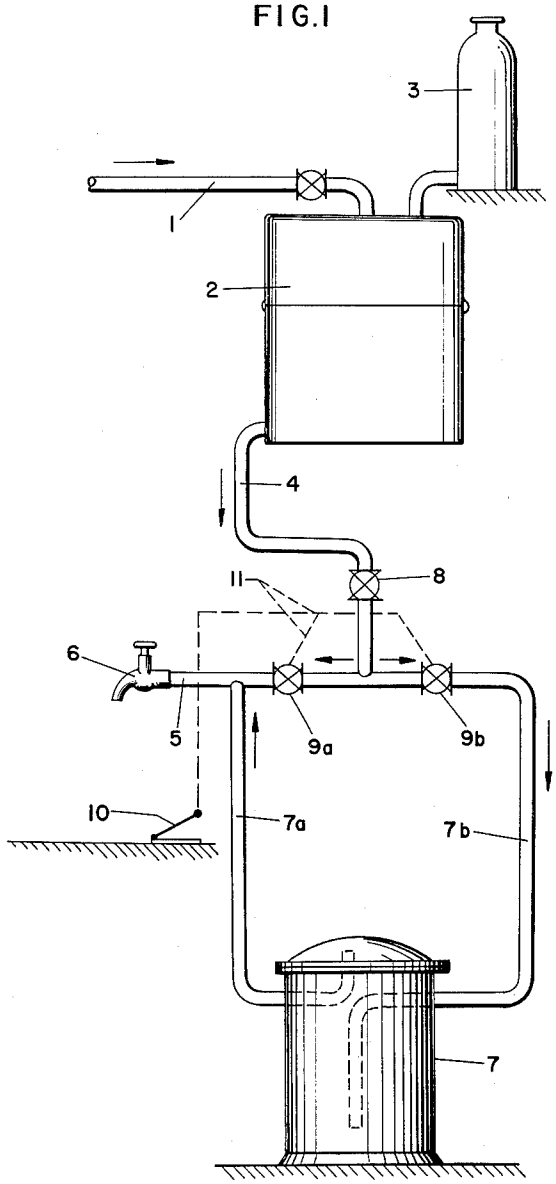
Jan. 30, 1962 C. FOUILLAND ET AL 3,019,185

MEANS AND ARRANGEMENTS FOR DISTRIBUTING STERILIZED WATER AND THE LIKE LIQUIDS OF A WELL DEFINED GRADE

Filed May 21, 1956 2 Sheets-Sheet 1

FIG.1



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Filed May 21, 1956 2 Sheets-Sheet 2

