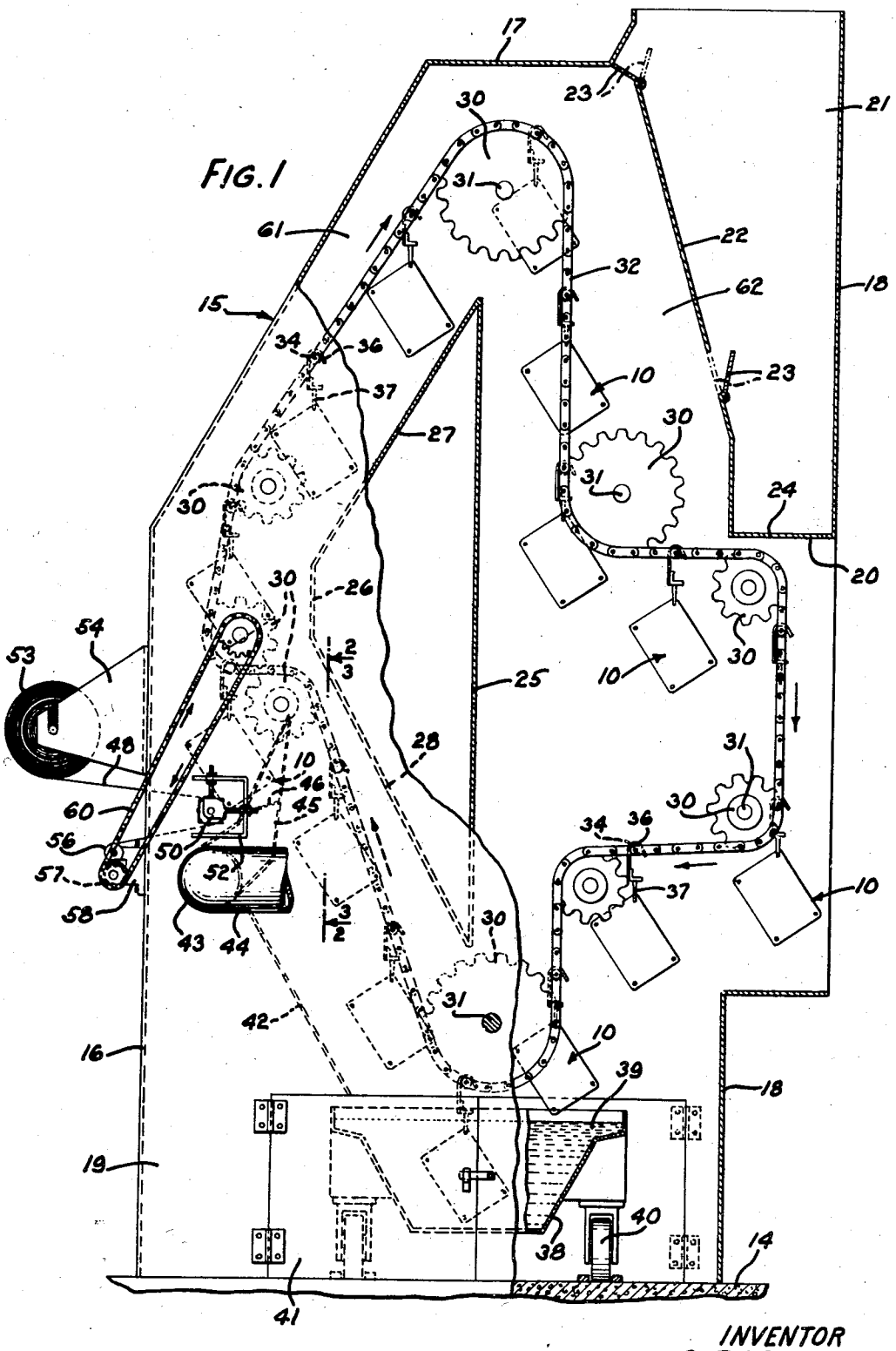
Jan. 13, 1942. G. P. McGRAW 2,269,592

COATING APPARATUS

Filed May 2, 1940 2 Sheets-Sheet 1

FIG. 1



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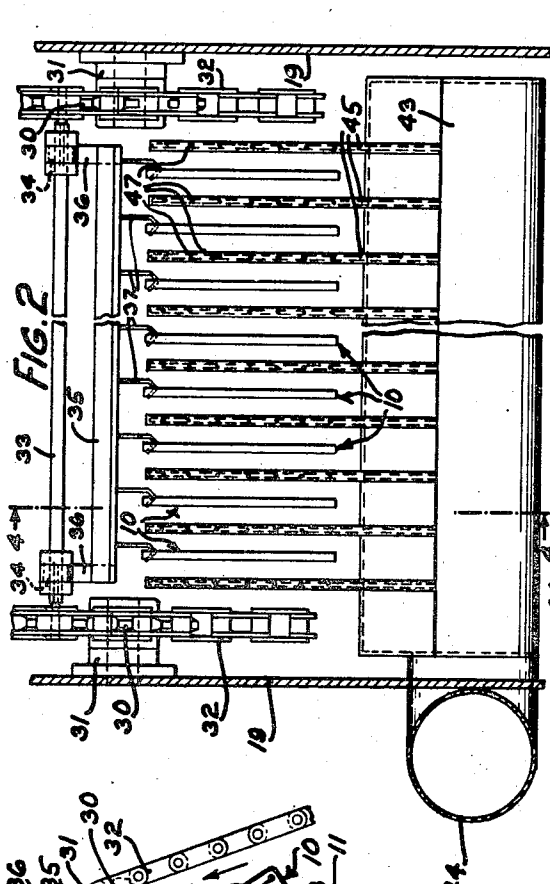


