

Filed April 17, 1947

2,487,111

2 Sheets-Sheet 1

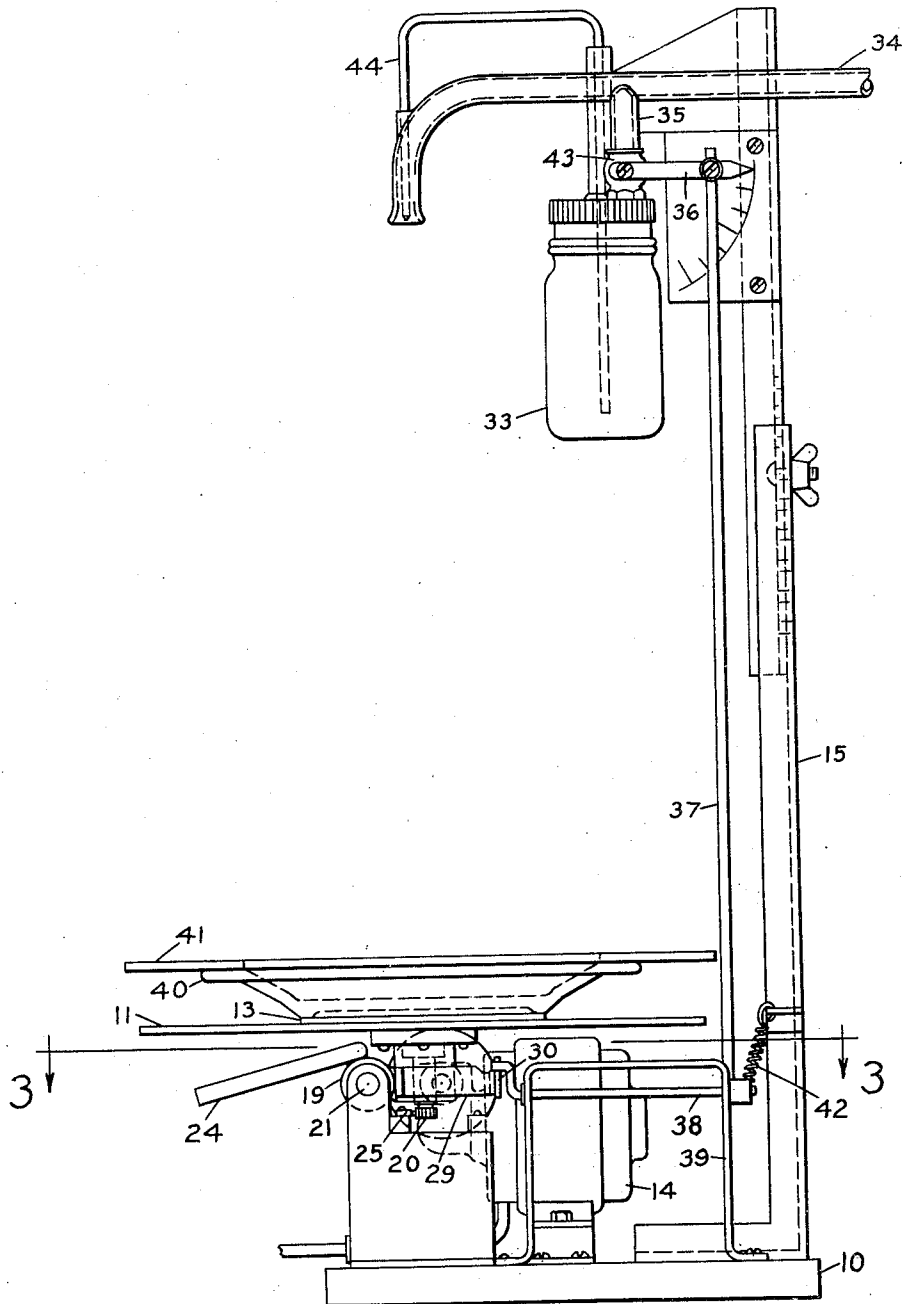


FIG. 1.

