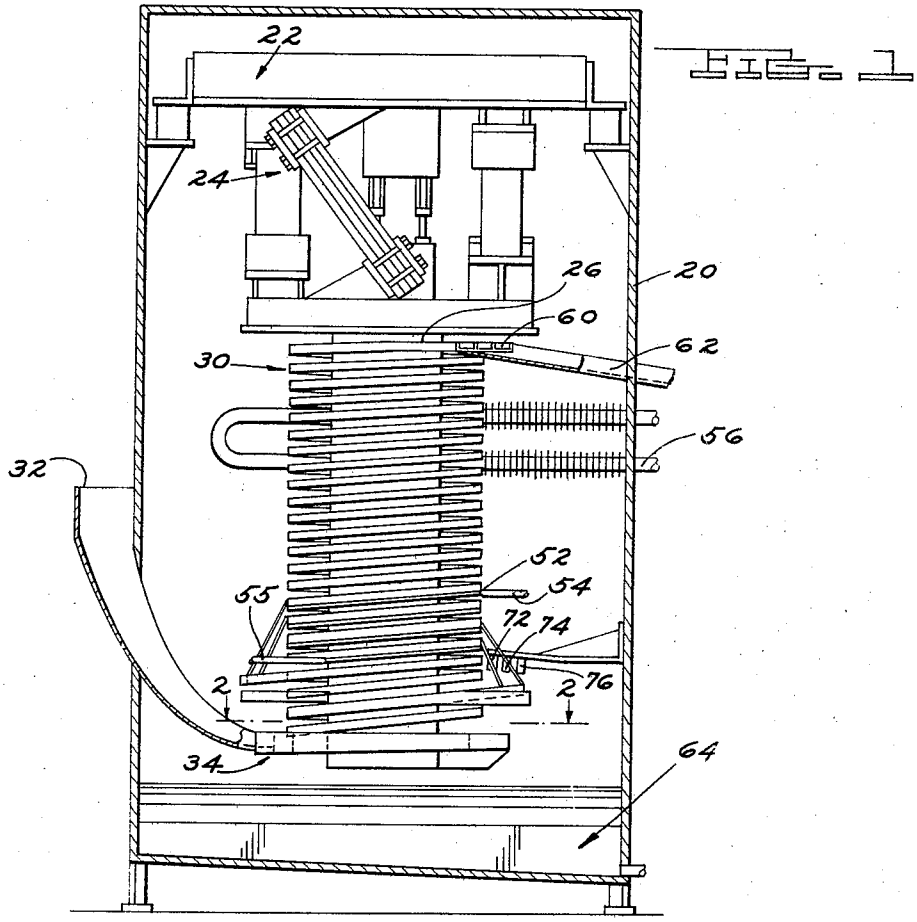
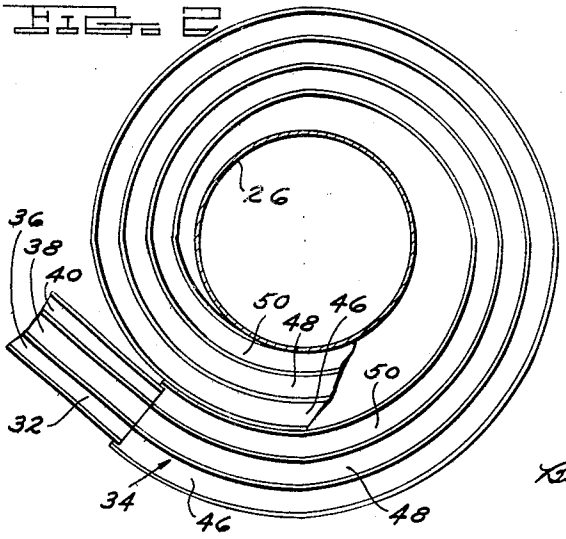
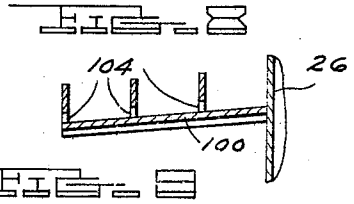
Nov. 9, 1965 R. C. WHITE 3,216,431

