May 4, 1937. W. RADECKER 2,079,037

APPARATUS FOR TREATING MATERIALS BY SALT QUENCHING OR ANNEALING BATHS OR GALVANIC BATHS

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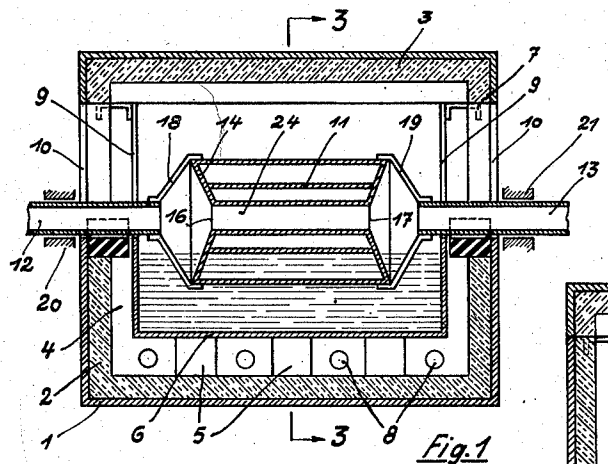


Fig.1

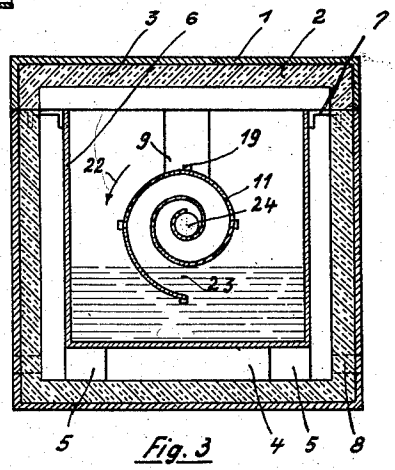


Fig.3

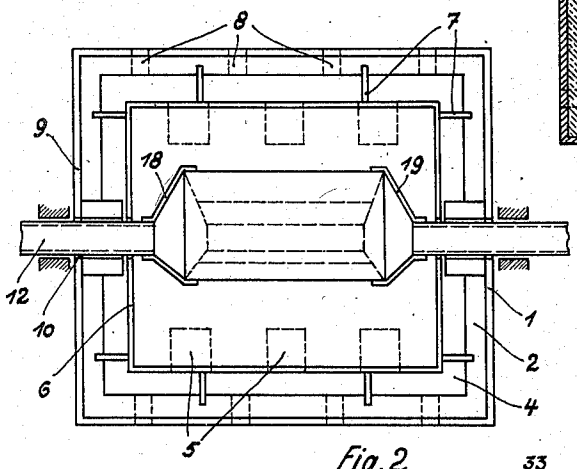


Fig.2

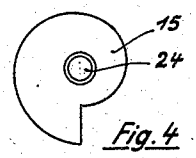


Fig.4

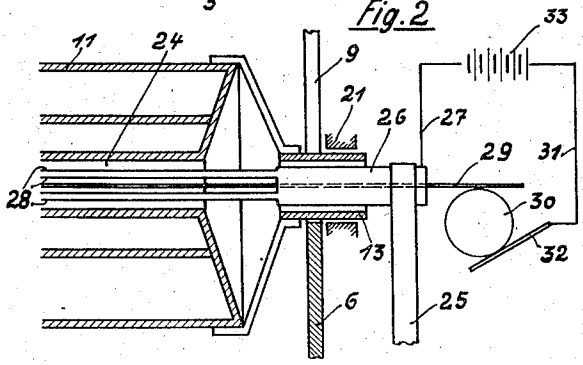


Fig.5

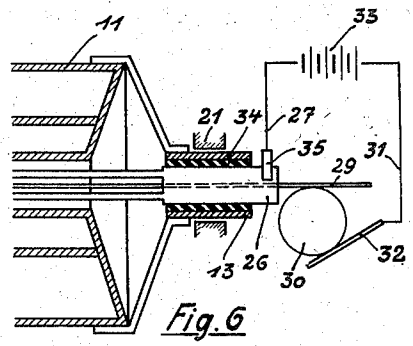


Fig.6

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APPARATUS FOR TREATING MATERIALS BY SALT QUENCHING OR ANNEALING BATHS OR GALVANIC BATHS

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8 Claims. (Cl. 204—5)

This invention relates to apparatus for the treatment of goods which are subjected to baths, that is to say when the goods are subjected to salt quenching or annealing baths or to galvanic baths.

