

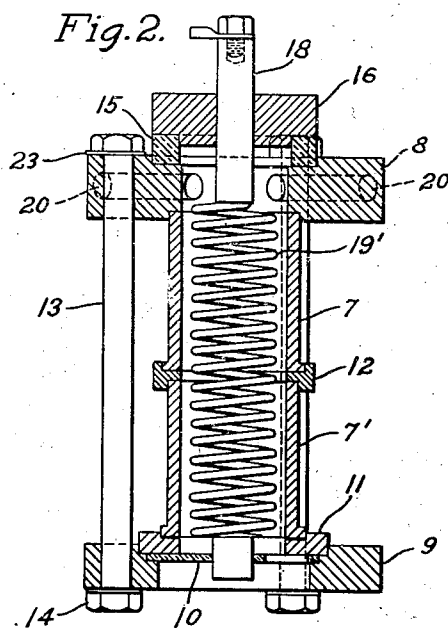
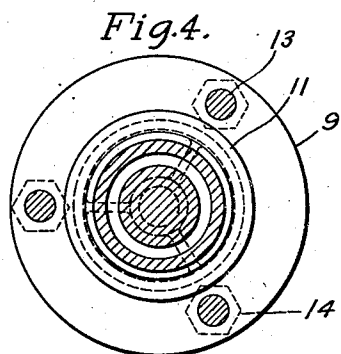
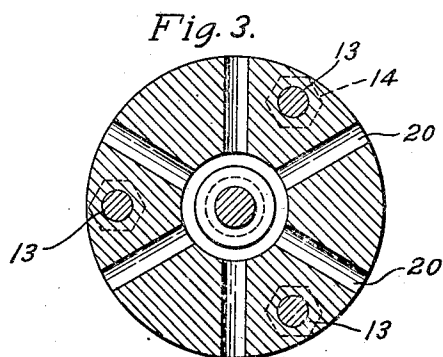
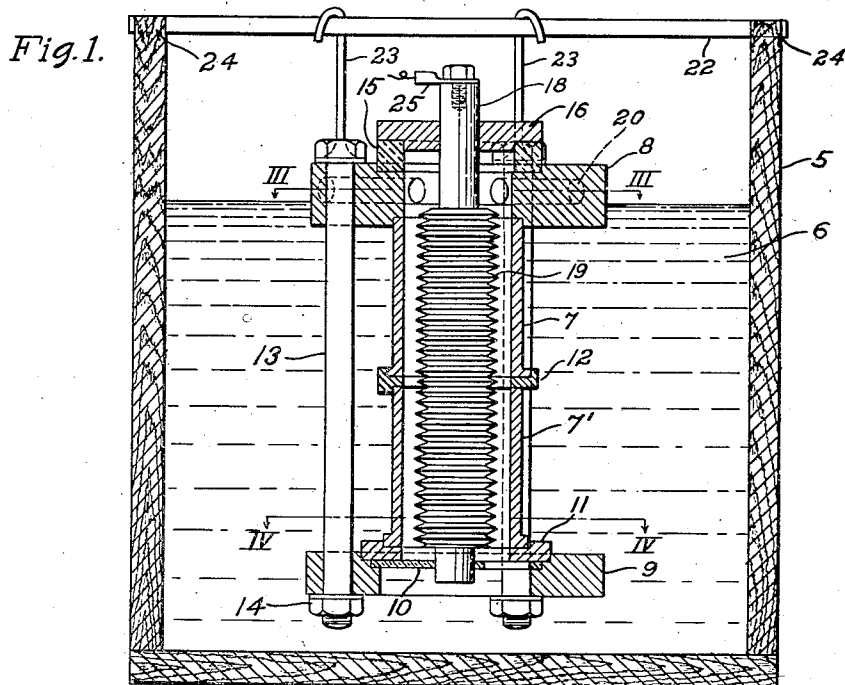
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J. K. HITNER

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CORRUGATED OR THREADED ANODES

Filed June 23, 1928



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CORRUGATED OR THREADED ANODE

Application filed June 23, 1928. Serial No. 287,672.

My invention relates to a process of electro-plating the interior surfaces of molds with layers of chromium and more particularly to an improved anode that is effective in causing an efficient deposition of the chromium on the molds.

An object of my invention is to provide an improved method of coating the interior surfaces of molds or dies with electro-deposited layers of another metal.

Another object of my invention is to provide a chromium-plating bath having an anode that is corrugated, threaded or formed into a spiral in such manner that a large anodic surface is presented in close relationship to the interior surface of a mold or other hollow body upon which an electro-deposited layer of chromium is desired, thus enabling the throwing power of the solution to be increased, and a uniform layer of chromium to be deposited upon the interior surface of the mold.

In the electro-deposition of chromium, it is desirable that the anode shall present a surface which is somewhat similar in contour to the surface of the article to be coated. In electro-plating the interior of molds, it has, therefore, been proposed to place the anode in concentric relationship with respect to the mold to be coated, so that the exterior surface of the anode will cause the chromium to be deposited evenly upon the interior surface of the mold. When the anode is arranged in this manner, however, it does not have a very large surface.

It is also desirable to utilize an anode having a comparatively low current density which is preferably lower than the current density at the cathode and this is accomplished by providing a comparatively large anodic area, as it has been found, in practice, that the life of the anode is considerably increased when the current density is low and that there is less tendency for an insulating scale to form on its surface. It is, therefore, an essential feature of my invention to corrugate or thread the anode, or make it in a spiral form so that it will have a surface equally as great as, or greater than, the surface of the article to be coated.

