Jan. 27, 1942. H. W. PLEISTER 2,271,094

METHOD AND APPARATUS FOR COATING MATERIALS AND ARTICLES

Filed June 22, 1940 3 Sheets-Sheet 1

Fig 1

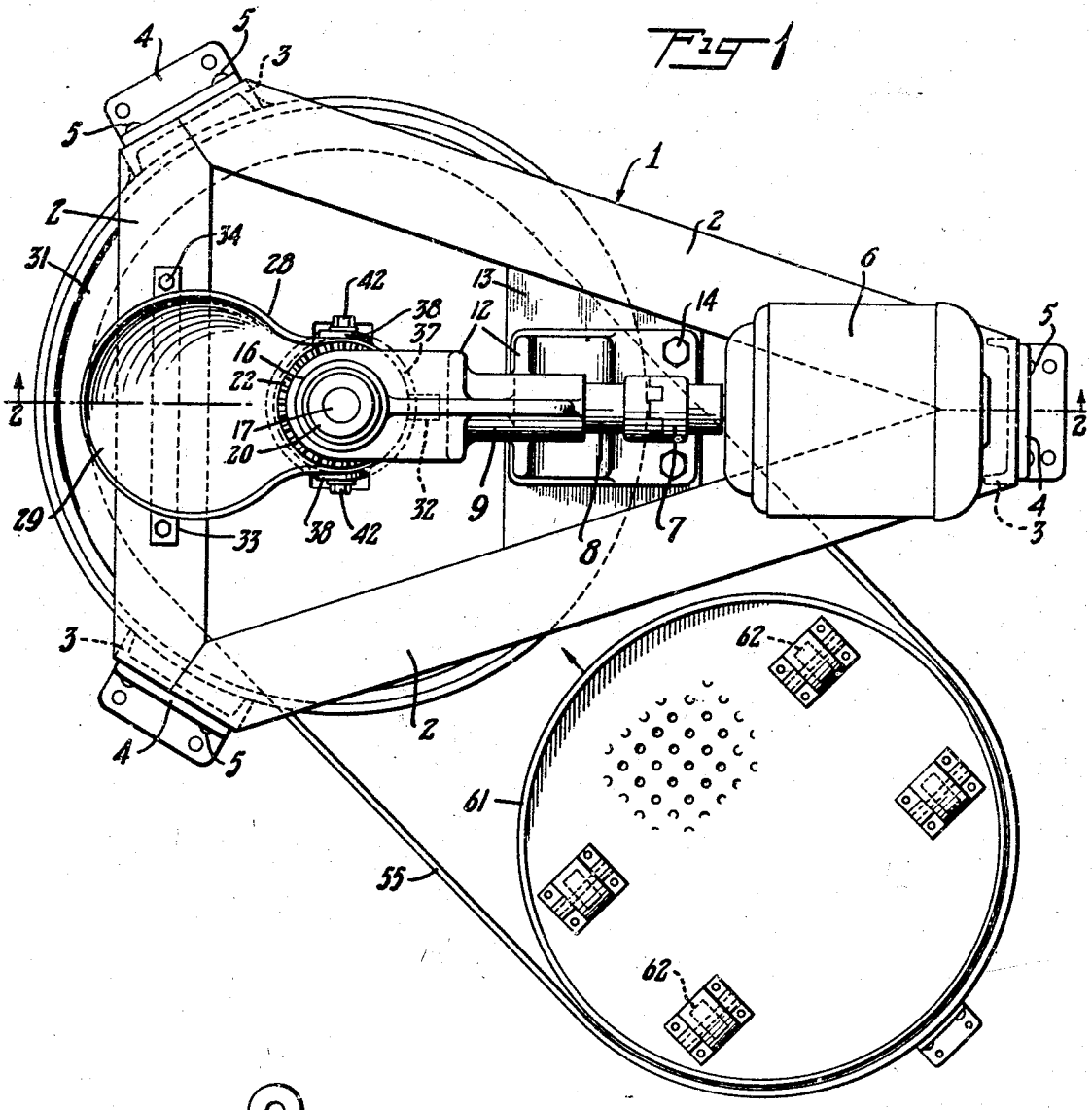
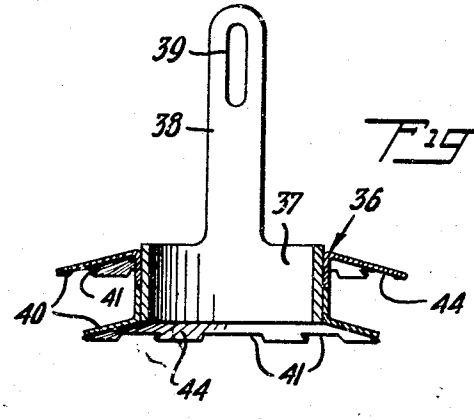


