Sept. 12, 1939. S. R. HOWARD 2,172,509

RECEPTACLE CLEANING MACHINE

Filed Aug. 2, 1935 2 Sheets-Sheet 1

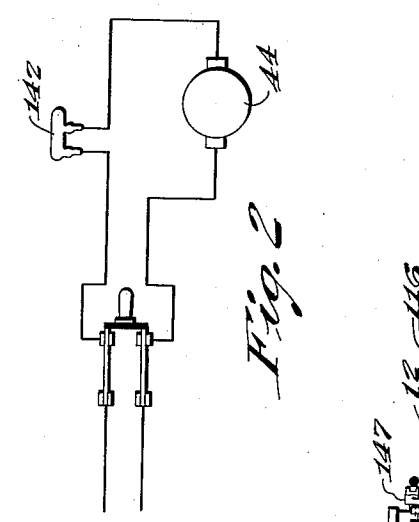


Fig. 2

Fig. 8

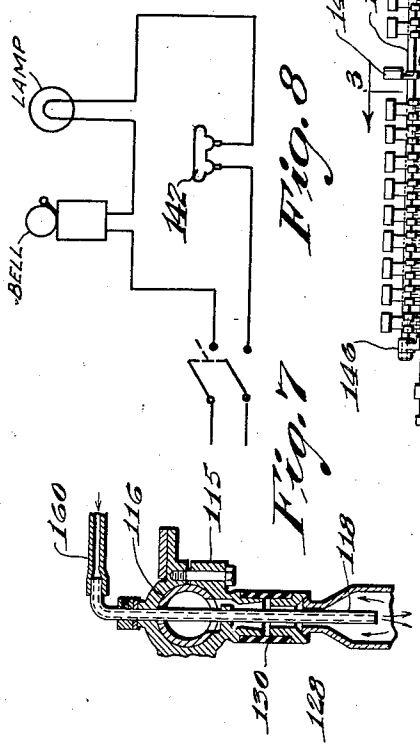


Fig. 7

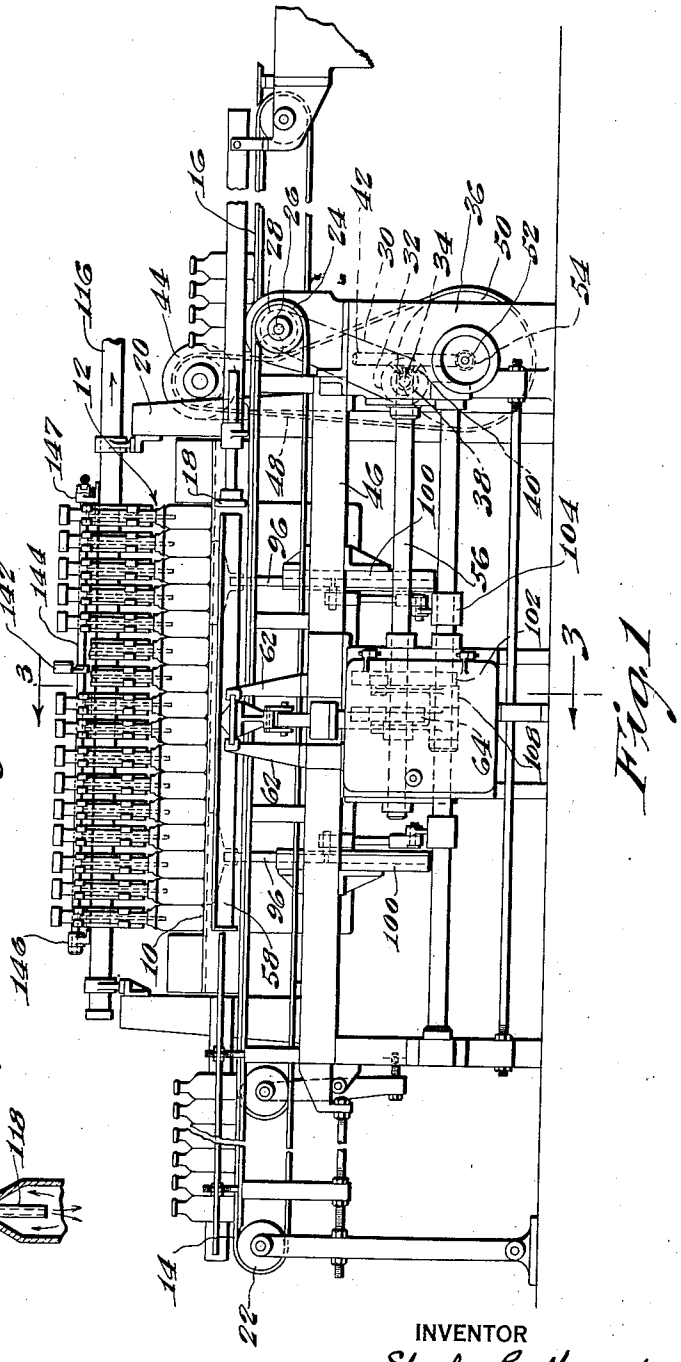


Fig. 1

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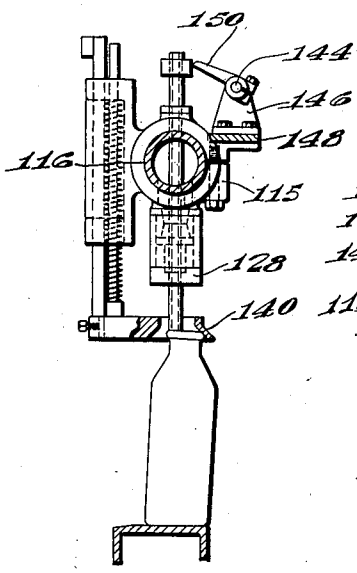


Fig. 5

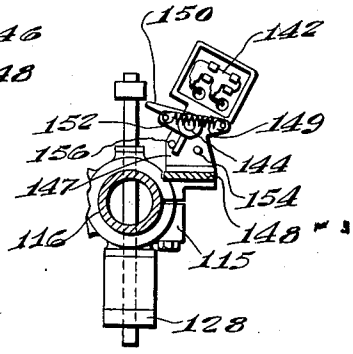


