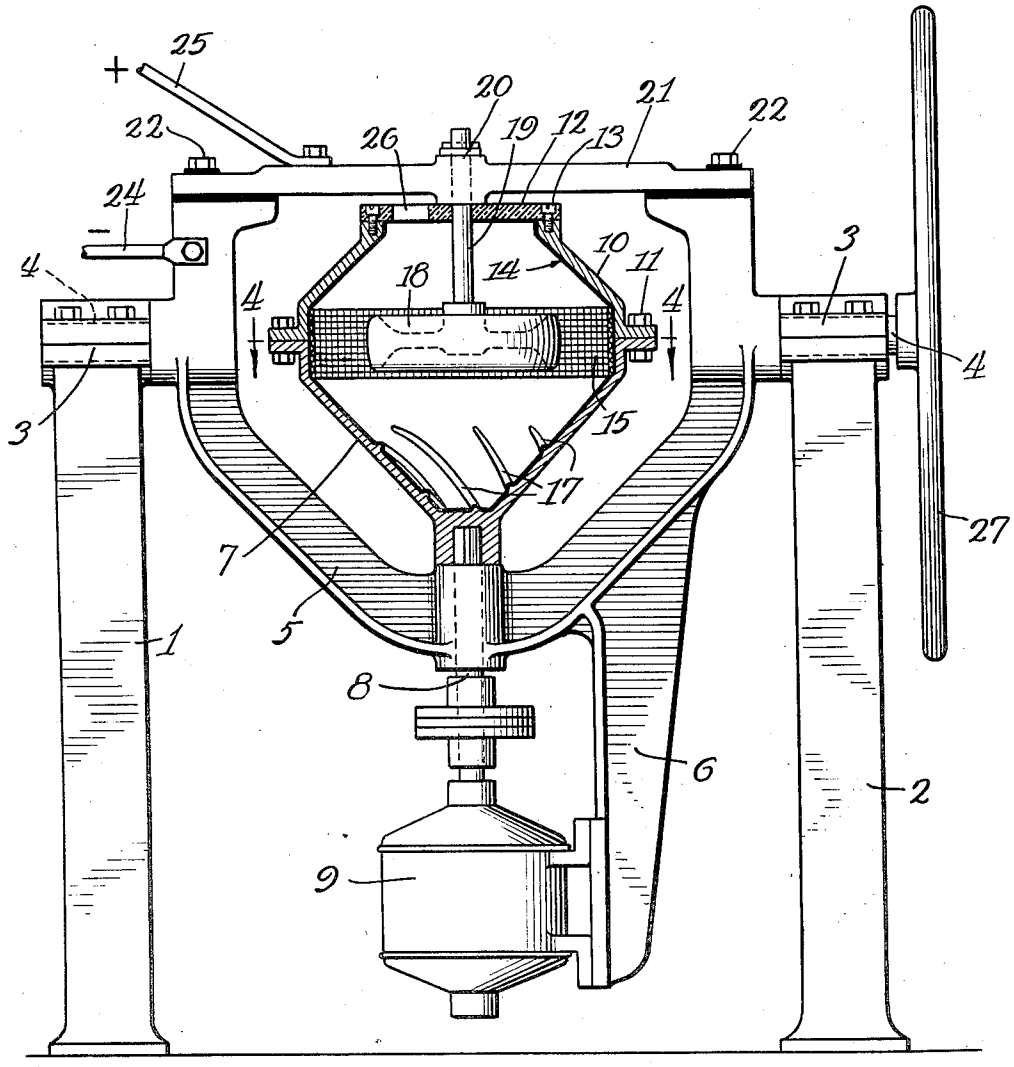
May 23, 1933. W. E. BELKE 1,910,145

ELECTROPLATING METHOD

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Fig. 1



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Fig. 2

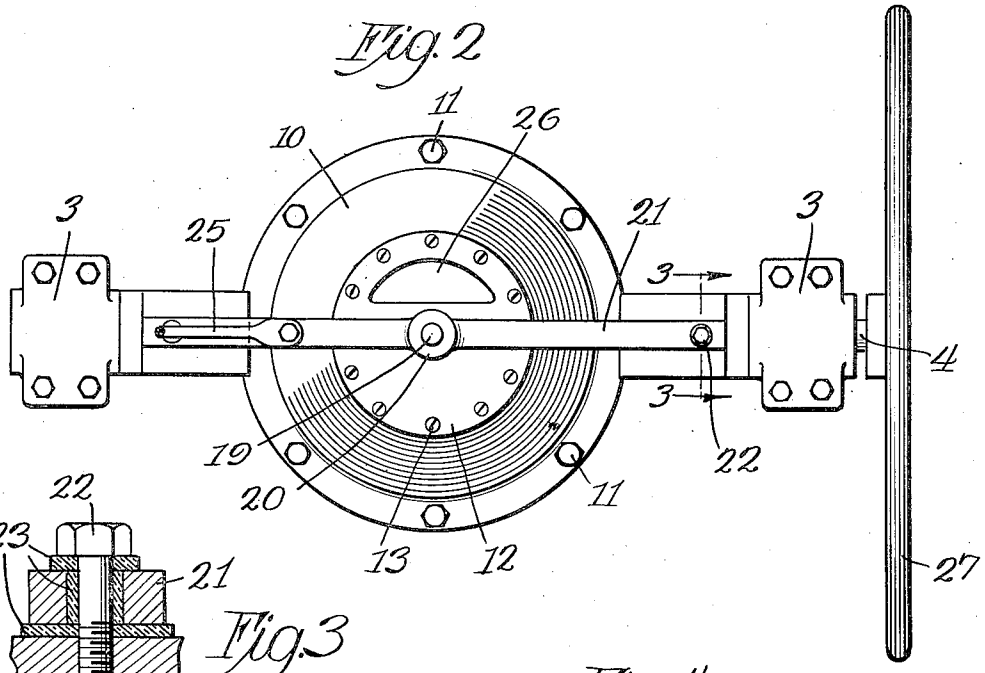
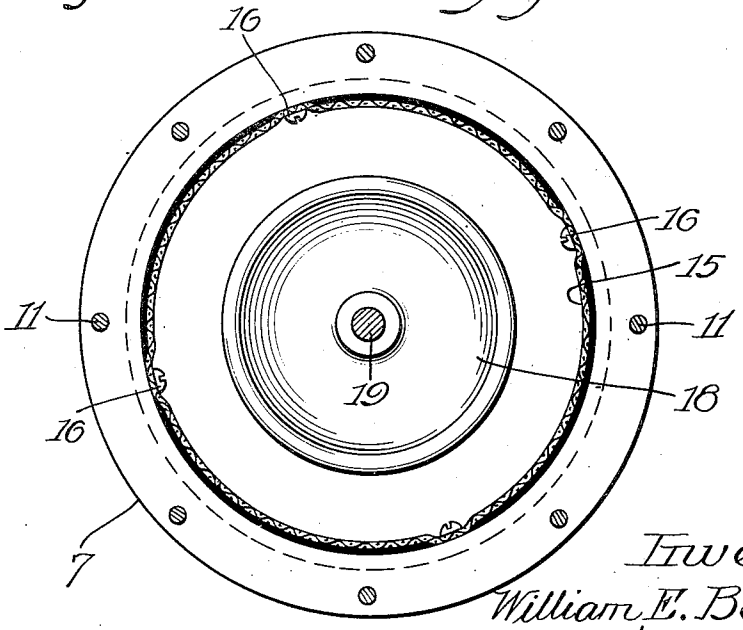


Fig. 3

Fig. 4



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UNITED STATES PATENT OFFICE

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ELECTROPLATING METHOD

Application filed December 11, 1930. Serial No. 501,546.

This invention relates to electroplating apparatus in general, and more especially to apparatus of this kind which is adapted for chromium plating.

