March 17, 1953 A. C. EVERETT 2,631,769

CONTAINER FILLING MACHINE

Filed March 30, 1948 2 SHEETS—SHEET 1

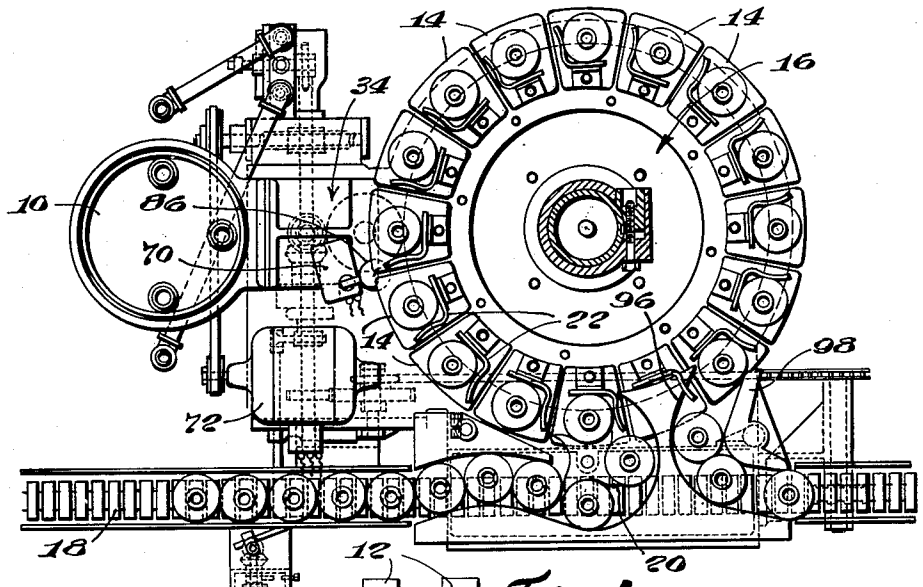


Fig. 1

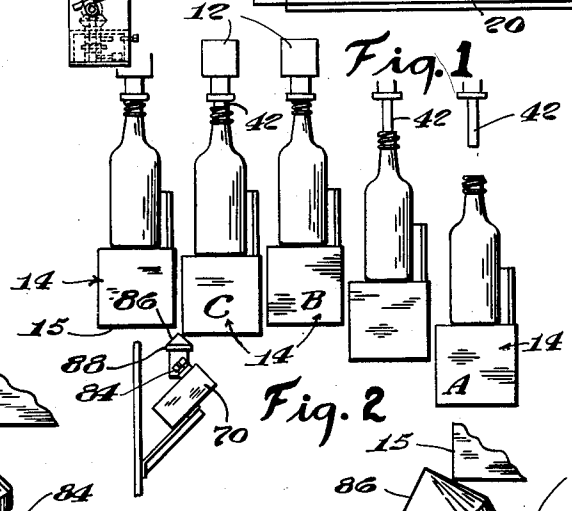


Fig. 2

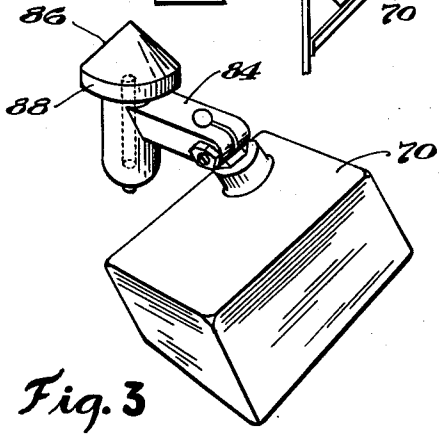


Fig. 3

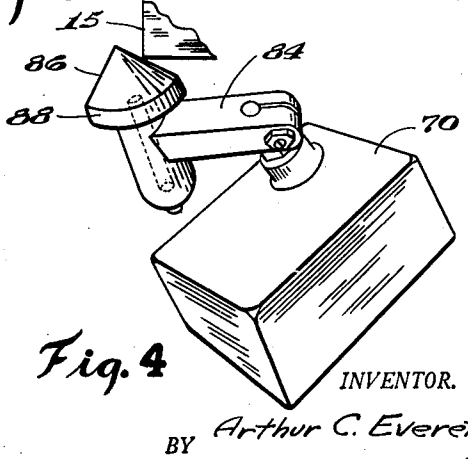


Fig. 4

INVENTOR.

