July 7, 1964 E. S. MINARD 3,139,915

NO-CONTAINER NO-FILL ARRANGEMENT FOR RECEPTACLE FILLING MACHINES

Filed May 12, 1961 4 Sheets-Sheet 1

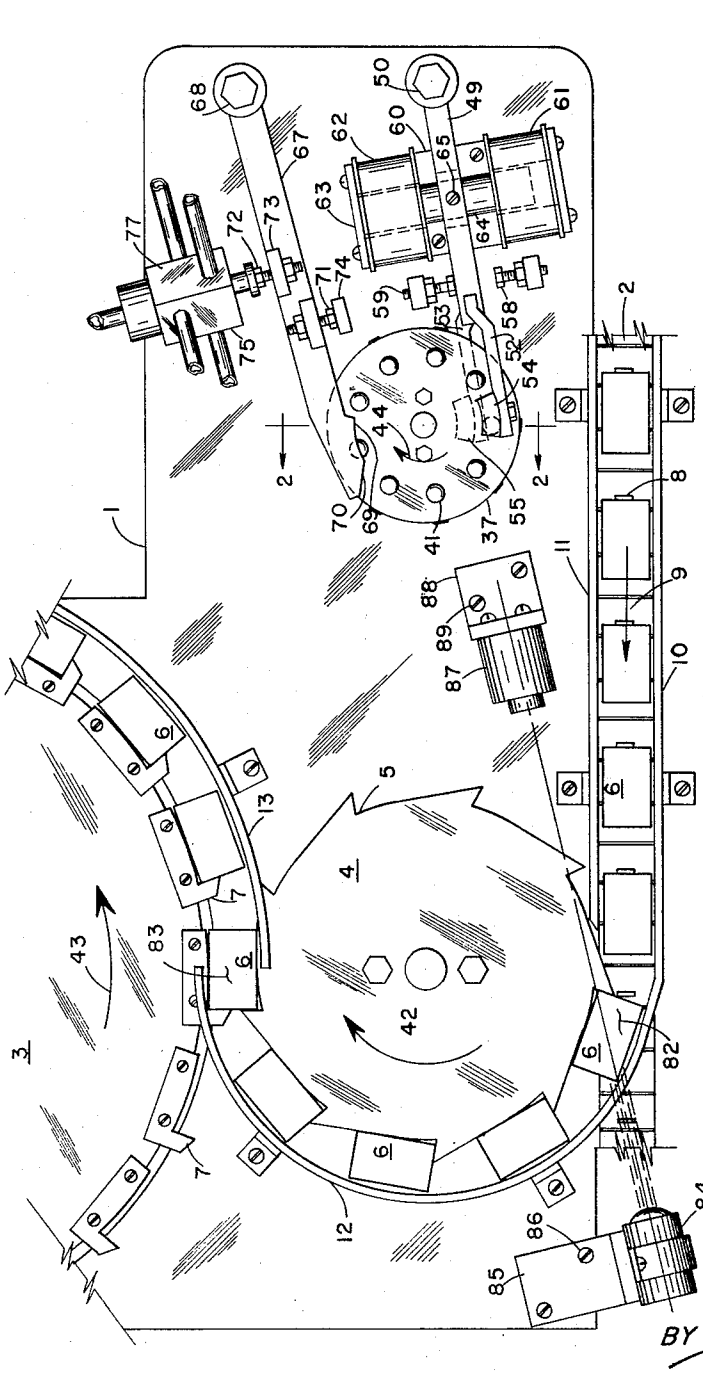

FIG. 1

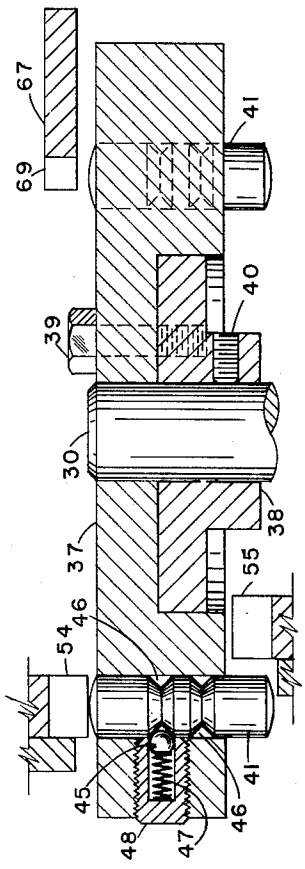

FIG. 2

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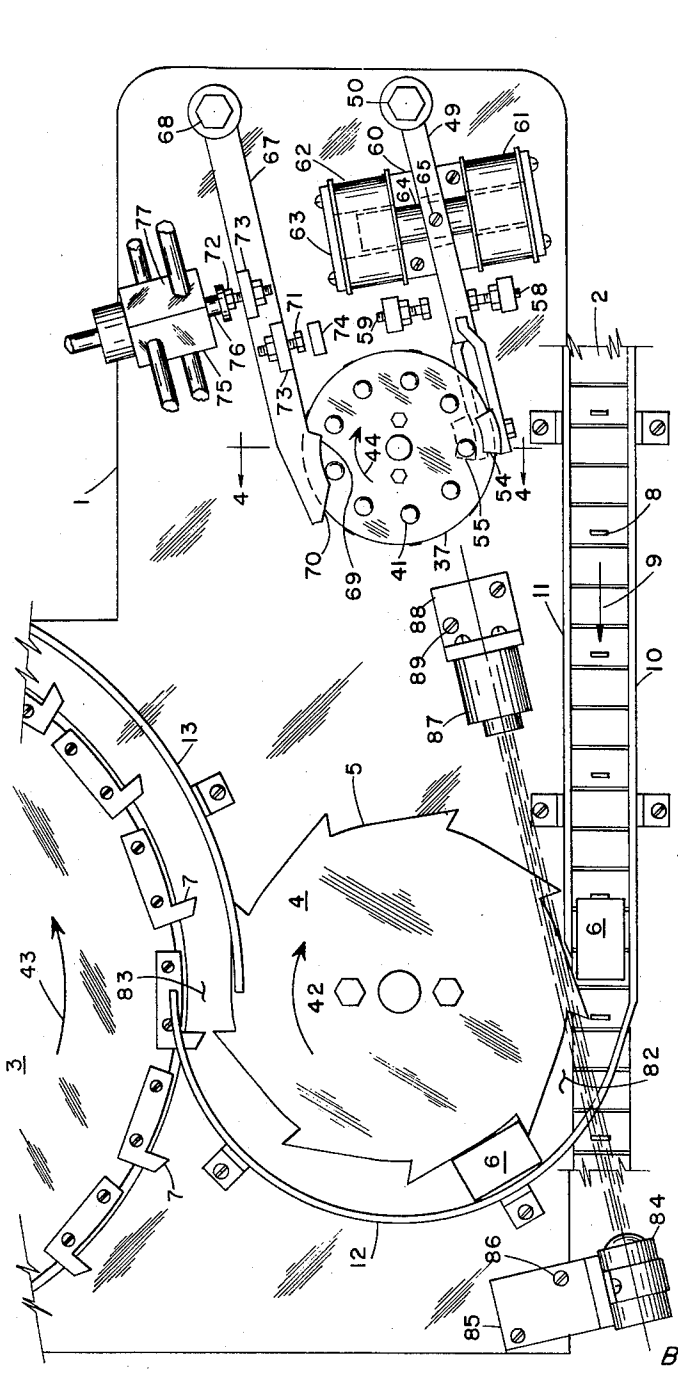

