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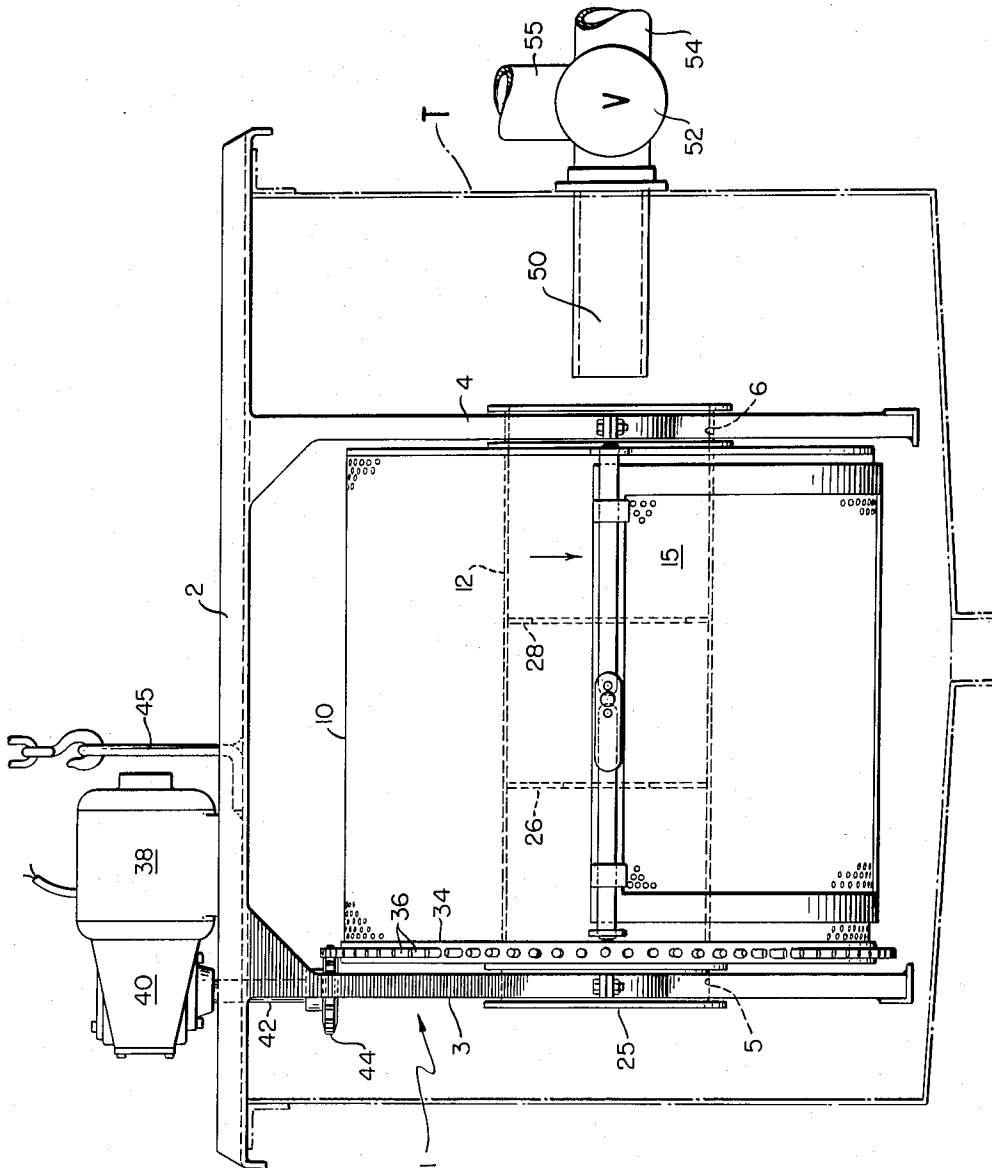
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2,748,549

