FIG. 1

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The present invention relates to filling machines, and particularly to control means for such filling machines designed to prevent operation of the filling device when the supply of containers to the machine is interrupted.

Various constructions have been proposed in the past for use in filling machines, to prevent the operation of the filling mechanism when the supply of containers to be filled is interrupted. Such devices are generally characterized as "no container—no fill" mechanisms.

It is one object of the present invention to provide improved control mechanism for filling machines which will prevent operation of the filling mechanism in the absence of a container to be filled.

It is another object of the invention to provide improved control mechanism of this type which is simple and economical in construction and positive in operation.

A further object is the provision of such safety control means particularly adapted for filling machines of the rotary type.

Still another object of the invention is a filling machine control mechanism particularly designed for use in combination with resilient operating means for moving the usual container support and filling head into juxtaposed filling position.

A further object is a control mechanism which is effective on an individual filling head without interruption of operation of the remainder of the machine.

Another object of the invention is a control mechanism which includes resilient operating means for relative movement of the filling head and container support of a rotary filling machine, in combination with stop means on the rotatable carrier of such a machine for preventing completion of the relative movement of the parts to filling position.

Still another object is the provision of a control mechanism for rotary machines of this type in which the position of movable stop means on the rotatable carrier of the machine is controlled by setting mechanism on the stationary base of the machine.

A further object is the provision of such control means in combination with resetting means on the stationary base of the machine for cooperation with movable stop means on the rotatable carrier.

Other objects and advantages of the invention will be apparent from the following specification in which certain preferred embodiments of the invention are described with particular reference to the accompanying drawings.

In these drawings, wherein like reference characters indicate like parts.

Figure 1 is a partial top plan of a rotary filling machine incorporating the control mechanism of the present invention with the upper or filling head portion of the machine broken away for clearness.

Fig. 2 is a schematic perspective view of certain stations of the machine of Fig. 1, showing details of operation of the control mechanism.

Fig. 3 is a sectional elevation taken in a radial plane passing through the axis of rotation of the machine and the axis of one of the container supports and filling heads.

Fig. 4 is an enlarged partial sectional view of part of the filling head of Fig. 3.

Fig. 5 is a partial sectional view of portions of the container support and filling head, with the container support locked to prevent completion of its movement to filling position.

Fig. 6 is a partial sectional view on the line 6—6 of Fig. 5 with the latch portion of the stop mechanism in locking position.

Fig. 7 is a view similar to Fig. 6 with the latch member in unlocked position.

Fig. 8 is an enlarged partial sectional view of the interengaging portions of the stop means and container support.

Fig. 9 is an enlarged side elevation, with certain parts shown in section, showing details of the setting mechanism according to the invention, and

Fig. 10 is a view similar to Fig. 3, but with the filling head and container support in relatively separated loading position, of another type of filling head construction suitable for use in accordance with the invention.

General description

In general, the objects of the present invention are accomplished by provision of a filling machine in which a suitable filling head and container support are mounted on a base for relative movement toward and from each other between a relatively spaced loading position and a relatively juxtaposed filling position. The power means for causing relative movement of these parts includes means resiliently moving the container support and filling head into relative filling position. For this resilient movement, the present description discloses the use of pneumatic operating means. However, in certain cases, other known forms of operating mechanism could.
be utilized in which the necessary resilience is provided by springs or the like.

The filling mechanism according to the present invention is so constituted that it will be disabled or inoperative unless the container support and filling head are moved completely into the filling position. In the present case the filling mechanism includes connections to a suitable source of vacuum. The filling head and container support are designed to include contracting elements which engage each other to form an airtight filling chamber when the parts are completely moved to filling position. Failure to complete the movement of these parts into filling position prevents interengagement of the cooperating elements on the support and head and thus prevents the reduction of pressure within the filling chamber. Since operation of such a filling head depends on the creation of a substantial vacuum within the filling chamber, failure to move the container support and filling head all the way to filling position will accordingly prevent operation of the filling mechanism.

While other arrangements may be used in certain cases to prevent operation of a filling mechanism in the absence of complete movement to filling position, the construction shown in the present specification is preferred by reason of its simplicity and economy of operation.

In accordance with the invention, a stop is provided which is movable to and from a blocking position in which it prevents completion of the relative movement of the container support and filling head into filling position.

The position of this stop means is controlled and determined by setting mechanism operated in response to a suitable detector which is responsive to the presence or absence of a container on the container support. Thus when no container is positioned on the support, the detector mechanism, through the setting device, will move the stop means into blocking position to prevent complete movement of the parts into filling position and thus prevent operation of the filling mechanism.

