DEVICE FOR REMOVING MOLTEN METAL

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It is an object of this invention to provide a novel device for removing the excess of molten plating material from the interior of a container, the invention being particularly, although not exclusively, adapted for use in the Method of hot plating containers described and claimed in my application for Letters Patent of the United States bearing Serial No. 107,001, filed October 26, 1936 now Patent 2,109,900.

Another object is to provide a device adapted to be inserted through a restricted opening in a can, tank or other container to reach and withdraw, at the proper instant, the accumulation of plating material which flows to the lowest point in the container.

A particular object is to provide a device of this kind for use in a hot plating process wherein the thickest plating is located on the bottom and adjacent parts of the containers and wherein containers having imperforate bottoms are allowed to cool and the plating allowed to harden while retaining the containers in upright or normal position.

Other objects will appear and be more fully pointed out in the following specification and claims.

In the manufacture of many types of sheet metal containers, such for example as those used for dairy products, it is desirable, in the interest of economy and to avoid unsightly and unsanitary joints, to weld the bottoms to the walls before the plating operation. When this is done, however, the problem of obtaining the proper distribution of the plating material to impart maximum durability to the container is rendered more difficult, particularly where the finished containers have no bottom opening which can be utilized as an outlet for the excess of plating material during the progressive cooling of the containers. By the device described and claimed herein I eliminate the necessity for an opening or perforation in the bottom of the container and at the same time secure the advantages of increased thickness of plating material on the bottom and lower portions of the walls of the containers and I also eliminate all unsightly metal drippings and such non-uniformity in the distribution of the metal on the container as commonly result from decanting the excess through a top opening in the container.

Referring to the accompanying drawing:

Fig. 1 is a side elevation of my improved device and illustrating the method of using it in connection with the plating of a milk can, the latter, together with a listing table supporting the same being shown in vertical section;

Fig. 2 is a vertical section through my device on a larger scale, together with the lower portion of a container;

Fig. 3 is a plan view of the head of the device, and

Fig. 4 illustrates the head in the position in which it is held or placed for emptying the plating material.

My device has a hollow head, indicated generally by the numeral 5, into which the pool of excess plating material may be drawn through a pendulum intake tube 6 which is open at its lower end and communicates with the interior of the head 5. The bottom of the head 5 slopes obliquely down from the periphery where the tube 6 is attached to form a trap in which the excess of plating material is collected. The head 5 is secured to the top of the head 5 is a pipe 9 which communicates with the interior of the head 5 and with a flexible, air hose 10. This hose extends to a suitable suction device (not shown) adapted to exhaust air from the hose pipe 9 and head 5 when it is desired to draw molten material into the head 5 through the inlet tube 6. To prevent particles of solid matter from entering the hose 10, a body 11 of porous filtering material is located in the connection between the hose 10 and pipe 9. Also communicating with the pipe 9 is a nipple 12 which has a top opening that may be closed by the hand of the operator when it is desired to create reduced pressure in the head 5.

I provide a heater for maintaining the head 5 at sufficiently elevated temperature to retain any plating material therein in molten condition. The heater consists of a small tube 13 supplying a mixture of combustible gas and air to a burner 14 arranged to direct a flame 15 against the head 5. The tube 13 is attached to the pipe 9 by small clamps 16 and is sufficiently flexible to permit manipulation of the device.

At one side of the top of the head 5, an outlet passage 17 is formed. This passage is normally closed by a flap valve 18 pivoted on a pin 19 in such position that the valve is closed when the pipe 9 is vertical and opens by gravity when the head 5 is to be emptied, as indicated in Fig. 4. The passage 17 is preferably located directly opposite or in alignment with the upper end of the tube 6 so that the passage 17 allows ready access to the tube 6 for cleaning.

The device is illustrated in connection with a milk can, indicated generally by the numeral 20, having its several parts joined together by welding. An internally concave bottom 21 is welded to the cylindrical walls of the can 20 and is preferably formed with a small indentation 22 at the central point of the bottom to receive the final increment of excess plating material. The container 20 is without perforations in its bottom so that the excess plating material cannot escape by gravity when the container is in upright position.
As shown in Fig. 1, during the process of hot plating the container 20 it is placed in upright position on a listing table 23 comprising a foraminous horizontal plate supported within the top of a kettle or vat 24 containing a body 25 of plating material. This material is maintained in molten condition by heating. Suitable burners for heating the metal in the vat 24 are well known in this art and are shown diagrammatically in the drawings, being indicated by the numeral 26. The solidified plating on the can 20 is indicated by the numeral 27.

