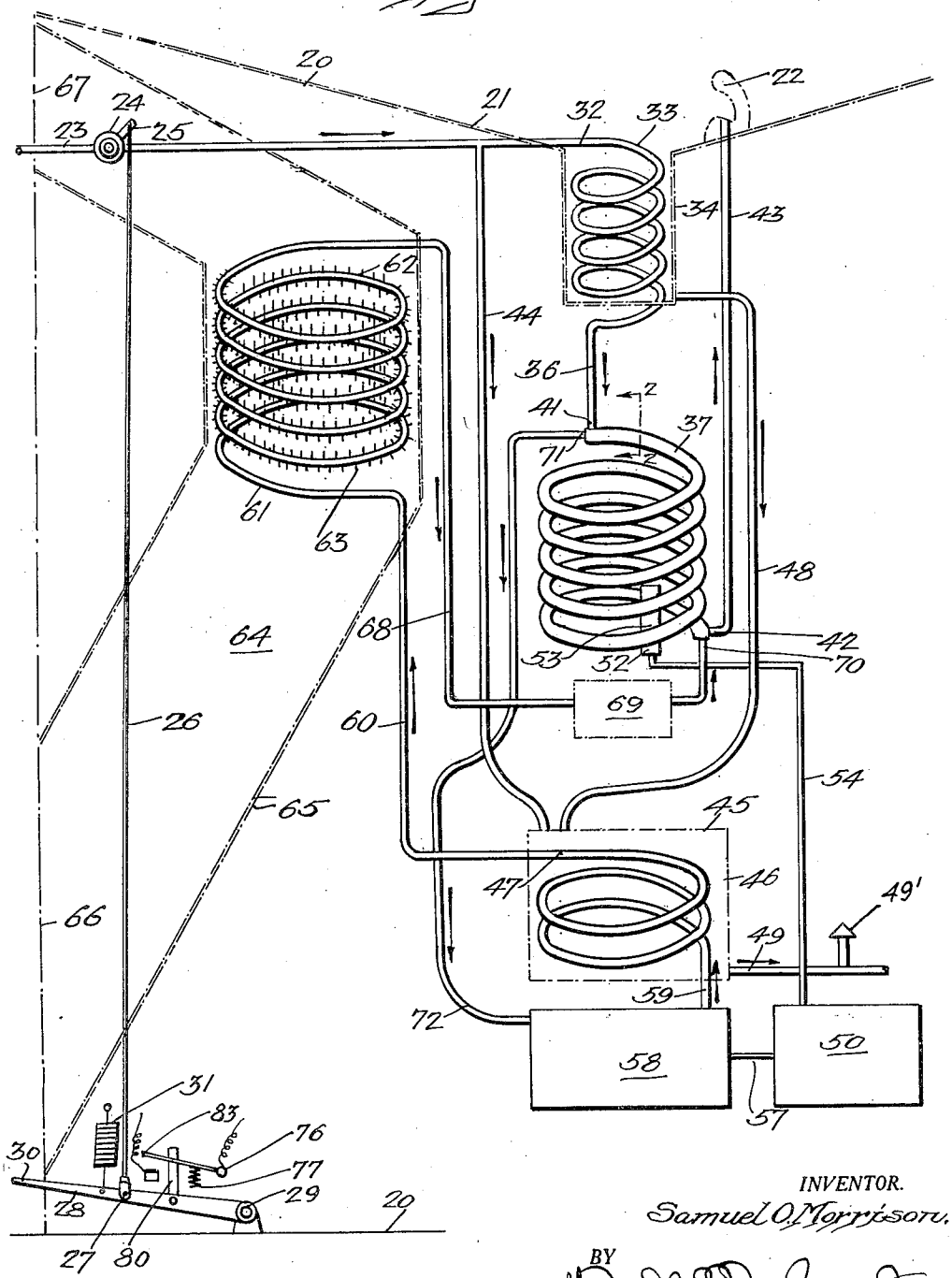
Nov. 14, 1950 S. O. MORRISON 2,529,782

SAFETY REFRIGERATOR

Filed Sept. 12, 1947 4 Sheets-Sheet 1

Fig 1.



