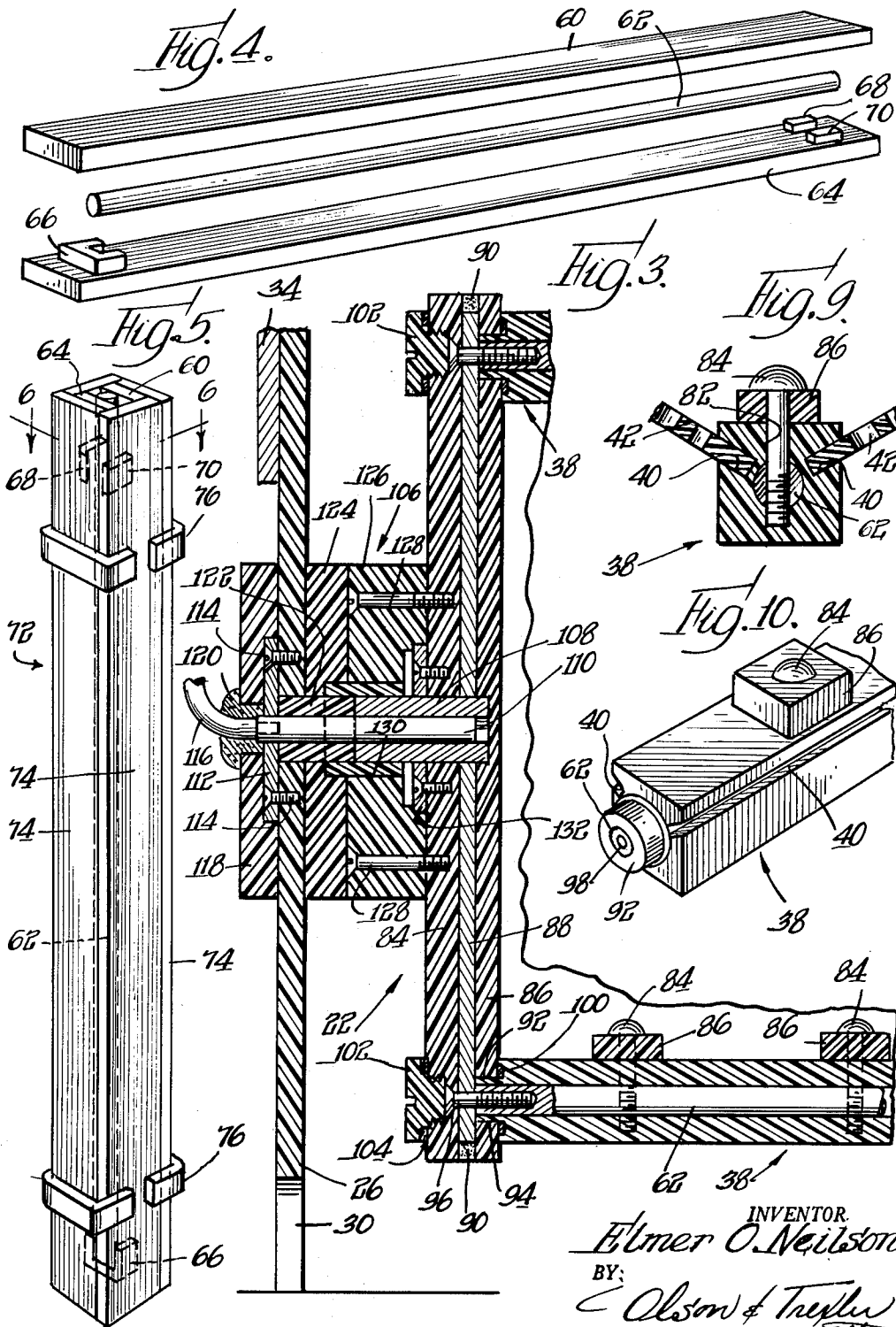
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PORTABLE PLATING BARREL

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2 Sheets-Sheet 2



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PORTABLE PLATING BARREL

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5 Claims. (Cl. 204—213)

This invention relates generally to electroplating apparatus and especially to electroplating apparatus of the kind adapted to handle batches of small parts.