BY Arthur C. Everett

J. Stanley Churchill

ATTORNEY

March 17, 1953 A. C. EVERETT 2,631,769

CONTAINER FILLING MACHINE

Filed March 30, 1948 2 SHEETS—SHEET 2

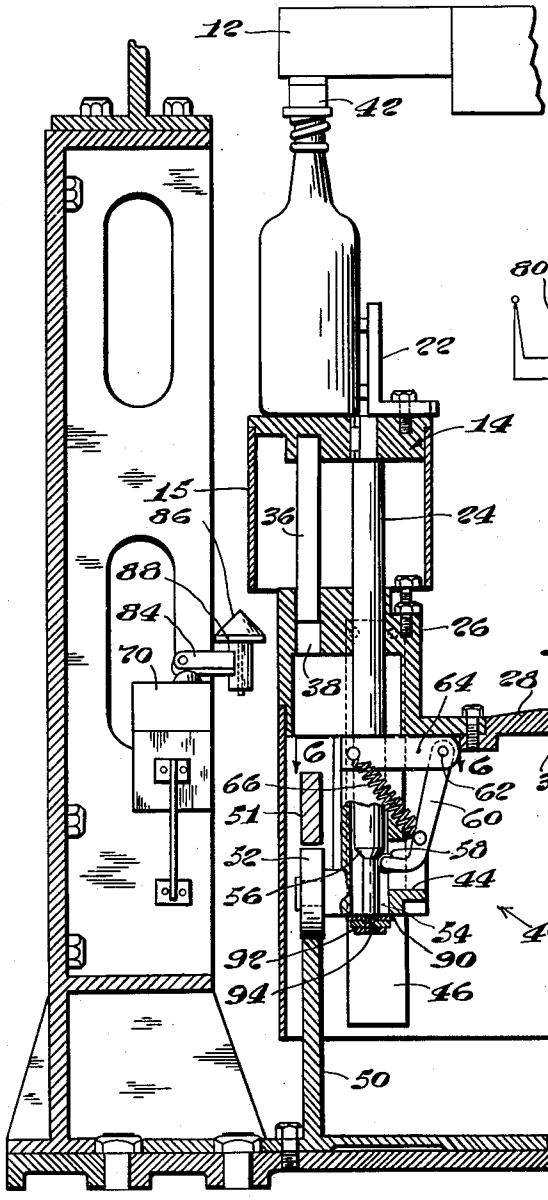


Fig. 5

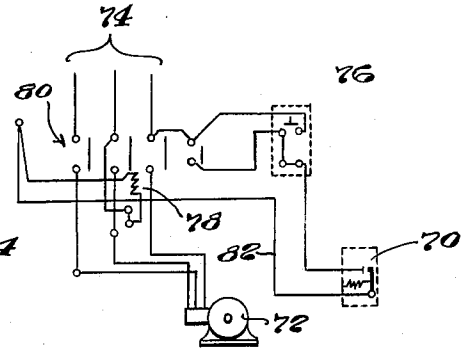


Fig. 7

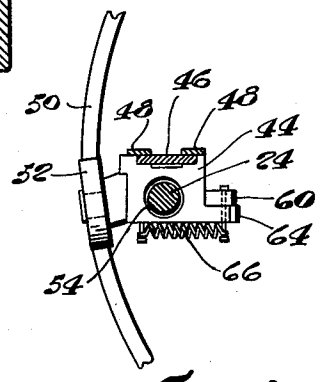


Fig. 6

INVENTOR.
Arthur C. Everett
BY
J. Stanley Churchill
ATTORNEY

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UNITED STATES PATENT OFFICE

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CONTAINER FILLING MACHINE

Arthur C. Everett, Brighton, Mass., assignor to Pneumatic Scale Corporation, Limited, Quincy, Mass., a corporation of Massachusetts

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12 Claims. (Cl. 226—96)

1

This invention relates to a container filling machine.

The invention has for an object to provide a novel and improved container filling machine of the type having a plurality of filling nozzles and elevating platforms for supporting and elevating the containers into filling engagement with the nozzles and which is characterized by novel provision for releasing the supporting platform when undue resistance to elevating movement is encountered, such as when a jam occurs, and for thereafter discontinuing operation of the machine upon detection of an incompletely elevated platform to permit the operator to correct the abnormal condition and thus prevent damage during subsequent operation of the machine.