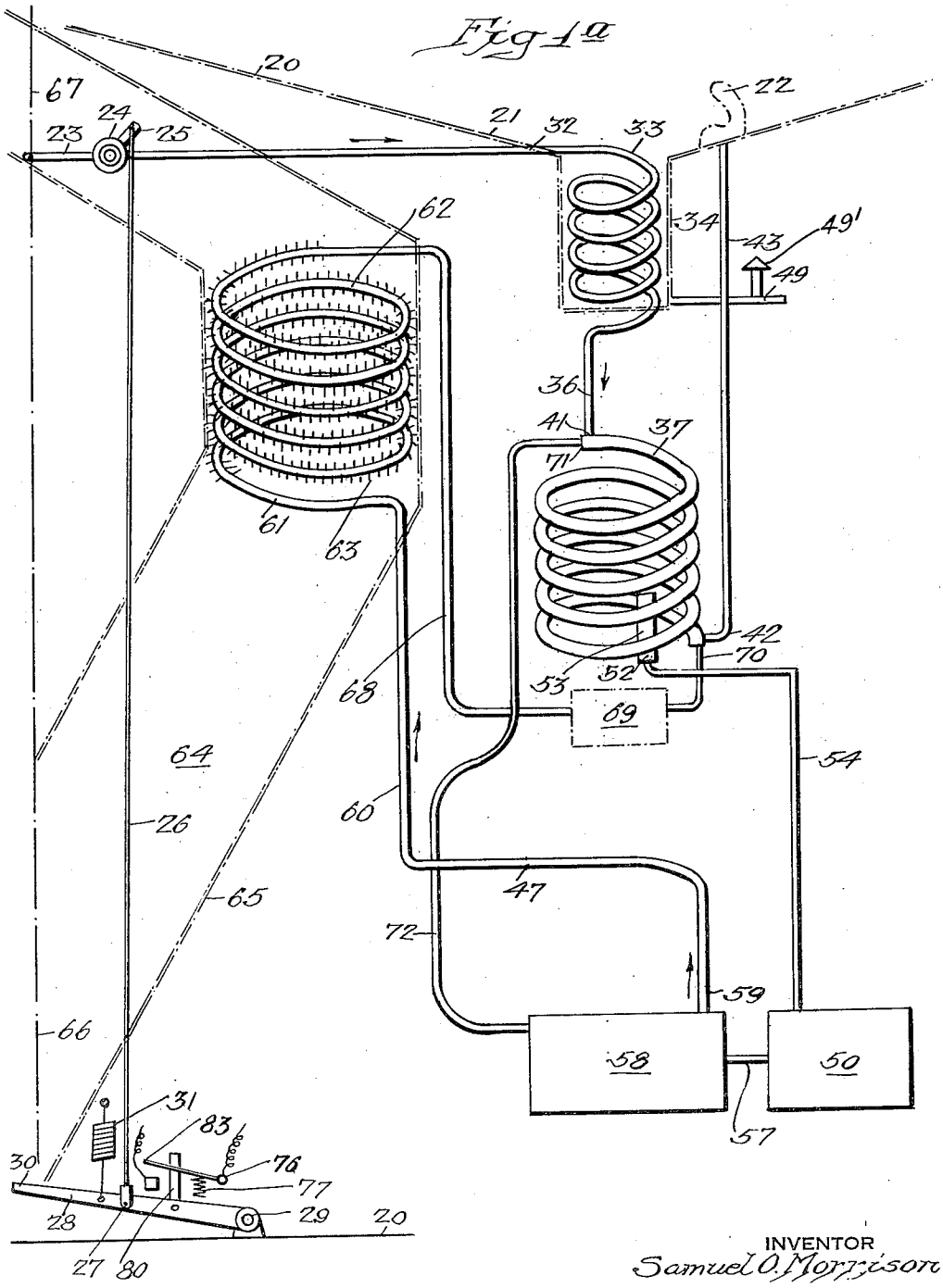
INVENTOR.
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Nov. 14, 1950 S. O. MORRISON 2,529,782

SAFETY REFRIGERATOR

Filed Sept. 12, 1947 4 Sheets-Sheet 2

Fig 1a



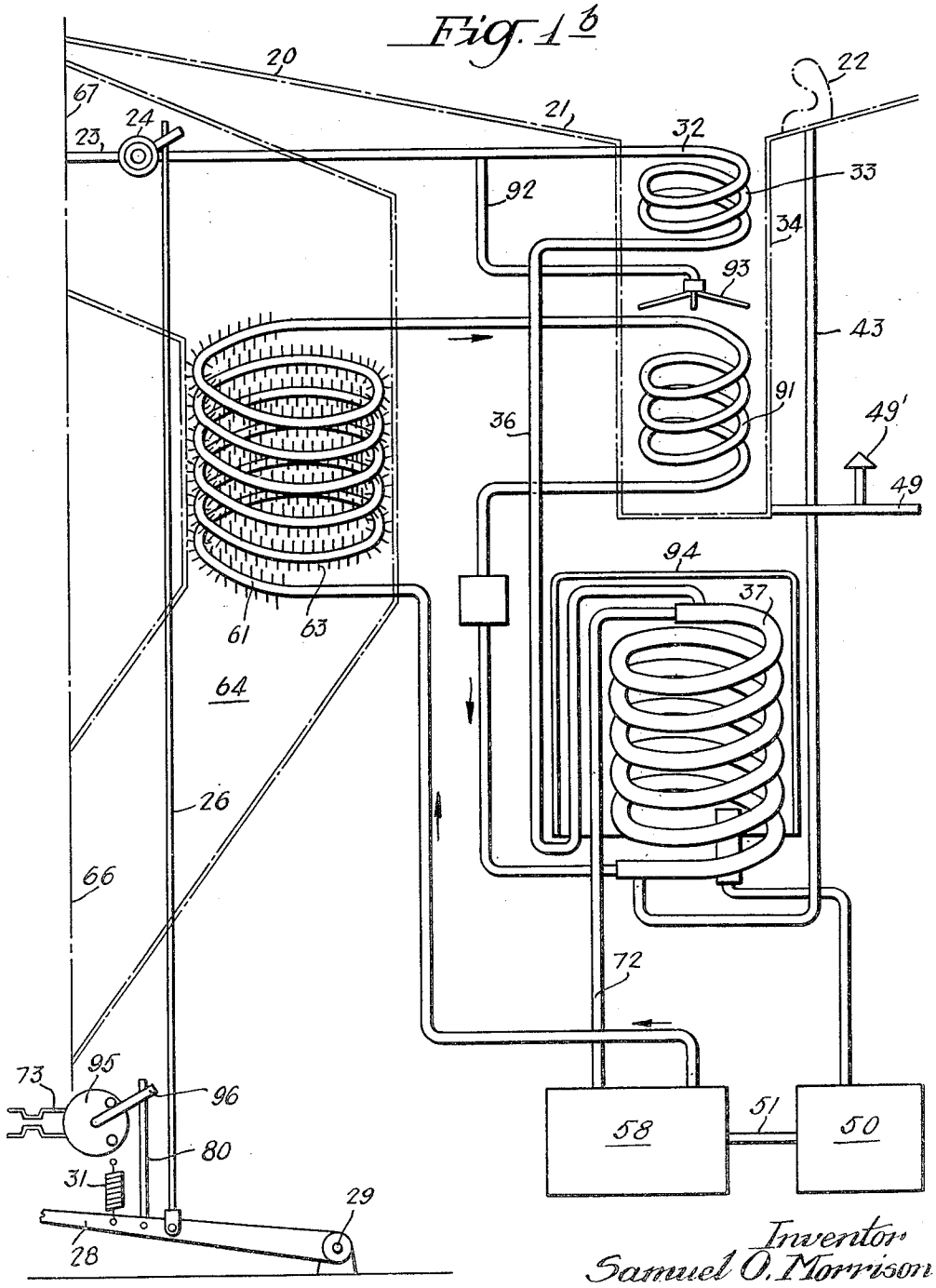
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SAFETY REFRIGERATOR

