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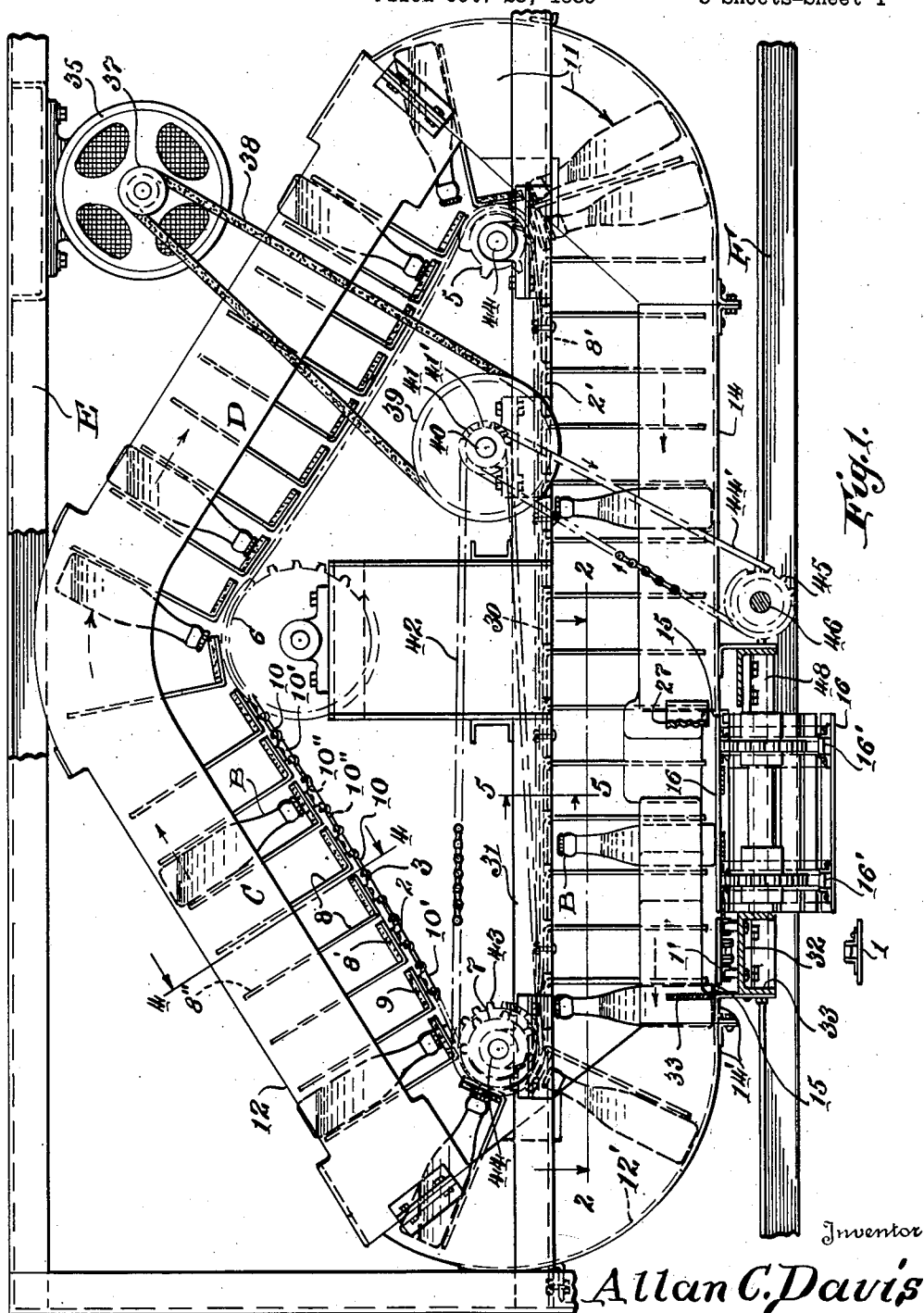
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2,265,803

