Fluid Substance Depositor for Filling Continuously Moving Receptacles

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FLUID SUBSTANCE DEPOSITOR FOR FILLING CONTINUOUSLY MOVING RECEPTACLES

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Fig. 4 is a view, as taken on line 4—4 of Fig. 3, showing the valve plate for the first, or left hand, nozzle of Fig. 3.

Fig. 5 is a similar view, as taken on line 5—5 of Fig. 3, showing the second, or right hand, nozzle valve plate.

Fig. 6 is a schematic view, in elevation, of the depositor nozzle and valve mechanism at the left hand side of Fig. 1, showing the relation of the valve plates and their operating means at the start of a depositing cycle.

Fig. 7 is a diagrammatic plan view showing the relation of all of the depositor nozzles and the receptacles to be filled at the start of a depositing cycle.

Fig. 8 is a view similar to Fig. 6, but showing the depositing mechanism at the position where the first nozzle is closed and the second nozzle is opened.

Fig. 9 is a view like Fig. 7 showing the relation of the parts at the stage shown in Fig. 8.

Fig. 10 is a view like Fig. 6, but showing the left side depositing mechanism at the end of its stroke and depositing operation.

Fig. 11 is a view like Fig. 7, showing the relation of the parts at the stage shown by Fig. 10.

Fig. 12 is a view like Fig. 6, but showing the left side depositing mechanism as it approaches the end of its return stroke for the start of the next depositing cycle.

Fig. 13 is a view like Fig. 7 showing the relation of the parts at the stage shown by Fig. 12.

Fig. 14 is a sectional view of the first valve plate, as taken on line 14—14 of Fig. 4, showing the arrangement of its operating pins.

Fig. 15 is a similar view of the second valve plate, as taken on line 15—15 of Fig. 5, showing the disposition of its operating pins.

Fig. 16 is a schematic view, on the order of Fig. 6, showing a valve and valve operating arrangement for a single nozzle depositor, the parts being shown in position for the start of a depositing cycle.

Fig. 17 is a view, on the order of Fig. 7, showing the relation of the single nozzle depositors and the respective receptacles at the start of a depositing cycle.

Fig. 18 is a view like Fig. 16 but showing the depositor nozzle and valve mechanism at the end of its depositing stroke.

Fig. 19 is a view like Fig. 17 showing the relation of the nozzles at the cycle stage shown in Fig. 12.

Fig. 20 is a schematic view in elevation, showing the principal elements of a depositor system embodying twin nozzle depositors.
Each valve operating means comprises a plurality of trip members supported on a stationary frame consisting of upright members 16 and 20, suitably mounted on the conveyor structure, having arm portions which overhang the conveyor and a horizontal cross bar 21 which extends between the arm portions and is rigidly connected thereto. The trip members are disposed along the path of the valve discs in position to operate them at predetermined periods in each cycle of reciprocating nozzle movement, as will be hereinafter described.

Referring to Figs. 2 and 3, which show the deposer mechanism at the right-hand side of Fig. 1, it will be seen that the Y-fitting 9 projects from the carriage 14 toward and above the conveyor so that the deposer nozzles will be positioned to discharge into the pie plates or receptacles as they are carried along by the conveyor.

The valve plate 16 is mounted in the nozzles behind the nozzle openings and carries a pair of tubular bearings 22 and 23 which are rigidly mounted on the plate, one above each nozzle and axially parallel therewith. Each of the valve discs 17 and 18 is mounted on the end of a respective shaft 24 and 25 and each of these shafts is rotatably contained in a respective one of the bearing members 22 and 23 on suitable bushings 26 and 27 which have radially flanged ends abutting the ends of the respective bearing members. The valve discs extend across the ends of the respective nozzles, as indicated in Figs. 1 and 2, and the flanges of each forward bushing 26 is designed to space the respective valve disc from the end of the bearing a sufficient distance to provide a light frictional engagement of the rear surface of the disc and the end of the nozzle which is square with the plane of the disc.

As shown, the shafts 24 and 25 extend beyond the rear ends of their respective bearing members and the frictional engagement of the valve discs and the end of the nozzles is maintained by a compression spring 28 mounted on each shaft and bearing between the flanges of the bushing and a washer 29 held by a nut 30 threaded onto the end of the shaft, the nut 30 being adjustable along the shaft to vary the tension in the spring 30.

Referring particularly to Figs. 4 and 5, it will be seen that the valve discs, 17 and 18, are flat, substantially semi-circular, plates each having a central portion, adapted to receive the end of the respective shaft, and a marginal portion adapted to overlie the end of a respective nozzle, the marginal portion being cut away for a part of its angular length so as to clear the nozzle and fully expose the nozzle opening. The cut-off edge of the marginal portion of each disc is also beveled at 17.1 and 18.1 to provide a more uniform cut-off action during valving operation.