METHOD OF COATING RELATIVELY SMALL METALLIC PARTS

Filed June 17, 1953

4 Sheets-Sheet 1



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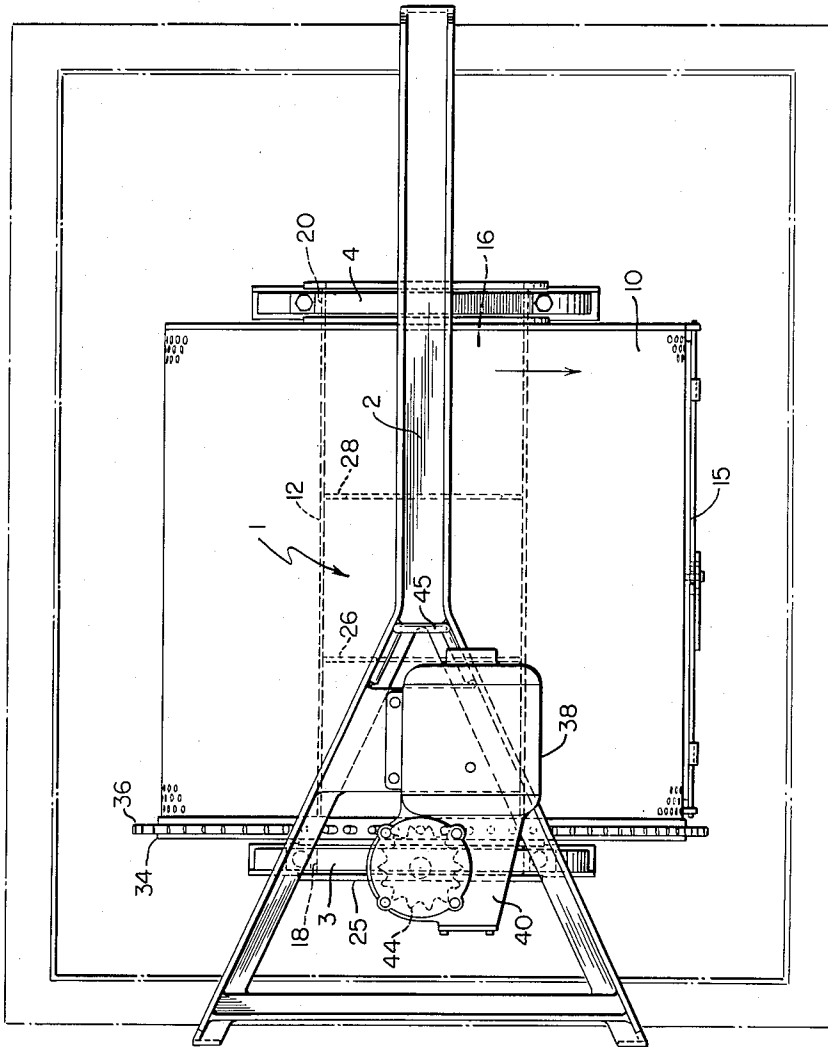


Fig. 2

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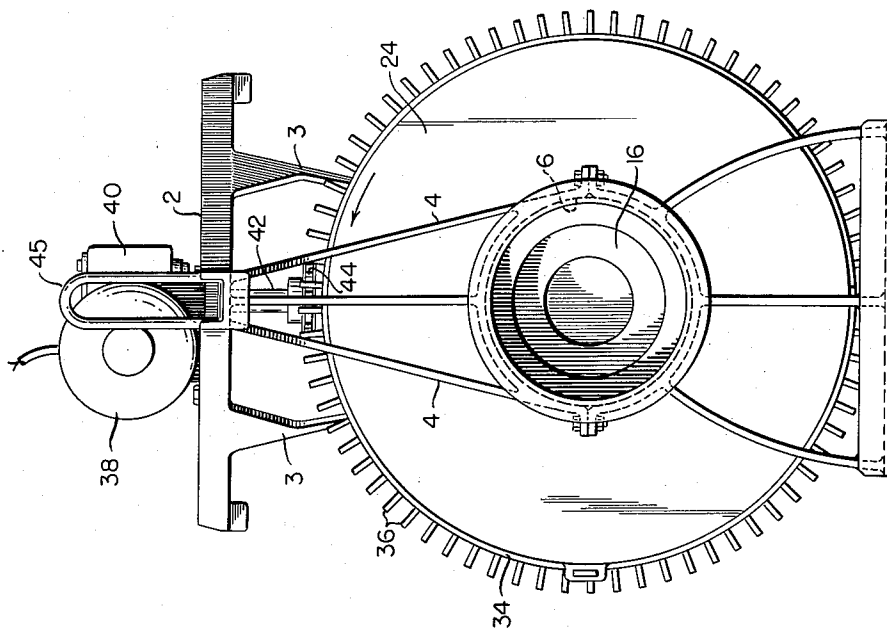


