March 22, 1932. L. C. ZIMMERMAN 1,850,576

APPARATUS USED IN THE PROCESS OF HEAT TREATING METALLIC ARTICLES

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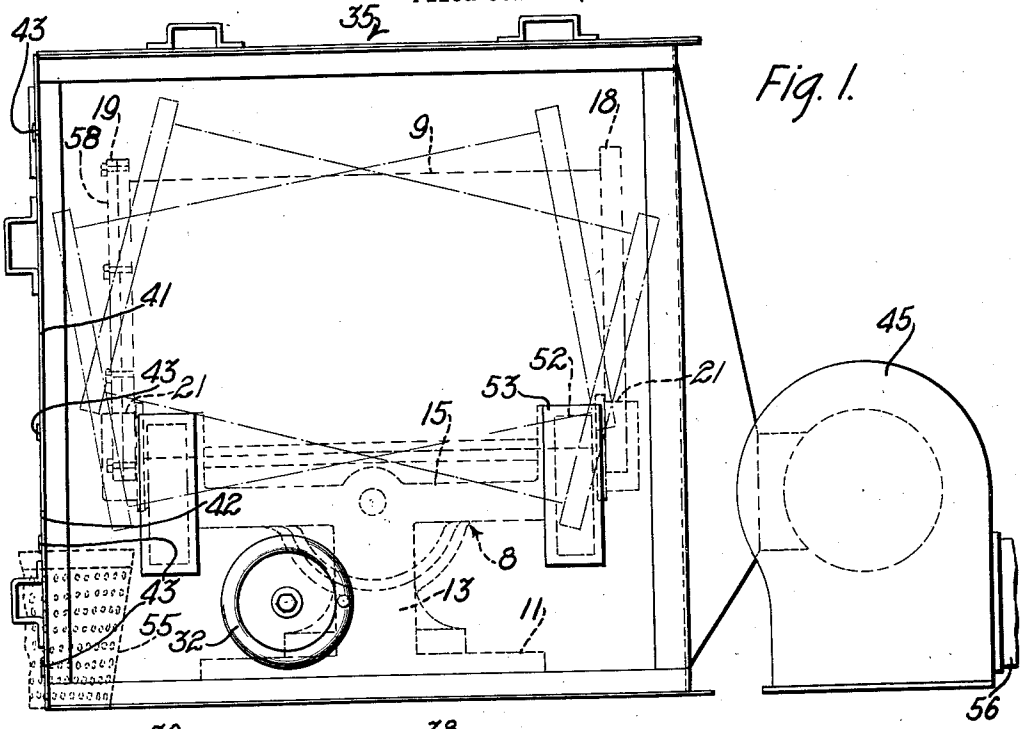



Fig. 1.

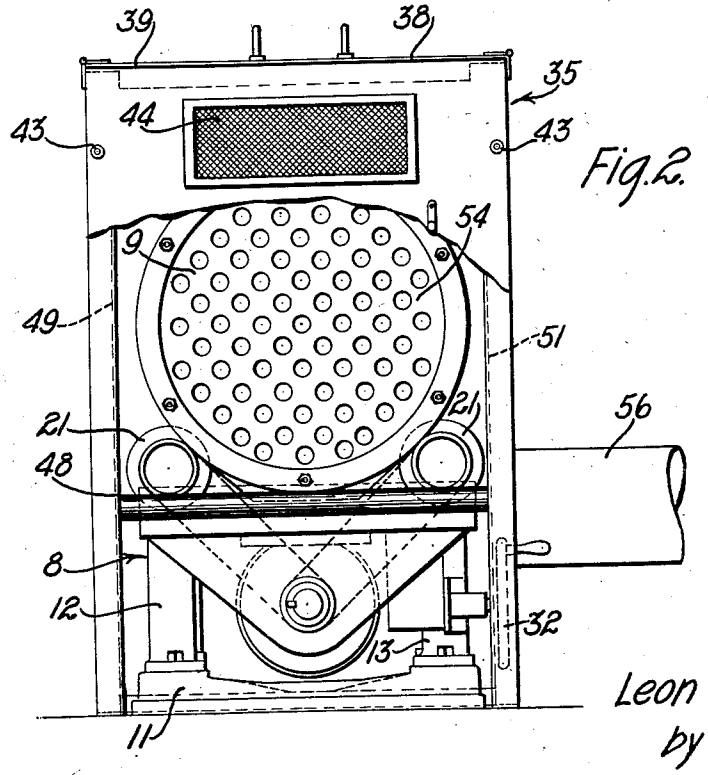



Fig. 2.

