The present invention relates to agitating machines, and more particularly to apparatus for agitating sealed individual merchandisable containers, e.g., bottles, each newly filled in a bottling plant with two or more separate, different substances, such as a small quantity of beverage syrup and a larger quantity of carbonated or plain water, which must be intimately admixed in the containers to produce a homogeneous mixture, solution or dispersion for sale and consumption as a soft drink or the like.

While the invention is usable for producing a thorough mixture of practically any liquids, semiliquids, and/or solids that have been separately charged into individual bottles, cans or other containers, it is particularly adapted for use in the bottling of carbonated or non-carbonated beverages, and a preferred embodiment will in this application for Letters Patent be described in terms of such use.

It is customary, in beverage bottling plants, to charge relatively small quantities of syrup or flavored concentrate into empty bottles, then fill the bottles with carbonated or plain water, and then seal the bottles. Because the two charges are of different specific gravity, it is necessary to shake the bottles to produce the necessary complete inter-dispersion of their contents.

A primary object of the present invention is to provide a machine which will rapidly and economically perform the required bottle shaking operation.

Related objects are concerned with performing the shaking operation on case lots of bottles or equivalent containers automatically as an incident to movement of the cases along a conveyor system for moving the cases from the bottling machine, label applying machine, and case-filling station to a point of final discharge, such as a table or platform from which the finished product is removed to storage or into a vehicle for transportation.

Incidental objects are concerned with producing a machine of the character described which will be fully automatic in operation, simple and durable in construction, inexpensive to manufacture and entirely foolproof in use.

A related object is to produce a machine which will require no motor or other power means to operate it.

A preferred embodiment of the invention which illustrates the principles defined by the appended claims is shown in the accompanying drawings, in which Figure 1 is a side elevational view illustrating the machine disposed between upper and lower sections or levels of a conveyor system for moving cases of bottled beverages from the bottling and related machines and stations.

Fig. 2 is a transverse sectional view taken through the machine,

Fig. 3 is a transverse sectional view taken through the carriage element of the machine,

Fig. 4 is a top plan view of the machine installed between the conveyor sections as shown in Fig. 1.

Fig. 5 is a longitudinal sectional view, taken on the line 5-5 of Fig. 4,

Fig. 6 is a relatively enlarged longitudinal sectional view of the carriage shown at the discharge end of the upper conveyor section, and

Fig. 7 is a detail perspective view of one of the case-latching catches which are provided on the receiving end of the carriage.

In these drawings the reference numeral 1 designates any suitable type of level or slightly downwardly inclined conveyor, here shown as a roller way, on which cases 2 of newly filled bottles 3 are conducted serially from any conventional bottling, labeling and case-filling equipment. It is assumed that the bottles 3 in the case 2 located at the position shown in Fig. 1 have been charged first with a syrup, then filled with water, and then sealed, and require agitation to effect the mixing or dispersion that has been explained hereinabove.

The conveyor section 1 is mounted at a relatively elevated position on a pedestal 4 and is longitudinally spaced from an aligned similar section 5 which is mounted at a lower elevation on a shorter pedestal 6. The two sections are connected by a runway 7 which is downwardly sloped or inclined, either along a flat plane or preferably along a curvilinear one as shown, from a receiving end 8 at the tail end of the upper conveyor section 1 to a discharge end 9 at the head end of the lower section 5.

The details of the conveyor sections are unimportant and form no part of the present invention. Suffice it to say that they may include spaced parallel side rails 10 journaling idle rollers 11 which support the cases 2 for movement by gravity or otherwise in a well known manner.

The runway 7 comprises a pair of laterally spaced parallel rails 12 of angle iron or the like, having their upper surfaces raked or provided with upstanding teeth 13. Any suitable means may be used for maintaining the rails 12 at a fixed separation from each other so as to leave the space between them wide open for a purpose.
hereinafter to be explained. In actual practice it is quite sufficient to secure the rail ends to the ends of the conveyor sections 1 and 2, the rigidity of the rail material rendering cross bracing or connections unnecessary.