As far described the mechanism according to the present invention is suitable either for single head, straight line, or rotary types of filling machines. The device is particularly useful, however, when used in connection with machines of the rotary type. In such machines, as shown in Figs. 1 and 2, containers 34 are fed into the machine by a suitable loading platform or conveyor 18 at an initial loading station designated as A. A rotatable carrier 22 carries a series of circumferentially spaced container supports 24 in the direction designated by arrow 36 of Fig. 1. Each container support thus passes first from the loading station at A to a detector station indicated at B. Here suitable detector mechanism 32 determines the presence or absence of a container on the support, and controls the position of a setting device 34 according to the presence or lack of such a container.

In the continued rotation of the carrier 22, setting device 34 determines the position of stop mechanism indicated generally at 36 (Figs. 1 and 2). As the container supports leave the station B and the detector mechanism and setting device, they move to a further station C (Fig. 2) at which the container support is normally moved upwardly to filling position. However, should the setting device 34 have moved the stop mechanism 36 to blocking position, complete movement of the support to filling position will be prevented.

During further rotation of the carrier 22 and support 24 the filling mechanism will become operative, for example, by connection to a suitable source of vacuum. As already described, this vacuum connection will only be effective to feed material through the filling head in the event that movement of the support to filling position has been complete. The filling operation is continued through a substantial portion of the rotary movement of plate 22 and support 24 and is terminated at a second point in the path of rotation just before the support reaches station D of Fig. 1.

At station D, a resetting device 88 is provided to restore the stop mechanism to its normal or inoperative position in preparation for a normal succeeding filling cycle. Further rotation of the machine to station E will result in removal of the containers from the various supports onto an unloading platform 80. This removal is accomplished by cooperating inner and outer guides 92 and 94 in combination with a movable pusher arm 96 fastened to transfer conveyor 98 which is rotated on an axis 100 in timed relation to the rotation of carrier 22.

Thus the positioning of the machine, containers will be fed to the supports at station A and will be filled during rotation of the supports from station A clockwise to station E. Should the supply of containers be interrupted for any reason, rotation of the carrier 22 and supports 24 may be continued. The stop means described generally above will prevent operation of any individual filling head which does not have a container in position to receive the material. At the same time the remaining heads will be operative to fill those containers which are available. Hence the safety mechanism of the present invention prevents needless interruption of the operating cycle of such a rotary filling machine. At the same time, the mechanism solves the problem which would otherwise be present, of preventing operation of the vacuum filling mechanism when a container is missing from a given support. Were it not for the stop means which prevents completion of the relative movement of the container support to filling position, it will be apparent that the cooperating elements on the filling head and support which establish the filling chamber would move into engagement with each other, would form an air tight chamber, and would accordingly permit operation of the filling head. Then as the parts were returned to their separated or loading position, the material would be spilled from the container support into the operating mechanism of the machine. These difficulties are prevented by the present mechanism in a simple and positive manner as described in detail below.

Container support and filling head operation

As shown in Figs. 1 to 3, inclusive, the present filling machine includes a stationary base 20 on which carrier 22 is mounted for rotation about a vertical axis. On carrier 22 are mounted a series of circumferentially spaced container supports 24. Carrier 22 supports a central hub 26, at the top of which is mounted a plate 28 which carries a series of filling heads 30. One such filling head is located above each container support 24. In the form shown in Fig. 3, the filling head 30 includes a depending extension 32, the internal volume of which is substantially equal to or slightly greater...
than the internal volume of the container 34 to be filled. Extension 32 is designed for insertion inside the mouth of container 34 so that the lower edge 50 of extension 32 engages the bottom 53 of container 34 and holds it firmly against the container support 24. In this case the support 24 is provided with a resilient insert 55 to insure sealing engagement of the container bottom between the extension and the support.

According to the invention, power means is provided for relative movement of the container support and filling head between respective loading and filling positions. While either the support or the filling head or both could be moved for this purpose, a construction has been shown in which the filling heads remain vertically stationary, and the container supports are reciprocated vertically from the loading position shown in Fig. 2 at station D to the filling position shown at station C of Fig. 2.