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Fig. 1b



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SAFETY REFRIGERATOR

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Fig. 2.

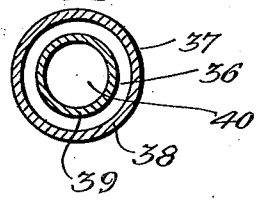


Fig. 3.

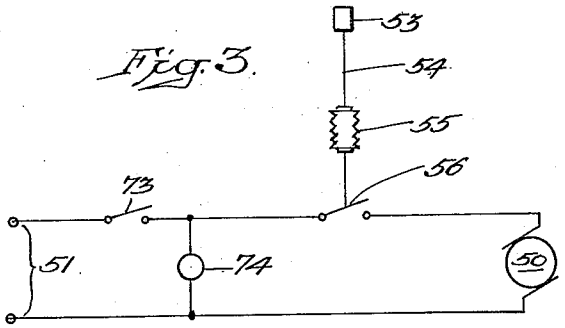


Fig. 4.

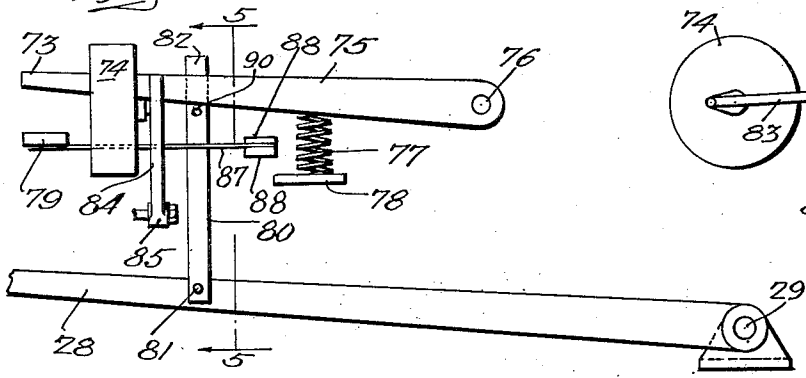


Fig. 5.

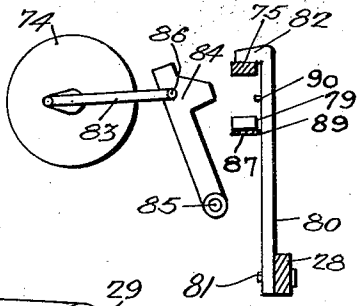


Fig. 6.

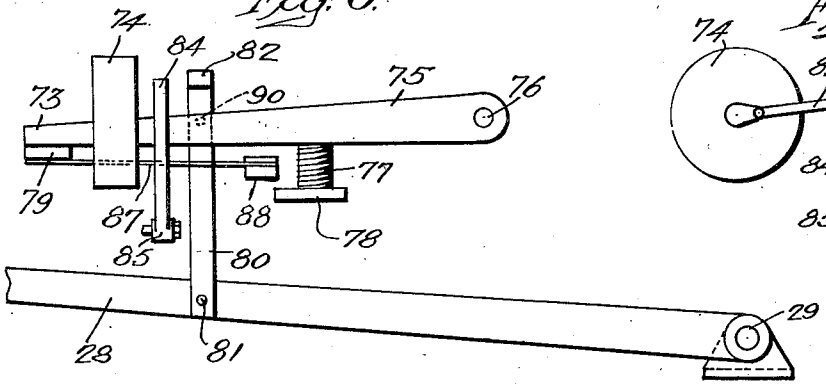
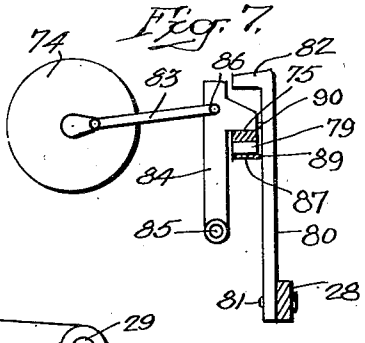


Fig. 7.