The reference numeral 14 designates a carriage which comprises essentially a skeletonized floor or beam made up of two longitudinally extending spaced side angle irons 15, to each of which is riveted or otherwise permanently affixed an upstanding side wall 16, and the two side walls are surmounted by a roof or top member 17. To make the spacing between the floor and top members adjustable, each side wall may be made quite low throughout its length, or at least at its end portions as shown at 16a (lower than the shortest bottle which the machine will be called upon to handle), and slotted to receive bolts holding brackets 18 depending from the top, as shown in Figs. 3 and 6. The top member and the side walls of the carriage may take the form of rigid metal plates, and the floor member may be completed by intermediate cross bars 19, a back or brailing edge 20, and a front or leading end sill 21, all spaced apart and having their ends secured to the side angle irons 15, as shown in Figs. 3 and 6. It will be recognized that the front and rear ends of the carriage are wide open so as to be capable of receiving and discharging a case 2. Such a case is shown in Figs. 3 and 6 positioned in the carriage.

Fixed to and spaced beyond the outer surface of each of the carriage side walls 16, as by a spacer block 22 having a large flange 22a, is a roller 23 provided with peripheral teeth 24 which are meshed with the teeth 13 of the adjacent one of the rails 12 of the runway 7. The two rollers are fixed on the same axis, and the dimensions and proportions of the blocks 22 and flanges 22a are such that the diameter of the flanges is greater than that of the rollers and the gauge of the rollers is that of the rails 12, while the distance between the outer surfaces of the carriage side walls 16 is less than the inside spacing of the rails 12. Thus the flanges hold the rollers on the rails and the carriage turns bodily, rotating on the axis of the rollers 23, turning end over end between the rails 12, as the rollers roll in either direction, upwardly or downwardly along the runway 7.

It is convenient and sufficient, though by no means essential, to make the length of the runway traversed by the carriage exactly twice that of the circumference of each of the rollers, so that on each movement of the carriage either up or down the runway the carriage will turn through two complete revolutions. This has been found to be ample and adequate to produce the required and desired mixing of beverage ingredients forming the contents of bottles in the case carried by the carriage, but of course, well within the spirit of the invention, the runway may be made longer, and/or the rollers made smaller, to provide for any greater number of revolutions that experience may show to be desirable to produce thorough mixing of any particular beverage ingredients.

The carriage descends by gravity from the receiving end 8 of the runway to the discharge end 9 thereof. To move it back up the runway, after it has discharged a case onto the conveyor section 5 as will be hereinafter explained, the invention provides a counterbalancing system which may include a cable 25 having one end connected to a ball 26 pivoted to the side walls of the carriage and having a weight 27 connected to its other end. The cable is trained over a system of pulleys 28, 29, and 30 and guided between guides 6 and 40 and down at a side of the conveyor section 1 as the carriage reciprocates along the runway. If desired or thought necessary, the run of the cable on which the weight 27 hangs may be caused to pass by an elevated fixture 31 and loosely through the bore of an additional weight 32 which is slidably captive in the fixture. The arrangement is such that just before the weight 27 rises to the end of its path of movement, determined by arrival of the carriage at the discharge end 8 of the runway, the carriage will have raised itself in the fixture, and pick up the weight 32, so that the added load will retard the descent of the carriage and bring it to a quick and gentle stop on the conveyor section 5.

It will be recognized, however, that a retarding or decelerating effect is produced also by the curvature of the runway. The steepness of the slope at the beginning of the descent of the carriage causes the carriage to move rapidly during the first part of its descent, while the leveling of the final portion of the runway causes the carriage to slow down as it approaches the discharge end 8. Both the contour of the runway and the additional weight 32 therefore tend to produce the same desired result; within the broad spirit of the invention either or both of these expedients may be used, or both may be omitted.