FIG. 3

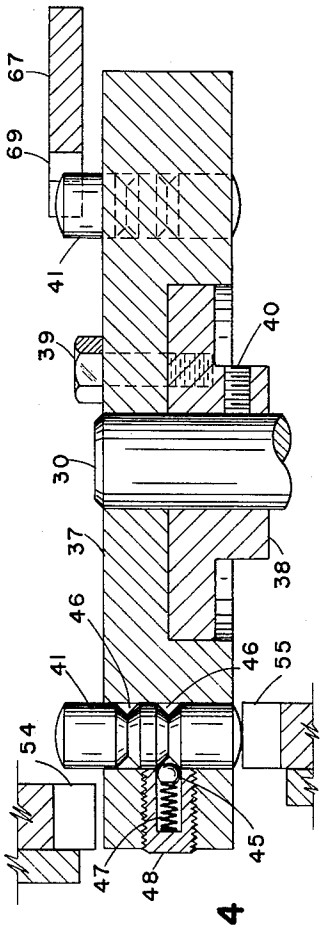

FIG. 4

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NO-CONTAINER NO-FILL ARRANGEMENT FOR RECEPTACLE FILLING MACHINES

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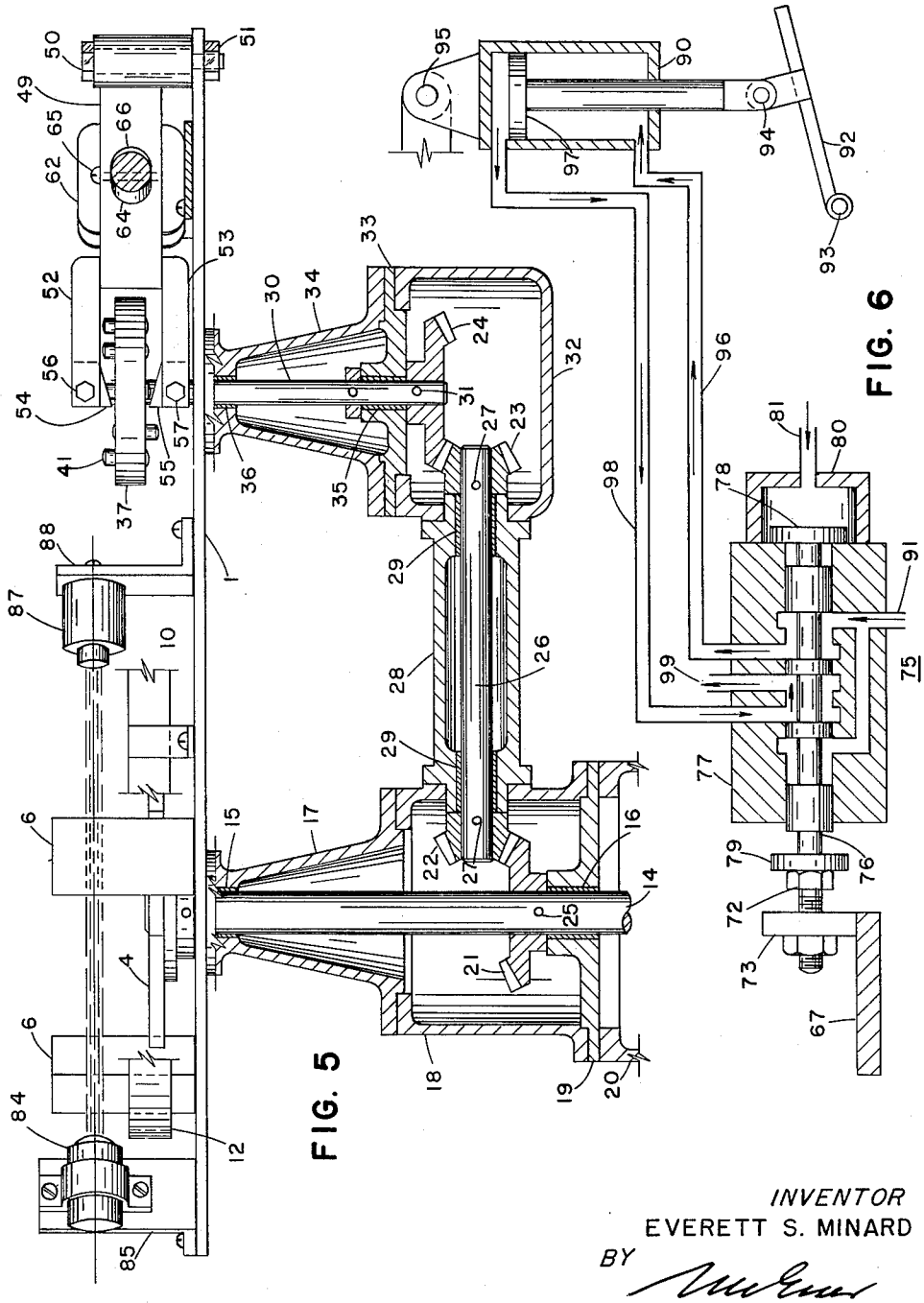

