Nov. 18, 1969 P. W. SANDROCK 3,479,271

DRUM FOR PLATING, BLACKENING, PICKLING AND THE LIKE

Filed July 7, 1965

Fig. 1

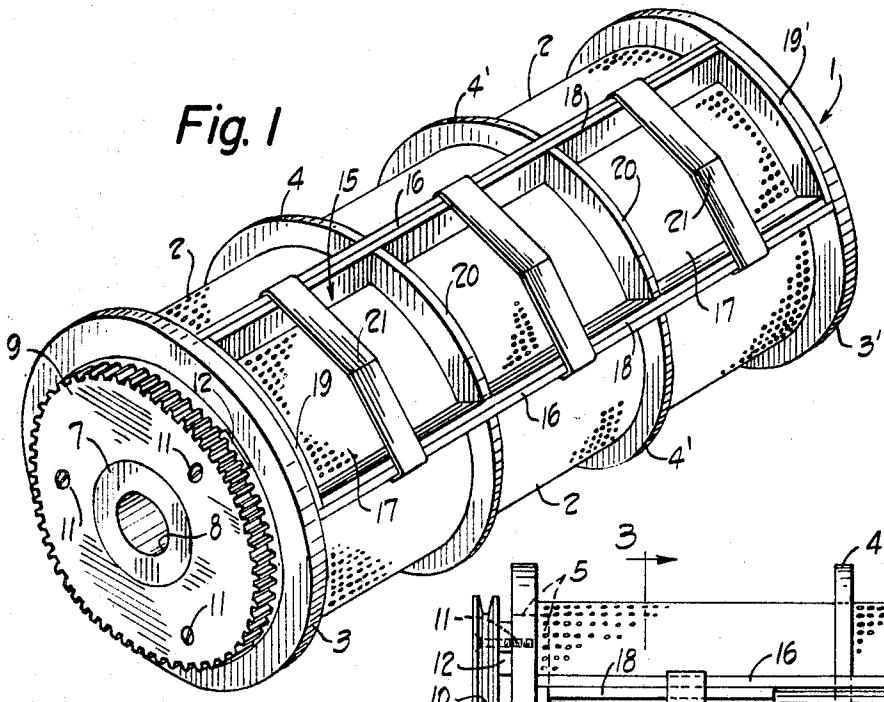


Fig. 2

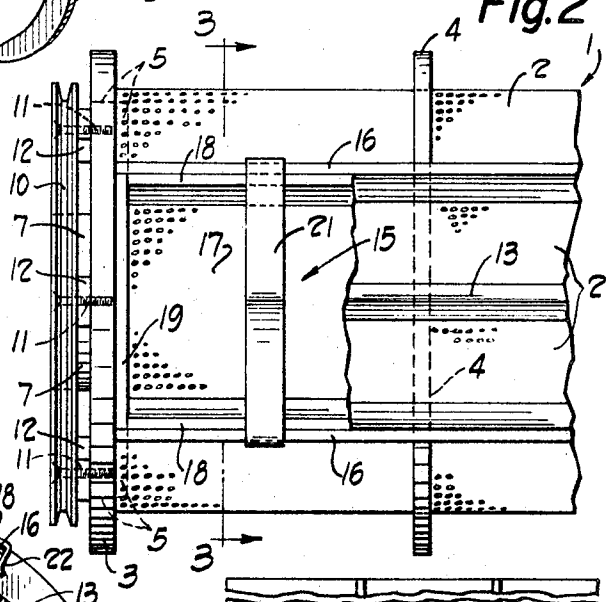
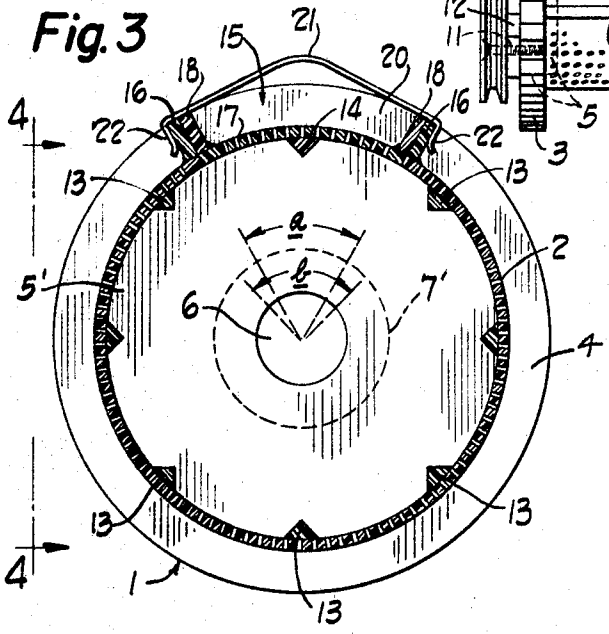


