Dec. 2, 1969 E. ROTHSCHILD 3,481,448

TRAY LIFTER

Filed Dec. 22, 1967 2 Sheets-Sheet 1

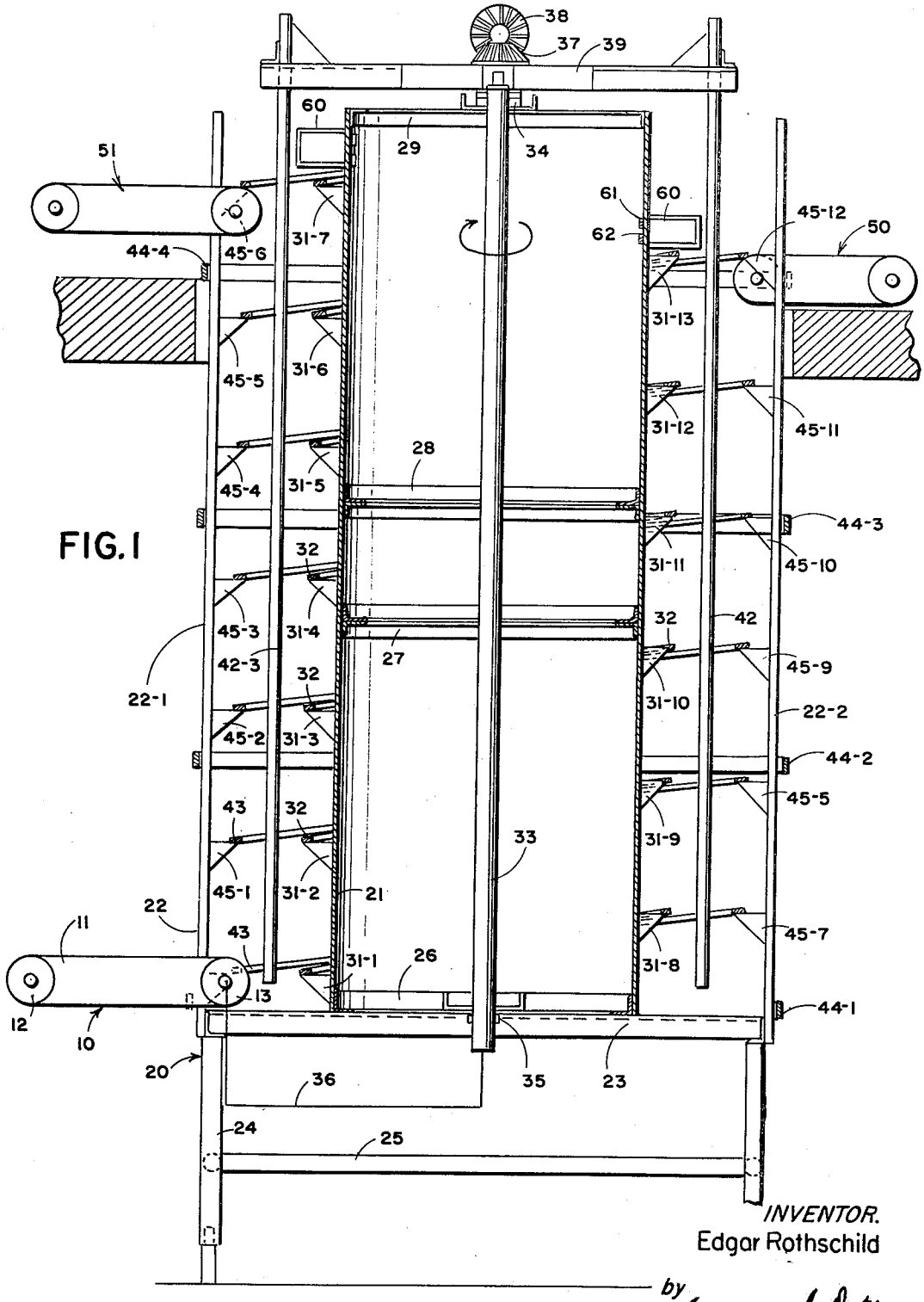


FIG. 1

INVENTOR.
Edgar Rothschild

by Greene and Kerr

ATTORNEYS.

