Oct. 18, 1960 R. A. HOEGH 2,956,943

APPARATUS FOR PLATING ARTICLES AND METHOD OF MAKING SAME

Original Filed Aug. 10, 1953 3 Sheets-Sheet 1

Fig. 1.

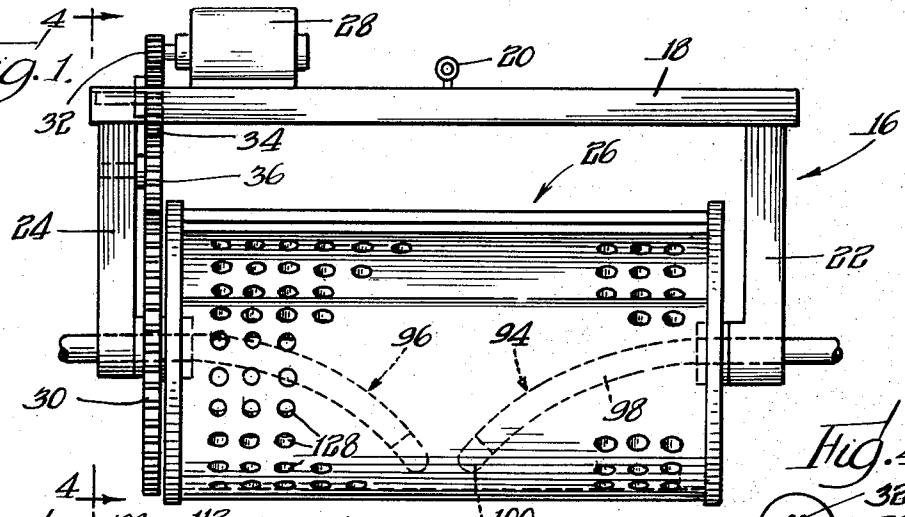


Fig. 2.

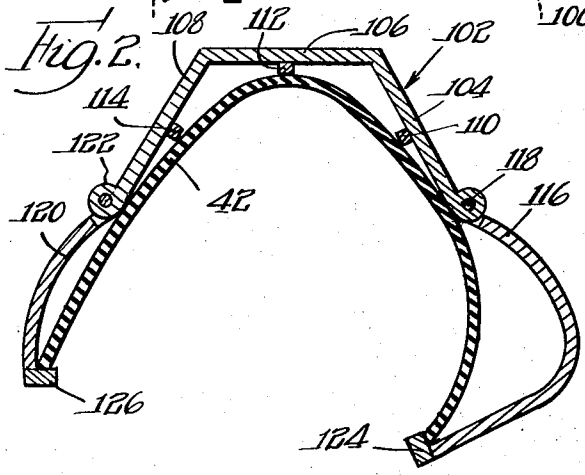


Fig. 4.

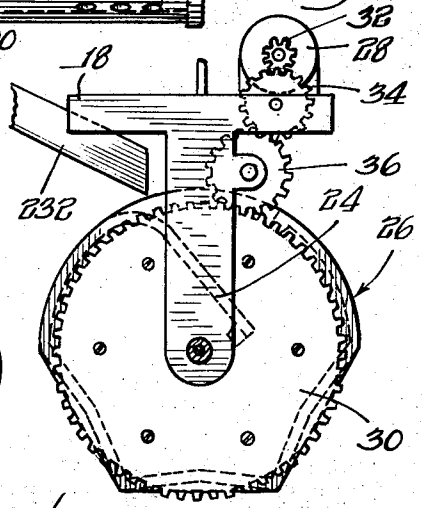


Fig. 3.

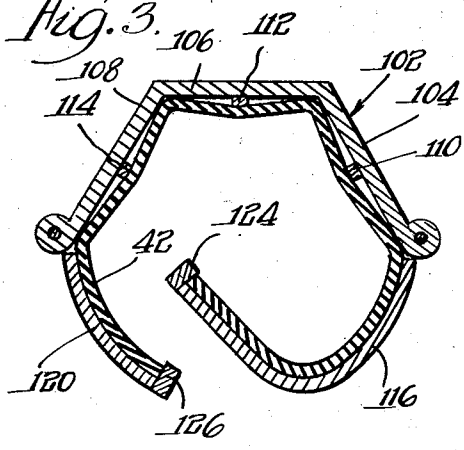
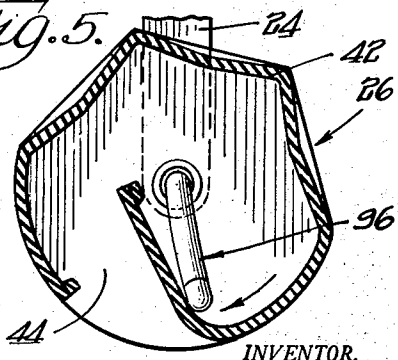


Fig. 5.



INVENTOR.
Roy A. Hoegh
BY
Olson & Treyler
Attys

Oct. 18, 1960 R. A. HOEGH 2,956,943

APPARATUS FOR PLATING ARTICLES AND METHOD OF MAKING SAME

Original Filed Aug. 10, 1953 3 Sheets-Sheet 2

Fig. 6.