Of course the value of the weight 27 is made such that an empty carriage will be overbalanced by it and pulled up to the receiving end 8 of the runway, while a carriage carrying a case 2 will overbalance the weight and roll down the runway. Thus reciprocation of the carriage along the runway, taking cases down and returning empty for reloading, is accomplished.

In order to make it unnecessary for an operator to be positioned at the end of conveyor section 1 to feed a case 2 to the carriage each time the carriage arrives in receiving position, and to eliminate the need for any automatic timing mechanism coordinating delivery of cases with ascent of the carriage, the invention provides a device 40 in the end portion of the conveyor section 1. These may comprise a pair of U-shaped elements each of which has a short leg 41 and a longer leg 42 biased upwardly and as by a spring 43 so as normally to elevate both legs up into the conveyor section into obstructing relation with a case advancing along the conveyor section. The two legs of each device are mounted so that they are spaced along the length of the conveyor, with each of the devices located on an inside margin of the bed of the conveyor, and the arrangement is such that the rearmost, and preferably longer, leg of each device is in position to engage the leading edge of an advancing case and stop it. However, when the carriage 14 reaches the receiving end 8 of the runway, being perched on the tall end of the conveyor section 1, in the position shown in full lines at the left side of Fig. 1, the leg 42 of the device 40 moves the carriage settles on and depresses the legs 41, which of course pulls legs 42 down from in front of the side carriage, whereupon the case is free to move into the carriage. To cause a waiting case, stopped beyond the legs 42, to move automatically by gravity into the carriage promptly upon the carriage depressing the legs 41, the upper conveyor section 1 is best made slightly downwardly inclined, as shown in Figs. 1 and 5. As soon as the case clears the two devices, the legs are raised by the spring 43 and the next case advances by
gravity and is halted by the legs 42 until the car-
riage returns and assumes receiving position,
whereupon the cycle is repeated.

The receiving position of the carriage is one
in which it rests flat on the extreme tail end of
the conveyor section 1, as shown in full lines in
Fig. 1. When a case is fully seated in the
 carriage thus positioned, the loaded carriage be-
comes overbalanced and it tips forwardly about
the tail rollers of carriage section 1. It starts
down the runway, turning end over end as the
rollers 23 turn in their rolling movement down
the rails 12. In the preferred embodiment of the
invention, illustrated in the drawing, the rollers
and runway are proportioned to turn the carriage
through two complete revolutions during its de-
scent, but of course within the spirit of the inven-
tion these proportions may be modified to cause
the carriage to turn three or even more times, as
has been explained. When the carriage reaches
the discharge end 9 of the runway, by turning
to come to rest in the position shown in Fig. 6
and in broken lines in Fig. 1, the inertia of the
relatively heavy loaded case causes the case to
continue its forward movement, so that it issues
from the open forward end of the carriage and
moves along the lower level conveyor section 5.

In like manner, the carriage may also be used
on the second part of the carriage 24, serve to steady the rollers on the rails
42 and prevent derailment in much the same
manner as the flanged wheels of a railroad car-
track function to maintain the wheels on the
track rails.

It will be evident that the type of operation
which has been explained requires some holding
or latching means for securing the case in the
 carriage during its rotating descent down the
runway, with appropriate release for discharge
of the case onto the conveyor section 5.

The invention provides such latching in the
form of the means best shown in Fig. 6. A pair
of spring clips 56 are bolted to the top surface
of the back or trailing end sill 22 of the carriage
floor so that their outer portions will lie below
the level of the horizontal flanges of the side
angles 16 on which the case slides, while
their inner ends are turned up, as shown. It
will be evident that the front end of an oncoming
case will depress each of the resilient clips as
it slides over them, and that the free ends of
the clips will rise behind the trailing end of the
case, to the position shown in Fig. 6, and lock
or latch the case against backward movement
out of the carriage.