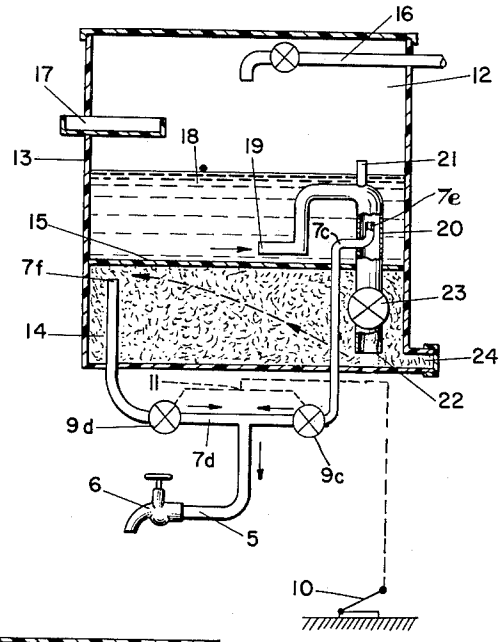


FIG.2

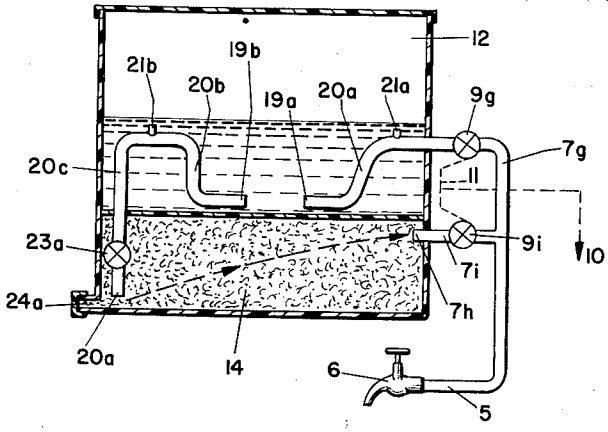


FIG.3

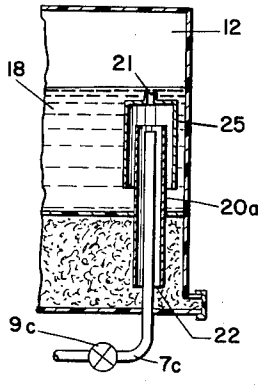


FIG.4

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3,019,185
MEANS AND ARRANGEMENTS FOR DISTRIBUTING STERILIZED WATER AND THE LIKE LIQUIDS OF A WELL DEFINED GRADE

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7 Claims. (Cl. 210—205)

Our invention has for its object means and arrangements for distributing liquids having a well defined grade and it relates more particularly, but not exclusively to the distribution of sterilized water, chiefly for the washing of one's hands, for medicinal or surgical purposes.

Certain modern activities, chiefly in laboratories, medical and hospital services, require the use of liquids having well defined physical properties or characteristics, which properties or characteristics are liable to become lost during the travel of such liquids through distributing channels as a consequence for instance of the entrance of air inside the channels. This is the case in particular of sterile water as required for surgical and medical purposes since the sterile water entering the distributing channels risks losing its sterilized condition when it remains inside said channels.

In the particular case of sterile water, one is led consequently to perform a further sterilization of the pipes before using the water again, each time the originally sterile water has stayed some time in the distributing pipes. To this end, it is generally customary to make hot water heated to a temperature above 100° C. under pressure flow in the pipes without being used, after which water sterilized through boiling and cooled to a temperature which may be borne by the user is caused to flow through said pipes.

Hitherto and as a consequence of the difficulty referred to hereinabove, no arrangement has been executed which allows a satisfactory and economical use of water sterilized through physico-chemical means rather than through boiling. However, it is highly advantageous to resort, in particular in arrangements of the type considered, to water which has been made sterile through the succession of the well-known steps of superchlorination and of dechlorination.

It is a well known fact that it is possible to obtain through superchlorination water having a sterilizing power, but that such water would be too active to allow its direct application to the human skin.

But it is also a well known fact that it is possible to reduce the excess of chlorine or of bleaching liquid contained in such water so as to make the latter soft and to allow its use on the skin without however said water losing its sterile character.

If, however, such a dechlorinaed water is caused to flow through a pipe, it risks losing its sterile character if the pipe is not also sterile or if air enters the pipe as already mentioned hereinabove when discussing the general problem to be solved.

Our invention has chiefly for its object the execution of means and arrangements for the distribution of a liquid having a predetermined grade and chiefly the distribution of sterile water, said means and arrangements satisfying better than hitherto the different requirements of practice.

Our invention consists chiefly in executing such arrangements wherethrough it is possible to feed in succession and as required a first liquid driving away or neutralizing the elements which might risk modifying the

grade of a second liquid and then this second liquid which is that intended for use.

In preferred embodiments of our invention which relate to the application to the distribution of sterile water, the following novel features may be incorporated separately or in combination:

Said first liquid is a sterilizing water obtained preferably through chlorination or superchlorination while the second liquid is a water obtained through dechlorination of the first water as provided by active carbon.

The superchlorinated water is obtained inside a vat or the like container which feeds in parallel at least one point of utilization or else another container or the like part inside which the dechlorination is performed, which latter part may feed in its turn the first mentioned point of utilization.

We associate in a single unit the apparatus or the vat or the like container which serves for the sterilization of the water and the apparatus, vat or the like container which serves for the dechlorination of the sterilized water. Preferably, the dechlorination apparatus is positioned underneath the sterilizing apparatus and the physical separation between the two apparatus is provided by an inner partition.

