May 20, 1930. C. A. GIBLIN 1,759,450

METHOD AND APPARATUS FOR TREATING HOT GALVANIZED ARTICLES

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Fig. 1

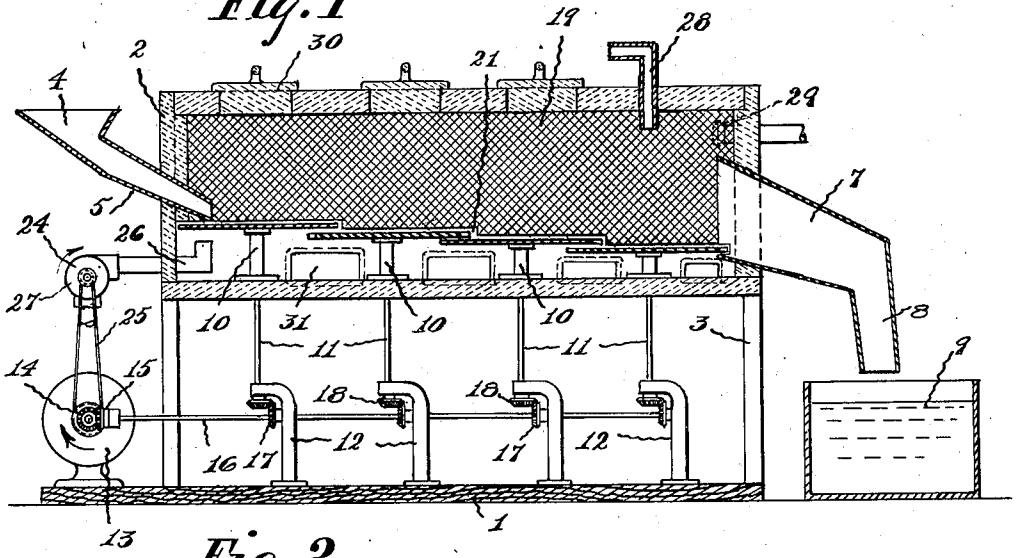


Fig. 2

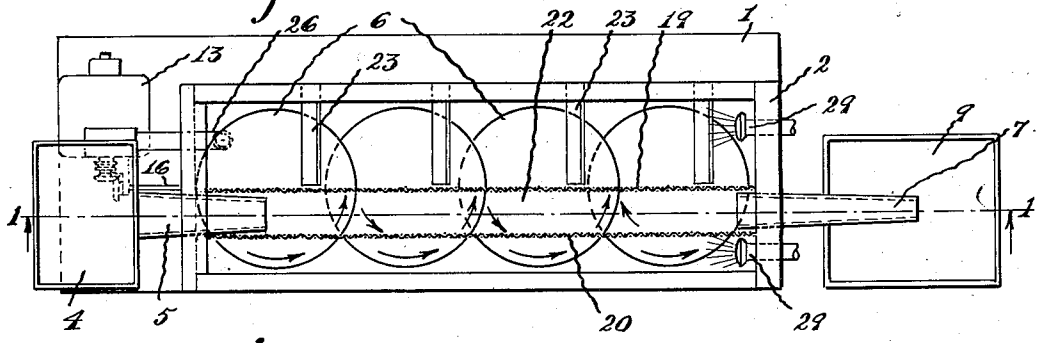
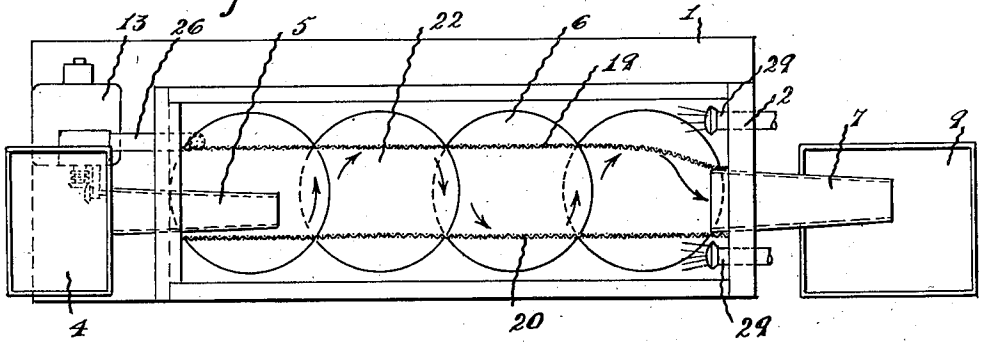