Fig 5



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Fig. 2

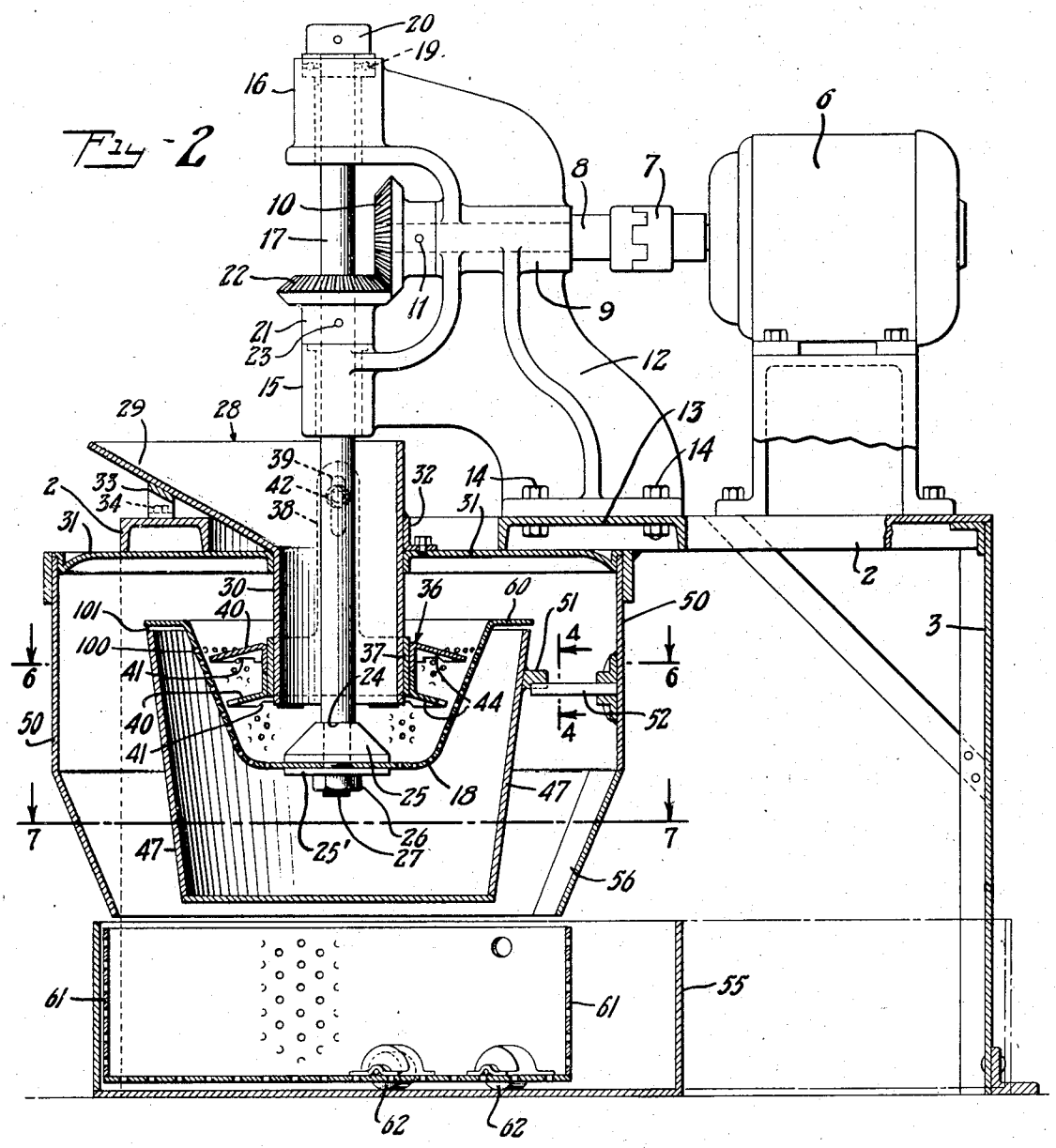
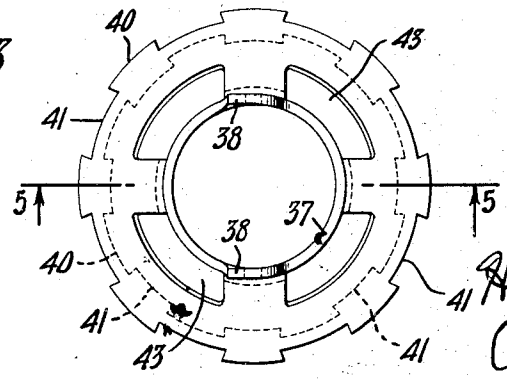