BY

BY
Richard A. Parsons
ATTORNEY

Nov. 8, 1949

P. J. DE KONING
ARTICLE COATING APPARATUS FOR
APPLYING UNIFORM COATINGS

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2 Sheets-Sheet 2

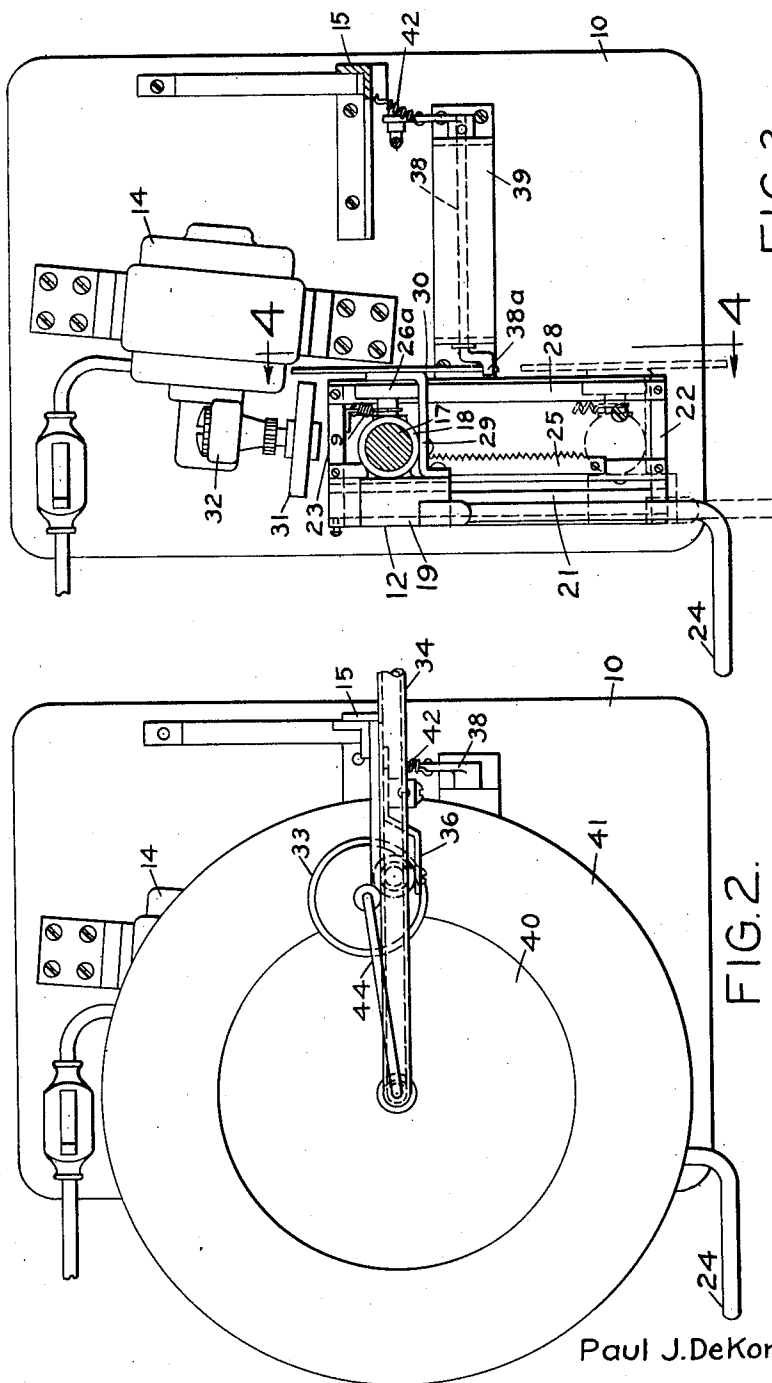


FIG. 3.

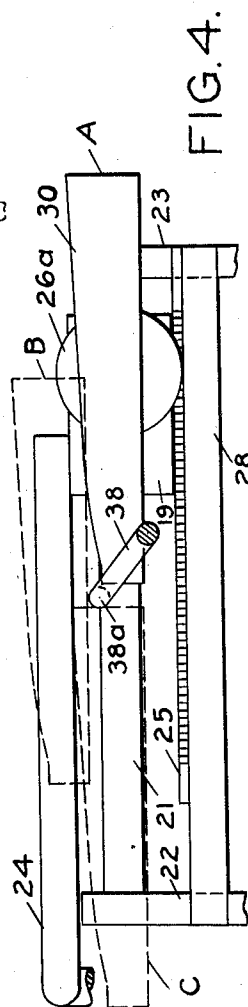


FIG. 4.

Paul J. DeKoning INVENTOR.

BY
Richard A. Parsons
ATTORNEY.