The means by which the container support is moved resiliently upward against the filling head extension 32 is shown in this case as a piston type cylinder 36 to which the container support 24 is rigidly connected. Cylinder 36 in turn is vertically reciprocable on a stationary piston 38. Piston 38 has an internal passage 40 communicating with an air passage 42 in the rotatable carrier 22. A pipe 44 is attached to passage 42 and is also adapted for connection to a suitable source of compressed air to lift cylinder 36 and container support 24 to the position of Fig. 3. A suitable bellows 46 connects the lower end of cylinder 36 to the piston supporting plate 48 on the rotatable cylinder 36. This bellows 46 forms and encloses the portion of the piston between the cylinder and the piston support and prevents the entrance of dust at these points during operation of the machine.

Since any well known means for controlling the air pressure through connection 44 may be utilized, the details of the pressure control mechanism have been omitted. It will be understood that pressure within cylinder 36 is increased to lift the cylinder and supporting plate at one point in the rotation of carrier 22, corresponding in this case to position C of Fig. 2. At a second point spaced farther along in the direction of rotation of carrier 22, the pressure in cylinder 36 will be reduced to lower the container support 24 back to its initial loading position prior to arrival of the support at station D of Fig. 1.

In order to locate each container 34 accurately with respect to its filling head, supporting plates 24 each include a guide post 56 fastened at 58 to the inner rear corner of the supporting plate 24. Guide post 56, in turn, is provided with angular upper and lower guides 58 and 62, respectively, for engagement with the inner and rear sides of each container 34. Thus as the containers are fed onto each container support and station A, they will engage the guides 58 and 62 and will be accurately positioned for filling during subsequent operation of the machine.

As shown in the enlarged view of Fig. 4, the filling head 30 includes a central filling opening 64 connected to a suitable hopper or other source of material to be filled. Filling opening 64 is so designed that downward movement of the powder or material not only takes place unless pressure is subsequently reduced below the filling opening.

To obtain the necessary reduction of pressure, filling head 30 is provided with one or more air control passages 60 and 64 which may include screens or filters 70 and 72 respectively. A conduit 74 is adapted for connection of passages 66 and 68 to a suitable controlled source of vacuum. Here again, details of the mechanism by which the vacuum is controlled have not been omitted, since any standard vacuum system may be used. It will be understood that a vacuum is normally established through connections 74 during a predetermined portion of the rotary movement of each filling head and container support between stations C and D of Figs. 2 and 3.

As already described, the connection 74 will not be effective to create a vacuum in the filling chamber within extension 32 unless the container support 24 is moved all the way to the filling position of Fig. 3. When the stop mechanism is operated in accordance with the present invention in response to absence of a container, the upward movement of support 24 will be arrested in the position of Fig. 3 just before the lower edge of the extension 32 engages the resilient seat 54 of the container support. Thus an annular opening 76 is provided through which air can enter extension 32 and prevent the reduction of pressure therein.

Stop means for container support

Details of the construction by which complete movement of the container support and filling head to filling position is prevented are shown in Figs. 5 to 8. The stop means, generally indicated at 66, includes a stop 102 which is pivoted at 104 to a supporting post 106. Post 106 is mounted on the rotatable carrier adjacent the lifting cylinder 36 and is fastened to the carrier at 100. As indicated in Fig. 2, a separate stop mechanism is provided for cooperation with each lifting cylinder and container support.

In the particular stop mechanism shown, the axis of pivot 104 for stop 102 extends generally radially and horizontally with respect to rotatable carrier 22. Stop 102 includes an abutment 110 at one end. Abutment 110 is located in the path of normal vertical movement of a cooperating projection 112 fastened to the cylinder 36 at 114. A spring 116 is located between the other end 118 of the stop 102 and a portion of support 24, and normally urges the stop 102 in a counterclockwise direction with respect to Fig. 5 so that end 118 of the stop 102 is held against cross member 119 on the supporting post 106. In this position of the stop, its abutment 110 is in the path of projection 112 and will be engaged by projection 112, as shown in Fig. 5, just before cylinder 36 and container support 24 reach their upper filling position. When the stop means of the invention is in its inactive or inoperative position, shoulder 112 will rotate abutment 110 and stop 102 upwardly as indicated in Fig. 6. This upward movement will stop when support 24 reaches its uppermost position and engages a container bottom against the lower end of filling head extension 32. At this time, latch 102 will be in the dotted line position of Fig. 8.

However, when the stop means is actuated in the vacuum position it is moved to the righthand side so that a latch portion 120 (Figs. 5 and 7) will be moved beneath the end 118 of stop 102 to prevent rotation to the dotted line position of Fig. 8. In this case, the parts will be held in the position of Fig. 3 to provide the angular space 75 between the extension and abutment 110 and the container support 24. Operation of the filling head will accordingly be prevented since pressure will not be reduced sufficiently to cause flow of the filling material.