As shown, the valve discs are of opposite hand from each other, since they rotate in opposite directions to open and close the nozzle openings, and, as shown in Figs. 14 and 15, each disc is provided with two operating pins, projecting normally from its face surfaces, for engagement with suitably located trip devices which operate the pins, the pins of each disc being engaged with the pins of the complementary discs to turn the left-hand disc 17, which is the first of the two to operate, its pins 31 and 32 axially aligned with each other, as shown in Fig. 14, and mounted above the axis of disc rotation. The right-hand disc 16, has its pins 33 and 34 located at diametrically opposite positions on the disc.
with the upper pin 33 projecting rearwardly and the lower pin 34 projecting forwardly from the disc, the pins being on a substantially vertical diameter of the disc when the disc is in the closed position shown.

As indicated in Figs. 1, 2, and 3, the valve operating means comprises a plurality of trip devices located in the path of the nozzles and positioned to engage the operating pins projecting from the front and rear faces of the valve discs as the nozzles are moved by the carriage 14. Four trip devices or valve operating members are employed for each pair of nozzles, two of them being stationary elements 35 and 36 mounted on rods 37 and 38 which in turn are mounted on the overhanging arm portions of the upright members 19 and 20 respectively. These trip members 35 and 36 are in the nature of fixed stops and are located adjacent respective ends of the nozzle path in a position to engage the pins 31 and 34 projecting from the forward faces of the valve discs 17 and 18.

The other pair of trip members are mounted on a support bar 39, which in turn is secured to the horizontal crossbar 21, and are located at the middle portion of the path of nozzle travel in position to engage the rearwardly projecting pins 32 and 33 of the valve discs. The first of these last-mentioned trip members comprises a fixed vertically disposed element 40, rigidly mounted on the forward face of the support bar 39, and the second of these trip members comprises a pivoted element 41, mounted on the support bar 39 so as to be swingable in a vertical plane or uprightly. These trip members 40 and 41 are spaced apart the proper distance to simultaneously engage the rearwardly projecting pins 32 and 33 on the respective valve discs as they are moved along the path of nozzle travel.

The trip members 40 and 41, however, are arranged to function only while the nozzles are moving in one direction, as will hereafter be explained, and for that reason the second trip member 41 is mounted and arranged so that it will yield upon engagement with the valve disc 33 when the nozzles are moving in the opposite direction. For this purpose a stop pin 42 is fixed on the support bar 39 at the left-hand side of the trip member 41, and above its pivotal, so as to hold the trip member against movement in the first direction; and a spring 43, extending between vertical extensions of the two trip members, is provided to normally hold the pivoted member 41 in vertical position.

It should now be understood that, while the depositor nozzles reciprocate back and forth along the path of conveyor travel, the nozzles function to deposit material into receptacles carried by the conveyor only while moving in the same direction as the conveyor. And, since depositor nozzles are provided on each side of the conveyor, it should be understood that the several valve elements are operated successively to open and close the nozzles one after the other, in sequence. Thus, the two nozzles on one side of the conveyor operate one after the other, and then the nozzles on the opposite side of the conveyor operate one after the other.

The conveyor, which carries the receptacles, moves continuously at a constant speed past the depositor nozzles, therefore the nozzles must travel with and at the same speed as the conveyor, during a depositing operation, in order to maintain nozzle-receptacle registry. For this reason the two sets of depositor nozzles, on either side of the machine, travel in opposite directions from each other during their reciprocating motion, so that when one set of nozzles is performing its depositing operation, while moving with the conveyor, the other set of nozzles is returning in the opposite direction to its starting position where it begins its depositing operation when the first set of nozzles reaches the end of its stroke.

Thus, in the arrangement shown in Fig. 1, wherein each plate holder 2 contains four pie plates, the depositing mechanism is constructed to provide one nozzle in each pie plate or receptacle, and the depositor nozzles function alternately to fill each receptacle in the order A, B, C and D, as indicated by the letters applied to the receptacles in Fig. 1. To accomplish this, the depositor mechanism on the left-hand side of the machine, which may be considered to be the first to operate, is located in advance of the depositor mechanism on the right-hand side of the machine so that the right-hand depositor nozzles will operate to fill the receptacles C and D successively, beginning at the time when the receptacle B becomes filled. In other words, the depositor mechanism on the right-hand side of the machine is so located, along the path of conveyor travel and relative to the mechanism on the left-hand side, that the nozzle 6 will be aligned with the receptacle C at the time the nozzle 5 finishes filling the receptacle B, and the nozzles 5 and 6 will then complete the filling of the receptacles C and D as they progress with the conveyor and while the depositor mechanism at the left-hand side of the machine, comprising the nozzles 4 and 5, is moving backwardly to pick up the next successive group of receptacles to be filled.

