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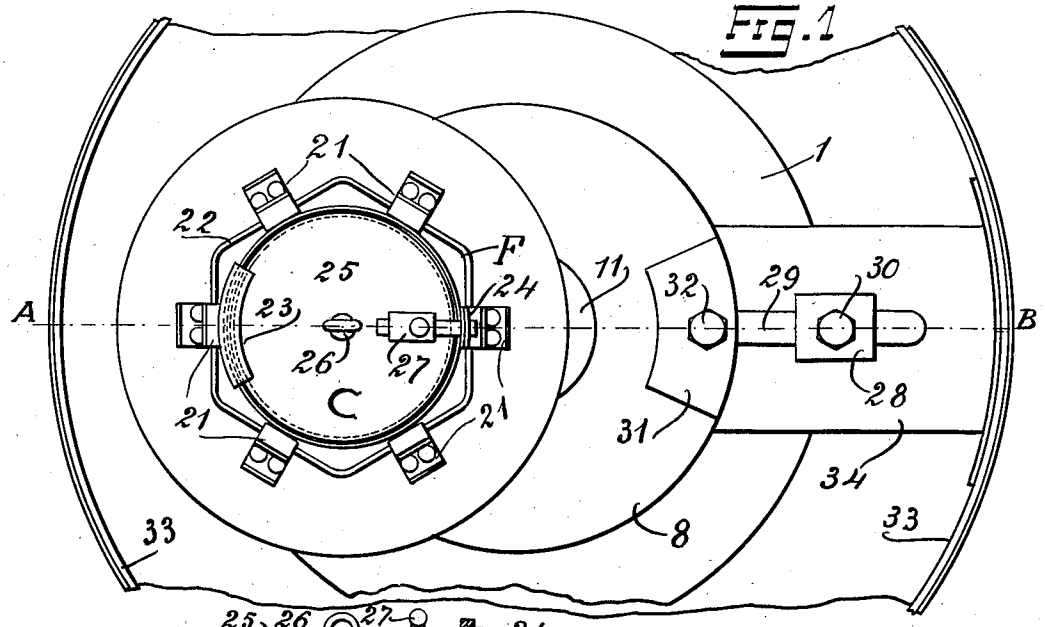
H. W. PLEISTER

CENTRIFUGAL COATING MACHINE

Filed April 10, 1922

Fig. 1



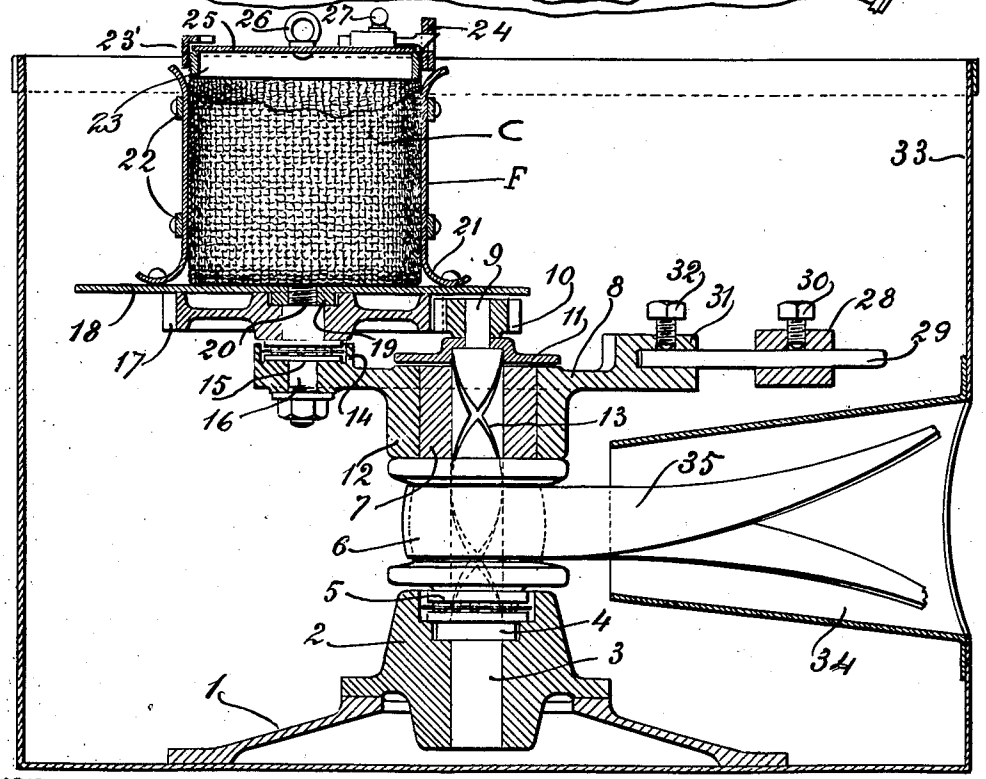


Fig. 2

Witnesses:

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UNITED STATES PATENT OFFICE.

