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METHOD AND APPARATUS FOR SPRAY PAINTING SMALL ARTICLES

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FIG. 1

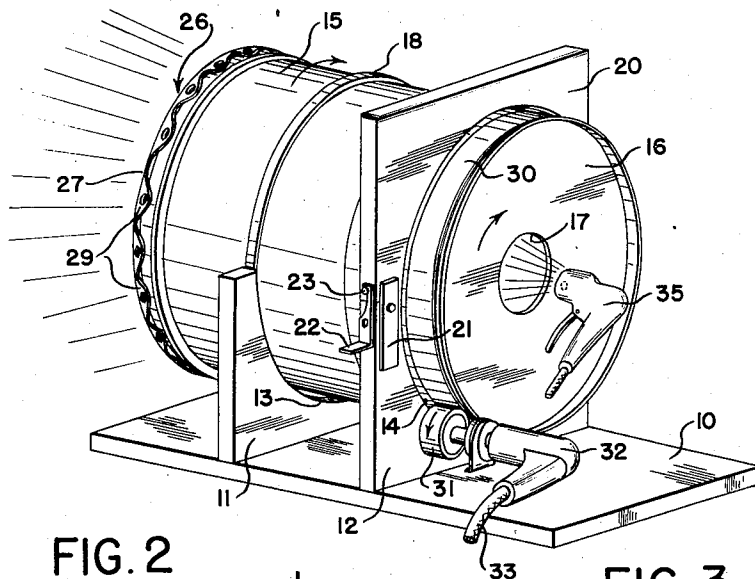


FIG. 2

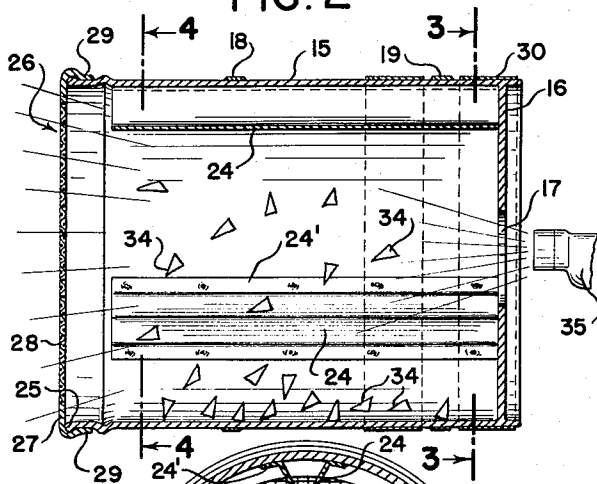


FIG. 3

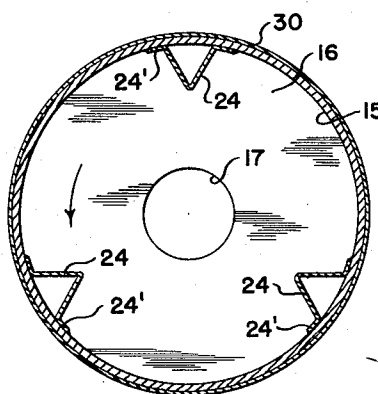
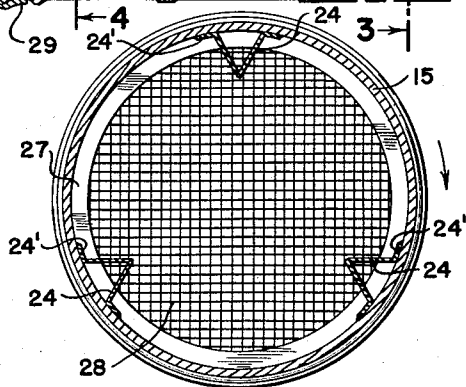


FIG. 4



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METHOD AND APPARATUS FOR SPRAY PAINTING SMALL ARTICLES

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4 Claims. (Cl. 118—303)

The present invention relates to the spray coating of small articles with paint and like materials, and more particularly to an improved method and apparatus for spray painting a large plurality of small articles at one time.

The handling of small articles for painting presents substantial practical problems in connection with the manufacture of such parts. Thus, in order to assure that all surfaces of the article are properly covered, it is necessary to provide for the relative movement of the parts and the spray applicator so that the spray is directed toward all surfaces of the parts. Where the volume of manufacture of the parts is such as not to warrant elaborate handling apparatus, it has been common practice to hang or hand-hold the parts during the spraying operation. As will be readily apparent, this involves considerable time and labor expense, which, in the manufacture of small parts, may constitute an excessive proportion of the final cost.

Accordingly, the present invention provides new and improved arrangements for the handling of small parts so that a large plurality thereof may be spray painted at one time, without undivided handling of the parts and with improved efficiency in the utilization of the paint.

More specifically, the invention provides an improved method and apparatus for spray painting a large plurality of small articles wherein the articles are placed in a revolvable container and caused to tumble therein in a random manner. A spray of paint is directed through the container, from one end to the other thereof, so that all surfaces of all parts are exposed to the spray and are evenly coated in a minimum of time. In accordance with the invention, the container has a small aperture at one end, through which the spray gun or applicator may be projected, and a removable screen cap is provided at the other end of the container to permit the spray of paint to pass freely out of the container, to be exhausted. The removable screen cap normally retains the parts within the container, but may be readily detached from the container for removal of painted parts or placing of new parts in the container.