Fig. 3



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METHOD AND APPARATUS FOR TREATING HOT GALVANIZED ARTICLES

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The present invention relates to an improvement in methods and apparatus for removing excess coating from coated articles and in particular to a method and apparatus for removing excess spelter from hot-dipped, galvanized articles, such as screws, nuts, bolts and the like.

One of the main objects of my invention is to provide a method of, and apparatus for, subjecting metal coated articles to a series of centrifugally initiated impacts while travelling in a sinuous path, the travel being initiated and continued by subjecting the articles to a series of successive rotary zones, whereby the articles are left with a uniform bright and smooth coating thereon.

Another important object of the invention is to provide apparatus that will operate swiftly and efficiently to take advantage of the molten condition of the galvanzing coating on hot-dipped articles immediately after leaving the molten bath, whereby to rapidly remove the excess before the setting of the molten coating, thereby leaving the articles uniformly coated.

Another object of the invention is to provide a method of, and apparatus for, dumping hot-dipped galvanized objects, as they are removed from the molten zinc bath, into an enclosed running apparatus, and by reason of the means therein provided, cause them to travel through said apparatus and be subjected to a series of sequential impacts, such action being initiated by a plurality of successive rotating platforms, the impacts being produced against baffles.

Another object is to provide baffles which are of perforate metal, or of screen form, whereby to receive the impact of the articles being treated, and to permit the excess coating, thus removed, to pass out of the path of the treating mechanism, past the baffles, and to be segregated for later removal and reuse.

Another object of the invention is to provide an enclosed apparatus with means for supplying heat thereto and in which the temperature within the apparatus may be maintained at predetermined heats during treatment of the objects to delay the setting of zinc coating material.

Another object of the invention is to provide such enclosed apparatus with a plurality of successive rotating tables, and also with means to introduce therein either a neutral, reducing or non-oxidizing gas, and, further, to provide means to regulate the circulation of the gas through the chamber.

A further object is to provide an article impacting means wherein the apparatus provided for imparting motion to the articles being treated is generally inclined at an angle, thus to facilitate passing through of the articles and to prevent the piling up thereof within the apparatus.

Other objects of the invention are to improve generally the simplicity and efficiency of such devices and to provide a device or apparatus of this kind which is economical, durable and reliable in operation, and economical to manufacture.

The invention features for the accomplishment of these and other objects are shown herein in connection with an improved method and apparatus for removing excess spelter from hot-dipped galvanized objects which comprises dumping the articles, as they come from the molten zinc, through a receiving hopper, on to a series of rotating disks, enclosed in a chamber made of heat resisting material and having heating means therein, the disks being arranged in the chamber in an overlapping manner so that the objects may be transferred from one disk to the other with facility, a circulating gas system being associated with the chamber to cause either a neutral, reducing or non-oxidizing gas to cotinuously flow through the chamber thereby providing a suitable atmosphere for the zinc coated articles, perforated baffle plates arranged in the chamber normal to the planes of the disks acting as a barrier to the movement of articles from disk to disk, the articles in their travel from the first disk to the last being caused to continuously impact against the baffle plates thereby knocking off the excess metal on them which passes through the screen perforations, normally closed cleaning apertures in the walls and top of the

chamber to clean the baffle plate perforations and floor of the chamber of excess metal, scrapers being associated with the chamber and each disk face to maintain the disk faces clear of spelter, and an outlet hopper associated with the chamber between the ends of the baffle plates to guide the treated articles into a cooling tank, and a cooling tank for finally chilling and holding the treated articles.

