Feb. 16, 1971 A. CARMICHAEL 3,563,877

ELECTRO-PLATING BARRELS

Filed Sept. 11, 1967

Fig. 1.

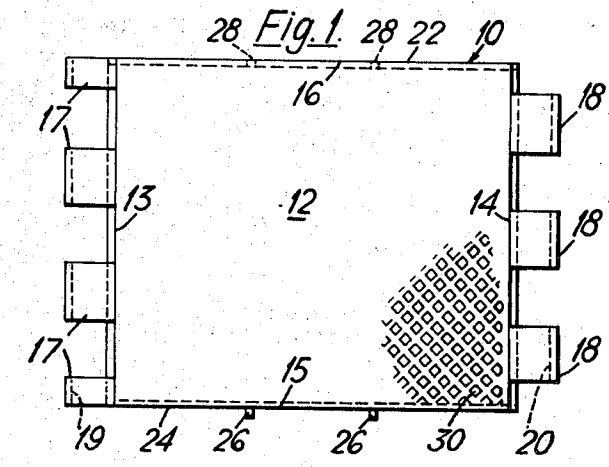


Fig. 2.

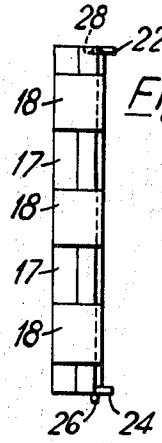


Fig. 3.

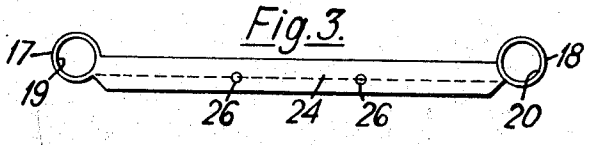


Fig. 4.

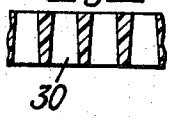


Fig. 5.

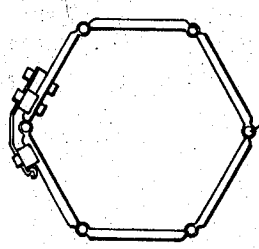


Fig. 7.

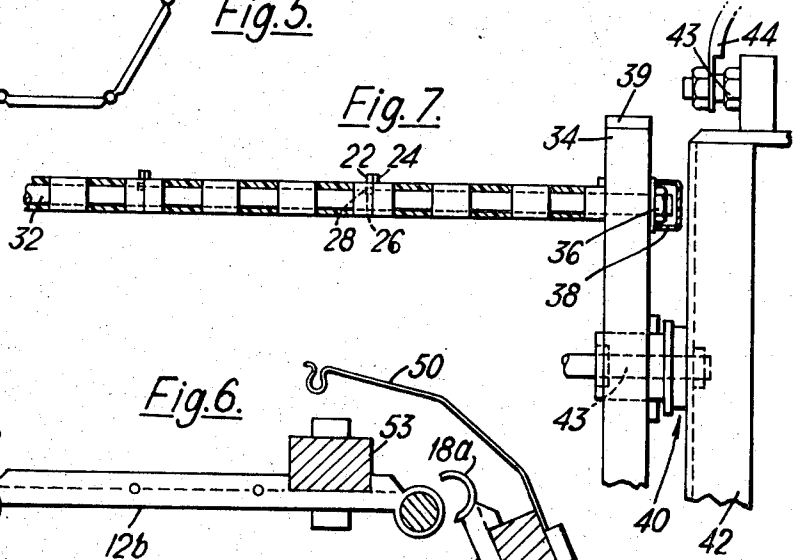
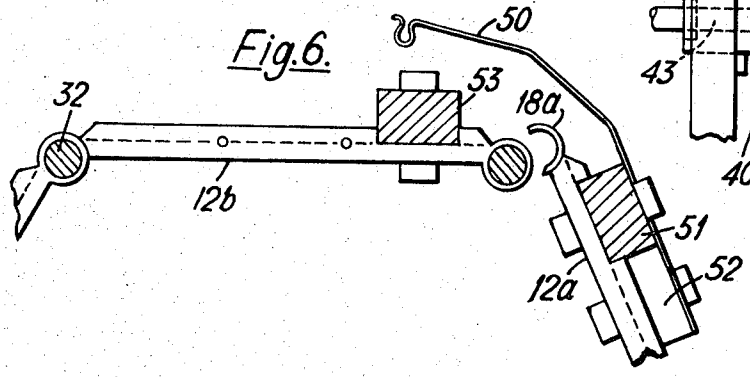


Fig. 6.