Generally stated, the object of the invention is to provide a novel and improved construction and arrangement, in a plating machine or apparatus, whereby centrifugal force is utilized to insure effective contact between the cathode and the metal article to be plated. This is advantageous for plating in general, but is especially advantageous in chromium plating, inasmuch as for this purpose a heavier current is required, and hence a more positive and reliable contact is required between the cathode and the object or article to be plated.

It is also an object to provide certain details and features of construction and combinations tending to increase the general efficiency and the desirability of an electroplating apparatus or machine of this particular character.

To the foregoing and other useful ends, the invention consists in the matters hereinafter set forth and claimed, and shown in the accompanying drawings, in which,—

Fig. 1 is a side elevation, with certain portions in vertical section, of an electroplating machine embodying the principles of the invention.

Fig. 2 is a plan of said machine.

Fig. 3 is an enlarged fragmentary detail sectional view.

Fig. 4 is an enlarged horizontal section on line 4—4 in Fig. 1 of the drawings.

As thus illustrated, the invention comprises body frames or castings 1 and 2 of any suitable character, provided at their upper ends with bearings 3 in which are mounted the trunnions 4 that are rigid with the tilting frame 5, the latter being preferably U-shaped in form, and provided at its lower side with a downward extension 6, as shown.

The barrel or container 7 has its bottom provided with a stem 8 in the form of a vertical shaft, and this shaft is coupled to an electric motor 9 that is mounted on the extension 6 previously mentioned. In this way, by operating said motor, the barrel 7 is rotated about a vertical axis. This barrel preferably has a separable top 10 held in place by bolts 11, and the top plate 12 is removably fastened to said top section 10 by means of bolts or screws 13, as shown. The inner surface of the barrel has an insulating lining 14, of any suitable character, and the middle portion of the barrel is provided interiorly with a mesh-like band 15 electro-conductively connected to the barrel by screws 16, or by any suitable means. The lower conical or hopper-like portion of the barrel is provided internally with ribs 17, for a purpose that will hereinafter more fully appear.

The anode 18 is of any suitable metal. If nickel or silver plating is to be done, this anode can be of the required metal for that purpose. However, for chromium plating, the desired metal is in the solution, not on the anode, and for such kind of plating the said anode may be of any metal commonly or advantageously employed for this purpose. It will be understood, furthermore, that in chromium plating, a much heavier current is necessary, in order to plate the metal in solution on to the object to be plated. As shown, the anode 18 is preferably supported on the lower end of a stem 19, which latter is removably secured at 20 in the middle portion of the bar 21, the ends of the latter being secured by bolts 22 to the upper ends of the U-shaped body frame 5 previously described. The bolts 22 may be insulated by insulation 23, in the manner shown in Fig. 3 of the drawings, whereby the bar 21 will be insulated from the U-shaped body frame 5, while the barrel 7 is electrically connected with said U-shaped frame, the latter having a negative electrode or connection 24, and the anode having a positive electrode or connection 25 that is fastened in any suitable manner to the said bar 21 that supports the anode.

In use, the articles, if they are comparatively small ones, to be plated can be inserted through the opening 26 in the plate or cover 12 of insulation, and thus dropped into the solution within the rotary barrel. Upon starting the motor 9, the barrel will

rotate and throw the articles upwardly and outwardly against the band 15, which latter is the cathode of the apparatus. The articles or objects to be plated will be forced by centrifugal pressure against the band 15 with considerable pressure, so that the contact between the articles and the band will be sufficient and effective for the electric current necessary, such as the heavy current ordinarily employed in chromium plating. By stopping the motor 9, the articles or objects to be plated will be permitted to fall down into the lower portion of the barrel, and then when the motor is started again, these articles will be thrown out against the band 15, but in different positions from what they were before. By repeating this from time to time, it will be seen that the articles or objects to be plated will be turned over and around, and exposed at different sides in the direction of the anode 18, whereby all sides of said objects or articles will be suitably plated, and whereby the plating will not be defective because of the contact between the objects or articles themselves when a greater or less number of them is placed in the barrel. In other words, the apparatus or machine can be operated in a manner to keep the said articles or objects in proper position for plating, by turning them over or around, now and then, inasmuch as the articles or objects to be plated are maintained in position by centrifugal force, instead of by gravity or other expedients.