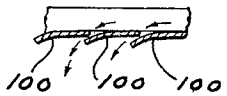
VIBRATORY CONVEYOR WITH MULTIPLE TRACK AND TURN-OUT

Filed Oct. 29, 1962 2 Sheets-Sheet 1









INVENTOR.
ROBERT C. WHITE
BY
Barnes, Kisselle, Raisch & Choate
ATTORNEYS

Nov. 9, 1965 R. C. WHITE 3,216,431

VIBRATORY CONVEYOR WITH MULTIPLE TRACK AND TURN-OUT

Filed Oct. 29, 1962 2 Sheets-Sheet 2

FIG. 3

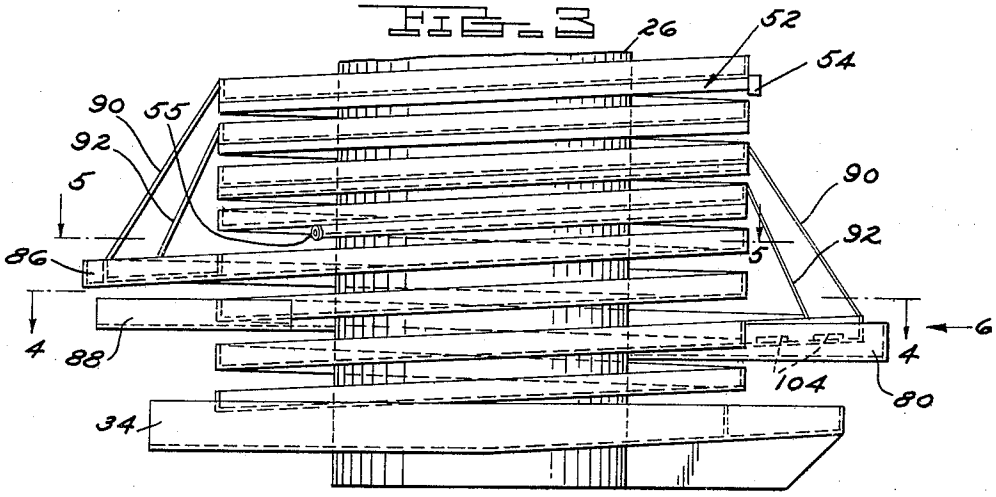


FIG. 4

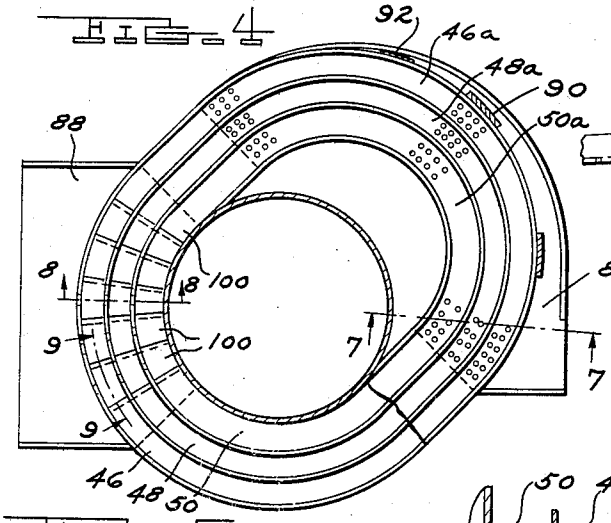


FIG. 6

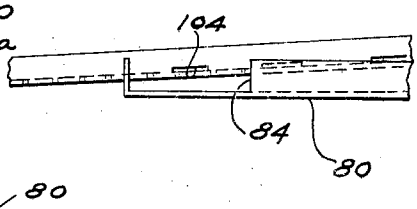


FIG. 7

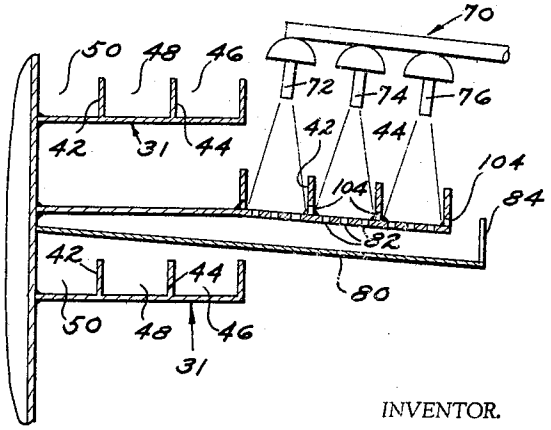
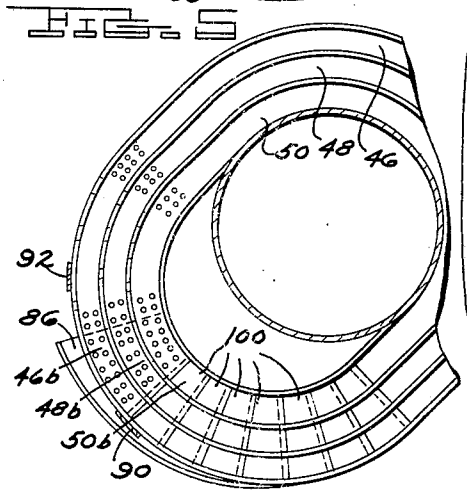


FIG. 5



INVENTOR.
ROBERT C. WHITE
BY
Barnes, Kisselle, Raisch & Choate
ATTORNEYS

United States Patent Office

3,216,431

Patented Nov. 9, 1965

3,216,431

VIBRATORY CONVEYOR WITH MULTIPLE TRACK AND TURN-OUT

Robert C. White, 26000 Capitol Ave., Detroit, Mich.

Filed Oct. 29, 1962, Ser. No. 233,836
6 Claims. (Cl. 134—132)

This invention relates to an apparatus for treating metal parts and more particularly to an apparatus for use with a vibratory spiral conveyor of the type used to move parts by incremental vibration through liquid or vapor for cleaning purposes. Full disclosures of this type of apparatus are found in U.S. reissue patent to Jones, No. 24,281, dated Feb. 26, 1957, and in U.S. patent to White, No. 3,024,133, dated Mar. 6, 1962. It will be seen that the device can be used for coating materials and also for cleaning.

It is an object of the present invention to provide a machine which can handle different parts simultaneously and also which will keep large quantities of small parts flowing through the machine without bunching up. Thus, a single machine can handle more parts and sometimes different parts at the same time. For example, sometimes