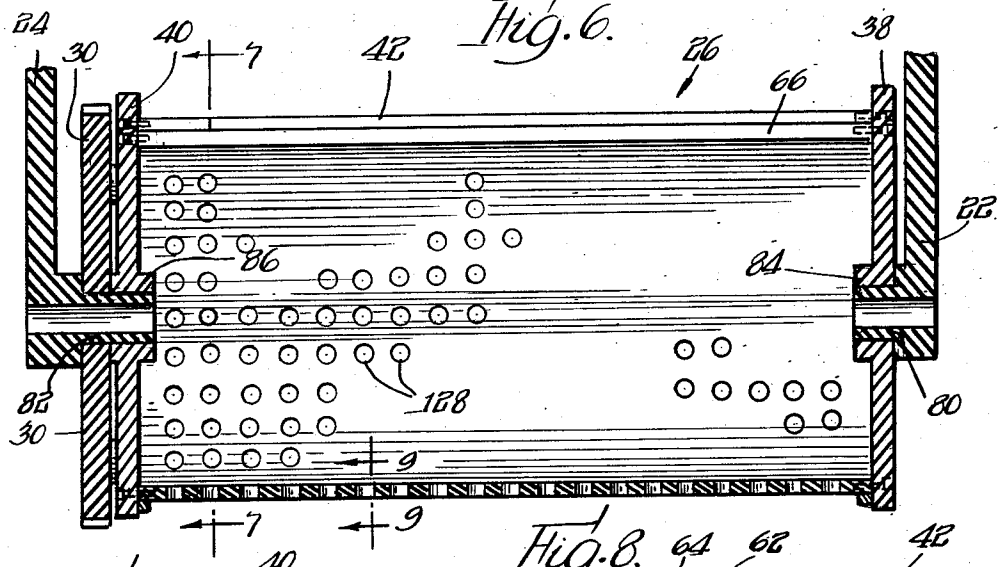


Fig. 8.

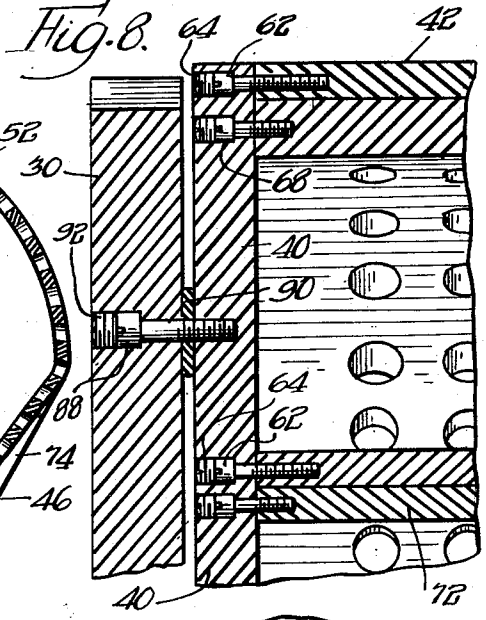


Fig. 7.

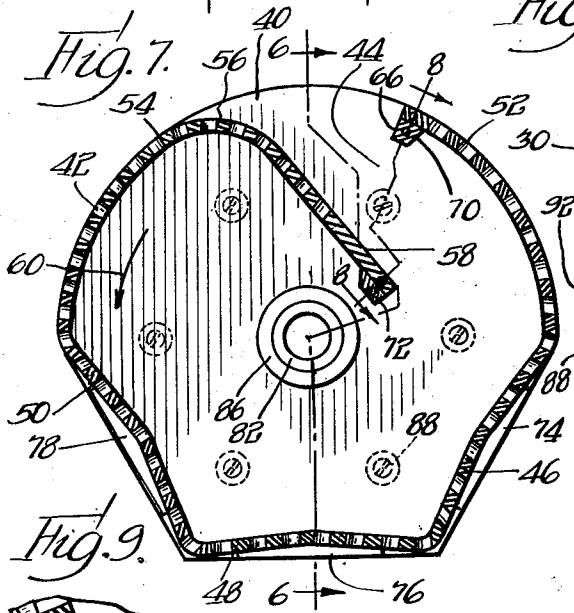


Fig. 9.

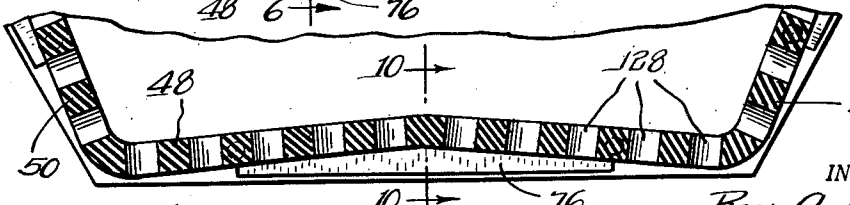
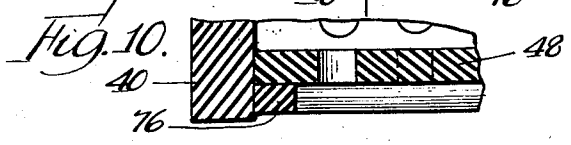


Fig. 10.



INVENTOR.
Roy A. Hoegh
BY
Olson & Trexler
Attys.

Oct. 18, 1960 R. A. HOEGH 2,956,943

APPARATUS FOR PLATING ARTICLES AND METHOD OF MAKING SAME

Original Filed Aug. 10, 1953 3 Sheets-Sheet 3

Fig. 11.