This operation of the depositor mechanism is illustrated in Figs. 6 to 13 inclusive, wherein Figs. 6, 8, 10 and 12 show the successive operation of the valves for the nozzles on the left-hand side of the machine during one cycle of this movement, and wherein Figs. 7, 9, 11 and 13 illustrate the manner in which the quadrangularly grouped receptacles are filled successively by the two depositing components of the apparatus during the cycle of operation of the left-hand nozzle. As shown in Fig. 6, the depositor mechanism has reached the end of its return stroke and is about to begin its movement in the direction of conveyor travel. At this point the fixed stop 35 has engaged the valve disc pin 31 and has rotated the valve disc 17 to a position wherein the nozzle 4 is fully opened, the nozzle 5 being completely closed by the valve disc 18. The relationship of the nozzles 4, 5, 6 and 7 at this point is shown in Fig. 7, wherein the nozzles 6 and 7 are at the end of their stroke in the direction of conveyor travel.

As the nozzles 4 and 5 begin moving with the conveyor, in the direction of the arrows in Fig. 7, the first receptacle A is being filled and the filling operation continues until the nozzles reach the position of the trip elements 40 and 41, at which point the nozzle 4 is caused to close while simultaneously the nozzle 5 is caused to open through engagement of the respective trip elements on the valve disc pins 31 and 32 which turn the discs counterclockwise until the pins pass beneath the lower ends of the trip elements. This point in the depositor cycle is shown in Fig. 8, wherein the nozzle 4 is completely closed and the nozzle 5 is completely open, and in Fig. 9 where receptacle A is filled and the receptacle B is being filled. Also, as shown in Fig. 9, the depositor nozzles 6 and 7 have, at this point, traveled part
7 way back to their starting position, the respective elements moving in the direction of the arrows in Fig. 9.

In Fig. 10, the depositor mechanism is shown at the end of its stroke in the direction of conveyor travel, at which point the valve tripping member 35, through engagement with the pin 33 projecting from the forward face of the disc 18, has caused the disc 18 to rotate clockwise to closed position. At this period in the depositor cycle, as shown in Fig. 11, the filling of the receptacle D has been completed and the nozzles 6 and 7 having reached their starting position wherein the nozzle 6 is open and filling of the receptacle 6 is begun.

The next operative position of the depositing mechanism is shown in Fig. 12, wherein the nozzles are passing the trip members 43 and 41 on their return stroke. The pin 31, on the valve disc 17 is in the same position where it was left upon first passing the trip 43 and therefore will pass beneath the same. The pin 32, of the valve disc 17, has, however, been elevated through clockwise rotation of the disc by the trip member 35 and has therefore engaged the pivoted trip member 41 and swung it in a clockwise direction against the action of the spring 43, so that the pin 32 can pass the trip 41 without further rotation of the disc 17 in the closing direction. At this point in the cycle of depositor operation, the nozzle 7 is in the process of filling the receptacle D, the filling of receptacle C having been completed, and the nozzles 6 and 7 are approaching the end of their stroke in the direction of conveyor travel, while the nozzles 4 and 5 are approaching the end of their return stroke where the nozzle 4 will become aligned with the first one of the next group of receptacles to be filled.

The final point in the cycle of depositor operation occurs when the depositing mechanism reaches the position shown in Fig. 6, wherein the valve pin 31, of the first or left hand depositor, is engaged by the trip member 35 to rotate the valve disc 17 clockwise to open position for the start of the next depositing cycle. It will now be seen that each depositor component of the depositing mechanism is intended to move reciprocally along the path of the conveyor in timed relation with the continuously traveling receptacles that are carried by the conveyor and that the separate depositor components or nozzle groups are always moving in opposite directions from each other. It will also be seen that in this arrangement, the several nozzles 4, 5, 6 and 7 operate in timed sequence with respect to each other and with respect to the conveyor travel.

Preferably this successive operation of the several nozzles is so timed that the total sum of the areas of actual nozzle opening at any instant for all of the nozzles in the depositor system, will be constant, one nozzle always being closed at the same instant and at the same rate as the next successive nozzle is being opened. In this manner the rate of flow of fluid material through the supply system, leading to the nozzles is always constant so that the pressure on the fluid material, on the pressure side of the supply system, remains the same throughout the entire time that the depositor mechanism is in operation.