Operation

As a preliminary to the plating or tinning of a container, it is thoroughly cleansed, usually in an acid bath. It is now immersed in a bath of the molten plating material so that the latter completely covers the inside and outside surfaces 20 of the container. Two or more immersions are usually from the top of the container 20 so that the lower extremity of the container 20 rests in the hot metal while the excess of plating material from the exterior of the container flows into the vat 24.

While thus positioned on the listing table, the container 20 cools progressively from the top down and the excess of plating material from the interior surfaces collects in a small pool centrally on the bottom 21, in and around the depression 22 in cases where the latter is provided. The central portion of the bottom 21 is the last interior part of the container to cool sufficiently for the hardening of the plating material. While this accumulation of molten metal is still in molten condition, the operator inserts my device through the top opening in the container 20, as indicated in Fig. 1, placing the intake tube 6 in the depression 22 or at the central point of the bottom of the container. Just before the pool hardens, the operator closes the upper end of the nipple 12 with his thumb. This causes the air to be exhausted from the head 5 through the pipe 9 and hose 10 with the result that the accumulation of plating material is drawn into the head 5.

The device is then withdrawn from the container, leaving a perfectly smooth plating surface therein, without contacting any of the cooled portions of plating. Finally the plated container 20 is removed from the listing table 23 and the head 5 is so placed that the entrapped plating material 8 is decanted through the passage 17, as indicated in Fig. 4. It will be understood that the head 5 is continuously heated by the flame 15 to such temperature as to liquefy the plating material contained in the head. The passage 17, being located in alignment with the inner end of the tube 6, affords easy access to the restricted inlet passage from which oxidized plating material must be periodically removed to keep the tube 6 open. To remove solid matter, such as the oxidized metal from the interior of the head 5, a wire rod or other suitable tool is inserted through the passage 17.

By locating the tube 6 at one side of the head 5 and with the inlet end of the tube projecting where it is visible through the top opening in the container 20, I facilitate the accurate placing of the device in the molten pool to be withdrawn. All drippings and spilling of the excess plating on the cooled surfaces of the container are eliminated by my device and unusually smooth, uniform plating material is obtained from the bottom surfaces from which the excess plating material has been withdrawn.

A substantial saving of plating material and the desired distribution with the thicker coating on the lower portion of the container, so that it affords the greatest protection where most needed, are further advantages obtained by the use of my device.

Having described my invention, what I claim as new and desire to protect by Letters Patent is:

1. A device for removing pools of molten metal from the interior surfaces of containers in the process of hot plating the same comprising, a hollow head adapted to be inserted through an opening in a container, an inlet passage for molten plating material communicating with the interior of said head and projecting downwardly therefrom and means for creating suction in said head.

2. A device for removing pools of molten metal from the interior surfaces of containers in the process of hot plating the same comprising, a hollow head adapted to be inserted through an opening in a container, an inlet passage for molten plating material communicating with the interior of said head and having an intake opening at its lower extremity, a suction pipe extending upwardly from said head and means for heating said head to maintain plating metal therein in molten condition.

3. A device of the class described having in combination, a hollow head adapted to be heated, an inlet passage for molten metal communicating with said head and having an intake forming to receive molten metal from a shallow pool in the bottom of a container, a suction pipe extending upward from said head and communicating with the interior thereof and a trap chamber formed in the bottom of said head to receive molten metal from said inlet passage.

4. A device of the class described comprising, a hollow head adapted to be inserted in a container, an inlet passage formed in said head to receive molten metal from a pool in the bottom of said container, a suction pipe communicating with said head, an outlet passage for molten metal formed in said head and a closure for said outlet passage.

5. A device for the class described comprising, a hollow head adapted to be inserted through a restricted opening in a container, an inlet passage communicating with the interior of said head and having a lower extremity adapted to receive molten metal from a pool in the bottom of said container, means for creating suction in said head, a trap chamber formed in the bottom of said head to receive metal from said inlet passage, and means for heating said head to maintain plating metal therein in molten condition.

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