Latch portion 120 constitutes an enlarged sec-
tion of a slidable latch member 122. This latch member 122 moves parallel to pivot 104, i.e., radially of the rotatable carrier 22. It is supported for this radial sliding movement by slots 124 and 126 in the support 108. At one end of the sliding latch 122 a stop member 128 is provided to limit movement of the latch in one direction. At the other end or outer end 130 of the radially slidable latch 122 a cam roller 132 is mounted, for engagement with the setting and resetting mechanism described below to determine the position of the latch.

As indicated in Figs. 6 and 7, the position of latch 122 and its enlarged section 120 with reference to end 116 of stop 102 determines whether or not stop 102 is locked in the position of Fig. 5 or is free to move to the dotted line position of Fig. 8. When latch 122 is in the position of Fig. 6, stop 102 is locked as shown also in Fig. 5. Similarly, movement of latch 122 to the position of Fig. 7 moves the enlarged section 120 out from under the end 116 of stop 102 and permits rotation of the stop as indicated in Fig. 8.

Setting means for support stop

Details of the setting mechanism according to the present invention are shown particularly in Figs. 1, 2, and 5. This setting mechanism 84 includes a lever 136 pivoted at 138 on an axis which extends substantially horizontally and circumferentially with respect to the rotatable carrier 22. Pivot 136 is supported by bearings 135 on a horizontal plate 137. Plate 131 extends laterally from a vertical carrying plate 139 (Figs. 1 and 5) which is hinged at 141 to a frame member 143 mounted on the stationary base 20 of the machine.

A spring 138 normally urges lever 134 in a clockwise direction with respect to Fig. 9 to the heavy line position of the figure. The inner end of lever 134, i.e., the end toward the center of the machine, carries a cam projection 140 which has a cam surface 142 angularly disposed with respect to the path of circumferential movement of the cam roller 132 on stop mechanism 86. The opposite end of lever 134 is bifurcated at 144 and the bifurcations are provided with slots 145 for engagement with a pin 150. Pin 150 is carried by a connecting rod 152 which is vertically slidable through a suitable guiding and sealing portion 154 on plate 137. The lower end of connecting rod 152 is pivoted at 156 to the core 158 of a solenoid 160. Solenoid 160 is enclosed in a housing 162 for protection of the parts. Leads 164 and 166 connect the solenoid core to a suitable source of current through the detector switch mechanism described below.

When solenoid 160 is energized, the parts remain in the position shown in heavy lines in Fig. 9 because of the force exerted by spring 138. When solenoid 160 is energized, its core 158 will be moved downwardly and will thus rock lever 134 and cam 146 to the dotted line position of Fig. 9. At this position cam 146 will be raised from its lower or heavy line position (in which it was clear of the path of movement of roller 132 on latch 122) to its upper or dotted line position (in which it lies directly in the path of movement of roller 132). The slope of cam surface 142 is such that roller 132 and latch 122 will be moved from the position of Figs. 7 and 9 to the position of Fig. 6 as the stop mechanism 86 is moved by the rotatable carrier 22 past the cam projection 140.

Thus, whenever solenoid 160 is energized, the setting mechanism will be moved into the path of the cam roller 132 and will thus set the stop mechanism 86 in locking position so as to block the upward movement of the container support 104 when it reaches the position of Fig. 10. It will be observed that completion of its movement to filling position. Similiarly, when the solenoid is deenergized, spring 138 will return the parts to the heavy line position of Fig. 9 so that the setting mechanism will have no effect on the stop devices 88 which thereafter pass the setting mechanism prior to reenergization of solenoid 160.

Detector mechanism

The detector mechanism 82 is best shown in Figs. 1 and 2. In the form shown, the detector includes a feeler arm 168 which is adapted to engage the outer side wall of a container 34 whenever such a container is mounted on support 24. This engagement of the feeler arm 168 and container 34 will hold the feeler arm 168 in the heavy line position of Fig. 1. This same position is also shown in heavy lines in Fig. 2.