UNITED STATES PATENT OFFICE

2,487,111

ARTICLE COATING APPARATUS FOR
APPLYING UNIFORM COATINGS

Paul J. De Koning, East Lansing, Mich., assignor
to National Sanitation Foundation, Ann Arbor,
Mich., a corporation of Michigan

Application April 17, 1947, Serial No. 742,077

5 Claims. (Cl. 91—45)

1

This invention relates to apparatus for spraying a uniform coating of liquid material on dishes or similar articles.

The principal object of the invention is to provide a novel apparatus of this character in which an article support is rotatable and horizontally reciprocable relative to a liquid spray directed toward the article support.

Another object of the invention is to provide a novel means for rotating and reciprocating the article support.

Another object of the invention is to provide means for varying the intensity of the spray in accordance with the reciprocatory movement of the article support.

While the present invention is a complete unit in itself, and is adapted to uniformly coat dishes with a thin film of uniform thickness, it is especially intended as a part of apparatus for testing the efficiency of dish washing machines. Dishes are uniformly covered with a soil coat by means of the washing machine to be tested, and thereafter the dishes are tested for cleanliness by another apparatus. The latter apparatus is the subject matter of my copending application for Letters Patent, Serial No. 742,078, filed April 17, 1947.

It will be evident as the description of the present invention proceeds, that it need not be confined to the specific use mentioned, but may be employed for such other purposes as uniformly glazing or painting various articles.

For a more thorough understanding of the invention, reference is made to the following specification and the accompanying drawings, wherein:

Figure 1 is a side elevational view of an article coating machine embodying the present invention;

Figure 2 is a plan view of the same;

Figure 3 is a cross-sectional view taken on substantially the line 3—3 of Figure 1; and

Figure 4 is a fragmentary cross-sectional view taken on substantially the line 4—4 of Figure 3.

In its overall aspects, the present invention comprises a support on which a turntable is rotatably and reciprocably mounted, means for rotating and reciprocating the turntable, spray mechanism for directing a spray of liquid toward the turntable, and means connected to the spray mechanism for regulating the intensity of the spray in accordance with reciprocatory movement of the turntable.

The support mentioned comprises a flat bed 10 and an upright standard 15. The standard 15

2

is fixedly connected to the bed 10. In turn, the standard carries the spray mechanism. Preferably the standard 15 is made in two overlapping parts which are capable of relative adjustment whereby to regulate the length of the standard. A bolt and wing nut 16 is provided for fastening the parts of the standard in any adjusted position.

The turntable designated by the numeral 11 comprises a flat, preferably circular, disk rotatably mounted on a reciprocatory carriage 12. The carriage 12 is preferably a one piece casting having a vertical cylindrical bearing 18 and a horizontal cylindrical bearing 19. A spindle 17 fixed to the center of the turntable depends therefrom. The spindle 17 is rotatably mounted in the vertical bearing 18. The lower end of the spindle 17 projects below the bearing 18 and is provided with a pinion 20, the purpose of which will appear presently. A circular pad 13 of frictional material is affixed to the center of the turntable.

The bearing 19 is rotatably and slidably mounted upon a cylindrical bar 21 which extends horizontally and transversely of the bed 10. The bar 21 is fixedly mounted in two upright brackets 22 and 23. These brackets are arranged in parallel spaced apart relation, as shown in Figure 3. A handle 24 is fixedly connected at one end to the carriage 12 whereby the latter may be rotated a limited amount on the bar 21. A stud 26 projects laterally from the bearing 18 in the carriage 12, as shown particularly in Figure 3. A roller 26a is rotatably mounted on the end of stud 26 remote from bearing 18. A coil spring 27 is connected at one end to the stud 26 and at the other end to the bracket 23. The purpose of this spring will appear later.

An elongated toothed rack 25 is fixedly mounted upon the brackets 22 and 23 parallel to the bar 21. The rack 25 is located in a position to engage the pinion 20 when the spindle 17 is in a vertical position. A guide 28 is mounted upon the brackets 22 in a parallel relation to the bar 21 and rack 25. The roller 26a rides upon the guide 28. An angle member 29 is fixedly connected at one end to the carriage 12. The other end of the angle member carries a cam 30, the configuration of which is illustrated in Figure 4.