United States Patent Office 3,563,877
Patented Feb. 16, 1971

3,563,877

ELECTRO-PLATING BARRELS

Alan Carmichael, Brookwood, England, assignor to Electro-Chemical Engineering Company Ltd., Sheerwater, Woking, Surrey, England, a British company

Filed Sept. 11, 1967, Ser. No. 666,820
Claims priority, application Great Britain, Sept. 14, 1966, 41,036/66
Int. Cl. C23b 5/78
U.S. Cl. 204—213 7 Claims

ABSTRACT OF THE DISCLOSURE

The invention provides an electro-plating barrel, and elements therefor, the perforated plastic elements having hinge lugs on opposite parallel sides, which interfit hinge lugs on the other sides of adjacent identical elements in a polygonal array, the elements being assembled by rods passing through the lugs.

The present invention relates to electro-plating barrels and to units for constructing such barrels. Electro-plating barrels are used to contain small articles, the barrels having perforated walls, so that electrolyte may flow into the interior of the barrels and thus contact the small articles, when the barrel is immersed in an electro-plating bath. Such barrels are normally rotated, so that an even coating of electro-plate is deposited on the articles to be plated.

In recent years such barrels have been constructed from a perforated sheet of synthetic material such as polypropylene and acrylic resins. Sheets of such material are welded or bonded together, for example, in a hexagonal array.

It is an object of the present invention to provide an element for constructing an electro-plating barrel.

According to the present invention I provide an element for constructing an electro-plating barrel, such element comprising a panel of perforated synthetic resin material having first and second pairs of opposite parallel sides, each side of said first pair being provided with hinge lugs, the hinge lugs on one of said sides being so spaced as to interfit with the hinge lugs on the opposite side of an identical element.

With the elements of the present invention, which are preferably rectangular, one can assemble a barrel by positioning the lugs of one of the elements in interfitting relationship with the lugs of an adjacent identical element, a rod being passed through the lugs to provide the connections between the two adjacent elements. Thus, the peripheral walls of a barrel can be formed by assembling three or more such elements in a polygonal array.

The invention, therefore, provides an electro-plating barrel comprising a plurality of identical elements according to the invention assembled in a polygonal array, the lugs on one side of said first pair of sides of each element being interfitted with the lugs on the opposite side of said first pair of sides of an adjacent element, a rod being passed through each set of interfitted lugs to hold such elements in the polygonal array, end walls being located on the opposite axial ends of such array to form a barrel, means for supplying electro-current to an electrode at the interior of at least one of said end walls, and means for rotating the barrel about an axis passing through both of said end walls.

In a preferred construction of element according to the invention, the elements are formed by moulding from suitable synthetic resin material, e.g. polypropylene which in turn enables a greater open area to be obtained. In order to save the quantity of polypropylene used to manufacture the element, the element should be made as thin as possible, e.g. 3/8" and, in a convenient construction, the distance between centres of the hinge lugs on opposite sides of the element would be 19.8 cm. while the element, which is rectangular, would be 15.3 cm. wide. In order to make the element more rigid a flange may be moulded along each of the edges of the element which are not provided with the hinge lugs.

In a convenient mould for forming such elements, the die for producing one face of the element os provided with a plurality of projections which serve to form the perforations in the element. Conveniently, those projections are formed by means of a tapered milling cutter so that the projections extend in rows and lines perpendicular to each other, the projections thus being of a tapered square cross-section.

