L. M. HOOPER.

LIQUID MIXING APPARATUS.

APPLICATION FILED JAN. 12, 1910.

1,010,052.

Patented Nov. 28, 1911.

Fig. 2.

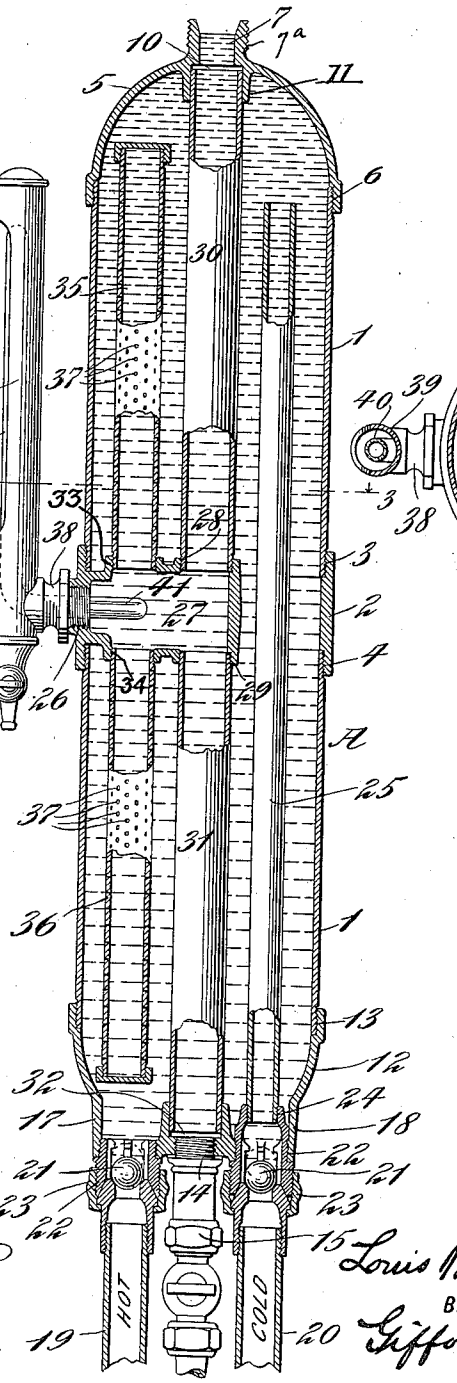


Fig. 1.

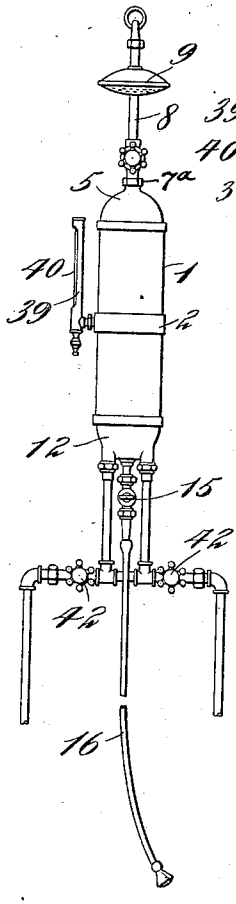
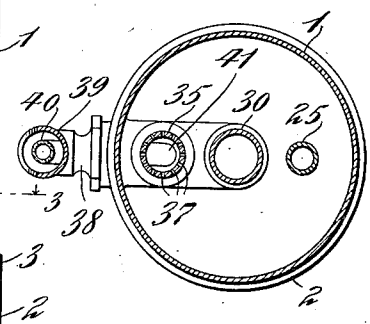


Fig. 3.



WITNESSES:

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UNITED STATES PATENT OFFICE.

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LIQUID-MIXING APPARATUS.

1,010,052. Specification of Letters Patent. Patented Nov. 28, 1911.

Application filed January 12, 1910. Serial No. 537,643.

To all whom it may concern:

Be it known that I, LOUIS M. HOOPER, a citizen of the United States, and a resident of Rutherford, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Liquid-Mixing Apparatus, of which the following is a specification.

My invention relates generally to liquid mixing apparatus for use in mixing liquids of different kinds, or of different temperature, and while the invention is capable of wide application and use wherever it is desired to mix liquids, the invention is particularly intended for use in mixing liquids of different temperature, for instance, hot and cold water as supplied to a bath or lavatory.

An apparatus of the type just referred to is shown in my prior Patent Number 584,265, granted June 8, 1897, which includes a mixing chamber, inlets for hot and cold water, a mixing element, and means for conducting the mixed water from the chamber.

The primary object of the invention is to provide a device which will be simple in construction, efficient in operation, sightly in appearance, and which can be expeditiously installed.

A further object is to so construct and arrange the several parts that any expansion or contraction thereof due to changes in temperature of the liquids being mixed will not affect the parts or the operation of the apparatus.