With this object in view, and such others as may hereinafter appear, the invention consists in the container filling machine and in the various structures, arrangements and combinations of parts hereinafter described and particularly defined in the claims at the end of this specification.

In the drawings illustrating the preferred embodiment of the invention, Fig. 1 is a plan view of a container filling machine embodying the present invention; Fig. 2 is a side elevation of the container supporting and elevating platforms in different positions of elevation; Figs. 3 and 4 are perspective views of a safety switch embodied in the present invention and shown in different positions of operation; Fig. 5 is a vertical sectional view of the container supporting and elevating mechanism; Fig. 6 is a plan view detail as seen from the line 6—6 of Fig. 5, some of the parts being shown in cross section; and Fig. 7 is a wiring diagram to be referred to.

The present invention contemplates the provision of safety mechanism for a bottle filling machine and more particularly for a rotary filling machine of the general type illustrated and described in the United States patent to Everett, No. 2,136,421, issued November 15, 1936, wherein a rotary unit is provided with a plurality of elevating platforms to which successive bottles to be filled are transferred. During the continuous rotation of the unit, the platforms are elevated to present the bottles into sealing engagement with their respective filling nozzles, the latter being arranged to extend into the mouth of the bottle and the filling operation being effected by the evacuation of the bottle in accordance with the well known vacuum principle. Upon completion of the filling operation, the elevating platforms are again lowered to transfer level and the filled bottles are transferred onto a discharge conveyor during the continuous movement of the machine.

2

In the operation of such prior filling machines the containers, such as bottles, are required to be in substantial alignment with their respective filling nozzles to permit the latter to extend into the mouth of the container and into sealing relation when the containers are elevated by the platforms, and, in the exent that a misaligned or defective container is elevated a jam may occur causing breakage of the container or damage to the nozzle or elevating parts. Defective containers which may cause trouble include those having offset neck portions and those in which the bottom of the bottle is rounded or irregular so that the bottle may tilt and effect misalignment of the mouth portion with the nozzle and in either case the edge of the bottle may engage the edge of the nozzle during the elevating operation to cause a jam. Other defects include a narrow or choked neck bottle which may prevent the entrance of, or cause jamming of, the nozzle in the neck of the bottle during the elevating operation. If the machine is permitted to continue in operation in this condition, further damage may result at the discharge station when the jammed bottle engages the discharge guide rails, or, at the receiving station where an empty bottle is to be transferred onto the platform.

In accordance with the present invention, provision is made for releasing the elevating mechanism in the event of undue resistance during the elevating operation, indicating an obstruction such as a bottle jammed betwen the supporting and elevating platform and the filling mechanism, thus preventing breakage of the bottle or damage to the operating parts, and, provision is further made for thereafter stopping the machine when an incompletely elevated platform is detected to permit the operator to relieve the jammed condition.

Referring now to the drawings, and particularly to Fig. 1, the present invention is illustrated as embodied in a rotary bottle filling machine of the type illustrated and described in the Everett Patent No. 2,136,421 wherein a source of supply of the liquid with which the bottles are to be filled is contained within a supply tank 10 and provision is made for filling the bottles by a plurality of bottle filling mechanisms, indicated generally at 12, during continuous movement of the bottle filling mechanisms and the bottles as they are supported upon elevating platforms 14

carried by a continuously rotating unit, indicated generally at 16.

In the operation of the illustrated bottle filling machine, the empty bottles are transferred from an incoming conveyor 18 onto successive elevating platforms 14 of the rotary device by a continuously rotating transfer wheel 20, the bottles being engaged by carrier arms 22 mounted on the platforms 14 and arranged to position the bottles in alignment with the filling heads 12.

Referring now particularly to Fig. 5, each bottle supporting and elevating platform 14 is secured to the upper end of a rod 24 which is mounted for vertical reciprocation in a bracket 26 attached to an annular member 28 carried by a flanged portion 30 of a rotatably driven sleeve 32, forming a part of the filling machine, the rotation of the sleeve 32 being effected through driving mechanism, indicated generally at 34, see Fig. 1, and as fully illustrated and described in the Everett patent above referred to. A guide pin 36 depending from the underside of the platform 14 and arranged to be slidingly received in an opening 38 formed in the bracket 26 serves to prevent rotation of the platform and to maintain the platform in vertical alignment during reciprocation thereof.