Preferably the elements are provided, on the edges which do not have the hinge lugs, with co-operating projections and recesses. A number of polygonal arrays of elements can be assembled in edge-to-edge relationship on a plurality of hinge rods to increase the length of the barrel. By providing co-operating projections and recesses in the edges of the elements which abut one another, a better locking together of the elements of adjacent arrays is achieved. Preferably the hinge rods which are used to construct the barrel are formed of polypropylene or a metal which is provided with a coating or sleeve of a synthetic resin material, e.g. polypropylene.

In a barrel assembled using elements according to the invention, a suitable arrangement should be made so that one or more of the elements is hingeable out of the barrel, about one of its sets of hinge lugs, to provide access to the interior of the barrel for the purpose of automatically loading and unloading the barrel.

In order that the invention may more readily be understood, the following description is given, merely by way of example, reference being made to the accompanying drawings, in which:

FIG. 1 is a top plane view of an element according to the invention;

FIG. 2 is an end elevation of the element of FIG. 1;

FIG. 3 is a side elevation of the element of FIG. 1;

FIG. 4 is an enlarged fragmentary view through the panel to illustrate the form of the perforations therein;

FIG. 5 is a schematic end elevation, in section, of a barrel formed according to the invention;

FIG. 6 is a fragmentary view of the barrel of FIG. 5, illustrated to an enlarged scale, to show the provision of an access panel for obtaining access to the interior of the barrel; and

FIG. 7 is a fragmentary schematic side elevation of the barrel of FIG. 5 illustrated to an enlarged scale.

Referring now to FIGS. 1, 2 and 3 there is illustrated therein an element **10** formed of moulded polypropylene, and comprising a central perforated panel **12** having a first pair of parallel edges **13** and **14** and a second pair of parallel edges **15** and **16**. The edge **13** is provided with four spaced apart hinge lugs **17**, moulded integrally with the panel **12**, and the edge **14** is provided with three similar

hinge lugs **18**. Each of the hinge lugs **17** is provided with a through-bore **19** and each of the hinge lugs **18** is provided with a similar through-bore **20** having the same diameter as the through-bore **19**.

Arranged on each edge **15**, **16** of the panel **12** is a strengthening rib **22**, **24**. Also on the edge **15** is moulded a pair of projections **26**, while on the opposite edge **16** co-operating recesses **28** are formed.

As can be seen more clearly from FIG. 4, the perforations **30** in the central panel **12** of the element are of tapered cross-section. This facilitates removal of the element from the mould. As can be seen from FIG. 1, the apertures **30** are formed in parallel lines and rows, these being produced by projections formed in the wall of the die by machining, for example with a milling cutter, in parallel lines and rows. This is a less expensive method of manufacturing the die, which gives perfectly satisfactory results as regard to the shape of the perforations in the central panel **12**. For the production of panels where round holes are called for a more complicated tool is required.

Referring to FIG. 5, there is illustrated schematically a section through a barrel formed by mounting six elements **10** in a hexagonal array. The lugs **17** of one element **10** are brought into engagement with the lugs **18** of an adjacent element, so that the through-bores **19** and **20** form a straight line through-passage, into which is inserted a hinge rod **32** (see also FIGS. 6 and 7). The rod **32** is formed of polypropylene but a mild steel rod covered with a sleeve of polypropylene could be used. By assemblying three of more panels, in FIG. 6, a polygonal array can be formed. Further such arrays are mounted on the rods **32**, the projections **26** of one array engaging in the corresponding recesses **28** of the adjacent array, to leck the two arrays more securely together. An end plate **34** is placed in position over the rods **32**, and the thus formed barrel is secured together by means of nuts **36** on the rods **32**. The nuts are of polypropylene; however if steel rods are used the steel nuts thereon would be protected against corrosion by a soft gasket and polypropylene cap **38**.

As can also be seen from FIG. 7, the end plate **34** is provided with teeth **39**, for engagment with a drive pinion to permit the end plate, together with the rest of the barrel to rotate. The end plate **34** is mounted on a plain bearing or collar bearing formed of a synthetic resin material, again polypropylene being a suitable material. The shaft of the plain bearing is mounted at **40** on a hanger comprised of a plastic dipped channel section member **42**. The member **42** is provided with means **43** for connecting a feed cable **44**, so that current for electrolysis may be fed via the hanger **42** and an electrode **45** to the electrolyte within the barrel, when the latter is suspended in an electrolytic bath.