A further object is to so construct the mixing chamber that the same may be conveniently and expeditiously assembled in installing the apparatus, or disassembled, should access to the interior thereof be desired.

Other objects will be apparent as the detailed description of the invention progresses hereinafter.

The invention consists in the improved construction of parts and their arrangement in operative combination, to be fully described hereinafter and the novelty of which will be particularly pointed out and distinctly claimed.

I have fully and clearly illustrated my invention in the accompanying drawings to be taken as a part of this specification and wherein—

Figure 1 is a view in front elevation of an apparatus including my invention. Fig. 2 is an enlarged view in central longitudinal section of a structure illustrative of the invention. Fig. 3 is a transverse section on the line 3—3 of Fig. 2.

Referring to the drawings by characters of reference, A designates generally a receptacle or vessel of a capacity and form to suit it for the purposes for which it is intended. This vessel consists preferably of upper and lower cylindrical sections 1, 1, arranged in vertical, longitudinal alinement and connected at their inner adjacent or meeting ends by a coupling ring. This coupling ring consists of an annular body 2 into the upper and lower ends of which are threaded the meeting ends of the vessel sections as shown at 3, 4 respectively. The upper end of the upper section of the vessel is closed by a substantially spherical dome or cap 5, threaded onto the end of the section as at 6, said dome having an opening 7 leading through an exterior nipple 7^a for connection with an outlet pipe 8, such as for instance, that leading to a shower 9. The dome is formed on its inner face with a seat 10 surrounded by an annular guide flange 11, as shown in Fig. 2, and which serves a purpose to be described hereinafter.

The lower section 1 of the vessel is closed at its lower end by a cap or base 12, threaded onto said section, as at 13, the same being formed with a central outlet opening 14 in which is threaded a pipe connection 15, for instance, a coupling for a shampoo device 16 as shown in Fig. 1. The cap 12 is also formed with nipples 17, 18 for connection with the inlet pipes 19, 20 respectively, the pipe 19 being for hot water and the pipe 20 for the cold water, each inlet being controlled by a check valve 21, preventing back flow of the water from the vessel through the pipes 19, 20. Preferably these check valves are mounted in bodily removable cages or casings 22 threaded into said nipples, and to which the pipes 19, 20 are connected by thimbles 23. The check valve cage for inlet for the cold water has an extension 24 thereon to which is connected an inner feed pipe 25 which extends upward through the vessel A, the end of the pipe terminating short of the top of the vessel.

Returning now to the construction of the ring 2, I would state that this ring is preferably cast in brass of one piece and is pro-

vided at one side with an interiorly threaded opening 26. Preferably, although not necessarily, cast integral with the ring 2, and projecting radially within the same is a hollow projection forming a pocket or chamber 27 which opens out through the opening 26. This pocket 27 is provided at its inner end with upper and lower alining openings 28, 29, into which are threaded upper and lower outlet pipes 30, 31, the upper one having its upper end slidably seated in the seat 10 above described, and the lower one having its lower end slidably seated in a similar seat 32 surrounding the lower outlet 14. It will be seen that the pipes slidably engage the seats in the elements 5 and 12 and by this arrangement said pipes are free to expand and contract longitudinally under influence of changes of temperature.

In the upper and lower walls of the chamber 27, between the outlet pipes and the wall of the ring 2, are openings 33, 34, respectively, into which are threaded the ends of mixing tubes 35, 36 extending in opposite direction above and below said chamber 27, longitudinally of the vessel, A. These pipes 35, 36 are perforated throughout their lengths as shown at 37, to permit ingress of water to said tubes from substantially all levels within the receptacle A.

Threaded into the opening 26 in the pocket 27, is the neck 38 of a thermometer casing 39 in which casing is arranged a thermometer 40, the bulb 41 of which projects into the pocket 27 between the mixing tubes so as to be subjected to the mixed liquid as it passes from said tubes to the outlet pipes.

The above described embodiment of my invention operates as follows: The hot and cold water enters the vessel A through the pipes 19 and 20, the cold water being delivered at the top of the vessel A and the hot water at the bottom thereof. The hot water rises up through the vessel, and the cold water drops toward the bottom thereof, the water from both inlet pipes being thus mixed and the temperature averaged. The water thus mixed flows into the mixing tubes, and as this water admitted to said tubes is taken from all heights within the receptacle the proper mixture is assured by the tubes 35, 36.

It will be understood that this apparatus provides for the continuous mixture of liquids as long as hot and cold water is provided through the inlets, and drawn off from either of the outlets, the thermometer indicating the temperature of the mixture flowing to the outlet pipes. The inlet pipes are provided with valves 42, 42, as shown in Fig. 1, by means of which the supply of hot and cold water may be regulated to secure the desired temperature of mixture.