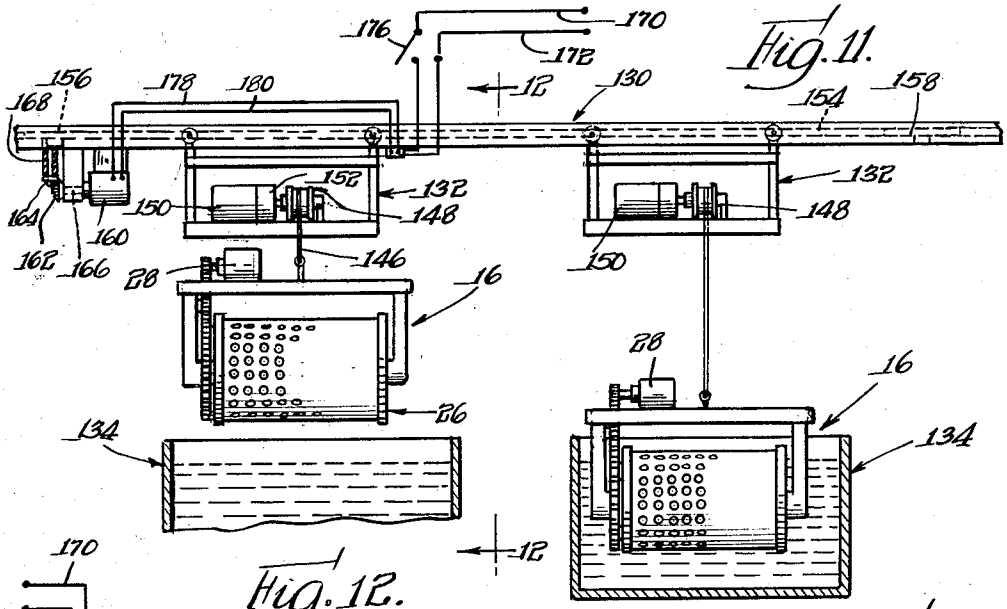


Fig. 12.

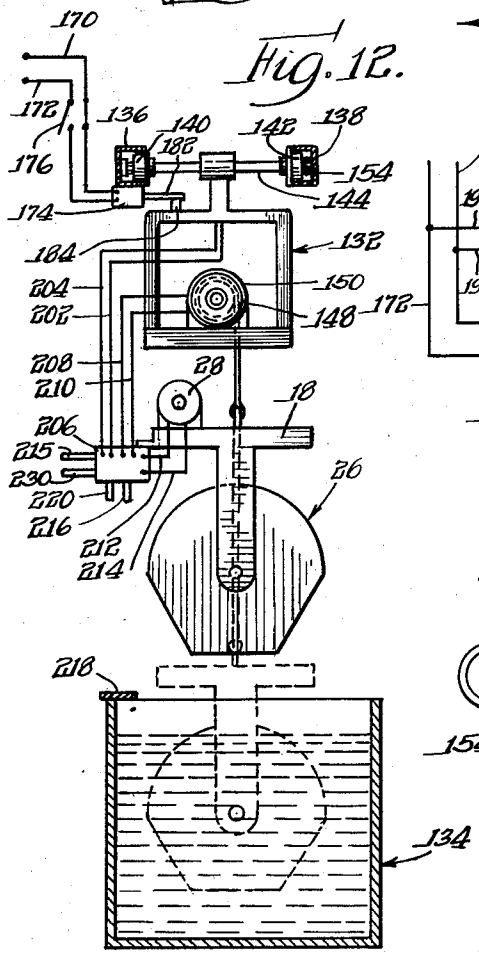


Fig. 13.

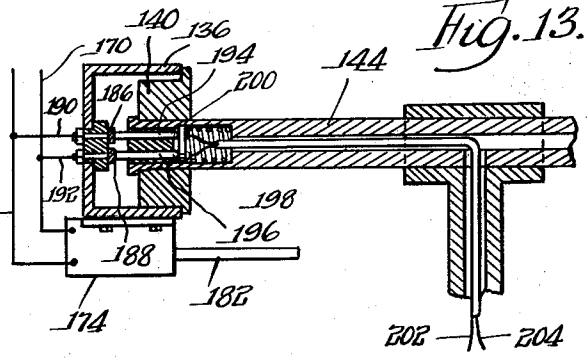
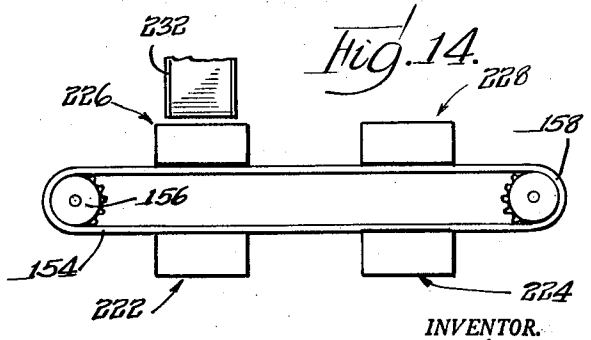


Fig. 14.



INVENTOR.
Roy A. Hoegh
BY
Olson & Trexler
Attys.

United States Patent Office 2,956,943 Patented Oct. 18, 1960

2,956,943

APPARATUS FOR PLATING ARTICLES AND METHOD OF MAKING SAME

Roy A. Hoegh, Chicago, Ill., assignor to Mercil Plating Equipment Company, Chicago, Ill., a corporation of Illinois

Continuation of application Ser. No. 373,136, Aug. 10, 1953. This application Nov. 29, 1957, Ser. No. 700,260

9 Claims. (Cl. 204—213)

The present invention relates to a novel apparatus for treating articles, and more particularly to a novel apparatus of the type, wherein the articles to be treated are disposed within a tumbling barrel.

An object of the present invention is to provide an apparatus of the above described type including a novel tumbling barrel constructed of plastic material, which barrel is of simple construction and may be relatively easily and economically manufactured.

Another object of the present invention is to provide a novel tumbling barrel of the above described general type which is constructed in a manner so that upon rotation thereof in one direction, articles will be discharged therefrom, while during rotation in the opposite direction, articles will be retained therein and efficiently tumbled for proper treatment or plating.