Fig. 4

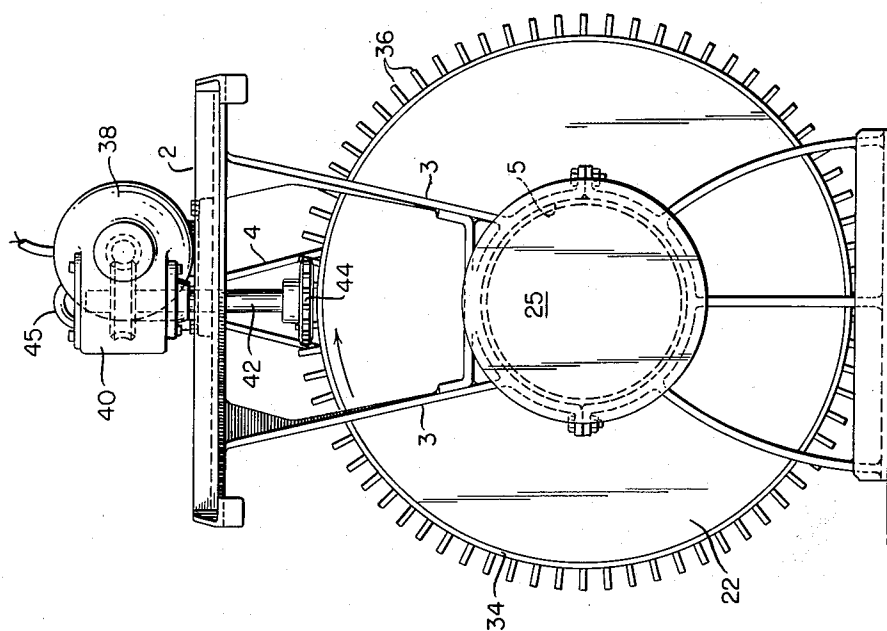


Fig. 3

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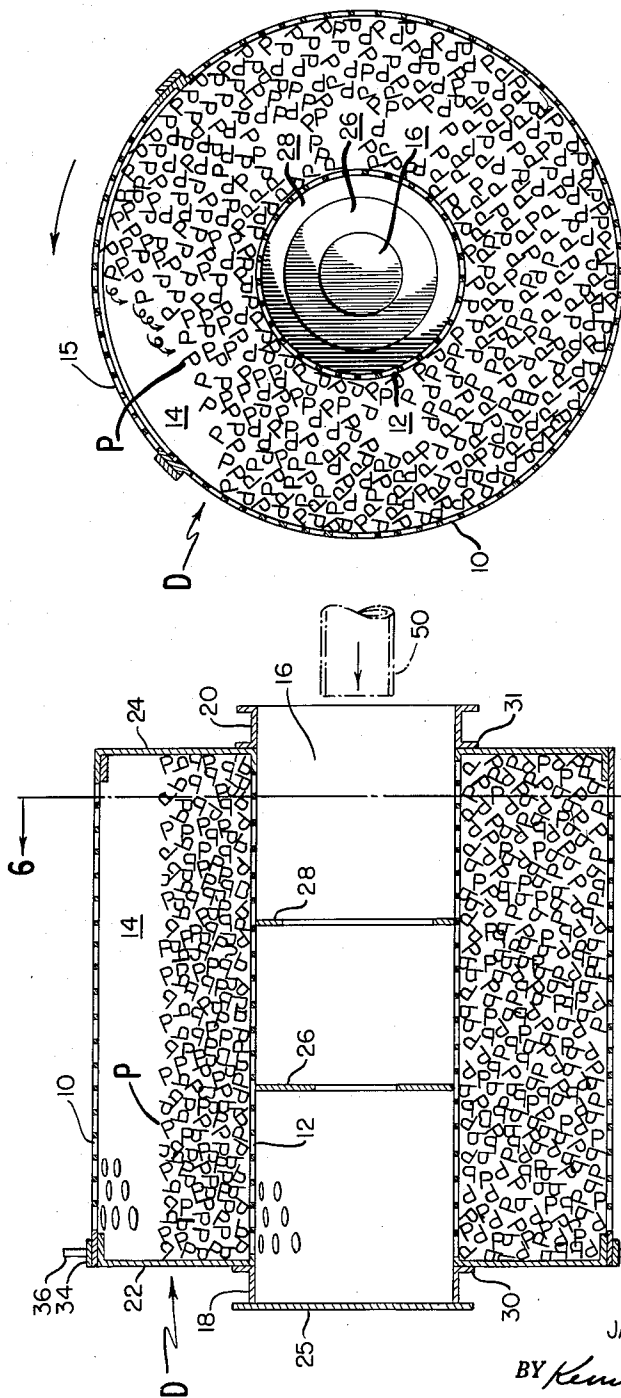


Fig. 6

Fig. 5

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METHOD OF COATING RELATIVELY SMALL METALLIC PARTS

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2 Claims. (Cl. 51—282)

In plating or otherwise treating metal parts to produce a protective coating, such as disclosed in United States Patent No. 2,295,063, granted September 8, 1942, and Patent No. 2,478,954, granted August 16, 1949, it is the practice to load the parts into a foraminous drum which is passed successively into the different tanks, e. g., cleaning, rinse, plating or chemical treatment, rinse, etc., after which the drum is passed into a hot air chamber where the parts are dried. In order to insure uniform treatment the drum is loaded to about two-thirds of its capacity so as to allow the parts to tumble over one another as the drum rotates, thereby exposing the entire surfaces of the individual parts to the treating fluid.