It will be readily understood that the invention is not limited to the exact construction or method shown and described, in order to utilize centrifugal force as the means for maintaining contact between the cathode and the articles or objects to be plated. The construction and mode of operation shown and described are illustrative of an operative form of the invention, but it is obvious that modifications or equivalent arrangements can be employed, to utilize centrifugal force for the purpose described, without departing from the spirit of the invention. For example, for some purposes, it may be found desirable to omit the insulation on the inner surface of the barrel or rotary container, depending upon circumstances and the character of the plating to be done. Again, while the drawings show a motor 9 that can be started and stopped to accomplish the desired mode of operation, as explained, it is obvious that the starting and stopping of the rotary barrel can be produced in any suitable or desired manner, all within the scope of the invention, in order to periodically readjust or change the positions of the articles or objects to be plated. Moreover, as shown, the outer barrel forms the cathode, and the anode is stationary, but there are obvious modifications of this, for the purpose of utilizing centrifugal force to maintain relatively heavy pressure contact between the cathode and the articles or objects to be plated, and hence the invention is not limited to having the cathode rotate while the anode remains stationary.

As stated, heavy current is necessary, as well as relatively heavy contact pressure, for some kinds of plating, as, for example, chromium plating, and such plating must be done rapidly and skilfully in order to insure a uniform and attractive surface for the article when the plating is finished. The invention, of which the accompanying drawings are illustrative of an operative form thereof, is calculated to insure the requirements and conditions necessary for effective plating.

It will be understood that the opening 26 can be provided with a suitable closure, not shown, to avoid any possible discharge of the solution during high-speed rotation of the receptacle forming the barrel. To discharge the plated articles from the barrel, the hand wheel 27, which is attached to the shaft 4, can be rotated to tilt the frame 5 about a horizontal axis, in order to turn the barrel upside down and thus discharge the contents. For this purpose, the cover 12 can be removed, and even the bar 21 can also be removed, to facilitate the discharge of the plated articles from the top or mouth of the barrel. The drawings are thus illustrative of one method of embodying and using the invention in an operative machine.

It will also be understood that the motor 9 may have any suitable means, such as an ordinary switch, not shown, for starting and stopping it in the desired manner.

It will be understood, of course, that to re-adjust the articles or objects that are being plated it is not necessary to absolutely stop the machine, as any change in the speed of rotation, as by accelerating the speed suddenly, or by retarding it, will accomplish the desired purpose.

Furthermore, it will be seen that the container or barrel is tapered downwardly and upwardly, so that its middle portion is of larger diameter than its upper end or its lower end. In this way, when the barrel or container is rotating at the desired speed, centrifugal force will cause the solution to hug the inner surface of the middle portion of the container, so that the machine is operable without closing the top of the container, if the quantity of the solution is not too great.

What I claim as my invention is:

1. The method of electroplating which comprises the subjecting of the articles to be plated to centrifugal force sufficient to maintain the articles in firm pressure contact with a cathode, while keeping the plating solution in ring form in the zone occupied by the articles being plated, with the

cathode forming the periphery of said ring, and with upwardly and downwardly tapering space maintained above and below said ring.

2. A method as specified in claim 1, the centrifugal force being developed by rotation of the cathode about a vertically disposed axis, whereby said pressure contact is uniform at all sides of said axis.

3. A method as specified in claim 1, involving the periodic tumbling of the articles away from the cathode, by gravity, and reassembling the articles in different positions against the cathode, whereby to periodically change the positions of the articles to insure uniform plating on the surfaces thereof.

4. A method as specified in claim 1, comprising the maintaining of an electric current of sufficient strength for chromium plating from the anode through the solution to the articles and cathode, while maintaining said pressure contact sufficiently to insure effective chromium plating.

Specification signed this 6th day of December, 1930.

WILLIAM E. BELKE.