Feeler arm 168 is pivoted at 170 to a supporting plate 172. A spring 174 normally urges the feeler arm 168 in a clockwise direction in Fig. 1 and thus holds the arm against the container side wall. In case no container is supplied to the support 24, spring 174 will move the feeler arm 168 from the heavy line position of Fig. 1 to the dotted line position of Fig. 2. A rearward extension 176 of the feeler arm will accordingly move away from the actuating lever 178 of a suitable detector switch 180 and will permit arm 178 to move under the influence of the internal spring normally associated with such a switch to change the effective operating position of the switch. 

The switch contacts are connected to leads 166 and 182. Lead 166, as explained above, is connected to one end of solenoid 160. Lead 182 from the microswitch 180 and the remaining lead 184 from the solenoid are connected to a suitable source of current.

Thus, when no container is present on a given container support 24, the feeler arm 168 will be moved to the dotted line position of Fig. 2 and will thus move the microswitch 180 to closed position to energize solenoid 160 and move the setting cam 140 into the proper position to set the stop mechanism 86 as described.

As soon as the supply of containers is resumed, the arrival of such a container on its support 24 at station B will move the feeler arm 168 back to the heavy line position of Figs. 1 and 2 and will thus move switch arm 178 to open position so that solenoid 160 is deenergized and the stop mechanisms 86 will not be set.

In cases where the containers are relatively thin and might not have sufficient rigidity to actuate a feeler arm of the type described, any other desired detector mechanism may be used. For example, a photo electric cell could be mounted at the detector station and connected in known manner to control the solenoid 160 in response to the presence or absence of a container on support 24 at this station.

Resetting device

The resetting device 88, shown in Figs. 1 and 2, includes a horizontal supporting plate 184 located just above the path of movement of the rollers 132 of stop mechanism 86. A downwardly extending flange 186 at the inner edge of plate 184 is positioned at an angle to the cr-
cumferential path of rotation of the parts. The surface 188 of flange 186 thus serves as a cam against which the roller 132 on latch 122 of each stop mechanism 30 will engage in the event that the roller and latch are in the blocking position of Fig. 6. The inclination of cam surface 188 is such that roller 132 will be moved radially outward from the dotted line position of Fig. 1 to the heavy line position of Fig. 1, i.e., from the locked position of Fig. 6 to the unlocked position of Fig. 7. In case roller 132 and its corresponding latch had not been set on their previous movement past the setting mechanism 82, roller 132 would already be in its outer radial position and would thus be unaffected by the resetting cam surface 188.

Cam supporting plate 184 is mounted by means of suitable brackets 180 and 182 on a vertical frame member 194 rigidly connected to the base 20 of the machine. Thus the resetting device, as well as the setting means, is mounted on the stationary base of the machine for cooperation with the stop means carried by the rotating carrier, during movement of the stop means past the setting and resetting mechanisms. In Fig. 10, another arrangement of the cooperating elements on the filling head and supporting plate is shown. In this embodiment of the invention, the filling head 195 is substantially similar to the filling head 30 previously described, with the exception of the extension associated therewith. Thus the filling head includes air control openings 196 connected by a conduit 200 to a suitably controlled source of vacuum. A central filling opening 205 in communication with a hopper 204 permits the filling material to flow downwardly when pressure is substantially reduced below the filling head.

In this case, the extension 206 depending from the filling head is designed to surround the container or container 224 rather than to be inserted within it as was the case with extension 32. Thus extension 206 is in the nature of an outer shroud which cooperates with supporting plate 216 to enclose completely the controllable chamber. The lower end of shroud 206 is flared outwardly at 208 and is provided with an air control passage 210 connected by a suitable conduit 212 to the controlled vacuum source. Container support 216 has a corner guide 218 for accurate location of the container 224 and also has a resilient insert 220 constituting a seal against which the lower end 208 of shroud 206 may engage to form an airtight filling chamber. Container support 216 is mounted on a pneumatic cylinder 222 which is reciprocated vertically in the same manner as cylinder 30 previously described.

The container support and filling head of Fig. 10 are particularly designed for use with relatively flexible and somewhat pervious containers where the dimensions are such that an inner extension such as 32 of Fig. 5 can not be used satisfactorily. The shroud 206 completely encloses container 224 and during the filling operation, a vacuum is maintained both outside of and within the container 224 by means of the conduits 212 and 200, respectively.

The stop mechanism, setting mechanism, detector and resetting device previously described will be described in connection with the filling head and container support of Fig. 10. Thus when upward movement of the support 216 is arrested before the support has moved all the way up into engagement with the lower end of shroud 206, an annular air space will be provided between the top of support 216 and the bottom of shroud portion 208. Air entering through this annular space will thus maintain normal pressures within shroud 206 even though conduits 200 and 212 are connected to the vacuum source. Maintenance of pressure in this manner will prevent downward flow of the filling material onto supporting plate 216 in the absence of a container.