Fig. 3



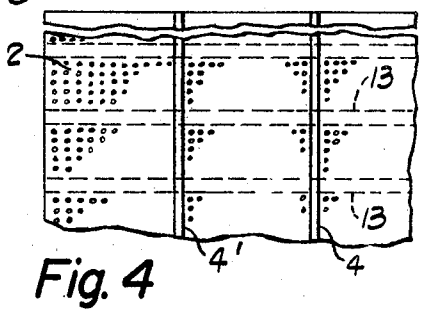


Fig. 4

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DRUM FOR PLATING, BLACKENING, PICKLING AND THE LIKE

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U.S. Cl. 204—213 3 Claims

ABSTRACT OF THE DISCLOSURE

A rotatable drum for use in plating, blackening, pickling and the like. The drum is immersed in a liquid bath and turned while carrying the items to be treated. It is fabricated of a synthetic resin and has rigid integral circumferential and longitudinal stiffening elements which reinforce the drum walls to enable the drum to accommodate unusually heavy loads.

This invention relates to a synthetic resin drum for plating, blackening, pickling or the like, hereinafter referred to, for the sake of convenience, simply as a plating drum.

Plating drums of acid-resistant materials are known, as, for example, from Singleton et al. Patent 2,886,505, granted May 12, 1959, for "Plating Apparatus." Heretofore such drums have usually been of hexagonal cross-section, although drums of a generally cylindrical shape have also been known as, for example, from Collick Patent 2,562,084, granted July 24, 1951 for "Article Treating and Plating Apparatus." Because of the conditions to which such drums are normally subjected, often including acid environments, elevated temperatures and heavy loads, their useful lives tend to be short, necessitating frequent replacement at inordinately heavy cost to the user.

Under loads of only two or three hundred pounds, which are commonplace, synthetic resin plating drums of the types heretofore known have a pronounced tendency to bulge and rupture between their ends, completely destroying their usefulness; similarly, the end plates of some such drums have a tendency to warp and bow outwardly, interfering thereby with the drive system which as a rule has to be located at one or both of the two ends of the drum. Within a hexagonal drum, unless special precautions are taken, it is not unusual for the parts being plated, ordinarily metal parts, to adhere and cling tenaciously to the flat side walls of the drum, thus precluding free flow of the plating medium through the perforations provided for the purpose of promoting circulation of the medium into and out of the drum.

The present invention has for one of its principal objects to eliminate or at least greatly reduce the incidence of these and similar vices in synthetic resin plating drums. This it does by introducing strategically located stiffening elements that are interrelated in such a way that when the side wall of the drum is projected onto a plane surface to produce what is known as a development, such side wall is seen as being divided into a multiplicity of small rectangles in each of which the sides and ends are only a short distance from the geometrical center of the rectangle, usually a matter of a few inches. Other objects, advantages and features of the invention will be apparent from the description which follows and from the accompanying drawings.

In the drawings,

FIGURE 1 is an isometric representation on a small scale of a plating drum conforming to the teachings of the present invention, the same being provided with a drive gear at one end.

FIGURE 2 is a top plan on a somewhat larger scale of what is essentially the same drum but with a pulley replacing the drive gear.

FIGURE 3 is a transverse cross section of the drum of FIGURE 2 as seen from view line 3—3.

FIGURE 4 is a fragmentary development on a much reduced scale of the exterior surface of the drum of FIGURES 2 and 3 showing the previously mentioned multiplicity of small rectangles.

FIGURE 5 is an isometric representation of a plating drum of the hexagonal type incorporating certain of the principles of the present invention.

FIGURE 1 illustrates a plating drum **1** of generally cylindrical shape the side wall or body portion **2** of which consists largely of perforated synthetic resin sheet material, such, for example, as polypropylene sheet, that has been formed into an incomplete cylinder the circumference of which measures approximately 300°. The area represented by angle *a* in FIGURE 3, which measures about 60° in the form of the invention illustrated in FIGURES 1 and 2, forms no part of body portion **2** but is left as a door opening: see the right-hand portion of FIGURE 2. Angle *a* may, if desired, be decreased to something less than 60°, although there is little advantage to be gained by doing so. On the other hand, a significant advantage may be realized by increasing it to as much as 90°, as indicated by angle *b*, this in the sense that much easier access to the interior of the drum then becomes possible. In plating drums of the types known to the prior art, it has not been considered practicable to leave openings as wide as the 90° door opening represented by angle *b*; however, in the strongly reinforced synthetic resin plating drums of the present invention, 90° door openings are entirely feasible.