FIG. 2

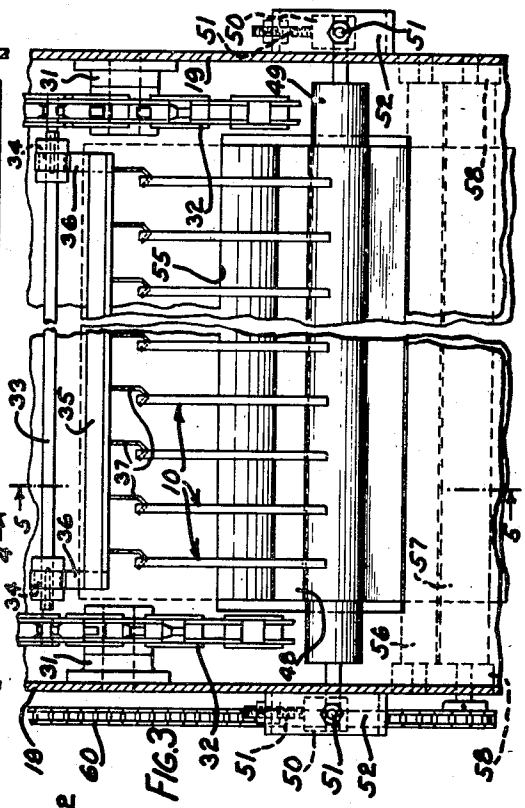


FIG. 3

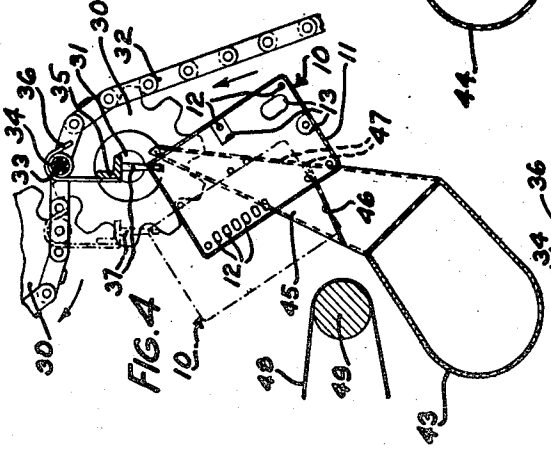


FIG. 4

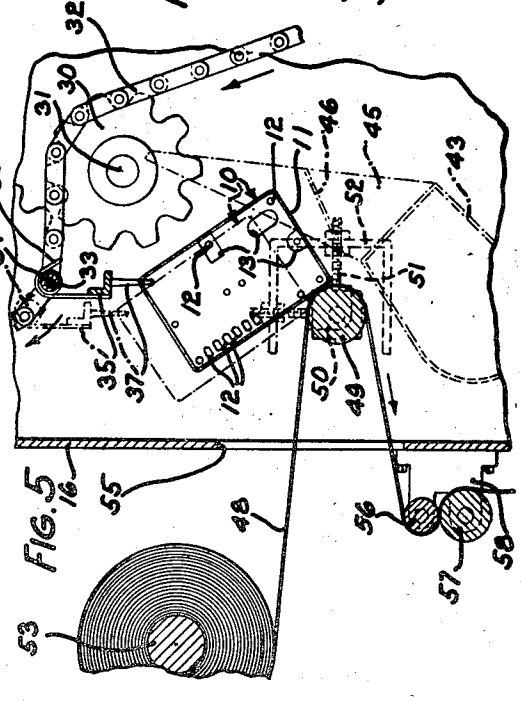


FIG. 5

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UNITED STATES PATENT OFFICE

2,269,592

COATING APPARATUS

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Application May 2, 1940, Serial No. 332,888

9 Claims. (Cl. 91—55)

This invention relates to coating apparatus, and more particularly to apparatus for coating articles by a dipping process.

In coating articles with paint, lacquer and other liquid materials it is often desirable to employ a dipping process because of the inherent speed and economy of these procedures. Processes of this general type have been used for coating various articles, but the former methods and apparatus are not very suitable for use with articles of irregular configuration, particularly those having perforations and surface indentations therein. When such articles are dip coated by the usual procedures, the coating medium tends to skin over the perforations and to accumulate in drips and runs at the irregular portions of the article surface. Consequently, it has been necessary in many cases to employ supplementary and expensive processing operations to remove the excess coating material before it has an opportunity to dry in order to provide a finish of satisfactory appearance and utility.

An object of this invention is the provision of improved apparatus for applying a smooth, uniform and durable coating of paint, lacquer or the like on articles of irregular configuration.

In one embodiment of the invention, apparatus is provided for applying a smooth and uniform coating of lacquer on articles having a flanged periphery and a body portion with a series of indentations and perforations formed therein. The articles, suspended from a conveyor, are first immersed in a tank of lacquer and then conducted past a series of shaped hot air ducts which emit hot air against the wet articles to remove the lacquer from the article perforations and also accumulate all excess lacquer at the lower edge of the suspended article. In the next stage, the article edge is wiped across a sheet of absorbent material to remove the accumulated lacquer, after which the article is carried successively through heated and cooled areas to complete the coating operation and finally delivered to an unloading position.