The circuits for the circulation and for the tapping off out of each of the two vats and apparatus are designed in a manner such that the liquids removed therefrom stay therein during a minimum time or else have travelled over useful paths the length of which is equal at least to a predetermined minimum.

The dechlorinating apparatus is fed from a vat containing a minimum provision of diluted bleaching liquid, said provision serving in particular for subjecting permanently said dechlorinating apparatus to the desired head.

According to a further embodiment, relating also to the distribution of sterile water, said dechlorinating vat and the pipes which contain normally only sterilized water and no sterilizing water are located at a level lower than said point of utilization.

Our invention covers more particularly the applications and embodiments illustrated by the accompanying drawings and in particular, it covers by way of novel articles of manufacture the means and arrangements referred to, together with the special parts required for their execution.

We will now describe our invention with further detail, reference being made to the accompanying drawings, wherein:

FIG. 1 is a diagram of a first embodiment of various features of our invention in the case of a distribution of water sterilized through chlorination.

FIGS. 2 and 3 are diagrammatic views relating to two modifications of a preferred embodiment of an arrangement for producing and distributing sterile water in accordance with the invention.

Lastly, FIG. 4 is a detail view relating to a modification of a section of FIG. 2.

It should be understood that these drawings and the corresponding disclosure are given by way of exemplification and by no means in a limiting sense.

In the embodiment illustrated in FIG. 1, it has been assumed that ordinary water fed through a pipe 1 was sterilized inside an apparatus 2 subjected to the pressure of a liquid head adapted to introduce into the water an excess of at least one sterilizing reagent. Said reagent may be constituted for instance by bleaching liquid which, it is assumed, is distributed from an auxiliary container 3.

The apparatus 2 which provides for the suitable mixing of ordinary water with a sterilizing reagent may furthermore be executed in various manners which do not

form part of our invention. We may thus resort to the arrangement disclosed in one of the French patents filed by the assignee: No. 721,156 filed on August 8, 1931, or 1,087,465 filed on August 3, 1953, or else in the co-pending French application filed on March 29, 1956, by the same applicant and entitled: "Improvements in Means and Arrangements for the Execution of Measured Mixtures of at Least One Chemical Substance With a Liquid." Said apparatus should in fact include a provision of water which is such that the duration of contact with the bleaching water may be long enough for the destruction of all the microbes before the water which has been sterilized and has thus become sterilizing flows out of the apparatus in the manner disclosed hereinafter.

The sterilizing water passes out of the apparatus 2 through a channel 4 out of which it is directed selectively into a pipe 5 and a distribution station illustrated by a tap 6 or else into a pipe 7*b* feeding a dechlorinating apparatus illustrated by the vat 7. A pipe-closing member 8 is advantageously inserted in the pipe 4 while the two closing members 9*a* and 9*b* inserted in branch pipes 5 and 7*b* respectively allow connecting said pipe 4 with either of said branch pipes, i.e. the tap 6 and the vat 7.

The vat 7 or the like dechlorinating apparatus may also be executed in various manners which do not form part of our present invention. It is possible for instance to resort to the apparatus disclosed in the French Patent 757,173 filed on September 10, 1932, and according to which the dechlorination is provided through active carbon mordanted with silver, which forms a safety step in the case where the arrangement is started operating under conditions where the sterilizing reagent is missing inside the apparatus 2.

The water which has been dechlorinated in said apparatus 7 may thus to be used directly on one's skin and it passes out of said apparatus through the pipe 7*a* which is connected with the tap 6 or with any other utilizing device, possibly along an indirect path through the pipe 5. Preferably, the pipe 7*b* for feeding the superchlorinated water extends downwardly inside the apparatus 7 near the bottom of the latter while the pipe 7*a* for the removal of the dechlorinated water starts from the upper end of said apparatus 7, this arrangement having for its object to prevent the apparatus 7 from emptying through a syphon action into the output pipe 7*a* or the like which would risk uncovering objectionably the active carbon inside the apparatus 7.

