Jan. 4, 1966 R. K. WIGHT 3,227,168

CLEANING UNIT FOR PURE-PAK MACHINES

Filed July 5, 1963 3 Sheets-Sheet 1

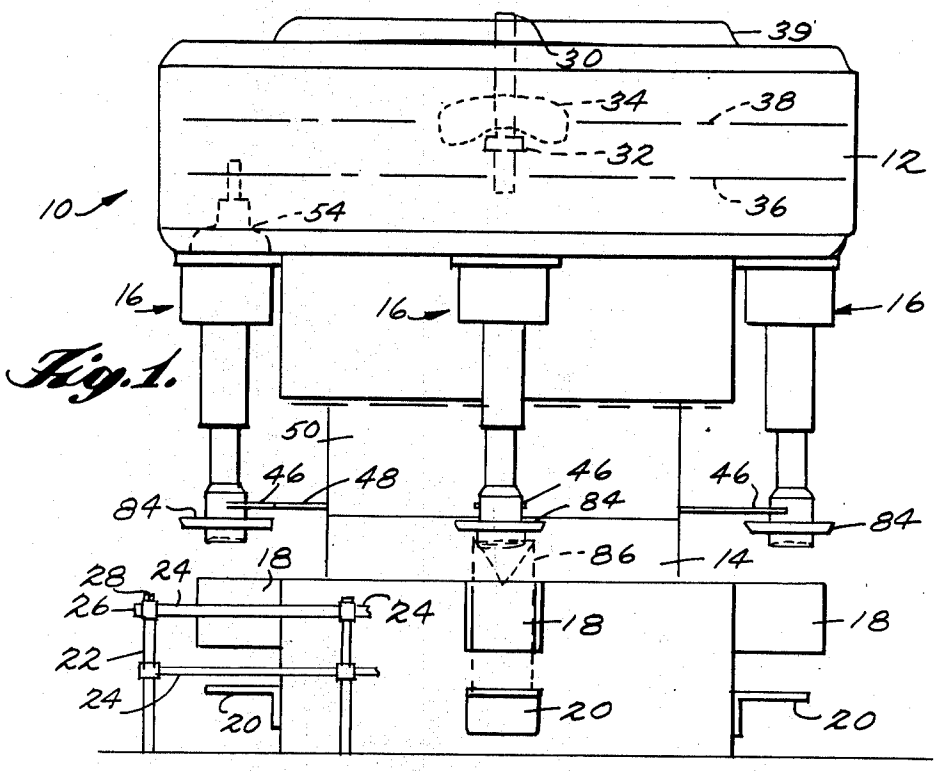


Fig. 1.

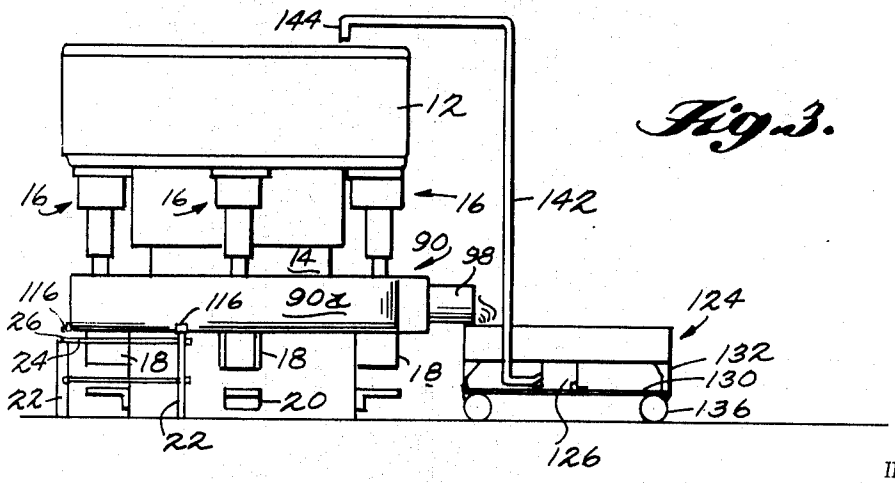


Fig. 3.

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Fig. 4.