In one specific aspect, the present invention relates to a portable electroplating barrel.

A common problem encountered in electroplating batches of small parts is keeping the electrolyte from leaking into contact with the electrical supply elements of the electroplating barrel. When the electrolyte does leak into contact with the electrical supply elements, a plating action occurs and plated metal builds up along the leakage path. Since the plated metals themselves are electrically conductive, a short circuit is eventually created; and an electroplating barrel having such a short circuit can no longer be used.

The problem of preventing electrolyte from leaking into contact with electrical supply elements is particularly vexing when a relatively low volume item, such as a portable electroplating barrel, is concerned. In such circumstances, the special purpose molds and tooling necessary to produce parts to close tolerances and extraordinary sealing methods cannot be employed economically.

Therefore, an important object of the present invention is to provide a new and improved electroplating barrel structure which is highly resistant to invasion by electroplating solutions.

Another object of the invention is to provide an electroplating barrel structure which is highly resistant to invasion by electroplating solutions, which is light in weight and which can be moved to and from plating tanks by hand.

A further object of the invention is to provide an electroplating barrel which is economical to manufacture.

Additional objects and features of the invention pertain to the particular structure, arrangements and materials whereby the above objects are attained.

Apparatus in accord with the invention includes upright, spaced-apart standards for rendering the apparatus self-supportive; hanger brackets on the standards extending laterally therebeyond adapted to suspend the standards in an electroplating bath; a drive end flange assembly; a live end flange assembly arranged to be rotated with the drive end flange assembly in spaced relationship; means rotatably mounting the end flange assemblies to the standards beneath the hanger brackets; drive means mounted adjacent at least one of the standards above the end flange assemblies; power transmitting means interconnecting the drive means and the drive end flange assembly; a plurality of rib means fixed between the end flange assemblies at arcuately spaced locations, each of the rib means including a pair of resinous strips sandwiching an electrically conductive element, further including a compatible resinous material polymerized in place between the strips joining the strips and surrounding the conductive element; perforated panels fastened between adjacent rib means; button-type contacts on the rib means in electrical communication with the conductive elements; and electrical supply means associated with the live end flange assembly for connecting the conductive elements to a source of power.

The invention, both to its structure and mode of operation, will be better understood by reference to the following disclosure and drawings forming a part thereof, wherein:

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FIG. 1 is a perspective view of electroplating apparatus constructed in accordance with the invention;

FIG. 2 is an enlarged view taken through the section 2—2 of FIG. 1;

FIG. 3 is a further enlarged view taken through the section 3—3 of FIG. 2 and showing the means for rotatably mounting the live end flange assembly to the adjacent standard;

FIG. 4 is an exploded perspective view of a rib means for use in the electroplating apparatus of FIG. 1;

FIG. 5 is a perspective view showing fabrication of a rib means;

FIG. 6 is an enlarged view taken through the section 6—6 of FIG. 5;

FIG. 7 is a central sectional view of a completed rib means taken in end elevation and showing the several component parts;

FIG. 8 is a showing similar to FIG. 7 illustrating the rib means notched to receive the perforated panels and provided with a tapped aperture for receiving a button-type contact;

FIG. 9 is a view similar to FIG. 8 showing the perforated panels and a button-type contact assembled into a rib means; and

FIG. 10 is a perspective view of one end of a rib means.

Referring now in detail to the drawings, specifically to FIGS. 1 and 2, a portable button-type electroplating barrel apparatus indicated generally by the numeral 20 will be seen to include a live end flange assembly 22 and a drive end flange assembly 24 spaced-apart and rotatably mounted respectively to an upright standard 26 and an upright standard 28. The standards 26 and 28 are advantageously arranged to terminate in feet 30 at their lower extremities in order that the barrel apparatus 20 may be free-standing when placed on a generally horizontal surface. Hanger brackets 32, each comprising an arm or yoke member 34 having hook members 36 at each end, are affixed to the standards 26 and 28 in horizontal disposition generally above the end flange assemblies 22 and 24. The hook members 36 of hanger brackets 32 extend laterally beyond the standards 26 and 28 for supporting barrel apparatus 20 in the electroplating tank.