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Patented Nov. 14, 1950 2,529,782

UNITED STATES PATENT OFFICE

2,529,782

SAFETY REFRIGERATOR

Samuel O. Morrison, Media, Pa., assignor to Sunroc Refrigeration Company, Dover, Del., a corporation of Delaware

Application September 12, 1947, Serial No. 773,591

17 Claims. (Cl. 62—7)

1

My invention relates to mechanically refrigerated water coolers or drinking fountains, particularly of safety character.

A purpose of my invention is to increase the safety of mechanically refrigerated water coolers, particularly by eliminating the danger of leakage of water in case of a break in the equipment, or of fire or of other damage in case of a short circuit or other electrical failure.

A further purpose is to economize both on electricity and on water.

A further purpose is to obtain silent operation.

A further purpose is to simplify the construction of electric water coolers by eliminating the necessity for air circulating fans and water control valves used in connection with condensers.

A further purpose is to control water flow into and through the water cooler and through the dispenser entirely at the inlet to the water cooler.

A further purpose is to operate a valve at the inlet to the water cooler to admit water to the water cooler and permit it to discharge from the dispenser, and also to turn off the water from the water cooler, and by the same operator to turn on the current for the refrigeration unit and permit the current to remain on for a predetermined interval of time which will assure that current is cut off during any extended period of disuse.

A further purpose is to cool the refrigerant medium wholly or in part by a static air condenser placed in a generally vertical air flue circulating air by chimney effect without forced circulation.

A further purpose is to employ both a static air and a water cooled condenser, the water cooled condenser receiving water only at a time of use of the water cooler and the static air condenser continuing the function during periods of inactivity when the refrigeration unit is operating.

A further purpose is to supply water to the water cooled condenser from the inlet when the inlet valve is open and also from waste water from the dispenser when the dispenser is operating.

A further purpose is to turn on the water and electric current to the water cooler by a foot pedal which also controls the dispenser.

Further purposes appear in the specification and in the claims.

In the drawings I have chosen to illustrate a few only of the embodiments of my invention, choosing the forms shown from the standpoints of convenience in operation, satisfactory illustration and clear demonstration of the principles involved.

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Figure 1 is a diagrammatic illustration of a water cooler in accordance with my invention.

Figure 1[a] is a variation of Figure 1.

Figure 1[b] is a further variation.

Figure 2 is a section of the heat transfer unit on the line 2—2 of Figure 1.

Figure 3 is an electric circuit diagram.

Figure 4 is an enlarged side elevation of the valve and switch operator with the switch in open position.

Figure 5 is a section of Figure 4 on the line 5—5.

Figure 6 is a view corresponding to Figure 4 with the switch closed.

Figure 7 is a view corresponding to Figure 5 with the switch in the position of Figure 6.

In the drawings like numerals refer to like parts.

Describing in illustration but not in limitation and referring to the drawings:

In the prior art the conventional practice in water coolers is to control the flow of water by a valve connecting to the system adjacent the dispenser. In some cases air condensers are used, cooled by forced draft from a fan, and in other cases water cooled condensers are employed which control the flow of water by a water valve.

Considerable difficulties have been encountered with such prior art systems, particularly in office buildings and the like where leakage or electrical failure may do serious harm. The water valves commonly include rubber diaphragms, which are subject to normal deterioration and may fail and permit leakage causing considerable damage to the building. The user, frequently not familiar with the principle of operation of the mechanism, hearing water flow during the night or during periods of inactivity, and fearing that something is wrong or that waste is occurring, may turn off the water from the water cooler, thus preventing proper cooling of the water cooled condenser and causing it to attain an unexpectedly high pressure, resulting in breakage of the water valve or in other parts of the condenser, with resultant leakage of water or of refrigerant or of both.

From time to time also the thermostatic switches which turn the electric motor on and off have failed to function properly, resulting in a freeze-up in the cooling unit, which may cause bursting of pipes and leakage of water or of refrigerant or of both.

For this and other reasons some cities and some

office buildings have regulations requiring that water or electric current or both be turned off from all water coolers and the like before closing for the night.

The present invention relates to a water cooler having improved safety features which overcome the difficulties above referred to, and at the same time simplify and cheapen the construction, and render it more sturdy and less likely to require maintenance.

In the preferred embodiment of the present invention, the water is connected at the inlet to the water cooler only so long as the dispenser is in use and otherwise is completely turned off, so that even if a failure should occur, leakage of water from the source of supply would not be possible. Likewise in the preferred embodiment the electricity will be turned off during any extended period of nonuse, and after use will remain connected for a predetermined time interval only, after which it will again be cut off. Thus the cooler will remain in continuous operation during periods of frequent use, and cold water will be immediately available at the dispenser, but after a period of extended nonuse it will require a short interval of time to adequately cool water coming from the dispenser. Control of the inlet valve and operation of the electric switch are preferably both accomplished from a foot pedal.

The condenser function is accomplished in the preferred form without the use of any fan or positive air circulation, relying wholly or partly upon circulation of air from chimney effect over a static condenser in a generally vertical flue. Supplemental condensing is obtained in the preferred embodiment by a water cooled condenser, operating when the dispenser is operating, from the inlet water and preferably also waste water. During the times when the dispenser is not operating, reliance is placed entirely on the static air condenser until the current is cut off by the timing device.

