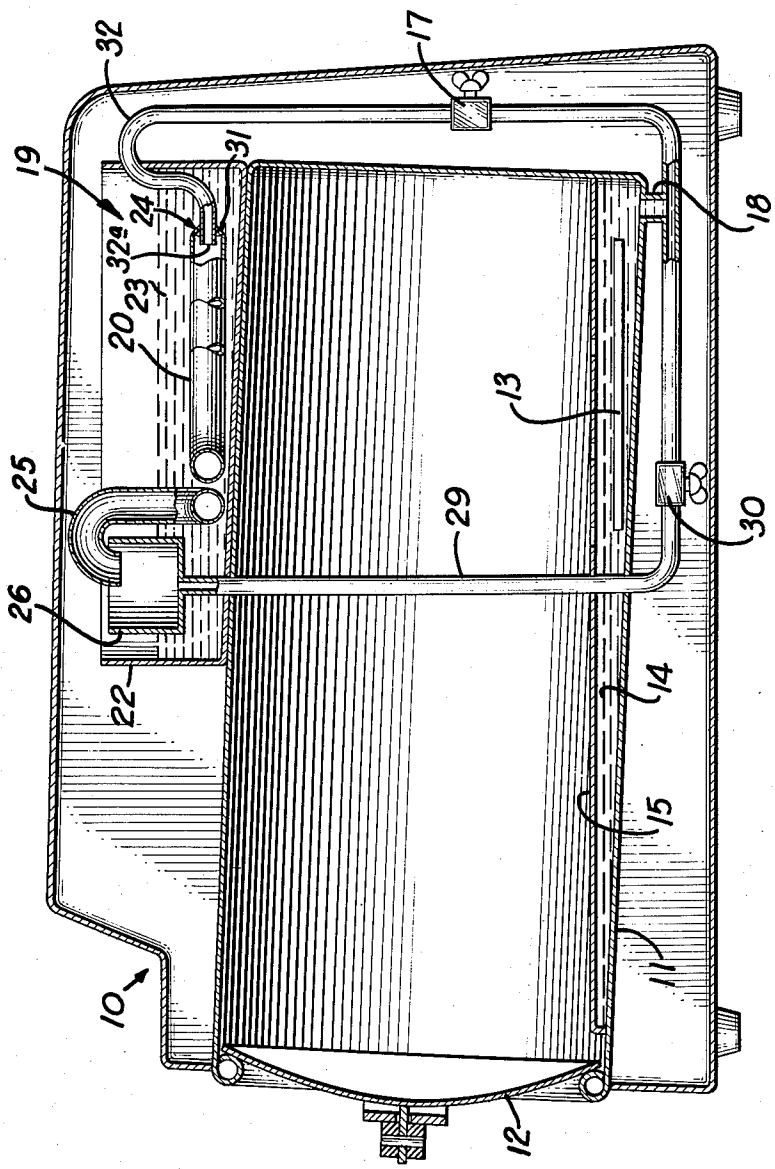
Nov. 27, 1962 A. VISCHER, JR 3,065,509

AUTOCLAVE

Filed July 10, 1959




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United States Patent Office

3,065,509
Patented Nov. 27, 1962



3,065,509

# AUTOCLAVE

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Filed July 10, 1959, Ser. No. 826,331
13 Claims. (Cl. 21—97)

The present invention relates to autoclaves of the type including a sealable chamber in which water is vaporized, and it more particularly relates to means for automatically measuring the quantity of water supplied to an autoclave at the start of a vaporizing operation.

Autoclaves of the type commonly used in hospitals, clinics, and the like for sterilizing medicinal instruments and other equipment usually comprise a sealable chamber in which the equipment to be sterilized is subjected to pressurized steam. In order to provide steam for the chamber, a small amount of water is placed in the chamber prior to the commencing of a sterilization operation, and after the door to the chamber has been sealed, a heating unit which is immersed in the water is energized to boil the water and thus to generate steam which fills the chamber. At the completion of the sterilizing operation, it is necessary to remove the steam from the chamber before removing the sterilized articles therefrom, and therefore, the chamber is adapted to be selectively connected to a steam condenser which may very simply comprise a coil or the like which is submerged in a tank of water. As the steam from the chamber passes through this coil it is condensed and even though the end of the coil is open, no steam is released to the atmosphere.