FIG. 5

FIG. 6

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NO-CONTAINER NO-FILL ARRANGEMENT FOR RECEPTACLE FILLING MACHINES

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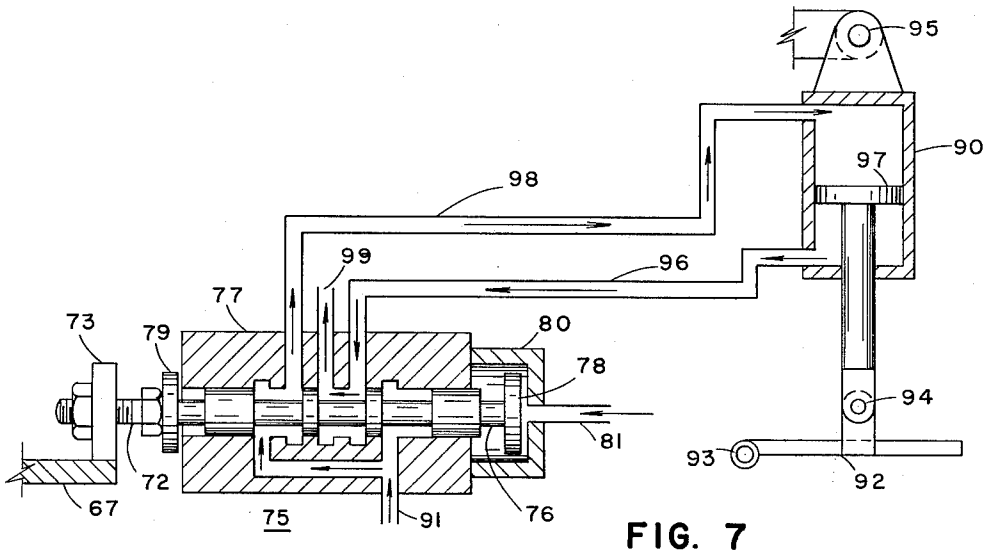

FIG. 7

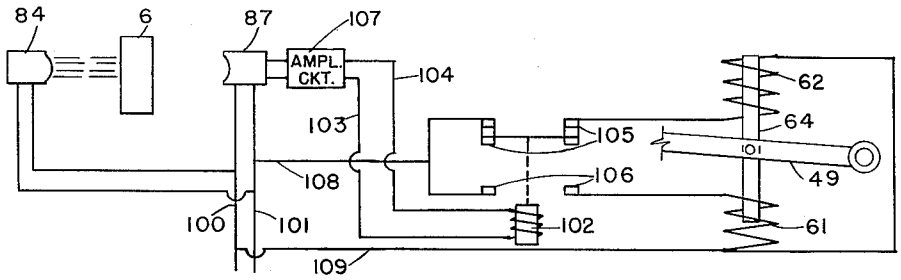

FIG. 8

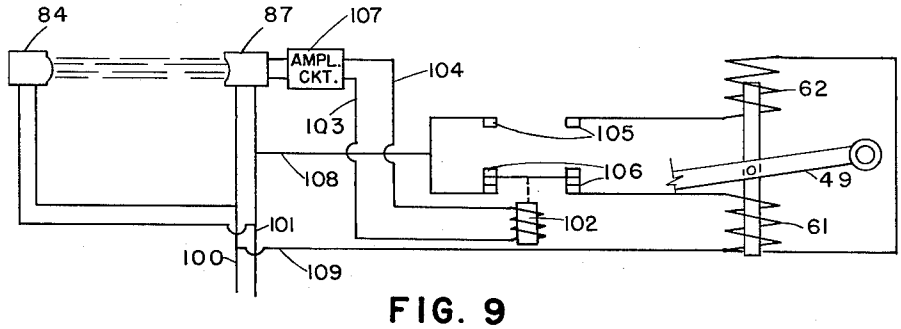

FIG. 9

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Patented July 7, 1964

3,139,915

NO-CONTAINER NO-FILL ARRANGEMENT FOR RECEPTACLE FILLING MACHINES

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Filed May 12, 1961, Ser. No. 109,743
10 Claims. (Cl. 141—94)

This invention relates in general to receptacle filling machines of the rotary type, and more particularly to a no-container no-fill arrangement for such filling machines.

In present day receptacle filling machine operations, the machines are for the most part designed for filling only a single size or shape of container, usually of simple cylindrical nature. In order for these machines to handle containers having shapes other than those for which the machines were originally designed, extensive alterations and changing of parts are required to handle these unfamiliar containers. This is especially true where not only the shape is different but the material of which the container is constructed also differs, because often the containers themselves must exert a counter force requisite to commence the force flow of product for filling the containers. In this latter example, if the construction of the container is not rigid enough to exert a counter force necessary to fully open a valve or operate other means required for proper functioning of certain type machines, other problems arise such as an insufficient discharge of product into the containers resulting from an improper flow of product. With present day packaging requiring a great variety of container or receptacle shapes and which are constructed of such materials as light gauge aluminum, plastic, and fiber materials, the packager or canner is confronted with continuous alterations of the machines in order to handle these different containers. This of course may also include expensive retooling and labor costs, as well as substantial time loss during the alteration periods.

In combination where the size, shape and construction of the container is instrumental in triggering a no-can no-fill mechanism commonly associated with receptacle filling machines, further problems may arise when containers unadapted to the machine are utilized. These no-can no-fill mechanisms are utilized to indicate the presence or absence of a receptacle for controlling the discharge of product or prevent such discharge dependent upon whether or not a receptacle has been detected in place for receiving the product. Usually, a detector arm aligned in the path of evenly spaced receptacles received from a moving conveyor, is adapted to engage each receptacle and therefore maintain a product feeding mechanism in condition to discharge product into the receptacles. However, should a receptacle be missing in a space on the conveyor, the detector arm will pivot into this space and affect the feeding mechanism to prevent discharge of the product. Thus, the size, shape and construction of the receptacle must be such as to prevent such a detector arm from pivoting and occupying the space of the receptacle, and act as a resistance to the pivotal tendency of the detector arm when a receptacle is occupying a space on the conveyor. This is not possible if the receptatcle is unable to withstand the pivotal movement of the detector arm.