At the ends of drum **1** are two end pieces **3** and **3'** each of which takes the form of an annulus that is unbroken around its entire periphery. Between end pieces **3** and **3'** and spaced at equal distances from each other and from the end pieces are two arcuate girth rings **4** and **4'**. Each takes the form of an incomplete annulus which extends most of the way around the drum but which is interrupted as shown in FIGURE 2 over an arc corresponding approximately to angle *a* in FIGURE 3. In effect, arcuate girth rings **4** and **4'** divide drum **1** into three lesser drums each of which is about one-third its altitude. End pieces **3** and **3'** and arcuate girth rings **4** and **4'** are preferably of the same material of which body portion **2** is formed, being fused or welded thereto, as by the application of heat, to provide a strong, sturdy, virtually unitary structure.

As will appear from what follows, the central openings (not shown) in the end pieces **3** and **3'** are of slightly smaller diameter than the corresponding openings in arcuate girth rings **4** and **4'**. The reason resides in the fact that generally circular synthetic resin heads **5** and **5'** (FIGURES 2 and 3) are fused or welded to the inside surfaces of body portion **2** at the extreme outer ends thereof: this gives rise to a structure of the sort illustrated at the left-hand portion of FIGURE 2. It will be evident therefrom that the outer face of head **5** is substantially flush with the outer face of end piece **3**. Heads **5** and **5'** are somewhat thicker than end pieces **3** and **3'** and therefore project inwardly beyond in the inside faces of

end pieces 3 and 3' in the manner indicated in dotted lines in FIGURE 2.

Extending through such heads are central openings 6, one of which is seen in FIGURE 3, that serve as openings for admitting the contactors or danglers conventionally used in plating drums. Usually, but not necessarily, there is a dangler at each end of the drum; ordinarily, therefore, each of the two heads incorporated in drum 1 is provided with such an opening. To the outer faces of heads 5 and 5' are fused or welded synthetic resin bosses 7 and 7' of annular shape. Within these bosses are cylindrical openings 8 (FIGURE 1) of the same diameter as and in axial alignment with the central openings in circular heads 5 and 5'. Thus the danglers are enabled to enter the rotating drum without likelihood of interference.

In FIGURE 1 is shown a synthetic resin gear 9 that is fused or welded to the outer end of boss 7 in such manner that the exposed faces of both are in the same plane. Associated with gear 9 in the installation in which drum 1 is used are a spur gear and a suitable prime mover, neither one shown, by which gear 9 is driven. In the form of the invention shown in FIGURE 2, which is otherwise the same as the form shown in FIGURE 1, the driving and driven gears are replaced by a synthetic resin pulley 10. Usually there will be two such pulleys, one at each end, each mounted on and fused to one of the two bosses 7 and 7'. Three screws 11, seen in FIGURE 1, are used to hold the gear or pulley in place on head 5 or 5', as the case may be. These screws pass through the gear or pulley into and through synthetic resin spacers 12, of which there are three disposed at angles of 120° from each other. Each spacer is fused or welded both to the gear or pulley and to the circular head behind it, thus stiffening both at the same time.

Fused or welded to the inside wall of body portion 2 of drum 1 are seven longitudinally extending synthetic resin strips 13, seen in FIGURES 2 and 3. Each is triangular in cross section and projects radially inward toward the longitudinal axis of the drum. As indicated in and by FIGURES 3 and 4, strips 13 are spaced equidistantly from each other. They serve a dual function; viz., they reinforce, stiffen and strengthen the interior of body portion 2 and they act as deflecting means to promote tumbling of the parts being plated. A similar strip 14, likewise of triangular cross section, forms part of synthetic resin door 15.

The latter, seen in FIGURES 2 and 3, seats at its ends on the inwardly projecting portions of circular heads 5 and 5' and is assisted into place thereon by two longitudinally extending synthetic resin guide strips 16 that are fused or welded to the laterally extending edge portions of body portion 2 of drum 1: see FIGURE 3.