Dec. 2, 1969 E. ROTHSCHILD 3,481,448

TRAY LIFTER

Filed Dec. 22, 1967 2 Sheets-Sheet 2

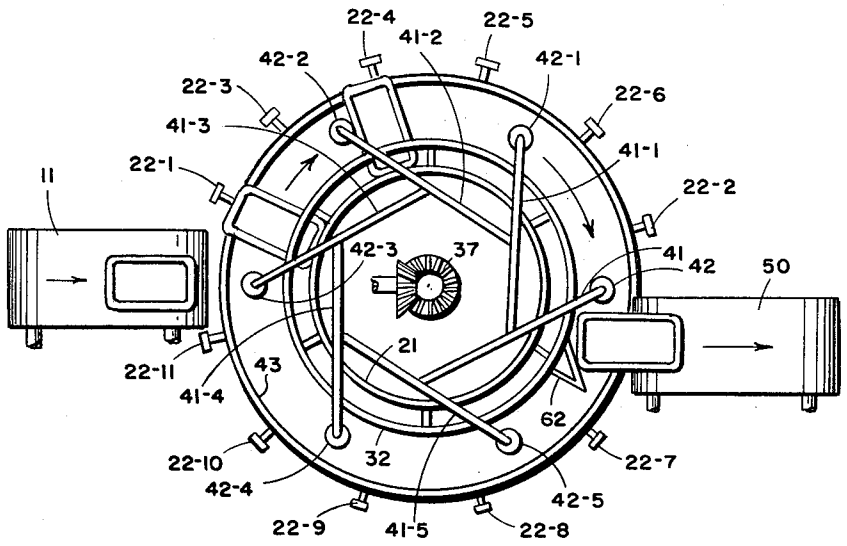


FIG. 2

INVENTOR.
Edgar Rothschild

by Greene & Kerr

ATTORNEYS.

United States Patent Office 3,481,448 Patented Dec. 2, 1969

3,481,448

TRAY LIFTER

Edgar Rothschild, Teaneck, N.J., assignor to Caddy Corporation of America, Secaucus, N.J., a corporation of New Jersey

Filed Dec. 22, 1967, Ser. No. 692,766
Int. Cl. B65g 33/02, 33/24
U.S. Cl. 198—136 2 Claims

ABSTRACT OF THE DISCLOSURE

The invention relates to a three conveyor system for transporting trays horizontally then vertically, from one floor to another for example, and then horizontally again when the trays have reached the height desired, all without abruptly changing the direction of the trays at any point and without stacking the trays.

This invention relates to a device for taking on, lifting or lowering and discharging of trays, particularly trays of the type used in cafeterias and restaurants connected with institutions such as hospitals where said trays are loaded with food-stuff in one area and then must be delivered to another higher or lower area.

In restaurants connected with hospitals and similar institutions, the food is prepared in the kitchen which is at one level, is loaded onto trays of a size which is suitable for one patient and then must be delivered to another floor or level before being given to the patient or other customer. Mechanical devices for lifting such trays from one floor to another have been developed but such devices, based mostly on the principle of the dumbwaiter, require that the tray or trays be delivered thereto in one direction, horizontally for example, then the direction of motion of the tray and its contents is sharply changed to a vertical direction, and finally after the vertical motion comes to a halt the tray is removed in another horizontal direction. Thus in being delivered from one level to another the tray and its contents (part of the contents usually being liquids), is stopped and started several times. Attempts to speed up the feeding of such trays to and removal of such trays from the lifting device necessarily results in spilling and splashing of the liquid contents of the trays. Also the feeding of trays to such a lifting device must be intermittent since a second tray cannot be fed onto the lifting mechanism until the previous tray has been lifted up to completely clear the oncoming tray.

Among the objects of the present invention is to provide a device which substantially continuously takes on a series of trays, feeds them upwardly or downwardly and thence horizontally at the desired level, all without any sudden changes in direction.

The objects of the invention are attained by connecting a horizontal conveyor means with a lifting or lowering device of the type having a pair of spiral tracks winding about a vertical axis, and connecting the latter with a second horizontal conveyor at the desired discharge point. Means are provided to automatically force the tray from the spiral tracks onto the discharge conveyor and such means can be attached at various points with respect to the spiral tracks to vary the discharge area as desired.

The trays are pushed along the spiral tracks by a series of rods held on a rotating spider and suspended from above or projected upwardly from below so that said rods can pass between the tracks at all levels when the spider is rotated.

In the accompanying drawing which illustrates, by way of example, a constructional form of the invention:

FIG. 1 is an elevational view, partly in section of the device of the invention.

FIG. 2 is a top view of the device of FIG. 1.

The device as a whole comprises one or more horizontal loading conveyors **10**, the spiral conveyor with a vertical axis **20** and one or more unloading conveyors **50**, **51**. The loading and unloading conveyors are suitably belt type conveyors. The loading conveyor **10**, for example, comprises an endless belt **11**, held between two rollers **12** and **13**, the latter roller being rotatably mounted within the cage formed in the spiral conveyor **20** between the drum **21** and series of vertical supports **22** thereof.