In handling fluid material containing solid substances, such as whole fruit or large pieces of fruit, it has been found that a constant rate of flow at a constant pressure will prevent the breaking up or crushing of the fruit pieces and for handling such material it is most expedient to employ a pump of the positive displacement type. As shown in Fig. 20, where the supply system is illustrated, a positive displacement pump of the rotary type is indicated by the numeral 12 and a pump of the type indicated  is made feasible by the arrangement of the depositor mechanism and the valve controlling mechanism so that a constant area of discharge opening from the supply system through the several nozzles is maintained at all times.

It will be understood, of course, that the rate of flow, or quantity of material to be discharged through the several nozzles, will vary according to the size of the receptacle to be filled and the speed at which the receptacles are carried past the depositor. Such variation of the quantity of material discharged is preferably controlled through adjustment of the speed of the pump 12, and such adjustment of the pump speed will also depend upon the nature of the material being handled as well as the time period that each nozzle is open to deposit material into the receptacles.

The depositor mechanism hereinafter described may be readily adapted for use in filling larger receptacles, such as the 8 inch or 10 inch pie plates that are used with automatic pie-making machinery and such a modification of the depositor mechanism is illustrated in Figs. 16 to 19 inclusive, and Fig. 21. In this case only one nozzle is employed on each side of the conveyor path, as indicated in Figs. 17, 19 and 21, and each nozzle is open for substantially the entire length of its stroke in the direction of conveyor travel. Thus, as shown in Fig. 21, the left hand nozzle 44 is opened and moves in the direction of conveyor travel during its filling operation, while the right hand nozzle 45 is closed and moves through its return stroke. The valve mechanism in this case is arranged so that when the nozzle 44 reaches the end of its filling stroke and is being closed, the nozzle 45 is simultaneously reaching the end of its return stroke and is being opened.

In the particular two-nozzle depositing mechanism shown in Fig. 21, each nozzle supplies only one-half of the total quantity of filling that is to be deposited in each receptacle, and the nozzles must operate successively to complete the filling of the receptacle. This requires that the second nozzle to operate be advanced along the conveyor, and with respect to the first nozzle, by a distance equivalent to one-half of the distance between centers of the successive receptacles to be filled as they are spaced along the conveyor. This is illustrated in Figs. 17 and 19 where in Fig. 17 the first nozzle 44 is shown at the beginning of its stroke in the direction of conveyor travel, while the nozzle 45 is shown at the end of its stroke in the direction of conveyor travel and at the instant of the beginning of its return stroke. Each nozzle is spaced a distance equivalent to one-half of the spacing between the centers of the receptacles and Fig. 19 shows the position of the nozzles 44 and 45 at the instant when the nozzle 44 becomes closed and where the nozzle 45 is fully opened to complete the filling of the receptacle 44. While the nozzle 45 moves in the direction of conveyor travel, as indicated by the arrow in Fig. 19, to complete filling of the receptacle, the nozzle 44 moves backwardly through its return stroke so
that when the receptacle 46 is filled, the nozzle 44 will be aligned with the next successive receptacle 47, in the position shown in Fig. 17, to begin the first half of the next filling operation.

The arrangement of the trip mechanism for operating the valve disc 48, for the nozzle 44, is illustrated in Figs. 18 and 19, and as shown only two trip members 49 and 50 are employed for each valve. In Fig. 16, the nozzle 44 is at its starting position, as in Fig. 17, at which point the trip element 49, through connection with a pin 51 on the valve disc 48 has caused the valve disc to swing counterclockwise to the fully opened position where it remains until the nozzle 44 reaches the end of its depositing stroke, or movement in the direction of conveyor travel, where the trip member 50, through engagement with a pin 52 on the valve disc, causes the valve disc to swing clockwise to the closed position indicated in Fig. 19. Since the nozzle on one side of the table reaches the end of its stroke in the forward direction at the same instant that the nozzle on the other side of the conveyor reaches the end of its stroke in the reverse or return direction, the valve means for the respective nozzles will be operated simultaneously and at the same rate, thereby maintaining a constant total area of nozzle opening during the entire operation of the conveyor.

The mechanism for maintaining continuous reciprocation of the nozzles on each side of the conveyor is illustrated in Figs. 22 to 26 inclusive. Two of these devices are required, one for each side of the conveyor. However, the construction and operation of each is the same and, therefore, only one of the reciprocating mechanisms is illustrated in detail.

In the form shown, the carriage 14 on which the depositing nozzles are mounted, is arranged to be moved back and forth along a pair of guide rails 53 and 54 rigidly mounted in a box-like frame 55, which may be directly attached to the conveyor structure, and the carriage is driven back and forth by means of a pair of chains 56 and 57, which travel in opposite directions and which move in opposite and alternating at the end of its movement in each direction.