Feeler arm 188, shown in Fig. 10, will assume a position depending on the presence or absence of a container to operate the detector switch and resetting mechanism in the manner previously described.

In conclusion, it will be noted that a control mechanism has been provided for filling machines in which the deposit of filling materials is positively prevented in the absence of a container to be filled. The construction set forth accomplishes the objects outlined at the beginning of this specification and offers a new and useful means of avoiding complete stoppage of filling machine operation when the supply of containers is only temporarily interrupted.

Since minor variations and changes in the exact details of construction will be apparent to persons skilled in this field, it is intended that this invention shall cover all such changes and modifications as fall within the spirit and scope of the attached claims.

Now, therefore, we claim:

1. A filling machine comprising a base, a container support and a filling head mounted on the base for relative movement between a loading position and a filling position, power means controlling said relative movement, actuating means for the filling head operable only when relative movement of the parts to filling position is complete, stop means mounted on the machine for movement to and from a blocking position in which it prevents complete relative movement to filling position, detector means responsive to absence of a container from the support, and means operatively interconnecting the stop means and detector means, said interconnecting means cooperating with said actuating means to provide an interlocking connection between the stop means to blocking position whenever the detector means responds to absence of such a container.

2. A filling machine comprising a base, a container support and a filling head mounted on the base for relative movement between a spaced loading position and a juxtaposed filling position, power means controlling said relative movement and including resilient means moving the support and head to filling position, actuating means for the filling head operable only when relative movement of the parts to filling position is complete, stop means mounted on the machine for movement to and from a blocking position in which it opposes the action of the resilient power means and prevents complete relative movement to filling position, detector means responsive to absence of a container from the support, and means operatively interconnecting the stop means and detector means; and moving the stop means to blocking position whenever the detector means responds to absence of such a container.

3. A filling machine according to claim 2 in which the power means controlling said relative movement includes pneumatic means urging the parts to filling position.
A filling machine comprising a base, a container support and a filling head mounted on the base for relative movement between a loading position and a filling position, power means controlling said relative movement, actuating means for the filling head operable only when relative movement of the parts to filling position is complete, stop means mounted on the machine for movement to and from a blocking position in which it prevents complete relative movement to filling position, setting means for movement of the stop means to blocking position, and detector means responsive to the absence of a container from the support, said detector means being operatively connected to actuate the setting means and thereby move the stop means to blocking position whenever the detector means responds to absence of such a container.

A filling machine comprising a base, a carrier rotatably mounted on the base, a container support and a filling head mounted on the carrier for relative movement between a spaced loading position and a juxtaposed filling position at predetermined points in the rotation of the carrier, power means controlling said relative movement and including resilient means moving the support and head to filling position, actuating means for the filling head operable only when relative movement of the parts to filling position is complete, stop means on the carrier movable to and from a blocking position in which it engages the container, and stop rotate past the setting means, and detector means responsive to absence of a container from the support for moving the setting means to blocked position.

A filling machine according to claim 5 including reset means mounted on the base at a point which, in the direction of rotation of the carrier, is beyond the setting means and beyond the point at which the support and head are in filling position, the reset means engaging and moving the stop means back out of blocking position in preparation for the next filling cycle.

A filling machine according to claim 5 in which the normally retracted setting means includes a solenoid for movement of the setting means to blocking position when the solenoid is energized, and the detector means includes a switch in circuit with the solenoid and a movable feeler arm controlling the operation of the switch and closing the latter when the feeler arm fails to encounter a container.

A filling machine comprising a base, a carrier rotatably mounted on the base, a container support and a filling head mounted on the carrier, pneumatic means on the carrier moving the support with respect to the head from a loading position to a filling position at a first point in the rotation of the carrier, actuating means for the filling head operable to fill a container on the support during rotation of the carrier, head and carrier between said first and second points, means effectively disabling the actuating means when the support is out of filling position, stop means on the carrier movable to and from a blocking position in which it engages the support and prevents completion of its movement to filling position, set-
silent air tight engagement of a container bottom between the extension and support.

14. A filling machine according to claim 12 in which said cooperating elements include a shroud on the filling head for completely enclosing a container to be filled, the shroud and support having portions movable into sealing engagement only when relative movement of the support and head to filling position is complete.

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REFERENCES CITED

The following references are of record in the file of this patent:

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