Fig. 3



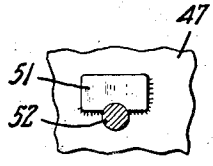


Fig. 4

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Fig 6

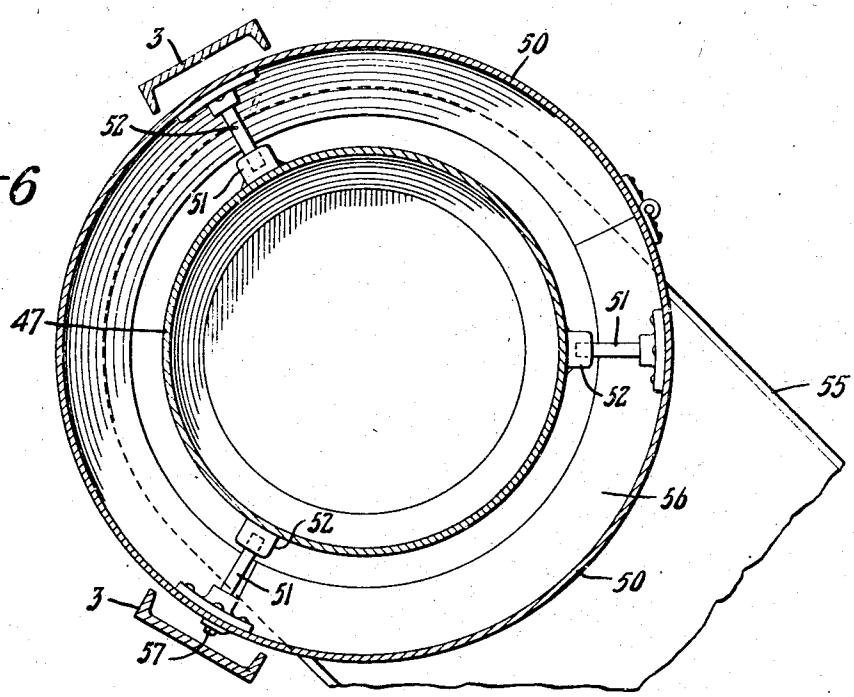


Fig 7

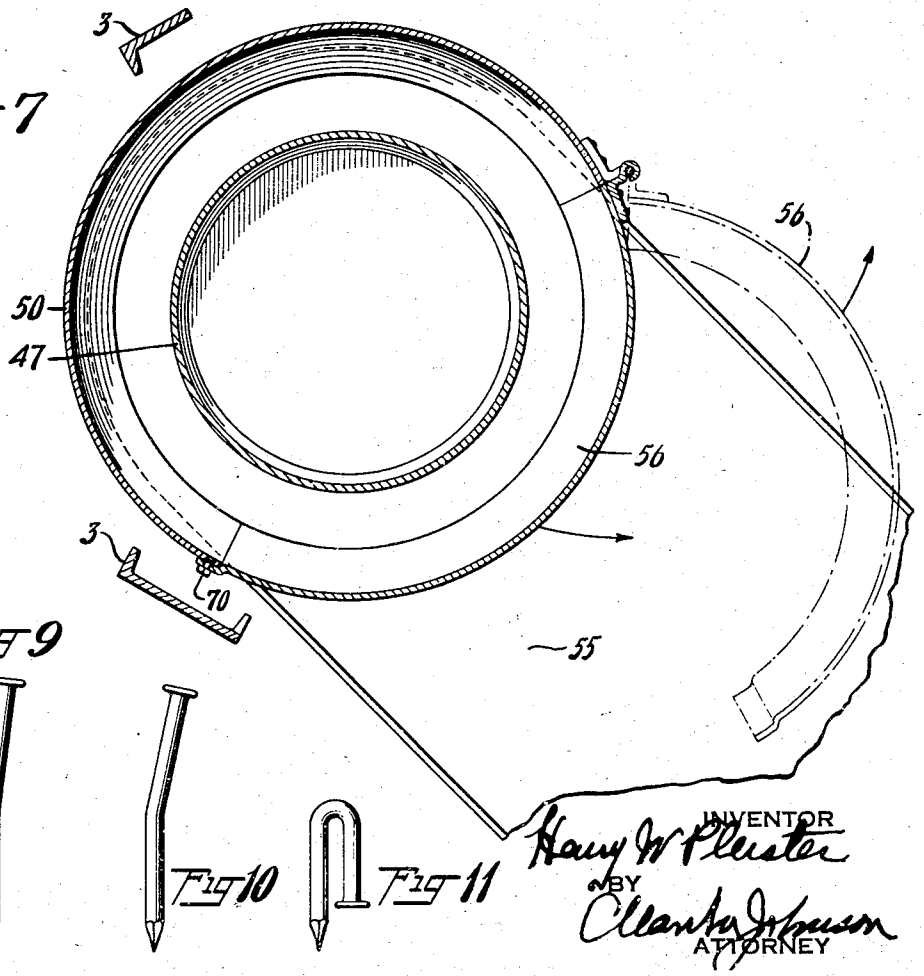


Fig 8



Fig 9



Fig 10

Fig 11

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UNITED STATES PATENT OFFICE

2,271,094

METHOD AND APPARATUS FOR COATING MATERIALS AND ARTICLES

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Application June 22, 1940, Serial No. 341,908

9 Claims. (Cl. 210—68)

My invention covers a method and apparatus for coating separate and independent metal objects of regular, or more or less irregular contour, with a coating of metal, usually zinc, aluminum, tin, alloy, or any metal that will melt at a lower temperature than the articles to be coated. It is particularly adapted to coat relatively small metal articles, as for example nails, screws, nuts, bolts, washers, tacks, and other small metal objects, as for example spikes, wire staples, or any such objects. My invention also covers the coated articles processed by my invention.

I use my invention primarily in galvanizing by the hot process in which zinc or spelter is used. In my process the separate articles of regular or irregular contour, to be coated, are immersed in a bath of molten zinc or spelter, or in a bath of any other molten metal if that metal is desired to coat the articles.

The metal objects are then removed from the molten bath and immediately subjected, in a basket or other container, to centrifugal action to remove the surplus coating material, the centrifugal action automatically throwing the separate articles over the rim of the whirling basket or other container, allowing them to drop into a cooling bath of water or other fluid.

Further by my process the travel of the separate independent articles out of the basket is temporarily impeded, to insure that all the different coated articles shall have all the surplus coating metal removed before they are automatically thrown over the lip of the basket or other container. To further this action and to insure the complete