In order to supply the necessary amount of water to the sterilizer at the beginning of a sterilizing operation, it has been the practice to provide a line between the water tank portion of the steam condenser and the sterilizing chamber and to include a manually controllable petcock in this line so that in order to supply water to the chamber the operator of the autoclave merely opens this petcock to permit water to flow into the chamber, and after the proper quantity of water has flowed into the chamber he closes the petcock. Unfortunately, this operation requires close judgment on the part of the operator, and if he is not careful, either an insufficient or an excess amount of water may flow into the chamber.

Therefore, an object of the present invention is to provide a new and improved liquid measuring device.

Another object of the present invention is to provide a new and improved autoclave including means for automatically controlling the amount of water fed to the pressure chamber at the beginning of a sterilization operation.

A further object of the present invention is to provide a new and improved liquid measuring device suitable for use in connection with an autoclave or similar devices.

Briefly, the above and further objects are realized in accordance with the present invention by locating a measuring cup so as to overflow into the tank portion of the steam condenser and connecting the bottom of this cup through a petcock or the like to the pressure chamber. Each time that a sterilizing operation is completed and steam is supplied from the chamber to the condenser, substantially all the water in the chamber is forced out of the end of the condensing coil and fed to the measuring cup. Since a small amount of water is lost during each operation as a result of leakage, absorption and the like, means must be provided to replenish this lost quantity of water or the amount of water available for boiling will gradually diminish until an insufficient amount of water remains. Therefore, in order to replenish the amount of water which is lost, an injector nozzle is mounted in the condenser tank below the water level and is connected in the steam line between the condenser



coil and the measuring cup. Therefore, as water from the pressure chamber is forced at a relatively high velocity through the injector nozzle, water is extracted from the tank and fed through the steam line into the measuring cup. The construction and arrangement is such that the amount of additional water which is drawn into the steam line exceeds that which was lost, so that the water which is fed to the measuring cup overflows and the excess water returns to the tank. In this manner, the measuring cup is always full at the beginning of a sterilizing operation so that when the water supply petcock is opened, exactly the right amount of water is automatically supplied to the sterilizing chamber.

Further objects and advantages of the present invention will become apparent as the following description proceeds, and the features of novelty which characterize the invention will be pointed out with particularity in the claims annexed to and forming a part of this specification. For a better understanding of the present invention, reference may be had to the accompanying drawing in which the single FIGURE is a schematic view of an autoclave embodying the present invention.

Referring now to the drawing, there is shown an autoclave **10** which comprises a generally horizontally disposed, generally cylindrical pressure chamber **11**, having an access door **12** mounted at one end thereof for sealing the chamber from the atmosphere. The bottom wall of the chamber **11** slants down toward the back of the chamber and an immersible type heating unit **13**, which may be of the sheathed electrical type, is mounted in the bottom of the chamber near the rear end thereof. At the start of a sterilizing operation, a sufficient quantity of water is placed in the chamber **11** to submerge the heating element **13**; the proper level of water may be, for example, at the line designated **14** in the drawing. Th material to be sterilized is placed in the chamber **11** on a suitable rack **15** which keeps it above the water level, and the door **12** is closed to completely seal the chamber except for an exhaust orifice of known type (not shown) which releases air from the chamber when steam is first generated and then closes. With the door **12** closed, the coil **13** is energized to boil the water and thereby fill the chamber **11** with steam under pressure.