The water cooler (sometimes called a drinking fountain) in the present invention has a frame **20** suitably shaped at **21** at the top to provide a catch basin for water from a dispenser **22**, which may suitably be of bubbler or drinking glass filler type or both as well known in the art. Inlet connection is made at **23** from a source of water, which may be a storage container or a source of domestic water supply connected to a city water system or the like, and control of flow into the water cooler is accomplished by a main cut-off valve **24** of rotary character having an operating arm **25** pivotally connected to a pull rod **26** which makes pivotal connection at the bottom at **27** to a valve operator **28** pivoted at **29** on the frame **20**. The operator carries at its outer end a foot pedal **30** for depression by the user, so that when presssure is applied to the foot pedal the valve will open and when pressure is withdrawn the valve will close under the action of tension spring **31** pulling upward on the operator. Beyond the valve water flows through a pipe **32** to a precooler coil **33**, preferably of copper or the like, located in a sump **34** in position to receive waste water from the catch basin **21**. From the bottom of the sump inlet water passes through a water passage **36** of a cooling unit **37**, preferably of tube-in-tube form as shown in Figure 2, and preferably of copper or the like. The water passage is conveniently constructed between an outer tube **38** and an inner tube **39**, joined together with suitable fittings at the end, the inner tube providing a refrigerant passage **40**.

Water enters at the inlet **41** to the water passage of the cooling unit, and discharges at the discharge **42**, conveniently flowing from top to bottom as shown. From the discharge end of the water passage, water now cooled, is passed through a pipe **43** to the dispenser **22**. It will be noted that a distinctive feature of the invention is that no local valve is employed on the dispenser, the flow of water to the dispenser being controlled by the valve **24**.

A branch pipe **44** from the water inlet is connected to the water passage **45** of a water cooled condenser **46** having a refrigerant passage **47**. In addition to the inlet water to the water cooled condenser **46** coming through the pipe **44**, water which has been cooled by the cooling unit and wasted by the dispenser is carried from the sump **34** through pipe **48** to the inlet of water passage **45** of water cooled condenser **46**.

Discharge of water from the water passage of water cooled condenser **46** to a suitable drain takes place at **49**. The drain is provided with a suitable vacuum breaker **49'**. A suitable electrically operated mechanical refrigeration unit is provided to cool the cooling unit **37**. This is conventionally indicated as including an electric motor **50** driven from a suitable current source **51** and controlled by a thermostat **52** in heat transfer relation with the water of the cooling unit, and suitably including a bulb **53** in contact with the tube-in-tube cooling unit containing an expansible fluid, connected by a pipe **54** to a bellows **55** which operates a switch **56** in the motor circuit to close the switch thermostatically when the water temperature rises to an abnormally high water temperature.

The motor is mechanically interconnected at **57** with a refrigeration compressor **58**, which produces a stream of heated and compressed refrigerant, which passes by pipe **59** to the condenser or condensers. In the form of Figure 1, the refrigerant passes first to the refrigerant passage **47** of the water cooled condenser **46**, and by pipe **60** to the refrigerant passage **61** of air cooled static condenser **62**. The refrigerant may pass through either condenser first. The condenser **62** is shown as a tube having fins **63** to suggest a finned tube, which may of course be of any desired shape. It is important to note that in the preferred embodiment no fan or forced circulation is employed in connection with the static condenser, which is located in a generally vertical flue **64** having walls **65** which extend from a bottom inlet **66** in one side (back) wall of the water cooler to an upper outlet **67** therein. I find surprisingly that a considerable air flow occurs due to the chimney effect, and this is often adequate for condenser action. The heat of the refrigerant itself greatly promotes the chimney effect.

In some embodiments I prefer to use the static air condenser and chimney exclusively without the water cooled condenser. To suggest this I show in Figure 1[a] a form identical with Figure 1 except that refrigerant flows directly from the compresser to the static condenser, and the water cooled condenser and the connections thereof are eliminated, connecting the sump directly to the drain **49**.

From the static air condenser of Figures 1 and 1[a], cooled refrigerant flows through a pipe **68** and a metering device **69** (such as a constriction or expansion valve) to a refrigerant inlet **70** of the refrigerant passage **40** of the cooling unit **37**.

From a refrigerant discharge 71 of the cooling unit, refrigerant which has suitably expanded is conducted by a pipe 72 to the opposite side of the compressor 58. In the electric circuit for the motor, toward the source with respect to the thermostatic switch, I locate a main switch 73 which when open cuts off all electric current from the water cooler. On the side of the switch 73 away from the source, in this form I locate an electric timer 74 of well known character placed in parallel across the circuit and disconnected by the switch 73. As best seen in Figures 4 to 7, inclusive, the movable switch 73 includes a switch arm 75 pivoted at 76 and spring urged at 77 from an abutment 78 away from a usually fixed contact 79. The movable contact 73 of the switch is closed by the operator 28 when depressed, by a hook connection 80 pivotally mounted at 81 on the operator and having a hook end 82 above the movable contact and in position to depress it when the operator is depressed. As soon as the switch is closed electric current flowing through the electric timer 74 actuates its operating arm 83 to push it forward as shown in Figures 6 and 7, swinging a latch 84 about its pivot 85 by a pivotal connection 86. The latch thus achieves the position shown in Figure 7, holding the contacts closed, notwithstanding that release of the operator 28 by the user permits the hook connection 80 to rise and permits the valve 24 to close. It will thus be seen that once the switch is closed it will remain closed until the timer runs through the predetermined time cycle, for example one hour, and pulls its plunger back to the position disconnecting the timer and allowing the timer to return automatically to zero, or until another user depresses the operator.