The chains 56 and 57 are mounted on longitudinally spaced sprockets 58, 59 and 60, 61 respectively, and are disposed parallel with each other with the respective sprockets in axial alignment. The sprockets 59 and 61 are idler sprockets mounted for free rotation on a shaft 62, suitably supported in the box-like housing 55, and the sprockets 58 and 60 are driving sprockets, also mounted for free rotation on a common shaft 63, suitably supported in the housing 55. The driving sprockets 58 and 60 are driven in opposite directions from each other by means of a countershaft 64, which extends through the housing 55 into the conveyor mechanism where power may be taken from the main conveyor drive shaft 65 through means of a suitably geared connection, such as the bevel gears 66 and 67.

In order that the sprockets 58 and 60 may be turned in opposite directions, the sprocket 60 is directly geared to the shaft 64, through the gears 68 and 69; and the sprocket 58 is driven by a gear 70 secured directly to the sprocket hub, which in turn is driven through an idler gear 71 by means of a gear 72 secured to the shaft 64. In this manner, though the sprockets 58 and 60 are driven from a common power shaft, they will be turned in opposite directions.

As indicated in Figs. 22 and 23, power from the shaft 64, which is driven directly from the conveyor mechanism, is transmitted across the conveyor to the reciprocating mechanism on the opposite side of the conveyor by means of a cross shaft 10, which is driven by a gear 14 meshed with the gear 72 mounted on the shaft 64. The reciprocating mechanism on the opposite side of the conveyor is indicated in Fig. 22 by the numeral 75, and it will be understood that this reciprocating mechanism is constructed in a similar manner to that which is indicated in detail in Figs. 22 and 23.

As before-mentioned, the carriage drive chains 56 and 57 travel in opposite directions and alternately engage the carriage 14 to cause it to reciprocate back and forth on the guide rails 53 and 54. The means for effecting engagement of the chains with the carriage comprises two pairs of spaced pins which project downwardly from the bottom side of the carriage so as to straddle a respective one of the drive chains, and each of the drive chains is provided with laterally projecting lugs or studs adapted to engage the carriage fingers and push the carriage in the direction of chain travel.

As shown in Figs. 23 and 25, each pair of carriage pins 76 and 77, is mounted on a base block 78 and 79 respectively, the base blocks being attached directly to the bottom of the carriage 14 at appropriate locations that will be hereafter described, and the lugs 80 and 81, which project laterally from the sides of respective chains 56 and 57, engage the carriage pins adjacent their lower ends.

As indicated and shown in Figs. 26 to 28 inclusive, the lugs projecting from the sides of each chain function as pusher members, which, upon engagement with the respective pins projecting downwardly from the carriage 14, serve to push the carriage along the rails 53 and 54 in the direction of the respective chain travel, pushing action continuing until the chain links carrying the lugs turn over the sprocket toward which the carriage is being moved and thereby drop downwardly below the ends of the carrying pins so as to become disengaged therewith. At that point the lugs on the oppositely moving chain engage the respective carriage pins which straddle that chain, and push the carriage along the rails 53 and 54 in the reverse direction. The carriage is then driven in that direction until the lugs on the engaged driving chain drop away from the carriage pins, upon turning over the sprocket toward which they are moving, at which point another pair of lugs on the first chain engages the respective carriage pins and again reverses the direction of movement of the carriage.

In order to accomplish this reciprocating drive of the carriage, each drive chain is provided with two sets of pusher lugs equally spaced from each other along the pitch-line length of the chain, and the total length of the chain is such that in one complete revolution of the chain, the carriage will be moved through two strokes in the same direction.

Thus, in the particular arrangement shown, the total length of the chain is four times the length of the carriage stroke in either direction. The reason for this arrangement is that since the pusher lugs on the chain disengage from the respective carriage pins by dropping downwardly as the chain passes around a sprocket, it is preferable to have the pusher lugs on the chain moving in the opposite direction come into engage-
ment with the respective carriage pins while moving along a straight line path in order to provide certainty of engagement and uniformity of lineal speed. The respective carriage pins are, therefore, located adjacent the end of the carriage nearest the direction in which the carriage is driven by the respective chains. Thus, as shown in Fig. 22, the drive chain 56 which moves the carriage to the left, are located adjacent the left hand end of the carriage; and the carry pins 71, which straddle the drive chain 57 which moves the carriage to the right, are located adjacent the right hand end of the carriage.