MIXING IN BOTTLES AND SIMILAR CONTAINERS

Filed Oct. 23, 1939

3 Sheets-Sheet 1



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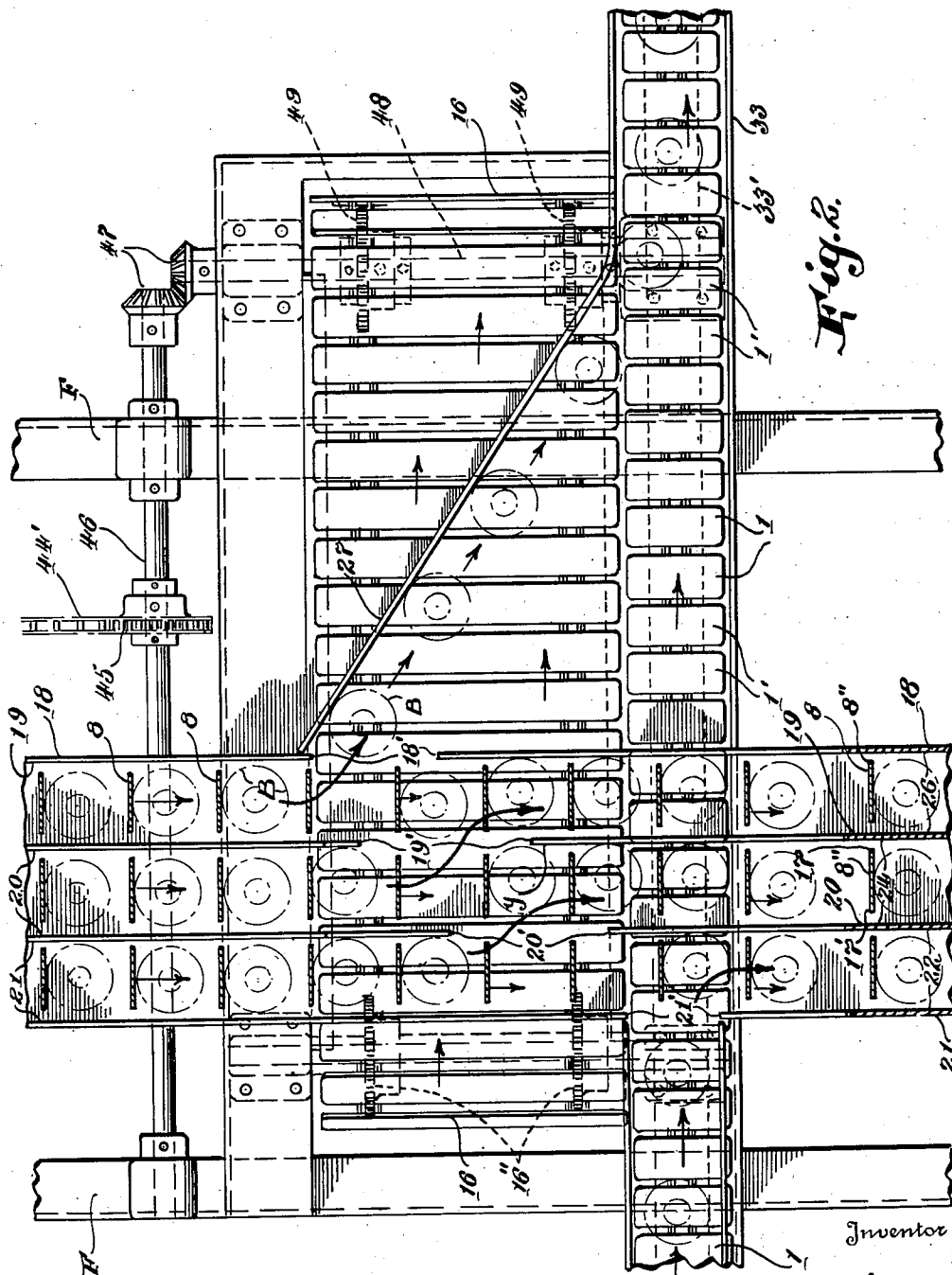
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3 Sheets-Sheet 2



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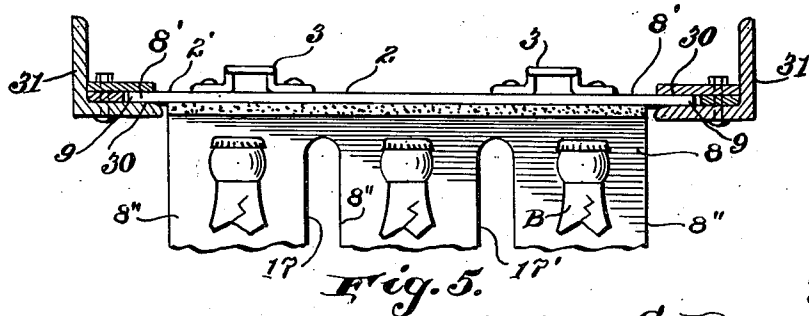
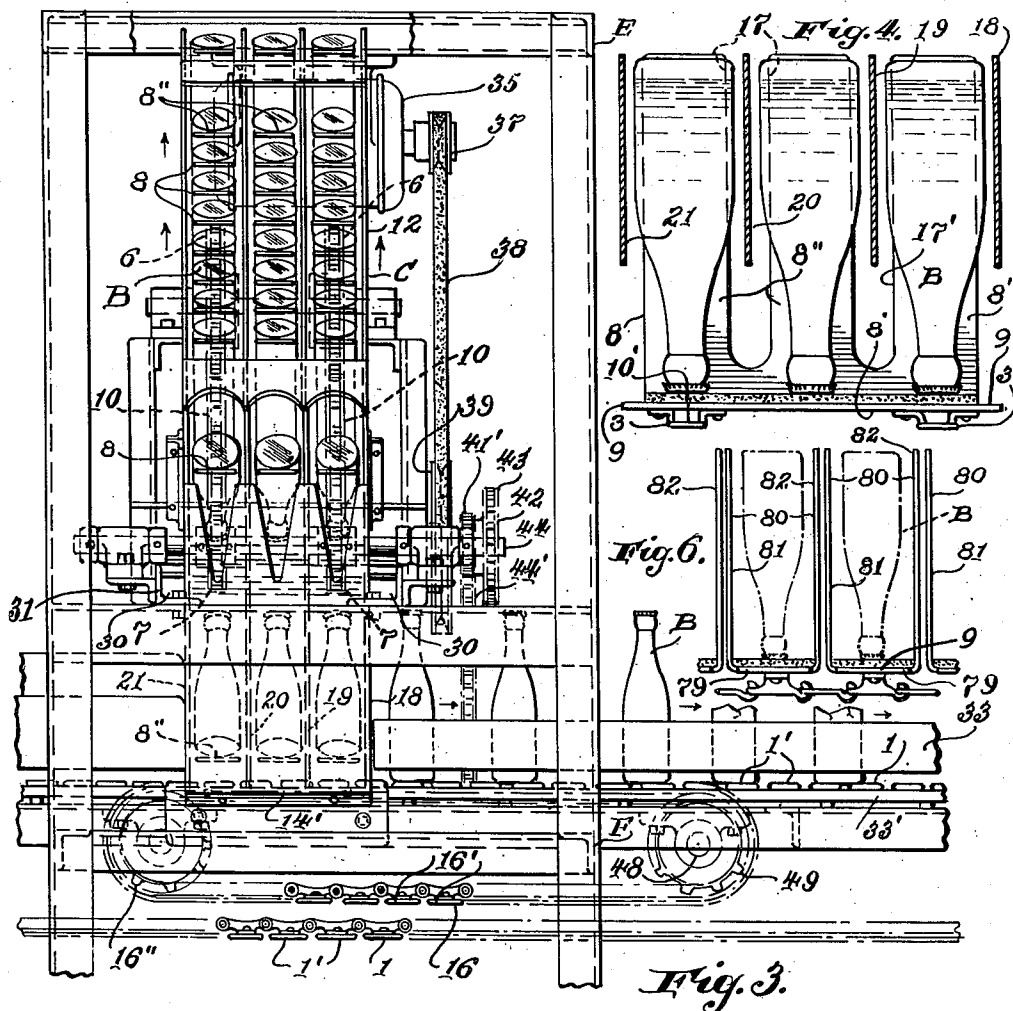
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MIXING IN BOTTLES AND SIMILAR CONTAINERS