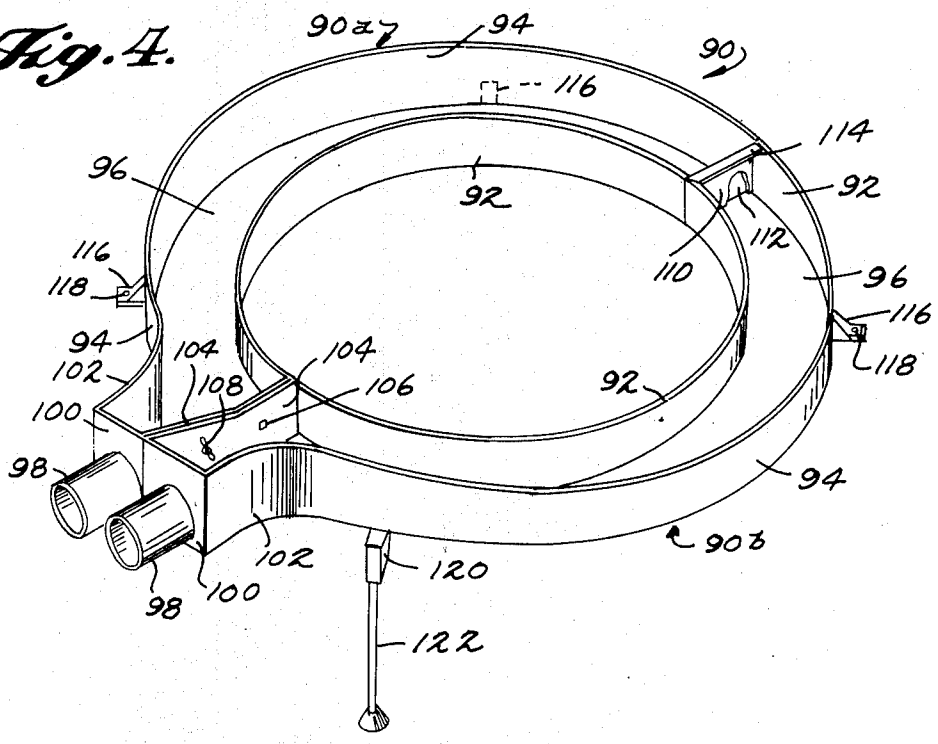
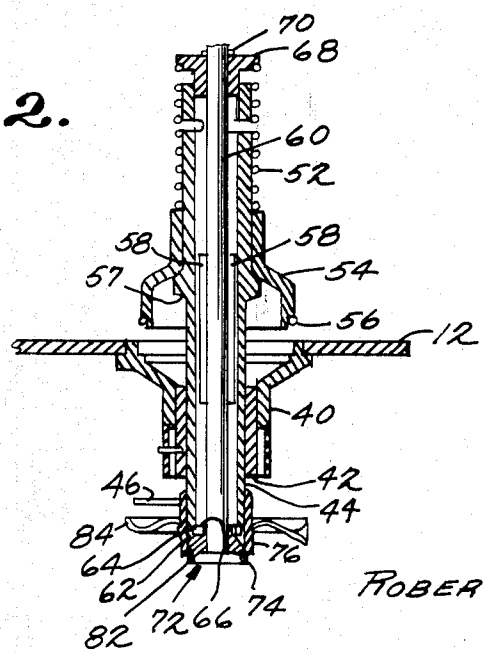


Fig. 2.