and uniform covering of the articles so there will be no blisters, rough spots, blow-holes, or excess material at any point on the articles; that the coating material will be smooth and ductile, and that there will be no adhesion between any two or more articles, I subject the coated articles while in the basket and while under centrifugal action, and while substantially at their maximum temperature, to percussion blows, which not only separate any two or more coated articles, which might have adhered to each other, but the percussion blows assist in removing any surplus coating metal from the articles.

These successive percussion blows on the articles while in the whirling basket also insure a smooth, even, and ductile coating. These blows are given the coated articles as they seek, under the centrifugal action, to automatically work over the rim or lip of the basket or other container.

These percussion blows may be given in various ways to the articles while in the centrifugal basket. I have obtained perfect results by letting the centrifugal action throw the treated articles against non-rotating baffle plates mounted in the rotating basket or container. Their action will be more fully hereinafter described.

My method of removing all the surplus coating material from the articles while they are substantially at their maximum temperature and under the action of centrifugal force is continuous.

The coated articles may be fed into my machine in any suitable manner as may be found convenient, there being no stopping or starting of the machine for the treatment of each basketful of articles processed, thereby insuring a great saving of time with less wear on the machine and motor, and less labor required per ton of articles treated.

My invention further relates to certain methods, combinations, sub-combinations, and articles of manufacture as will be more fully hereinafter described and pointed out in the claims.

In the accompanying drawings I have shown one illustrative form of apparatus, simply by way of example, but my improved method is not to be limited to this apparatus.