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CENTRIFUGAL COATING MACHINE.

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This invention relates to rotary extractor apparatus by which galvanized metal articles, such as bolts, screws, nails, etc., are cleaned of any excess spelter immediately after being dipped and while they are still hot, and before the spelter begins to set, the surplus spelter being thrown off by centrifugal force, the articles retaining the thinnest desirable coating, uniformly coating the articles sufficiently to prevent oxidation.

Another advantage of my device is that due to the introduction of a secondary rotation galvanizing container, in which the goods are carried, the tendency for such articles after being dipped to cling together in an apparently inextricable mass is obviated, and the articles while in the extractor are kept in constant motion during the process of throwing off the excess spelter. By this means greater economy in the use of spelter is obtained inasmuch as only a desired minimum coating may be permitted to remain upon the articles, it having been found in practice that such minimum is sufficient to protect them against ordinary requirements.

In addition to these advantages my apparatus permits the container in which the articles are treated to be placed in operative position in the extractor with great facility and to be held with flexible rigidity during the centrifugal and whirling motion the container goes through, and then as quickly removed from the container. By this advantage of quick setting and fastening of the article container onto the machine, the transfer time of said articles from the spelter vat to full rotation is facilitated and the articles are treated while hot, with the spelter still in plastic condition, thereby insuring the desired removal of the surplus spelter and all dross from the said articles.

Another advantage is in the means whereby the weight of the articles in the container to be treated may be quickly and exactly balanced for a perfectly harmonized gyroscopic motion of the loaded container support or head on an even plane, insuring thereby maximum mechanical efficiency and balance.

An additional advantage in my apparatus lies in that it is placed in a housing that prevents the wide scattering of the thrown spelter and enables the easy recovery thereof.

Another distinct advantage in my device is that owing to the peculiar combined action of the primary and secondary rotation of the articles being treated, they are left with a brighter and smoother finish, as all particles of dross are thrown therefrom outwardly from the container, thereby leaving a thin, smooth and bright coating, without the customary broken and checked surface heretofore experienced, especially to be noted upon small articles such as roofing nails, etc.

A still further advantage of my apparatus consists in the fact that I protect the driving belt and gears of the machine entirely from the falling hot spelter.

Other advantages of the invention will appear as the description proceeds; and while herein details of the invention are described, the invention is not limited to these, since many and various changes may be made without departing from the scope of the invention as claimed.

In the accompanying drawing, Fig. 1 is a top plan view of my apparatus.

Fig. 2 is a sectional elevation of the apparatus on the line A—B of Fig. 1.

The apparatus consists of a suitable metal base 1; a support 2 is fastened to base 1 in which support 2 is fixedly mounted a vertical shaft 3 with a shoulder 4 resting in support 2 and supporting a thrust ball bearing 5, on which rests a driving pulley 6. Pulley 6 which turns freely around shaft 3 is provided with an upwardly extended hub 7 fixedly supporting a platform table on head 8.

On top of shaft 3, I provide a step 9 on which is fixedly mounted a pinion 10 resting on cap bearing 11 covering hub 7 of pulley 6 and hub 12 of head 8, and is provided with adequate oil holes (not shown) for oiling the rotating surfaces of hub 7 and pulley 6 around shaft 3 by way of oil grooves 13 provided for this purpose on shaft 3.

Radially on one side of head 8, I provide a boss 14, hollowed, to contain a thrust ball bearing 15 around stud 16. Stud 16 and ball bearing 15 support gear 17 fixedly mounted on stud 16 freely rotating in head 8. Gear 17 meshes with pinion 10. The ratio between the primary gear and secondary pinion is not a fixed ratio. It may

be of any value that may be found advisable and depends on the kind of articles to be treated, various compounding of gears and pinion ratios being always available. The ratio as shown in the drawing is slightly over 3 to 1, which means that for one complete revolution of gear 17 around its axis, that is around stud 16, it has to revolve three and a fraction times around pinion 10 and shaft 3.

A secondary table 18 has a hub 19 set in a recess of the upper hub of gear 17. Hub 19 is threaded and screwed tightly on step 20 of stud 16, thus making the table integral to the gear or vice versa, but detachable one from the other, which is more advisable than making them wholly as a unit. The same table serves for any gear when a change of ratio between gear and pinion is needed, which is advantageous in that if each gear had its own table, each table would also have to possess the means to hold a container C of the articles that are to be freed of the excess spelter.