The receptacle detecting means must affect the filling mechanism almost instantaneously because most filling machines operate at very high filling rates, and consequently any delay in preventing discharge of product when no receptacle is present to receive it would defeat the purpose of such a mechanism.

It is therefore a primary object of this invention to provide a receptacle filling machine of the rotary type

that will receive various shaped receptacles of widely varying material strength with the minimum amount of alteration to the machine, while providing means for detecting the presence or absence of a receptacle from a conveyor regardless of its construction, and which means can be easily adjusted to compensate for the receipt of a plurality of receptacles having a shape different than a preceding batch of receptacles.

It is another object of this invention to provide a mechanism for determining sufficiently in advance the presence or absence of a receptacle which is to receive product so that there is no delay in operating the means for preventing the discharge of product in the absence of a receptacle.

It is another object of this invention to provide a no-can no-fill mechanism in a receptacle filling machine that in no manner engages receptacles or utilizes means to occupy a space during the absence of a receptacle, and is therefore not limited to any specific size, shape or construction of receptacles to be received for filling of a product.

In accordance with these objects this invention may embody a photoelectric cell, a light source, a memory device and other means, in which, a light beam from the light source is directed toward the photoelectric cell and through which light beam a plurality of evenly spaced receptacles are moved from a conveyor to pockets on a rotating star wheel. The interruption of the light beam by the receipt of a receptacle or the non-interruption of the light beam by the absence of a receptacle causes said means to operate and record on a "memory wheel" in advance of a product filling cycle, whether or not product should be discharged from a product filling assembly when a particular pocket on the star wheel is beneath said assembly. The said memory device may comprise a plurality of pins corresponding numerically to the number of pockets in said star wheel, and a positioning arm operative through circuitry controlled by said photo-electric cell for positioning said pins in either of two positions during rotation of a memory wheel and effective during rotation through a predetermined distance for triggering or preventing triggering of means controlling the discharge of product indicative of a receptacle or the absence thereof in a particular pocket of the star wheel.

Other objects and advantages of this invention will more fully appear from the following description taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a plan view of the feeding mechanism for feeding receptacles to the filling stations of a rotary filling machine including the no-can no-fill apparatus and the uninterrupted receipt of receptacles to be filled;

FIG. 2 is an enlarged sectional view taken along line 2—2 of FIG. 1 showing a "memory wheel" of the no-can no-fill apparatus;

FIG. 3 is the same view as FIG. 1 illustrating an interruption in the receipt of receptacles;

FIG. 4 is an enlarged sectional view taken along line 4—4 of FIG. 3 showing pins on the memory wheel positioned to indicate the interruption in the receipt of a receptacle;

FIG. 5 is a front view of the rotary filling machine with certain portions in section to expose gears for rotating certain elements of the filler;

FIG. 6 is a diagram of a fluid control valve, cylinder, and piping for the fluid which control a material dispensing valve above a receptacle, and showing the control valve positioned to permit material to be dispensed;

FIG. 7 is the same view as FIG. 6 except the position of the control valve and cylinder indicates the absence of a receptacle preventing material from being dispensed;

FIG. 8 is a circuit diagram showing a closed circuit indicating the presence of a receptacle to be filled; and

FIG. 9 is the same diagram as FIG. 8 but showing the circuit condition during the absence of a receptacle.

The no-can no-fill mechanism of this invention and other apparatus to be described may preferably be utilized in a rotary filling machine of the type described in U.S. Letters Patent 2,896,676, issued July 28, 1959, to which reference may be had. In a rotary filling machine of the type referred to, receptacles are fed beneath filling assemblies by means of pockets in a rotating star wheel. The star wheel rotates together with the overlying filling assemblies and during an approximate 180° rotational movement which designates the receipt and exit of an individual receptacle in a pocket of the star wheel, the receptacle is filled with a fluid or semi-fluid product. The actual material or product measuring and receptacle filling operation may be found in the description of said patent.

In FIGS. 1 and 3 a bed plate 1 forms a table upon which a large portion of the filling machine apparatus is mounted and supported. A conveyor 2 lying adjacent and in the same plane with the top surface of the table 1, feeds receptacles 6 to filling stations (not shown) above the table 1. More particularly a circular opening (not shown) provided in the table 1 allows a rotatable filling machine wheel 3 to be positioned adjacent a rotatable feed star 4, which latter has its outer circumference provided with a predetermined number of equally spaced pockets 5 shaped to convey the receptacles 6 from the conveyor 2 to pockets 7 provided around the circumference of the wheel 3. The rotatable filling machine wheel 3 thereafter feeds the receptacles 6 beneath overlying filling assemblies where a pre-measured amount of material is deposited in each receptacle, in a manner described in the referenced Patent 2,896,676.

Conveyor 2 has lugs 8 spaced at equal intervals extending upward to engage and convey receptacles 6 in an equally spaced relationship to each other. Conveyor 2 is driven through a gearing mechanism, in the direction of arrow 9 at a fixed speed relative to the rotating speed of feed star 4, which speed is such as to receive one receptacle in each pocket 5 for each equally spaced receptacle delivered from the conveyor 2. Likewise, the rate of rotation of the feed star 4 with the rate of rotation of wheel 3, is in such unison as to deliver one receptacle from each pocket 5 to each pocket 7.

Guide bars 10 and 11 on opposite sides of conveyor 2, maintain receptacles 6 in proper position during travel on conveyor 2, to insure that the receptacles 6 are delivered to pockets 5 in the correct position. Likewise, an arcuate extension 12 of guide bar 10 and a substantially circular guide bar 13, serve to respectively maintain the receptacles in pockets 5 of the feed star and the pockets 7 of the wheel 3 preparatory to the filling operation.