Fig. 6

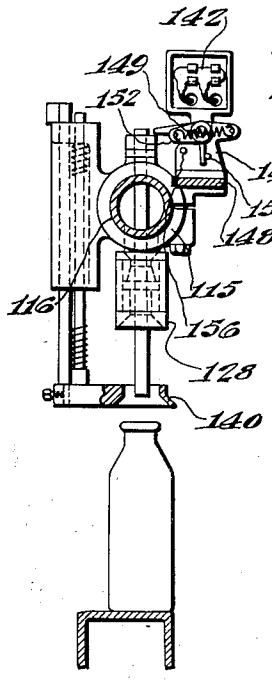


Fig. 4

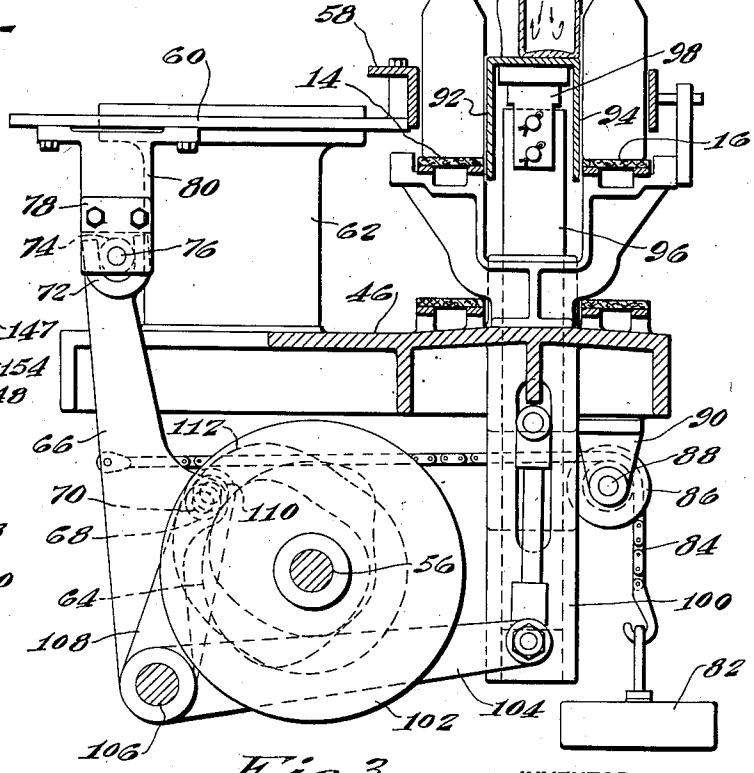


Fig. 3

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RECEPTACLE CLEANING MACHINE

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Application August 2, 1935, Serial No. 34,342

6 Claims. (Cl. 15—20)

This invention relates to a receptacle cleaning machine.