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3 Sheets-Sheet 3



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MIXING IN BOTTLES AND SIMILAR
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Application October 23, 1939, Serial No. 300,741

13 Claims. (Cl. 259—54)

In the manufacture of bottled soft drinks, the vended product is compounded by introducing syrup and water in predetermined proportions into each bottle and thereafter moving the bottles in some way which is more or less effective in agitating the contents and causing them to combine in a uniform and permanent mixture.

On account of the tendency of the contained gases which are essential to the flavor of the drink, to be discharged from the liquid even at normal room temperatures and the much greater tendency of these gases to escape at higher temperatures, the liquid, i. e., the syrup and water, must as placed in the bottles be at low temperature as compared to normal room temperatures. And while heating the liquids in the bottles after they are closed is of assistance in mixing, it has been found so expensive that this expedient is not generally employed in the bottling of such drinks.

According to the practice prevailing in the bottling of soft drinks, the syrup as placed in the bottles is in the vicinity of 50 degrees Fahrenheit, the water from 38 to 40 degrees Fahrenheit, the temperatures having no particular bearing on the present invention, except as thus given they are explanatory of the difficulty which has been encountered in mixing the syrup and water in the bottles. The object of the present invention is to provide a machine for this purpose whereby the combined syrup and water bottled in accordance with the practice above outlined are thoroughly mixed forming a uniform and permanent mixture, and for mixing any fluids in bottles or similar containers.

In the bottling and mixing of cold liquids, it has been found that shaking of the bottles and agitation of the liquid for a prolonged period is necessary to proper mixing and the previous mixing machines for this purpose have not proved satisfactory. Wheel conveyors which hold the bottles in various positions relative to the wheel as the wheel rotates have been tried for this purpose and have not been found satisfactory because the wheels rotating at the speed necessary to give the essential time element, though they invert the bottle, do not give sufficient agitation to effect the desired result, i. e., to give a uniform and permanent mixture because the change of angle of the bottle axis to the earth's axis is uniform and changes of speed are not conveniently accomplished.

The invention provides a machine for this purpose which is believed to overcome the difficulties mentioned. Important advantages of the machine of the invention are: that this machine is simple and constructed at relatively small cost and it is so designed that with slight variation the time element may be increased by slight changes involving relatively small expense. An important feature of operation is that the bottles instead

of being gradually inverted at uniform rate as in the wheel conveyor, turn suddenly with accelerated speeds at various points in their traverse. Between such turnings the bottles, preferably in inverted position, may, in the form of the machine shown, be continuously agitated by a jerking vibratory action which has not been obtained with any other type of machine designed for mixing liquids in bottles or similar containers, the present machine being adapted to various containers.

It is further an important accomplishment that the machine is short and otherwise of small dimensions and the period of agitation may be increased without increasing the length of the machine and with a relatively slight increase of its width, further, in the machine as shown, the time element and the period of agitation and the actual agitation of the bottles as compared to any known machine for this purpose are exceedingly great in proportion to the dimensions of the machine.

In the preferred form of the machine, the bottles are inverted with a quick angular acceleration and retardation and are repeatedly vibrated between inversions which are not essentially complete, i. e., of 180° angular extent, in any single change of direction.

In the accompanying drawings I have disclosed a machine embodying the features of my invention, the drawings being largely diagrammatic, the machine shown being an illustrative example of the machines in which the invention may be embodied.

In the drawings:

Fig. 1 is a front elevation of the machine, the discharge end of the feeding and discharging conveyor being shown in section.

Fig. 2 is a horizontal section looking downwardly from the line 2—2 in Fig. 1.

Fig. 3 is an elevation looking from the right in Fig. 1.

Fig. 4 is a section on line 4—4 in Fig. 1, looking in the direction of the arrows.

Fig. 5 is a section on line 5—5 in Fig. 1, looking to the right in said figure.