Referring to FIG. 5, a shaft 14 through suitable moving means such as described in Patent 2,896,676, is the supporting and driving means for the feed star 4. Shaft 14 is aligned for rotation through bearings 15 and 16 in a gear housing which comprises the casings 17, 18, 19 and 20 supporting one end of the table 1. A gear 21 secured to shaft 14 by means of a pin 25, is meshed in driving relationship with a pinion 22 secured to a shaft 26 by means of a pin 27. Shaft 26 is rotatably aligned within a housing 28 through bearings 29. The other end of shaft 26 has secured by means of pin 27 a pinion 23 meshed with a gear 24, which latter is secured by means of a pin 31 to one end of a shaft 30. Shaft 30 is aligned for rotation through bearings 35 and 36 within a housing comprising casings 32, 33 and 34 which supports another end of table 1.

A mechanical memory device hereinafter referred to as "memory wheel" 37, is secured to the upper end of shaft 30 protruding above and through an opening in table 1. A flange 38 of the memory wheel 37 as best seen in FIG. 2, circumscribes shaft 30 and is secured

for rotary movement therewith by means of a set screw 40. The memory wheel 37 which is adapted to rotate with the shaft 30 and flange 38, is securely fastened to the flange 38 by means of bolts 39 received in provided threaded holes.

A ring of equally spaced openings is provided in, and in concentric relation to, the memory wheel 37, for housing free fitting pins 41 equally spaced with relation to each other. Each pin 41 is held in position within its provided opening by a spring 47 tensioning a steel sphere detent 45 into either one of two grooves 46 provided in the pins 41. Each spring 47 and detent 45 are housed and held in position within a hollow portion of one of a plurality of set screws 48 threadedly received in holes provided along the outer circumference of memory wheel 37. When the detent 45 engages the upper groove 46, the pin 41 is approximately flush with the upper surface of memory wheel 37, and when it engages the lower groove 46 the pin 41 is approximately flush with the lower surface of wheel 37. The gearing is such that one pin 41 of the group of pins will pass a given point as the feed star 4 advances in rotation by an amount equal to one receptacle pocket 5. Therefore, there is one pin 41 for each pocket 5 on feed star 4.

An arm 49 is pivotally mounted on the bed plate 1 by a screw 50 extending through a provided hole and secured by a nut 51. Arm 49 extends to a point where a U-shaped fork extension in the form of two legs 52 and 53 adjacently overlap the thickness of memory wheel 37. The upper leg 52 extends over the upper surface of memory wheel 37 sufficient to clear the top of pins 41 when the pins are in their uppermost position. The bottom leg 53 extends a distance below the bottom surface of the wheel 37 sufficient to clear the bottom of pins 41 when the pins are in their lowermost position.

A shoe 54 having an inclined surface is bolted to the outer end of arm 52 at a point where arm 52 is tangent to the circle of pins 41. Shoe 54 is so located that the lower end of its inclined surface positions the pins 41 so that the ball detents 45 may secure the pins 41 in their lower position through the ball engagement with the upper groove 46. The upper end of the inclined surface of shoe 54 is on a plane approximately even with the underside of leg 52 and at all times remains above the highest position the pins 41 may take. The length of this inclined surface is less than the distance between two adjacent pins 41, so that shoe 54 will never engage more than one pin at a time.

A similar inclined surface on a shoe 55 bolted to arm 53 by bolt 57 performs the same function as shoe 54 except to reverse the position of the pins 41. That is, the pins are urged upward causing detents 45 to enter the lower grooves 46. In FIGS. 1 and 3 it will be noted that the arms 52 and 53 are offset one from another so that in the different pivoted positions illustrated of arm 49, only one of the inclined surfaces of shoes 54 and 55 can be in position for engagement with a pin 41 at one time. The travel of arm 49 is limited to the space between a pair of stop screws 58 and 59 mounted on plate 1 adjacent opposite sides of arm 49. These screws 58 and 59 are adjusted in length to stop the arm 49 in its outward pivotal movement by contact with screw 58 when inclined shoe 55 is aligned with the pins 41, and the inward pivotal movement of arm 49 by contact with screw 59 when the inclined shoe 54 is aligned with the pins 41.

A solenoid assembly 60 is mounted on the bed plate 1 consisting of two solenoid coils 61 and 62 secured to brackets 63 on casing 60. A plunger 64 has its opposite ends extending into center bores provided between each solenoid coil 61 and 62 for a loose slidable fit therein. The arm 49 near the halfway point of its length is pivotally secured by means of a pivot pin 65 extending into plunger 64.

A sensing arm 67 extending towards wheel 37 is piv-

otally mounted on bed plate 1 by a bolt 68. Near the extended end of arm 67 an integral arcuate edge 69 is concentric to the outer circumference of the circular ring formed by the pins 41 as the pins are rotated by memory wheel 37. The length of the arcuate edge 69 is equal to the distance, as measured in degrees, from the center of one pin 41 to the next succeeding pin. An inclined edge 70 extends away from the arcuate edge 69, a distance or length sufficient to extend beyond the outer circle formed by the pins 41. Stop screws 71 and 72 are secured within lugs 73, which in turn, are integral with arm 67. Screw 71 is adjustable in length within its corresponding lug 73 so that screw 71 strikes lug 74 when the arcuate edge 69 overlies the circular path of the pins 41 by approximately half the pin diameter when a pin 41 is in its lowermost position. The lug 74 therefore limits the inward travel of arm 67 towards the center of the memory wheel 37.

A slide valve assembly 75 is secured to base plate 1, having a center spool 76 aligned and in contact with the screw 72 which lies on the side of arm 69 opposite to the memory wheel 37. The slide valve assembly 75 as best seen in FIGS. 6 and 7 has a housing 77 through which the spool valve 76 slides freely in a provided bore. Spool 76 has various diameters along its central axis to form hubs and pockets within said bore. Spool ends 78 and 79 are secured to or may be integral with opposite ends of spool valve 76, and which spool ends limit the travel of the spool valve within the bore in housing 77. A casing 80 secured to one end of housing 77 encloses spool end 78 in a fluid compartment, the latter being fluid tight except for an inlet tube 81 allowing access to this compartment.