As herein illustrated, novel elevating mechanism, indicated generally at 40, is arranged to cooperate with the rod 24 to effect elevation of the platforms 14 and the bottles supported thereon into operative engagement with the nozzles 42 of the filling mechanism 12 during the continuous rotation of the machine, the elevating mechanism being characterized by its ability to be released from operative engagement with the elevating rod 24 upon undue resistance being applied to the elevating movement. As best shown in Fig. 5, the elevating mechanism 40 comprises a vertically reciprocable member 44 slidingly mounted on a vertical slide bar 46 attached to the supporting bracket 26, the elevating member 44 being maintained in engagement with the slide bar by gibs 48. The elevating member 44 is arranged to be reciprocated by a stationary ring cam 50 in cooperation with a cam roll 52 carried by the member 44.

The elevating rod 24 extends freely through a bore 54 in the member 44 and is provided with a shouldered portion 56 adjacent its lower end arranged to cooperate with a roller 58 carried by an arm 60 pivotally mounted at 62 in an extension 64 from the upper end of the elevating member 44. The roller 58 is held in operative engagement with the shouldered portion 56 by a relatively strong spring 66 connected to the arm 60, as clearly shown in Fig. 5.

From the description thus far it will be seen that in the operation of the machine, when the roll carrying member 44 is elevated by the ring cam 50, the yieldable engagement of the roller 58 with the shouldered portion 56 of the rod effects elevation of the platform unit 14. With this construction it will be seen that in the event the elevator platform should meet with undue resistance so as to overcome the tension of the spring 66 during the elevating operation, the roller 58 will ride over the shouldered portion of the rod 24, thus releasing the driving connection and preventing further elevation of the platform 14 and protecting the operating parts from damage.

Provision is further made in the illustrated embodiment of the invention for detecting an unelevated or partially elevated platform at a predetermined point in the rotary progress of the elevating units, and for stopping the machine when an unelevated platform is detected in order to permit the operator to correct the abnormal condition so as to avoid damage to the parts during subsequent operation of the machine.

As illustrated in Fig. 2 the elevating platforms 14 are provided with depending arcuate skirt portions 15 coextensive with the radius of rotation of the rotary driven unit 16, and, are normally elevated through the connections described, from a lowered or transfer level, indicated at A, to an elevated position, indicated at B, to present the bottles into operative filling position with the nozzles 42. In the event that a platform is prevented from attaining its fully elevated position, as indicated at C, wherein a nozzle 42 has jammed in the narrow neck portion of a defective bottle, the platform is arranged to engage and operate a switch, indicater at 70, disposed in the path of an incompletely elevated platform at a point immediately beyond the station at which the platform would normally have arrived at its fully elevated position.

The switch 70 forms part of an electrical circuit to the driving motor 72, and, as shown in Fig. 7, the motor circuit includes the main lines 74; a push button switch 76 arranged when closed to energize a relay 78 forming a part of a conventional motor switch 80 to start the motor, the switch 70 being inserted in the relay circuit 82. In operation, the switch 70, which may comprise a micro-switch, is normally closed to permit continuous operation of the machine, and, when the switch is operated by engagement of an incompletely elevated platform 14, the relay circuit is opened to deenergize the relay and effect opening of the motor switch 80 to stop the machine.

The switch 70 is preferably constructed and arranged to be operated by an incompletely elevated platform being moved therepast at different positions of elevation so that the machine will be stopped by an incompletely elevated platform including an unelevated or partially elevated platform which has been released from its actuating mechanism and has come to rest in any horizontal plane defined between its lowermost or transfer level and a level immediately below its maximum position of elevation. As herein shown, the switch box is preferably supported in a downwardly inclined angular position in the direction of movement of the platforms, approximately 45 degrees relative to the horizontal plane of movement of the platforms, and is provided with a switch arm 84 arranged to be rocked downwardly at an angle of approximately 45 degrees, parallel to the plane of the angularly disposed switch box. As shown in Fig. 1, the switch arm 84 extends substantially radially of the rotary driven unit 16 when in its closed or inoperative position and is provided with a conical roller 86 rotatably mounted upon a vertical axis in the free end of the arm 84. The upper end of the cone in its normal position is disposed immediately below the lower edge of the depending arcuate skirt portion 15 of a platform when in a fully elevated position, viewed in a horizontal plane, see Fig. 5, and, when viewed from above, see Fig. 1, the upper end of the cone is disposed substantially in alignment with or preferably immediately beyond the radius defining the outer surface or periphery of the skirt portion 15. The lower portion or base of the conical roller 86 extends into the path of an unelevated platform skirt 15 and is provided with a shouldered portion 88. With this construction

