Sept. 4, 1956 H. C. LUECHAUER 2,761,831

ELECTROPLATING FIXTURE

Filed May 17, 1952

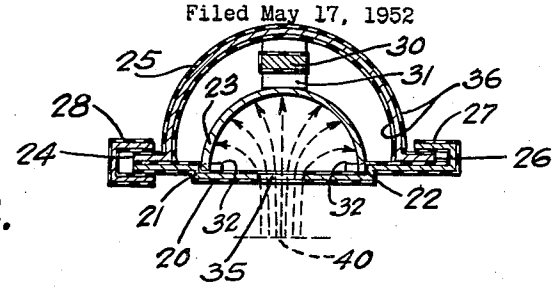


Fig. 2.

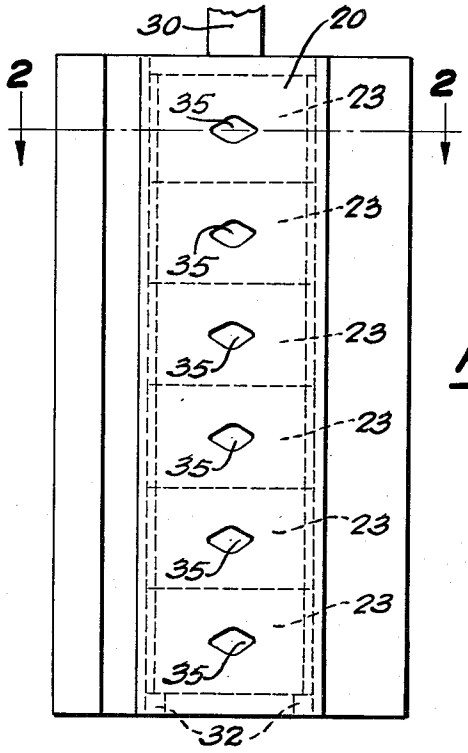


Fig. 1.

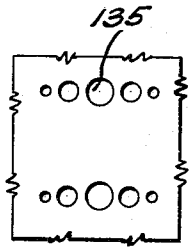


Fig. 3

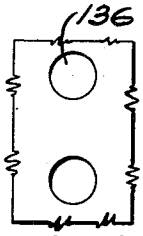


Fig. 4.

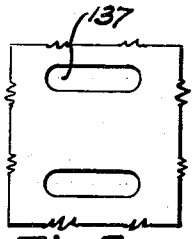


Fig. 5.

INVENTOR.
HOLLE C. LUECHAUER
BY
Willits, Hardman and Fisher
HIS ATTORNEYS.

United States Patent Office

2,761,831

Patented Sept. 4, 1956

2,761,831

ELECTROPLATING FIXTURE

Holle C. Luechauer, Dayton, Ohio, assignor to General Motors Corporation, Detroit, Mich., a corporation of Delaware

Application May 17, 1952, Serial No. 288,415

1 Claim. (Cl. 204—297)

This invention relates to improvements in fixtures for holding workpieces during electroplating thereof.

It is among the objects of the present invention to provide a fixture in which arcuate workpieces, such as semicircular bearings, are held side by side in contiguous alignment while immersed in a plating bath adjacent the anode therein, said fixture having means for controlling the electroplating forces so that the concaved surfaces of said bearings receive a layer of metal or metallic alloy of uniform distribution and thickness, thereby eliminating the necessity of machining the bearings after the plating operation.

When semicircular bearings are placed in a fixture and then immersed in a plating bath adjacent the anode therein, said anode is not equidistant from all points on the concaved surface of the bearing to be plated but on the contrary is closer to certain portions of the surfaces to be plated than to others. This variation in distances causes a variation in the distribution of electroplating forces over the arcuate surfaces of the bearings to be plated and consequently a variable electroplate. The electroplate on the surfaces nearest the anode will be thicker than the plate deposited upon more remote surfaces and therefore a uniform plate on a bearing will not be obtained by the use of an ordinary workholder.