According to a further feature of our invention, the dechlorinating apparatus 7 and the pipe 7*a* which is fed normally only with sterilized water and not with sterilizing water are in this embodiment located entirely underneath the utilization tap or station 6. Consequently, in the case of a lack of pressure or even of a failure in the feeding of the arrangement, the air which may enter either the apparatus 2 or the utilization station 6 cannot enter the pipe 7*a* feeding sterile water or the apparatus 7. As soon as this pipe and this apparatus have been sterilized, they are not normally exposed to the risk of losing their sterile character. The case is not the same however for the other pipes and chiefly for the pipe 5 and also of the pipes 4 and 7*b*. But the arrangement thus executed in accordance with our invention allows restoring the sterile character of said further pipes as will be disclosed hereinafter.

As a matter of fact, the manner of using the arrangement according to FIG. 1, is as follows: when it is desired to use the sterile water passing out of the apparatus 7 and which consequently cannot damage one's skin, it is necessary to first provide for a renewed sterilization of the pipe 5 and of the tap 6 when they have been liable to lose their original sterile condition, chiefly in the case of a hospital service. To this end, the closing member 9*b* is shut and the closing member 9*a* and the tap 6 are opened; the sterilizing water flows out then through the latter.

When the sterilizing water has flown out during the time found experimentally as necessary and sufficient for the obtention of a renewed sterilization, the tap 6 is closed: the closing member 9*b* is then opened and the closing member 9*a* is closed. In other words, the positions of 9*a* and 9*b* are interchanged. If the tap 6 is then opened, the water which is distributed by the latter after a few seconds is constituted by dechlorinated water from the apparatus 7 and has only passed through sterile pipes.

The arrangements according to our invention may also form the object of various improvements. For instance, the operations of the closing members 9*a* and 9*b* may be advantageously associated through a mechanism in a manner such that one of said members is closed when the other is open and reversely. It is also possible for these associated operations to be controlled through a pedal 10 located in proximity with the utilization station 6 and connected with the pipe-closing members 9*a* and 9*b* through a linkage 11.

According to another embodiment which may in fact be preferred in many cases, the procedure is that illustrated in FIGS. 2 to 4 which show various modifications with reference to one another.

In FIGS. 2 and 3, the sterilizing section of the unit executed in accordance with last mentioned embodiment is located at 12 in the upper part of a chamber 13 the walls of which are advantageously made of moulded plastic material while the dechlorinating section of said unit is located at 14 underneath the sterilizing section from which it is separated by a fluidtight partition 15. The latter is made advantageously of the same plastic material as the walls of the chamber 13 inside which it is fitted and glued fluidtightly after the dechlorinating section has been formed. The plastic material used for such walls may be in particular polyvinyl chloride, polyethylene or the like. Preferably an opening covered by a plug or the like provides an access inside the dechlorinating section with a view in particular to allowing the renewal of the active material therein, which material is preferably constituted in this case also by active carbon.

In order to simplify the drawings, the different parts incorporated with the sterilizing section have not been illustrated except for a very diagrammatic showing of the pipe 16, feeding ordinary water and of a partly outwardly projecting vat 17 containing the desired provision of bleaching water.

The sterilizing and dechlorinating sections forming thus an independent unit, the pipes connected with the latter are designed as follows and the liquid moves therein also as described hereinafter: the tap is fitted at the end of a pipe section 5 adapted to be fed either with sterilizing water through a pipe 7*c* in which may be inserted a suitable closing member 9*c* or else with dechlorinated water, through the pipe 7*d* in which is inserted similarly a closing member such as 9*b*.

During ordinary operation, one of the closing members 9*c* or 9*d* is closed while the other is open. It is advantageous to interconnect the control means for said closing members during operation so as to make them open selectively under the action of a linkage 11 adapted to be actuated through a pedal 10 which constitutes a single control member for the apparatus.