In the drawing accompanying and forming a part of this specification,

Figure 1 is a vertical sectional view of a tank and supports for the electrodes, showing the molds to be plated in cross-section and my improved anode in elevation;

Fig. 2 is a similar view of the supports for the electrodes, showing the molds in cross section and a modified form of my anode in elevation;

Fig. 3 is a view in transverse section of the device shown in Fig. 1, taken along the line III—III; and

Fig. 4 is a similar view of the device shown in Fig. 1, taken along the line IV—IV, showing means for centering the bottom part of the anode.

In practicing my invention, I provide a suitable tank 5 containing the bath or electrolyte 6, which is preferably composed of a dilute solution of chromic acid containing a small percentage of chromic sulphate. The molds 7 and 7' are supported in compact form by an upper annular member or ring 8 and a lower ring 9. A recessed portion of the upper ring 8 rests upon the upper edge of metallic mold 7, and the lower ring 9 supports a mica plate 10 and a base plate 11, the base plate supporting the lower mold 7'. A separating ring 12 is provided when it is desired to plate a plurality of molds at one time. A plurality of spaced bolts 13, extending through apertures in the rings 8 and 9, are provided with nuts 14 which bear against the lower ring and, when tightened, cause the upper ring and the base plate 11 to bear against the molds, thus holding them in firm, compact relationship.

The upper ring 8 is recessed at its upper central portion to provide a seat for a porcelain ring 15. A cover 16, having a central aperture therethrough, rests upon the porcelain ring and supports a corrugated anode 19, the upper end 18 of which extends through the aperture and makes a tight-fitting engagement with the cover. The porcelain ring 15 serves to insulate the anode from the molds at the upper portion and the mica plate 10, which is in the form of a spider, performs the same function at the lower portion.

and also serves to center the anode so that it will be equally distant from all portions of the molds. Lateral apertures 20 are provided in upper ring 8 to permit the free circulation of the electrolyte.

The electrode structure shown in Fig. 2 is similar to that shown in Fig. 1 with the exception that the anode 19' is shown in the form of a spiral instead of being corrugated. The anodes 19 and 19' are preferably formed entirely of lead, although, if preferred, a steel rod coated with lead by any desired method, as by spraying, may be used.

The assembled electrodes are preferably suspended in the electrolyte by means of a cross bar 22, embedded in slots 24 in the upper edges of tank 5, and supporting hooks 23, the lower ends of which are wrapped around bolts 13 between the annular ring 8 and the heads of the bolts. However, if desired, the electrodes may be supported from the bottom of the tank by blocks of any material that will not be attacked by the electrolyte, such as glass.

It is essential, however, that the electrodes be suspended or supported in some such manner, as a sludge has a tendency to form and settle on the bottom of the tank during electrolysis, which would circulate between the electrodes and prevent the deposition of a smooth plate of chromium if the electrodes were permitted to rest on the bottom of the tank.

My novel arrangement of the cathode and anode enables the electrolyte to flow continuously between the surfaces of the electrodes, thereby enriching the plating solution between the electrodes, which would otherwise have the tendency to become weak because of the electrode-position of the chromium. The large anodic area which is in close relationship to the inner surface of the molds 7 and 7' to be plated enables the chromium to be deposited evenly and in an efficient manner.

During electrolysis, the current enters through the positive terminal 25, which is secured to the upper end 18 of anode 19, passes through the anode and the solution 6, causing the chromium to be deposited upon the interior surface of the mold, and then flows through the ring 8 and supporting hooks 23 to the negative terminal (not shown) which is attached in any desired manner to the supporting bar 22.

It will be understood that various modifications may be made by those skilled in the art without departing from the spirit of my invention. For example, instead of plating two molds, the number may be varied, depending upon the depth of the electrolyte. The improved arrangement of the electrodes and the character of the anode may also be utilized for the coating of the interior of dies or other hollow bodies. The anode may

also be formed of other metals, such as iron or steel, but I prefer to use lead, as it has been found that the utilization of a lead anode in the electro-deposition of chromium has the tendency to oxidize any undesirable chromic chromate which may be formed in the bath, to chromic acid. A corrugated or spiral anode, such as I have shown, may also be useful in the electro-deposition of other metals which require a large anodic surface, for instance, nickel. I desire, therefore, that only such limitations shall be imposed upon my invention as are required by the prior art and the appended claims.

I claim as my invention:—

1. In an apparatus for the electro-deposition of metals, the combination of an upper ring, a lower ring, a plurality of molds supported between the two rings, and a corrugated anode supported coaxially in the interior of the molds.

2. In an apparatus for the electro-deposition of metals, the combination of a hollow body, an anode situated interiorly of said body and having a surface at least as large as the interior surface of the hollow body, and means including a plurality of rings and a cover for holding the anode and cathode in spaced relationship.

3. In an apparatus for the electro-deposition of chromium, the combination of a plurality of hollow bodies, means for supporting the hollow bodies in coaxial alignment with each other and means for supporting an anode coaxially in the interior of said hollow bodies, the exterior surface of said anode being at least equal to the interior surface of the hollow bodies.

In testimony whereof, I have hereunto subscribed my name this sixteenth day of June, 1928.

JOHN K. HITNER.