Aug. 4, 1931. H. G. BLACK 1,817,122

APPARATUS FOR GALVANIZING WIRE AND THE LIKE

Filed April 22, 1929

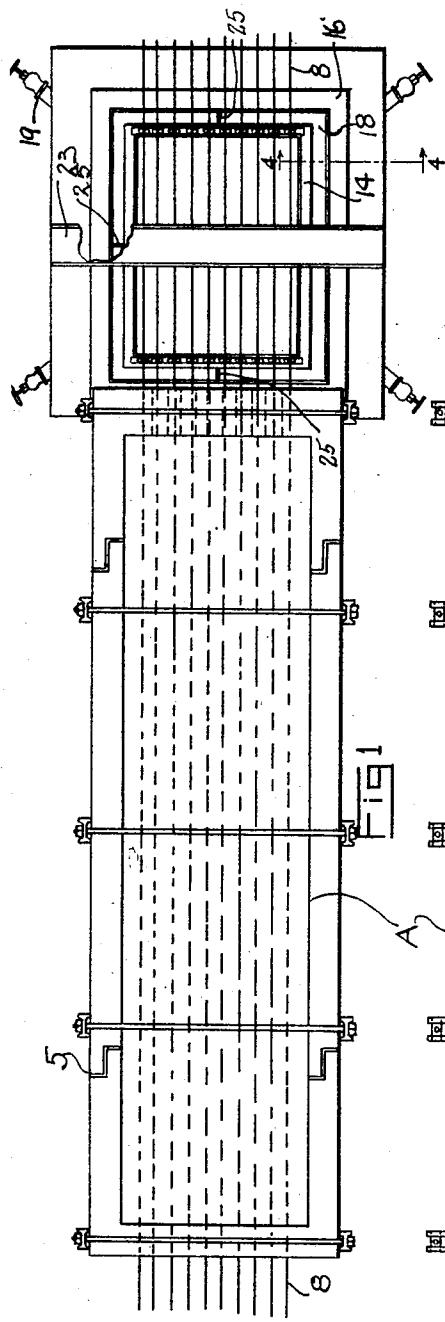


Fig 1

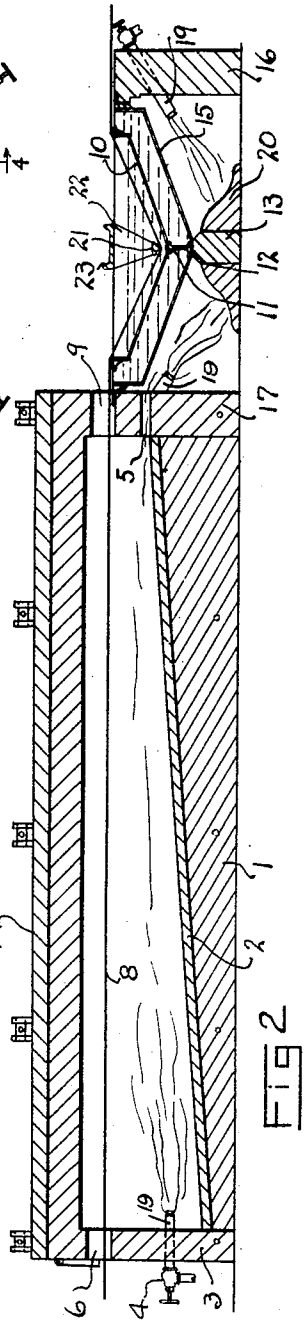


Fig 2

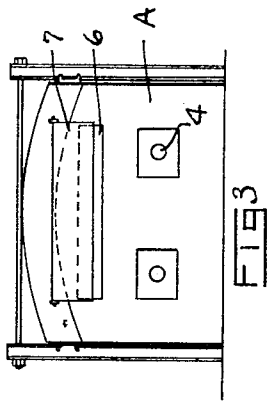


Fig 3

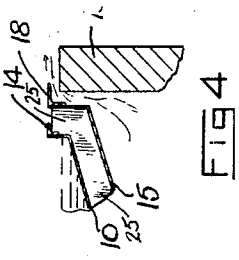


Fig 4

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UNITED STATES PATENT OFFICE

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APPARATUS FOR GALVANIZING WIRE AND THE LIKE

Application filed April 22, 1929. Serial No. 356,953.