After a sufficient time has elapsed to sterilize the articles placed in the chamber **11**, the operator opens a petcock **17** which is connected between a drain line **18** at the lowest point of the bottom of the chamber **11** and a condenser **19** mounted on the top of the chamber. Accordingly, steam under pressure forces water from the chamber **11** through the petcock **17** and into a serpentine-like tube or coil **20** mounted in the bottom of a condenser tank **22** which, as shown, contains a quantity of water **23**. Location of the drain at the lowest point of the chamber bottom insures drainage of all the water from the chamber by the steam. As water and steam pass to the serpentine **20** where the steam condenses, the pressurized steam remaining in the chamber **11** forces the condensate and additional water through the open-ended tube **25**, which extends over the lip of a measuring cup **26**, and thus into the cup **26**. The bottom of the cup **26** is connected through a conduit **29** and a petcock **30** to the drain line **18**.

In order to replenish the water which is lost from the steam system, due to leakage, absorption and the like, there is provided in accordance with the present invention an injector nozzle **24** which is connected between the tube **32** and the serpentine **20** for drawing water from the condenser tank **22** into the steam system. Considered in greater detail and as shown in the drawing, the serpentine **20** comprises a tube of substantially greater internal diameter than the corresponding diameter of the tube **32**, and the end portion **32***a* of the conduit **32** extends

a substantial distance into the inlet end of the serpentine 20. A plurality of apertures 31 are provided in the wall of the serpentine tube aft of the outlet end 32*a* so that as steam and water pass from the tube 32 into the serpentine 20 at a relatively high velocity, a Venturi effect is produced which draws water from the tank 22 into the serpentine 20. By properly designing the injector nozzle 24, the amount of water thus drawn into the serpentine tube 20 from the tank 22 exceeds the amount of water which is lost through leakage, absorption, and the like, and the water from the tube 25 thus overflows the cup 26 so that when the petcock 30 is opened at the beginning of the next sterilizing operation, the exact quantity of water as determined by the filled measuring cup 26 flows into the chamber 11.

In order to prevent the water from the injector nozzle 24 from flowing back through the petcock 17 at the end of a sterilization operation into the chamber 11 and possibly siphoning all of the water from the tank 22 into the chamber 11, a portion 32 of the tube which connects the serpentine 20 to the petcock 17 extends above the level of the liquid 23 to provide an air lock. In this same connection, since the tube 25 extends over the lip of the cup 26, water cannot drain out of the cup 26 into the tank 22.

In the illustrated embodiment of the invention the injector nozzle 24 is interposed between the conduit 32 and the serpentine 20 so that the water which is extracted from the condenser tank 23 mixes with the steam from the chamber 11 thereby to provide a particularly efficient steam condenser. However, where expedient, the injector nozzle 24 may be interposed between the serpentine 20 and the conduit 25 and a sufficient quantity of water will, nevertheless, be extracted from the condenser tank 22 to replenish any losses in the system.

There is thus provided in accordance with the present invention an automatic measuring device which is particularly siutable for use with autoclaves of the type in which steam is produced in a pressure chamber by boiling a predetermined quantity of water. By using the measuring means of the present invention in connection with an autoclave, the operator is freed from the task of measuring the amount of water placed in the chamber thereby to speed up the use of the autoclave and, in addition, since a precise amount of water is always placed in the chamber, proper sterilization of the articles placed therein is insured.

While there has been described what is at present considered to be the preferred embodiment of the invention, it will be understood that various modifications may be made therein which are within the true spirit and scope of the invention as defined in the appended claims.

What is claimed as new and is desired to be secured by Letters Patent of the United States is:

1. An autoclave comprising a pressure chamber in which articles to be sterilized may be placed, a steam condenser, a measuring cup mounted above the bottom of said chamber, valve means for selectively connecting said chamber to said steam condenser, conduit means for connecting said steam condenser to the top of said cup, and valve means for selectively connecting said chamber to the bottom of said cup.