it will be seen that in the operation of the machine, the conical portion of the roller is arranged to be engaged by the lower edge of the skirt portion of a platform which has been stopped at a horizontal position within the range defined by the upper and lower limits of the cone surface, and that any platform which has been stopped at a horizontal level below this plane will engage the shouldered portion of the roller. In either event, engagement of an incompletely elevated platform with the roller will effect rocking of the switch arm 84 to open the circuit to the motor and stop the machine.

In the normal operation of the machine, and, upon continued operation after a released platform has been reset, the elevating member 44 is positively lowered by the upper portion 51 of the cam 50 in cooperation with the roller 52, and, the rod 24 and platform 14 are positively returned to transfer level by the engagement of the underside of the member 44 with a disc or washer 90 secured to the lower end of the rod 24 by nuts 92 cooperating with a threaded end portion 94 of the rod. The filled bottles are then received between guide rails 96, 98 arranged in the path of the bottles to remove the same from the platforms and to guide them onto the discharge end of the conveyer, as shown in Fig. 1.

From the above description it will be seen that the present container filling machine embodying a plurality of bottle supporting and elevating platforms for elevating the bottles into operative position with the filling nozzles of the machine is provided with elevating mechanism capable of being released when undue resistance to elevation is encountered whereby to prevent damage to the operating parts; and is further provided with control mechanism adapted to discontinue the operation of the machine when an incompletely elevated platform is detected to enable the operator to correct the abnormal condition and thus prevent damage during subsequent operation of the machine.

While the preferred embodiment of the invention has been herein illustrated and described, it will be understood that the invention may be embodied in other forms within the scope of the following claims.

Having thus described the invention, what is claimed is:

1. In a container filling machine a filling nozzle, a container supporting platform arranged to be elevated to present a container into operating filling position during continuous movement of the platform, elevating means including a releasable connection normally cooperating with the platform and adapted to be completely disengaged when an undue resistance to elevating movement is encountered, and means disposed in the path of and arranged to engage the platform at any point of elevation below its completely elevated position for discontinuing operation of the machine when an incompletely elevated platform is detected.

2. In a container filling machine, a container supporting member, a filling nozzle and means for elevating the container supporting member into filling position with relation to the filling nozzle, said means comprising driving means and means for completely disconnecting the driving means and container supporting member when the latter encounters undue resistance in its elevating movement, and means disposed in the path of and arranged to engage the platform at any point of elevation below its completely elevated position for discontinuing operation of the machine when an incompletely elevated platform is detected.

3. In a container filling machine, a container supporting platform arranged to be elevated to present a container into operative filling position during continuous movement of the platform, elevating means including a resiliently engageable releasable connection normally cooperating with the platform and adapted to be completely disengaged when an undue resistance to elevating movement is encountered, and means disposed in the path of and arranged to be engaged by an incompletely elevated platform at any point of elevation below its completely elevated position during movement thereof subsequent to said disengagement for discontinuing the operation of the machine.

4. In a container filling machine, a container supporting platform arranged to be elevated to present a container into operative filling position during continuous movement of the platform in a horizontal plane, elevating means including a releasable connection normally cooperating with the platform and adapted to be completely disengaged when an undue resistance to elevating movement is encountered, and means disposed in the path of and arranged to be engaged by an incompletely elevated platform at any point of elevation below its completely elevated position during subsequent movement thereof in a horizontal plane for discontinuing operation of the machine.

5. In a container filling machine a filling nozzle, a container supporting platform arranged to be elevated to present a container into operative filling position during continuous movement of the platform, elevating means including a releasable connection normally cooperating with the platform and adapted to be completely disengaged when an undue resistance to elevating movement is encountered, driving means for the machine including an electric motor, and a switch for said motor disposed in the path of and arranged to be operated by an incompletely elevated platform which has come to rest at any point below its completely elevated position to discontinue the operation of said driving means.