The invention relates to galvanizing metal wire, metal strips, and the like.

In the type of apparatus now most commonly used for galvanzing metal objects, the charge of zinc is melted in a large vat of steel or similar metal, and, as the heat is applied to the lower surface, the surface adjacent the furnace is heated to a higher temperature than is necessary for the metal near the center of the vat. At high temperatures around 1000° F. the zinc alloys with the steel of the vat and the walls rapidly disintegrate. In applying the zinc to the objects it is found that the said objects must be immersed in the molten zinc long enough to be thoroughly heated to the temperature of the zinc or the coating will not adhere properly. This makes necessary a larger vat for the zinc than would otherwise be necessary.

It is an object of the invention to preheat the wire or other metal objects to be galvanized so that only a short immersion will be necessary, thus economizing in the amount of zinc melted at any one time.

It is also desired to provide a novel means of heating the wire and conducting it through the charge of molten zinc.

I also have as an object to provide a means of heating the zinc to a uniform temperature, whereby it will not be too hot and hence will not rapidly attack the walls of the vat.

The method of heating and subjecting the wire to the galvanizing bath has novel features which will more clearly appear from the description which follows:

Referring to the drawing herewith, wherein a preferred embodiment of the invention is shown,

Fig. 1 is a top plan view of an installation whereby my invention may be carried out.

Fig. 2 is a longitudinal vertical section of the same.

Fig. 3 is an end elevation of the furnace, and

Fig. 4 is a broken detail taken on the line 4—4 of Fig. 1.

In previous operations with ordinary galvanizing installations the wire or any other object to be galvanized is introduced into the bath of zinc and at atmospheric temperature and has to be run through the molten zinc for a period long enough to heat up the object so that the coating may adhere properly. I overcome this necessity by providing a preheating furnace for the wire before it is immersed in the molten zinc. In the drawing the preheating furnace is indicated at A. The furnace has a lower wall 1 which is inclined upwardly from the forward end toward the rearward end. This floor may be of clay or other material resistant to heat and having a face 2 of fire brick or other similar material. The forward end 3 of the furnace has openings toward the lower portion thereof through which the fuel burners 4 may extend. These burners are adapted to burn liquid or gaseous fluid and the flame from the burners is projected backwardly through the furnace so that the spent gases may find an exit through a series of openings 5 to a point beneath the zinc vat.

The upper wall and side walls of the furnace may be of heat-resistant material and I have shown expansion joints 5 to allow for expansion under heat. The forward end of the furnace toward the upper side is provided with an opening 6, best shown in Fig. 3. This opening may be partially closed by a door 7 hinged above the opening and adapted to extend downwardly to partially close the opening. This opening 6 is to receive the wire 8, which passes through the length of the furnace and issues at the opposite end through an opening 9. It is to be understood that the wire in passing through this furnace at its ordinary rate of travel will be heated to the temperature of the molten zinc or perhaps slightly above the zinc temperature.

From the furnace the wire passes into a pan or vat 10 for the molten zinc. This pan, as shown, is approximately rectangular in shape, the lower wall of the pan being inclined downwardly to the center, and the central portion 11 is supported upon an I-beam 12, which in turn is supported upon a base or foundation 13 of heat-resistant material. The upper margins of the pan 10 are extended laterally to form flanges 14, best seen in Fig. 4.

As previously stated, the temperature of the zinc should not be raised to too high a point or it will alloy with the steel of the tank and form a dross in the bottom of the pan. I, therefore, provide means to prevent the zinc from being raised to an extremely high temperature by placing a second and larger pan or vat 15 below the pan 10. This pan is of the same shape as the pan 10 but is intended to contain lead which melts at comparatively low temperatures and does not attack the steel of the pan at high temperatures. I am thereby enabled to heat the lead at any desired temperature so as to maintain the temperatures of the zinc at about 850° where danger of alloying with the steel of the pan is greatly reduced.