Following is a more detailed description of the invention, taken in conjunction with the appended drawings, in which

Fig. 1 is a side elevation, partly in section, of an article coating apparatus embodying certain features of the invention;

Fig. 2 is an enlarged sectional view of the apparatus of Fig. 1 taken on the line 2—2 to show portions of the apparatus and the articles under treatment at one stage of the coating cycle;

Fig. 3 is an enlarged sectional view of the apparatus taken on the same line as Fig. 2 to show portions of the apparatus and articles at a subsequent stage of the article coating cycle to that illustrated in Fig. 2;

Fig. 4 is a sectional view of Fig. 2 taken on the line 4—4, and

Fig. 5 is a sectional view of Fig. 3, taken on the line 5—5.

The apparatus shown in the drawings is especially adapted for coating configured articles containing perforations, recesses and surface indentations. The particular article 10 illustrated in the drawings is a base plate used on telephone subscriber sets. This base (Fig. 4) has a flanged periphery 11, and a body portion with a series of perforations 12 and indentations 13 of various shapes formed therein.

The coating apparatus (Fig. 1) is supported on a base or floor 14 and comprises a cabinet 15 which is made of sheet metal and suitably framed with structural members to impart the necessary rigidity thereto. The cabinet, which is rectangular in plan section, has a back wall 16 which slopes inwardly at its upper portion, a roof 17, a front wall 18 and side walls 19. In the front wall is a large opening 20 at a suitable height above the floor to enable the operator to load and remove the articles conveniently.

In the upper front portion of the cabinet is an exhaust duct or passage 21 formed by a sloping partition 22 extending between the side walls, and a bottom wall 24 extending from the partition to the front wall of the cabinet. In the partition 22 are a plurality of manually operated hinged dampers 23. The top portion of the exhaust chamber is connected to an exhaust fan (not shown).