Fig. 6 is a section of a modified propeller plate taken in a plane parallel to the plane of Fig. 1.

Referring to the drawings by numerals, each of which is used to indicate the same or similar parts of the different figures:

In a machine, as shown, the filled bottles are fed to the agitating area by a conveyor 1, which is preferably horizontal and in Fig. 2 this conveyor is shown in plan, the motion of the top flight of this conveyor and of the bottles being in the direction of the arrows. In Fig. 1, in which this conveyor is shown in transverse cross section, its motion is toward the observer in said figure,

the length of the conveyor being at right angles to the plane of Fig. 1.

The bottle shaking or agitating conveyor 2 comprises two or any suitable number of chains 3-3 running on sprockets 5, 6, 7, which guide support and drive the conveyor 2 in the performance of the mixing or agitating operation. In the form of machine shown, this mixing or agitating conveyor 2 is provided with transverse propeller plates 8, also referred to as retaining means which are disposed in planes at right angles to the length and to the motion of this conveyor 2. The propeller plates 8, in the form of the invention shown, are of L shaped cross section in planes parallel of the conveyor 2, and in the bottom flight of the said conveyor at 2' on which the bottles are received from conveyor 1, the L shaped cross section is inverted, the foot of the L 8' being attached at its lateral ends 9 to the links 10' of the conveyor chains which are shaped for this purpose as shown in Figs. 4 and 6 the intermediate links being indicated by 10.

Fig. 6 shows a U shaped propeller member 80, and having a foot or cross arm 79 and two legs 81 and 82. The foot 79 is secured after the manner of the foot 8' and the legs 81 and 82 project outwardly after the manner of the arms or uprights 8''.

The conveyor 2 may be driven from any pair of sprockets, 5, 6 or 7, as hereinafter described being, in the form of the invention shown, operated or driven in the direction of the arrow 11.

The shaking or agitating conveyor 2 with its propeller plates 8 is shown as enclosed by a casing or shield 12 which may include supports or tables 14 which extend beneath the bottom flight 2' of the conveyor 2, said supports or tables being omitted as to an intermediate portion 15 in which the bottles are supported by conveyors 1 and 16, i. e., the feeding conveyor 1 and a transfer conveyor 16 to be further described, which conveyors 1 and 16 are disposed at right angles to conveyor 2 with their top flight in the plane of supports 14.

The upright and depending arms 8'' of the L-shaped propeller members 8 are, in the form of the invention shown, slotted at 17 and 17' and the machine is provided with longitudinal guide plates 18, 19, 20 and 21. The guide plates 19 and 20 pass through the slots 17 and 17', and the guide plates 18 and 21 are at the sides. These guide plates extend along the entire path of the conveyor 2 being supported on the shield or casing 12 to which they may be secured, or they may be supported in any suitable manner. The guide plates are provided with transfer openings 18', 19', 20' and 21', respectively, through which the bottles are transferred as hereinafter described.

The upright and depending arms 8'' project outward radially as they swing around the sprockets. For convenience and brevity the phrase "projecting outwardly from the conveyor or from the conveyor path" has been used to express this or an equivalent arrangement of these arms. Said arms are, container engaging means, and they provide bottle compartments on the conveyor of dimensions which measured longitudinally of the conveyor slightly exceed and hence correspond to the diameter of bottle to be handled, thus providing for maintenance of the bottles in said outwardly projecting relation to the conveyor, preferably permitting them to rock between adjacent arms 8''.

It is of interest that the propeller members 8

have their base plates 8' extended outwardly at their ends 9 and that these ends in the bottom flight of the conveyor run in horizontal guides 30, Fig. 5, which are supported on angle bars 31 which form part of the frame of the machine. The top flights of this conveyor are unsupported except by their chains 3. The guides 30 hold the propeller uprights 8'' at right angles to the guides in moving the bottles overcoming the friction of the bottles on supports 14 and conveyors 1 and 16. The conveyor 1 is supported on the center webs 32 of channel 33 as to its top flight which supports the bottles.

The feed belt which is shown as of a width suitable to one bottle, being adapted to support the bottles in single line from the bottling machine, as already stated, is so operated that its top flight carrying the bottles B moves toward the observer in Fig. 1, and from left to right in the plan Fig. 2. The width of the conveyors and the number of lines of bottles handled in this machine is a matter of election or design. Feeding in a single line is satisfactory under existing conditions. The transfer belt 16, as shown, is of a width corresponding to three lines of bottles side by side and is moved in the same direction as feed belt 1, its length being suitably limited as shown. Both the belts 1 and 16 are located in the opening or omitted portion 15, sufficiently close together and to supports 14 to prevent the dropping of bottles between conveyors 1 and 16 and supports 14 all of which serve as supporting means for the bottles, in and beneath the bottom flight 2' of the conveyor 2. The channels providing for a single row of bottles between the guides 21, 20, 19 and 18 are indicated by reference characters 22, 24, and 26 respectively.

