May 26, 1970 P. MORTIMER ET AL 3,513,808

PAINT SPRAY DEVICE

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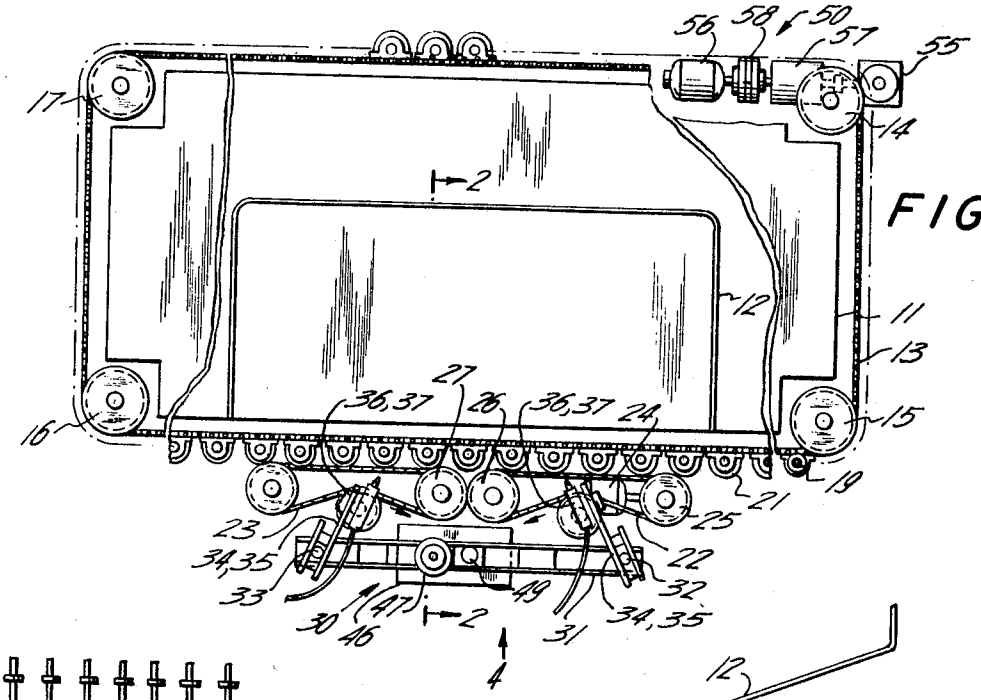