Screw 72 is adjusted in length within lug 73, so that the spool end 79 is forced rearwardly in close proximity with the end of housing 77 as illustrated in FIG. 7, when the arced face 69 of arm 67 is aligned above the outer circumference of the circle formed by the rotary path of the pins 41. On the other hand, when screw 71 is properly adjusted to engage lug 74, the spool end 78 will be in close proximity with the rear end of housing 77 as illustrated in FIG. 6. In this latter position, the inclined face 70 of arm 67 is of such length that it extends beyond the outer circle formed by the rotating path of pins 41.

The location of arms 49 and 67 relative to the memory wheel 37 must be such that the number of pins 41 counted in the direction of arrow 44, and starting with the pin directly under or above the inclined shoes 54 or 55 shall be the same amount numerically as there are receptacle pockets 5 in the feed star 4, starting with position 82 (FIG. 1) and ending with position 83 before the last pin reaches the inclined face 70 of arm 67.

A light source 84 in the form of an electric lamp fastened on a bracket 85 is mounted on bed plate 1 by means of screws 86. A photoelectric cell hereafter referred to as a light receiver 87 fastened on a bracket 88 is mounted on bed plate 1, and so positioned relative to the light source 84 that a beam of light from light source 84 will center on the receiving end of light receiver 87. This beam of light travels a path through which receptacles 6 pass during travel from conveyor 2 to the pockets 5 of feed star 4. The angle at which the receptacles 6 engage the path of the beam of light is such, that when there is a continuous uninterrupted line of receptables being conveyed past the beam, the beam will continuously play on successive passing receptacles consequently preventing exposure of the light receiver 87 to the beam.

The valve assembly 75 controls fluid flow to a fluid operated cylinder 90 which in turn controls the opening and closing of valves (not shown) that are utilized for discharging measured material from a reservoir into receptacles underlying discharge nozzles. This fluid cylinder 90 and other operations above outlined are further described in copending application Ser. No. 795,711, filed February 26, 1959, now Patent No. 3,073,359, issued January 15, 1963, and copending application Serial No. 39,887, filed June 30, 1960, now Patent No. 3,097,672, issued July 16, 1963, to which reference may be had.

Referring to the valve assembly 75 shown in FIG. 6, there is provided an inlet port 91 through which is fed a high pressure fluid into housing 77. As illustrated, the spool valve 76 has been forced to the left by high pressure fluid from inlet conduit 81 acting against valve surface 78. An inlet port 91 through which is fed high pressure fluid into housing 77, travels through conduit 96 via a pocket in the housing opened by the movement of valve 76. This latter high pressure fluid enters cylinder 90 forcing a hub 97 on the cylinder piston to be moved upward. All fluid above the hub 97 is forced out through conduit 98, a pocket in housing 77 opened by the valve movement, and vented to atmosphere via conduit 99. The lift shoe 92 for controlling the dispensing valves described in more detail in the copending application Ser. No. 795,711, is pivotally connected to the piston of cylinder 90 by means of pivot pin 94. As the piston is forced upward within cylinder 90, the lift shoe 92 pivots on a pivot pin 93, and at pivot pin 94 the free end of lift shoe 92 is elevated to assume an inclined position. The inclined position of lift shoe 92 initiates the opening of a material dispensing valve in the manner described in the copending application Ser. No. 795,711.

In FIG. 7 the above described operation is reversed. The movement of spool valve 76 to the right causes the high pressure fluid to flow from inlet port 91, a pocket in housing 77 opened by movement of the valve 76, conduit 98 and into the upper part of cylinder 90. This fluid pressure is exerted on the top of hub 97 causing the piston to move downward. All fluid below hub 97 is forced through conduit 96, a pocket in housing 77 opened by the valve movement, and atmosphere via conduit 99. The downward movement of the piston causes the lift shoe to pivot and assume a straight horizontal position, which initiates the preventive opening of a material dispensing valve, also described in more detail in the copending application Serial No. 795,711.

Referring to the circuit in FIG. 8 an electrical power source is connected to lines 100 and 101 which energizes light source 84 and the light receiver 87. The receptacle 6 is interposed in the path of the light beam from the light source 84 preventing the light beam from reaching the light receiver 87. An amplifier circuit 107 preferably comprising a triode amplifier tube is connected to the photoelectric cell light receiver 87, for controlling amplification of current to a two position relay 102 connected to this circuit via conductors 103 and 104. One terminal of each respective solenoid 61 and 62 is connected by conductor 109 to conductor 100 of the power supply. The other terminal of solenoid 62 is connected to contact 105 of relay 102 and the other terminal of solenoid 61 is connected to contact 106 of relay 102. The other contacts 105 and 106 are respectively connected to conductor 108 extending to the other power supply conductor 101. As long as the light beam from the light source 84 is masked from the photoelectric cell light receiver 87, and more particularly the cathode of this light receiver, the light receiver acts like a very high impedance and passes almost no current to the amplifier circuit 107. Thus the winding of the two position relay 102 remains unenergized. In this unenergized condition, the armature of relay 102 bridges contacts 102 maintaining a circuit closed for energizing solenoid 62 over a circuit extending from the power source, conductors 100, 109, coil of solenoid 62, contacts 105 bridged by the relay armature, conductors 108 and 101 to the power source. In this energized condition, the plunger 64 is magnetically attracted to the solenoid 62 and the pivotally mounted arm 49 assumes the position illustrated in FIG. 1.

In FIG. 9, the same circuit diagram is shown illustrating however the absence of a receptacle in the path of the light beam. The light receiver 87 therefore receives the light beam causing more electrons to flow and thus rendering the cathode conductive consequently passing sufficient current over conductors 103 and 104 from the amplifier circuit to energize the winding of relay 102. Relay 102 upon being energized attracts its armature, opening contacts 105 to deenergize solenoid 62. Contacts 106 are closed by the attracted relay armature, closing a circuit for energizing the coil of solenoid 61 over a circuit extending from the power supply, conductors 100, 108, contacts 106, solenoid 61, conductors 109 and 101 and back to the power supply. Plunger 64 is thus magnetically attracted to the solenoid 61 causing arm 49 to pivot and assume the position illustrated in FIG. 3. As long as there is an absence of receptacles, relay 102 and solenoid 61 will continue to be energized. As soon as the light beam is interrupted by a receptacle in the path of the beam, the light receiver 87 will again become non conductive to prevent current flow to the amplifier circuit 107, consequently causing the immediate deenergization of relay 102 and thereafter solenoid 61.