For holding the container C during revolving operation the frame F is provided, this frame consisting of a circular series of resilient uprights 21 secured to the secondary table and surrounded by the two separate polygonal bands 22 of resilient metal, the uprights 21 and bands 22 forming a flexible polygonal member, in the present instance of hexagonal form, for receiving and supporting therein the container C.

The container C is of cylindrical form and comprises a basket receptacle portion of resilient material, such as strong wire mesh, the mesh openings of which are of a size to permit easy passage of liquid spelter therethrough from the basket portion, but are not large enough for passage of any of the articles being treated. The flexible receptacle portion is provided at its top with the rim band 23 to which is fixedly attached the angle-iron sector band 23′, and diametrically opposite to the sector band 23′, a latch socket such as 24 is secured to the rim band.

The container C is slidably received in the polygonal member formed by the uprights 21 and bands 22 and is frictionally retained therein, the outer sides of the flexible basket portion being in contact with the inner longitudinal faces of the uprights, the flexible basket thus being in contact with the flexible polygonal member, the intention being that during rotation of the container, as the tendency of the loose articles therein under centrifugal force is to impact against the interior of the container at the outermost points of the radii thereof remote from the axis of the container, the flexible sides of the container are thus forced against the uprights 21 which give slightly under the impact, but which, due to their resiliency and the spring action of adjacent angular portions of the bands 22 quickly return to their former positions, the contact of the flexible sides of the container with the flexible uprights thereby giving the articles a shaking movement whereby the articles therein are thrown apart and prevented from sticking or clinging together or "freezing", and the loose spelter is separated and flung from the sides of the basket portion.

The container C is covered by a removable cover 25 with a ring handle 26 in the center, and a spring latch bolt 27. Cover 25 is as easily and instantly placeable onto container C as it is removable. To place it I push it under the inwardly protruding member of the sector band 23, the latch bolt 27 above the latch socket 24, and then let it fall onto the circular metal band, the bolt automatically engaging into the socket thereby latching the cover 25 to the container C. To remove the cover 25 all that is required is to push the latch 27 out of the socket and raise the cover by its handle 26.

In apparatuses of this kind where only simple centrifugal motion is employed to free the galvanized articles of excess spelter, the article container can only be partially loaded, the contained articles would accumulate against the side of the container in a ring-like compact non-movable mass away from the center, which would prevent the easy outflow of the spelter which would then tend to cool and solidify the articles into lumps. This, as explained, is prevented by the combined secondary whirling motion of the article container and the primary centrifugal motion, and the shaking of the container.

By the combined primary and secondary motion, as noted, the articles to be treated, and which, as is understood, are coated with a rapidly setting or solidifying compound, are given a centrifugal action to discharge excess spelter, and the articles in addition are treated to a secondary axial rotation whereby they are whirled about the axis of their orbital centrifugal rotation, thereby constantly turning them over within the container and constantly breaking their capillary contact with one another until no more spelter is discharged therefrom, and thereafter immediately, and before the spelter has set, they are removed from the machine rapidly by reason of the quickly detachable means I have provided and are shaken out into a separate mass into a suitable cooling medium in the usual manner. By this action it will be seen that each individual article from the moment of placing into the extractor until they have been cooled is kept moving relatively to

its associated articles, so that there is no opportunity for "bunching" and the centrifugal energy acts upon the constantly changing positions and surfaces of the articles being treated.

In order to variably counterbalance the container C, relative to its different load contents, a metal weight 38 is provided, which is slidable on a rod 29, with a set screw 30 to adjustably fix it firmly at any required distance from the center of shaft 3 on said rod 29. Rod 29 is inserted on a segmental rim 31 provided radially across boss 14 on head 8, and held in firm position in rim 31 by set-screw 32. A further object of rim 31 is to counterbalance gear 17 and table 18, so that counterweight 28 has to counterbalance container C with its load for different loads, or when different articles in different quantities are to be treated.

My apparatus is enclosed by an open metal housing 33. The object of this housing is to prevent the wide scattering of the discharged spelter and to concentrate it into a relatively small space at the bottom of the housing from where it can be collected for remelting in the spelter vat. On one side of the housing I provide a sheet metal casing 34 extending under head 8 near the pulley 5 and wide enough to leave free passage to the driving belt 35. The object of this casing is not only to protect said belt from any thrown off hot spelter, but to prevent any spelter to be carried out of the housing by the belt, or to be carried with the belt between it and the pulley.

The operation of my apparatus is as follows:

Container C is carried, fully loaded, directly from the spelter vat and placed in the holder frame F, then counterbalanced by weight 28. This done, the motive power that drives the apparatus is applied to belt 35 which revolves the primary centrifugal head 8 around shaft 3. This forces gear 17 to revolve around pinion 10, which, being stationary, forces gear 17 to revolve about its orbital axis around shaft 3, with a speed depending on the ratio between gear and pinion.