Many of the features of the invention may be used without employing all of them, as some of those which are not essential may be omitted without departing from the spirit of the invention, though such omission may to a greater or less extent affect the equality of the result.

Moreover, the apparatus in this invention is capable of receiving various mechanical expressions without departing from the spirit of the invention itself; and, for the purpose of describing the invention, there is illustrated in the accompanying drawings the preferred form of apparatus in which drawings

Fig. 1 is a sectional view taken on the line 1—1, Fig. 2, looking in the direction of the arrows.

Fig. 2 is a plan view of the apparatus, the top of the heating chamber being removed.

Fig. 3 is a plan view of a modified form of apparatus similar to that shown in Fig. 2.

Referring to the drawings and in particular to Fig. 1, a base 1 of wood or other material supports thereon a chamber 2 made of fire brick or other heat resisting material, affixed to the base by uprights 3. It should be observed that the chamber 2 entirely encloses the apparatus therein, except for the openings to be described later.

A filling hopper 4 having a spout 5 projecting through an opening in the side wall of the chamber 2 receives the galvanized articles as soon as they are removed from the molten zinc pot (not shown). The spout 5 feeds the articles, which may be screws, bolts, nuts and the like, to the centrifugal disks 6 housed within the chamber 2.

An outlet hopper 7 is positioned in the chamber side wall, opposite to the above mentioned one, and directs the treated objects into a downwardly disposed spout 8 leading into a cooling tank 9, filled with water. Thus, the instant process is begun when the articles enter the hopper 4 and is ended when they fall into the cooling tank 9.

Within the chamber 2, the first disk is positioned beneath the spout 5, as shown, and is supported on an upright bearing 10 supported on the bottom of the chamber 2. A vertical disk driving shaft 11 is supported by the bottom bearing bracket 12 which is secured to the base 1 whereby the shaft 11 is vertically supported for rotation, the upper end of the shaft being affixed to the bottom of the disk 6, to cause it to be rotatably supported.

A driving motor 13 is mounted to the base 1 and by means of bevelled gears 14—15 drives a horizontal main shaft 16 supported in the upright bearings 12. It will be observed that there are three other disks 6 and driving structure therefor similar in structure to that described above for the first disk. Any number of centrifugal disks may be used, as desired.

The centrifugal disks 6 are arranged in stepped relation to each other, so that in their spaced operative positions they overlap one another in successively descending planes.

The motor driven shaft 16 has a number of bevel driving gears 17 thereon, each one of which meshes with a driven bevelled gear 18, attached to each disk shaft 11. Thus, the disks 6 are all driven from the same motor 13 and thus rotate in the same direction, as shown by the arrows in Fig. 2. The last disk 6 projects somewhat into the outlet hopper 7, thereby facilitating the passage of the treated articles from the chamber 2 to the cooler 9.

In order to effectively act as an impact member and remove the excess coating from the coated articles, I provide a perforated baffle plate or screen 19 in the chamber spaced along a line parallel to the plane passing through the centers of the disks and normal to the planes of said disks. The impact screen contacts with the end walls and top of the chamber 2, and its lower edge is stepped to lie in extremely close proximity to the faces of the disks 6. The lower edge of the impact screen 19 is accordingly cut away in a series of steps 21 in order to more perfectly and closely cooperate with the faces of the overlapped disks. The side and top edges of the screen are affixed to the chamber walls by any suitable attaching means. It should be observed that the opposite end edges of the screen adjoin the spout 5 and hopper 7 at the points where the latter are positioned within the chamber, thus forming a continuous side barrier from said spout to the hopper 7.

A second perforated baffle impact screen 20 spaced from and parallel to screen 19 is positioned in a manner similar to the latter but opposite thereto, and is also affixed at its ends to the members 5 and 7. Thus, the screens 19, 20, the planes of the disks 6 and the top of the chamber between the plates form a confining channel 22 for the articles as they are carried therethrough. It will be observed that the spout 5 leads directly into said channel 22, and that the mouth of the hopper 7 fits directly between the screens 19, 20.