As will be evident from the preceding description, the turntable 11 is rotatable in the bearing 18, and because of the normal meshing engagement of pinion 20 with rack 25, when the turntable is rotatable in a counter-clockwise direction, as viewed in Figures 2 and 3, the turn-

3

table 11 and the carriage 12 move laterally with respect to the bed 10 from the broken line position in Figure 3 to the full line position. During this movement, the bearing 19 slides along the bar 21. When the carriage has reached one extremity of its movement (the position shown in full lines in Figure 3) it can be released by pushing downwardly on the handle 24. This tilts the carriage in a counter-clockwise direction, as viewed in Figure 1, releasing the pinion 20 from the rack 25. The carriage can then be pulled to the other end of its reciprocatory travel (the position shown in broken lines in Figure 3), in readiness for another operative cycle.

The mechanism for rotating and reciprocating the turntable 11 comprises a motor 14 and a drive wheel 31. The drive wheel 31 is a circular disk which frictionally engages the under side of the turntable 11. The disk is driven through a reduction gear drive, indicated generally by the numeral 32. Normally the drive wheel 31 is in engagement with the turntable 11, but such frictional driving connection is released when the handle 24 is pushed downwardly.

The spray mechanism is mounted on the standard 15 in a manner clearly disclosed in Figure 1. The spray mechanism comprises a container 33 to which is connected a source of compressed air (not shown), through conduits 34 and 35. The latter conduit extends downwardly from conduit 34 and into the container. A valve 43 of the butterfly type is mounted in the conduit 35 and is opened and closed by a lever 36.

The conduit 34 extends horizontally beyond the conduit 35 and is bent downwardly at its extremity so that the end of the conduit 34 is directed downwardly over the center of the turntable 11 when the latter is in its initial position, shown in Figure 2. A pipe 44 of small diameter has one end extending nearly to the bottom of the container 33. The other end of the pipe 44 extends through an opening in the side of conduit 34 and down to the open extremity of the conduit 34. The latter end of the pipe 44 is formed to provide a nozzle and is axially aligned with the open end of the conduit 34. The pipe 44 is of smaller diameter than the conduit 34 so that compressed air passing through this conduit will flow past the nozzle and draw fluid from the pipe 44 and expel the same toward the turntable.

The fluid placed in the container 33 is usually a relatively viscous one and is not readily drawn from the container by the aspirating action of the air flowing out through the conduit 34. Thus, air under pressure is introduced into the container through the conduit 35. The pressure of the air on the fluid in the container, plus the aspirating action of the air discharged from conduit 34 at the nozzle end, expels the fluid from the container and atomizes the same.

The rate of flow of fluid from the conduit 34 is controlled by means of the valve 43. It is necessary to regulate the rate of flow of fluid in order that the coating applied to a dish 40 or other article on the turntable will be uniform.

The valve 43 in the conduit 35 is opened and closed by the cam 30 through the medium of a valve lever 36, a rod 37, a crank 38, and a spring 42. The valve lever 36 is fixed to the stem of the valve 43. The rod 37 is pivotally connected at its upper end to the lever 36 and at its lower end to the arm of the crank adjacent the standard 15. The crank 38 is pivotally journaled in a U-shaped bracket 39 attached to the bed 10.

4

The arm (designated 38a) of the crank 38 adjacent the cam 30 lies in the path of the cam. The spring 42 is connected to the crank 38 and to the standard 15 in such a way as to tend to close the valve 43. The arm 38a of the crank 38 rides upon the top of the cam 30 during the time the carriage 12 moves from the full line to the broken line position in Figure 3, or from left to right in Figure 4, and as it reciprocates with the carriage 12 the crank is rotated and the valve 43 opened and closed.

To use the invention in its intended manner, a dish 40 is placed upon the pad 13 in the center of the turntable. The dish is partially covered by a mask 41 which, in the present instance, is an annular ring. The motor 14 is started. All parts are then in the full line positions in Figures 3 and 4. The handle 24 on the carriage 12 is depressed, tilting the carriage counter-clockwise, as view in Figure 1, and disengaging the pinion from the rack 25. The rotation of the carriage about the bar 21 lifts the cam 30 to a level above the free end of the crank arm 38a. The handle 24 is pulled in a direction toward the left, as view in Figure 4, which moves the carriage and turntable to the broken line position B in Figure 4. When the carriage reaches the position shown in broken lines in Figure 3, the cam 30 will have travelled past the crank arm 38a. The handle 24 is then released, whereupon the carriage rotates clockwise, as seen in Figure 1, so that the pinion 20 meshes with rack 25 and the cam 30 drops to the broken line position C in Figure 4.