It is an object of this invention to provide a rotatable member, such as a spiral drum, rotatably mounted in operative relation to a bath and in which the said rotatable spiral drum receives the liquid bath in its rotation and causes said bath to flow or move toward its axis or transverse center where it immerses the material or goods which is to be treated, it being part of the invention that provision is made for permitting the bath to escape at the ends of the spiral drum and return to the tank or receptacle from whence it was removed by the rotation of the said spiral drum.

It is furthermore an object of the invention to provide axial passages leading to and from the drum, in which goods or the commodity to be treated is moved longitudinally from end to end through the portion of the drum in which the said goods or material is subjected to the action of the fluid.

Spiral drums for raising and agitating liquids are known, but their use offers especial advantage in the present instance, for it renders it possible to pass the goods to be treated through the bathing or treating liquid without their having to be dipped into the bath by placing them in the bath receptacle from above and by thereafter removing them by lifting them therefrom. In the present invention, the fluid or bath liquid can be maintained uniformly at a height with respect to the diameter of the spiral drum and in such relation to the spiral drum that the space between the outer and next succeeding convolution of the spiral will be occupied by the bathing fluid, so that when the drum is turned, water in the space will be shipped or "scooped" and caused to flow toward the central zone of the spiral drum, which central zone is occupied by the material to be treated.

It is a still further object of this invention to provide means for mounting the spiral drum for rotary motion in the receptacle containing the bathing fluid, provision being also made for permitting the free passage of the goods into and out of the apparatus and through the approximate center of the rotatable spiral drum.

It is furthermore an object of this invention to provide means in association with a rotatable spiral drum for subjecting a wire, rod or the like to a galvanic bath, which will be contained within the receptacle heretofore referred to as the receptacle for the bathing fluid. Where the device is to be used for a galvanic bath, certain instrumentalities, to be hereinafter referred to, will be provided in association with the spiral drum, and other devices will be arranged externally thereof, for carrying the invention into practice, and provision is made to have an anode concentric with the spiral drum and to rotate the said anode or lodge it so that it will remain stationary.

With the foregoing and other objects in view, the invention consists in the details of construction, and in the arrangement and combination of parts to be hereinafter more fully set forth and claimed.

In describing the invention in detail, reference will be had to the accompanying drawing forming part of this application, wherein like characters denote corresponding parts in the several views, and in which—

Figure 1 illustrates a vertical sectional view of an apparatus embodying the invention;

Figure 2 illustrates a top plan view with the cover removed;

Figure 3 illustrates a sectional view of the apparatus on the line 3—3 of Fig. 1;

Figure 4 illustrates an end view of the rotatable spiral drum;

Figure 5 illustrates a vertical sectional view of an apparatus embodying a modification; and

Figure 6 illustrates a vertical sectional view of an apparatus embodying another modification.

In the drawing, 1 denotes the metal jacket of the heater which is preferably lined with vitreous material 2, or other heat-resisting material. The upper part or cover 3 of the outer structure has the same characteristics as that of the parts heretofore described. The foregoing structure forms a receptacle 4, stove-like in character, in that the interior is to be heated, for a purpose to be presently explained. Stationed on the bottom of the said receptacle are a plurality of fireproof bricks or blocks 5 which support the bath tank 6. The bath tank is held in spaced relation to the interior of the receptacle by braces 7, such as angle pieces or the like, and heat is delivered to the interior of the receptacle through the ports 8. The heating agent may consist of the usual torch flames, oil burners, gas burners or the like, discharging into the receptacle through the said ports, and the inventor does not wish to be limited with respect to the manner of heating the interior.

The end walls of the bath tank are slotted, as at 9, to permit the installation or removal of a spiral drum and the end walls of the receptacle may be likewise provided with slots 10 to produce a clearance for the trunnions of the said spiral drum. The spiral drum 11 is supported by tubular trunnions 12 and 13 and the said trunnions are connected to the heads 14 and 15 of the said spiral drum by ribs or bars 18 and 19, which ribs are attached to the trunnions 12

and 13, respectively. The heads 14 and 15 are preferably concave and have apertures 16 and 17 which register with the central portion of the drum and the tubular trunnions 12 and 13. The central portion of the drum is shorter than the peripheral portion thereof, and a passage 24 is produced at the central portion of the drum which is in alinement with the hollow trunnions 12 and 13. The trunnions are journaled in suitable bearings 20 and 21 and it is intended that the said spiral drum shall be rotated in the direction of the arrow 22 in Figure 3. In Figure 3 the fluid is shown as being sufficiently high to occupy the space between the end of the spiral drum and the convolution immediately inside said end so that the mouth 23 of the spiral drum is closed by the bath fluid and, of course, as the drum is rotated in the direction of the arrow, fluid will be shipped or scooped and confined between the convolutions of the drum and during the rotation of the drum it will flow toward the center thereof into the channel 24.