A spelter scraper 23 is positioned in contact with the upper face of each disk 6, one end thereof being affixed to the chamber wall and the other in close proximity to the screen 19 and is located without the channel 22.

These scrapers 23 keep the disk faces clear of removed spelter and may be made adjustable to regulate the distance of the scrapers from the disk faces.

A blower 24 suitably supported adjacent the chamber 2, and operated by the motor 13 by a belt drive 25, furnishes a continuous supply of a gas to displace atmospheric air and which is either neutral, reducing or non-oxidizing in nature. The gas may be vaporized sal-ammoniac or some other well known substance, the purpose of which is to prevent oxidation of the zinc coating on the coated articles during treatment. The gas comes from a source, not shown, to a pipe 27, passes through the blower and is then ejected into the chamber through a pipe 26.

The gas diffuses throughout the chamber, passing through the baffle plate perforations with facility, and thus furnishes the non-oxidizing atmosphere within the apparatus. To remove the gas, a gas discharge pipe 28 is mounted in the top of the chamber 2 and projects into the interior thereof.

To maintain a predetermined degree of temperature in the chamber, a pair of gas or oil burner nozzles 29, fuel fed by means not shown, project into the interior thereof, thereby furnishing any degree of heat that may be desired.

Provision is made to clean the screens or baffles 19, 20 by forming closable apertures 27ª in the top of the chamber 2. These apertures or clean outs are normally closed by covers 30 during the operation of the disks. Additional closable clean out openings 31, also closed during the operation of the apparatus, are provided along the side wall of the chamber 2, between the disks and the chamber bottom. The accumulated thrown off excess metal which passes the screens may be removed from the bottom of the chamber through these holes 31.

The process consists in dumping the objects, as they come from the zinc pot, through hopper 4 onto the disks 6. The disks rotate in the same direction and are driven by the motor 13, at a speed sufficient to impart centrifugal force and cause the articles to fly off the disks tangentially and forcefully strike against the perforated baffle screens 19, 20. Being confined by the screens the articles pass rapidly from disk to disk in their rebound from the screens, leaving their surplus metal to pass through said screens.

Thus the articles rebound from the screens to the succeeding disks 6, and are intermediately thrown from disk to screen until the articles have reached the mouth of the hopper 7, when they pass therein, and down the spout 8 into the cooling tank 9.

Thus the articles are passed through a series of impacts initiated and continued by an overlapping stepped series of moving disks all rotating in the same direction. Each change of direction of an article while in transit is accompanied by an impact against an impact screen and a consequent removal of excess spelter. When the objects are removed from the bath 9, they are found to have lustrous uniform and smooth coatings.

In Fig. 3, I have shown a modified form of apparatus. Since most of the elements are similar, they will be designated by the same numerals. In this form, the impact screens 19 and 20 are placed equidistantly from the line connecting the centers of the disks 6. The ends of the screens on one side adjoin the mouth of the inlet hopper 4, but the opposite ends are arranged to converge to the discharge outlet 7. This arrangement provides a wider channel 22, thus slightly increasing the impact of the articles from disk to disk.

Each disk 6, in this modification, is rotated in a direction opposite to the one adjoining it. This is accomplished by merely mesehing every second gear 17 on the main shaft 16 on the side opposite to that shown in Fig. 2 in reversed drive connection with the main shaft 16. This arrangement will result in the rotation of the disks in the directions shown by the arrows in Fig. 3 and with alternate impact action.

This modification operates in other respects in the same manner as described above for Fig. 2.

The foregoing detailed description has been given for clearness of understanding and hence no unnecessary limitation should be understood. Further, the appended claims should be construed as broadly as permissible in view of the prior art, since many and various changes may be made without departing from the scope of the invention as defined in the broader claims.

I claim:

1. A method of the class described which consists in subjecting a coated article to intermittent impacts in a confined channel, and moving said article in an irregular path through said channel whereby excess coating on said object is removed

2. A method of the class described which consists in subjecting metal coated articles to a series of impacts and moving said articles in an irregular path in a general direction normal to the means producing the impact.