The opening 21' through the guide 21 is in alignment with the conveyor 1 and is a little wider than the diameter of the bottles thereon indicated by B. The motion of the bottles with the conveyor 1 on the plates 1' of which they stand is arrested by the guide 20 which spans the conveyor 1 opposite the opening 21'. The motion of the bottom flight 2' of the belt 2 and its propeller plates 8 causes the bottles, fed by conveyor 1, to move to the left in Fig. 1, being at that time passed along support 14' and up the incline 12' of casing 12 and they continue along the path of conveyor 2 making the loop which is the continuous path of conveyor 2 as shown in Fig. 1. When the bottles again reach the bottom flight of conveyor 2 at the right they move along support 14 to the left and across transfer conveyor 16, moving forwardly with the conveyor 2 until they come opposite the opening 20' at which time they are still on the transfer conveyor 16 which moves in the same direction as does the feed conveyor 1. Up to this time, the bottles traced, have been moved from feeding conveyor 1 to conveyor 2, and have made a complete circuit of the latter in channel 22. The combined motion of the belt 16 and the propellers 8 cause the bottles to pass through the opening 20' and brings them into contact with the portion of the guide 19 on the side of opening 19' toward the observer in Fig. 2, so that they are transferred to channel 24 in which they move with the propellers 8 making a second complete or almost complete circuit of the path of the conveyor 2. At the end of the second circuit of conveyor 2 they come to the opening 19' which is also over the transfer belt 16. The combined motion of the transfer belt 16 on which the bottles are now resting and the propellers 8 passes

the bottles through the opening 18' when they contact the guide 18 and move toward the observer in Fig. 2, the bottles traced being now in channel 26 in which they make a third complete circuit of the path of conveyor 2 and come back to the opening 18' where they are discharged by the cooperation of the transfer conveyor 16 and an inclined guide 27 which is deflected from the line of conveyor 2 forwardly in the direction of the transfer motion which is parallel to the feed belt 1. This deflector, cooperating with transfer belt 16, returns the bottles to the feed belt 1, whereby they are carried forwardly to the case filling machine or other case filling means, the bottles, in some instances, being placed in the cases by hand.

It is of interest that the conveyor 2 may be of any desired width comprising as many bottle channels 22, 24, 26, as desired in which the bottles make successive circuits of conveyor 2 giving any desired time elements and any desired number of successive periods of inverting and shaking or vibrations.

Referring now to the mechanical details whereby the conveyors are driven and other mechanical details incident to the functioning of these conveyors and agitating members, the mixing or agitating machine, in the form illustrated, is driven from and by an electric motor 35 or any suitable source of power. The motor 35 is shown as depending from a top frame member E in Fig. 1. This motor is provided with a small driving pulley 37 secured to the armature shaft and this pulley 37 drives, by way of the belt 38, a pulley 39 secured to a shaft 40 mounted in suitable bearings on the machine frame, this shaft carries, secured thereto, a sprocket 41 which drives a chain 42 which in turn drives a sprocket 43 at the left in Fig. 1, the sprocket 43 being secured to a shaft 44 to which are secured two sprockets 7, spaced according to the spacing of the chains 3 of the conveyor 2 and meshing with said chains whereby the conveyor 2 is driven on the continuous path described.

It is of interest to note that the conveyor 2 is relatively loose and unguided and unsupported except by the sprockets as to its two upper flights, indicated by C and D, and that the sprockets 5 and 7 are relatively small and have a comparatively small number of teeth spaced well apart along the circumference of each sprocket. In the drawing Fig. 1, the spacing of the adjacent teeth of sprockets 5 and 7 measured circumferentially from the center of one tooth to the center of the next approaches the length of the radius about the center of the sprocket at said circumference where the measurement is taken, this spacing may be increased or decreased. This arrangement causes a vibratory action of the chains and the conveyor 2 in these flights, giving a vibratory action of the bottles while they are in inverted position as elsewhere described. The proportionate spacing of the teeth as stated above and shown in the drawing gives a vibratory action of the conveyor which is entirely satisfactory and effective but satisfactory shaking or vibration of the conveyor is obtainable independently of the tooth spacing.

The small diameter of the idler or guiding and supporting sprockets 6 and 5 and the angular motion or inversion of the bottles as they swing about these sprockets together with the vibration of the conveyor and hence of the bottles, and the turning of the same as they pass the

sprockets are also elsewhere described in the specification.

It is of very considerable assistance to and in the mixing operation that the bottles which usually have a small space not occupied by the liquid are inverted when on the upper flights C and D, the agitating conveyor 2 in which they are vibrated and the angle of the bottle axis with the vertical is changed as at sprockets 5, 6 and 7, for which other direction changing means may be substituted. This may be explained as follows: The syrup is heavier than the water or other thinning liquid employed and the syrup thus has a tendency to gravitate to the bottom of the bottle, the same being in upright position when filled. The syrup is also inclined to adhere to the bottom wall even in this position retarding mixing. In the circumstances outlined, vibration and swinging of the bottle in inverted position which gives a washing of the liquid on the bottom of the bottle which is of great assistance in attaining a uniform mixture.

The shaft 40 carries a second sprocket 41' which is shown as of the same size as the sprocket 41, this sprocket 41' drives a downwardly inclined chain 44' as shown in Fig. 1, which engages and drives a sprocket 45 on a shaft 46 which extends across the machine as best shown in Fig. 2 and is mounted in suitable bearings in the machine frame. This shaft 46, in turn, drives a shaft 48 arranged transversely thereto as shown in Fig. 2 and less conspicuously in Fig. 1, the motion of shaft 46 being transmitted to shaft 48 by way of bevelled gears 47. The shaft 48 carries secured thereto sprockets 49 which mesh with the chains 16' of the conveyor 16, and drive said conveyor. The transfer conveyor 16 is supported and guided at its opposite ends by idler sprockets 16''.

