This invention relates to an improved track for vibratory conveyor mechanisms particularly of the type using a spiral track for moving parts by incremental vibration through liquid or vapor for treating, cleaning, and other purposes such as drying or subjection to differential temperatures.

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 is an object of the present invention to provide a special track design which improves motion of material or parts on the track as a result of the basic incremental vibration imparted thereto and also improves drainage from the track particularly in the area where rising liquid or liquid in larger than the usual quantities is added and must be drained off. More particularly, the invention relates to a track which is provided with transverse ridges above openings formed by segmental portions wherein the rear portion of one segment will cooperate with the forward portion of another segment to provide the slot.

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

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.

FIGURE 10, a plan view of a modified construction.

FIGURE 11, a sectional view on line 11—11 of FIGURE 10.

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适合的 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 the track. The out-runs 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 track. 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 46a, 48a and 50a 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 46b, 48b and 50b. 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 46a, 48a and 50a 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 track. 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 at some areas as perforate, that is, provided with a plurality of closely spaced holes but a preferred type of construction for the track, according to the present invention, is shown in FIGURES 4, 5, 8 and 9 where segmental plates 100 are disposed in close adjacent relationship, the forward edges 101 of the plates terminating in spaced relation to the downwardly turned rearward edges of the plates 100 to provide drainage slots 102. In the embodiment shown, the rearward edges of the plates are disposed down below the forward edges of the next adjacent plates.
to create this slot and also to provide the forward edge 101 in such relation to the general track surface that it can serve as a bumper edge for parts that are resting against it as the vibratory motion is imparted. This edge thus gives an extra kick to the parts thus contacted and moves them more rapidly over the track.

In addition, since the slots 102 are transverse of the track and also lie transverse to the direction of motion, the vibratory action tends to drive draining liquid down through the slots and thus facilitates the drainage action.

When plain perforations are used, it has been found that the vibrations plus the surface tension of the liquid tend to close the holes and thus inhibit drainage. The combination segmental construction therefore with the slots transverse of the track and transverse of the direction of vibration provides the combined effect of increasing motion of parts on the track and assuring a clearing of the track which is particularly important when the conveyor is to be used for different kinds of parts at different times. The combination also produces another unexpected result in increasing the drainage through the slots in a manner which has not been achieved by perforations in a plain surface.

The outruns 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. While only portions of the track have been shown with the improved motion-drainage surface as above described, it will be understood that the entire track may be so constructed except in areas where direct steam jacketing is to be accomplished below the track in a manner commonly known in the art as it presently exists.

In FIGURE 10, a modified structure is shown wherein a track plate 110 is subjected to a die to cut the material at the side edges 112, 114 and leading edges 116 and also to form the resulting tabs or blades upwardly as shown in the sections in FIGURE 11. This leaves a slot 120 below the leading edges 116 to serve the function of the drainage slot disposed transversely to direction of vibration and intended motion. The plate 110 is mounted around a central cylinder 122 and the track is provided with a retaining outer side wall 124.

What is claimed as new is as follows:

1. In a vibratory conveyor for conveying of parts of the type utilizing:
   (a) an incremental motion to effect conveyance of articles, that improvement which comprises:
   (b) a central cylindrical support vertically disposed,
   (c) a plate disposed in a spiral circle around the outside wall of said cylinder,
   (d) a vertical flange on the outside of said plate to define, with the wall of said cylinder, a wide spiral track, and
   (e) 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 composed of a plurality of segments arranged with slots transverse to the direction of motion of said track to facilitate drainage at circumferentially spaced points along the path thereof.

2. In a vibratory conveyor for conveying of parts of the type including:
   (a) a support,
   (b) a spiral track on said support, and
   (c) means to impart an incremental motion to said track transverse of the radii thereof to effect conveyance of articles placed thereon, that improvement which comprises:
   (d) a bottom portion in said spiral track having perforate portions to facilitate localized drainage at said portions, said perforate portions being formed by a plurality of segmented plates in juxtaposition to leave radial drain slots therewith while forming a continuous spiral path for the support and travel of parts along said track.

3. In a vibratory conveyor for treatment of fungible parts of the type including:
   (a) a support,
   (b) a spiral track on said support, and
   (c) means to impart an incremental motion to said track to effect conveyance of articles placed thereon, that improvement which comprises:
   (d) a bottom portion in said spiral track having openings to facilitate drainage and movement of parts, said track and openings being formed by a plurality of relatively narrow strips extending across said track transversely to the directional path of articles traversing said track having the forward edge of each strip spaced vertically from the rearward edge of the next adjacent strip whereby the incremental motion of said track imparts a driving motion to said forward edges while facilitating the passage of liquid through said openings.

4. In a vibratory conveyor for movement of parts of the type including:
   (a) a support,
   (b) a spiral track on said support, and
   (c) means to impart an incremental motion to said track transverse of the radii thereof to effect conveyance of articles placed thereon, that improvement which comprises:
   (d) a bottom portion in said spiral track shaped to facilitate drainage and movement of parts comprising a plurality of radially extending blades having a leading edge presented transversely to the direction of travel and a trailing edge below the leading edge to form a radial slot in the track.

5. In a vibratory conveyor for movement of parts of the type including:
   (a) a support,
   (b) a spiral track on said support, and
   (c) means to impart an incremental motion to said track transverse of the radii thereof to effect conveyance of articles placed thereon, that improvement which comprises:
   (d) a bottom portion in said spiral track shaped to facilitate drainage and movement of parts comprising a helical plate having segmental blades struck therefrom each with a leading edge presented transversely to the direction of travel and spaced from the general plane of said plate to form radial slots in the track.

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