In the central part of the cabinet is another partition extending between and secured to the side walls. This partition includes a straight front wall 25 parallel to the front cabinet wall, a back wall 26, a top 27 and a bottom 28. The top and bottom slope sharply from the front wall to the back wall of the partition thus forming cooperatively with the cabinet walls an elongated article treating chamber extending around the cabinet.

A conveyor is provided for conducting the articles through this chamber. A series of sprocket wheels 30 are supported in bearings 31 mounted in spaced arrangement on the inside surface of each of the cabinet side walls. The series of sprockets on each side wall supports and drives a continuous linked chain 32. One sprocket

wheel in each series is driven by keying the lower sprocket wheel in each series or set on a common shaft extending across the cabinet and connecting the shaft to a suitable motor (not shown).

The articles to be coated are supported from the linked chains by means of rods **33** (Fig. 2) mounted on the chains at uniform intervals along the chain length. These rods extend between the two chains and are secured thereto. On each end portion of each rod, adjacent to the chains, a ball or roller bearing **34** is mounted. An angle member **35** is supported on the outer race of the two bearings by means of connecting arms **36** and a series of spaced article supporting hooks **37** depend from the angle member. When the driven chains carry the articles around the chamber, the article supporting angles move readily on the ball bearings so that the position of the articles is not affected by turning of the rod during travel of the chain around the chamber.

In the base of the cabinet (Fig. 1) below the bottom sprockets is a container **38** for the lacquer, paint or other coating material **39** in which the articles are immersed. This container is mounted on wheels **40** and the container is placed in the cabinet or removed therefrom for refilling or cleaning through a hinged door **41** in each of the side cabinet walls.

Directly above the rear portion of the container is a sloping drain board **42** for returning to the container coating material that drips from the freshly dipped articles.

Above the drain board and extending across the back of the cabinet just below the path of the articles on the conveyor is a shaped sheet metal pipe **43**, one end of which is connected with a hot air supply line **44** outside of the cabinet.

Extending from the front portion of the pipe **43** are a series of shaped and vented ducts **45** for applying hot air against the surfaces of the wet articles. One duct is positioned between the path taken by each pair of articles and one duct is positioned at each end of the article series (Figs. 2 and 4). These ducts are narrow with parallel side walls of substantially triangular shape. A sloping vent **46** is cut in the lower portion of each side wall and additional vents **47** are provided in the front or forward wall of each duct. When the wet articles are carried by the conveyor into the zone of these ducts, hot air emitted from the front vents **47** initially sweeps across the article surfaces. This action smooths the coatings as the article travels in an upwardly direction against the air currents and also removes coating material from the perforations and indentations in the article surface. The excess coating is thus transferred to the lower portion of the article and collects in a pool within the bottom article flange. Then as the article is advanced in a substantially horizontal direction by the conveyor, air emitted from the side wall jets **46** forces this coating accumulation out over the flange to form in a bead depending from the lower outside article corner or edge.

This accumulated bead of coating material is removed by wiping or rolling the article edge against a sheet of absorbent material **48** which is partially wrapped around a roller **49** mounted parallel to and in back of the hot air ducts. Various absorbent materials, such as cloth or paper, are suitable for this purpose, but paper is used preferably for cost considerations. The roller **49** is freely mounted in a pair of bearings **50**, one bearing being supported on the outside of each of the side cabinet walls. Each bearing is supported on two bolts **51** positioned at right angles to one another and fastened to a frame **52** on the cabinet wall. The position of the bearings and the roller is accurately controlled by regulating the position of the bolts, by means of nuts threaded thereon, in elongated slots in the frames.

The roller is positioned to cause the absorbent sheet thereon to first engage the leading edge of the article, which is then traveling in a substantially horizontal direction, just above the bottom of the article. Then as the article is further advanced by the conveyor, its direction of travel is changed towards the vertical which causes the entire lower edge portion of the article to be wiped across or rolled against the sheet of absorbent material. This action completely removes the accumulated excess coating material. Because the articles are free to move freely relative to the conveyor, due to the bearing supports, the pressure between the article and the absorbent material is not great with the result that all of the excess material is removed without the thickness of the desired coating at that portion of the article being affected.