It will be seen that the mixing tubes take the water from both the top and bottom of the vessel and lead it to the pocket in the vessel where both streams meet and an ultimate mixture of the desired temperature assured. It will also be seen that the central ring element serves as a support for the mixing tubes, outlet conduits and the vessel sections, and that either of the latter may be removed when access is desired to the interior, without disturbing the arrangement of said tubes, there being no positive connection between the vessel sections and said tubes which must be disconnected before the sections can be removed.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. An apparatus of the character described, comprising a vessel having inlets and an outlet, a mixing chamber intermediate the ends of said vessel, means for delivering liquids from the opposite ends of the chamber to said vessel, and an outlet conduit connecting said mixing chamber with said outlet.

2. An apparatus of the character described, comprising a vessel formed of cooperating sections, an element for connecting said sections, said vessel having an outlet, and a mixing chamber supported solely by said element.

3. An apparatus of the character described, comprising a vessel, a support within the vessel intermediate the ends thereof, oppositely extending mixing tubes mounted on the support and extending longitudinally of the vessel, and an outlet conduit to receive the mixed liquid from said tubes.

4. An apparatus of the character described, comprising a vessel having inlets and an outlet, a mixing chamber in the vessel, a perforated mixing tube connected to the chamber, and an outlet conduit connecting said chamber with the outlet from the vessel.

5. An apparatus of the character described, comprising a vessel having inlets and an outlet, a chamber in the vessel, a mixing tube connected to said chamber, a conduit connecting the chamber with said outlet, said tube and conduit communicating with each other through the chamber.

6. An apparatus of the character described, comprising a vessel formed of cooperating sections, an element for connecting said sections, said vessel having an outlet, and a perforated mixing tube supported solely by said element.

7. An apparatus of the character described, comprising a vessel formed of cooperating sections, an element for connecting said sections, said vessel having an outlet, and a perforated mixing tube supported by said element.

8. An apparatus of the character de-

scribed, comprising a vessel formed of co-operating hollow sections, an element connecting said sections and having a part projecting within the vessel, a mixing tube supported by said part, and an outlet conduit also supported thereby.

9. An apparatus of the character described, comprising a vessel formed of co-operating hollow sections arranged end to end, an element connecting the meeting ends of said sections and having a hollow part projecting within the vessel, a mixing tube supported by said part, and an outlet conduit also supported thereby, said tube and conduit communicating with each other through said hollow part.

10. An apparatus of the class described, comprising a vessel, oppositely disposed mixing tubes extending in a general direction longitudinally of the vessel, and an outlet conduit connected to the inner ends of said tubes.

11. An apparatus of the character described, comprising a vessel composed of separable sections, means for supporting and connecting said sections, an outlet tube arranged within the vessel and fixedly supported by said connecting means at one end, the opposite end of the tube having a slidable connection with a wall of one of the vessel sections.

12. An apparatus of the character described, comprising a vessel, a support within the vessel intermediate the ends thereof and oppositely extending mixing tubes mounted on said support and extending longitudinally of the vessel.

13. An apparatus of the character described, comprising a vessel, a chamber located in the vessel intermediate the ends thereof, oppositely extending mixing tubes communicating with said chamber and extending longitudinally of the vessel, and an outlet from the chamber.

14. An apparatus of the character described, comprising a vessel, a chamber located in the vessel intermediate the ends thereof, oppositely extending mixing tubes supported by said chamber and extending longitudinally of the vessel, and an outlet conduit connecting said chamber with an outlet through the wall of the vessel.

15. An apparatus of the character described, comprising a vessel, a chamber located within the vessel intermediate the ends thereof, oppositely disposed mixing tubes supported by the chamber and extending longitudinally of the vessel, and oppositely disposed outlet tubes also supported by said chamber and opening through the walls of the chamber at the upper and lower end portions thereof, respectively.

16. An apparatus of the character described, comprising a vessel composed of upper and lower sections, a central annular coupling adjustably connecting the said sections, a mixing tube, and oppositely directed outlet tubes rigidly supported by said coupling, and slidable connections between the ends of said outlet tubes and the vessel sections, the arrangement being such that said outlet tubes are free to move relative to the vessel sections due to expansion and contraction under changes of temperature.

17. An apparatus of the character described, comprising a vessel, a projection within the vessel, an outlet tube fixedly supported on said projection, a removable head for the vessel having an outlet, and means on the head for slidably connecting one end of said outlet tube with said outlet.

18. An apparatus of the character described, comprising a vessel composed of upper and lower sections, a central annular coupling connecting the said sections, an inwardly projecting chamber carried by said coupling, a temperature-measuring device suported outside of the vessel and having a portion thereof extending into the said chamber and a mixing tube connected with said chamber.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

L. M. HOOPER.

Witnesses:
E. O. CAMP,
H. DAIBER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."