The pan 15 is supported between the I-beam 12 and the base 13 and is supported at its ends upon the wall 16 at the outer end of the pan and upon the wall 17 at the inner end of the pan, the pan being formed with a flange resting upon the lower side of the opening 9 in the furnace. At the sides of the pan 15, the flange 18 around the margin of the pan is spaced slightly from the wall 16, of the fire box beneath the pan 15 so as to allow the escape of the heated gases upwardly around the edge of the pan, thereby maintaining the temperature of the upper portion of the pan at the proper point.

In order to avoid undue strain upon the pan 10 when the material is allowed to cool, I have divided the interior of the lead containing pan 15 into a plurality of chambers I employ partitions 25 preferably at the middle point at each side of the pan. These partitions extend into contact with the outer surface of the pan 10. The effect of these partitions is to allow contraction of the lead in the pan 15 when cooling without forming a continuous plate of lead extending about the zinc pan. The lead in each chamber may shrink and draw away from the walls or partitions 25 without exerting a strain upon the said pan such as would occur if there were a continuous body of lead.

The lower side of the pan 15 is heated through burners 19, said burners being directed downwardly at an angle toward a baffle 20 of fire brick or other fire-resisting material. As will be noted from Fig. 1, I have provided four of these burners, each of them directed inwardly toward the center and downwardly toward the baffle 20. I am thus enabled to heat the baffle of fire brick to an incandescent heat and maintain in the fire box a temperature high enough to perform the galvanizing operation.

The wire is guided through the bath of molten zinc by a cross bar 21, which may be a strip of angle iron, or the like, the lower side of which I contemplate facing with a hard abrasion-resistant material such as Stellite or the like. This cross bar is supported at each end by a hanger 22 carried by a cross beam 23 resting upon the upper wall of the furnace.

The wire in passing to the bath of zinc passes over the edge of the pan beneath the cross bar 21 and out over the opposite margin of the pan to the reel upon which the wire is wound.

It will be noted that the amount of zinc necessary for use in this operation is comparatively small. The pan with the molten zinc therein is much smaller than that employed where the wire is not heated before it is subjected to the galvanizing operation. This allows a large economy in the use of zinc and makes it materially cheaper to heat the zinc and keep it at the proper temperature. Further, the use of the double pan with molten lead between the two pans makes it possible to maintain the zinc at the proper galvanizing temperature without danger of its becoming too hot adjacent the furnace by which it is heated.

There is a further advantage in the use of the preheating furnace in that it does not interfere in any way with the drawing of the wire through the galvanizing material and the heated gases from the preheating furnace may be run into the space below the galvanizing tank and thereby assist in the heating of the charge of zinc. The device is exceedingly simple in construction and efficient in its operation and is much more economical in use than is the old type of galvanizing installation. The further advantages of the construction will be obvious to those skilled in the art.

What I claim as new is:

1. A galvanizing pan for zinc, a pan spaced below said galvanizing pan adapted to contain lead, means to heat the lower of said pans, and partitions in said lower pan acting to divide the same into four chambers for the purpose set forth.

2. In a galvanizing apparatus, a pan for zinc, a second pan below said first mentioned pan adapted to contain lead, a baffle supporting said lower pan, a plurality of burners directed against said baffle to heat said pan, and means to allow escape of heated gases around the margin of said lower pan whereby said lower pan is uniformly heated.

3. In a galvanizing apparatus, upper and lower pans, a baffle centrally below said lower pan and acting to support the same, burners below said pans directed upon said baffle, a wall surrounding said pans, said wall being spaced slightly from the margin of said lower pan for the purpose described.

4. A galvanizing pan for zinc, a lead containing pan spaced below said galvanizing pan, means to heat the lead containing pan and a plurality of partitions transversely of

said lower pan serving to divide the same into a plurality of chambers whereby the contraction of said lead on cooling will not affect said pan.

In testimony whereof I hereunto affix my signature this 18th day of April, A. D. 1929.

HARRY GEAN BLACK.