The primary centrifugal force imparted to the whole mass in the container, discharges the excess hot, liquid spelter from articles in the container, which articles, by being subjected to the secondary rotary agitation and jarring of the container, leave free passage between them for the spelter to reach the side of the container and to flow out through the meshes thereof and to be thrown against the side of the housing.

It will be noticed that table 18 is fully extended over gear 17 and pinion 10, thereby preventing said gear and pinion from accumulation of, and clogging by, chilled spelter.

Having thus described my invention, I claim—

1. In apparatus for removing excess metal from metal coated articles, the combination with a table; of a support for said table eccentric thereof, means to impart a planetary motion to the table, a skeleton frame fixed concentrically on said table, and a reticulated article holder resistant to the heat of spelter removably held in said frame.

2. In apparatus for removing excess metal from metal coated articles, the combination with a table; of a support for said table eccentric thereof, means to impart a planetary motion to the table, said skeleton frame being yieldable to permit shifting of the article holder on the table and shaking of the contents thereof.

3. In apparatus for removing excess metal from metal coated articles, the combination with a table; of a support for said table eccentric thereof, means to impart a planetary motion to the table, a series of spaced spring arms extending upwardly from said table in concentric relation to the axis of the table, a polygonal spring band having its sides connected to said arms adjacent the upper ends of the arms, and a reticulated container removably held in said table within the series of arms.

4. In apparatus for removing excess metal from metal coated articles, the combination of a support, a head rotatably mounted on said support, a shaft rotatably mounted in said head eccentric to the support, planetary gearing connecting the shaft and support, means to rotate said head, a shiftable counterweight carried by said head diametrically opposite the shaft, a table fixed on said shaft, a skeleton frame fixed concentrically on said table, and a reticulated article holder removably mounted on said support.

5. An apparatus for removing molten excess metal from metal coated articles, said apparatus comprising an article container having openings in the sides thereof removably disposed in the apparatus; and means for imparting planetary motion to said container sufficient to cause centrifugal force to throw through said openings molten metal from metal coated articles in the container; said container and frame being resistant to the heat of molten metal and articles being galvanized and constructed to permit molten metal to pass through said openings.

6. An apparatus for removing molten excess metal from metal coated articles, said apparatus comprising a frame; an article container having openings in the sides thereof removably disposed in said frame; and means for imparting planetary motion to said frame sufficient to cause centrifugal force to throw through said openings molten zinc from zinc coated articles in the container; said container and frame being re-

sistant to the centrifugal force exerted by said metal articles, and resistant to the heat of molten zinc and articles being galvanized, and constructed to permit the molten zinc to pass through said openings.

7. An apparatus for removing molten excess metal from metal coated articles, said apparatus comprising an article container having openings in the sides thereof; a frame constructed for the substantially instantaneous reception of said container to prevent the freezing of the molten metal before throwing it off; and means for imparting planetary motion to said frame, with the container therein, sufficient to cause centrifugal force to throw through said openings molten metal from metal coated articles in the container; said container and frame being resistant to the heat of molten metal and articles being galvanized and constructed to permit molten metal to pass through said openings.

8. An apparatus for removing molten excess metal from metal coated articles, said apparatus comprising an article container having openings in the sides thereof; a frame constructed for the immediate reception of said container when the latter is lowered therein; means for imparting planetary motion to said frame, with the container and articles therein, sufficient to cause centrifugal force to throw through said openings molten metal from metal coated articles in the container; said container and frame being strong enough to resist the centrifugal force exerted by said metal articles and resistant to the heat of molten metal and articles being galvanized and constructed to permit molten metal to pass through said openings; a housing surrounding said carrier and open at the top to permit the lowering of said container with the frame; and a removable cover disposable over said housing.

9. An apparatus for removing molten excess metal from metal coated bolts and similar articles, said apparatus comprising an article container removably disposed in the apparatus and having openings in the sides thereof large enough to permit molten metal to pass through said openings and small enough to prevent the passage of any of said articles; and means for imparting planetary motion to said container sufficient to cause centrifugal force to throw through said openings molten metal from metal coated articles in the container; said container being strong enough to resist the centrifugal force exerted by said articles and resistant to the heat of molten metal and articles being galvanized.

10. An apparatus for removing excess metal from metal coated articles, said apparatus comprising a frame; a perforated container for the articles disposable in said frame; and means for imparting planetary motion to said frame whereby centrifugal force of oppositely varying directions relative to the frame is imparted to said articles, whereby the articles are thrown from side to side of the container; said frame including resilient means for absorbing the shocks caused by said articles when being thus thrown.

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