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CONVEYER EQUIPMENT

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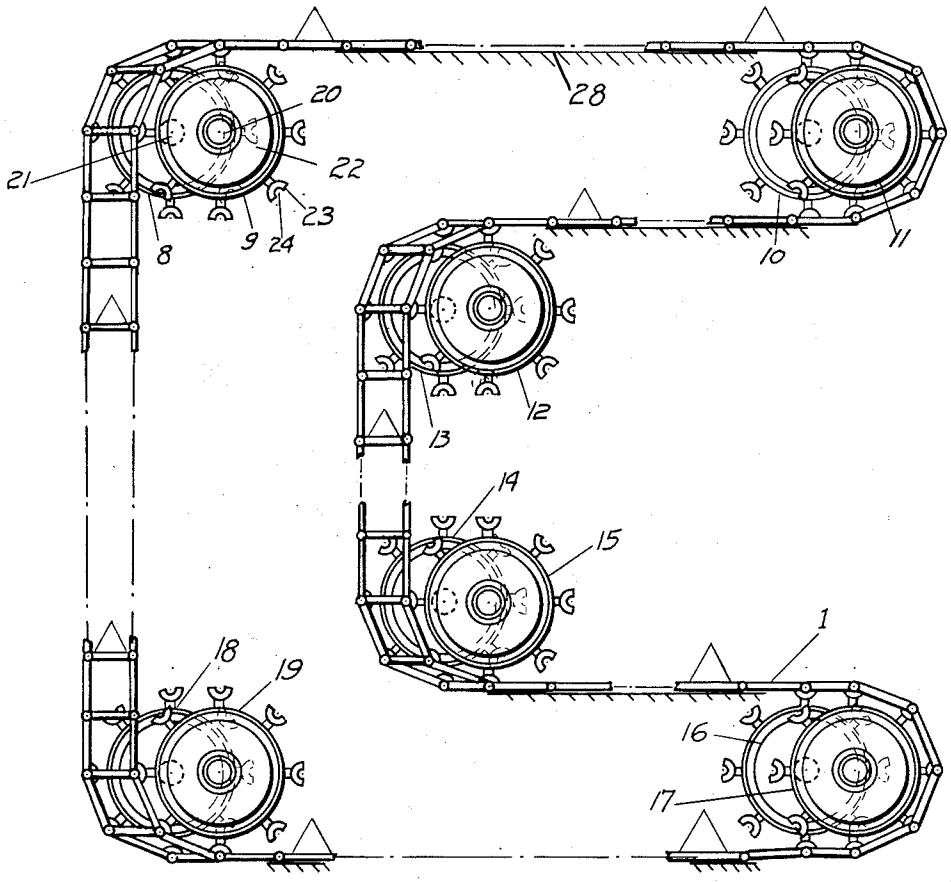

FIGURE I

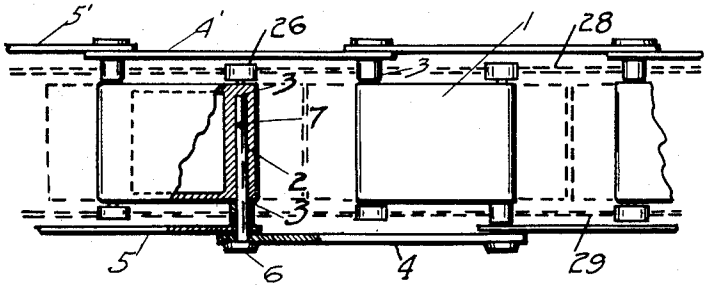

FIGURE II

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UNITED STATES PATENT OFFICE.

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CONVEYER EQUIPMENT.

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This invention relates to machinery and devices known as "conveyers" or "conveyer equipment" which is a class of mechanism designed to mechanically transport various types of materials.

The object of this invention is to provide a type of conveyer mechanism in which the conveyer shelves or table units will always maintain a constant position with relation to the horizontal. The special case of this equipment, which is of most general application, is the instance in which all of the conveyer shelves or table units are continually maintained substantially horizontal, whether the chain member is traveling in a vertical or horizontal direction. There are certain applications, however, in which it is desirable to maintain all of the units substantially vertical at all times, and I therefore do not wish to be confined to the single case of the horizontal table.

Referring to the drawing, Figure I shows a general view of the arrangement of equipment made in accordance with my invention. Figure I is an elevation of one form of my device. Figure II shows a plan view of the conveyer elements used in one form of my device. Figure II is partly in section.

Referring to the drawings, (1) indicates the table units or elements upon which the material to be transported is carried. These units may be of any desired size, shape or contour, and they may be designed to come into substantial contact with each other (or even overlap), or they may be spaced as shown in the drawing. The exact contour of these elements is not material to my invention. Rollers (26) are idlers.

The elements (1) are pivoted on pins (2) inserted into a recess (3^1) shown for convenience at each end of the table unit. Pin (2) passes through bushing (3) and links (4 and (5). Pin (2) is provided with a head (6) to prevent withdrawal, and a retaining pin member (7) to hold it in place with regard to said table unit (1). The link members (4 and 5) are duplicated on each side of the table unit (1) in such a way that the two series $4—5—4^1—5^1$ form a continuous chain of links all substantially equal in length and pivoted to the pin members (2). The continuous chain formed by links (4, 5, etc.) pass around various pairs of sprockets, which may be arranged in any convenient manner, determined by building conditions and results to be accomplished. Sprockets (8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19) are shown in Figure I. In construction these sprockets are substantially similar although they may be modified as to dimensions without affecting the results obtained. A description of sprocket (9) will be given, and for the sake of simplicity it will be understood that the other sprockets referred to above are substantially similar in construction. (28)—(29) indicate tracks for rollers. The sprocket (9) is pivoted on a shaft (20) while sprocket (8) is pivoted on independent shaft (21). Shafts (20, 21, etc.,) may be supported on any desired type of bearings which form no portion of my invention, it being essential, however, that the two shafts are independent and each carry one sprocket only. The shafts must be aligned so that their axes are substantially parallel, and in the case under discussion, in which the table units are to be horizontal, the plane which passes through the axes of the shafts (21 and 20) must be a horizontal plane.

Sprocket (9) consists of a web member (22) which carries a series of tooth members (23), which are provided with a recess (24) adapted to accurately engage with bushing (3). Tooth members (23) are spaced equally and symmetrically about the circumference of the various sprockets in such a manner that the distance in a straight line between recesses (24) is substantially equal to the length of the link members (4, 5, etc.) of the chain.

The horizontal distance between the axes of shafts (20 and 21) should to advantage be approximately equal to the horizontal distance between adjacent pins (2) in the same table unit.

On referring to the drawing, and particularly to Figure II, it will be noted that the plane of the table element (1) will be determined by the axes of the two pins (2) in each unit. In other words, if both of pins (2) are in the same horizontal plane, the table unit (1) will be in a horizontal plane.

Referring now to Figure I, it will be noted that owing to the fact that the axes of each pair of sprockets are in a horizontal plane

and are displaced exactly the distance between adjacent pins (2), the adjacent pins (2) of each table unit will always be horizontal and the table units will therefore always be horizontal.

This is independent of whether the chain is going in a vertical or horizontal direction. To clearly indicate this, however, pyramids (25) are indicated on the chain at various points. These pyramids may be taken to represent any material which the conveyer is carrying.

Referring to the drawing and particularly Fig. II, it will be noted that the trays (1) are supported primarily at two diagonally opposite corners. The axis of support at these corners coincides substantially with the axis of the pivot for the corresponding links of the chain. It will be noted also that the two sides of the chain (5^1) and (5) are arranged so that their pivotal points alternate. That is to say, the joints of chain (5) are located substantially midway between the joints in chain (5^1). Referring now to Fig. I and keeping in mind the fact that the tray (1) is supported at two diagonally opposite corners, it will be noted that when the tray is traveling in a horizontal position and the chain passes around sprockets in its travel to assume a vertical position, one of the chains is maintained in advance of the other chains by a distance approximately equal to the longitudinal measurement between the two parallel axes of table (1).

This is shown clearly in Figure I which should not be considered as a perspective drawing, but as a side elevation, the displacement between the axes of the sprockets in all cases being substantially the distance between the parallel axes of the table (1). Under these conditions it will be noted that table (1) is forced to maintain a horizontal position for the reason that the following or rear portion of the table begins to move upward or downward as the case may be at the same instant as the front or forward portion begins to move upward or downward, this condition being obtained by the displacement of the two chains which form the conveyer. In other words, since the forward end of the table is carried by one chain and the rearward end of the table by another chain, if both chains are caused to turn upward or downward at the same instant, it would be obvious that both the upward and rearward end of the table would, therefore, turn upward or downward at the same instant. This condition is obtained as set forth by the displacement of the two sprockets which cooperate with the two chains in the manner explained.