Still another object of the present invention is to provide a novel unit including a tumbling barrel of the above described type, which unit includes means for rotating the barrel, whereby the unit may be used in connection with various treating or plating baths without necessitating connecting and disconnecting the unit with outside sources of power.

Still another object of the present invention is to provide a novel apparatus, whereby articles may be placed into the barrel, treated, and discharged from the barrel automatically, thereby assuring substantial savings in time and labor costs.

Still a further object of the present invention is to provide a novel method for manufacturing a tumbling barrel of the above described type.

Other objects and advantages of the present invention will become apparent from the following description and the accompanying drawings, wherein:

Fig. 1 is a side elevational view of a novel article treating unit embodying the principles of this invention;

Figs. 2 and 3 are somewhat schematic views illustrating the novel method of forming the sidewall of the barrel of this invention;

Figs. 4 and 5 are somewhat schematic views illustrating, respectively, the manner of loading and unloading the novel barrel of this invention;

Fig. 6 is a cross sectional view taken along line 6—6 in Fig. 7;

Fig. 7 is a cross sectional view taken along line 7—7 in Fig. 6;

Fig. 8 is an enlarged fragmentary cross sectional view taken along line 8—8 in Fig. 7;

Fig. 9 is an enlarged fragmentary cross sectional view taken along line 9—9 in Fig. 6;

Fig. 10 is a fragmentary cross sectional view taken along line 10—10 in Fig. 9;

Fig. 11 is a somewhat schematic side elevational view illustrating a novel apparatus for automatically treating the articles and discharging the articles from the barrel;

Fig. 12 is a cross sectional view taken along line 12—12 in Fig. 11;

Fig. 13 is an enlarged fragmentary cross sectional view taken along the same line as Fig. 12 and showing a portion of the apparatus in greater detail; and

Fig. 14 is a schematic plan view of the apparatus shown in Fig. 11.

Referring now more specifically to the drawings, wherein like parts are designated by the same numerals throughout the various figures, a unit 16 for electro-plating articles embodying the principles of this invention is illustrated best in Fig. 1. The unit 16 includes a platform or frame 18 which is adapted to be supported or suspended by a hook 20. A pair of hanger arms 22 and 24 depend from the platform 18 and support therebetween a novel tumbling barrel 26 embodying certain features of this invention.

In order to rotate the barrel 26 without necessitating setting up driving means every time the barrel is immersed in a plating tank, an electric motor 28 is mounted on the frame or platform 18. A suitable gear chain is provided in order to obtain a driving connection between the motor 28 and the barrel. This gear chain includes a large gear 30 secured to one end of the barrel and a relatively small pinion 32 mounted on the motor shaft. A plurality of idler gears 34 and 36 are mounted on the unit frame by suitable means for connecting the large gear 30 and the pinion 32.

Referring now to Figs. 6 through 10, it will be seen that the novel tumbling barrel 26 includes a pair of end plates 38 and 40 and a generally annularly arranged foraminous side wall 42 secured between said end plates. In accordance with a feature of this invention, the side wall 42 is arranged to provide a permanent opening 44 through which articles are loaded into or discharged from the barrel. In addition, the side wall 42 is formed so that the articles are retained within the barrel when it is rotated in one direction and efficiently tumble so that an even treatment or coating of the articles is assured. Furthermore, the side wall 42 is formed so that by rotating the barrel in an opposite direction, the articles will be automatically discharged therefrom. The formation of the side wall 42 to accomplish these results is shown best in Fig. 7, wherein the sidewall is illustrated as having a plurality of angularly disposed panels 46, 48, and 50 generally opposite the opening 44 and generally arcuate or curved sections 52 and 54 adjacent the opening. The curved section 54 merges with a relatively sharply inwardly curved section 56 which in turn merges with a section 58 extending inwardly of the barrel. In the particular position shown in Fig. 7, it is noted that the portion 58 extends across the vertical axis of the barrel to a point adjacent the horizontal axis of the barrel, whereby the portion 58 is spaced radially inwardly of and in overlapping relationship with respect to the curved portion 52. With this arrangement, when the barrel is rotated in the direction of the arrow 60, articles in the barrel will be retained therein, and when the barrel is rotated in the opposite direction, articles will be discharged therefrom. When the barrel is rotated in the direction of the arrow 60, the articles to be treated are caught in a pocket formed by the curved sections 54 and 56 and the portion 58, and in order to prevent the articles from bouncing out of this pocket and out of the barrel when the barrel is inverted, it has been found desirable to form these pocket forming wall sections in the manner substantially as illustrated. Thus, the start of the relatively sharply curved section 56 is located at substantially the midportion of the upper lefthand quadrant of the barrel when viewed as in Fig. 7, whereby the above mentioned pocket is provided with ample depth to retain the articles. It will be understood that the sharply curved section 56 may be started at a higher point in the upper lefthand quadrant of the barrel, but this is undesirable since it unnecessarily increases the size of the barrel.

As shown best in Figs. 7 and 10, each of the angularly disposed panels 46 through 50 consists of a pair of sections inclined relative to each other so that the mid portions of the panels project inwardly of the barrel. This structure not only serves to strengthen and rigidify the barrel sidewall, but also to increase tumbling of the articles to insure even treatment or plating of the articles. Furthermore, by referring to Fig. 10, it will be seen that the angularly disposed panels are joined with each other by short arcuate corner sections, which rounded corners prevent jamming of the articles and further strengthen the barrel structure.