FIG. 1

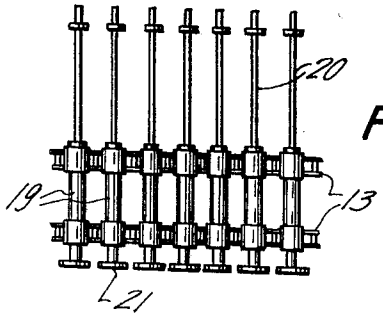


FIG. 3

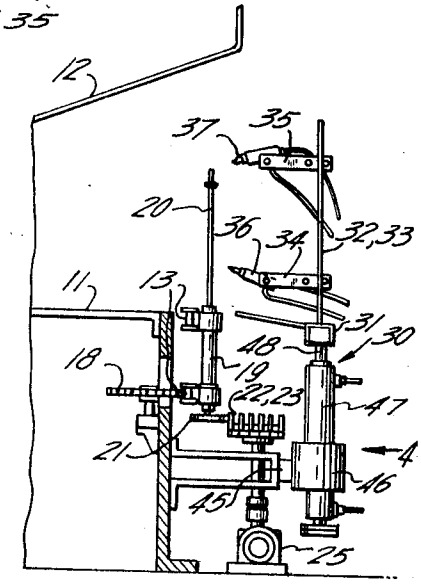


FIG. 2

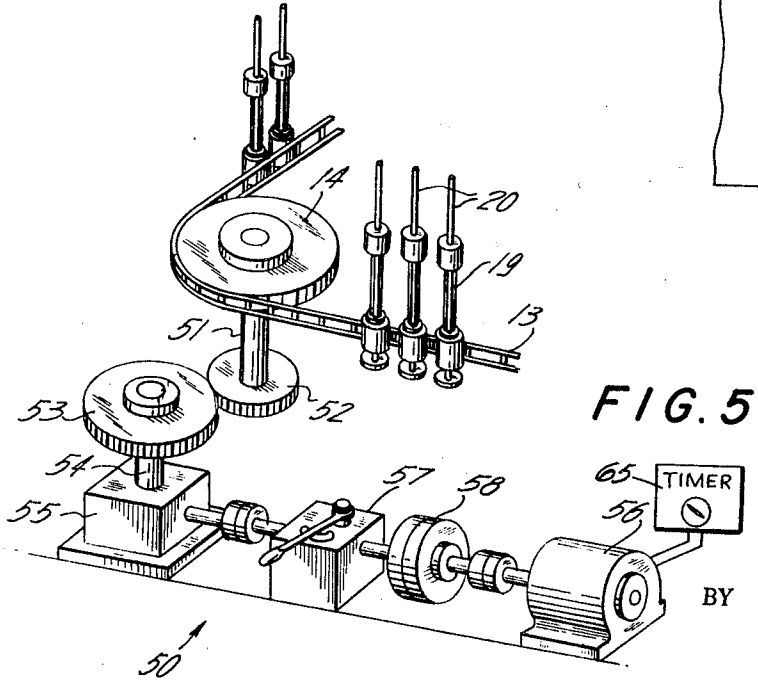


FIG. 5

INVENTORS.
THOMAS W. OLSEN
PETER MORTIMER

BY

SPARROW AND SPARROW
ATTORNEYS

May 26, 1970 P. MORTIMER ET AL 3,513,808

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FIG. 4

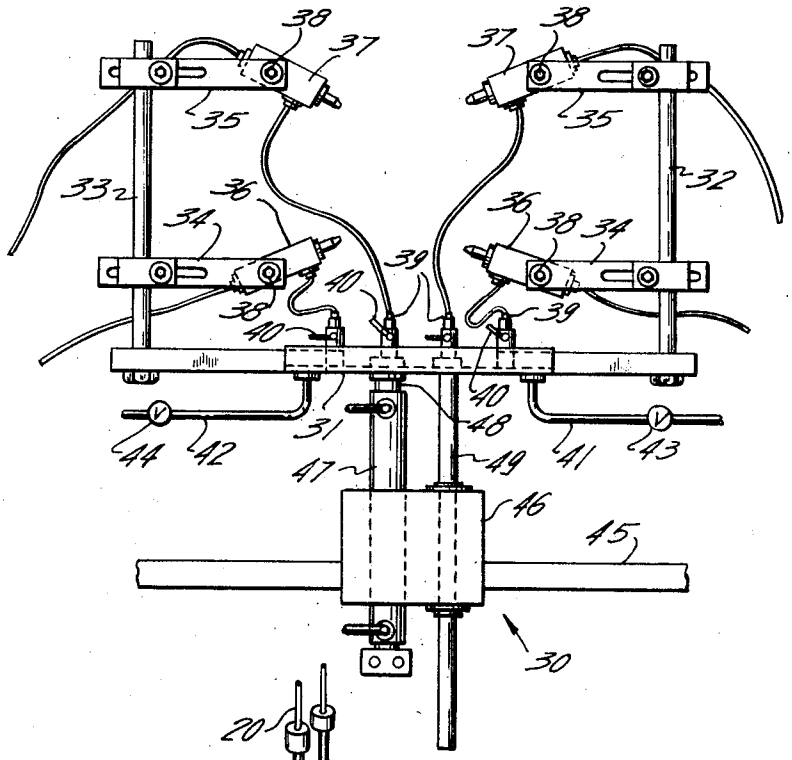
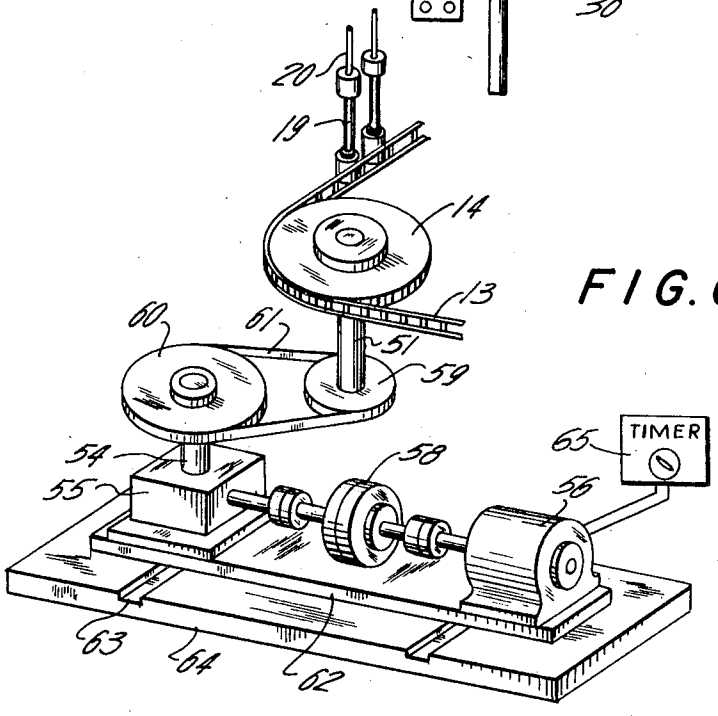