The invention has for one of its objects to provide a novel and improved receptacle cleaning machine having a cleaning nozzle of novel and improved construction adapted to normally extend into the receptacle for a substantial distance during the cleaning operation, and which has provision for permitting the nozzle to be elevated in the event that the nozzle is engaged by a bottle or a receptacle during the movement of the bottle or receptacle into bottle cleaning position, to the end that the liability of breaking or damaging the receptacle or nozzle may be reduced to a minimum.

A further object of the invention is to provide a novel and improved receptacle cleaning machine in which provision is made for permitting elevation of the cleaning nozzle by a bottle in the event that the latter engages the nozzle upon being brought into cleaning position and for indicating by a signal or alarm the fact that the cleaning nozzle has thus been moved into inoperative position.

A still further object of the invention is to provide a machine of the character specified in which provision is made for stopping the machine in the event that the cleaning nozzle has been moved by a bottle or receptacle into an inoperative position.

A still further object of the invention is to provide a novel and improved nozzle assembly which is particularly adapted for use in receptacle cleaning machines of either the vacuum or pressure type and which for some purposes may be used with advantage in receptacle filling machines.

With these general objects in view and such others as may hereinafter appear, the invention consists in the receptacle cleaning machine and in the nozzle assembly and various structures, arrangements and combination 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 front elevation of a bottle cleaning machine; Fig. 2 is a detail to be referred to; Fig. 3 is a section on line 3—3 of Fig. 1, viewed from the right; Figs. 4, 5 and 6 are detail views of the cleaning nozzle, shown in different positions of operation; Fig. 7 is a detail view of the cleaning nozzle adapted for use with the pressure type of receptacle cleaning machine; and Fig. 8 is a view illustrating a conventional circuit for initiating the operation of an alarm device to be referred to.

Referring now to the drawings, which illustrate the different features of the invention as embodied in a machine for automatically cleaning bottles, 10 represents a bottle supporting member which in the illustrated machine is adapted to operatively support a plurality of bottles. The machine is further provided with a plurality of cleaning nozzles generally indicated at 12, and provision is made, as will be described, for elevating the bottle supporting member at the proper time in the cycle of operation of the machine to bring the mouth of the bottles into engagement with said nozzles to enable the cleaning operation to be performed. Provision is preferably made for feeding the bottles to be cleaned into the machine upon an incoming conveyor 14 and for discharging the cleaned bottles from the machine upon a discharge conveyor 16.

The bottles ready to be cleaned are deposited on the conveyor 14 and are carried along by the same until they reach a stop 18 adjustably supported upon an upright member 20 forming a part of the machine frame. The conveyor 14 runs over an idler pulley 22 at one end of the machine and over a driving pulley 24 at the other end of the machine. The driving pulley 24 is fast on a shaft 26 driven through mechanism including a sprocket 28, a chain 30 and a sprocket 32 which turns free on a stud 34 supported on a vertical bracket 36. The sprocket 32 is provided with a bevel gear 38 attached thereto and arranged to mesh with a bevel gear 40 attached to a worm wheel 42, and provision is made for continuously driving the worm wheel 42. As herein shown the worm wheel 42 is driven from a motor 44 supported upon a platen 46 forming a part of the machine frame through a belt 48 and pulley 50 fast on a shaft 52. The shaft 52 is provided with a worm 54 which drives the worm wheel 42, the latter being fast upon a cam shaft 56. In this manner, during the operation of the machine a continuous motion is imparted to the conveyor 14 to thereby move the uncleaned bottles into a position in which the first bottle rests against the stop 18.

Provision is made for the transferring of a plurality of the bottles from their position on the incoming conveyor 14 onto the bottle supporting member 10 when the latter is in its depressed position with its surface flush with the surface of the conveyor 14. As herein shown, the bottle pushing mechanism comprises a bar 58 mounted on a slide 60 guided in brackets 62

mounted on the platen 46 of the machine. The slide 60 has a reciprocating motion imparted to it by a cam 64 which operates on a lever 66 through a cam roll 68 and cam pin 70 fastened in the cam lever 66. The upper end of the cam lever 66 has a forked end 72 which embraces a roll 74 free on a stud 76 fastened in a plate 78 adjustably clamped to a bracket 80 attached to the slide 60. The cam 64 is attached to the cam shaft 56 and rotates with it. A counterbalance weight 82 is attached to the cam lever 66 by a chain 84 running over a pulley 86 free to turn on a pin 88 attached to a bracket 90 fastened to the underside of the platen 46.