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Fig. 3.

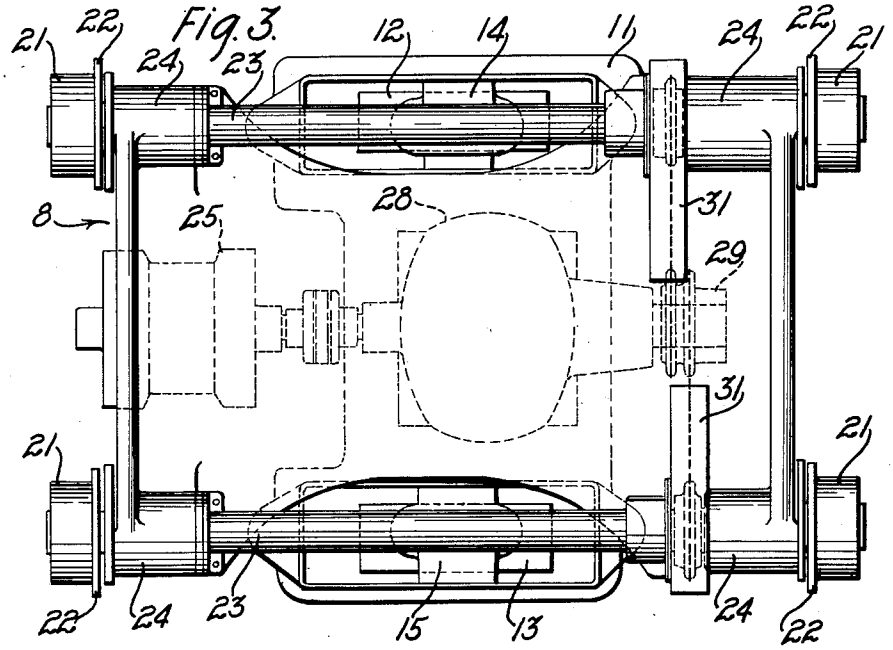
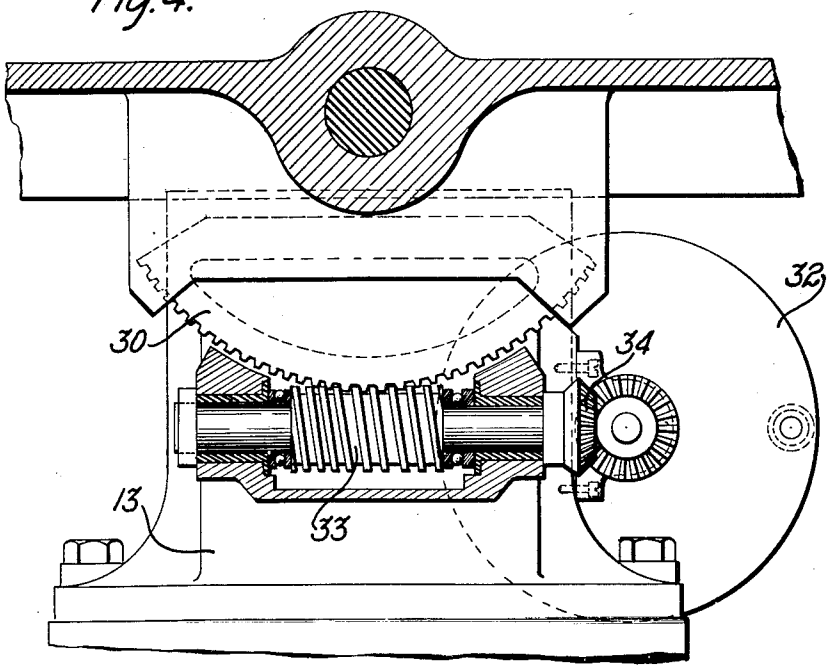



Fig. 4.