FIG. 6



INVENTORS.
THOMAS W. OLSEN
PETER MORTIMER

BY SPARROW AND SPARROW

ATTORNEY

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PAINT SPRAY DEVICE

Peter Mortimer, North Haledon, and Thomas W. Olsen, Wayne, N.J., assignors to Modern Decorating Company, Passaic, N.J.

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U.S. Cl. 118—9 8 Claims

ABSTRACT OF THE DISCLOSURE

A paint spray device including a spray booth, mounted on a base around which a periodically indexed double-chain conveyor with article carrying fixtures is arranged, so that the articles to be sprayed are moved along the front of the booth, and chain drives in front of the booth for rotating the article carrying fixtures in opposite directions consecutively during the spraying period.

Background of the invention

The invention relates to paint spraying devices, particularly to such devices in which articles to be painted by spraying are moved along in front of spray guns.

Prior art discloses devices for painting, varnishing or coating articles, in which these articles are loaded on trays or suspended from a chain or hung on hooks on such chains. The chains are part of a conveyor system and thus the articles can be passed along in front of one or more spray guns, which may be located in front or in the rear of the chain, or in both places. However, in most cases the articles to be sprayed are not flat but rather three-dimensional, for example round or cylindrical. In such cases a uniform coating may not always be attained unless special spray gun arrangements are made. The problem of an even and uniform coating on such three-dimensional articles is solved by the invention in an improved yet quite simple manner.

Summary

The invention consists in such novel features, construction arrangements, combination of parts and improvements as may be shown and described in connection with the apparatus herein disclosed by way of example only and as illustrative of a preferred embodiment. The inventive idea is to provide a novel machine which not only comprises structural arrangements for spraying the articles from all sides uniformly and evenly but also a device which offers the advantages of a continuous work operation. Objects and advantages of the invention will be set forth in part hereafter and in part will be obvious herefrom or may be learned by practicing the invention, the same being realized and attained by means of the instrumentalities and combinations pointed out in the appended claims.

It is an object of the invention to provide contrivances for a continuously operating article spraying device.

A further object of the invention is to provide a chain conveyor with freely rotatable article holding fixtures mounted thereon.

Another object of the invention is to provide for power operated spray gun fixtures which are adjustable and which optionally may or may not be moved vertically up and down.

Yet another object of the invention is to provide power

operated drive systems for rotating the article holding fixtures in front of the spray guns alternately in one direction and then in the opposite direction while the conveyor is forwardly indexed in timed sequences.

Furthermore, it is an object to provide for a compact machine of the kind described which may be simply and safely operated for an economic production.

Various further and more specific purposes, features and advantages will clearly appear from the detailed description given below taken in connection with the accompanying drawing which forms part of this specification and illustrates merely by way of example one embodiment of the device of the invention.

Brief description of the drawing

In the following description and in the claims, parts will be identified by specific names for convenience, but such names are intended to be as generic in their application to similar parts as the art will permit. Like reference characters denote like parts in the several figures of the drawing, in which

FIG. 1 shows in a schematical manner a plain view of the device of the invention;

FIG. 2 shows in more detail a cross-section along the line 2—2 in FIG. 1;

FIG. 3 shows a portion of the conveyor chain with the freely rotatable article holding fixtures, partly broken away;

FIG. 4 shows a detail view of the vertically movable spray gun fixtures, taken in the direction of the arrow 4 in FIG. 1;

FIG. 5 shows an isometric view of the conveyor chain drive; and

FIG. 6 shows a modification of an adjustable belt device.