As soon as the carriage and its turntable have been lowered to their normal positions the pinion 20 meshes with the rack 25 and the turntable engages the driving disk 31 connected to the motor. The turntable then begins to rotate counter-clockwise, as viewed in Figure 2. Rotation of the turntable imparts a corresponding rotation of the pinion 20 which causes the carriage to move toward the full line position shown in Figures 3 and 4. The carriage moves from left to right in Figure 4. As the cam 30 moving with the carriage strikes the crank arm 38a it quickly pushes it to a vertical, or nearly vertical, position and relatively abruptly opens the valve 43, permitting a spray of liquid to descend upon the dish 40. When the crank arm 38a reaches the aforesaid vertical position the cam moves under the crank arm 38a, and as the cam moves along with the carriage the crank 38 is permitted to rotate counter-clockwise, as viewed in Figure 4, and slowly close the valve 43. When the carriage 12 and the cam 30 reach the full line positions shown in Figures 3 and 4, the valve 43 will be closed.

It will be noted that the left hand end of the cam, as seen in Figure 4, has a relatively abrupt inclination, so that as the carriage nears its position of rest the valve 43 will close abruptly.

The reason for the relatively abrupt inclination at the left hand end of the cam 30 is to decrease the spray relatively abruptly as the cone of the spray nears the center of the dish 40. The spray expelled from the nozzle of the pipe 44 is in the form of an elongated relatively narrow cone which deposits the coating material on the dish on the turntable in a spiral band as the turntable rotates. As the base of the spray cone nears the center of the dish, the area of the base of the spray cone increases rapidly relative to one revolution of the spiral band. Therefore, to produce an evenly coated plate it is es-

essential that the rate of flow be controlled by closing the spray control valve relatively rapidly as the plate center approaches the spray.

From the foregoing it will be apparent that the present invention provides a simple and efficient mechanism for uniformly spraying a coating of liquid material upon various articles, such as dishes and the like.

The scope of the invention is indicated in the appended claims.

I claim:

1. A device of the character described comprising a support, a traversing carriage mounted upon said support for reciprocatory movement, a turntable rotatably mounted upon said carriage, means associated with said turntable for rotating the same, means associated with said carriage for reciprocating the latter, spray mechanism positioned above said turntable for spraying a coating upon an article placed on said turntable, said means including a valve for adjusting the intensity of the spray, and means including a cam member attached to said carriage and reciprocable therewith connecting said carriage and said valve for regulating the intensity of the spray during reciprocation of said carriage.

2. A device of the character described comprising a support, a horizontal guide mounted on said support, a rack parallel to said guide and connected thereto, a carriage mounted upon said guide for reciprocatory movement thereon, a turntable rotatably mounted upon said carriage and having a pinion connected thereto engaging said rack, means on said support engaging said

turntable for rotating the latter, and spray mechanism located above said turntable for spraying a coating upon an article placed upon said turntable.

3. A device of the character defined in claim 2 wherein said spray mechanism is provided with a valve for regulating the intensity of the spray, and wherein means connects said valve and said carriage for moving said valve to regulate the intensity of the spray during reciprocatory movement of said carriage.

4. A device of the character defined in claim 2 wherein the means for rotating the turntable comprises a motor and a shaft driven thereby, said shaft having a rotary disk for frictional engagement with said turntable.

5. A device of the character defined in claim 2 wherein said carriage is pivotally mounted on an axis parallel to the direction of reciprocation of the carriage to permit disengagement of the pinion from the rack.

PAUL J. DE KONING.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
684,568	Gardner et al. -----	Oct. 15, 1901
1,201,448	Edison -----	Oct. 17, 1916
2,243,587	Turner -----	May 27, 1941
2,281,169	Pattison -----	Apr. 28, 1942
2,403,994	Paynter -----	July 16, 1946

Certificate of Correction

Patent No. 2,487,111

November 8, 1949

PAUL J. DE KONING

It is hereby certified that errors appear in the printed specification of the above numbered patent requiring correction as follows:

Column 1, line 21, after "coat" insert the words and comma *by means of the present invention, the dishes are then washed;*; column 2, line 54, for "rotatable" read *rotated*; column 4, lines 20 and 25, for "view" read *viewed*;

and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 7th day of March, A. D. 1950.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.