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Patented Mar. 22, 1932 1,850,576

# UNITED STATES PATENT OFFICE

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## APPARATUS USED IN THE PROCESS OF HEAT TREATING METALLIC ARTICLES

Application filed June 30, 1926. Serial No. 119,515.

This invention relates to apparatus used in the process of heat treating metallic articles, and more particularly to apparatus employed in the process of sherardizing or dry galvanizing of metallic articles.

An object of the invention is to provide apparatus which will reduce the time of the temperature cycle required for the treating process and thereby increase the output and reduce the expense of the process and which will facilitate the handling of the articles to be treated and the materials for treating them during the treating process.

In carrying out the sherardizing process it is the practice in many instances to place the articles, together with a charge of zinc dust containing a small amount of oxide of zinc in an air-tight drum, which is then placed in a furnace and rotated while being heated. When the temperature has reached a definite value the zinc vaporizes and the rotation of the drum allows the vapor to come in contact with all of the surfaces of the articles covering them with an even coating of zinc which partly alloys with the iron or steel of the articles to form the desired rust proof surface.

The invention contemplates the provision of apparatus for handling the drum and its charge after its removal from the furnace and comprises apparatus for cooling the drum and guarding against dust hazards, for separating the articles from the zinc dust and unloading the articles from the drum into suitable containers.

It is believed that a better understanding of the invention may be had by reference to the following description taken in connection with the accompanying drawings, in which

Fig. 1 is a side elevation showing a drum on a tiltable cradle encased in a ventilating hood;

Fig. 2 is a front elevation of the apparatus shown in Fig. 1 with parts broken away to show the interior of the hood;

Fig. 3 is a plan view of the drum rotating mechanism, and

Fig. 4 is a detail cross sectional view of the cradle tilting mechanism.

Referring to the drawings in which similar parts are designated by the same characters in the several views, a cradle 8 is provided for rotating and tilting a drum 9 which contains the articles being sherardized and the sherardizing charge. The cradle 8 rests upon a base 11 from which rise two standards 12 and 13 carrying trunnion bearings 14 and 15, respectively, about which the cradle is tilted. The drum is provided with a flange 18 at its base and a similar flange 19 at its top, which are spaced so as to rest upon rollers 21—21 when the drum is placed upon the cradle. The rollers are each provided with a flange 22 to cooperate with the flanges on the drum in keeping the drum on the cradle when it is tilted. The rollers 21—21 are mounted on a pair of parallel shafts 23—23 which are journaled in suitable bearings 24—24 on the cradle. The rollers may be rotated by a driving mechanism consisting of a motor 25 and a speed reducing device 28 of any suitable type whose ratio is such as to cause a rotation of the drum of one revolution per minute. The movement of the drive pulley 29 of the reducing mechanism is communicated to the shafts 23 through the medium of a pair of chains 31.

The tilting of the cradle is accomplished through a segmental gear 30 which is fixed to the cradle adjacent the trunnion bearing 15. When a hand wheel 32 is turned the movement is transmitted to a worm wheel 33 engaging the segmental gear 30 through a set of bevel gears 34—34 causing a tilting of the cradle. The angular dimensions of the segmental gear are such as to permit the cradle to tilt 30° on either side of the horizontal position. The cradle is tilted backward to permit substitution of a perforated head 54 for an air tight head 58 of the drum without spilling the contents of the drum.

Encasing the cradle and the drum is a ventilating hood designated generally by 35. The top of the hood is provided with two hinged doors 38 and 39 and the front is provided with doors 41 and 42 which are held in place by thumb screws 43. A bar 48 is located at the junction of the front doors and serves to support the side walls 49 and 51 of the hood. The door 41 of the hood is pro-

vided with a screened opening 44 for admitting cool air which is drawn over the drum by a fan 45 and led from the room through a tube 56. The wall 51 of the hood is provided with two apertures 52—52 covered by doors 53—53 through which the interior of the hood may be viewed without opening the large doors.

In the process of sherardizing, the articles to be treated are placed in a drum and a charge of zinc dust containing a small amount of zinc oxide is added. The drum is then hermetically sealed and placed in a furnace where it is rotated while being heated. When the temperature reaches a definite value the zinc dust vaporizes and the resulting vapor is brought in contact with all of the surfaces of the articles by the rotation of the drum. After the articles have been subjected to the zinc vapors a sufficient length of time to produce the desired coating, the drum is removed from the furnace and cooled to reduce the zinc vapors which have not been consumed to the original solid state to be used again in subsequent treatments.