In order to prevent coating or plating of any portion of the barrel and its associated structure which will contact the plating bath, the barrel and such associated structure are preferably made of a plastic material. In addition, the sidewall 42 is preferably made from a plastic material which may be easily formed into the shape described above. One such plastic material which has been found satisfactory is a methyl methacrylate resin cast in sheets and sold under the name of "Plexiglas." As shown best in Fig. 8, the side 42 is joined to the end plate 40 by a plurality of screws 62, which screws are disposed with their heads countersunk in suitable bores in the end plate. In order to prevent plating of the screws, the heads thereof are covered with suitable plastic plugs 64. In addition, the junction between the end plate and the side 42 is sealed with a suitable plastic adhesive. It is, of course, understood that the screws 62 are spaced evenly around the entire sidewall and that the sidewall is connected to the end plate 38 in the same manner as it is connected to the end plate 40.

In order to reinforce the free longitudinal edge of the curved section 52 of the sidewall, a plastic bar-like member 66 is secured thereto by a suitable adhesive, which bar-like member is also secured to the end plates by countersunk and covered screws 68 and a suitable adhesive. Preferably, the inner wall 70 of the bar 66 is inclined, as illustrated in Fig. 7, to eliminate substantially any possibility of articles being caught and retained by the bar when the barrel is rotated in a direction to discharge the articles. A similar bar-like member 72 is secured to the free edge of the side wall section 58 to reinforce this sidewall section.

Since the sidewall 42 is made from plastic material, it is often desirable to provide means for maintaining the desired shape of the angularly disposed panels. This means includes plastic blocks 74, 76, and 78 secured to the end plate 40 and having inclined surfaces abutting the inclined sections of each panel to maintain these sections in the desired position.

As shown best in Fig. 6, the hanger members 22 and 24, which may be made of any suitable material such as wood or plastic, are provided with aligned hollow stub shafts or hubs 80 and 82, respectively. Each of the end plates 38 and 40 is provided with bearing sleeves 84 and 86, respectively, rotatably received on the stub shafts. In addition, the above described large gear 30 encircles the stub shaft 82 and is rigidly secured to the end plate 40 by means of a plurality of countersunk screws 88. The gear 30 is preferably spaced slightly from the end plate 40 by spacing members 90 which encircle the screws 88 and are secured to the end plate and gear by suitable adhesive, whereby the shanks of the screws 88 are sealed from contact with the plating bath. The heads of the screws 88 are also sealed from the plating bath by means of suitable plastic plugs 92.

As shown in Fig. 1, a pair of electrodes 94 and 96 are inserted into the tumbling barrel through the hollow stub shafts 80 and 82. Each of the electrodes includes a flexible plastic insulating tube 98 which is secured in and supported by its respective stub shaft and a metal tip 100. It is understood that the flexible plastic tube 98 houses an electric conduit connected with the metal tip, and the plastic tube extends to a point above the plating bath from where the electrical conduit is directed to any suitable source of electric power.

From the above description, it is seen that the present invention has provided a novel plating barrel and associated structure which is completely free of exposed metal parts, except for the metal tips of the electrodes, whereby loss of the plating metal is eliminated. Furthermore, it is seen that the novel plating barrel is of simple, yet rugged, construction and is formed so as to tumble efficiently the articles being treated, and at the same time is formed so that the barrel is self-unloading upon rotation in one direction.

As set forth hereinabove, the one piece sidewall 42 is made from a sheet of plastic material. A method for forming this sidewall is illustrated in Figs. 2 and 3. By referring to these figures, it will be seen that a mold 102 is provided having a plurality of angularly disposed sides 104, 106, and 108. Longitudinally extending blocks 110, 112, and 114 are disposed centrally of these sides of the mold for the purpose described below. A wing 116, which conforms to the shape of the sidewall sections 54, 56, and 58 described above, is pivotally mounted to one side of the mold, as at 118, and another wing 120, which conforms to the curved section 52 of the barrel sidewall, is pivotally mounted to an opposite side of the mold, as at 122. Elongated abutment members 124 and 126 are secured to the free edges of the wings 116 and 120, respectively, for engagement with the edges of the sidewall blank in the manner illustrated.

When it is desired to form a sheet of plastic material into a sidewall 42, the sheet is first heated in any well known manner until it becomes pliable. The sheet is then placed into the mold 102 in the manner illustrated in Fig. 2 with the edges of the sheet hooked behind the abutments 124 and 126 on the open wings. The wings are then closed manually, or by suitable means, not shown, to the position illustrated in Fig. 3. During this movement of the wings, the abutments 124 and 126 apply forces directed transversely of the width of the sheet, which forces cause the sheet to conform to the shape of the mold. The above mentioned blocks 110 through 114 bend the sheet in order to provide the angularly disposed panels with the inclined sections described above. After the wings of the mold have been closed, the plastic sheet is cooled, whereupon the shaped one piece sidewall 42 is removed from the mold and secured to the end plates in the manner described above. The sidewall 42 is then perforated, as by drilling a plurality of holes at 128 therein, in order to permit free circulation of the plating bath through the barrel. If desired, the sidewall may be perforated before it is secured to the end plates, and in some instances, the plastic sheet may be perforated before it is placed in the mold.

Figs. 11 through 14 illustrate an apparatus in which the above described article treating unit 16 may be used for carrying out the entire treating or plating operation automatically. This apparatus includes an endless and preferably generally oval-shaped track 130 for movably supporting a carriage 132, which carriage has means thereon for raising and lowering the plating unit 16 to immerse the tumbling barrel in a suitable plating tank 134. Suitable means described hereinbelow are provided for intermittently moving the carriage 132 from a barrel loading station to one or more article treating stations and thence to a barrel unloading station and for actuating the barrel raising and lowering means and the barrel rotating means in timed relationship with each other and with the carriage moving means. With this arrangement, it will be seen that the barrel may be loaded, and the subsequent treating and unloading operations are carried out automatically.