In order to deposit a metal plate of uniform thickness over the entire concaved surfaces of a semicircular bearing, applicant provides a fixture in which a plurality of bearings are held in end to end engagement upon the base of the fixture, being clamped upon said base by resilient contact fingers secured within a cover attached to the base in any suitable manner. Thus the end edges of adjacent bearings in the fixture engage while the lateral edges rest upon the base thereby forming a semicylindrical chamber between said base and the concaved surfaces of the bearings. The base has a plurality of apertures so spaced that the base is perforated at areas midway between the end edges of each bearing in the fixture. These apertures are of such conformation that they diminish in size as they approach the opposite lateral edges of each respective bearing, thereby choking the electrodepositing forces as they pass through the apertures and fan outwardly toward all regions of the concaved surfaces of the bearings facing said apertures. The anode from which said forces emanate is closer to the lateral edges of the bearings than to the central concaved areas thereof and thus the depositing forces, if not controlled by the diminishing apertures, would deposit a heavier plate along said lateral edge areas than in the central area.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein a preferred embodiment of the present invention is clearly shown.

In the drawings:

Fig. 1 is a front elevation of the plating fixture.

Fig. 2 is a transverse sectional view taken along the line and in the direction of the arrows 2—2 in Fig. 1.

Figs. 3, 4 and 5 are fragmentary views each illustrating a different form of aperture in the base of the fixture and capable of providing the desired plating result.

Referring to the drawings, the general construction of the fixture consists of a rectangularly shaped base 20 having a central, longitudinal depressed area forming two substantially parallel and spaced shoulders 21 and 22 engageable by the lateral edges of bearings 23 when said bearings are placed upon the base as shown in Fig. 2. The one, longer side of the base has a flat area upon which the one oppositely disposed, outwardly extending flange 24 of the dome-shaped cover 25 seats. The opposite flange 26 of the cover extends into the elongated niche formed by the bent over side 27 of the base. A C-clamp 28 is placed over the cover flange 24 and its engaged side of the base tightly to hold the cover on the base. All surfaces of the base and cover are coated with a covering of any suitable insulating material 36, preferably elastic to assure sealing engagements of the cover and base. Any suitable conductor bar 30 is attached within the cover 25, this bar having a plurality of contact fingers 31 attached thereto, said fingers being resilient so that when a finger engages a bearing as shown in Fig. 2, it will press and hold the bearing upon the base 20 with the concaved surface of the bearing facing the base. Extensions 32 on the base provide locating stops engageable by the one end bearing placed on the base, whereby said bearings engaging each other end for end are properly located on the base and so held by the respective resilient fingers 31. Any suitable hook formation, not shown, provided on the portion of conductor bar 30 extending outside the fixture cover 25, may be placed on the electrically charged bar over the plating tank whereby the fixture is suspended on the plating tank so that the fixture and its contained bearings are immersed in the plating bath adjacent an anode in said bath, said anode being alongside the vertically suspended base 20 of the immersed fixture.

In order to permit the electrodepositing forces emanating from the anode to enter into the fixture and be directed against the concaved surfaces of the bearings held in said fixture, said surfaces being the ones to receive a uniform thickness plate, evenly distributed over the entire inner concaved surface of each bearing, apertures 35 are provided in the base through which said electrodepositing forces are directed into the fixture. For purposes of this description an anode 40 is represented by dotted lines, indicating the aproximate position of the bearing carrying fixture relatively to the anode in the plating bath. The electrodepositing forces emanate from the anode and enter the fixture through the apertures 35 and continue to fan out in all directions toward the exposed concaved surfaces of the bearings. It will be seen that the greatest distance to be traversed by the electrodepositing force is along a path passing from the anode, through the vertical center of the apertures 35 to a center line on the bearing surfaces substantially midway between the lateral edges of the bearings. The term "lateral edges" as used herein denotes the contiguous edges of two semicircular bearings when placed about a shaft journaled between said bearing portions. Moving from said center line in either direction toward said lateral edges of a bearing the distance of the concaved surface of the bearing from the anode 40 progressively decreases and thus if no controlling resistance between the anode and said aproaching surface is provided said bearing surfaces will receive an electroplate gradually increasing in thickness toward said lateral edges.