As an ancillary but important feature, the invention provides a new and improved apparatus for spray painting a large plurality of small articles which is compact, of simplified construction, and capable of inexpensive manufacture. The new apparatus is also ideally suited for general utilization for painting of parts of any shape and may thus be efficiently employed in a variety of operations.

For a better understanding of the invention, reference should be made to the following detailed description and accompanying drawings, in which:

Fig. 1 is a perspective view of a spray painting apparatus constructed in accordance with the teachings of the invention;

Fig. 2 is a longitudinal section view of the parts con-

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tainer incorporated in the apparatus of Fig. 1, illustrating the spray painting method of the invention;

Fig. 3 is a transverse cross-sectional view taken along line 3—3 of Fig. 2; and

Fig. 4 is a transverse cross-sectional view taken along line 4—4 of Fig. 2.

Referring now to the drawing, the numeral 10 designates a base member, upon which are mounted longitudinally spaced supports 11, 12. The supports 11, 12 are provided with semicircular recesses 13, 14, respectively, which are aligned along a common axis and have suitable anti-friction bearing means (not shown) therein.

Carried by the supports 11, 12 and journaled for rotation by the anti-friction bearing means therein, is a cylindrical container 15. The container is open at one end and has a wall 16 substantially closing its other end. The end wall 16, in accordance with the invention, has a relatively small aperture 17 located in concentric relation with the cylindrical side wall of the container.

At spaced points between its ends, the container 15 has bearing rings 18, 19 which, in the assembled apparatus, are received within the semi-circular recesses 13, 14 in supports 11, 12 and engaged with the anti-friction bearings therein. The rings 18, 19 and bearing provide for the free rotation of the cylindrical container 15 on the supports 11, 12, as will be readily understood.

To retain the container 15 on the supports 11, 12, one or both thereof may be provided with means extending over the upper part of the container to restrain the latter against upward movement. In the illustrated apparatus the support 12, toward the back of the container 15, is provided with a retaining member 20 hinged at one side to the support 12 and releasably engaging the support 12 at the other side. In the perspective view of Fig. 1, a suitable hinge (not visible) connects the retainer 20 to the support 12 at the right-hand side of the apparatus, as viewed from the back. At the other side, the support 12 has guides 21, which project upwardly and engage the opposite surfaces of the retainer 20 to properly align it with the support. Also mounted on the support 12 is a pivoted locking member 22 which engages with a projection 23 on the retainer 20 to hold the latter down, in its assembled position.

In accordance with the invention, the container 15 is provided interiorly with an evenly spaced plurality of longitudinally extending baffles 24. In the illustrated apparatus, the baffles 24 are straight, generally triangular in cross section, and have flanges 24' at the base enabling the baffles to be conveniently secured to the inner walls of the container 15, as by welding, for example. The baffles 24 extend throughout substantially the whole of the length of the container 15, and if desired, instead of being straight as shown in Fig. 2, may be curved baffles, and placed in a generally helical arrangement about the interior of container 15. In the apparatus illustrated herein, three baffles 24 are provided, but it is to be understood that a larger or smaller number may be used.

At its forward or open end, the container 15 has a lip or bead 25 forming a small outward projection. Received over the open end of the container 15 and removably locked in place by the bead 25 is a cap 26 comprising a thin annular frame 27 and circular screen 28. The annular frame 27 has minimum radial dimensions, sufficient merely to impart adequate strength to the cap 26 and to provide a surface for mounting the screen 28 by its peripheral edge portions. The frame also has a plurality of axially projecting spring-like retaining tabs 29 which are received over the annular bead 25 at the front end of the container 15 and serve to releasably retain the cap 26 in a closed position at the front of the container. As is shown in Fig. 2, the retaining tabs 29 have recessed portions for

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receiving the bead 25 and lip portions which press resiliently inward against the side wall of the container 15 to effect a resilient engagement of the tabs 29 with the bead 25.

Adjacent its closed end, the container 15 is provided with a circular band 30 which is exposed at the back side of the rear support 12. The band 30 is adapted to be engaged with a driving wheel 31, having a surface of friction material, such as rubber. The driving wheel 31 is supported for rotation on the base 10, and, in accordance with the invention, is driven by an air motor 32 that is supplied through an air line 33 with compressed air from a suitable source thereof, not shown. The use of the air motor 32 is particularly advantageous in its present application, since the possibility of causing an explosion of the paint-air mixture is wholly obviated, and no additional equipment is required in connection with the compressed air source and lines inasmuch as the spraying of the paint is conventionally carried out with compressed air. If desired, however, the container may be belt driven or gear driven, and an enclosed electric motor employed as the driving force.