The spiral conveyor **20** comprises the drum **21** fixed upon the top surface **23** of the frame structure **24**, **25**. The drum **21** is suitably reinforced from the inside by caps **26** and **29** and rings **27** and **28**. Attached to the outer surface of the drum **21** by welding for example, are a series of brackets **31–1** to **31–13**, etc., which are so arranged that a helical spiral track **32** of uniform pitch may be supported thereby. Extending down through the drum **21** is the shaft **33** which is rotatably mounted in bearings **34** and **35** positioned adjacent the central openings in caps **26** and **29**. The lower end of shaft **33** is connected mechanically by means **36**, illustrated diagrammatically, by which said conveyor **10** is driven from said shaft **33**. Suitable means including the bevel gears **37**, **38** are provided to positively rotate the shaft **33**.

Attached to the upper portion of shaft **33** is the spider **39** containing the plurality of arms (in this case six) **41**, **41–1**, **41–2**, **41–3**, **41–4** and **41–5** on the ends of which the rods **42**, **42–1**, **42–2**, **42–3**, **42–4** and **42–5** are attached. On rotation of the spider **39**, the rods **42** to **42–5** move around the drum **21** in the space outside of track **32** and inside of track **43** (to be described below).

Secured to the rim of the top surface **23** of the support **24**, **25** are a plurality of uprights **22–1**, **22–2**, etc., forming the cage **22**. The uprights **22–1**, **22–2**, etc. are further reinforced by means of reinforcing rings **41–1**, **44–2**, **44–3** and **44–4**. Secured to the uprights **22–1**, **22–2**, etc., are a plurality of brackets **45–1** to **45–13** on which the spiral track **43** is mounted to parallel the track **32**.

The tracks **32** and **43** can be formed of any material which preferably has a low coefficient of friction. Suitable materials are plastics such as polyethylene, polypropylene, Teflon, polyvinyl chloride, polycarbonates, nylon, etc. Although shown as being flat in shape the tracks can in fact be made with the cross sectional shape of a T or an I or may have plurality of reinforcing ribs on the under or upper sides thereof. Ordinarily, trays containing a single meal are not very heavy and a rugged track is not necessary. If desired, tracks formed of a series of rollers such as used in roller conveyors may be employed. The pusher rods **42** to **42–5** are preferably positioned just slightly outside of the imaginary cylindrical surface which bisects the space between the two tracks **32** and **43** so that any tendency that the pusher rods have to turn the trays away from the exact spiral path, tends to turn such trays toward the central drum **21** so that, in effect, the trays are guided by the tracks **32** and **43** and occasionally by the surface of drum **21**.

The trays can be discharged at almost any desired point between two adjacent uprights **22–1** to **22–11** in the area adjacent the spiral tracks by affixing the discharge angle piece **60** to the drum **21** in the path of the tray at the region where the discharge is desired. Said angle piece **60** comprises a pair of ears **61**, **62** which pass through predetermined holes in the drum **21** and are clamped on the inside of the drum. The sloping surface **63** of said angle piece **60** is adapted to contact the edge of the tray and as the tray is squeezed between the rod **42** and the surface **63** it is guided between the two uprights **22–2** and **22–7** of FIG. **2**, for example, where it is picked up by conveyor belt **50** and transported horizontally.

The features and principles underlying the invention

described above in connection with specific exemplifications will suggest to those skilled in the art many other modifications thereof. It is accordingly desired that the appended claims shall not be limited to any specific feature or details thereof.

I claim:

1. An apparatus for transporting a series of loaded trays in a continuous manner, first in a horizontal direction thence vertically and finally horizontally without abruptly changing the direction thereof comprising a horizontal belt conveyor, spiral conveyor means to take the trays from the belt conveyor and transport them vertically in a spiral path and a second horizontal belt conveyor for taking said trays from said vertical conveyor,

said spiral conveyor means comprising a cylindrical drum adapted to support the first of a pair of spiral tracks in a position spaced from the outer surface thereof,

a cage structure arranged concentric to and outside of said cylindrical drum, means extending from said cage structure to support the second of said pair of spiral tracks in a position extending inwardly from said cage toward said drum and parallel to put spaced from said first track,

spider means supported to rotate on a vertical axis which is concentrically with respect to said drum, said spider means including spider arms extending above the space between said pair of tracks,

a plurality of pusher rods one affixed to each of said spider arms extending substantially the full length of the space between said tracks whereby rotation of said spider means causes at least one of said rods to push a tray positioned on said track so that said tray moves on said spiral tracks,

discharge means having a sloping surface which projects into the path of a tray travelling on said spiral path, said discharge means being positioned opposite the second horizonal belt conveyor whereby a tray pushed into contact with said discharge means passes onto said second belt conveyor.

2. The device as claimed in claim 1 wherein said pusher rods are adjusted to extend just outside of the imaginary cylindrical surface bisecting the space between the pair of spiral tracks.

References Cited

UNITED STATES PATENTS

1,085,852	2/1914	Duncan	198—212
1,177,502	3/1916	Ewald	198—212

EVON C. BLUNK, Primary Examiner

ROGER S. GAITHER, Assistant Examiner

U.S. Cl. X.R.

198—212