Oct. 12, 1948. A. KECK 2,451,391

APPARATUS FOR SURFACE TREATING SMALL OBJECTS

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FIG. 1

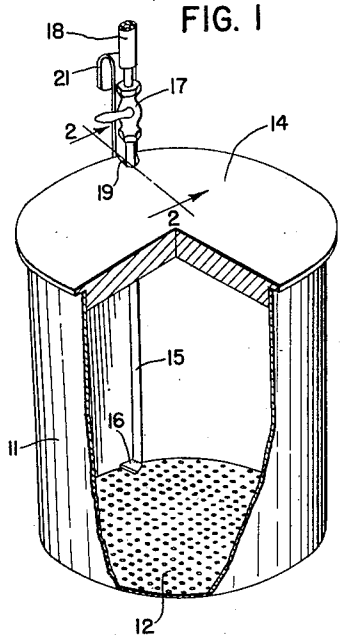


FIG. 2

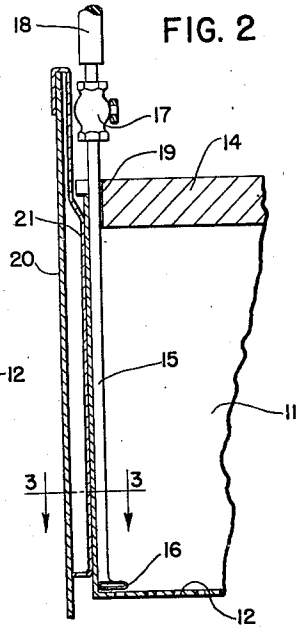


FIG. 3

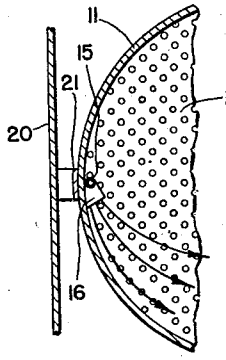
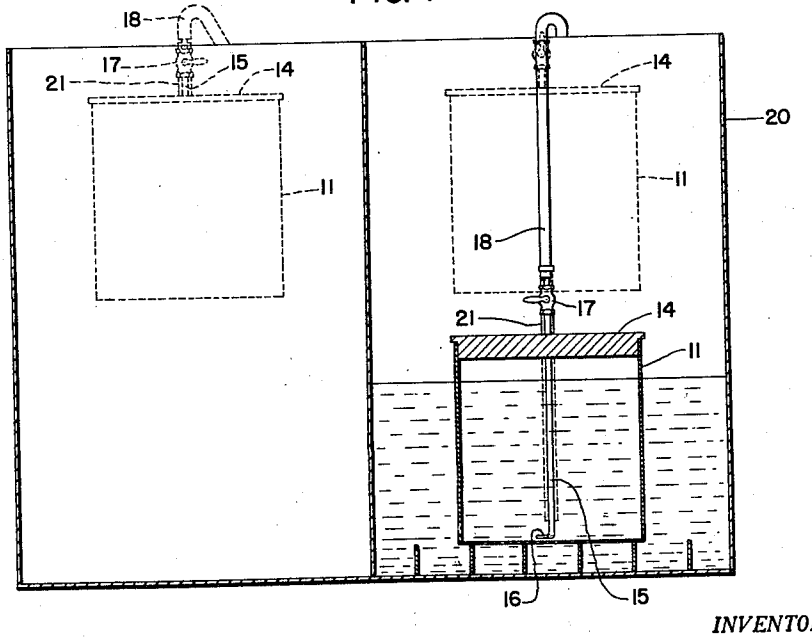