The relationship of the drive chains 56 and 57 to each other and the relative positions of the pusher lugs 89 and 81 must, therefore, be carefully predetermined and maintained at all times so that the pusher lugs of one chain will drop out of engagement with the respective carriage pins the chain turns over a sprocket, just prior to engagement of the pusher lugs of the oppositely moving chain with their respective carriage pins. Also, in order to effect precise timing for the engagement of the pusher lugs with the carriage pins, the blocks 73 and 79, which carry the carriage pins 76 and 77, are mounted on the bottom of the carriage in such a manner that they may be adjusted lengthwise of the carriage, the mounting of the pin blocks being by means of a suitable bolt or screw which passes through a central slot 83 as shown in Fig. 25.

The operation of the carriage during one stroke of its reciprocatory movement is illustrated diagrammatically in Figs. 26 to 28 inclusive. As shown in Fig. 26, the carriage 4 has just reached the end of its stroke under the influence of the chain 57, and the pusher lugs 81 have just dropped below the ends of the carriage pins 71, at the right hand end of the carriage, as the chain 57 is passing around the sprocket 61. At that point the pusher lugs 89 on the chain 56 come into engagement with the pins 76, adjacent the left hand end of the carriage, and the carriage is immediately started in its movement in the left hand direction. As this moment, as shown in Fig. 26, a pair of pusher lugs 81.1 on the carriage are just passing over the left hand sprocket 60, and the lugs 80.1 on the chain 56 are substantially opposite the pusher lugs 80.

Fig. 27 shows the position of the carriage 14 midway of its stroke in the left hand direction toward the sprockets 59 and 60. At this point it will be seen that the pusher lugs 81 have passed over the sprocket 61 and are passing along the bottom run of the chain 57 while the second pair of pusher lugs 81.1 are moving over the upper run of the chain 27 toward the pusher pins 71.

Fig. 28 shows the carriage 14 at the end of its stroke in the left hand direction under the influence of the chain 56 at which point the pusher lugs 80 have dropped away from the carriage pins 76, as the chain passes over the sprocket 58, and the second set of pusher lugs 81.1 on the chain 57 have just come into engagement with the carriage pins 77 to begin movement of the carriage in the right hand direction.

From these views it will be seen that, with the chains 56 and 57 moving continuously in opposite directions, and by means of the pusher lugs carried by the chains, the carriage is caused to reciprocate continuously back and forth along the straight line path which, as shown in Fig. 1, is parallel with the path of conveyor travel.

As before-mentioned and as indicated in Figs. 76 and 22 and 23, the carriage reciprocating drive mechanism is powered directly from the main conveyor drive shaft and it will be understood that, since the carriage must travel at substantially the same speed as the conveyor in order to keep the depositor nozzles aligned with the receptacles during the depositing operation, both of the carriage drive chains 56, 57 must also travel at substantially the same lineal speed as the conveyor. This is necessary in order that the carriage can make a return stroke, in its reciprocatory movement, during the same time period required for a stroke in the direction of conveyor travel.

In the operation of the herein described depositor mechanism, the conveyor and the nozzle reciprocating mechanisms are first put into motion and brought up to operating speed before the pump 12 of the fluid material supply system is started. Then, the conveyor having been provided with suitable receptacles, the supply system for the material to be deposited in the receptacles is started. Since the movement of the nozzles along the path of conveyor travel is timed to coincide with the locations of the receptacles on the conveyor, it is immaterial as to which nozzle begins a depositing operation; and because the nozzles operate successively, and in precisely timed sequence, the operation of filling the receptacles will be continuous so long as the mechanism continues to run.

It will be understood, of course, that the reciprocating mechanisms, on both sides of the conveyor, operate in precisely timed relation with each other so that as the depositor nozzles on one side of the conveyor are moving in the direction of conveyor travel and operating to deposit material into the receptacles on the conveyor, the depositor mechanism on the other side of the conveyor is making a return stroke in the direction opposite the conveyor travel in order to become aligned with the receptacles or receptacle which is to fill the moment that the first depositor mechanism completes its operation. Thus, the depositors function alternately, first one side of the conveyor and then on the other, so that the depositing operation is continuous and is accomplished without any interruption whatsoever in the conveyor travel.

The principal advantages of this invention reside in the arrangement and operation of depositor nozzles whereby continuous automatic filling of serially progressing containers or receptacles is accomplished without intermittent operation of the receptacle conveyor; and in the operation of the apparatus whereby whole fruit or fruit pieces can be handled without their being broken or crushed. Other advantages are to be found in that the apparatus is particularly adaptable for depositing predetermined quantities of fluid material which may be of heavy, rather thick consistency; and in the fact that such material can be handled continuously and deposited accurately into receptacles which are constantly in motion along a track.
handled may be quickly and easily dismantled for cleaning and thereby maintained in sanitary condition at all times.