The operation of the mechanism is as follows:

When the filling machine is first placed into operation, the receptacles 6 are withheld from conveyor 2 so that the receiver 87 is unobstructed relative to light source 84. The withholding of the receptacles 6 causes relay 102 to energize as illustrated in FIG. 9, and the magnetic attraction of solenoid 61 as previously described pulls plunger 64 towards this solenoid. Arm 49 being pivotally connected to plunger 64, moves to a position against screw 58 placing the inclined shoe 55 aligned so the pins 41 will all be forced upward and held in this position by detents 45 engaging grooves 46.

As the filling machine rotates, the memory wheel 37 correspondingly rotates causing the pins 41 which are in their upward position to engage the inclined surface 70 of arm 67. This engagement causes arm 67 to pivot outwardly and away from the circular path of pins as the memory wheel 37 rotates, as illustrated in FIG. 3. Each successively raised rotating pin 41 will engage the arcuate surface 69 to maintain the arm 67 in the outward position riding a circumferential path formed by the rotating pins 41. In this position the arm 67 by means of screw 72 engages and moves the spool end 79 and consequently the spool valve to the position illustrated in FIG. 7, causing the flow of fluid in valve housing 77 to hold the lift shoe 92 in a lowered position so that the valves on the filling machine are not moved to an open position and discharge product when receptacles are not below the corresponding filling assemblies as described in the copending application Serial No. 795,711.

When the receptacles 6 are fed by conveyor 2 to feed star 4, these receptacles pass through the light beam from light source 84 interrupting the beam to the light receiver 87. This light beam interruption changes the current characteristics flowing from the light receiver 87 to the amplifier circuit 107 causing insufficient current flow from the amplifier circuit to relay 102. Relay 102 deenergizes, causing contacts 106 to open, deenergizing solenoid 61, and closing contacts 105 to energize the coil of solenoid 62. The energization of solenoid 62 magnetically pulls plunger 64 upward causing arm 49 to pivot against stop screw 59, aligning shoe 54 above the circular path of pins 41. Thus as each pin 41 rotates beneath shoe 54, the inclined edge of shoe 54 forces the pins downward. As a pin 41 is forced downward, a hub between the upper and lower grooves 46 causes the spring 47 to retract within the opening provided in set screw 48 until the upper groove 46 is in alignment with detent ball 45, at which time, the spring urges the detent ball 45 into this groove yieldingly holding the pin in its lowermost position.

As the memory wheel 37 rotates in the direction of arrow 44, and as the first pin 41 that has been depressed by inclined shoe 54 reaches the inclined edge 70 of arm 67, the pin 41 will lie on a plane below the arm 67. The low fluid pressure exerted against the spool end 78 in valve housing 77 moves the valve against the screw 72 on arm 67, causing arm 67 to pivot inward towards the center of memory wheel 37 and pass over the lowered pin 41. In this position of the valve 75, the flow of fluid to cylinder 90 reverses its course, traveling now from inlet port 91, through conduit 96 and into cylinder 90 causing piston 97 to move upward. The upward movement of piston 97 causes lift shoe 92 to pivot at both pivot pins 93 and 94, moving this shoe into an inclined position for permitting the filling machine valves (not shown) to open and allow material to discharge into receptacles now under the corresponding valves in a manner described in the copending application, Serial No. 795,711.

Should a receptacle be absent from a spacer 8 on the conveyor 2 approaching feed star 4, the light beam would again project through this empty space to the light receiver 87 when this empty space on conveyor 2 reaches position 82 on feed star 4. Light receiver 87 would then initiate the operation of relay 102 in a manner above described, to in turn, initiate the lowering of lift shoe 92 indicative of a vacant pocket on the feed star 4, so that when this vacant pocket reaches position 83, a valve corresponding to the pocket 7 of wheel 3 that receives only this vacant space will not be opened to discharge material.

Thus there is provided means for determining in advance, if there will be a receptacle at a point of exit from feed star 4 as far ahead as upon entrance to feed star 4. This advance determination or notice that there is or is not going to be a receptacle under a particular filling assembly permits other parts of the filling machine sufficient time to operate properly before a pocket 4 leaving position 82 arrives at position 83. For instance, from the time a pocket 5 arrives at position 82 until the time it reaches position 83, a corresponding pin 41 on memory wheel 37 will be in either a raised or a lowered position before it reaches arm 67. Therefore, a pivotal movement or a maintained position on the part of arm 67 is the only significant operation remaining for controlling either the opening or preventing opening of a product feed valve by the time a pocket 5 reaches position 83. The rotating wheel 37 with its raised or/and lowered pins 41 act as a memory unit for insuring that product will be discharged only when there is a receptacle available to receive it after a corresponding pocket leaves position 83.

Although the receptacles 6 in the drawing have been illustrated as being rectangular-shaped, the receptacles may be of any shape. In using different shaped receptacles, it would only be necessary to adjust the angle of the light beam so that during receipt of successive receptacles the light beam will be continuously interrupted, and thereby preventing the light beam from reaching the light receiver 87. It would therefore even be possible to feed receptacles of different shapes at the same time providing that they are all capable of holding the same volume of product to be discharged, and that they are able to block the light beam during the mixed receipt of receptacles, as well as permit projection of the beam to the light receiver during the absence of a receptacle.

Also, in the event that the size and shape of the receptacles are such that it is practically impossible to adjust the angle of the light beam relative to the light receiver for maintaining a continuous blocking of the beam by an uninterrupted receipt of receptacles, the beam may be reflected from a mirror like object to attain the same purpose. In this case the photoelectric cell 87 will be wired to operate when the receipt of a receptacle will cause the beam to be reflected to the light receiver, and the ab-

sence of a receptacle will prevent the beam from being reflected to the light receiver. The light reflector may be any object capable of reflecting light and placed at an angle relative to the light source, the light receiver and the moving receptacles so that the beam will reflect to the light receiver as long as there is an uninterrupted receipt of receptacles. In the case of shiny surfaced receptacles, a beam reflected off of these receptacles to the light receiver will also serve to indicate the presence of receptacles and likewise there will be no reflection of the light beam to the light receiver during the absence of a receptacle. Thus, the photo-electric light receiver **87** can be wired in various manners providing the memory wheel to be affected to respond and perform its intended function.