right-hand and left-hand parts vary slightly and must be kept separate. In addition, elongate parts are much less apt to jam if kept in some sort of alignment. The present invention with a multiplicity of narrow tracks can accomplish this while maintaining the volume normally handled on a wide track.

It is also an object of the invention to provide special run-out sections wherein supplemental cleaning and rinsing solutions may be directed to the parts to enhance the action intended. Thus, in one automatic operation, parts can be washed, rinsed several times and dried before discharge. It is also possible to utilize different kinds of liquids in a single machine to increase its versatility. The machine can be used for washing and cleaning but also for pickling or phosphate coating, for zinc chromate treatment of die cast parts, or for a painting process or a combination of these processes where it is advisable.

Other objects and features of the invention relating to details of construction and operation will be apparent in the following description and claims.

The drawings accompany the disclosure and the various views thereof may be briefly described as:

FIGURE 1, a side elevation of an apparatus showing the relationship of the parts.

FIGURE 2, a sectional view on line 2—2 of FIGURE 1.

FIGURE 3, an enlarged view of a portion of a conveyor showing the manner in which two different liquid shed areas can be applied to one machine.

FIGURE 4, a sectional view on line 4—4 of FIGURE 3.

FIGURE 5, a sectional view on line 5—5 of FIGURE 3.

FIGURE 6, a view taken at line 6 of FIGURE 3.

FIGURE 7, a sectional view on line 7—7 of FIGURE 4.

FIGURE 8, a sectional view on line 8—8 of FIGURE 4.

FIGURE 9, a sectional view on line 9—9 of FIGURE 4.