The normally fixed contact 79 is floating on a spring 87 mounted on a contact terminal 88. The spring carries a side projection 89 which is engaged by a projection 90 on the hook connection 80 to momentarily deflect contact 79 as the operator moves down.

In operation of the form of Figure 1 it will be understood that once the device is started by depressing the pedal on the operator, the inlet valve will open, permitting water to flow through the dispenser and through the water cooled condenser, and the main switch will close starting the timing device and closing the electric circuit to the motor. If the water cooler has been inactive for an extended period it will take a short interval of time to develop enough refrigeration so that cold water will come from the dispenser. The interval in the preferred embodiment will be about one and one-half minutes before adequately cooled water will arrive at the dispenser. Waste water from the dispenser in the meantime will pass over the precooler, aiding in cooling the inlet water and through the water cooled condenser. This waste water is very valuable in functioning of the system, and if the water from the dispenser or drinking glass filler is collected in a pitcher or the like, the loss of the waste water from the standpoint of precooling and condensation will be made up by the condensing action of the static air condenser in the chimney-like vertical flue.

Where the form of Figure 1[a] is employed, of course all condensation must be accomplished by the static air condenser.

In the form of Figure 1, as soon as the user removes his foot from the foot pedal, water is cut off from the water cooler and water ceases

to flow through the water cooled condenser. The static condenser then continues to function during the period of operation of the refrigeration unit permitted by the timer. During this period the motor and compressor will operate as long as the thermostatic switch is closed. Of course, due to the absence of cooling, the thermostatic switch will usually be closed during the period when the main switch is open, so that closing of the main switch will immediately start the compressor.

It will be evident that the water cooled condenser in the present invention operates without any water valve, so that difficulty through failure of a water valve cannot occur.

In case the pedal is pressed when the main switch is already closed, the action will turn on the water valve and operate the dispenser, and restart the timer on a new cycle.

The user may break the circuit momentarily whenever the operator is depressed in order to disconnect the timer, and permit it to return to zero and start over again on a new time interval, as shown in Figure 1, so that the refrigeration unit will operate continuously under control of the thermostatic switch without other substantial interruption so long as there is at least one user every hour or other time interval. To accomplish this the fixed contact 79 is floating on the spring arm 87 mounted on terminal abutment 88. At a position in line with the hook member 80 and on the side of the arm 87 is a projection 89 which lies in the path of a projection 90 on the corresponding side of the hook member 80. Thus every time the operator is depressed and the hook member moved down the projection 90 on the hook member disengages the fixed contact from the movable contact 73, for a very brief interval, breaking the circuit and causing the timer to return to zero as shown in Figure 5. The circuit is of course immediately made again, but this starts the timer on a new time interval.

Figure 1[b] illustrates certain variations in the forms of Figures 1 and 1[a] which will preferably be employed in the preferred embodiment.

In this form a water cooled condenser 91 is used, located in the sump 34 and receiving the overflow cold water from the dispenser 22 after it has passed from the precooler 33, and also receiving inlet water through the by-pass 92 whenever the valve 24 is open. The by-pass water suitably enters below the precooler and is conveniently sprayed, jetted or distributed, as by a rotary spray 93. Whereas in Figure 1 the refrigerant passes first to the water cooled condenser and then to the static condenser, in the form of Figure 1[b] it passes first to the static condenser and then to the water cooled condenser.

In the form of Figure 1[b] the heat insulation around the cooling unit is preferably made by an inverted vacuum housing 94 similar to a Dewar flask, and closed in any suitable way at the bottom, not shown.

Whereas in the forms of Figures 1 and 1[a] an electrical timer is used, in the form of Figure 1[b] I illustrate a mechanical timer 95 of the type employed in electric oven clocks (essentially of the parking meter type) in which a lever 96 is turned clockwise by the hook member 80 to start the timer and close the switch contacts 73, and the lever 96 returns progressively counterclockwise as the time elapses, but if the operator 28 is again depressed before the end of the time interval the lever 96 is pulled down to its position corresponding with a new beginning of the

time cycle. When, however, the full cycle elapses without the lever **96** being again pulled down, the device, as well known, releases the contacts **73** thus cutting off the current and terminating the operation of the compressor until the mechanism is again started by pressing down on the operator **28**.

The device of Figure 1b has the advantage that when the cycle is partly completed and the operator is again depressed the cycle will start over at the beginning without breaking the circuit, thus preventing the time delay which will occur in readjusting conditions in the refrigerant system if the circuit is broken while the compressor is operating.

The most severe condition of operation is one in which all water from the dispenser is removed, and no waste water flows to the water cooled condenser. This is taken care of by the static air condenser which will restore conditions to normal in case refrigerant pressure rises abnormally.

It will be evident that the device of the present invention is quite fool proof, since it will not be damaged in case water is turned off by the user during the night, and it will not damage the building during a period of long inactivity due to water leakage or electrical trouble.