Although but one specific embodiment of this invention has been herein shown and described it will be understood that numerous details of the construction shown may be altered without departing from the spirit of this invention as defined by the following claims.

We claim:

1. A depositor for fluid substances comprising a pair of nozzles mounted for movement along a predetermined path, a continuously moving conveyor extending along said path and adapted to carry a series of uniformly spaced receptacles, said nozzles being disposed one on each side of said conveyor and positioned to discharge into receptacles carried thereby, means adapted to reciprocate said nozzles along said path in respectively opposite directions and in timed relation with the movement of said conveyor, valve means adapted to open and close said nozzles individually, valve operating means adapted to operate said valve means sequentially in timed relation with the movement of said nozzles, and conduit means connecting said nozzles to a source of fluid substance supply.

2. A depositor for fluid substances comprising a pair of nozzles mounted for movement along a predetermined path, a continuously moving conveyor extending along said path and adapted to carry a series of uniformly spaced receptacles, said nozzles being disposed one on each side of said conveyor and positioned to discharge into receptacles carried thereby, means adapted to reciprocate said nozzles along said path in respectively opposite directions and in timed relation with the movement of said conveyor, valve means adapted to open and close said nozzles individually, valve operating means adapted to operate said valve means sequentially in timed relation with the movement of said nozzles to maintain the sum of the opening areas of said nozzles substantially constant, and conduit means connecting said nozzles with a common source of fluid substance supply.

3. A depositor for fluid substances comprising a conveyor adapted to carry a continuous series of uniformly spaced receptacles along a predetermined path, a depositor nozzle mounted on each side of said conveyor and adapted to discharge into receptacles carried thereby, carriage means on each side of said conveyor adapted to move each nozzle reciprocally along said conveyor path in timed relation with said conveyor, said carriage means being correlated to move said nozzles in respectively opposite directions, a valve means adapted to control the discharge from each nozzle, valve operating means mounted along the path of each of said nozzles adapted to actuate said valve means alternately and in timed relation with each other, and conduit means connecting each nozzle with a source of fluid substance supply.

4. A depositor for fluid substances comprising a conveyor adapted to carry a continuous series of uniformly spaced receptacles along a predetermined path, a depositor nozzle mounted on each side of said conveyor and adapted to discharge into receptacles carried thereby, carriage means on each side of said conveyor adapted to move said nozzle reciprocally along said conveyor path in timed relation with said conveyor, said carriage means being correlated to move said nozzles in respectively opposite directions, a valve means adapted to control the discharge from each nozzle, valve operating means mounted along the path of each of said nozzles adapted to actuate said valve means alternately and in timed relation with each other, and conduit means connecting each nozzle with a source of fluid substance supply.

5. A depositor for fluid substances comprising a conveyor moving continuously and adapted to carry a continuous series of uniformly spaced receptacles along a predetermined path, a depositor nozzle mounted on each side of said conveyor and adapted to discharge into receptacles carried thereby, carriage means on each side of said conveyor adapted to move each nozzle reciprocally along said conveyor path in timed relation with said conveyor and the receptacles carried thereby, said carriage means being correlated to move said nozzles in respectively opposite directions and in timed relation with each other, and conduit means connecting each nozzle with a source of fluid substance supply.

6. An automatic depositor for fluid materials comprising a continuously moving conveyor having means to hold receptacles in uniformly spaced relation, a carrier mounted on each side of said conveyor and adapted to move reciprocally along said conveyor path, drive means adapted to reciprocate the carriers continuously in respectively opposite directions and in timed relation with the continuous movement of said conveyor, a plurality of nozzles mounted on each of said carriers and disposed to discharge into respective receptacles carried on said conveyor, valve means adapted to control the discharge from said nozzles selectively, valve operating means adapted to open and close said nozzles sequentially and in timed relation with each other, and conduit means connecting said nozzles to a source of fluid material supply.

7. An automatic depositor for fluid materials comprising a continuously moving conveyor having means to hold receptacles in uniformly spaced relation, a carrier mounted on each side of said conveyor and adapted to move reciprocally along said conveyor path, drive means adapted to reciprocate the carriers continuously in respectively opposite directions and in timed relation with the continuous movement of said conveyor, a plurality of nozzles mounted on each of said carriers and disposed to discharge into respective receptacles carried on said conveyor, valve means adapted to control the discharge from said nozzles selectively, valve operating means adapted to open and close said nozzles sequentially and in timed relation with each other, and conduit means connecting said nozzles to a common source of fluid material supply, said valve operating means being related to the movement of said carriers to correlate the sequential opening and closing of said nozzles and maintain the total opened area of all said nozzles constant at all times.