Referring to the drawings:

In FIGURE 1, an outer container **20** is shown with a supporting bracket **22** at the top portion thereof for holding a vibratory mechanism **24** of the electro-vibro type, this mechanism supporting a center column **26** on which is mounted a spiral track **30** comprising a plate **31** having suitable means such as welding for attaching the track to the center column. An inlet for parts is shown at **32** leading to a tangential entrance track **34** at the bottom of the conveyor as shown particularly in FIGURE 2. An outer vertical flange **35** on the edge of plate **31** completes a wide track channel.

It will be seen that the entrance track **32** has three channels **36**, **38** and **40** and these merge with channels

46, **48** and **50** formed by intermediate spiral flanges **42** and **44** on plate **31**. This multiplicity of tracks allows the passage of different parts through the same conveyor if this is desired, or if there is a multitude of small parts, it keeps them running in separate channels so that they do not tend to bunch up and inhibit the contact with the various fluids which are placed in the apparatus for whatever treatment is desired.

This general type of mechanism is fully described in the Jones and White patents previously mentioned. For example, suitable drying areas can be provided wherein a double or false bottom along a portion of the track receives steam or some other heated gas or liquid to hit portions of the track. An example is shown at **52** where a hot fluid inlet **54** with outlet **55** is provided. Also, a cooling coil **56** can be provided for condensing vapors as a cleaning liquid of the vapor type is utilized.

The top of the conveyor discharges tangentially at **60** into an exit chute **62**. The bottom of the container **20** is provided with an area **64** for retaining a fluid which can be used for creating a cleaning vapor atmosphere in the tank. In some cases, this material is heated to create the vapor which is condensed at the condenser tube **56**. The liquid level can be adjusted to any point desired.

In FIGURE 3, the track is shown in greater detail and as shown in FIGURES 4 and 5, the track is shaped outwardly of the general spiral circle in an oval portion at certain places to allow vertical access for a special spray operation to take place.

In FIGURE 4, for example, it will be noted that the channel runs **46**, **48** and **50** are extended outwardly in runs **46***a*, **48***a* and **50***a* beyond the normal vertical area generally occupied by the circular spiral track. This places them out in an area where a spray unit **70** having nozzles **72**, **74** and **76** can be directed into the tracks to contact the parts directly where additional cleaning fluid can be directed against the parts with any force desired.

In FIGURE 5, a similar run-out is provided for the tracks and it will be seen that in FIGURE 5 the tracks are extended at **46***b*, **48***b* and **50***b*. The exact nature of the fluid that is sprayed on the parts will depend on the particular problem but in some cases it may be desirable to treat the parts with one fluid at one stage and another fluid at a second stage. In this case, as shown in FIGURES 4 and 7, an arcuate shed pan **80** is shown so designed that liquid which is sprayed into the run-out tracks **46***a*, **48***a* and **50***a* can drain through perforations **82** in the run-out portion to the shed pan **80** where it may be taken off at an opening **84**, for example. Similarly, under the run-out shown in FIGURE 5, a shed pan **86** can perform the same function, this pan draining into an apron **88**. In FIGURE 3, certain supporting brackets **90** and **92** stabilize the out-runs of the tracks. The out-runs permit a liquid spray to have impact contact with parts but also facilitate the use of separate liquids in a treating process. The drawings show the draining portions of the track in some places as perforate but other open construction would be acceptable. The word "perforate" may be taken to mean any drain openings. Slots would also facilitate the drainage or louvered track sections. For example, in FIGURES 4 and 5, stepped segmental plates **100** are vertically spaced to permit drainage while parts pass over them. See FIGURES 8 and 9 for details of this construction where drainage slots **102** are formed between segmental plates **100**. These out-runs and portions of the track adjacent them may have a slight downward slope as shown in FIGURES 7 and 8 to accelerate drainage to the shed pans, and each retaining flange in the drainage section is preferably provided with spaced elongate slots **104** at the bottom edge to allow free flow to the shed pans.

Thus, the various treating liquids whether for coating, cleaning, washing, or rinsing can be collected and reused, if desired, and kept separate where more than one is used. For example, a cleaning cycle can proceed as follows:

(1) The parts are vibrated completely immersed through a vibrating hot cleaning solution at the bottom of the unit.