Description of the preferred embodiment

Referring now in more detail to the drawings illustrating a preferred embodiment by which the invention may be realized, there is shown in FIG. 1 a rectangular table-like base structure **11** on which a spray booth **12** is mounted. An endless double-chain conveyor **13** is laid around table structure **11** in such manner that it is guided over the corners of table structure **11** by sprockets **14, 15, 16, 17** and supported by intermediate sprockets **18** which are shown in FIG. 2. Bearing housings **19** are arranged at every chain link, acting at the same time as vertical spacers for the conveyor **13**. Freely running vertical shafts **20** are mounted in ball bearings (not shown in the drawing) which are located in housings **19**. Vertical shafts **20** extend upwardly in such manner that they serve as receiving and supporting means for articles to be processed, as it will be described below. Each shaft **20** has a free end extending downwardly below housing **19**, on which end a roller chain sprocket **21** is fastened.

In front of booth **12** and at the same horizontal level as sprockets **21** of shafts **19** are two roller chains **22, 23**. Sprockets **21** engage in successive order chains **22** and **23**, when conveyor **13** is moving around table structure **11**. Chains **22** and **23** are driven by an electric motor **24** by way of gear box **25**. Center sprockets **26, 27** have spur gears (not visible in the drawing) which mesh with one another so that chain **23** rolls in the opposite direction of chain **22**. By this arrangement shafts **20** are

rotated in opposite directions in front of booth **12** in successive order.

A spray gun device **30** is placed in front of booth **12** outside of conveyor chain **13**, as shown in FIGS. 1 and 2. The device is shown in a larger scale in FIG. 4. The device consists of a horizontal beam **31** on which two upright posts **32, 33** are erected. Each post **32, 33** supports two horizontally extending brackets **34, 35** which can be adjusted vertically, horizontally and rotatably about their posts. Each bracket **34, 35** carries two spray guns **36, 37** in such manner that they can be rotatably adjusted about their fixing screw **38**. Beam **31** serves also as a distributor for the fluid which is to be sprayed by guns **36, 37**, and carries to that extent the necessary hose connecting fixtures **39** and valves **40**. Feed lines **41, 42** with main valves **43, 44** carry the fluid to beam **31**. Supported by a cross-brace **45** is a support block **46** on which a double-acting air cylinder **47** is fastened. The upper end **48** of the piston of air cylinder **47** is attached to beam **31**, and a vertical guide rod **49** is arranged parallel to air cylinder **47**. By this construction, beam **31** and everything that is attached to it can be moved vertically upward and downward, so that the spray of spray guns **36, 37** may cover the entire height of an article supported by shafts **20**.

The main drive **50** for chain conveyor **13** is shown in FIG. 5. Sprocket **14** is mounted on a vertical shaft **51** which has a gear **52** on its lower end. Gear **52** meshes with gear **53** which is fiixed on the vertical shaft **54** of an indexing device **55** (not shown in more detail since it is a known commercial device). Indexing device **55** is driven by the main drive motor **56** over a speed reducing gear **57** which at the same time is built as a gear shifting device. Between motor **56** and speed reduced **57** is an electro-magnetic clutch and brake device **58**.

The operation of the machine may be described as follows:

Main motor **56** is switched on and the operating cycle is started. Clutch **58** is engaged and brake is released. Chain conveyor **13** with articles loaded on shafts **20** is indexed forward. When indexing device **55** has finished its indexing movement, a microswitch is operated by it, releasing clutch **58** and engaging the brake. At the same time a timing device **65** is started while motor **24** is continuously running. Shafts **20** carrying the articles to be sprayed are rotated so that spray guns **36, 37** can apply an even and uniform coating on the articles. Obviously the vertical movement of beam **31** with the guns can be operated at the same time, if necessary. When timing device **65** has run its pre-set time, guns **36, 37**, and air cylinder **48** are stopped; timing device is re-set, clutch **58** is energized again and the brake is released. Thus the operating cycle starts again.

Obviously, there is sufficient time alloted for drying of the sprayed coating, and the finished articles can be taken off and new articles placed on shafts **20**. It is understood that any kind of dryer, infra-red, gas or electric can be applied to the chain conveyor path, if it is so desired. But such drying equipment is optional and is not claimed as new.