The present invention provides predeterminately sized and shaped apertures in the base 20 which provide the

necessary resistance or choking of the electro-depositing forces passing from the anode through said apertures toward the concaved surface of the bearing to be plated. In Fig. 1 the base is provided with a number of identical apertures **35** equal to the number of bearings supported within the fixture. Here six bearings, indicated by the dotted lines, are clamped within the fixture. Six apertures **35** are provided in the base **20**, each aperture being diamond shaped with its longer center dimension substantially parallel to and midway between the two end edges of the respective bearing. The shorter center dimension of the diamond-shaped aperture **35** is substantially parallel to and midway of the two lateral edges of the respective bearing. The obtuse angled, central portion of the apertures, being in the longest distance path of travel of the electro-depositing forces, offers the least resistance to said force. As the oppositely disposed, acute angled ends of the apertures are approached, a gradually increasing resistance to the electro-depositing forces in both directions toward the lateral edges of the bearings is provided, thus compensating for the closer proximity of the arcuate surface adjacent said lateral edges of the anode and thereby controlling the deposit of the electroplate so that the entire concaved surface of each bearing receives a substantially even plate of uniform thickness.

Figs. 3, 4 and 5 illustrate modified forms of apertures in the base **20** of the fixture. Instead of the diamond shaped aperture **35**, a plurality of apertures are provided, arranged in a row substantially midway between the two end edges of each bearing **23** and parallel thereto, the center aperture **135** being the largest while the apertures on each side of this center one are progressively smaller in diameter. These apertures give the same results as the diamond-shaped aperture **35** inasmuch as they gradually restrict or impede the electrodepositing forces as they are directed toward the lateral side edges of the concaved surfaces of the respective bearings.

Fig. 4 shows the fixture provided with a row of circular openings **136**, the size of said openings being predetermined so that a substantially uniform and even electroplate is applied to each bearing.

From the aforegoing description it will be seen that the present invention provides a bearing carrying fixture which, when immersed in a plating bath, controls the electro-depositing forces in such a maner that all portions of the concaved surfaces of the semicylindrical bearing therein receive an evenly distributed plate of uniform thickness even though portions of the said concaved surface are in closer proximity to the anode in the plating bath than other portions of the bearing surfaces exposed to the electrodepositing forces emanating from said anode.

While the embodiment of the present invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted.

What is claimed is as follows:

An electroplating apparatus for uniformly plating the concave surfaces of semicylindrical workpieces, an electroplating fixture comprising an elongated base having two substantially parallel edges, one of said two edges extending upwardly and inwardly to provide an elongated niche between said one of said edges and said base, said base including a central longitudinal depressed area forming two spaced shoulders substantially parallel to said edges of said base, extensions on said base providing workpiece stops adjacent a common end of each of said shoulders, said base further having a plurality of longitudinally spaced diamond shaped apertures in said depressed area, the shorter center dimension of said apertures being substantially parallel to and midway between said shoulders, a dome-shaped cover for said base including a pair of oppositely disposed outwardly extending flanges, one of said flanges extending into said elongated niche, means clamping the other of said flanges against the other of said edges of said base, electrical insulating material coating said base and said cover, and a conductive bar attached within said cover and having a plurality of resilient fingers thereon to clamp the workpieces to be plated between said shoulders and said cover with the concave surfaces of said workpieces facing said apertures in said base.

References Cited in the file of this patent

UNITED STATES PATENTS

1,700,178	Porzel	Jan. 29, 1929
2,073,679	Brown	Mar. 16, 1937
2,500,206	Schaefer	Mar. 14, 1950