(2) They are then vibrated up 2¼ flights against a counter-flow of the same hot cleaning solution.

(3) The parts are sprayed through nozzles **72**, **74**, **76** in a concentrated vibrating area with the hot cleaning solution which also created the counterflow in (2).

(4) They then pass over a perforated drain section **46***a*, **48***a*, **50***a* which eliminates any excess cleaning solution.

(5) The parts then progress through a second counterflow of hot rinse solution.

(6) They move through a spray of hot rinse solution which is sprayed in a concentrated vibrating area.

(7) Parts vibrate over a perforated drain section **46***b*, **48***b*, **50***b* which eliminates the excess rinse.

(8) Drying is done by steam jacketing **54** at the upper flights (low velocity hot air, optional).

(9) Cleaned parts are then discharged through an unloading chute for additional processing.

It will thus be seen that there is provided a vibratory conveying device for liquid treatment which can be used for normal cleaning with a single solution and it also can be used for a forced flushing action as well as in connection with the use of second rinsing fluid which can be drained off independently of the basic cleaning fluid.

I claim:

1. In a vibratory conveyor for treatment of fungible parts of the type utilizing an incremental motion to effect conveyance of articles, that improvement which comprises:

(a) a central cylindrical support vertically disposed,

(b) a plate disposed in a spiral circle around the outside wall of said cylinder,

(c) a vertical flange on the outside of said plate to define, with the wall of said cylinder, a wide spiral track, and

(d) one or more vertical walls between said flange and said cylinder to divide said wide track into a plurality of parallel tracks extending around said cylinder, said plate being disposed at spaced points in its spiral travel outside the general circle of spiral, to provide vertical access to said track at said points.

2. A device as defined in claim **1** in which said plate, in the area in which it is disposed outside the general circle of spiral, is perforate to provide drainage for a liquid applied to the track at said area, and a liquid shed means disposed under said perforate areas to collect liquid applied to the perforate track at said perforate areas.

3. A device as defined in claim **1** in which said plate, in the area in which it is disposed outside the general circle of spiral, has openings to provide drainage for a liquid applied to the track at said area, and a liquid shed means disposed under said openings to collect and divert liquid applied to the track.

4. A device as defined in claim **1** in which said plate in the area in which it is disposed outside the general circle of spiral is sloped downwardly and outwardly to facilitate localized drainage at said area.

5. A device as defined in claim **1** in which said plate in the area in which it is disposed outside the general circle of spiral is perforate and sloped downwardly and outwardly to facilitate localized drainage at said area, said vertical flange and walls being slotted at the bottom edges also to facilitate drainage.

6. In a vibratory conveyor for treatment of fungible parts of the type utilizing an incremental motion to effect conveyance of articles, that improvement which comprises:

(a) a central support vertically disposed,

(b) a plate disposed generally in a spiral circle around the outside of said support,

(c) flange means to define a channel track between said support and the outside of said plate,

(d) portions of said plate extending outside the general circle of spiral at spaced points in the vertical progression of said plate to permit vertical access to said track, said portions being perforate, and

(e) shed plates disposed vertically below said perforate portions to collect and deflect liquid passing through said portions to predetermined collection areas.

References Cited by the Examiner

UNITED STATES PATENTS

24,281	2/57	Jones et al.	134—65
2,166,644	7/39	Severin	134—25 X
2,190,072	2/40	Keys	134—65 X
2,660,544	11/53	Rieckhoff	134—30
2,662,851	12/53	Jones	134—132 X
2,718,957	9/55	Spurlin	198—220
2,854,361	9/58	Fulkerson	134—30
2,946,429	7/60	Carrier	198—220
2,980,121	4/61	Schuricht	134—132 X
3,024,133	3/62	White	198—220

FOREIGN PATENTS

215,990	5/58	Australia.
554,192	6/43	Great Britain.

CHARLES A. WILLMUTH, *Primary Examiner.*

MORRIS O. WALK, GEORGE J. NORTH, *Examiners.*