Door 15 itself comprises a synthetic resin perforated door panel 17 of arcuate contour corresponding in width to angle *a*; two synthetic resin strips 18 which in general parallel guide strips 16 but which are fused or welded to panel 17 along its two lateral edges; and, at opposite ends of the panel, two synthetic resin arcuate strips 19 and 19' each of which is fused or welded both to panel 17 and to longitudinally extending strips 18. Similar synthetic resin arcuate strips 20, positioned as shown in FIGURES 1 and 2, serve to complete girth rings 4. As in the case of arcuate strips 19 and 19', arcuate strips 20 are fused to longitudinally extending strips 18 and to door panel 17.

To hold door 15 firmly in place, corrosion-resistant metal clamps 21 of the nature of straps may be employed. Constructed as shown in FIGURE 3, they are characterized, among other things, by outwardly flared depending ends 22 adapted to engage strips 16. When downward pressure is exerted on the clamp near the middle portion thereof, as by the palm of one hand, ends 22 tend to spring apart. By applying the other hand to one or the other of the two ends of the clamp, it is possible to lift such end without much difficulty out of engagement with strip 16, thereby releasing clamp 21 as a whole. When all three clamps have been removed, door 15 may itself be removed by grasping arcuate strips 20, one in each hand, and lifting it out of position on body portion 2 of the drum.

With a cylindrical synthetic resin drum of the sort illustrated in FIGURES 1 to 3, the provision of means of the kind described above and illustrated somewhat diagrammatically in FIGURE 4 for reinforcing the drum at short intervals both internally and externally thereof, longitudinally in one case and radially in the other, permits of the introduction into the drum of much heavier loads, sometimes half as heavy again as the maximum loads that can safely be employed in synthetic resin drums of any of the types commercially available. Even with loads which are grossly overweight, measured according to the standards of the prior art, a cylindrical synthetic resin plating drum constructed along the lines herein outlined will not rupture in ordinary service nor will it even bulge outwardly to any significant degree. From an operations standpoint, these are extremely important practical advantages.

Drums of the type described above and illustrated in FIGURES 1 to 4 have in common (a) the fact that they are made largely of synthetic resin, (b) the fact that most of their component parts are fused or welded together, (c) the fact that at regular intervals lengthwise thereof girth rings or their equivalents are provided, and (d) the fact that the latter, in cooperation with longitudinally extending reinforcing strips, give rise to what may be taken to be small areas of rectangular shape in which, as indicated in the development represented by FIGURE 4, the geometrical center is removed from the sides and ends of the rectangles by only a matter of inches.

Thus virtually every part of the body portion of the drum is strongly reinforced, not merely lengthwise of the drum but radially as well.

What is claimed is:

1. Apparatus for plating, blackening, pickling and the like comprising (1) a synthetic resin drum of cylindrical shape designed for rotation about a longitudinally extending axis, said drum being incomplete in the sense that it has in its cylindrical body portion an elongated opening corresponding to a subtending angle of magnitude between about 60° and about 90°; (2) synthetic resin end structure secured to said body portion; and (3) rigid, integral synthetic resin reinforcing means extending in part longitudinally and in part circumferentially of said cylindrical body portion, said reinforcing means when represented in the form of a development forming a multiplicity of small rectangles.

2. Apparatus as in claim 1 wherein the circumferentially extending portions of such reinforcing means take the form of massive, laterally spaced, interrupted girth rings each of which is subtended by an angle measuring from about 270 to about 300 degrees.

3. Apparatus for plating, blackening, pickling and the like comprising (1) a synthetic resin drum of circular cross section designed for rotation about a longitudinally extending axis, said drum being incomplete in the sense that it has in its body portion an elongated opening corresponding to a subtending angle measuring from 60 to 90°; (2) synthetic resin end structure secured to said body portion; and (3) rigid, integral external synthetic resin reinforcing means located in a zone spaced substantially equidistantly from the two ends of the drum and extending generally circumferentially of the body portion thereof, said zone being characterized by a plurality of massive, laterally spaced reinforcing members each of which takes the form of an interrupted girth ring etxending between its two ends over a continuous arc of at least 270°.

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U.S. Cl. X.R.

259—89

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,479,271 November 18, 1969

Paul W. Sandrock

It is certified that error appears in the above identified patent and that said Letters Patent are hereby corrected as shown below:

Column 2, lines 13 to 15, cancel "FIGURE 5 is an isometric representation of a plating drum of the hexagonal type incorporating certain of the principles of the present invention.". Column 4, line 72, "etxending" should read -- extending --.

Signed and sealed this 20th day of October 1970.

(SEAL)
Attest:

Edward M. Fletcher, Jr.
Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents