ELEVATING AND LOWERING CONVEYORS

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ABSTRACT
This invention relates to an unloading device for use with a container elevating and lowering conveyor in which the containers, are hung on inwardly directed pegs secured to a pair of vertical continuously moving endless chains.

5 Claims, 3 Drawing Figures
3,717,237

ELEVATING AND LOWERING CONVEYORS

This invention concerns improvements relating to elevating and lowering conveyors, particularly selective document conveyors. It seeks to provide a conveyor of this nature which is not only relatively simple, compact and inexpensive, but also readily adaptable to suit a variety of requirements.

According to the invention, there is provided an elevating and lowering conveyor comprising two endless elements, such as chains, moving continuously side by side in a vertically elongated path and including an ascending and descending flight and having at intervals members, such as pegs, projecting inwardly towards each other from the side elements, and one or more containers adapted for being swingably suspended from said elements by outwardly projecting parts of the containers engageable by the said members, so that the said containers will remain suspended in a vertical position while passing around an end of the said path, wherein a container is unloadable from a descending flight of said elements by means of a device which is pivotable between two rest positions in one of which it extends into the path of a descending container and is adapted to engage the underside of container and to remove the same from said inwardly projecting members, the weight of the container then causing the device to pivot to its other rest position in which it is removed from the path of subsequent descending containers.

One manner of carrying the invention into effect will now be more fully described by way of example with reference to the accompanying drawings, in which:

FIG. 1 is a side elevation of part of a conveyor, illustrating one loading and one discharge station,

FIG. 2 is a plan view of a discharge conveyor at the discharge station,

FIG. 3 is a side view of the conveyor shown in FIG. 2.

In this example, the containers 1 are of an upwardly open bucket-like nature, with a wide and deep substantially rectangular, but slightly downwardly tapering, shape as seen in front elevation (not shown) and with a narrow slightly downwardly tapering shape in side elevation (FIG. 1). The end walls 2 are each extended upwardly towards their middle, the upper end edges having outwardly flanges or lips 3 rising to a crest 4 at the middle. Such containers may conveniently be made from a substantially rigid nylon or other plastics material, for example a polyethylene material.

The endless members are chains 5 of a small size commonly used as transmission chains, suitably having 1/4 to 1/8 inch pitch. There are two such chains 5 one on each side of the conveyor, only one being shown in FIG. 1. Mounted at intervals on the chains 5 are pegs 6 projecting inwardly. The pegs 6, which have spherical extremities, may be made of steel.

Loading is effected at the, or each, loading station, co-operating with the rising flight of the conveyor, by means of a cradle, tray or grid. A suitable arrangement is described in the specification of our British Pat. No. 1,206,271.

Once picked up by a pair of pegs 6, the container 1 will hang freely in a vertical position from the pegs under its own weight, maintaining this position also at the upper, or upper and lower, ends of the side-by-side chains 5 where the latter pass round sprocket wheels.

At the or each discharge station co-operating with the descending flight of the conveyor a discharge device 7 is employed which comprises a pair of substantially L shaped rods 8 both secured to a pivotal axle 9 and joined at their upper ends by a plate 10.

In their discharge position, shown in full lines in FIG. 1, the rods 8 extend upwardly between the two chains 5 the plate 9 resting against a stop 11 made of rubber or other resilient material, and are so spaced that a descending container 1 is picked off the pegs 6 and slides down the rods onto the end portion 12 thereof.

The weight of the container 1 now acts to pivot the device 7 anti-clockwise (FIG. 1) to the position shown in dotted lines in which the top edge of the plate 10 rests against a second rubber stop 13. In this position the end portion 12 of the device 11 slopes downwardly and the container 1 is able to slide off on to rails 14 and thence on to a belt conveyor 15 if required. Rails 14 alone may be used for storage of delivered containers, the containers being subsequently taken off by hand. The device 7 remains in this position, well clear of the chains 5 thus allowing subsequent containers to freely pass by.

When it is desired to remove a container, a solenoid device (not shown) is actuated to cause the shaft 9 and hence the device 7 to pivot clockwise to the position shown in full lines in FIG. 1. Once in this position the solenoid device can be switched off as the device 7 will remain under its own weight until a container 1 comes to rest on the end portion 12 causing the device 7 to pivot anti-clockwise as described above.