Fig. 6 also shows the means employed for halt-
ing the case at a position fully received within
the carriage and preventing premature sliding
of the case out from the front of the carriage.
This may comprise a pair of pins 51 resiliently
pressed up through laterally spaced holes in the
front or leading end sill 21 of the carriage floor
by spring means 52 socketed below the sill. The
spacing of the pins 51 and the latches 50 is such
as to accommodate between them the length of
a case 2 with slight clearance, and the pins and
latches serve to hold the carriage to the runway
during its rotation on descent along the runway.
The roof or top 17 of the carriage holds the
bottles, and hence the case also, well seated on
the carriage floor.

In order to retract the pins 51 when the car-
rriage reaches the discharge end 9 of the runway,
spaced rails and the carriage includes a pair of rollers fixed relatively to the carriage and frictionally engaged with the rails for rotation, and for rotating the carriage, as the rollers roll down the runway.

5. An agitating machine as claimed in claim 2, in which the carriage is countermbalanced to move up the runway to the receiving end thereof when the carriage is empty, and to descend to the discharge end thereof when loaded with a predetermined number of containers.

6. An agitating machine as claimed in claim 2, including a detent cooperating with the discharge end of the upper level conveyor for stopping containers at said end, and means for releasing the same and releasing the carriage reaching the receiving end of the runway to actuate the detent to release the carriage to be received by the carriage.

7. An agitating machine as claimed in claim 2, in which the carriage comprises spaced parallel floor and top members adapted to receive between them a case of containers, in combination with movable abutment means operatively connected with the floor member for holding the case and the containers therein against separation from the carriage during inversion upon rotation down the runway, said abutment means including a resilient element depressible by the leading end of a case entering the carriage and movable to abut the trailing end thereof and a second resilient element for engaging and stopping the leading end of a case fully seated on the carriage.

8. An agitating machine as claimed in claim 2, in which the carriage comprises spaced parallel floor and top members adapted to receive between them a case of containers, in combination with movable abutment means operatively connected with the floor member for holding the case and the containers therein against separation from the carriage during inversion upon rotation down the runway, said abutment means including a resilient element depressible by the leading end of a case entering the carriage and movable to abut the trailing end thereof and a second resilient element for engaging and stopping the leading end of a case fully seated on the carriage, and means for retracting the same and releasing the case automatically when the carriage reaches the discharge end of the runway.

10. An agitating machine as claimed in claim 2, in which the runway includes a pair of laterally spaced toothed rails and the carriage includes a pair of rollers fixed relatively to the carriage and having peripheral teeth engaged with the teeth of the rails for rotation, and for rotating the carriage, as the rollers roll down the runway.

11. An agitating machine as claimed in claim 2, including a counterweight and a line connecting the counterweight to the carriage, the weight of the counterweight being sufficient to overbalance the carriage when empty and pull the carriage to the receiving end of the runway and adapted to be overbalanced by the carriage when loaded whereby the loaded carriage will roll down the runway to the discharge end thereof.

12. An agitating machine for mixing charges of syrup and water in individual merchandise containers comprising a downwardly inclined runway, having an upper receiving end and a lower discharge end, a carriage having fixed thereon roller means frictionally engaged with the runway for rotating the carriage on descent along the runway, means for supplying containers to the carriage at the receiving end of the runway, and means for releasing the containers from the carriage at the discharge end of the runway.

13. An agitating machine as claimed in claim 12, in which the runway comprises rack means and the roller means comprises gear means meshed with the rack means.

14. An agitating machine as claimed in claim 12, including means for holding the containers in the carriage during descent along the runway.

15. An agitating machine as claimed in claim 12, including counterweight means for returning the empty carriage upwardly along the runway.

16. An agitating machine as claimed in claim 12, including means for retarding movement of the carriage as it approaches the discharge end of the runway.

17. An agitating machine as claimed in claim 12, including means for returning the empty carriage to the receiving end of the runway, and in which the runway is arcuately curved, being steepest adjacent the receiving end, whereby the speed of the carriage is reduced as it approaches the receiving end.

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