The pipe 7*c* may extend through the dechlorinating section 14 so as to remove the sterilized water out of the provision 18 above the said dechlorinating section, preferably from the lower part of said provision. Preferably also, the sterilized water may be collected until it is stopped automatically when the level of said provision 18 drops underneath the lowermost value considered as necessary for a sufficiently long staying of the sterilized water which is being capped off inside the provision, said staying allowing the water to acquire in contact with the bleaching water or the like sterilizing liquid the desired microbicide and sterilizing properties.

This cutting off of the flow of sterilized water is obtained in the example illustrated in FIG. 2 in the following manner.

The sterilized water is tapped off at 19 at the lower end of the provision 18 through a syphon 20, provided with a vent 21 adapted to dewater the syphon or else we may resort to an arrangement having a similar effect for the case where the level drops underneath a predetermined minimum value. The syphon extends downwardly down to a level 22 inside the lower part of the dechlorinating section 14, preferably towards one side of the latter. The pipe 7c extends up to the point 7e inside the syphon above the partition 15. This last disclosed arrangement allows resorting to a single collecting syphon with a dewatering arrangement for feeding selectively as desired the dechlorinating section and the pipe 7c.

As to the pipe 7d it collects at 7f the dechlorinated water, preferably at a point in the upper part of the dechlorinating section and at a distance from the lower end 22 of the syphon opening into said section so that the path followed by the sterilized water admitted at 22 into the dechlorinating section may be sufficiently long for a satisfactory dechlorination to be obtained.

As to the original sterilization of the pipe 7d feeding the tap 6, it is preferably to provide on the arrangement means for executing said original sterilization and also for renewing said sterilization each time this may appear as necessary. Such means may be constituted as follows:

A closing member 23 allows cutting off the admission of sterilized water out of the lower end 22 of the syphon into the dechlorinating section. A disconnection of the common control, if any, of the closing members 9c and 9d allows opening these two closing members simultaneously; an output opening 24 intended for use during the original sterilization allows the original sterilizing liquid to pass directly out of the dechlorinating section. It will thus be readily ascertained that, during said operation, the fluid circuit is closed through the opening 19 of the channel collecting the sterilized water so as to feed the latter through the pipe 7c into the pipe 7d and out through the upper opening 7f of the latter, which provides for the sterilization of this pipe 7d and finishes the sterilizing of the dechlorinating section 14 through which the sterilizing water passes in a direction which is approximately opposed to the direction of flow of the sterilized water during operation, the sterilizing liquid being finally removed at 24 at the end of this operative sterilizing step. Obviously, the output opening 24 is provided with a safety device as required for it to remain closed during normal operation as perfectly as may be required. During normal operation of the apparatus, the pipe section 7d extending between the closing means 9d and the pipe 5 is kept in proper sterile condition since the sterilizing water fed through 7c enters it in a satisfactory manner.

Having thus described with full detail the embodiment illustrated in FIG. 2, we will disclose in a brief manner, reference being made to the modification according to FIG. 3, the particular features of the latter, said FIG. 3 showing as precedingly a sterilizing section 12 and a dechlorinating section 14 arranged to form in super position a unit similar to that illustrated with more detail in FIG. 2. However the pipes communicating with said sterilizing and dechlorinating sections are positioned sideways instead of being located underneath the apparatus. Under such conditions:

The tapping of sterilized water for the outer circuit is performed through a syphon 19a—20a with dewatering means at 21a operating for a minimum level of the water, said syphon opening into a pipe 7g in which are inserted closing means 9g.

The tapping of sterilized water for feeding the dechlorinating section is performed through a similar syphon which is however independent of the former as shown at 19b, 20b, 21b, said syphon being connected

through the pipe section 20c with a lower opening 20d near the bottom and to one side of the dechlorinating section 14.

And the tapping of dechlorinated water is performed through a point 7h in the upper part of the dechlorinating section spaced with reference to the opening 20d, said point 7h being located at the input end of a pipe section 7i in which are inserted closing means 9i. Under such conditions, the operation and the use of the apparatus are practically the same as in the case of FIG. 2. It is advantageous to operate the closing means 9g and 9i through a common control 11. Closing means 23a are inserted in the pipe 20c in association with a temporary output opening 24a in the dechlorinating section so as to provide for the original sterilization of the pipe 7i and of the parts of the dechlorinating section located more particularly near said pipe.