It will be evident that the present invention may be employed with the by-pass as described in my application, Serial No. 724,636, filed January 27, 1947, for Adjustable Drinking Water Temperature Water Bleed and Process.

In view of my invention and disclosure variations and modifications to meet individual whim or particular need will doubtless become evident to others skilled in the art, to obtain all or part of the benefits of my invention without copying the structure shown, and I, therefore, claim all such insofar as they fall within the reasonable spirit and scope of my claims.

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

1. In a safety water cooler, a refrigeration unit including an electric drive and a water inlet, a dispenser connected to the unit without intermediate valve shut-off and receiving cooled water therefrom, a water valve in the inlet, a switch controlling current to the electric drive, and an operator accessible to the user in position to drink from the dispenser, mechanically interconnected with the valve and with the switch and which both closes the switch and opens the valve.

2. In a safety water cooler, a refrigeration unit including an electric drive and a water inlet, a dispenser connected to the unit and receiving cooled water therefrom, a water valve in the inlet, a switch controlling current to the electric drive, an operator which both closes the switch and opens the valve when moved in one direction and closes the valve when moved in the other direction, and time release mechanism for holding the switch closed for a predetermined time after movement of the operator and then releasing the switch.

3. In a water cooler, a cooling unit having a water passage and a refrigerant passage in heat transfer relation, means for supplying inlet water to the water passage of the cooling unit, a dispenser connected at the discharge side of the water passage of the cooling unit, a mechanical refrigeration unit including an air cooled condenser and a separate water cooled condenser having a water passage as well as a refrigerant passage, the refrigeration unit being connected to the refrigerant passage of the cooling unit, means for passing water from the inlet through the water passage of the water cooled condenser and a generally vertical air flue free from forced air circulation including the air cooled condenser and having an air inlet at a low point and an air outlet at a high point.

4. In a water cooler, a cooling unit having a water passage and a refrigerant passage, a dispenser, means for collecting waste water from the dispenser, a precooler in the means for collecting the waste water, a water inlet connection to the precooler, a water inlet connection from the precooler to the water passage of the cooling unit, a connection from the water passage of the cooling unit to the dispenser, a mechanical refrigeration unit having refrigerant connections to the refrigerant passages of the cooling unit and including an air cooled condenser and a water cooled condenser having a water passage, a generally vertical flue for carrying air over the air cooled condenser, a water connection from the inlet to the water cooled condenser and a water connection from the means for collecting the waste water to the water cooled condenser.

5. In a water cooler, a cooling unit having a water passage and a refrigerant passage, a water inlet valve, a water inlet connection from the valve to the inlet side of the water passage of the cooling unit, a dispenser, a connection from the discharge of the water passage of the cooling unit to the dispenser without intermediate valve shut-off, a mechanical refrigeration unit including an electric drive having a switch and an air cooled condenser, the refrigeration unit being connected through the condenser to the refrigeration passages of the cooling unit, walls forming a generally vertical flue including the air cooled condenser and having a lower inlet and an upper outlet and a common operator accessible to the user in position to drink from the dispenser, mechanically interconnected with the valve and also with the switch for both opening the valve and closing the switch.

6. In a water cooler, a cooling unit having a water passage and a refrigerant passage, a water inlet valve, a water inlet connection from the valve to the inlet side of the water passage of the cooling unit, a dispenser, a connection from the discharge of the water passage of the cooling unit to the dispenser, a mechanical refrigeration unit including an electric drive having a switch and an air cooled condenser, the refrigeration unit being connected through the condenser to the refrigeration passage of the cooling unit, walls forming a generally vertical flue including the air cooled condenser and having a lower inlet and an upper outlet, a common operator for opening the valve and closing the switch and time control means for delaying the opening of the switch for a predetermined time interval after the closing thereof.

7. In a water cooler, a cooling unit having a water passage and a refrigerant passage, an inlet valve, a connection from the inlet valve to the inlet side of the water passage of the cooling unit, a dispenser, a connection from the discharge side of the water passage of the cooling unit to the dispenser, an electrically driven mechanical refrigeration unit including a main switch, an air cooled condenser and a water cooled condenser having a water passage, the refrigeration unit being connected through the condensers to the refrigeration passage of the cooling unit, a generally ver-

tical air flue including the air cooled condenser, a connection from the inlet valve to the water passage of the water cooled condenser, a discharge from the water cooled condenser and an operator for opening the valve and closing the switch.

8. In a water cooler, a cooling unit having a water passage and a refrigerant passage, an inlet valve, a connection from the inlet valve to the inlet side of the water passage of the cooling unit, a dispenser, a connection from the discharge side of the water passage of the cooling unit to the dispenser, an electrically driven mechanical refrigeration unit including a main switch, an air cooled condenser and a water cooled condenser having a water passage, the refrigeration unit being connected through the condensers to the refrigeration passage of the cooling unit, a generally vertical air flue including the air cooled condenser, a connection from the inlet valve to the water passage of the water cooled condenser, a discharge from the water cooled condenser, an operator for opening and closing the valve and closing the switch and time controlled mechanism for opening the switch after a predetermined time interval from the closing thereof.