It is desirable to replace the absorbent material constantly as successive articles are delivered by the conveyor. To accomplish this, fresh absorbent material is delivered continuously to the roller by a feeding mechanism coordinated with the movement of the conveyor. In this mechanism the absorbent sheet material is supplied from a supply roll **53** supported rotatably on brackets **54** on the outside back wall of the cabinet. The sheet extends from the roll through an opening **55** in the back cabinet wall, over the roller, out through the wall opening and between a pair of rotatable shafts **56** and **57** supported in a bracket **58** on the back cabinet wall. One of these shafts is driven by means of a chain **60** geared to one of conveyor sprockets. With this construction fresh absorbent material is pulled over the roller at all times that the conveyor is running.

After the articles are rolled against the wiper, they are carried upwardly by the conveyor through a drying chamber **61** (Fig. 1). The hot air emitted from the ducts **45** is carried up into this drying chamber by the action of the exhaust fan, and the position of the upper damper in the exhaust chamber is set to insure the desired degree of drying or setting of the coating material during passage of the article through this chamber.

From the drying chamber, the articles are carried downwardly by the conveyor through a cooling chamber **62**. Cold air is supplied to this chamber from the front opening of the cabinet and its flow is regulated by the position of the lower damper in the partition **22**.

The operation of the apparatus is as follows: The articles are placed on the hooks depending from the conveyor by the operator at the lower portion of the front cabinet opening while the conveyor is in motion. The articles illustrated in the drawings are hung from a hole in their upper corner and other articles can be hung or clamped on the conveyor by any suitable means. From the loading position the articles are carried to the coating container and immersed in the coating material. The wet articles are then carried over the drain board and into the zone of the hot air jets. As previously explained, the hot air emitted from the front jets smooths the coating and removes the excess coating from indentations and

holes in the article, and air emitted from the side jets accumulates all excess coating in a bead depending from the lower corner of the article. Next, the lower corner of the article is wiped across or rolled against the absorbent sheet to remove this bead without affecting the base coating. The articles are then carried successively through the heating and cooling chambers, where the arranged coating is rapidly dried and set, and then delivered to the unloading position, at the top of the front cabinet opening, where they are removed by the operator while the conveyor is in motion.

Due to the action of the hot air duct, wiper, forced drying and cooling, the resultant coating is smooth, uniform, unblemished and durable and the articles are ready for immediate use without additional finishing operations being required. The process is rapid, involves minimum handling and is economical of coating material, with the result that an entirely satisfactory coating is applied on the article at low cost.

This apparatus can be used with various coating materials, such as lacquer, varnish, paint and the like, and is in general suitable for use with those materials that are adapted to dip coating processes.

Also, various features of the invention can be used separately. For example, in certain instances, depending largely upon the configuration of the articles being coated, independent use of either the wiping mechanism or the hot air duct structure is advantageous.

It will, therefore, be apparent that modifications of the specific embodiment of the invention described herein are feasible and it is to be understood that the invention is limited only by the scope of the appended claims.

What is claimed is:

1. In an apparatus for dip coating articles, a cabinet having an article treating chamber therein, means for conveying the articles through the chamber, a container of coating material in the chamber for applying coating material on the articles by immersion, means for applying air pressure against the surfaces of the moving articles to move excess coating material on the article to one portion of the article surface, and an absorbent material positioned in the path of the moving article for engaging the article and removing the accumulated excess coating material therefrom.

2. In an apparatus for dip coating articles having perforations therein, a walled cabinet with an elongated article treating chamber therein, a conveyor traversing said chamber for carrying the articles through the chamber, a container of coating material in the chamber for applying coating material on the articles by immersion, a plurality of shaped ducts adjacent to said container for applying air pressure against the coated articles to remove coating material from the article perforations and move excess coating material to one portion of the article surface, an absorbent material in the path of the moving article for engaging the article and removing the excess coating material, and a heated area in the chamber for drying the coating on the articles.

3. In an apparatus for dip coating articles having perforations and surface indentations therein, a cabinet with an article treating chamber therein, a driven conveyor traversing said chamber for carrying articles suspended therefrom through the chamber, a container of coating material in the chamber for applying coating material on the article by immersion, a plurality of shaped ducts adjacent to the container for applying air pressure against the surfaces of the coated articles to remove excess coating material from the article perforations and indentations and accumulating the excess coating material at the lower edge portion of the suspended article, an absorbent sheet adjacent to the ducts for engaging the lower edge of the article and removing the accumulated excess coating material therefrom as the articles are moved by the conveyor, and means within the chamber for drying the residual coating on the articles.