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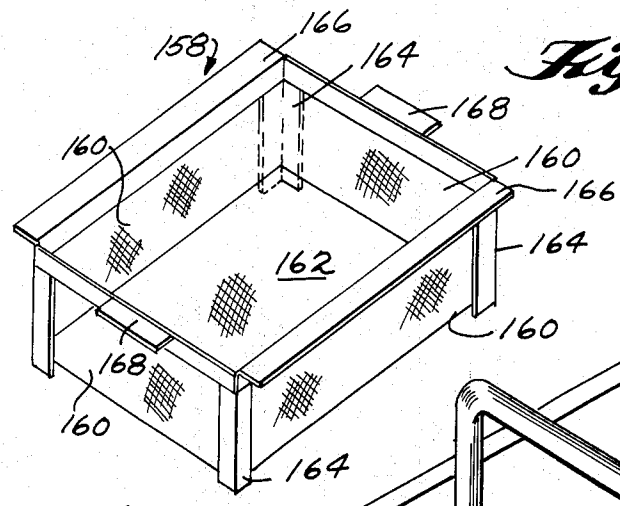
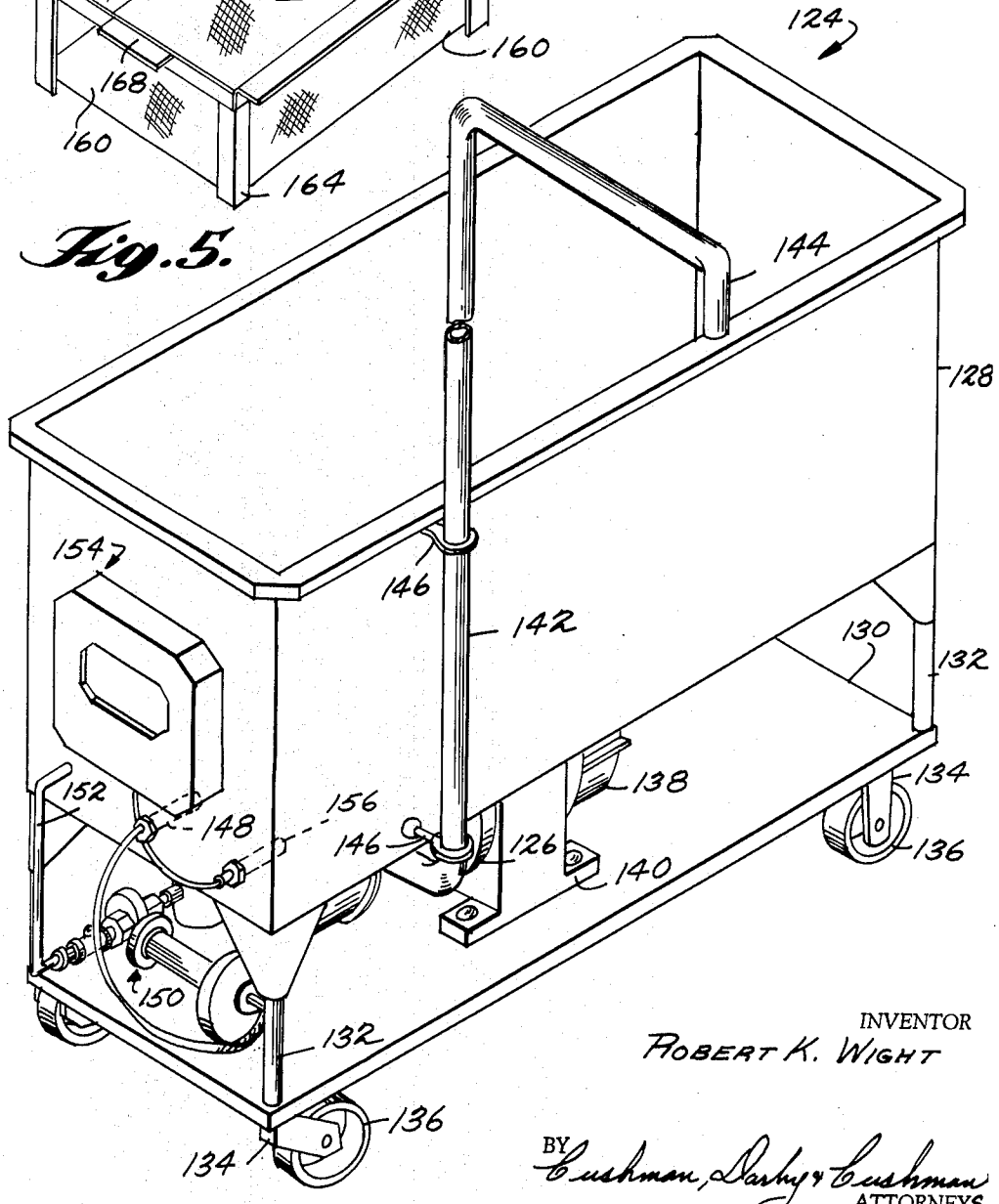


Fig. 6.

Fig. 5.



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CLEANING UNIT FOR PURE-PAK MACHINES

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8 Claims. (Cl. 134—169)

This invention relates to the flushing and cleaning of liquid dispensing machines, particularly the type of machine which comprises a tank for holding liquid to be dispensed and a plurality of downwardly projecting valve members for automatically dispensing the liquid into a plurality of cartons or the like disposed below the tank.

The general type of machine to which the cleaning apparatus of the present invention pertains is fully described in prior patents such as 2,353,519 of July 11, 1964, 2,611,525 of September 23, 1952, 2,750,721 of July 19, 1956 and 3,002,540 of October 3, 1961. These machines include a liquid storage tank mounted upon a rotatable turret and a number of depending liquid dispensing heads adapted to function while the turret rotates to fill containers carried by the turret below the dispensing heads. The dispensing heads are relatively complex in that they consist of a number of parts which are machined to high tolerances in order to achieve accurate and uniform metering and discharge of the liquid from the tank.