The bottle supporting and elevating member 10 is formed with downwardly extending sides 92, 94, to form side guides for the bottles being conveyed into the machine on the incoming conveyor belt 14 and also for the cleaned bottles leaving the machine on the outgoing conveyor. Provision is made for automatically moving the bottle supporting and elevating member 10 at predetermined times in the cycle of operation of the machine in order to elevate the bottles to cleaning position and to subsequently lower the member 10 to a position flush with the incoming belt 14 and discharge belt 16, and for this purpose the member 10 is rigidly attached to slide members 96 by means of brackets 98. The slide members 96 are guided in slideways formed in brackets 100 supported by the platen 46 above referred to. The bottle supporting and elevating member 10 is actuated by a cam 102 fast on the cam shaft 56 by connections between it and the cam including a lever 104 fast on the rock shaft 106 and including a cam lever 108 also fast on the rock shaft 106 and which is provided with a cam roll 110 operating in the path 112 of the elevating cam 102. During the operation of the machine, when the bottle supporting and elevating member 10 is in its lower position, the bottle pushing bar 58 operates to push a row of uncleaned bottles from the incoming conveyor belt 14 into a position upon the bottle supporting member 10 under the cleaning nozzles 12, and this operation pushes over the row of previously cleaned bottles laterally from the bottle supporting and elevating member 10 onto the outgoing conveyor belt 16, by which they are discharged from the machine.

At each cycle in the operation of the machine, as the bottle supporting member is elevated, a row of bottles is lifted as shown in Fig. 3 until the mouth of each bottle contacts and is sealed by one of the series of cleaning nozzles 12. In order to effect the pneumatic cleaning of the row of bottles contacting with the cleaning nozzles 12, each nozzle has provision for permitting air to be admitted into the bottle either by suction produced in the bottle or by an air stream injected into the bottle in a manner such that the dust and other foreign matter may be removed with the air current upwardly and outwardly from the bottle through the cleaning nozzle. In Fig. 3, the preferred form of cleaning nozzle assembly is shown wherein the bottles are cleaned by suction produced in the bottle. Each cleaning nozzle comprises a clamp member 115 secured to a manifold 116. The manifold 116 may be connected to any source of suction such as a vacuum pump, not shown. The clamp member 115 is provided with an air admitting nozzle 118 slidably mounted in bearings 120, 122 formed in the clamp member 115. A collar 124 and rubber washer 126 secured to the upper end of the nozzle 118 serve to suspend the nozzle on the manifold 116, with the nozzle in its lowered position. A bottle sealing member 128 which has a flared opening at the bottom thereof to receive the mouth of the bottle is connected to the lower end of the clamp member 115 by a collar 130 of rubber or other yieldable material. As herein illustrated the air admitting nozzle 118 extends through the manifold 116 and the manifold is provided with an opening 132 which corresponds to an opening 134 in the lower part of the clamp member 115. During the operation of the machine, when the vacuum pump is operating, a suction is created within the manifold and also within the cleaning nozzles so that when a bottle is raised into sealing engagement with one of the sealing members 128 an air current is drawn into the bottle through the air admitting nozzle 118 by the suction created within the bottle. The air admitting nozzles permit free air to flow into the bottles establishing a current of air through the bottles and outwardly through the suction nozzles and into the manifold, enabling any particles of foreign matter contained in the bottles being cleaned to be sucked out with the air current. When the bottle is raised into sealing position the collar 130 is permitted to yield slightly to the end that the mouth of the bottle may be firmly seated in the sealing member 128.

It will be observed that in the event the nozzle 118 is engaged by the edge of a bottle during its movement into bottle cleaning position the slidably mounted nozzle will be elevated, reducing to a minimum liability of breakage or damage to the bottle or nozzle. This feature of the invention is particularly useful because of the fact that not infrequently a defective bottle is fed into the machine, such imperfections including a choked neck bottle, a film of glass across the top of a bottle or as illustrated in Fig. 5, a bottle may be out of square at the bottom so that the mouth of the bottle will not register correctly with the nozzle. Although a yieldable guide block 140 is provided to guide the mouth of the bottle into register with the nozzle it is sometimes possible for this guide to be deflected and consequently the nozzle will be elevated as illustrated in Fig. 5 and thereby prevent any damage to the nozzle.