FIG. 4 illustrates a detail modification in the execution of a liquid-removing syphon to be used in an embodiment such as that illustrated in FIG. 2.

In accordance with this modification, the syphon 19—20 with its dewatering vent 21 is replaced by a sort of bell 25 opening downwardly and provided in its upper part with a vent 21a or with an arrangement providing when required a similar dewatering effect. A part of the channel 20 of FIG. 2 is then replaced by a tubular section 20a extending coaxially inside the bell and over the pipe 22.

Under such conditions, and whatever embodiment is resorted to, we obtain an arrangement which is greatly improved with reference to all prior means and arrangements proposed for the distribution of liquids having predetermined properties such as sterile water.

The characteristic features of the improvements made and the operation of the means and arrangements incorporating same will appear sufficiently through the reading of the preceding disclosure and it is therefore unnecessary to give any further detail indications.

Such means and arrangements show, furthermore, considerable advantages and chiefly that of providing a simple arrangement supplying water in a reliably sterile state under normal conditions in a very rapid manner under economical and practical conditions of production. These advantages are believed to be substantial, chiefly in the case of surgical services for the washing of the hands of the surgeon, helps and attendants. As already apparent from the above disclosure, our invention is by no means limited to those embodiments or applications or embodiments of its component parts which have been disclosed more particularly and it covers in contradistinction all the modifications thereof falling within the scope of the accompanying claims, to wit in particular:

The modification according to which one at least of the utilization stations is constituted by an apparatus distributing liquid soap.

The modification according to which the liquids distributed by an arrangement according to our invention are different from sterilizing water and sterile water,

And finally those modifications according to which the number of pipes and units is increased so as to allow the distribution in succession through at least one station or more than two liquids of a predetermined grade.

What we claim is:

1. An arrangement for supplying sterile, non-irritating water, comprising a chlorinating device, means to feed water to such device, a dechlorinating apparatus, a first means to feed chlorinated water from said device to said apparatus, a second means to feed water from said apparatus to a point of use, a third means to feed chlorinated water directly from said device to said second feed means, a single control member, and means operatively connected to said control member for selectively opening said third feed means to permit flow of chlorinated water to the point of use while closing one of said first and second feed means so as to prevent flow of dechlori-

nated water to such point or closing said third feed means to prevent flow of chlorinated water to the point of use while opening the closed feed means to permit flow of dechlorinated water to such point.

2. In an arrangement as claimed in claim 1, said chlorinating device and said dechlorinating apparatus constituting a single unit, said chlorinating device being located on top of said dechlorinating apparatus, and a wall separating said device from said apparatus.

3. In an arrangement according to claim 1, said means for feeding water from said device having at least a part thereof at a sufficient distance above the bottom of the device to ensure a minimum level of water in the device before water is fed to said apparatus.

4. In an arrangement according to claim 1, said apparatus and at least a part of said second means being located at a lower level than the point of use.

5. In an arrangement according to claim 1, said selectively operating means comprising valves to control said feeding means, said control member comprising a pedal connected to said valves for simultaneously controlling the same.

6. In combination, a chlorinating device, a dechlorinating apparatus, an outlet pipe from said device, a connection from said outlet pipe to said apparatus, a second connection from said outlet pipe to a point of use, a first valve in said outlet pipe, second and third valves in said first and second connections respectively, a third connection from said apparatus to said second connection at a point between said third valve and the point of use, and a control member operatively connected to said second and third valves for simultaneously opening one and closing the other.

7. In combination, a chlorinating device, a dechlorinating apparatus, an outlet pipe from said device, a first connection from said outlet pipe to said apparatus, a second connection from said outlet pipe to a point of use, first and second valves in said first and second connections respectively, a third connection from said apparatus to said second connection at a point between said second valve and the point of use, and a control member operatively connected to said valves for simultaneously opening one and closing the other.

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