When a drum is removed from the sherardizing furnace, the top and front doors of the hood 35 are opened and the drum is placed on the cradle 8 by means of a hoist. The doors are then closed and the drum is slowly revolved about its horizontal axis while a large volume of cool air is drawn thereover by the fan 45. The rotation of the drum insures a uniform cooling by reason of which the cooling operation may progress quite rapidly without danger of cracking the parts due to strains from sudden thermal changes such as may take place if the cooling is not uniform. After the drum has been sufficiently cooled it is tilted backward and the perforated head 54 is substituted for the air tight head 58 of the drum. The drum is then tilted forward and rotated to sift the zinc dust into a pan (not shown) to be used again. Instead of substituting a perforated head for the separation of the zinc dust and the articles it is expedient in some cases to merely loosen the bolts holding the air tight head 58 on the drum and allow the dust to escape between the head and the drum. During the entire sifting or separating operation the doors of the hood are closed to prevent the escape of zinc dust into the room. When the separating operation is complete, which may be ascertained by looking through the aperture 52, a basket 55 is substituted for the pan and the articles are unloaded into baskets by a proper tilting of the drum.

It will be understood that the embodiment of the invention herein described and illustrated is merely a convenient and useful form of the invention, which is capable of many other modifications without departing from the spirit and scope of the invention.

What is claimed is:

1. In an apparatus for handling material in a sherardizing process, a tiltable support, a drum supported thereby for containing the articles being sherardized, a hood encasing the drum, means for rotating the drum, and means for drawing cool air over the drum while the latter is rotated to cause a uniform cooling thereof.

2. In an apparatus for handling material in a sherardizing process, a hood encasing a drum for containing articles being sherardized, said hood comprising fixed side walls, removable doors on top and in front to admit the drum, one of the doors having an opening formed therein, and means to cause air to pass through the opening to ventilate the hood and to cool the drum.

3. In an apparatus for handling material in a sherardizing process, a drum for containing the articles being sherardized and a charge of zinc dust and having a portion thereof separable to provide an aperture, a cradle for removably and rotatably mounting the drum, means for tilting the drum, and means for rotating the drum in its tilted position to discharge the zinc dust from the drum.

4. In an apparatus for handling material in a sherardizing process, a drum for containing the articles being sherardized and a charge of zinc dust having a portion thereof separable to provide an aperture, said drum having a flange at either end, a cradle for removably and rotatably mounting the drum having rollers provided with flanges to cooperate with the flanges of the drum to prevent longitudinal displacement of the drum on the cradle, means for tilting the cradle, and means for rotating the rollers while the cradle is in the tilted position to separate the zinc dust from the articles.

5. In an apparatus for handling material in a sherardizing process, a drum for containing the articles being sherardized provided with a flange at either end and having a removable head, a cradle for removably mounting the drum having rollers provided with flanges to cooperate with the flanges of the drum to prevent longitudinal displacement of the drum on the cradle, and means for tilting the drum along its longitudinal axis to unload the articles.

6. In an apparatus for handling material in a sherardizing process, a tiltable cradle, a drum removably positioned upon the cradle, a hood surrounding the cradle and the drum, and means for passing air through the hood to cool the drum.

7. In an apparatus for handling material in a sherardizing process, a tiltable cradle having a plurality of rollers mounted thereon, means for positively rotating the rollers, a drum for containing articles removably positioned upon the rollers for rotation there-

by, a hood surrounding the above described members, and means for passing air through the hood around the drum to cool the drum and its contents while the drum is rotated by the rollers.

8. In an apparatus for handling material in a sherardizing process, a tiltable support, a drum removably positioned thereon for confining zinc dust and articles which have been heated to vaporize the zinc, a hood surrounding the drum, means for rotating the drum, and means for circulating air over all surfaces of the rotating drum to uniformly cool the drum and the articles and quickly condense the vaporized zinc before the drum is opened.

In witness whereof, I hereunto subscribe my name this 14th day of June, A. D. 1926.

LEON COLUMBUS ZIMMERMAN.