Fig. 1 is a plan view of one form of apparatus for carrying out my improved method.

Fig. 2 is a vertical section on line 2, 2 of Fig. 1;

Fig. 3 is a plan view of one form of adjustable baffle spider;

Fig. 4 is a cross-section on line 4—4 of Fig. 2;

Fig. 5 is a vertical section on line 5, 5 of Fig. 3;

Fig. 6 is a cross-section on line 6, 6 of Fig. 2;

Fig. 7 is a cross-section on line 7, 7 of Fig. 2;

Fig. 8 is a side elevation of a wire nail, being one of the great number of separate articles which are coated by my method;

Fig. 9 is a side elevation of the same nail bent seven degrees;

Fig. 10 is a side elevation of the same nail bent twelve degrees;

Fig. 11 is a side elevation of the same nail bent one hundred and eighty degrees.

In the machine, illustrated by way of example, the triangular frame 1 consists of three horizontal plates 2, 2 secured to the vertical legs 3, 3, preferably formed of channel irons, secured to the brackets 4, 4 in any suitable manner such as by the rivets 5.

On the frame 1 is mounted a motor 6, provided with a flexible coupling 7 to drive the shaft 8 mounted in the horizontal bearing 9. On the

other end of this shaft 8 is mounted a bevel gear 10, secured to the shaft in any suitable manner as by the pin 11.

This horizontal bearing 9 is formed in the bracket 12, secured to the plate 13 by any suitable means as by the bolt 14. This bracket 12 has also two vertical bearings 15 and 16, in which is mounted the drive shaft 17 to rotate the perforated basket 18. The upper portion of the drive shaft 17 is provided with a head or enlargement 20, supported on the bracket 12 by a roller bearing 19. On the shaft 17 is mounted a sleeve 21 carrying a bevel gear 22 in mesh with the bevel gear 10. The sleeve 21 is secured to the shaft 17 in any suitable manner as by a pin 23.

On the lower end of the drive shaft 17 is carried the perforated basket 18, preferably by reducing the diameter of the shaft slightly to form a shoulder 24, so that a cone shaped collar 25 mounted upon the reduced portion of the shaft 17, will permit the nut 26 to clamp and hold the bottom of the basket 18 as the nut is screwed up on the thread 27 on the end of the shaft 17. The washer 25' may be located between the nut 26 and the bottom of the bracket 18, Fig. 2. This cone-shaped collar 25 also spreads the articles to be coated towards the sides of the basket 18, and prevents a "dead" spot in the basket, where the full force of the centrifugal action would not be exerted upon the articles when fed into the basket through the funnel 28.

This funnel 28 has a lip 29 and a cylindrical portion 30, which extends well down into the basket 18, see Fig. 2. The funnel 28 is immovably secured to the cover 31 by the bracket 32 and the bracket 33, the ends of this latter bracket being secured by the bolts 34, 34 to the channel iron 2, see Figs. 2 and 1.

On the cylindrical portion 30 of the funnel 28, I mount my baffle or spider unit 36, Figs. 5, 2 and 3, which is preferably adjustable vertically, but when once adjusted is immovable.

This baffle unit or spider 36 consists of a cylindrical sleeve 37 (Figs. 3 and 5), provided with two arms 38, 38, each arm being provided with an elongated adjusting slot 39. Mounted fast on the cylindrical sleeve 37 are one or more baffle plates 40, 40, two being shown by way of example. These baffle plates 40, 40 are provided with openings 41, 41, preferably in the form of cut-away portions in the baffle plates, though of course they could be formed in any other suitable manner. Openings 43, 43, Fig. 3, between the baffle plates 40, 40 and the sleeve 37 are also preferably provided.

I preferably arrange the outer rim of each baffle plate 40 at a lower elevation than the center of the baffle plate so as to form an inclined surface 44, Fig. 5.

The openings 41, 41 and 43, 43, in each baffle plate 40 are preferably arranged staggered with relation to the similar openings in the next higher baffle plate, to prevent too rapid exit of the coated articles from the basket 18, and to insure that each coated article, at one or more points in its travel out of the perforated basket, will receive a tap or percussion blow by being thrown against one or more of the fixed baffle plates 40.

After adjusting the baffle or spider unit 36 at the desired position on the cylindrical portion of the fixed funnel 30, it is held in that adjusted position by means of the nuts 42, 42 (Figs. 1 and 2).