2. An autoclave comprising a pressure chamber, a vapor condenser mounted externally of said chamber above the bottom thereof, said condenser including a tank having a conduit mounted therein, a first passageway connecting one end of said conduit to said chamber, valve means provided in said passageway, a measuring cup adapted to overflow into said tank, a second passageway connecting the bottom of said cup to said chamber, valve means provided in said second passageway, and means connecting the other end of said conduit to said measuring cup for conveying liquid from said conduit to said cup.

3. An autoclave as set forth in claim 2 wherein said last-named means comprises a tube extending over the lip of said cup.

4. An autoclave as set forth in claim 2 wherein means is connected between said last-named means and said conduit for extracting water from said tank and supplying it to said cup.

5. An autoclave as set forth in claim 4 where said means for extracting water from said tank comprises a conduit having a plurality of apertures therein opening into said tank.

6. An autoclave as set forth in claim 2 wherein said first named passageway extends above the normal liquid level in said tank.

7. Apparatus as set forth in claim 2 wherein the first named passageway is connected to the lowest point at the bottom of said pressure chamber.

8. An autoclave comprising a pressure chamber, a steam condenser mounted above the bottom of said chamber, said condenser comprising a tank for holding a quantity of liquid therein, a conduit mounted in the bottom of said tank, a passageway connecting one of said conduits to said pressure chamber, a measuring cup mounted in said tank, a passageway connecting said measuring cup to said pressure chamber, and means connecting the other end of said conduit to said measuring cup, said means comprising a tubular member having a small diameter portion and a large diameter portion, said portions being connected by a perforated transition portion located below the normal level of said liquid.

9. An autoclave comprising a pressure chamber, a vapor condenser for holding a supply of liquid and a first conduit extending into said liquid, measuring means adapted to overflow into said liquid and connected to the outlet of said first conduit, a second conduit having a first shut-off valve therein and extending from said measuring means to said chamber, a third conduit extending from said chamber to said first conduit and having a second shut-off valve therein, and said first conduit including an injector for withdrawing water from said liquid supply when said second valve is opened after operation of said autoclave and upon the flow of liquid and vapor through said first conduit.

10. An autoclave comprising a pressure chamber adapted to hold a supply of liquid and heating means operable to vaporize the liquid, means for releasing and condensing the vapor following termination of the operation of said heating means including a condenser with liquid in it, means for collecting a predetermined amount of the condensate and liquid from said condenser after each operation of said heating means, and means for supplying the collected liquid to said chamber.

11. An autoclave comprising a pressure chamber, a vapor condenser including means for holding a supply of liquid, a first conduit extending from said chamber into said liquid, measuring means connected to the outlet of said first conduit, a second conduit extending from said measuring means to said chamber, and means connected in said first conduit between said chamber and said measuring means for supplying water to said measuring means.

12. An autoclave comprising a pressure chamber, measuring means for supplying a predetermined quantity of liquid to said chamber, and means connected between said chamber and said measuring means and responsive to the pressure within said chamber for condensing the vapor contained in said chamber and for supplying liquid to said measuring device.

13. An autoclave comprising a pressurizable chamber in which articles to be sterilized may be placed, a heating unit mounted in the bottom of said chamber for vaporizing a liquid contained in the bottom of said chamber, a vapor condenser mounted externally of said chamber, said condenser including a tank for holding a supply of liquid and a conduit mounted in said tank near the bottom thereof, said conduit being connected at one end to

the bottom of said chamber, a valve connected between said conduit and said chamber for selectively connecting said conduit to said chamber, a measuring cup mounted above the bottom of said tank with the top of said cup being disposed above the normal level of liquid in said tank, the other end of said conduit being disposed to supply fluid emitted therefrom into said cup, a conduit connected between the bottom of said cup and said chamber, a valve connected between said chamber and said last-named conduit for controlling the supply of fluid from said cup to said chamber, and an injector located in said conduit within said tank, said cup being disposed to overflow into said tank.



**References Cited** in the file of this patent

UNITED STATES PATENTS

1,028,297 Spaulding ---------- June 4, 1952