Frequent cleaning of these machines is required, particularly when milk is being dispensed. It has heretofore been considered necessary to completely disassemble each of the dispensing devices and place the parts in a bath of cleaning solution and then rinse them prior to re-assembly. This procedure is at best very time-consuming and is made even more lengthy by the fact that each dispensing head has been machined as a unit in order to maintain close tolerances. The parts of the heads are not interchangeable so that special precautions must be taken to keep the parts of each head together during the cleaning process. In addition, special care must be taken not to drop or otherwise damage the parts. Obviously, the frequent cleaning which is necessary vastly increases the opportunity for mixing or damaging the dispensing head parts when complete disassembly is routinely practiced.

In accordance with the present invention cleaning solution is delivered to the storage tank, allowed to drain through the dispensing heads which have been only partially disassembled, and is recycled to the storage tank thus greatly reducing cleaning time and handling of the parts. The procedure is made possible primarily by the use of an open-topped circulation ring which receives the cleaning solution from all the heads simultaneously and delivers it to a circulation tank from which it is pumped back to the storage tank of the dispensing machine. Advantageously, the parts which have been removed from the machine are placed in perforated baskets in the circulation tank for cleaning at the same time. Advantageously, also, the circulation tank with a pump attached is provided with means for heating and maintaining the cleaning solution at a desired temperature and with wheels so as to be readily movable from one dispensing machine to another.

It is thus a primary object of the present invention to provide for the rapid and effective cleaning of multiple-head liquid dispensing machines.

It is a further object to provide an apparatus for continuously recycling a cleaning or rinsing solution through a multiple-head liquid dispensing machine.

It is a further object to provide an apparatus which permits rapid and effective cleaning of a multiple-head liquid dispensing machine without complete disassembly of the complex dispensing heads, thereby reducing disassembly and re-assembly time and reducing handling of the parts.

The invention will be further understood from the following detailed description of an illustrative embodiment taken with the drawings in which:

FIGURE 1 is a schematic elevational view, partly broken away, of a dispensing machine of the general type to which the invention may advantageously be applied;

FIGURE 2 is a fragmentary vertical sectional view of one of the dispensing heads of the machine of FIGURE 1 on an enlarged scale;

FIGURE 3 is a schematic elevational view of the machine of FIGURE 1 showing the circulation ring and circulation tank of the present invention in their operative positions;

FIGURE 4 is a perspective view of the circulation ring of FIGURE 3;

FIGURE 5 is a perspective view of the circulation tank of FIGURE 3; and

FIGURE 6 is a perspective view of a basket adapted to fit within the circulation tank of FIGURE 5.

Referring to FIGURES 1 and 3 there is shown schematically a dispensing machine **10** of the kind conventionally used to fill milk cartons which includes a generally cylindrical storage tank **12** mounted on an upstanding rotatable turret **14** with which it is concentric and provided with a plurality of depending dispensing heads **16**. Secured to the periphery of the turret **14** below each of the dispensing heads **16** is a support for holding a carton which is to be filled by the associated head **16**. As shown, each support includes an outwardly open channel-shaped bracket **18** for engaging two opposite sides of a carton and an L-shaped bracket **20** for engaging the bottom of the carton.

Outwardly from the lower portion of the turret **14** is a carton guide which extends around the turret for about two-thirds of its circumference. The carton guide includes a plurality of upstanding posts **22** and two vertically spaced curved rails **24**, the upper of which is connected to the top of the posts by a bracket **26** and nut **28**.

The tank **12** is provided with an inlet duct **30** disposed coaxially therewith, the inflow of liquid being controlled by a valve indicated generally at **32** carried by a float **34**. The arrangement is such that the liquid in the tank **12** will not fall below a level indicated by the line **36** and will not rise above a level indicated by line **38**. The open top of the tank is normally closed with a removable lid **39**.

While neither the construction nor the operation of the dispensing heads **16** form part of the invention it is believed that a description of a typical head will emphasize the advantages achieved by the present invention. As seen in FIGURE 2, each of the dispensing heads **16** in the illustrated embodiment includes a fixed cylinder **40** detachably and sealingly mounted in a suitable aperture in the bottom of the supply tank **12**. Adjustably and sealingly mounted within the depending portion of the fixed cylinder **40** is a calibration bushing **42**. Slidably and sealingly mounted within the calibration bushing **42** is an operating sleeve **44** adapted to be reciprocated vertically by means of a forked arm **46**. The latter is rigidly fixed upon a bracket **48** which is rigidly secured to a movable sleeve **50** situated on the turret **14** and reciprocated vertically by means of a filler unit cam mechanism (not shown).