To effect the spraying of a large plurality of small articles using the new method and apparatus, the screen cap 26 is removed from the front end of the container 15, and a large number of unpainted articles 34 are inserted into the container from its open end. These articles for example may be support clips or electrical clips to be painted, or shims to receive zinc chromate primer. The screen cap 26 is then replaced, being thereby locked in place by the plurality of tabs 29.

After the unpainted parts 34 are placed in the container 15 and confined therein by the screen cap 26, the air motor 32 is energized to drive the wheel 31 and effect the rotation of the container 15 on its supports 11, 12. The motor 32 is arranged to drive the container at a speed such that the parts 34 will not be held against the interior walls of the container by centrifugal force, but will be carried upwardly by the baffles 24 and then caused to drop to the bottom of the container by gravity. This effects a thorough tumbling of the parts 34, so that the parts are kept in random motion.

When the container is rotating in the manner desired, a paint spray gun 35, which in itself may be of conventional design, is held up to or secured near the aperture 17 in the rear wall 16 of the container, and a spray of paint is directed into the interior of the container through the aperture 17. In this respect, it will be understood that the aperture 17 is concentric with the walls of the container 15, and therefore with the axis of rotation thereof. Accordingly, the position of the aperture does not change when the container is rotating.

As the spray of atomized point is directed into the interior of the container 15 by the spray gun 35, it falls upon the exposed surfaces of the parts 34 confined within the container. The spray is effective throughout the whole of the length of the container 15 since the forward end thereof is open to the flow of the atomized paint, and the spray moves longitudinally through the container substantially unimpeded, except for the presence of the parts 34. Such of the paint particles as are impinged upon the parts 34 are retained thereon, in the desired manner, while the excess flows freely out of the front end of the container through the screen cap 26, and is exhausted in a conventional manner, as by passing through a water screen, for example.

If desired, an automatic spray gun arrangement can be used with the gun arranged to operate cyclically. For instance, the gun can spray for three seconds, shut off for seven seconds, spray for three seconds, shut off for seven seconds, and so on for a total of six or so cycles. The seven second or so drying period of each cycle permits the paint particles on each part 34 to dry somewhat, thereby inhibiting the accumulation of excess paint on the parts and preventing them from sticking together. Preferably,

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the drying periods for each cycle are obtained by shutting off by automatic means the flow of paint to the gun, while allowing the high pressure air responsible for spraying the paint to continue to flow through the spray gun so as to contribute somewhat to the drying of the parts.

At all times when the container is rotating, the parts 34 are tumbled about at random so that all surfaces thereof are presented to the direct flow of the paint spray. In this manner, all parts are fully covered with the paint in a practical minimum of time.

After the operation has continued for a sufficient length of time to effectively coat all surfaces of the plurality of parts 34, the spray gun 35 is shut off and the air motor 32 de-energized. The rotating container 15 is allowed to come to rest, and the screen cap 26 is then removed to enable the painted parts to be discharged into a suitable container for heating, drying or other further operations. Preferably, the discharge of the painted parts is effected by merely tipping the entire assembly so that the parts fall by gravity out of the open end thereof.

The advantages of the invention should now be apparent. The new method and apparatus provide for high efficiency in the painting of small articles since a large plurality thereof may be painted at the same time without special handling of the parts as has been necessary in the past. Moreover, the invention provides for an efficient utilization of the paint, because the flow of atomized paint is passed about the randomly moving parts throughout a relatively substantial longitudinal distance. Accordingly, there is a maximum opportunity for the paint particles to fall upon a surface of one of the parts before reaching and passing out through the screen cap 26.

Another advantage of the new apparatus is that it may be inexpensively manufactured and is capable of use in connection with the painting of a wide variety of parts, so that the apparatus is suitable for economical use in small operations, as well as large.

It should be understood, however, that the specific form of the invention herein illustrated and described is intended to be representative only, as certain changes may be made therein without departing from the teachings herein disclosed. Reference should therefore be made to the following appended claims in determining the full scope of the invention.

I claim:

1. Apparatus for spray coating a large plurality of small articles comprising in combination a container, said container being open at one end so that a flow path can be established therethrough, means to support said container for rotation about a substantially horizontal axis, a wall substantially closing the other end of said container, in which is located a relatively small aperture disposed in concentric relation to the axis of rotation of said container, a screen cap removably secured to said container at the open end thereof, baffle means disposed on the inner walls of said container for agitating said articles while said container is rotating, means for rotating said container, and means located adjacent said aperture for directing a spray of coating material through the interior of said container and toward said screen.

2. The spray coating apparatus of claim 1, further characterized by said means to rotate comprising an air driven motor.

3. Rotating apparatus for the spray coating of a large plurality of small articles comprising a container mounted for rotation about a substantially horizontal axis, one end of said container being substantially closed but having a centrally disposed aperture therein, the other end of said container being open and covered by a screen, spray means disposed adjacent said aperture and arranged to establish a flow path through said container by directing a spray of coating material through the interior of said container during the rotation thereof, the sprayed material being substantially unimpeded by said screen, with a portion of the spray not intercepted by

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articles in said container making its exit through said screen.

4. The device as defined in claim 3 in which said screen is removable for the loading and unloading of articles from said container.

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