In order to place articles within the barrel, the latter is provided with one hinged panel or set of panels. A suitable method of forming this hinged panel is illustrated in FIG. 6. A part of the end of the three lugs on one side of one of the panels **12***a* is machined off at **18***a* to enable the door to locate flush between the co-operating lugs of the adjacent panel **12***b*. During plating the hinged panel or set of panels are held firmly in the closed position by titanium springs **50** carried by a clamping bar **51** and support block **52** on panel **12***a*, engaging behind a clamping bar **53** on panel **12***a*.

It will be appreciated that with the elements and barrel according to the invention, it is readily possible to form any size and shape of barrel with a minimum number of necessary components in store. If one of the elements should prove to be faulty then it can readily be replaced by another element from the store. Further, by forming the elements for building the barrel by moulding, the cost of their production, at least when the cost of the mould has been met, is substantially reduced as compared with prior forms of construction. The various elements are firmly located by the hinge lugs, and this provides a distinct improvement over the prior art constructions, in which the various panels were held together by welding or some form of adhesive. In certain conditions the welding or bonding could readily break down causing the barrel to disintegrate. This is clearly unsatisfactory and the barrels formed using the elements of the present invention completely overcome this fault.

I claim:

1. An electro-plating barrel comprising, in combination:

(I) a plurality of identical construction elements assembled in at least one polygonal array, and each said element including:

(a) a panel of synthetic resin material having first and second faces;

(b) means defining perforations in said panel;

(c) first and second pairs of opposite parallel sides to said panel;

(d) a first set of spaced apart hinged lugs on one of said first pair of sides; and

(e) a second set of spaced apart hinge lugs on the other of said first pair of sides and interfitting with the first set of hinge lugs of an adjacent element in such polygonal array;

(II) corners to said polygonal array;

(III) a plurality of rods passed through the interfitting hinge lugs at each said corner of said polygonal array;

(IV) end walls to said barrel located on opposite axial ends of such polygonal array;

(V) an electrode at the interior for at least one of said end walls;

(VI) means for supplying electricty to such electrodes; and

(VII) means for rotating said barrel.

2. An electro-plating barrel comprising in combination-

(I) a plurality of identical construction elements assembled in a polygonal array;

(II) means defining tetragonal perforations in said elements;

(III) end walls to said barrel located on opposite axial ends of said polygonal array;

(IV) an electrode at the interior of at least one of said walls;

(V) means for supplying electricity to such electrode; and

(VI) means for rotating said barrel.

3. An electro-plating barrel as defined in claim **2** and further comprising first and second opposite faces to each construction element, and wherein said perforations increase in area from said first face of the element to said second face, and are of rectangular cross-section.

4. The barrel defined in claim **1**, wherein a plurality of said polygonal arrays are assembled with one side of said second pair of sides of the elements of each array abuting the other side of the said second pair of sides of an adjacent array.

5. The barrel defined in claim **4**, wherein the two sides of said second pair of sides of the elements are provided with interengaging means, the interengaging means of the elements of one polygonal array interfitting with the interengaging means of the element of an adjacent array.

6. The barrel defined in claim **1** wherein a portion of the hinge lugs of one side of said first pair of sides of at least one element is omitted effective to permit said at least one panel to be pivoted about the rod passing through the hinge lugs on the opposite side of said first pair of sides, whereby said panel may act as an access door to the interior of said barrel.

7. The barrel defined in claim 6 and including releasable catch means effective releasably to retain said access door panel in the closed position.

References Cited

UNITED STATES PATENTS

690,240	12/1901	Cutler	259—89
772,102	10/1904	King	204—213
1,030,053	6/1912	Catlin	204—213
3,442,783	5/1969	Kirkpatrick et al.	204—213

FOREIGN PATENTS

912,113	12/1962	Great Britain	204—213

TA-HSUNG TUNG, Primary Examiner

T. TUFARIELLO, Assistant Examiner

U.S. Cl. X.R.

259—89