While one specific and preferred form of the invention has been illustrated and described, it will be understood that other forms will be suggested to those skilled in the art and it is intended to include all such modifications that do not depart from the spirit of this invention within its scope as best defined in the appended claims, wherein there is claimed:

1. A detection and actuating arrangement for a multi-stationed, high speed receptacle filling machine of the type having a plurality of product filling assemblies with associated filling valves operable by means of a movable camming surface overlying and moving along a path in synchronism with a plurality of receptacles, a rotatable feed star having pockets for individually feeding receptacles beneath said product filling assemblies and a conveyor for transporting uniformly spaced receptacles to said pockets, comprising detecting means for detecting in advance of a product filling assembly the presence or absence of a receptacle in a pocket of said star wheel, memory means operative for recording the absence and presence of receptacles in each pocket as detected by said detecting means, and means including a camming surface operative by said memory means upon each pocket of said star wheel being rotated to a predetermined position prior to entrance of receptacles beneath said filling assemblies for camming said product filling valve during an indicated presence of a receptacle and preventing a camming of the product filling valve during an indicated absence of a receptacle said detecting means affecting said memory means differently only upon a change of conditions with respect to the absence and presence of a receptacle.

2. A detection and actuating arrangement for a multi-stationed, high speed receptacle filling machine as claimed in claim 1, in which said memory means includes a rotatable wheel having slidable pins positioned during rotation of said rotatable wheel into a first position indicative of the presence of a receptacle in a corresponding pocket, and into a second position indicative of the absence of a receptacle in a corresponding pocket, the position of each pin triggering said means in predetermined rotated positions of said rotatable wheel.

3. A detection and actuating arrangement for a multi-stationed, high speed receptacle filling machine as claimed in claim 2, in which there is one corresponding pin on said memory wheel for each pocket on said feed star rotated in synchronism therewith, whereby as one pocket is checked by said detecting means and rotated to a position beneath a product filling assembly, a corresponding pin is position by said detecting means and rotated to a position controlling said product filling valve.

4. A detection and actuating arrangement for a multi-stationed, high speed receptacle filling machine as claimed in claim 2, in which said detecting means includes a light beam directed on a photo-electric cell controlling an electro-mechanical circuit, and said light beam is so beamed relative to said photoelectric cell that an uninterrupted receipt of receptacles in pockets of said feed star will continuously interrupt said light beam and only the absence of a receptacle in a pocket will permit said light beam to be projected to said photoelectric cell for altering said electromechanical circuit controlling said memory means.

5. A detection and actuating arrangement for a multi-stationed, high speed receptacle filling machine of the type having a plurality of product filling assemblies with associated filling valves operable by means of a movable camming surface overlying and moving along a path in synchronism with a plurality of receptacles, a rotatable feed star having pockets for individually feeding receptacles beneath said product filling assemblies and a conveyor for transporting evenly spaced receptacles to said pockets comprising, detecting means for detecting in advance of a product filling assembly the presence or absence of a receptacle in each pocket of said feed star, said detecting means including an electro-mechanical circuit having a first solenoid energized during the detected presence of a receptacle in a particular pocket and a second solenoid energized during the detected absence of a receptacle in a pocket, a rotatable memory wheel having a plurality of pins forming a concentric circle on said memory wheel, an arm adapted to pivot in one direction responsive to the energization of said first solenoid and to pivot in another direction responsive to the energization of said second solenoid, an offset bifurcated extension on said arm overlapping adjacent sides of said memory wheel and adapted to engage and move said pins into a first position responsive to said arm being pivoted in said one direction and into a second position responsive to said arm being pivoted in said other direction, and means including a camming surface operated by said positioned pins indicating the absence and presence of receptacles in particular pockets of said feed star for camming the product filling valve during the presence of a receptacle and preventing a camming of the product filling valve during the absence of a receptacle said detecting means affecting said memory wheel differently only upon a change of conditions with respect to the absence and presence of a receptacle.

6. A detection and actuating arrangement for a multi-stationed, high speed receptacle filling machine as claimed in claim 5, including detent means for holding said pins in either said first or second position during a single revolution of said rotating memory wheel for insuring a correct recording of the presence and absence of receptacles in said pockets prior to and during operation of said means controlling said product filling valves.

7. A detection and actuating arrangement for a multi-stationed, high speed receptacle filling machine as claimed in claim 5, in which said bifurcated extension comprises a first inclined shoe adjacent one side of said memory wheel and a second inclined shoe adjacent the other side of said memory wheel, each said shoe being offset from the other so that only one of said shoes lies in the path of said pins during rotation of said memory wheel for engaging and positioning said pins while the other shoe lies at a point away from the rotating path of pins as aligned by the pivoted position of said arm determining the presence and absence of receptacles in said pockets.

8. A detection and actuating arrangement for a multi-stationed, high speed receptacle filling machine as claimed in claim 5, in which said detecting means includes a member adapted to pivot in one direction by engagement with said pins which are in said first position, and adapted to pivot in a second direction by nonengagement with said pins which are in said second position for initiating the camming of said product filling valves.

9. A detection and actuating arrangement for a multi-stationed, high speed receptacle filling machine as claimed in claim 5, in which said detecting means also includes a light beam trained on a photoelectric light receiver, said pockets of said feed star adapted to travel below said light beam causing receptacles to block the light beam indicating the presence thereof, said light beam being so trained relative to said light receiver that a continuous

receipt of uniformly spaced receptacles will uninterruptedly block said light beam and maintain said first solenoids energized for indicating the presence of receptacles to said memory means.

10. A detection and actuating arrangement for a multi-stationed, high speed receptacle filling machine as claimed in claim 9, in which only the absence of a receptacle in a pocket below said light beam will permit said light beam to be received by said light receiver causing said light receiver to energize said second solenoid for indicating an absence of a receptacle in said pocket to said memory means.

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