8. An automatic depositor for fluid materials comprising a continuously moving conveyor having means to hold receptacles in uniformly spaced relation, a nozzle movably mounted at each side of said conveyor and adapted to discharge into receptacles carried on said conveyor, each nozzle having a connection with a source of fluid material supply, drive means adapted to move said nozzles reciprocally along the path.
of said conveyor in respectively opposite directions and in timed relation with the movement of said conveyor, a valve for controlling each of said nozzles and adapted to open and close the same, and valve operating means mounted along the path of said nozzles and adapted to actuate said valves to open and close the respective nozzles at predetermined periods in each cycle of reciprocating movement thereof.

9. An automatic depositor for fluid materials comprising a continuously moving conveyor having means to hold receptacles in uniformly spaced relation, a nozzle movably mounted at each side of said conveyor and adapted to discharge into receptacles carried on said conveyor, each nozzle having a connection with a common source of fluid material supply, drive means adapted to move said nozzles reciprocatively along the path of said conveyor in respectively opposite directions and in timed relation with the movement of said conveyor, a valve mounted on each of said nozzles and adapted to open and close the same, and valve operating means mounted along the path of said nozzles and adapted to actuate said valves to open and close the respective nozzles at predetermined periods in each cycle of reciprocating movement thereof, said valve operating means being disposed to open one nozzle while closing the other to maintain the total sum of the opened areas of said nozzles constant at all times.

10. An automatic depositor for fluid materials comprising a continuously moving conveyor having means to hold receptacles in uniformly spaced relation, a plurality of nozzles movably mounted at each side of said conveyor and adapted to discharge into respective receptacles carried on said conveyor, each of said nozzles having a connection with a source of fluid material supply and the nozzles at each side of said conveyor being mounted for movement in unison, drive means adapted to move the nozzle at each side of said conveyor in unison reciprocatively along the path of said conveyor and in timed relation with speed thereof, the nozzles at each side of said conveyor being connected to said drive means for movement in respectively opposite directions in continuous cycles of reciprocative travel, a valve for controlling each nozzle and adapted to open and close the same, and valve operating means mounted along the path of movement of said nozzles and adapted to actuate said valves to open and close said nozzles sequentially as they move along the path of said conveyor.

11. An automatic depositor for fluid materials comprising a continuously moving conveyor having means to hold receptacles in uniformly spaced relation, a plurality of nozzles movably mounted at each side of said conveyor and adapted to discharge into respective receptacles carried on said conveyor, each of said nozzles having a connection with a common source of fluid material supply and the nozzles at each side of said conveyor being mounted for movement in unison, drive means adapted to move the nozzles at each side of said conveyor in unison reciprocatively along the path of said conveyor and in timed relation with speed thereof, the nozzles at each side of said conveyor being connected to said drive means for movement in respectively opposite directions in continuous cycles of reciprocative travel, a valve for controlling each nozzle and adapted to open and close the same, and valve operating means mounted along the path of movement of said nozzles and adapted to actuate said valves to open and close said nozzles sequentially as they move along the path of said conveyor.

References Cited in the file of this patent

UNITED STATES PATENTS

<table>
<thead>
<tr>
<th>Number</th>
<th>Name</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,223,293</td>
<td>Rose</td>
<td>Apr. 17, 1917</td>
</tr>
<tr>
<td>1,451,512</td>
<td>Kellogg</td>
<td>Apr. 10, 1923</td>
</tr>
<tr>
<td>1,992,464</td>
<td>Blackman</td>
<td>Feb. 26, 1935</td>
</tr>
<tr>
<td>1,956,918</td>
<td>De Markus</td>
<td>Mar. 26, 1935</td>
</tr>
<tr>
<td>2,032,287</td>
<td>Bleam</td>
<td>June 1, 1939</td>
</tr>
<tr>
<td>2,038,385</td>
<td>Harder</td>
<td>Apr. 22, 1941</td>
</tr>
<tr>
<td>2,315,932</td>
<td>Burt et al.</td>
<td>Apr. 6, 1943</td>
</tr>
<tr>
<td>2,590,755</td>
<td>Bingham</td>
<td>Nov. 21, 1950</td>
</tr>
</tbody>
</table>

FOREIGN PATENTS

<table>
<thead>
<tr>
<th>Number</th>
<th>Country</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>155,205</td>
<td>Great Britain</td>
<td>Sept. 27, 1919</td>
</tr>
<tr>
<td>711,406</td>
<td>Germany</td>
<td>Oct. 1, 1941</td>
</tr>
</tbody>
</table>