Removably mounted on the interior of the outer fixed shield or guard 50 is a spelter guard 47. Any suitable form of mounting which will permit the removal of the spelter guard to remove the excess spelter, or other coating material, thrown off of the coated articles and caught by the spelter guard 47, may be employed. I have shown the exterior of the spelter guard provided with three lugs 51, 51, Figs. 6 and 4, cooperating with the pins 52, 52 immovably secured to the outer fixed shield or guard 50.

When it is necessary to clean out this spelter guard 47, to remove the excess spelter, or other coating material caught by it during the centrifugal action, it can be turned slightly to free the lugs 51, 51 from the fixed pins 52, 52, Fig. 4, permitting it to drop into the oval water tank 55, when it can be taken out and cleaned before replacing it on the lugs 51, 51. To assist in this operation, the fixed shield or guard 50 is provided with a door 56, Figs. 2, 6 and 7. The door may be held closed by any suitable means, such as by the bolt 70, Fig. 7.

Applicant is the patentee of U. S. Patent 1,662,537, granted March 13, 1928.

To fully understand the invention covered by this present application, it is necessary to comply with Sec. 4888 of the Revised Statutes, and to refer to the prior art, which is exemplified by this prior patent.

In the prior art, using a flaring basket, and relying on the centrifugal action to throw the coated articles out over the lip or edge of the basket, after the surplus coated material had been removed, or partially removed, it is found impossible to control the time that the articles are subjected to centrifugal action.

For example, it is found in practice that where a sufficient flare or incline is given to the sides of the basket to insure the coated articles, under the centrifugal action, rising from the bottom of the basket, they will be thrown over the lip or upper edge of the basket and into the cooling water before they have been sufficiently stripped of their excess coating material. Moreover, a large portion of the free molten coating material will also be thrown over the lip of the basket with the coated articles.

If, on the the other hand, the sides of the perforated basket are not inclined or flared sufficiently, the coated articles will remain in the basket and defeat the purpose of having the centrifugal action not only remove the excess coating material from the coated articles, and also automatically throw out of the basket such coated articles as have been properly processed to make room in the basket for new untreated coated articles.

Experience has shown that there is no middle ground where the coated articles will slowly move up the sides of the basket, to allow sufficient time for the necessary centrifugal treatment. The coated articles will either stay in the bottom of the basket when its sides have not a sufficient flare or incline, or will fly with great rapidity over the lip of the basket, where there is enough flare or incline to move them upward at all.

It is also found that under the old method different sizes and shapes of articles require different inclines or flares to the sides of the basket, in order to cause them to rise under the centrifugal action. When once a sufficient incline is given to the sides of the basket for them to rise at all, they will immediately fly out of the basket without having received the amount of centrif-

ugal treatment to insure a smooth and ductile surface.

Furthermore, during the centrifugal operation where articles are discharged suddenly from the bottom over the top of the basket, a large portion of the molten excess coating will carry out over the top of the basket and move along with the coated articles and, at the same time, adhere to many of them, causing blisters, rough spots, and irregularities in the thickness of the coating.

Method of operation

In my present invention the separate detached articles to be coated are first immersed in the molten metal bath of the coating material, which may be zinc, aluminum, tin, spelter, alloy, or any other suitable coating material. For convenience in description I shall refer to the molten bath as being one of spelter.

While the articles coated may be any separate and detached articles I shall, for convenience, refer to them as wire nails, as illustrated in Figs. 8 to 10, though, of course, my invention is not to be confined to such articles.

The coated articles are fed on to the lip 29 of the fixed funnel 28 by any suitable means, in batches or continuously, and drop on to the cone-collar 25, which distributes them around the bottom of the perforated basket 18. As the basket is being rotated continuously, they are immediately subjected to centrifugal action, and move up the flaring or inclined sides of the basket 18.

Some of the excess coating material will be immediately thrown off and pass out through the perforations in the basket, and fall into the spelter catch or guard 47. Meanwhile, the articles continue to move up, the flaring or inclined sides of the basket 18 in their attempt to work their way immediately over the lip 60 of the basket, so that they could hit the inside surface of the fixed shield or guard 50, and then fall into the container 61, mounted on wheels 62, 62, in the water trough 55. This container 61 can be wheeled out from under the centrifugal basket 18, Fig. 1, to remove the processed articles without stopping the machine.