FIG. 4



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FIG. 5

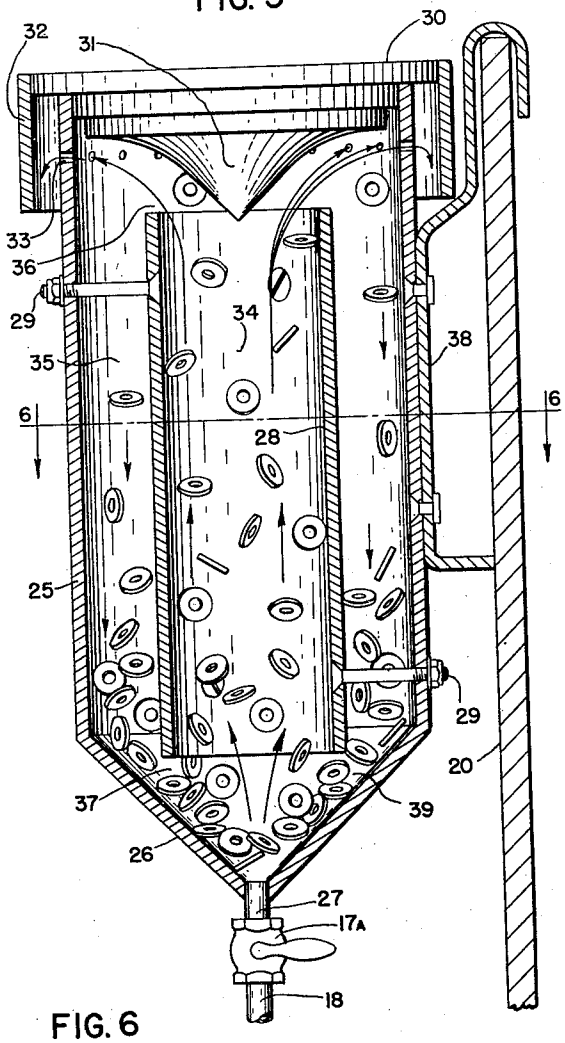


FIG. 6

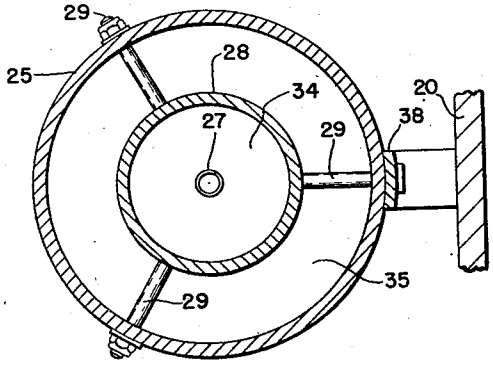


FIG. 7

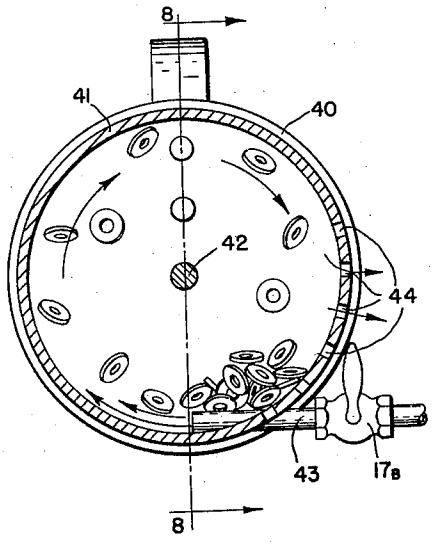
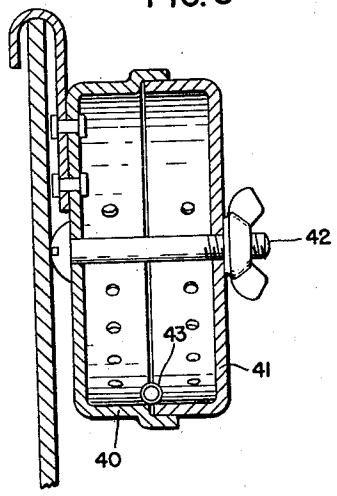


FIG. 8



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APPARATUS FOR SURFACE TREATING SMALL OBJECTS

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Application May 6, 1944, Serial No. 534,468

2 Claims. (Cl. 91—46)

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This invention relates to an apparatus for surface treating small objects and may be availed of with particular advantage in applying finishing and protective coatings to washers, rivets and the like.

When, for example, objects such as washers are to be surface treated by the application of a coating of paint, it is current practice to apply the paint in spraying or dipping operations. The application of the paint in a spraying operation is objectionable because the washers usually have surfaces of such contour or which are so located with respect to one another, or both, that some of such surfaces escape the paint spray, particularly when the washers are painted in mass or batch quantities. When the dipping method of painting is employed, the washers are immersed in the paint and then hung to drain and dry. During the draining and drying operations, globules of paint frequently accumulate on their undersides. Such grounds may interfere with the intended use of the washers by preventing them from lying flat. Moreover, when the washers are painted in mass or batch quantities, they may adhere to one another and when this occurs and they are separated they are improperly or incompletely coated.

The principal object of the present invention, therefore, is to overcome the above objections, this object contemplating the application of the treating medium to the objects in such a manner that all exposed surfaces will be completely and uniformly treated.