Telescopically mounted on the upper end of the operating sleeve **44** and resiliently biased downwardly with

respect thereto by means of spring 52 is a displacement cylinder 54 which is somewhat bell-shaped. Adjacent its lower external periphery the displacement cylinder 54 is provided with an O-ring 56 adapting the displacement-cylinder 54 to sealingly engage the inner peripheral wall of the fixed cylinder 40 which projects upwards into the supply tank 12. Within the interior of the displacement cylinder 54 the operating sleeve 44 is provided with a lateral enlargement, or shoulder 57 intermediate the ends of the sleeve. The abutment 57 is adapted to engage the inner wall of the displacement cylinder 54 in the event of sufficient relative sliding between the latter and the operating sleeve 44. The operating sleeve 44 is also provided with relatively long filling slots 58 providing communication between the interior of the operating sleeve 44 and the interior of the displacement cylinder 54 and the fixed cylinder 40.

Concentrically mounted within the operating sleeve 44 and rigidly fixed with respect thereto is an air exhaust tube 60. The latter carries adjacent its lower end a detachable orifice control collar 62 having one or more radial abutments 64 which engage a suitable stop shoulder 66 inside the operating sleeve 44. The upper end of the exhaust tube 60 is held in place by means of spring retainer collar 68 partially nested within the upper end of the operating sleeve 44. A retainer clip 70 attached to the upper end of the exhaust tube 60 prevents the spring retainer collar 68 from slipping off the tube 60. The spring 52, which is compressed between the retainer collar 68 and the upper end of the displacement cylinder 54, provides seating pressure for the latter and also maintains the exhaust tube 60 in position within the operating sleeve 44.

A dispensing valve 72 is mounted adjacent the lower end of the operating sleeve 44. In this instance, the valve comprises a head 74 of frusto-conical shape fixed to the lower end of the air exhaust tube 60 and a container-actuated valve bushing 76 sealingly and slidably mounted on the lower end of the operating sleeve 44.

The head 74 is maintained in predetermined spaced relation with the internally tapered lower end portion of the operating sleeve 44 so as to define an annular orifice of appropriate size for the viscosity of the fluid to be dispensed. The orifice control collar 62 positions the head and thereby determines the size of the orifice. The vertical length of the collar 62 is somewhat greater than that of its radial abutments. The size of the dispensing orifice may, accordingly, be altered by detaching the collar and reassembling it in inverted position on the tube.

The valve bushing 76 is formed with a tapered seat 80 at its lower end and which is adapted to sealingly engage a resilient O-ring 82 carried by the head 74. Engagement between the seat 80 and O-ring 82 when the bushing 76 is down effectively closes the dispensing orifice.

To prevent accumulated condensation on the supply tank 12 or the dispensing heads 16 from dripping into the containers as they pass beneath these members, each bushing 76 is provided with a suitable annular drip pan 84.

The operation of the dispensing heads 16 is fully disclosed in Patent No. 3,002,540 and is only briefly summarized here. A head is initially filled with liquid from the tank 12 by raising the forked arm 46 with the cam arrangement (not shown) which is associated with the machine. This causes the displacement cylinder 54 and the operating sleeve 44 to rise, permitting liquid to flow from the tank 12 into the interior of the sleeve 44 and into the interior of the cylinders 40, 54. The operating sleeve 44 and the displacement cylinder 54 are then moved downwardly by the arm 46, the cylinder 54 telescoping into the fixed cylinder 40 to trap liquid within the head 16. As the operating sleeve approaches the lower limit of its travel a stop (not shown) disposed below the drip pan 84 engages the top of a carton 86 and raises the bushing 76 away from the O-ring 82 to allow a measured quantity of liquid to flow from the interior of the head 16 into the container 86. Air displaced from the container passes upwardly through the air exhaust tube 60.

As pointed out above, it has been the conventional practice when cleaning a machine of the general type just described, to completely remove and disassemble each dispensing head 16, place the parts in a bath of cleaning solution or otherwise clean them by hand and to clean the tank in a separate operation. According to the present invention, however, the dispensing heads 16 are only partially disassembled and the unremoved parts are cleaned at the same time as the tank 12 by passing a cleaning solution into the top of the tank 12 and allowing it to drain out of all of the partially disassembled heads 16 simultaneously. To accomplish this without spilling the cleaning solution and to effect the cleaning operation with a relatively small amount of cleaning solution the invention provides a circulation ring 90 such as that illustrated in FIGURE 4 which permits the solution draining from the heads 16 to be caught and delivered to a pumping system for recycle to the top of the tank 12.

Referring to FIGURES 3 and 4, it is seen that the circulation ring 90 is basically an open-top, circular trough adapted to be inserted around the turret 14 of the dispensing machine 10 below the dispensing heads 16 and provided with one or more outlets from which the cleaning solution may be delivered to a pumping system or other equipment or to a waste sump. The ring is adapted to be inserted around the turret 14 by being constructed in two or more separate parts, each of which is preferably of liquid-tight construction so as to avoid the necessity of seals between the halves.