As shown best in Fig. 12, the endless track 130 may comprise a pair of oppositely facing channel members 136 and 138. The carriage 132, which may have any suitable structure, is movably supported on the track by rollers 140 and 142 rotatably mounted on an axle 144

secured to the carriage frame by suitable means. As illustrated in Fig. 11, the carriage is preferably supported by pairs of rollers disposed adjacent leading and trailing ends thereof. The article treating unit **16** is connected with the carriage for vertical adjustment by means of a cable **146** wound on a drum **148** rotatably mounted on the carriage. A reversible electric motor **150** is connected with the drum through a suitable reduction gear box **152** for raising and lowering the article treating unit.

In order to move the carriage **132** around the track, an endless chain **154** encircles the inner track channel member **138** and is connected with the inner end of the carriage supporting axle **144** by any suitable means. A driving sprocket wheel **156** projects through a suitable opening in the channel member **138** for meshing engagement with the chain, and an idler sprocket wheel **158** disposed at the opposite end of the track also projects through an opening in the channel member **138** and meshes with the chain. An electric motor **160** is provided for driving the sprocket wheel **156** and is operatively connected thereto by meshing bevelled gears **162** and **164** secured, respectively, to the motor shaft **166** and the sprocket wheel shaft **168**.

The motor **28** for rotating the article treating or plating barrel, the motor **150** for raising or lowering the barrel, and the motor **160** for driving the carriage along the track are intermittently operated by the means somewhat schematically shown in Figs. 11, 12, and 13. This means includes a pair of electric conduits **170** and **172** which are connected between a switch box **174** mounted on the track channel member **136** and any suitable source of power. A master switch **176** is inserted in the line **170** to control starting and stopping of the apparatus. A pair of electric lines **178** and **180** connect the switch box **174** with the electric motor **160**. The switch box **174** is preferably constructed so that the circuit to the motor **160** is normally closed when the master switch is closed, whereupon the motor **160** is energized to advance the carriage **132**. This advancement continues until the carriage **132** reaches an article treating position above the plating tank **134**, whereupon the mechanism within the switch box **134** is actuated to break the circuit and stop the motor **160**. In order to break the circuit at the proper moment, the switch box **134** is preferably disposed substantially at the work treating station and includes mechanism actuated by the advancing carriage **132**. This mechanism may include a switch actuated by a spring biased arm **182** which projects inwardly for engagement with a lug **184** secured to the carriage frame. Thus, as the carriage advances, the arm **182** is actuated to open the switch, thereby stopping the motor and properly locating the unit **16** at the work station. After a predetermined interval of time required for proper treating or plating of the articles in the barrel, the motor **160** is again energized to advance the carriage, and this may be accomplished by a suitable timing device in the switch box **174** which is energized when the arm **182** is actuated and is adapted to close the switch after the passage of a predetermined interval of time.

In order to energize the motors **28** and **150**, a pair of endless electrical contact strips **186** and **188** are disposed around the track channel member **136** and are insulated therefrom and from each other by suitable means. The contact strips are connected with the main power lines by suitable branch lines **190** and **192**. As shown best in Fig. 13, a pair of electrical contact brushes **194** and **196** are slidably mounted in a suitable bore in the end of the carriage supporting axle **144** for contact with the strips **186** and **188**, respectively. Preferably, the brushes are resiliently urged toward the strips by a suitable spring **198** which is insulated from the brushes by a washer **200** of insulating material. A pair of insulated wires **202** and **204** connect the brushes with a switch box **206** mounted on the platform or frame **18** of the article treating unit **16**. The switch box is also connected with the motor **150** by a pair of wires **208** and **210** and with the motor **28** by a pair of wires **212** and **214**.

The switch box **206** includes a switch mechanism having an operating arm **215** actuated by a suitable cam, not shown, disposed adjacent the path of travel of the unit **16** and at the treating station to close the switch and energize the motor **150**, whereby the motor is rotated in a direction to lower the unit **16**. Thus, when the carriage **132** reaches the treating station above the tank **134**, the motor **150** is immediately energized so as to lower the unit **116**. The switch box **206** includes a push button-type switch actuated by a spring biased plunger **216** which is positioned to engage a plate **218** secured to the upper edge of the tank **134** when the barrel has reached a lower position immersed in the tank. When the plunger **216** is actuated by engagement with the plate **218**, the motor **150** is de-energized to stop the downward movement of the article treating unit. The switch box **206** also contains a switch operated by a timing device for closing the circuit to the motor **150** in a manner to cause reverse rotation of the motor and, thus, raising of the article treating unit. This timing device is preferably energized upon actuation of the plunger **216** and may be set so that the article plating barrel remains immersed in the plating bath for the desired interval of time before being lifted from the barrel. It is understood, of course, that this timing device must be set to raise the barrel before the above described timing device energizes the motor **160** to advance the carriage **132** and the barrel along the track.

The above mentioned switch box **206** also contains a switch mechanism for controlling the operation of the barrel rotating motor **28**. This mechanism includes a simple push button-type switch actuated by a plunger **220** which engages the plate **218** on the tank **134** when the barrel is immersed in the tank. Thus, when the unit **16** reaches its lowered position, the plunger **220** is actuated to close a switch so that the motor **28** is energized to rotate the plating barrel in the direction indicated by the arrow **60** (see Fig. 7), whereby the articles in the barrel are tumbled for uniform treatment or plating. It is understood that as the unit **16** is raised from the plating bath, the plunger **220** and the switch actuated thereby return to their normal positions to stop the motor **28**.