Between the end flange assemblies 22 and 24, a number of ribs 38 are affixed to unite the end flange assemblies into a barrel framework. Each of the ribs 38 is provided with longitudinally extending slots 40, shown for example in FIG. 10, slots 40 flaring outwardly from opposite sides of each rib 38 so as to receive the edges of perforated panels 42 which define sides for the barrel structure, as is shown in FIG. 2. The panels 42 are desirably fabricated from a methyl methacrylate resin and are perforated with numerous holes in order to allow free circulation of electroplating fluids through the barrel. As will be seen from an inspection of FIG. 2, the panels 42 extend between the adjacent ribs 38 defining all but one of the sides of the barrel. The remaining side of the barrel is closed by means of a perforated panel 44. Panel 44 is fashioned with tapered lateral edges which cooperatively seat against two of the ribs 38, as shown, panel 44 being suitably secured in place as by a clamp means 46. Handles 48 may be fastened to panel 44 in order to facilitate opening and closing of the barrel.

As will be recognized, batches of small parts to be electroplated are easily loaded and unloaded from the barrel apparatus by means of the removable panel 44, the numerous holes in the several panels 42 and 44 providing ready access of electroplating solutions to the contents of the barrel. The holes with which the panels 42 and 44 are perforated are advantageously selected to be of such a size as to prevent the parts charged into the bar-

rel from sifting out of the barrel into the electroplating tank.

For purposes of rotating the electroplating barrel and thereby tumbling its contents, the drive end flange assembly 24 incorporates a spur gear 50 which is arranged with its axis coincident with the axis of rotation of the barrel. An electric motor 52 or other suitable drive means is advantageously mounted on a shelf member 54 which extends between the standards 26 and 28 above the barrel proper. A pinion gear 56 is secured to the output shaft 58 of motor 52 to mesh with spur gear 50 providing the desired motive force to the barrel structure.

The ribs 38 are specially constructed to preclude invasion by electroplating solutions and thereby prevent the development of electrical leakage paths to that portion of the electrical supply contained within each rib. The construction of a rib 38 will now be described with particular reference to FIGS. 4-10. Considering first the showing of FIG. 4, components of a rib will be seen to include an elongated, electrically insulative strip 60, an electrically conductive rod 62 and an elongated, electrically insulative strip 64. In compliance with a preferred form of the invention, the strips 60 and 64 are selected to be premolded strips of a polymerized methyl methacrylate resin. The rod 62 is arranged to be shorter than the two strips 60 and 64; and furthermore, the strip 64 has a C-shaped bracket 66 affixed to the surface confronting strip 60 adjacent one end. In addition, two elongated blocks, blocks 68 and 70, are affixed to the same surface of strip 64 adjacent the opposite end, bracket 66 and blocks 68 and 70 providing means for positioning the rod 62 between the strips 60 and 64.

With the conductive rod 62 sandwiched between the strips 60 and 64, a fixture 72, shown in FIGS. 5 and 6, is assembled surrounding the sandwiched parts, the fixture 72 comprising sides 74 and clamp members 76. When the strips 60 and 64 and the rod 62 are assembled in the fixture 72, a void or space 78 is defined about rod 62 as shown in FIG. 6; and in accordance with the invention, a compatible material, specifically a room temperature polymerizing methyl methacrylate resin system, is introduced into the void 78 to be allowed to solidify joining the strips 60 and 64 surrounding the rod 62. This room temperature polymerizing methyl methacrylate resin system advantageously comprises particulate polymerized resin dispersed in a liquid monomer and, when polymerized, forms the resinous element 80 shown in FIG. 7.

After the strips 60 and 64 have been united by the element 80 forming a rib 38, as shown in FIG. 8, a number of radially extending, longitudinally spaced-apart, tapped apertures 82 are desirably formed in the rib member 38, the apertures 82 preferably entering the rod 62. A co-operatively threaded button contact element 84 is then secured in each of the apertures 82, a block 86 preferably formed from a melamine resin-linen laminate being secured between the head of each contact 84 and rib means 38, as is well shown in FIG. 9.