It will be apparent that there are many possible variations in the construction of conveyer equipment which will come within the scope of this invention. For example, the number of sprockets in the gears may be greatly increased or decreased, the contour or form of the sprockets may be radically changed, and the details of construction may be altered in many ways without departing from the essence of my invention.

What I have particularly invented is a conveyer mechanism which permits of the table units always being maintained in a given relation to the horizontal at all points of the conveyer travel. As pointed out above, this is maintained essentially by means of the following features:

1. The axes of two pivoted and parallel members determine the plane of the table and unit.

2. The sprockets over which the conveyer chain passes are arranged in such manner that the two movable pins referred to above are always maintained in any desired plane.

I am aware that conveyers have been constructed in which shelves or baskets are pivoted to rotate freely about a horizontal axis, and by this means are able to maintain a substantially horizontal position during all parts of the conveyer chain travel. This rotary construction, however, is unstable, in that it permits considerable swinging, depends to a high degree on freedom from friction in the rotating parts, and occupies much more space than a conveyer constructed in accordance with the principles of my invention.

A conveyer constructed in accordance with my invention is also much less expensive than the swinging shelf type, and permits of passing the conveyer immediately over a table, working bench, or other similar equipment.

Further, since a conveyer constructed in accordance with my invention provides a rigid support for the movable table units, it is possible to use my conveyer as a working conveyer upon which various mechanisms, machines, etc., may be assembled or constructed as the conveyer travels. This is not feasible with the swinging basket type of conveyer.

The conveyer which I have invented may be employed to decided advantage for a great many purposes. For example, it is well suited to convey dough or bread through the various baking operations, and by reason of the fact that the table units are always horizontal, even while passing from floor to floor in either direction, a conveyer of this type may be used to hold and transport the bread successively through the proofing operation, the baking, the cooling operation, and to the wrapping machine.

Another application of this equipment is in connection with core ovens. The conveyer may be so placed that the operators as fast as they make the cores place them upon the

table units of the conveyer, which carries them automatically through the baking oven to the storage racks.

Equipment of this kind can also be used to advantage in department stores, warehouses, stock rooms, etc., providing a quick, economical and convenient means of carrying packages of all kinds from one position to another position on any desired floor or on any part of a desired floor.

Further, this equipment may be used in the mass production of machinery, automobiles, and other mechanisms, by passing the conveyer between a row of workmen each of whom adds one or more desired parts or performs a certain number of desired operations as the machine automatically travels toward the shipping room.

Such operations as baking of japan, drying of paint, and applying paint or japan, etc., may make use of this equipment to good advantage.

By use of equipment I have invented it is possible to use a materially lighter and less expensive conveyer chain inasmuch as strains are much reduced. The conveyers also slide horizontally in a small space close above or beneath work benches, tables, etc., or may form a work bench.

This conveyer mechanism can to advantage be used as a carrier for dishes, for hotel or restaurants for dish washing machines, and for many related uses.

Having now fully described my invention, what I claim as new and wish to secure by Letters Patent in the United States, is as follows:

1. A conveyer mechanism consisting of a series of table members carried by parallel pin members and pivoted and supported at diagonally opposite corners, a series of link members forming a supporting chain on each side of said table members said link members being staggered with respect to the corresponding link members in the opposite chain, a series of pairs of sprockets coacting with said chains, each sprocket of each pair being mounted on an independent axis displaced in a horizontal plane from the axis of the other sprocket of the same pair.

2. In a conveyer mechanism, parallel chain members having the links of one chain staggered with relation to the links of the other, a table member supported at two diagonal corners by parallel pin members, one end of each of said pin members engaging with the staggered joints of said chains.

3. In a conveyer mechanism a pair of chains formed of substantially equal link members, the joints of said link members of one chain being approximately opposite the centers of the links of the other chain, a series of table units supported from diagonal corners at said pair of chains, each of said table units being attached by one point to each of said chains, and a series of pairs of sprockets coacting with said pair of chains, the axis of one sprocket of each pair being displaced from but parallel to the axis of the other sprocket of the pair.

4. A conveyer mechanism consisting of a pair of chain members, a series of table members supported from two diagonal corners by two parallel pin members attached to said chains, said pin members being arranged to serve as pivots for the links of said chains.

JULIAN M. LIVINGSTON.