FIG. 6 shows a modified drive of the device for changing the speed of the conveyor chain **13**. In lieu of gears **52, 53**, there may be provided interchangeable sprockets or V-belt sheaves **59, 60** and the belt **61** can be tightened by mounting the motor **56** and gear box **55** on a base plate **62** which is slidable in slots **63** of a mounting plate **64**. By changing the diameters of the pulley **59** and **60**, it is readily seen that the speed ratio can be modified.

From the foregoing it is apparent that there is herein provided a device for coating in a continuous process articles by spraying comprising a spray both **12**, a horizontally disposed endless conveyor **13** surrounding the booth, means for driving conveyor **13** continuously, a plurality of bearing housings **19** vertically mounted on conveyor **13**, vertically upwards extending shafts **20** freely rotatably journalled in housings **19** adapted to carry the articles to be sprayed, the shafts carrying circular members **21**, endless bands **22, 23** arranged in front of booth **12**, the bands **22, 23**, being driven in opposite directions engaging members **21** for rotating shafts **20** and thus the articles thereon to be sprayed in opposite directions in a consecutive order, and spray gun apparatus **30** located in front of booth **12**, conveyor **13** carrying shafts **20** being located between apparatus **30** and booth **12**, whereby the articles may be sprayed during their rotation in one direction and then during their rotation in the other direction, while conveyor **13** is forwardly indexed in timed sequences by the indexing means.

While the invention has been described and illustrated with respect to a certain preferred embodiment which gives satisfactory results, it will be understood by those skilled in the art after understanding the principle of the invention that various other changes and modifications may be made without departing from the spirit and scope of the invention and it is intended therefor in the appended claims to cover all such changes and modifications.

What is claimed is:

1. In a device for coating in a continuous process articles by spraying, said device having a spray booth, a horizontally disposed endless conveyor surrounding said booth, means for driving said conveyor, a plurality of bearing housings vertically mounted on said conveyor, vertically upwards extending shafts freely rotatably journalled in said housings adapted to carry articles to be sprayed, said shafts carrying circular members substantially on their lower end; spray gun apparatus located in front of said booth, said conveyor carrying said rotatable shafts being located between said apparatus and said booth, two endless bands arranged in front of said spray booth, said bands having connecting gear means for being driven in opposite directions engaging said members for rotating said shafts in opposite directions in a consecutive order, whereby said articles may be sprayed during their rotation in one direction and then during their rotation in the other direction, and a timing device on said driving means for controlling the sequence of operations of said device.

2. A device according to cliam **1**, wherein said conveyor comprises a chain having links, said housings mounted on said links, said circular members comprise sprockets, and said endless bands comprise chains engaging said sprockets.

3. A device according to claim **2**, said spray gun apparatus comprising a horizontal beam, at least two upright posts spaced apart from one another on said beam, at least two adjustable horizontally extending brackets on each one of said posts, adjustable spray guns attached to said brackets and a fluid power operated motor having a double-acting piston, said piston attached to said beam for periodically moving said beam vertically up and down.

4. A device according to claim **1**, said spray gun apparatus comprising a horizontal beam, at least two upright posts spaced apart from one another on said beam, at least two adjustable horizontally extending brackets on each one of said posts, adjustable spray guns attached to said brackets and a fluid power operated motor having a double-acting piston, said piston attached to said beam for periodically moving said beam vertically up and down.

5. A device according to claim **1**, and variable speed drive means for said conveyor, said drive means comprising an indexing device for intermittently indexing said conveyor and a clutch and brake device on said drive means for starting and stopping said conveyor.

6. A device according to claim **1**, said apparatus comprising adjustable spray guns.

7. In a device for coating in a continuous process articles by spraying having a spray booth, a horizontally moving endless conveyor at the front of said booth, rotatable article holding fixtures on said conveyor, spray gun apparatus disposed in front of said fixtures; indexing means on said conveyor, a timing device connected with said indexing means, and power operated drive means for

rotating said fixtures alternately in one direction and then in the opposite direction while said conveyor is forwardly indexed in timed sequences by said indexing means.

8. A device according to claim 7, said drive means comprising endless bands arranged in front of said conveyor, and connecting gear means for driving said bands in opposite directions, said bands engaging said fixtures.

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WALTER A. SCHEEL, Primary Examiner

J. P. McINTOSH, Assistant Examiner

U.S. Cl. X.R.

118—321, 322, 326, 314