However, in my invention, the coated articles do not move freely out of the centrifugal machine. Their free movement is retarded by one or more baffle plates 40, 40 while still in the centrifugal basket 18, and while still at substantially their maximum temperature, and before the coating material can set.

By adjusting the edges of the baffle plates 40, 40 to or from the flaring or inclined surface of the centrifugal basket 18, the progress of the coated articles upward towards the lip 60 of the centrifugal basket is impeded and a certain percentage of the articles will be retarded and forced back into the bottom of the basket 18 to raise again, thereby retaining the coated articles that much longer under the centrifugal action of the basket 18.

Some of the coated articles will pass through some of the openings 41, 41 and 43, 43 in the different baffle plates 40, 40, by arranging, if necessary, these openings in each baffle plate staggered with relation to those in the next adjacent baffle plate; thereby the coated articles are further retained a sufficient length of time in the centrifugal basket 18 to insure that all the surplus coating material is removed from all the coated articles, and that the completely processed coated articles are smooth, without blemish, and have a ductile coating.

This ductile coating is very important. Not only are articles made by my method or process superior to those made by the prior art, but they are safer, in that the coating metal on articles processed by my method has greater ductility and adherence to the metal of the article coated.

There have been instances where mechanics on several occasions have been blinded by flying spelter in driving nails or spikes where the zinc or spelter has flaked off and flown into the eye of the mechanic.

Tests on nails, spikes, bolts, screws, wire staples and numerous other articles coated by old methods indicate that a bend of 7 to 12 degrees is approximately the limit before the coating metal will crack and flake, Figs. 9 and 10. With my improved method, it is possible to coat small articles in a mass that will stand a bend of 180°, Fig. 11, or more, without flaking the zinc coating.

In practical operation two or more centrifugal baskets 18, having different flaring or inclined sides are employed, depending upon the size of the articles to be processed.

The basket 18 illustrated with a flare or inclined surface, as shown, will work perfectly with articles of substantially the same size. It will work equally as well with larger or smaller articles to be processed, by adjusting the baffle or spider unit 36, on the cylindrical portion 30 of the fixed funnel, to or from the bottom of the basket 18, by loosening the nuts 42, 42, and sliding the arms 38, 38 of the baffle or spider unit 36, up or down, as permitted by the adjusting slots 39, 39.

By using one basket 18, having a given flare or inclined sides, and adjusting the baffle or skeleton unit as described, different sized articles within a wide range may be processed with the same centrifugal basket 18.

One or more other centrifugal baskets, having different inclined or flared sides, may be used for articles of different sizes. So also different sized baffle or spider units 36 may be used with different centrifugal baskets 18.

It will be noted that in my invention the coated article while in the centrifugal baskets 18, and while the coating metal is substantially at its maximum temperature, and has had no opportunity to set or freeze, the coated articles are subjected to multiple percussion blows, by being thrown against the fixed baffles 40, 40.

These percussion blows are given the coated articles while in the basket 18, and remove a large quantity of the surplus coating metal, and tends to spread out evenly the remaining coating metal, so that the coated article is given a smooth and ductile coating. The advantage of having a ductile coating has been previously described.

The lip 60 of the basket 18 overhangs the sides of the spelter guard 47, so that no spelter, or other coating metal or any coated article, can drop from the lip 60 into the spelter guard 47. I also preferably discontinue the perforations in the centrifugal basket 18 at an appreciable distance from the lip 60, the last perforations being on a line marked 100, so that no excess spelter will be thrown out in the space 101 between the lip 60 and the spelter guard 47, to fall into the container 61.

Having thus described my method, apparatus and new article of manufacture in connection with the illustrative embodiment thereof, of the details of which I do not desire to be limited, what I claim is new and what is desired to be secured

by Letters Patent is set forth in the appended claims.

What I claim is:

1. The continuous method of treating a plurality of separate independent metal articles immediately after they have been coated by immersing them in a hot molten bath of the coating metal, consisting in feeding the coated articles continuously into the bottom of a whirling basket of a centrifugal machine having upward flaring sides, and while the coating metal on the articles is substantially at the temperature of the said bath of molten coating metal, thereby subjecting the articles to centrifugal action while the coating metal is still liquid, impeding their normal movement to work up and out of the basket until all the surplus coating metal is removed, and continuously discharging the coated articles over the upper edge of the basket.