As is well known, an article to be plated is often coated with several different metals, whereby a plurality of plating baths are required. Thus, in the schematic illustration of Fig. 14, a pair of article treating stations **222** and **224** are shown along with an article loading station **226** and an unloading station **228**. In order to unload the articles from the barrel at the unloading station, it is merely necessary to rotate the barrel in a direction opposite the arrow **60** (see Fig. 7) and in the manner illustrated by the arrow in Fig. 5. When the barrel reaches the unloading station, the motor **28** is energized to rotate the barrel in the proper direction by means of suitable switch mechanism in the switch box **206**, which switch mechanism is actuated by an arm **230** engageable with fixed cam means (not shown) disposed adjacent the unloading station.

From the above description, the operation of the apparatus is believed to be clear, but a short description of such operation is as follows. Preferably, an article treating unit **16** and carriage mechanism therefor is provided for each work station around the endless track. Thus, for the apparatus illustrated schematically in Fig. 4, which includes two article treating stations, a loading station, and an unloading station, four article treating units are preferably provided. Starting at the loading station, the barrel **26** is positioned in the manner illustrated in Fig. 4, and a load of articles is inserted through the opening in the barrel by a suitable chute **232**. The loading of articles by this chute may be either manually controlled,

or suitable control means, not shown, may be provided for automatically loading the articles. After the articles have been loaded, master switch **176** is closed so that the loaded article treating unit **16** is conveyed by the carriage **132** to the treating station **222**. When the loaded unit **16** reaches this treating station, the conveyor motor **160** is de-energized by the mechanism in the above described switch box **174**, and the motor **150** is energized in the manner described above for lowering the barrel into the plating bath. At the same time, another treating unit has been moved into position at the article loading station and is loaded with articles. After a predetermined interval of time, controlled by the timing device in switch box **206**, the barrel is raised from the plating bath, whereupon the timing device in switch box **174** is effective to energize the motor **160** until the next article treating unit reaches the treating station **222**. It is understood that this operation is carried on continuously, and each article treating unit is advanced to each treating station and to the unloading station **228**, where the barrel is rotated in a direction to discharge the articles therefrom. Any suitable means, such as endless conveyor, hopper, or a chute may be provided for receiving articles from the barrel at the discharge station. From the discharge station, the barrels are again advanced to the loading station to repeat the cycle of operation.

Referring again briefly to the barrel structure, there is provided a discrete and relatively large pocket defined between wall portions **42**, **54**, **56** and **58**, and this pocket may occupy a substantial portion of the left-hand quadrant of the barrel, as viewed in Fig. 7. The angular tumbling panels **46**, **48**, **50** extend over a substantial portion of the periphery of the barrel and approximate to a greater or less extent substantially half the barrel periphery. These tumbling panels are along an intermediate portion of the periphery of the barrel and tend to effect increased tumbling action of the articles along this portion of the barrel. With such increased tumbling action, and the relatively large outlet opening, the barrel structure is such as to prevent articles from bouncing out of the opening without making the opening of such a minute size as to prevent free egress of the treated articles when the barrel is rotated in the dumping direction. To this end, the pocket presents a substantially smooth interior wall surface along the arcuate section **54**, the curved section **56**, and the substantially radial portion **58** so that the previous increased agitation of the articles is reduced as the articles are collected in the pocket and then discharged therefrom to the opposite angular tumbling panels for further treatment as the barrel is rotated in the treating direction of the arrow **60** in Fig. 7. Thus, the articles in the pocket will tend to slide along the smooth surface thereof with reduced turbulence so that the tendency for the articles to bounce out of the opening is substantially eliminated. Further, positioning of the portion **58** relatively close to the axis of the barrel provides a relatively wide space between it and the arcuate section **52** so as to facilitate substantially free flow of the treated articles therebetween and dumping of the treated articles through the opening **40** when the barrel is rotated in the reverse or dumping direction. As illustrated, the end of the wall portion **58** is located closer to the axis of the barrel than to the free edge of the arcuate section **52** but this positioning may be varied within limits such as to obtain the desired characteristics of operation of the barrel during its rotation in the treating direction and its reverse rotation in the dumping direction.

From the above description, it is seen that the present invention has provided a novel article treating unit having self-contained means for rotating the barrel, whereby the unit may be used with various plating baths without requiring setting up any complicated drive mechanism. Furthermore, it is seen that the present invention has provided a novel article treating or plating barrel which may be quickly and easily either loaded or unloaded and which is capable of efficiently tumbling articles therein to insure uniform treatment of the articles. More specifically, it is seen that the present invention has provided a novel barrel of simple and economical construction while at the same time highly efficient in operation. In addition, it is seen that the present invention has provided a relatively simple apparatus including a novel self-unloading barrel, whereby various steps of the plating operation may be carried out substantially automatically and, therefore, relatively quickly and economically.

This application is a continuation of my co-pending application, Serial Number 373,136, filed August 10, 1953, now abandoned, entitled, Apparatus for Plating Articles and Method for Making Same.

While the preferred embodiment of the present invention has been shown and described herein, it is obvious that many structural details may be changed without departing from the spirit and scope of the appended claims.

The invention is claimed as follows:

1. In an apparatus for treating articles, a barrel comprising end walls and a one piece plastic sidewall, said sidewall including longitudinally extending arcuate sections spaced from one another to provide an article inlet and outlet opening and forming substantially approximately half the periphery of the barrel and said sidewall further including a plurality of angularly disposed tumbling panels between said arcuate sections and substantially completing the remaining periphery of the barrel, said arcuate sections terminating in free marginal portions, one of said marginal portions being located substantially inwardly from the other marginal portion toward the axis of the barrel and providing with the contiguous arcuate section a discrete substantially radial pocket with a generally smooth gradually curved surface merging with the adjacent tumbling panel and operating to trap with reduced agitation articles accumulating therein from the angularly disposed tumbling panels when the barrel is rotating in the treating direction whereby to prevent articles from bouncing out of the barrel through the space between the said marginal portions.