In accord with the invention, electrical supply means are incorporated in the live end flange assembly 22; and turning to FIG. 3, the live end flange assembly 22 will be seen to include a plate-like element 84 and a plate-like element 86 arranged to sandwich an electrically conductive, spider 88, assembly 22 being constructed so as to preclude electroplating solutions from leaking into contact with the spider. In compliance with one preferred form of the invention, spider 88 is fabricated from bronze and the plate-like elements 84 and 86 are fabricated from a polymerized methyl methacrylate resin. In making the end flange assembly 22, the plate-like elements 84 and 86 are joined together by a compatible material, specifically a room temperature polymerizing methyl methacrylate resin system, which surrounds the spider 88 in the form of a resinous element 90. Like the resinous element 80, the resinous element 90 is formed from a methyl methacrylate resin system which comprises a particulate polymer dispersed in a liquid monomer.

With reference to FIG. 10 and with continuing reference to FIG. 3, a rib member 38 is seen produced with a turned end 92 which is adapted to be inserted in a bore 94 formed adjacent the edge of live end flange assembly 22 at the end of an arm of spider 88. A screw 96 passes through the arm of spider 88 to engage a tapped aperture 98 formed in the turned end 92 of rod 62. Screw 96 establishes and maintains intimate physical and electrical contact between the spider 88 and the rod 62. A resilient washer 100 is desirably interposed between the plate-like element 86 and a shoulder portion of the end of rib 38 so as to seal off the connection between spider 88 and rod 62. Likewise, a resinous plastic plug 102 threadedly engages a cooperating bore formed in plate-like element 84 to seal off the head of screw 96. In addition, a washer 104 is usefully situated beneath the head of plug 102 for sealing purposes.

The live end flange assembly 22 is rotatably mounted to standard 26 by means of a journal unit indicated generally by the numeral 106 and adapted to exclude electroplating solutions. The unit 106 includes a bronze bushing 108 which enters a central bore formed in the end flange assembly 22. A bronze trunnion 110 is fixed to standard 26 by a flange 112 and screws 114, bushing 108 rotatably receiving the trunnion 110. The trunnion 110 is also connected to a dangle lead 116 while the flange 112 is covered with an insulating plate 118 preferably fabricated from methyl methacrylate resin. Advantageously, a quantity of the room temperature polymerizing methyl methacrylate resin system is polymerized in place about the connection between dangle lead 116 and trunnion 110 to form a resinous plug 120 filling the central aperture in plate 118.

A sleeve 122, desirably fabricated from a melamine resin-linen laminate is interposed between flange 112 and the bushing 108, sleeve 122 being of approximately the same internal and external diameter as bushing 108. A plate 124 is fixed with respect to standard 26 and a plate 126 is affixed to end flange assembly 22 as by means of screws 128, plate 124 bearingly engaging block 126. A melamine resin-linen laminate sleeve bearing 130 is adapted to enter communicating bores in plate 124 and block 126 overlapping the juncture between bushing 108 and sleeve 122; and a washer element 132 is affixed to plate-like element 84 in an annular recess formed within block 126 confronting one end of sleeve bearing 130.

It is to be pointed out that the electrical supply flows from dangle lead 116 to the trunnion 110 and the bushing 108; from thence to the spider 88, the screws 96, and the rod 62; through the button-type contacts 84 to the metal parts being tumbled within the barrel apparatus.

It will become apparent from the foregoing descriptions that the barrel apparatus 20 is constructed from low density materials and incorporates its own, individual drive means. Accordingly, the apparatus 20 can be readily constructed as a portable unit easily transported by hand.

The manner in which the present invention may be practiced and the purposes to which it may be put are also evident from the foregoing descriptions; and while a particular embodiment of the invention has been shown, it should be understood, of course, that the invention is not to be limited thereto since many modifications may be made. It is, therefore, contemplated to cover by the appended claims any such modifications as fall within the true spirit and scope of the invention.