2. The continuous method of treating a plurality of separate independent metal articles immediately after they have been coated by immersing them in a hot molten bath of the coating metal, consisting in feeding them into the bottom of a whirling basket of a centrifugal machine, said basket having upward flaring sides, and while the coated metal is substantially at the temperature of the said bath of molten coating metal, thereby subjecting them to centrifugal action, and percussion blows against fixed baffles mounted within the basket, until all the surplus metal coating is removed.

3. The continuous method of treating a plurality of separate independent metal articles immediately after they have been coated by immersing them in a hot molten bath of the coating metal, consisting in feeding them into the bottom of a whirling basket of a centrifugal machine, said basket having upward flaring sides and stationary baffles therein, and while the coated metal is substantially at the temperature of the said bath of molten coating metal, subjecting them to centrifugal action and causing the coated articles to follow a circuitous path through the rotating basket in their normal continuous movement to automatically work up and out of the basket until all the surplus coating is removed.

4. The continuous method of treating a plurality of separate independent metal articles immediately after they have been coated by immersing them in a hot molten bath of the coating metal, consisting in feeding them into the bottom of a whirling basket of a centrifugal machine, said basket having upward flaring sides, and while the coated metal is substantially at the temperature of the said bath of molten coating metal, simultaneously subjecting them to centrifugal action and percussion blows against a stationary baffle while in the whirling basket so that the articles are subjected to centrifugal action and percussion blows at the same time, and causing them to follow a circuitous path through the basket in their normal movement to work up and out of the basket, until all the surplus metal coating is removed.

5. In a centrifugal machine for removing surplus molten metal from coated articles, while the coating metal on the articles is still liquid, a centrifugal basket mounted on a vertical axis and provided with an upward flaring or inclined sides to permit the coated articles treated to work their way automatically out over the rim of the basket, while the coating metal is still liquid, and fixed non-rotatable spaced baffles mounted to project into the basket adjacent the inclined sides, and against which the articles treated are thrown to give them percussion blows while in, and subject to, the centrifugal action of the rotating basket to retard the movement of the treated articles out of the basket until all the surplus coating metal is removed from them.

6. In a centrifugal machine for removing surplus molten metal from coated articles, while the coating metal on the articles is still liquid, a centrifugal basket mounted on a vertical axis and provided with an upward flaring or inclined sides to permit the coated articles treated to work their way automatically out over the rim of the basket, while the coating metal is still liquid, and fixed non-rotatable spaced baffles mounted to project into the basket adjacent the inclined sides, and against which the articles treated are thrown to give them percussion blows while in, and subject to, the centrifugal action of the rotating basket to retard the movement of the treated articles out of the basket until all the surplus coating metal is removed from them, and means to adjust the fixed non-rotatable baffle means to and from the flaring or inclined sides of the basket to retard the automatic movement of the coated articles from the basket.

7. In a centrifugal machine for removing surplus molten metal from coated article while the coating metal on the articles is still liquid, a centrifugal basket mounted on a vertical axis, provided with upward, flaring or inclined sides to permit the coated articles treated to work their way automatically out over the rim of the basket, while the coating metal is still liquid, and fixed non-rotatable rigid percussion means, mounted to project into the basket adjacent to the side walls of the basket and against which the coated articles are thrown while subject to centrifugal action of the basket thereby insuring that the percussion blows on the articles are given while the coated articles are still subject to centrifugal action in their movement to automatically work out of the basket.

8. In a centrifugal machine for removing surplus molten metal from coated articles while the coating metal on the articles is still liquid, a centrifugal basket mounted on a vertical axis, provided with upward flaring or inclined sides, to permit the coated articles treated to work their way automatically out over the rim of the basket while the coating metal is still liquid, and fixed non-rotatable baffle means, including one or more baffles mounted to project into the basket adjacent to the inclined sides of the basket, and means to adjust said baffles to or from the upward flaring sides of the basket.

9. In a centrifugal machine for removing surplus molten metal from coated articles, while the coating metal on the articles is still liquid, a centrifugal basket mounted on a vertical axis and provided with an upward flaring or inclined sides to permit the coated articles treated to work their way automatically out over the rim of the basket, while the coating metal is still liquid, and plural fixed non-rotatable baffles spaced from each other mounted to project into the basket adjacent to the inclined sides of the basket and spaced inwardly toward the axis, to retard the movement of the treated articles out of the basket until all the surplus coating metal is removed from them.

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