6. In a rotary type filling machine, a plurality of filling nozzles, a plurality of container supporting platforms arranged to be elevated to present successive containers into operative filling position during continuous rotary movement of the platform, elevating means for each platform including a releasable connection normally cooperating with the platform and adapted to be completely disengaged when undue resistance to elevating movement is encountered, driving means for the machine including an electric motor, a circuit for the motor, and a switch in said motor circuit arranged to open the circuit and discontinue operation of the machine when engaged by an incompletely elevated platform which has come to rest at any position below its completely elevated position, said switch being disposed in the path of rotary movement of the platforms and engageable with an arcuate portion thereof at a point in the rotary travel of a platform immediately beyond a position in which the platform would normally be in its maximum position of operation.

7. In a rotary type container filling machine, a filling nozzle, a container supporting platform adapted to be elevated from a transfer level to operative filling position during continuous

rotary movement of the platform, driving means for the machine including an electric motor and a circuit for the motor, and a switch in said circuit having an arm mounted to be rocked through an inclined plane and arranged to be opened to discontinue operation of the machine when engaged by a platform which has failed to reach its maximum position of elevation and come to rest at any point below said maximum position at a predetermined point in its rotary movement.

8. In a rotary type container filling machine, a filling nozzle, a container supporting platform adapted to be elevated from a transfer level to operative filling position during continuous rotary movement of the platform, driving means for the machine including an electric motor and a circuit for the motor, a switch in said circuit disposed in the rotary path of said platform and arranged to be opened to discontinue operation of the machine when engaged by a platform which has failed to reach its maximum position of elevation at a predetermined point in its rotary movement, said switch having an arm mounted to be rocked through an inclined plane when engaged by an arcuate portion of a platform disposed in any horizontal plane between said transfer level and a point immediately below its maximum position of elevation.

9. In a rotary type container filling machine, a filling nozzle, a container supporting platform adapted to be elevated from a transfer level to operative filling position during continuous rotary movement of the platform, and driving means for the machine including an electric motor and a circuit for the motor, and a switch in said circuit arranged to be opened to discontinue operation of the machine when engaged by a platform which has failed to reach its maximum position or elevation at a predetermined point in its rotary movement, said switch having a switch arm mounted to be rocked in a downwardly inclined plane relative to the direction of movement of the platform in a horizontal plane, and a conical roller carried by said arm and mounted for rotation on a vertical axis, said roller being disposed in a position to be engaged by a platform disposed in any horizontal plane between said transfer level and a point immediately below the maximum position of elevation of the platform to operate the switch.

10. In a rotary type filling machine, a filling nozzle, a container supporting platform arranged to be elevated to present a container into operative filling position during continuous movement of the platform through a circular path in a horizontal plane, elevating means including a releasable connection cooperating with the platform and adapted to be disengaged when an undue resistance to elevating movement is encountered, and driving means for the machine including an electric motor, a circuit for the motor, and a switch in said circuit arranged to be opened to discontinue operation of the machine when engaged by a platform which has failed to reach its maximum position of elevation, said switch having a switch arm mounted to be rocked in a downwardly inclined plane relative to the movement of the platform in a horizontal plane, and a conical roller mounted for rotation on a vertical axis carried by said arm, said roller being disposed in a position to be engaged by a platform disposed in any horizontal plane between said transfer level and a point immediately below the maximum position of elevation of the platform to operate the switch.

11. In a container filling machine, a filling nozzle, a container supporting platform arranged to be elevated from a transfer level to present a container into operative filling position during continuous movement of the platform, a rod mounted for vertical reciprocation attached to said platform and having a shouldered portion adjacent its lower end, and means for elevating the platform comprising a positively reciprocated member, a spring urged arm carried by said member and having a roller engageable with said shouldered portion to effect elevation of the platform when the member is elevated, said spring urged arm being arranged to yield and permit the roller to ride over the shouldered portion to release the connection when an undue resistance to elevating movement is encountered.

12. In a container filling machine, a filling nozzle, a container supporting platform arranged to be elevated from a transfer level to present a container into operative filling position during continuous movement of the platform, a rod mounted for vertical reciprocation attached to said platform and having a shouldered portion adjacent its lower end, and means for elevating the platform comprising a positively reciprocated member, a spring urged arm carried by said member and having a roller engageable with said shouldered portion to effect elevation of the platform when the member is elevated, said spring urged arm being arranged to yield and permit the roller to ride over the shouldered portion to release the connection when an undue resistance to elevating movement is encountered, and means formed on the lower end of the rod engageable by said member for subsequently effecting positive return of the platform to transfer level.

ARTHUR C. EVERETT.

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