The feeding conveyor 1 which in the regular practice brings filled and closed bottles from the bottling machine to the shaking or mixing machine and carries them from this machine may be driven from an outside source. The agitating or shaking conveyor 2 and the transfer conveyor 16 are preferably driven from a single source and timed to move in cooperation in order to effect the transfer at 20', 19', and 18', as above described.

The following details and features of the sprockets 5, 7, 6 and the propellers 8 are regarded as of considerable importance in connection with the time element and mixing motions which are variable to attain satisfactory results in mixing in accordance with the properties of the liquids being mixed.

The sprockets 5 and 7 and either of these sprockets are preferably of relatively small diameter, the sprockets in the machine described being about 3 inches in diameter and provided with a relatively small number of teeth, the tooth engaging links of the chain 3 being spaced so that as the foot 8' of each L shaped or U shaped propeller 8 reaches a turn about the sprocket 5 or 7 at the end of the bottom traverse, there is a quick jerky swing of the upright propeller arm 8'' whereby the upright axis of the bottle supported thereby is quickly changed as to its angle with the vertical. At the ends of the bottom flight 2' each bottle is substantially inverted and at the sprocket 6, the upright axis of the inverted bottle is swung from one side to the other side of the vertical. The motion of the bottles at sprockets 5 and 7 causes a quick flow and substantial reversal of the position of the unmixed

liquids in the bottle which are usually of different specific gravities whereby an important step of the mixing operation is performed, and, as the base plates 8' of the propeller plates pass the sprockets 6, 6', there is another change of the angle of the bottle axis from one side of the vertical to the other, the bottles being changed from a position in which they lean against one upright 8'', to a position in which they lean against the opposite upright 8'', giving an intermediate and somewhat lesser change of angle with a quick jerky motion corresponding to that already described. There being, in all instances, when the bottles pass a sprocket a wide change of the angle of the bottle axis giving a swing of the bottle with a quick acceleration and an immediately subsequent equally quick retardation whereby the liquid is further agitated and mixed. The fact that the bottles are inverted has an important effect, as already described.

It is of interest that the chain 3 is preferably somewhat longer than is required to span the sprockets, the upper flights C and D of the conveyor 2 being relatively loose and permitted to sag between the sprockets giving a vibratory motion due to the engagement and release of the chain by the relatively small number of teeth in the small sprockets 5, and 7 and to a less degree on the sprockets 6 and 6'. This motion at the sprockets is a snapping or tightening and loosening of the chains and of the corresponding portions of the conveyor whereby the bottles are continuously shaken and vibrated as they move along the upper flights C and D of the conveyor path and to a less degree on the lower flight 2'. The recent inversion being a contributing advantage.

It is of importance that the number of paths 22, 24, 26 and the number of transfers can be indefinitely increased without increasing the length of the machine and with very slight increase of dimension so that the time element and the period during which the bottles are shaken and the number of inversions can be definitely increased without increasing the length of the machine and with but a slight, if any, increase of its width. While a satisfactory result may be attained by a single path conveyor of this type of sufficient length the saving of the space which is incident to the use of multiple paths with a transfer from one path to the other successively is regarded as of great importance, the actual saving being actual length of the path multiplied by the number of paths reduced by one.

It is to be noted that while the angular turns of the path of the agitating conveyor 2 are subject to variation the turns at 5 and 7 may be designated as to the machine shown at about 160°, the turns at 6 being approximately 100°, the sprockets 6 and 7 being made of otherwise unusually small diameter and few teeth to give the vibration described which would in other types of conveyor for other purposes be most undesirable, the nature of the chains and the spacing of the teeth 5' and tooth springs 10'' of the chains is a contributing element.

The machine described, while it is regarded as a comparatively simple embodiment of the invention, is obviously capable of variation, for example, the continuous treatment of a continuous supply of bottles continuously delivered from the mixing machine may be accomplished without utilizing the entire length of the continuous shaking conveyor and while the 150° change

of angle of the conveyor at each end of the bottom horizontal flight 2, as shown, seems to be highly satisfactory, it is possible to change this angle and to change the position and contour of the conveyor path without departure from the spirit of the invention or loss of a useful result attained.

While it is desirable that the conveyor path be in the nature of a continuous loop, as shown, positioned in a substantially vertical plane, and that the conveyor path have abrupt turns which with the other portions of the conveyor path may be defined as irregularly related changes of direction, the abrupt turns, at each end of the bottom flight, the bottles being supported with their axes approximately at right angles or otherwise transverse to the portion of the conveyor on which each is supported and with the bottle axes in or near or parallel to said vertical plane, as shown, it is possible to utilize some features of the invention without others and to effect fairly satisfactory agitation of the contents of the bottles, though less efficiently and possibly with less economy in space and less convenience to the operator due to the loss of the function of the portions omitted, and, while the quick swing of the bottle axis effected by abrupt or sharp change of direction of the path, together with the vibratory motion of the bottles between such changes particularly with the bottoms of the bottles upward, contribute in considerable proportion to the highly satisfactory results attained, the quick swinging of the bottle or changes of direction may be utilized without the vibratory motion of the chains, and the vibratory motion of the chain may be utilized in various mixing operations without the other motions described, but, in the form of the machine shown, these two motions and the continuous operation transferring the bottles from one path to the other, the arrangement of the path in a substantially vertical plane, with the axes of the bottles in said plane at right angles or substantially right angles to the conveyor are all interdependent in the attainment of the new and highly satisfactory result which has been attained.