Material to be treated or subjected to the bath is introduced through one of the hollow trunnions and removed from the apparatus through the opposite hollow trunnion and it is immaterial in which direction the material is moved through the apparatus. As stated, the goods to be introduced or treated is drawn through the space 24 of the drum and it has a straight passage above the bath of liquid, and as the hollow trunnions 12 and 13 are also above the level of the liquid, they do not require a stuffing box or other means for preventing the escape of liquid from the tank 6.

When the apparatus is to be used for galvanizing, those parts of the apparatus which correspond to the constructions referred to in Figures 1, 2, and 3 are correspondingly numbered in Figure 5, but in adapting the said apparatus for subjecting material to a galvanic bath, the interior 24 of the spiral drum 11 is occupied by a tube 26, which tube extends outwardly beyond the bearing on which the spiral drum is mounted. The tube 26 acts as an anode and is connected to a suitable source of electricity 33 by the conductor 27. The tube 26 has longitudinal slots 28 in order that the electrolyte can enter the tube and flow out again into the tank 6. The material 29 to be galvanized is passed through the anode tube 26 and then into engagement with a roller 30 which connects it conductively to the other pole or conductor 31 through the medium of a brush contact 32. The tube 26 is supported by a strut 25, or any appropriate means may be provided for this purpose.

In the modified apparatus illustrated in Figure 6 the tube 26 is not supported by a strut 25, but is held in the hollow trunnion 13 by a sleeve 34 of insulating material, by this way rotating with the spiral drum 11. The tube 26 is connected with the conductor 27 by means of a sliding (brush) contact 35. Those parts of the apparatus which correspond to the construction referred to in Figure 5 are correspondingly numbered in Figure 6.

I claim:

1. An apparatus for subjecting materials to baths comprising a tank, a rotatably arranged and substantially horizontally positioned drum in said tank, said drum having a helical channel leading from the periphery thereof to an open ended axial channel therein for the circulation of bathing fluid therethrough said axial channel providing a passage through which materials are moved in a straight line axially of the drum for subjecting the said materials to the action of the bath and for returning the said bath to said tank.

2. An apparatus for subjecting materials to baths, a tank for containing a bath, a drum rotatable in a substantially horizontal plane in said tank and having a tubular central portion, tubular trunnions whose axes aline with the tubular central portion of the drum, through which trunnions and drum material is transferred for subjecting the material to the action of the bath as the drum is rotated and said drum being provided with a helical channel leading from the periphery thereof and communicating with said central portion for supplying bath fluid thereto.

3. In apparatus for subjecting materials to baths, a tank for containing a bath, a drum rotatably mounted therein, said drum being provided with a helical channel leading from the periphery thereof to an open ended axial channel therein, hollow trunnions extending beyond the tank, spaced means for connecting the hollow trunnions to the drum for permitting the bath fluid to pass from the drum to the tank, the said hollow trunnions being in alinement with said axial channel of said drum to permit material to pass through said drum and the said trunnions.

4. In an apparatus for subjecting materials to baths, a tank for containing a bath, a drum having an open ended axial passage therein, a helical channel leading from the periphery thereof to said passage for supplying bath fluid thereto, said drum having concave ends centrally apertured, hollow trunnions in alinement with the said apertures, means for connecting the trunnions to the said drum, said means having spaces therebetween for permitting the bath fluid escaping from the drum to return to the tank, the said hollow trunnions projecting beyond the tank, whereby the said trunnions act as passages through which material is transferred to and through the axial passage of said drum.

5. In an apparatus for subjecting materials to baths, a tank having an electrolyte, a drum rotatably mounted in the tank, the said drum having a central channel and a helical passage leading from the periphery of said drum to said channel for supplying electrolyte thereto, hollow trunnions connected to the said drum in alinement with the said central channel thereof, the said hollow trunnions projecting beyond the tank, an anode arranged in the channel of the drum, a conductor from the said anode to a pole of a source of electricity, a guide beyond said anode with which the material to be galvanized contacts in its travel, and a conductor of electricity in engagement with the guide connected with the other pole of the source of electricity.

6. Apparatus according to claim 5, characterized by having the anode comprising a tube having the same axis as the drum, which tube has openings for the passage of liquid.

7. Apparatus according to claim 5, and said anode being rotatably connected with said drum.

8. Apparatus according to claim 5, characterized by having the anode comprising a tube having the same axis as the drum, which tube has openings for the passage of liquid, and the further provision that said anode is rotatably connected with the drum.

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