9. In a water cooler, a cooling unit having a water passage and a refrigerant passage, an inlet valve, a connection from the inlet valve to the inlet side of the water passage of the cooling unit, a dispenser, a connection from the discharge side of the water passage of the cooling unit to the dispenser, an electrically driven mechanical refrigeration unit including a main switch, an air cooled condenser and a water cooled condenser having a water passage, the refrigeration unit being connected through the condensers to the refrigeration passages of the cooling unit, a generally vertical air flue including the air cooled condenser, a connection from the inlet valve to the water passage of the water cooled condenser, a discharge from the water cooled condenser, means for collecting waste water from the dispenser and supplying the same to the water passage of the water cooled condenser, an operator for opening and closing the valve and closing the switch and time delay mechanism for opening the switch after a predetermined interval from the time of closing the switch.

10. In a water cooler, a cooling unit having a water passage and a refrigerant passage, a water inlet valve, a precooler connected to the water inlet valve, a connection from the opposite side of the precooler to the inlet of the water passage of the cooling unit, a dispenser, a connection from the discharge of the water passage of the cooling unit to the dispenser, a sump surrounding the precooler and collecting waste water from the dispenser, an electrically operated mechanical refrigeration unit, including an air cooled condenser and a water cooled condenser having a water passage and including an electric switch which when open cuts off all current from the water cooler, walls forming a generally vertical flue including the air cooled condenser and having a lower and an upper outlet, a connection from the valve to the water passage of the water cooled condenser at the inlet, a connection from the sump to the water passage of the water cooled condenser at the inlet, a discharge for the water passage of the water cooled condenser, and an operator for opening the valve and closing the switch.

11. In a water cooler, a cooling unit having a water passage and a refrigerant passage, a water inlet valve, a precooler connected to the water inlet valve, a connection from the opposite side of the precooler to the inlet of the water passage of the cooling unit, a dispenser, a connection from the discharge of the water passage of the cooling unit to the dispenser, a sump surrounding the precooler and collecting waste water from the dispenser, an electrically operated mechanical refrigeration unit, including an air cooled condenser and a water cooled condenser having a water passage and including an electric switch which when open cuts off all current from the water cooler, walls forming a generally vertical flue including the air cooled condenser and having a lower inlet and upper outlet, a connection from the valve to the water passage of the water cooled condenser at the inlet, a connection from the sump to the water passage of the water cooled condenser at the inlet, a discharge for the water passage of the water cooled condenser, an operator for opening and closing the valve and closing the switch, and time delay mechanism for opening the valve after a predetermined time interval from the closing thereof.

12. In a water cooler, a cooling unit having a water passage and a refrigerant passage, an inlet connection to the water passage, a dispenser, a discharge connection from the water passage to the dispenser, a mechanical refrigeration unit having a main switch and having connection to the refrigerant passage of the cooling unit, an operator for closing the switch, time delay means for holding the switch closed for a predetermined interval after it is closed and means for resetting the time delay means at the beginning of a new cycle every time the operator closes the switch.

13. In a water cooler, a cooling unit having a water passage and a refrigerant passage, an inlet connection to the water passage, a dispenser, a discharge connection from the water passage to the dispenser, a mechanical refrigeration unit having a main switch and having connection to the refrigerant passage of the cooling unit, an operator for closing the switch, time delay means for holding the switch closed for a predetermined interval after it is closed and means for opening the switch to reset the time delay means on a new cycle every time the operator closes the switch.

14. In a water cooler, a cooling unit having refrigerant passages and water passages, an inlet water connection to the water passages, a dispenser, an outlet water connection from the cooling unit to the dispenser, a sump for receiving overflow water from the dispenser, a mechanical refrigeration unit having refrigerant connection to the refrigerant passages of the cooling unit, a water cooled condenser in the sump partially cooled by the overflow water from the dispenser and connected to the mechanical refrigeration unit and a by-pass water connection from the inlet for pouring water over the water cooled condenser in the sump.

15. In a water cooler, a cooling unit having refrigerant passages and water passages, an inlet water connection to the water passages, a dispenser, an outlet water connection from the cooling unit to the dispenser, a sump for receiving overflow water from the dispenser, a mechanical refrigeration unit having refrigerant connection to the refrigerant passages of the cooling unit, a water cooled condenser in the sump partially cooled by overflow water from the dispenser and connected to the mechanical refrigeration unit, an air cooled condenser also connected to the mechanical refrigeration unit and a by-pass con-

nection from the water inlet for introducing inlet water into the sump above the water cooled condenser.

16. In a water cooler, a cooling unit having refrigerant passages and water passages, an inlet water connection to the water passages, a dispenser, an outlet water connection from the cooling unit to the dispenser, a sump for receiving overflow water from the dispenser, a mechanical refrigeration unit having refrigerant connection to the refrigerant passages of the cooling unit, a water cooled condenser in the sump partially cooled by overflow water from the condenser and connected to the mechanical refrigeration unit, a by-pass water connection from the inlet to the sump and means for spraying water from the by-pass over the condenser in the sump.

17. In a water cooler, a cooling unit having refrigerant passages and water passages, an inlet water connection to the water passages, a dispenser, an outlet water connection from the cooling unit to the dispenser, a sump for receiving overflow water from the dispenser, a mechanical refrigeration unit having refrigerant connection

to the refrigerant passages of the cooling unit, a precooler in the sump and connected in the inlet water system ahead of the cooling unit, a water cooled condenser in the sump below the precooler, subjected to cooling in part by the overflow from the dispenser after it has passed over the precooler and connected to the mechanical refrigeration unit and a by-pass water connection to the sump at a level below the precooler and above the water cooled condenser.

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