Fig. 6 illustrates a modified form of propeller member 80 which is similar to the propeller member 8 with the addition of a second leg or upright 82, the first upright being 81. This form of propeller has the advantage that it prevents or eliminates any tendency of the bottles to drop at the down turning end of the agitating conveyor path where it encircles the sprockets 5 at 11, Fig. 1. This tendency exists only where the machine or conveyor 2 is operated at relatively slow speeds as, to increase the time element.

The operation has been fully described in connection with the description of the machine.

I have thus described an illustrative apparatus embodying my invention and my improved method of mixing of liquids in bottles, the description being specific and in detail, in order that the manner of constructing, applying, operating and using the invention may be fully understood; however, the machine, as shown, and the principles disclosed are capable of wide variation and application, the specific terms herein being used in a descriptive rather than in a limiting sense and the scope of the invention being defined in the claims.

What I claim as new and desire to secure by Letters Patent is:

1. In a machine for shaking bottles or similar containers to agitate and mix the contents, an endless link conveyor for the bottles and means

for feeding the bottles to the conveyor, supporting means for guiding and driving said conveyor, propeller arms for advancing the bottles secured to the link members in predetermined and substantially constant relation to the portion of the conveyor adjacent each arm, the means for moving and guiding the conveyor on a continuous path comprising sprockets providing sharp angular turns of the conveyor whereby the propeller arms project from the conveyor path and outward radially from said sprockets as they swing about the same, said feed and said arms operating in combination whereby the bottles are located on the conveyor with their axes extending outwardly substantially parallel to the radial length of said arms, some of the sprockets being of small diameter determining the said sharp angle of the turns and the portion of the conveyor immediately beyond some of the small sprockets being slack and the sprocket teeth being widely spaced whereby the conveyor is given a snapping motion as the sprocket teeth are engaged by and disengaged from the chain links vibrating the conveyor and the bottles said arms being spaced in the direction of the length of the conveyor in approximate correspondence with the diameter of bottle to be handled by the machine.

2. In a machine for shaking bottles and similar containers to agitate and mix the contents, an endless link conveyor with driving means and guiding and supporting sprockets for operating the conveyor in a path which is substantially parallel to an upright plane, propeller means for the bottles secured to the link members and distributed along the conveyor, means for holding each propeller at a predetermined angle to the adjacent portion of the links, means adjacent said links for supporting one end of the bottle when in inverted position, means for feeding the bottles to and discharging the bottles from the conveyor at points on opposite sides of a sprocket and guiding means for holding the bottles on the conveyor and aligning them therewith between said points, the turns of the conveyor at the sprockets and the passage of the conveyor around the sprockets serving to swing each propeller member in turn through an angle, the propeller member being quickly accelerated at the beginning and quickly retarded at the end of said turn the bottles resting on the conveyor and being supported by the propeller members in fixed relation to the portion of the conveyor on which they rest, providing a quickly accelerated and retarded turn of each bottle at the sprocket, said conveyor having guides dividing the conveyor into a plurality of channels for the bottles extending along the conveyor, and means for transferring the bottles from each channel to the next.

3. In a machine for shaking bottles and similar containers to agitate and mix the contents, a flexible endless conveyor and means for supporting, guiding and moving said conveyor on a continuous endless path substantially parallel to a single plane, means for holding the bottles on said conveyor with their axes substantially parallel to said plane and transverse to said path and extending outwardly from said path for substantially their full axial length, and means for bringing the bottles to the position on the conveyor thus defined, said supporting and guiding means providing changes of direction of said path which are abrupt as compared to the contour of adjacent portions of said path whereby

the axes of said containers are swung through an angle by the advance of said conveyor through said changes of direction with a change of speed which is quick relatively to the speed of the conveyor said holding means for the bottles comprising bottle contacting members carried by the conveyor and projecting outwardly therefrom and spaced in the direction of the length of the conveyor said spacing corresponding to the diameter of bottle to be handled by the machine.

4. In a machine for shaking bottles, an endless chain conveyor with means for supporting, guiding and moving the same on a continuous path said means including a sprocket engaging said chain and means on said sprocket engaging the chain alternately slackening and tightening the conveyor providing a vibratory motion, means for supporting said bottles outwardly from one side of the links on the vibrating portion of said conveyor, means for feeding the containers to their positions on the conveyor and for removing them therefrom after a predetermined advance of the conveyor and after a predetermined period of vibration.

5. In a machine for mixing the contents of bottles and similar containers, an endless flexible conveyor for moving the bottles to agitate and mix the contents and means for operating the same on a continuous elongated path comprising changes of direction which are abrupt relatively to the contour of other portions of said path, said conveyor having means for advancing and guiding the bottles thereon in a plurality of parallel lines extending in the direction of said path, said advancing means being adapted to hold the bottles with their axes extending outwardly from said path in substantially perpendicular relation to the portion of the conveyor immediately adjacent each said bottle throughout some of said changes of direction, means for transferring the bottles from one said line to the other at predetermined points in the path of said conveyor, feeding means arranged to feed the bottles to the path at one side of the conveyor, delivery means for discharging the bottles from the path at the other side of the conveyor, whereby the bottles are caused to make a plurality of circuits about said conveyor said circuits corresponding to the number of lines.