A further object is to prevent the objects being treated from adhering to one another and to prevent localized accumulations of the treating material.

Other and further objects and advantages will be apparent from the following description, reference being had to the accompanying drawings wherein preferred embodiments of apparatus for carrying out the method are shown.

In the drawings:

Figure 1 is a perspective view of apparatus for carrying out the method, a portion of the apparatus being broken away to show the construction and arrangement of its various parts;

Figure 2 is a sectional view taken on line 2—2 of Figure 1;

Figure 3 is a fragmentary sectional view taken on line 3—3 of Figure 2;

Figure 4 is a view in section showing the treating apparatus suspended within a paint tank;

Figure 5 is a view in section of the preferred form of apparatus for carrying out the method;

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Figure 6 is a sectional view taken on line 6—6 of Figure 5;

Figure 7 is a view in section of another form of apparatus for carrying out the method; and

Figure 8 is a sectional view taken on line 8—8 of Figure 7.

I have found that quantities of small objects such as washers, rivets and the like may be rapidly and uniformly coated by dipping them in a liquid bath of the coating material and then, after removing them from such bath, directing a gaseous medium against them in such a manner that they are caused to traverse a prescribed path and during a part of their travel are elevated by the gaseous medium. When such objects are elevated and suspended by a gaseous medium, they will constantly change their positions. The said medium thus acts against all surfaces to effect a uniform distribution of the previously applied coating material while evaporating the solvents employed in connection with such material. The coating, therefore, will be uniformly distributed over the objects, will remain of a uniform thickness during the drying operation, and will be dried rapidly.

In Figure 1 of the drawings, there is shown one form of a device by which the method of my invention may be carried out. The device comprises a cylindrical container 11 which is closed at one end by a perforated bottom 12 and at its other end by a lid or cover 14. A tube 15, attached to the sidewall of the container, extends from adjacent the perforated bottom upwardly through the top of the container. The lower end 16 of the tube is formed to provide a jet for directing a sheetlike flow of gas into the container circumferentially, parallel to, and adjacent the perforated bottom 12. A manually operated valve 17 is connected to the outer end of the tube 15 and is used to control the quantity of gas, which in this instance is air, admitted to the tube from a suitable source (not shown) through a supply tube 18. The valve 17 is preferably a three-stage control, that is, it is designed so that it may be adjusted to a position in which it permits a large quantity of air to pass through it; it is adjustable to a second position in which the flow of air is reduced, and to a third position in which the flow of air is cut off. The purpose of this three-stage valve will be fully set forth hereinafter. The cover 14 fits the container tightly and is cut out at 19 to provide an opening through which the tube 15 extends. While it is preferred to extend the tube along the inside wall of the container, the device may be

constructed in any suitable manner so that the air discharge jet causes the air to enter the container as previously described.

In operating my apparatus, I first introduce into the container a quantity of the objects which are to be painted and which, if necessary, have been first degreased. The cover is then placed on the container. For the best results the quantity of objects introduced into the container at any one time should not exceed two-thirds the total capacity of the container, the remaining space being utilized to permit the necessary free movement of the objects during the drying operation. The container is held in an upright position and the objects therein are immersed in the coating material by lowering the container into one compartment of a tank **20** (Figure 4) which contains a bath of the paint with which the objects are to be coated. When the container is in the bath, the paint flows through the perforated bottom **12**, into the container to completely cover the objects. After the objects have been immersed, the valve **17** is opened to its low-stage and the air entering the container causes the objects to be thoroughly agitated. Agitation of the objects while they are immersed in the coating material insures that they cannot remain in a stacked condition and that all of the surfaces thereof will be covered. Preferably, the flow of air through the jet is now interrupted and the container is elevated above the bath and suspended from the edge of the tank, as indicated in dotted lines, by a supporting bracket **21** which is suitably secured to, and forms a part of, the container. This operation permits the excess paint to drain from the objects and container back into the tank. After the objects have drained, but before the paint thereon begins to dry, the container is removed from above the bath and is hung by the bracket **21** in the other compartment of the tank, as indicated, and the valve **17** is opened to its high-stage. The sheet-like, high-velocity stream of air entering the container adjacent its bottom keeps the objects in continuous motion, thereby causing any excess paint still remaining on them to be removed. The air imparts a rotary motion to the mass of objects in the container and as the objects pass the jet, the air lifts and supports them while turning them. Thus all surfaces of the objects are uniformly subjected to the drying action of the air while at the same time the paint adhering to such surfaces is uniformly distributed. The air is permitted to flow until the coating on the objects has completely dried. The openings in the bottom of the container provide for the escape of the exhaust air and any excess paint removed from the objects by the air.