FIG. 2 shows a plan view of one example of a discharge conveyor 15 on which the containers 1 are deposited after leaving the device 7.

The discharge conveyor consists of a first pair of spaced belts 16a and 16b which are spaced apart such that the container 1 hangs between them being supported by its flanges 3 as shown. These belts 16a and 16b each pass over a guide pulley 17 and a drive pulley 18. A second pair of spaced belts 19a and 19b are provided following the belts 16a and 16b. These belts 19a are spaced slightly further apart than the belts 16 but still sufficiently close together such that a container 1 can hang between the belts being supported by its flanges 3 which rest on the belts 19.

The belts 19 each pass over a guide pulley 20 and a drive pulley 21. A motor 22 drives the pulleys 18 and 21 by way of a belt 23.

As can be seen the driven ends of the two pairs of belts 16 and 19 overlap so as to ensure a smooth transfer of a container carried by the belts 16 to the belts 19. The drive pulleys 18 and 21 are both adjustably mounted in the longitudinal direction of the belts both to tension the belts 16 and 19 and also to vary the amount of overlap of the belts 16 and 19 and hence the overall length of the conveyor, the position of the pulleys 17 and 20 also being adjustable.

In use, a container 1 is dropped from the unloading device onto the belts 16a and 16b and is conveyed on its flanges 3 by them in the direction of the arrow 'A', transferring to the belts 19a and 19b and finally being deposited onto a conventional conveyor belt 25, on which it travels in the direction of the arrow 'B' now supported on its base, at right angles to its original direction of travel.
As can be seen in FIGS. 2 and 3 the container 1 is supported on the belts 16 and 19 by the four tips 24 of the crested flanges 3.

As may be seen in FIG. 2, the belt 19a is shorter than the belt 19b and as the leading edge of the container 1 passes beyond the end of the belt 19a, the container is supported by only one flange tip 24 on the belt 19a, the two tips 24 of the other flange 3 both remaining in contact with the belt 19b. The container 1 is thus supported at three points only as it passes into position above the belt 25 and it has been found that despite this incomplete support, the container remains completely stable and does not tip forward.

As the rear edge of the container 1 passes beyond the end of the belt 19a, the container is correctly positioned over the belt 25 onto which it drops and is carried away.

I claim:

1. A container elevating and lowering arrangement which is characterized by:
   a. two endless conveyor elements which are arranged to move side-by-side in a vertically elongated flight including an ascending and a descending flight,
   b. a plurality of pairs of container support members such as pegs, located at spaced intervals along said endless conveyor elements, the individual members of each horizontally aligned pair projecting inwardly toward each other,
   c. at least one container having outwardly projecting end portions that are adapted to engage one of said horizontally aligned pairs of container support members,
   d. a container unloading device positioned adjacent the descending flight of said two endless conveyor elements, said unloading device comprising a generally L-shaped member including a substantially vertical arm and a substantially horizontal arm secured thereto, said L-shaped member being pivotally mounted adjacent the lower end of said vertical arm so as to be movable between two rest positions in one of which said vertical arm extends diagonally upwards between the descending flight of endless conveyor elements where it is adapted to engage the underside of a container and to remove the container from said container support members, the weight of the container then causing the unloading device to pivot to its second rest position in which it is removed from the path of subsequent descending containers.

2. An arrangement as set forth in claim 1 wherein said L-shaped member is associated with a solenoid device which can be actuated to remove said L-shaped member from said second rest position back to said first rest position.

3. An arrangement as set forth in claim 1 wherein said L-shaped member comprises a pair of L-shaped rods that are joined together at their upper ends.

4. An arrangement as set forth in claim 1 wherein a discharge conveyor means is positioned adjacent the second rest position of said container unloading device.

5. An arrangement as set forth in claim 4 wherein said discharge conveyor comprises a sequential first and second pair of horizontal parallel moving belts, the belts of each pair being spaced apart by a distance which allows a container to hang therebetween, being supported by said outwardly projecting end portions of the container, said first and second pairs of belts being in overlapping relationship, and means are provided for varying the degree of overlap between said first and second pairs of belts.

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