4. In an apparatus for dip coating articles having perforations and surface indentations, a cabinet having an article treating chamber therein, a conveyor for moving the articles through the chamber, a container of coating material at the bottom of the chamber for applying coating material on the articles by immersion, a series of shaped air ducts positioned adjacent to the path of the coated articles, said ducts having a front wall with jets therein for emitting air against the surfaces of the moving articles to remove coating material from the article perforations, and side walls with jets therein for applying air pressure against the article surfaces and accumulating the excess coating material at one portion of the article surface, an absorbent material positioned in the path of the moving article for engaging the article and removing the accumulated excess coating material therefrom, and a heated portion of said chamber for drying the residual coating on the articles.

5. In an apparatus for dip coating articles, a cabinet having an article treating chamber therein, a conveyor for moving the articles through the chamber, means for driving the conveyor, a container of coating material at the bottom of the chamber for applying coating material on the articles by immersion, means for applying air pressure against the surfaces of the moving articles to move excess coating material on the article to one portion of the article surface, an absorbent material positioned in the path of the moving article for engaging the moving article and removing the accumulated excess coating material therefrom, and means coordinated with the conveyor drive for constantly supplying fresh absorbent material to the position where the absorbent material engages the moving articles.

6. In an apparatus for dip coating articles, a cabinet having an article treating chamber therein, a conveyor for moving the articles through the chamber, the articles being suspended from the conveyor and hanging downwardly from the conveyor, a container of coating material at the bottom of the chamber for applying coating material on the articles by immersion, means for applying air pressure against the surfaces of the moving articles to move excess coating material on the article to the lower edge portion of the suspended article, and a sheet of absorbent material positioned in the path of the moving article to remove the accumulated excess coating material therefrom, the absorbent sheet and direction of article travel being coordinated to cause the leading lower edge portion of the moving article to first engage the sheet and the complete lower edge portion of the article to be wiped against the sheet as the article is advanced by the conveyor.

7. In an apparatus for dip coating articles, a

cabinet having an elongated article treating chamber therein, a conveyor for carrying the articles through the chamber, means for driving the conveyor, a container of coating material in the chamber for applying coating material on the articles by immersion, means for applying air pressure against the surfaces of the coated articles to accumulate excess coating material on the article at one portion of the article surface, and means positioned in the path of the moving article and subsequent to the accumulating means for engaging the article and removing the accumulated excess coating material therefrom, said means comprising a roller adjacent to the article path, a sheet of absorbent material wrapped over said roller for engaging the moving articles, a feed roll engaging the sheet for pulling the sheet over the roller, and a chain interconnecting the conveyor and the feed roll to cause the sheet to be advanced over the roller whenever the conveyor is in motion.

8. In an apparatus for dip coating articles having perforations and surface indentations therein, a walled cabinet having an elongated article treating chamber therein, a conveyor traversing said chamber for conducting articles suspended therefrom through the chamber, means for driving the conveyor, a container of coating material at the bottom portion of the cabinet for applying coating material on the articles by immersion, a series of shaped hot air ducts positioned subsequent to the container, said ducts having a front wall with vents therein for emitting air against the article surface to remove coating material from the article perforations, and side walls with a vent therein for emitting air to sweep excess coating material from the article indentation and accumulate the excess coating material at the lower corner of the article, an absorbent sheet positioned subsequent to the ducts, said sheet being adapted to engage and absorb the accumulated excess coating material on the article, a feed roll engaging the absorbent sheet, and a drive for said feed roll responsive to the conveyor drive for advancing the absorbent sheet whenever the conveyor is in motion.

9. In an apparatus for coating an article having perforations therein, a chamber, means for moving the article through the chamber, means for applying coating material on the article, means adjacent to the coating means for applying air pressure against the article to remove coating material from the perforations and accumulate excess coating material at one portion of the article surface, an absorbent material in the path of the moving article for engaging the article and removing the excess coating material therefrom, and means for drying the remaining coating material on the article.

GEORGE P. McGRAW.