In Figures 5 and 6, there is shown another device for carrying out the surface treating operation, which device may be preferred because it is capable of accommodating a greater quantity of objects and because collision between the objects during their treatment is minimized. This device comprises a cylindrical container **25** having an inverted conical bottom **26** with an air jet **27** in the tip thereof. A valve **17***a* is connected to the lower end of the jet **27**. An open ended tube **28** is supported centrally and vertically within the container by bolts **29**. A cover **30**, including a centrally disposed deflector **31** and an outer depending skirt **32**, tightly fits the top of the container. The deflector is preferably cone-shaped and of wood or other cushioning material. The skirt extends downwardly outside the container and forms a deflector for exhaust air which may

escape through outlet ports **33** which are formed in the container near the top thereof. The length and diameter of the inner tube **28** is such that it and the container form a pair of chambers **34** and **35** which are interconnected by passages **36** and **37**. The device is provided with a bracket **38** by which it may be supported from a vertical panel or by the side of the paint tank **20**.

This device is used only for drying the coating material upon the objects. In using it, the objects are first dipped in the coating material and drained, and prior to hardening of the coating material on the objects, the latter are placed in the container. The cover is then fitted securely to the container and the valve **17***a* is opened. The jet **27** is positioned to direct a stream of air upwardly and centrally through the inner chamber **34**. The deflector **31** breaks up the air stream and the exhaust air is discharged from the container through the openings **33** being deflected downwardly by the skirt **32**. The air outlets are preferably positioned as shown in the drawings but their location is not critical. They may, for example, be formed in the cover. The cone shaped bottom **26** forms a receptacle **39** which directs the objects therein toward the center of the container where they are "picked up" by the air stream issuing from the jet **27** and are blown upwardly through the chamber **34**, directed outwardly by the deflector, and returned by gravity through the outer chamber **35** to the receptacle **39** so that they may again be "picked up" by the air stream to start anew the cycle described. The device will operate without the inner tube **28** but its use is highly desirable because it minimizes collisions between the rising and descending objects.

In Figures 7 and 8, a more simplified form of device is shown. In this embodiment the casing is provided by a pair of cooperating sections **40** and **41**. The said sections are secured together by a central bolt **42** and provide an annular drying chamber. A jet **43** having a valve **17***b* extends into the casing through the section **40** and directs a stream of air into the device at the lower side of the drying chamber and circumferentially of the annular wall thereof. The air entering the drying chamber is thus adapted to cause the objects to travel in a circular path in a vertical plane. Hence during a portion of their travel, the objects will, as in the embodiments heretofore described, be elevated and turned free of all contact with the walls of the drying chamber. Openings **44** are formed in the device to permit the escape of exhaust air therefrom.

From the foregoing it will be apparent that in all of the described devices the gaseous medium is directed against the objects in such manner as to elevate them and while they are elevated to turn them, thereby exposing all of their surfaces to the drying and coating-distributing action of the gaseous medium. The apparatus is highly effective and enables the objects to be coated rapidly, economically and in mass or batch quantities.

While the invention is described in connection with an apparatus for painting objects, it is to be understood that this is by way of illustration only and that the invention may be availed of with equal advantage in treating objects which are intended to be impregnated or impregnated and coated.

I claim as my invention:

1. Apparatus for use in coating manufactured objects of the character described, comprising a

container into which said objects are introduced, said container having a perforated bottom through which coating material containing a liquid solvent may be introduced into the container to coat said objects and may thereafter drain to remove excess material from said objects, and means for directing a jet of a gaseous medium into the container in such manner as to elevate said objects and thereby increase the effectiveness of the gaseous medium in evaporating the solvent of the coating material on said objects.

2. Apparatus for coating manufactured objects such as washers comprising a first container for a coating material containing a liquid solvent and second container into which said objects may be introduced, said second container having a perforated bottom wall and being adapted for immersion in a body of said coating material in said first container, said perforated bottom wall permitting excess coating material to drain from the objects when the second container is removed from the coating material in said first container, and means for directing a jet of a gaseous medium into the second container in such a manner as to elevate said objects and thereby increase the effectiveness of the gaseous material in evaporating the solvent of the coating material.

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