2. In an apparatus for treating articles as claimed in claim 1, wherein the marginal portions are disposed in radially overlapping relationship, and wherein said one marginal portion extends inwardly of the barrel from substantially the midportion of one quadrant of the barrel adjacent said opening.

3. In an apparatus as claimed in claim 1, wherein at least some of said angularly disposed panels have midportions thereof projecting inwardly of the barrel to increase tumbling action on the articles passing therealong.

4. In an apparatus for treating articles, a barrel adapted for rotation in an article treating direction and for opposite rotation in an article dumping direction and comprising a one piece plastic sidewall, said sidewall including longitudinally extending arcuate sections spaced from one another to provide an article inlet and outlet opening through the barrel periphery and forming substantially approximately half the periphery of the barrel and said sidewall further including a plurality of angularly disposed tumbling panels between said arcuate sections and substantially completing the remaining periphery of the barrel, said arcuate sections terminating in free marginal portions, one of said marginal portions terminating substantially inwardly from the free edge of the other marginal portion toward the axis of the barrel to provide an enlarged egress passage for articles when the barrel is rotating in the dumping direction and providing with the contiguous arcuate section a discrete and relatively deep substantially radial pocket with predominantly smooth inner surfaces merging with the adjacent tumbling panel operating to reduce agitation of articles accumulating therein from the angularly disposed tumbling panels when the barrel is rotating in the treating direction whereby to prevent articles from

bouncing out of the barrel through the said egress passage as the articles pass from the pocket to the angularly disposed tumbling panels for further treatment while the barrel is rotating in the treating direction.

5. In an apparatus for treating articles as claimed in claim 4, wherein the inwardly directed marginal portion merges into the contiguous arcuate section along a curved inner surface effective to reduce agitation of articles passing therebetween as the barrel is rotated in the treating direction.

6. In an apparatus for treating articles as claimed in claim 4, wherein the inwardly directed marginal portion has the free edge thereof terminating relatively closer to the axis of rotation of the barrel than to the free edge of the other marginal portion.

7. In an apparatus for treating articles, a barrel comprising end walls and a sidewall having a plurality of angularly disposed tumbling panels forming substantially approximately half the periphery of the barrel for effecting relatively turbulent tumbling action therealong and a pair of arcuate end sections included in the remaining periphery of the barrel, the terminal edge of a first arcuate section being spaced circumferentially from the other arcuate section to leave an opening through the periphery of the barrel, said arcuate sections and said opening covering the complemental periphery of the barrel, the second arcuate section terminating in a curved section merging into a substantially radial portion extending inwardly of the barrel to a point substantially inwardly of said first arcuate section and relatively close to the axis of rotation of the barrel and providing with said second arcuate section and said curved section a discrete and relatively deep substantially radial pocket along a fraction of the periphery of the barrel with substantially smooth interior wall surfaces merging with the adjacent tumbling panel whereby to prevent the articles being treated from bouncing out of the pocket as the barrel is inverted during rotation thereof in the treating direction, and said first arcuate section being relatively widely spaced from said substantially radial portion to facilitate egress of articles therebetween and discharge through said opening as the barrel is rotated in the opposite dumping direction.

8. In an apparatus for treating articles as claimed in claim 7, wherein the substantially radial portion comprises an elongated section with the terminal edge thereof located relatively closer to the axis of rotation of the barrel than to said first arcuate section.

9. In an apparatus for treating articles, a barrel adapted for rotation in an article treating direction and for opposite rotation in an article dumping direction and comprising end walls and a sidewall having a plurality of angularly disposed tumbling panels substantially approximating half the periphery of the barrel for effecting relatively turbulent tumbling action therealong, the said intermediate portion of the periphery of the barrel terminating in a pair of arcuate end sections spaced from one another to provide an inlet and outlet opening and forming with said opening the remaining complemental periphery of the barrel, one of said arcuate end sections terminating in an inwardly directed wall portion extending toward a tumbling panel remote from the aforesaid one arcuate section and lapping the edge of the other arcuate end section in spaced relation thereto at a position disposed relatively close to the axis of rotation of the barrel and substantially radially opposing the tumbling panel adjacent the aforesaid one arcuate section, the said inwardly directed portion and contiguous arcuate end section forming a discrete and relatively deep radial pocket with predominantly smooth interior surfaces merging with the adjacent tumbling panel to trap with reduced agitation articles accumulating therein from the tumbling panels as the barrel is rotated in the treating direction, the inner edge of said inwardly directed portion being positioned with respect to the peripheral extent of the barrel including the tumbling panels so as to substantially prevent any articles engaged by any tumbling panel from gaining access to the said opening as the barrel is rotated in the treating direction.

References Cited in the file of this patent

UNITED STATES PATENTS

2,491,925	Lazaro	Dec. 20, 1949
2,562,084	Collick	July 24, 1951
2,640,025	Lazaro	May 26, 1953
2,741,463	Colclesser	Apr. 10, 1956
2,749,572	Nowak	June 12, 1956
2,762,772	Jackson	Sept. 11, 1956
2,777,165	Hurt	Jan. 15, 1957
2,836,400	Jackson	May 27, 1958

FOREIGN PATENTS

464,334	Italy	July 28, 1951