In the embodiment illustrated, the ring 90 is constructed in two semicircular parts 90*a* and 90*b*, each of which has vertical, arcuate inner and outer side walls 92 and 94, respectively, and a flat horizontal bottom wall 96. At one end, the front end for purposes of description, each half-ring is provided with a short, radially extending discharge tube 98. As shown, each tube 98 is welded to a flat portion 100 of the outer side wall 94, the flat portion 100 being off-set radially from the remainder of the side wall 94 by an outwardly extending portion 102. A radially disposed flat plate 104 is welded to the inner side wall 92, the flat portion 100 and the bottom wall 96 to close the forward end of each half-ring. The plates 104 on the two half-rings are provided with a pair of spaced, aligned holes for receiving bolts 106 and wing nuts 108 for securing the half-rings together.

The rear end of the half-ring 90*b* is closed by a flat plate 110 which is welded to the side and bottom walls 92, 94 and 96. The plate 110 is somewhat shorter than the side walls so that a slot-like space is left between the side walls 92, 94 in this location. A flat plate 112 is similarly welded to the rear end of the other half-ring 90*a* and, in addition, is provided with a horizontal flange portion 114 which can be inserted between the side walls of the half-ring 90*b* for the purpose of aligning the two when placed in their operative positions on the machine 10.

Conveniently, the half-rings 90*a* and 90*b* are provided with suitable brackets, supports or other mechanical features for adapting them to be easily attached to whatever dispensing machine is to be cleaned. In the particular embodiment illustrated, small L-shaped brackets 116 are secured to the outside of the outer side walls 94 near the lower edge. The horizontal legs of the brackets 116 are provided with holes 118 so that bolts (not shown) may be passed therethrough and through suitable adapter plates (not shown) on the tops of the posts 22 of the machine 10. Since the posts 22 are not located around

the entire circumference of the machine **10**, the right half-ring **90***b* is provided near its forward end with a depending tubular adapter **120** designed to hold a leg **122** for supporting that portion of the half-ring **90***b*.

It will be understood that the circulation ring is subject to various modifications and need not have the precise construction illustrated. The ring may be constructed of more than two pieces, although the two-piece construction is preferred from the standpoint of simplicity of construction and ease of handling. The shape and locations of the discharge openings may, of course, be varied to cooperate with whatever auxiliary equipment is used. Obviously, also, the nature and locations of the brackets and other features for attaching the ring **90** to the machine to be cleaned may be varied. The particular ring **90** which has been illustrated has, however, been found to be highly efficient and effective from the standpoint of ease of assembly.

According to another feature of the invention the cleaning of the machine **10** with the aid of the circulation ring **90** can be carried out more rapidly with the concomitant use of a circulation tank such as that illustrated in FIGURE 5 at **124**. The primary purpose of the tank **124** and associated equipment is to provide a readily available and mobile means for receiving the cleaning solution from the circulation ring **90** and returning it to the top of the tank **12** of the machine **10**. Preferably, the circulation tank includes in addition to a pump **126**, means for heating and maintaining the cleaning solution at a desired elevated temperature.

The circulation tank **124** illustrated in FIGURE 5 includes a rectangular open-top tank **128** spaced above and secured to a flat shelf member **130** by means of corner legs **132**. Depending from each corner of the shelf **130** is a bracket **134** on which is journaled a floor-engaging wheel **136**. As is conventional, the brackets at one end may be swivelly mounted so that the mobile structure is easily maneuvered. The pump **126** together with an electric motor **138** for driving the same is mounted on the shelf **130** by means of a support **140** bolted to the top of the shelf **130**. The inlet of the pump **126** communicates by means of a suitable fitting (not shown) with the interior of the tank **128** through its bottom wall. The outlet of the pump **126** is connected to a vertically extending pipe **142** which terminates at its upper end in a downwardly facing discharge portion **144**. The pipe **142** is suitably supported as by brackets **146** secured to the side wall of the tank **128**.

It will usually be desirable to provide the circulation tank **124** with a solution heating and regulating means which, as shown, includes a temperature sensitive element **148** operatively connected to a valve **150** which controls a flow of steam from a steam line (not shown) into a tube **152** which connects with a coil (not shown) in the tank **128**. The construction illustrated also includes a conventional temperature recorder **154** and associated temperature sensitive element **156** mounted on an end wall of the tank **128**.