6. In a machine for mixing the contents of bottles and similar containers, an endless chain conveyor and means for operating the same on a predetermined non-circular path, said path being in a substantially upright plane, the conveyor having means for supporting and retaining and guiding the bottles thereon, the retaining means being adapted to hold each bottle with its axis approximately parallel to said plane and in substantially transverse relation to the portion of the conveyor immediately adjacent said bottle throughout its path said retaining means comprising bottle contacting members carried by the conveyor and projecting outwardly therefrom and spaced as to their contacting surfaces, in the direction of the length of the conveyor, in approximate correspondence with the diameter of bottle to be handled by the machine, said path comprising abrupt changes of direction whereby the relation of the axes of the bottles to the vertical is quickly changed, the bottles being substantially inverted whereby the bottoms of the bottles are upwardly disposed in portions of the path, feeding means arranged to feed the bottles to the conveyor, and into said transverse

relation therewith delivery means for discharging the bottles from the conveyor.

7. In a machine for moving bottles to agitate and mix the contents, a continuously operated conveyor and means for moving the same on a path which is elongated in a relatively upright plane, means intermediate said path providing a plurality of changes of direction of said conveyor comprising approximately 360° change of angle, providing an upper and a lower flight of said conveyor separated by said direction changing means, means for continuously feeding the bottles to the conveyor and for continuously discharging them therefrom, means for holding each bottle with its axis approximately parallel to said plane with substantially its entire axial length extending outwardly from said path and in substantially transverse relation to the portion of the conveyor on which it is located whereby the bottles are inverted intermediately of said path, some of said changes of direction being abrupt and means for vibrating portions of said conveyor with the bottles thereon.

8. In an apparatus for mixing the contents of containers, an endless conveyor, means to support and drive said conveyor through an endless path including successive runs arranged at an angle to each other, container engaging means on said conveyor to hold each container with its longitudinal axis substantially at right angles to the plane of the conveyor where it is located, a dividing element extending longitudinally of said conveyor, means to transfer said containers from one side of the said dividing element to the other, means to deliver containers to and remove them from said conveyor, and means to drive and vibrate said conveyor.

9. In combination with a conveyor for delivering bottles or containers, a bottle agitating means angularly disposed to the delivery conveyor and overlying the same, said agitating means being made up of a plurality of link members hinged together to form an endless conveyor, means to support and drive said second conveyor through a polygonal path in a plane substantially perpendicular to the plane of the delivery conveyor, bottle engaging means secured to said link members for removing the bottles from the delivery conveyor to the second conveyor, and for positioning the said bottles relative to the said conveyor, guiding elements extending longitudinally of said second conveyor forming a plurality of channels through which said bottles or containers are conveyed, means for transferring the said bottles and containers from one channel to the other after they have traversed the said polygonal path and for discharging the said bottles and containers from said agitating means after they have passed through the agitating means.

10. In a machine for mixing the contents of containers, an endless conveyor and means for operating the same continuously on a non-circular path, means for feeding the containers to the conveyor with their axes approximately upright the conveyor also having means for supporting and advancing and guiding the containers thereon in said upright position and in approximately fixed relation to the adjacent portion of the conveyor, the conveyor path comprising abrupt changes of direction whereby the rela-

tion of the container axes to the vertical is quickly changed, the containers being substantially inverted whereby the bottom ends of the containers, as fed, are upwardly disposed in portions of the path, and means for vibrating portions of the conveyor on which the containers are thus inverted, and delivery means for discharging the containers from the conveyor.

11. In a machine for mixing in bottles and similar containers, having an endless conveyor, means for supporting and driving said conveyor continuously on an endless path having abrupt changes of direction, means for holding the bottles on said conveyor and in determined relation thereto, with their axes approximately upright in a portion of said path and for holding the bottles approximately in said relation to the conveyor throughout a considerable portion of the path, including said changes of direction whereby the axes of the bottles are approximately inverted in their relation to said upright position and means for feeding the bottles to and delivering the bottles from said conveyor, said holding means for the bottles comprising bottle contacting means carried by said conveyor and projecting outwardly therefrom, said contacting means being spaced in the direction of the length of said conveyor by a distance in correspondence with the diameter of the bottles to be handled.

12. In a machine for mixing in bottles and similar containers having an endless conveyor, means for supporting and driving said conveyor on a path having abrupt changes of direction, means for holding the bottles on said conveyor in portions of its path with their axes approximately upright and for holding, guiding and supporting the bottles in approximately said relation to the conveyor throughout a considerable portion of said path, including said changes of direction whereby the axes of the bottles are approximately inverted, means dividing the conveyor into a plurality of bottle paths, means for transferring the bottles from one bottle path to the next successively after passing around the conveyor and means for feeding them to and discharging them from the conveyor.

13. In a machine for mixing in bottles and similar containers having an endless link type bottle agitating conveyor with driving means and sprockets supporting the same on an endless path having a plurality of angularly related runs with sharp changes of direction at said sprockets, bottle supporting arms projecting outwardly from the conveyor, said arms having feet extending along the conveyor in the direction of said path and secured thereto to maintain said relation of the arms to the conveyor, additional means for guiding and supporting the bottles whereby they are held on the conveyor through portions of both runs and some of said changes of direction in positions with their lengths extending outwardly along said arms whereby the relation of the bottle axes to the vertical is changed and said axes tend to be inverted, means for bringing the bottles to said positions and means for discharging them, the passing of said feet through said changes of direction imparting a jerking motion to said arms and to said containers.

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