A difficulty inherent in such procedures is that the treating solution, rinse water and drying fluid must penetrate a depth or thickness approximately equal to the radius of the drum, and in the case of the treating solution, impoverishment is apt to take place before it encounters the innermost pieces under treatment with the result that such pieces do not receive the effective treatment as those closer to the foraminous wall of the drum; and the same is true with respect to the effectiveness of the rinsing and drying treatment.

Another outstanding objection is that the tumbling action often injures the treated surfaces, particularly the corners and other salient portions, with the result that the protective coating applied thereto is abraded or chipped off and such pieces do not stand up when subjected to the conventional salt-spray test or exposed to weathering.

Moreover, the operator is always handling an unbalanced load which is difficult to manipulate when the drum is placed in tanks which are not equipped with a mechanical drive; and when a mechanical drive is provided the unbalanced load requires a greater power consumption than if the load were balanced.

The principal object of the present invention is to provide an improved apparatus which not only overcomes the aforementioned objections, but which permits the entire sequence of operation from cleaning to drying to be carried out more easily and efficiently.

Further objects will be apparent from a consideration of the following description and the accompanying drawings, wherein:

Fig. 1 is a side elevation with parts shown in section of my improved apparatus;

Fig. 2 is a top plan view of the apparatus shown in Fig. 1;

Fig. 3 is a view of one end of the apparatus;

Fig. 4 is a view of the opposite end;

Fig. 5 is an axial section through the foraminous drum; and

Fig. 6 is a section on the line 6—6 of Fig. 5.

In accordance with the present invention I provide an apparatus comprising a frame member having spaced brackets or supporting members or legs formed with aligned openings or otherwise provided with parts defining bearing means, the construction of the frame member being such that it may be bodily lifted into and out of a

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processing tank, trough or catch basin. A drum, preferably in the form of a cylinder, is mounted between the legs of the frame member and comprises radially spaced, telescopically disposed inner and outer walls, both of which are preferably foraminous. The inner and outer walls define a generally annular compartment for receiving the parts to be treated and the outer wall member is provided with an access door or the like.

The opposite ends of the compartment are provided with closure plates and one end of the central chamber, defined by the inner wall, is preferably provided with a closure plate. The ends of the drum are provided with axially aligned parts or other suitable means defining supporting members mounted on or within the bearing means carried by the legs so as rotatably to support the drum. Where, as is preferred, the drum is to be rotated by a motor directly associated with the apparatus, one end of the drum may be provided with a suitable transmission member such as an annular or ring gear, and a motor may be mounted on the frame member together with a speed reducer having a driving connection with the annular gear.

Referring to the accompanying drawings which show what is now considered the preferred form of apparatus, the numeral 1 designates the supporting frame which comprises a Y-shaped horizontal member 2 the length of which is such as to span the distance across the opposite walls of a treating tank T, as shown in Figs. 1 and 2. Between its ends the member 1 carries spaced depending legs 3 and 4 each of which is formed with a circular opening or the like to provide bearing members 5 and 6 (Figs. 3 and 4).

Mounted between the legs 3 and 4 is a cylindrical drum D (Figs. 5 and 6) which comprises an outer foraminous metal wall 10 and an inner foraminous wall 12 which define an annular compartment 14 for receiving the parts P to be treated. The outer wall 10 is provided with an access door 15 which may be hinged, clamped or otherwise held in place so that it may be readily opened or removed in loading and unloading the compartment 14.

The inner wall 12 defines a central chamber 16 and its imperforate end portions project outwardly beyond the ends of the outer wall so as to provide supporting members 18 and 20 (Fig. 5) which are mounted in the bearings 5 and 6. Annular plates 22 and 24 fit about the projecting end portions of the inner member to provide closures for the compartment 14, and a closure plate 25 is welded or otherwise secured to one end of the inner wall 12 to close that end of the central chamber 16. Between the open and closed ends of the chamber 16 are spaced annular baffles 26 and 28 which are secured to the inner wall 12, the opening in the baffle 28 being larger than that of the baffle 26 so that when a treating fluid such as hot air is admitted to the chamber, as indicated in Fig. 5, it will be deflected outwardly and uniformly distributed throughout the compartment 14. Thrust rings 30 and 31 (Fig. 5) are carried by the supports 18 and 20 to minimize friction and strengthen the parts.