Preferably, the circulation tank **124** is also provided with a removable part-cleaning basket **158** in which parts of the dispensing heads **16** may be placed for immersion in the cleaning solution. As shown, the basket **158** is constructed of an open, box-like frame to the sides of which are secured sheets **160** of expanded stainless steel mesh. The bottom **162** of the basket **158** is a solid sheet of stainless steel to the corners of which are secured upstanding angle pieces **164**. These, together with suitable top pieces, form the frame for supporting the sheets **160** of mesh. Two of the top pieces have outwardly extending flanges **166** for engagement with the top edges of the tank **128** so as to support the basket inside the tank **128**. The other top pieces are provided with handle pieces **168** by which the basket **158** may be lifted manually.

If desired, the basket **158** may be constructed of rigid perforated sheets of metal welded or otherwise secured together at their edges to form an open-top box-like structure. The tops of opposite side walls may be flanged to provide supports for engaging the top of the tank **128** or separate pieces, such as upstanding hooks at the corners, may be provided.

The general use of the circulation ring **90** and the circulation tank **124** are apparent from the foregoing description. However, the cleaning of the particular machine **10** will be described by way of a specific example of carrying out the invention. To prepare the empty machine **10** for cleaning, the lid **39** and the float assembly **34** of the storage tank **12** are first removed. The dispensing heads **16** are then partially disassembled by removing each of the valve bushings **76**, O-rings **82** and drip pans **84**. The removed parts are placed in the basket **158** which is then placed in the tank **124**. This partial disassembly has the effect of permitting continuous flow of liquid through the heads from the tank **12**.

Next, the circulation ring **90** is installed below the open ends of the partially disassembled dispensing heads **16**. A suitable apertured adaptor plate (not shown) is first attached to the top of each guide post by removing the nut **28**, placing the adaptor plate over the exposed stud and replacing the nut **28**. The two half-rings **90***a* and **90***b* may then be brought separately into position and secured in place by inserting bolts through the holes **118** in the circulation ring brackets **116** and through suitable holes in the adaptor plate.

Conveniently, the left half-ring **90***a* is inserted first by slipping it under the dispensing heads and securing its brackets **116** to the adaptor plate. Then the right half-ring **90***b* is maneuvered so as to slip its rear flange **114** between the side walls of the left half-ring **90***a*. The removable leg **122** is inserted in its adaptor **120** and the bolts **106** and wing nuts **108** are installed to secure the two half-rings together. Revolving the turret **14** several revolutions at this time will indicate to the operator whether or not the two half-rings are properly positioned with respect to the dispensing heads **16**.

The circulation tank **128** is then moved to a position adjacent the machine, as seen in FIGURE 3, such that the discharge end **144** of the pipe **142** will discharge into the top of the storage tank **12** and such that the circulation ring **90** will discharge into the tank **128**. A suitable cleaning solution is made up in the tank **12** and is heated to a temperature not exceeding 150° F. The drive (not shown) for the turret **14** is started and then the pump **126** is started. The flow of cleaning solution is regulated so as to maintain the storage tank **12** from ½ to ¾ full. The solution which passes through the dispensing heads **16** drains into the circulation ring and then into the tank **128** where it is again heated and pumped to the storage tank **12** through the pipe **142**. This recycling of the solution is maintained for at least 15 minutes and preferably somewhat longer.

When the solution has been recycled for the desired length of time, the pump **126** is stopped and all of the solution is allowed to drain into the tank **128** where it may be either stored or pumped to another container. Before the solution in the storage tank **12** and the dispensing heads can dry on the metal surfaces it is rinsed away with water or a slightly acid rinse solution. This may be accomplished either manually with a hose or with the tank **124** if it has been freed of the cleaning solution. In either case the rinse water is caught by the circulation ring **90** and is directed to waste by any convenient means. The parts of the dispensing heads **16** which were in the basket **158** are rinsed and replaced using an appropriate lubricant. The particular cleaning and rinse solutions and recycle time form no part of the invention and may be varied as desired. For example, it may be desirable under some conditions to use two or more different cleaning solutions in sequence. It will be appreciated also

that while a mobile recycle tank **124** having heating means and pump associated therewith is a preferred auxiliary to the circulation ring **90**, the ring **90** is not limited to the combination and may be used without any additional equipment.

In order to emphasize the saving in time provided by the present invention the following time figures are given for the cleaning of dispensing heads by the procedure heretofore used and by the procedure of the invention.