The invention is claimed as follows:

1. In a button-type electroplating barrel, the combination comprising: a pair of electrically insulative end flanges arranged to be rotated in spaced relationship; a plurality of rib means fixed between said end flanges at arcuately spaced locations, each of said rib means including a pair of elongated, resinous strips disposed on opposite sides of an electrically conductive element, each of said rib means further including a compatible resinous material polymerized in place between said strips joining said strips and

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surrounding said conductive element; perforated panels fastened between adjacent rib means; button-type contacts on said rib means in electrical communication with said elements; and electrical supply means associated with one of said end flanges for connecting said elements to a source of power, said strips being fabricated from a methyl methacrylate resin and said compatible material being a methyl methacrylate system including particulate polymer and liquid monomer.

2. An electroplating barrel according to claim 1 wherein said methyl methacrylate system is room temperature polymerizable.

3. In a button-type electroplating barrel, the combination comprising: a pair of electrically insulative end flanges arranged to be rotated in spaced relationship, one of said flanges including a pair of resinous, plate-like elements disposed on opposite sides of an electrically conductive spider, said one end flange further including a compatible resinous material polymerized in place between said plate-like elements joining said elements and surrounding said spider, said spider being connectable to a source of power; a plurality of rib means fixed between said end flanges at arcuately spaced locations, each of said rib means including an electrically conductive element; perforated panels fastened between adjacent rib means; and button-type contacts on said rib means electrically connected to said spider through said conductive elements, said plate-like elements being fabricated from a methyl methacrylate resin and said compatible resinous material being a methyl methacrylate system including particulate polymer and liquid monomer.

4. In a button-type electroplating barrel, the combination comprising: a pair of electrically insulative end flanges arranged to be rotated synchronously in spaced relationship, one of said flanges including a pair of resinous, plate-like elements disposed on opposite sides of an electrically conductive spider, said one end flange further including a compatible resinous material polymerized in place between said plate-like elements joining said elements and surrounding said spider, said spider being connectable to a source of power; a plurality of rib means fixed between said end flanges at arcuately spaced locations, each of said rib means including a pair of elongated, resinous strips disposed on opposite sides of an electrically conductive element, each of said rib means further including a compatible resinous material polymerized in place between said strips joining said strips and surrounding said elements; perforated panels fastened between adjacent rib means; and button-type contacts on said rib means electrically connected to said spider through said conductive elements, said plate-like elements and said strips being fab-

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ricated from a methyl methacrylate resin and said compatible resinous material polymerized in place between cluding particulate polymer and liquid monomer.

5. Electroplating apparatus adapted to be transported by hand, said apparatus comprising: upright, spaced-apart standards for rendering said apparatus self-supportive; hanger brackets on said standards extending laterally therebeyond adapted to suspend said standards in an electroplating bath; a drive end flange assembly; a live end flange assembly arranged to be rotated synchronously with said drive end flange assembly in spaced relationship; means rotatably mounting said end flange assemblies to said standards beneath said hanger brackets; drive means mounted adjacent at least one of said standards above said end flange assemblies; power transmitting means interconnecting said drive means and said drive end flange assembly; a plurality of rib means fixed between said end flange assemblies at arcuately spaced locations, each of said rib means including a pair of elongated, resinous strips disposed on opposite sides of an electrically conductive element, each of said rib means further including a compatible resinous material polymerized in place between said strips joining said strips and surrounding said conductive elements; perforated panels fastened between adjacent rib means; button-type contacts on said rib means in electrical communication with said conductive elements; and electrical supply means associated with said live end flange assembly for connecting said conductive elements to a source of power, said strips being fabricated from a methyl methacrylate resin and said compatible material being a methyl methacrylate system including particulate polymer and a liquid monomer.

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JOHN H. MACK, *Primary Examiner*.

JOSEPH REBOLD, JOHN R. SPECK, WINSTON A. DOUGLAS, *Examiners*.

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,205,159

September 7, 1965

Elmer O. Neilson

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 6, lines 2 and 3, for "resinous material polymerized in place between cluding" read -- material being a methyl methacrylate system including --.

Signed and sealed this 20th day of September 1966.

(SEAL)

Attest:

ERNEST W. SWIDER

Attesting Officer

EDWARD J. BRENNER

Commissioner of Patents