One end of the outer wall 10 carries a ring 34 from which project circumferentially spaced radial lugs or teeth 36 which provide, in effect, an annular or ring gear. Mounted on the divergent end of the horizontal frame member 2 just above the ring gear is an electric motor 38 having a back gear or speed reducer 40 with its take-off shaft 42 projecting downwardly in juxtaposition to the ring gear 34, 36. The lower end of the shaft 42 carries a sprocket 44 which engages the teeth 36, thereby rotating the drum when the motor 38 is turned on.

Since the apparatus is designed to be lifted from one tank to another, the frame is provided with a lifting loop

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45 welded or otherwise secured to the horizontal member 2 as close as possible to the vertical line defining the center of gravity, thus permitting easy manipulation of the apparatus.

In using the apparatus the compartment 14 is loaded 5 with the parts P to be treated to about 95% of capacity so that the parts P may be permitted a slight degree of freedom of movement, but insufficient to undergo appreciable tumbling action. When thus loaded the drum is substantially balanced and hence may be rotated with 10 a minimum power input.

After having loaded the drum and secured the door 15, the entire apparatus is bodily lifted by an overhead crane or the like and lowered into the first of a series of processing tanks T, as illustrated in Figs. 1 and 2. Where, as here shown, the horizontal member 2 is sufficient to span the top of the tank, the apparatus may be set on the tank and the crane disconnected. The motor is then started and the drum rotated in the treating solution within the tank, which may be a preliminary cleaning treatment, a plating or coating treatment, etc., after which the apparatus is lifted out and set in the next tank.

When the apparatus reaches the final rinsing tank or trough T (Fig. 1), the parts either may be rinsed in the usual manner and the rinse water is then drained from the tank, after which the parts are dried; or the apparatus may be positioned in a trough T or over a catch basin and a jet of rinse water directed into the chamber 16 while the drum D is being rotated, after which an air jet is directed into the chamber 16. To this end the tank or trough T is provided with a duct or nozzle 50 aligned with the open end of the central chamber 16, as shown in Figs. 1 and 5, the duct 50 being connected with a two-way valve 52 one branch of which is connected with a water line 54 and the other branch of which is connected to a duct 55 running to a blower or other source of air or treating fluid. While the drum D is rotating the valve 52 is first operated to admit rinse water to the chamber 16 and when the parts have been sufficiently rinsed, the valve 52 is operated so that a jet of air or treating fluid is directed into the chamber 16. Upon striking baffles 28 and 26, the jet of water or air, as the case may be, is deflected outwardly through the foraminous inner wall 12 and distributed throughout the compartment 14 with the result that the parts P are uniformly rinsed and dried in the minimum time. The apparatus is then conveyed to the unloading station or other destination for such further treatment as may be in order.

It will be noted that the provision of the central chamber 16 reduces the depth or thickness of the work under treatment and hence the travel of the treating, rinsing and

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drying fluids in contacting the innermost pieces is of the order of one third the travel when using drums of conventional design and construction. Accordingly, impoverishment of the treating solution is avoided and a more thorough and uniform rinsing and drying is achieved in a minimum time.

It will be further noted that during each treatment a balanced load is not only maintained, but also the undesirable tumbling action is avoided. However, the parts under treatment are permitted sufficient freedom of action to insure complete exposure of their surfaces to the treating solution or fluid. Hence, a more uniform treatment is achieved in a highly efficient manner.

While I have shown and described one desirable embodiment of the invention, it is to be understood that this disclosure is for the purpose of illustration and that various changes and modifications may be made without departing from the spirit and scope of the invention as set forth in the appended claims.

I claim:

1. In the method of treating a mass of relatively small metallic parts to produce a corrosion-resistant chemical coating, the steps which comprise disposing said parts in an annular chamber of a drum defined by concentric inner and outer foraminous walls, the parts being packed so that they have a slight degree of freedom of movement, but insufficient to undergo tumbling action, thereby insuring a balanced load, immersing said drum and parts into a chemical treating solution reactive with said parts to produce a corrosion-resistant coating, and rotating said drum so as to cause said treating solution to migrate through said foraminous walls and uniformly react with said parts.

2. The method set forth in claim 1 followed by the steps of rinsing said parts while rotating said drum and then directing a jet of air through the inner foraminous wall while rotating said drum, thereby to dry said parts.

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