Conventional procedure

	Min.
(a) Completely disassemble dispensing heads and remove from machine	45
(b) Place parts in a tank, circulate cleaning solution in tank, rinse parts	40
(c) Reassemble heads, lubricating at same time	45
	130

Procedure of invention using circulation ring and circulation tank

	Min.
(a) Remove lid and float assembly, remove O-rings, drip shields, springs and valve bushings, place head parts in basket	10
(b) Install circulation ring and position circulation tank	5
(c) Place basket in circulating tank; recycle cleaning solution through dispensing machine rinse	30
(d) Remove circulation ring; replace O-rings, drip shields, springs and valve bushings	10
(e) Lubricate dispensing heads; replace float assembly and lid	10
	65

It will be understood that the outside of the machine will also require cleaning but as the present invention does not involve outside cleaning the time for this step has been omitted from both of the above tables.

Thus, it will be appreciated that the present invention not only reduces the time required for cleaning the inside of a multi-headed dispensing machine, but it also assures maximum life for the dispensing heads. As pointed out before, the parts of the dispensing heads are machined to high tolerances and are therefore inherently susceptible to damage during handling. In addition, improper assembly by interchange of parts is avoided because the non-interchangeable parts are not removed from the heads.

While a specific embodiment of the invention has been described and illustrated it is not intended that the details thereof be limiting except as they appear in the appended claims.

What is claimed is:

1. Apparatus for use in cleaning the interior of a liquid dispensing machine having a storage tank and a plurality of depending dispensing heads disposed in a circular pattern, said apparatus comprising: a plurality of open-top troughs, each of said troughs being generally arcuate in top plan view and having closed ends, said troughs being engageable in end-to-end relationship to form an open-top liquid collection ring which, when assembled below the dispensing heads of the machine with which it is to be used, substantially completely encircles the machine and has a diameter about that of the circular pattern of the dispensing heads whereby cleaning solution flowing out of the dispensing heads from the tank is collected in said ring, each of and at least one of said troughs having a discharge opening therein disposed at a level which permits substantially all liquid to drain from said ring; and means associated with said troughs for releasably securing adjacent troughs in said end-to-end relationship.

2. Apparatus as in claim **1** wherein there are two troughs and wherein each trough has an outwardly extending discharge member defining the discharge opening, said members being located near an end of their respective trough so as to be adjacent each other in the assembled ring.

3. Apparatus as in claim **1** wherein bracket means are provided on each of said troughs for securing them to the machine to be cleaned.

4. Apparatus for use in cleaning the interior of a liquid dispensing machine having a storage tank and a plurality of depending dispensing heads disposed in a circular pattern, said apparatus comprising: a pair of open-top troughs each being generally semicircular in top plan view and having a pair of end walls and a pair of side walls; means for releasably securing the end walls of one trough adjacent the end walls of the other trough so as to form an open-top liquid collection ring, said ring when assembled below the dispensing heads of the machine with which it is to be employed substantially completely encircling the machine and having a diameter about equal to that of the circular pattern of the dispensing heads whereby cleaning solution which flows out of the dispensing heads from the tank may be collected in said ring, each of said troughs having a discharge opening disposed adjacent one end at a level which permits substantially all liquid to drain from said ring by gravity, said one ends of said troughs which have said discharge openings being those ends which are secured together in the assembled ring whereby said discharge openings are disposed close to each other.

5. Apparatus as in claim **4** wherein in the assembled ring the end walls of said adjacent troughs are in abutment with each other.

6. Apparatus as in claim **4** further including bracket means carried by said troughs for securing the same to the machine which is to be cleaned.

7. Apparatus for use in cleaning the interior of a liquid dispensing machine of the type having a storage tank and a plurality of depending dispensing heads disposed in a circular pattern, said apparatus comprising: a plurality of arcuate, open-top troughs releasably secured in end-to-end abutting relationship so as to define an open-top liquid collection ring which when assembled below the dispensing heads of the machine with which it is to be used, substantially encircles the machine and has a diameter about equal to that of the circular pattern of dispensing heads whereby cleaning solution flowing out of the dispensing heads from the tank is collected in said ring; means for draining liquid from said ring including at least one discharge opening in said ring disposed at a level to permit substantially complete draining of the ring by gravity; means supporting said ring above floor level; a circulation tank means disposed below said draining means to receive liquid from said ring; a pump carried by said tank means and having an outlet and an inlet, said inlet being in communication with said tank means; a conduit carried by said tank means and being in communication with said outlet, said conduit extending upwardly and laterally so as to be capable of discharging into the top of the storage tank of the machine which is to be cleaned.

8. Apparatus as in claim **7** wherein said circulation tank means includes an open-top tank supported by floor-engaging wheels and disposed directly below said draining means whereby liquid flows from said ring directly into said tank.

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