3. A method of the class described which consists in subjecting metal coated articles to a series of intermittent movements in a confined channel and simultaneously subjecting said articles to impacts whereby excess coating thereon is removed

4. A method of the class described which consists in subjecting metal coated articles to a series of movements in an immovable, confined channel and simultaneously subjecting said articles to a series of impacts wholly

within said channel whereby excess coating on said object is removed.

5. A method of the class described which consists in subjecting metal coated articles to a series of movements in an immovable, elongated, confined channel and simultaneously subjecting said articles to a series of impacts wholly within said channel whereby excess coating on said objects is removed.

6. In an apparatus of the class described, a series of overlapping rotating disks, means for feeding metal coated articles on to said disks thereby to cause said articles to intermittently travel from disk to disk, impact screens associated with said disks adapted to limit the lateral movement of said articles over said disks, the contact of said articles with said impact screens removing excess coating from said objects, and passing the removed excess material out of the path of movement of said articles.

7. In an apparatus of the class described, a chamber, a series of progressive, overlapping rotating disks therein, a pair of spaced channel-forming impact screens associated with each of said disks, said screens being also spaced from the planes of the disks, means to feed metal coated articles on to said disks and between said screens, means associated with said chamber to maintain a non-oxidizing atmosphere therein, said rotating disks being adapted to centrifugally move said articles into impacting contact with said screens whereby excess coating on said objects is removed.

8. In an apparatus of the class described, a chamber, heating means associated therewith, a progressive series of rotating disks in said chamber, means to actuate said disks, means associated with said chamber to maintain a non-oxidizing atmosphere therein, impact screens in said chamber associated with said disks, means to feed metal coated articles into said chamber on to said disks and between said screens, said disks throwing said articles into impact with said screens thereby removing excess coating from said articles, and scraper means associated with said chamber and in contact with said disks to maintain the same free of metal thereon during rotation thereof.

9. In an apparatus of the class described, a chamber, a series of progressive overlapping oppositely rotating disks therein, a pair of spaced perforated impact plates in contact with the end walls of said chamber, said plates being vertical to the planes of disks, means to feed hot-dipped metal coated articles to said disks and between said plates, said members being adapted to throw said articles against said plates, contact of said articles and plates jarring the former and thereby removing excess metal coating therefrom, and means to direct said objects into a cooling tank after passage through said apparatus.

10. In an apparatus of the class described, a chamber, means to move metal coated articles in a progressive series of intermittent paths through said chamber, means in said chamber to limit lateral movement of said articles as they travel through said series of paths and simultaneously jar said articles by impact, thereby removing excess metal coating thereon, means in said chamber to keep said articles moving means free of metal coating, and means providing closable cleaning apertures associated with said chamber whereby to remove thrown metal from said limiting means and the interior of said chamber.

11. In an apparatus of the class described, a chamber made of heat resisting material, a hopper at one end adapted to feed hot-dipped galvanized articles into said chamber, an outlet hopper at the opposite end to deliver said articles to a cooling tank, a cooling tank, a motor, a progressive series of overlapping disks in said chamber, the first of said disks adjoining said feed hopper, the last disk adjoining said outlet hopper, means associated with said motor and disks to rotate said disks in opposite directions, a pair of spaced perforated plates associated with said disks and the end walls of said chamber, the planes of said plates being vertical to the planes of said disks, said disks being adapted to move said articles into impacting contact with said plates thereby jarring said objects and removing excess coating therefrom, and passing the removed, excess coating out of the plane of movement of said articles.

12. An apparatus of the class described comprising a chamber, a series of moving members therein, impact means associated with said series of members and means for feeding metal coated articles on to said series of members, whereby said articles are repeatedly moved against said impact means and excess coating on said articles thereby removed.

13. In an apparatus of the class described a series of rotating members, means for feeding coated articles to said series and means associated with said series of members, adapted to limit the lateral movement of said articles as they are being projected from the surface of said members, the contact of said articles with said limiting means removing excess coating from said articles.

Signed at Garwood in the county of Union and State of New Jersey this 4th day of Sept., A. D. 1928.

CHARLES A. GIBLIN.