In the event that a nozzle 118 is elevated, during the operation of the machine in the manner described, provision is made for stopping the machine as by opening the circuit to the motor 44 and as herein shown a mercury switch 142 fixed to a rod 144 is arranged to be rocked by the elevation of the nozzles. The rod 144 is mounted in bearings 146—147 secured to a bar 148 attached to the clamp member 115. Operating levers 150 clamped to the rod 144 are arranged to extend above and in the path of the nozzle so that when any of the nozzles is elevated, the rod 144 will be rocked and break open the motor circuit at the mercury switch 142. Each mercury switch 142 is normally maintained in its closed or upright position by a spring 149, attached at one end to a stud in the bracket 147 and at the other end to a lever 152 fixed to the rod 144. A stop pin 154 limits the rocking movement in one direction and when the rod is rocked a stop pin 156 limits the rocking movement in the other direction. In order to notify an operator that one of the nozzles 118 has been elevated by reason of a deflective bottle, and to indicate the particular nozzle, the machine may

be provided with indicating means for each nozzle, such as a bell or light and suitable circuits may be opened by mercury switches arranged to be operated by elevation of the nozzles in a similar manner to the switch 142 as indicated in Fig. 8.

In Fig. 7 I have illustrated the details of a cleaning nozzle assembly which I prefer to employed in order to pneumatically clean the bottle by the pressure method. The air admitting nozzle 118 may be connected to a source of pressure, not shown, by a tube 160 so that when the bottle is elevated to sealing position a blast of air will be injected into the bottle and pass upwardly and outwardly through the mouth of the bottle and into the manifold thus removing any foreign matter from the bottles. The manifold may and preferably will be maintained under suction, to convey away such foreign matter.

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

Having thus described the invention what is claimed is:

1. In a receptacle cleaning machine, in combination, an air admitting nozzle, means in which said air admitting nozzle is slidably mounted to be capable of yielding when abnormally engaged by a receptacle, means for effecting the flow of air into the receptacle through said air admitting nozzle to perform the cleaning operation, a conveyor for conveying receptacles into cleaning position, and control mechanism operatively connected with the air admitting nozzle for stopping the conveyor in the event that the air admitting nozzle is abnormally engaged by a receptacle when the latter is moved into cleaning position.

2. In a receptacle cleaning machine, in combination, an air admitting nozzle adapted normally to extend into the receptacle through the mouth thereof during the cleaning operation, supporting means for said air admitting nozzle having provision for permitting the nozzle to yield and move with respect to said supporting means when abnormally engaged by a receptacle, and means rendered operative upon such movement of the nozzle for initiating the operation of an alarm device for indicating to the operator that the nozzle has been moved.

3. In a receptacle cleaning machine, in combination, receptacle supporting means, an air admitting nozzle capable of being extended into a receptacle supported by said supporting means through the mouth of the receptacle when the latter is in cleaning position, a suction manifold in which the air admitting nozzle is mounted in sliding and non-communicating relation, a suction nozzle operatively connected with the manifold to be supplied with suction therefrom for sealing the mouth of the receptacle and through which said air admitting nozzle is arranged to slidingly extend, whereby to permit the same to be slidingly moved upon abnormal engagement by a receptacle.

4. In a vacuum type receptacle cleaning machine, in combination, a suction nozzle adapted to seal the mouth of a receptacle preparatory to the suction cleaning, an air admitting nozzle extending through said suction nozzle and adapted to extend into the receptacle when the latter is in cleaning position, and means for supporting the air admitting nozzle having provision for permitting it to yield with respect to the suction nozzle when abnormally engaged by a receptacle.

5. In a vacuum type receptacle cleaning machine, in combination, a plurality of suction nozzles for sealing the mouths of a plurality of receptacles, receptacle supporting means, a suction conduit operatively connected with said suction nozzles to evacuate receptacles sealed by said suction nozzles, a plurality of air admitting nozzles, one for each suction nozzle, through which air is caused to flow into said receptacles by the suction thus created within said receptacles, said air admitting nozzles being slidably mounted in and extending transversely through said suction conduit, means for effecting relative movement of the receptacle supporting means and all of said suction nozzles as a unit, and means operatively connected to said air admitting nozzles for terminating the relative movement of the suction nozzles and receptacle supporting means in the event of engagement of one of the air admitting nozzles by a receptacle.

6. In a receptacle cleaning machine, in combination, receptacle supporting means, an air admitting nozzle adapted to normally extend through the mouth of and into a receptacle supported by said supporting means in cleaning position, means for causing flow of air into the receptacle through said air admitting nozzle to perform the cleaning operation, means for relatively moving said nozzle and said receptacle supporting means to introduce the nozzle into the receptacle, supporting means for said air admitting nozzle having provision for permitting the nozzle to yield and move when abnormally engaged by a receptacle, and means rendered operative by such abnormal movement of the nozzle for terminating the relative movement of said nozzle and said receptacle supporting means.

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