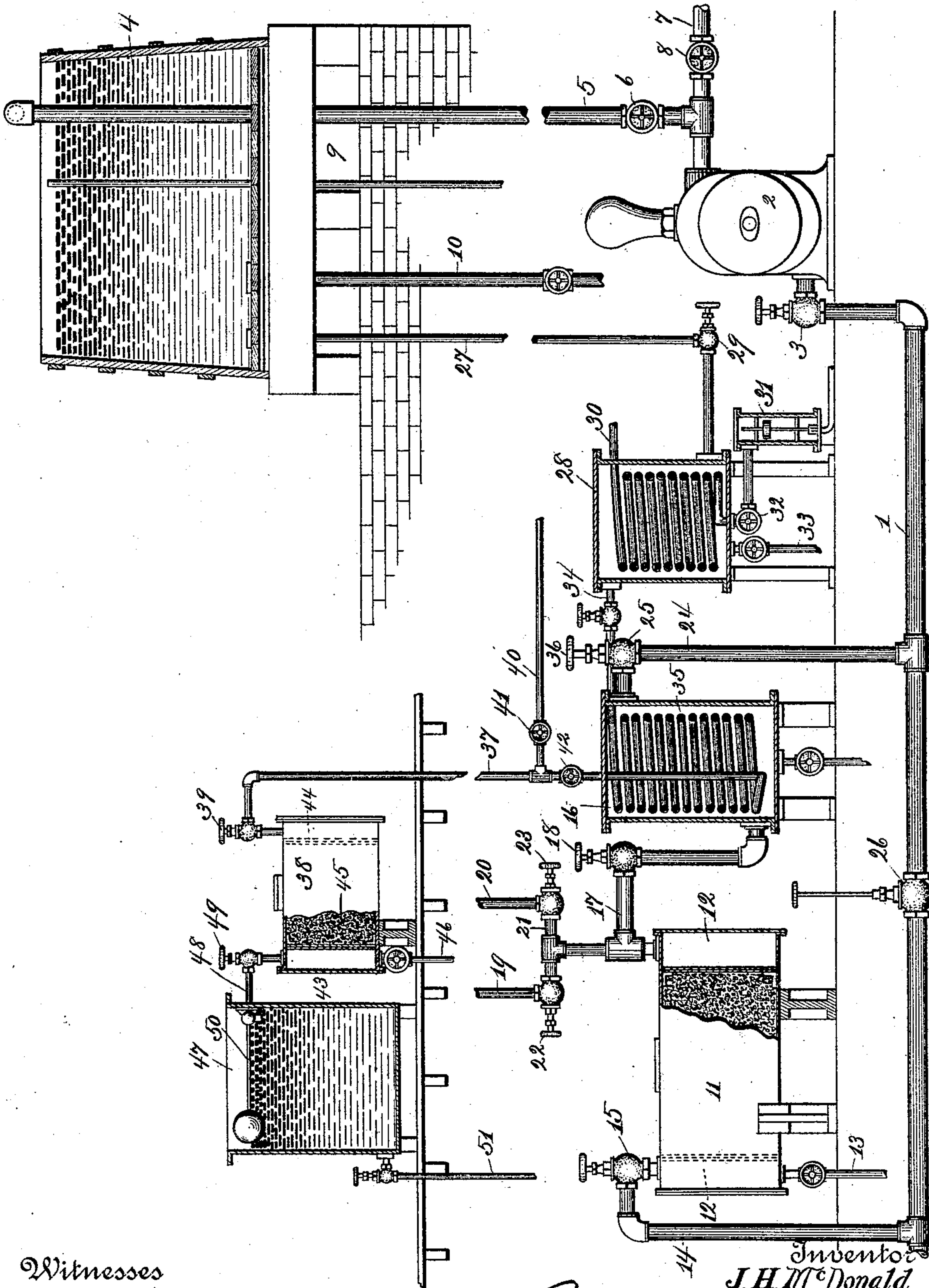


(No Model.)

J. H. McDONALD.
APPARATUS FOR PURIFYING WATER.

No. 517,552.

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Witnesses

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APPARATUS FOR PURIFYING WATER.

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To all whom it may concern:

Be it known that I, JOSEPH H. McDONALD, of the city, county, and State of New York, have invented a certain new and useful Apparatus for Purifying Water, of which the following is a specification, reference being had to the accompanying drawing.

The object of my invention is to produce a simple and efficient apparatus which will more effectually and thoroughly filter, sterilize and decolorize water than those now in use.

In the accompanying drawing I illustrate in side elevation my apparatus, portions of the working parts being shown in cross section.

Referring to the figures on the drawing, 1 indicates a water supply pipe of ordinary kind communicating with a main, for example, supplying water of the ordinary unfiltered kind generally found in cities.

2 indicates an ordinary pump, and 3 a valve controlling the flow of water in the pipe 1 to the pump.

4 indicates a tank, and 5 a tank supply pipe controlled by valve 6. A pipe 7, adapted ordinarily to lead to a boiler, not shown, is illustrated, and a boiler pipe valve 8 controlling the flow of water through the same.

It will be perceived that my apparatus is shown as applied to an ordinary system for supplying water to a building. Therefore, in addition to the parts just described, I show an overflow-pipe 9, and a general water-supply pipe 10 communicating with the tank. These parts, it should be understood, do not enter into the substance of my invention, but are illustrated to show the applicability of my apparatus to water systems now generally employed.

11 indicates a filter case, carried on suitable supports and provided within it with a separate compartment containing suitable filtering medium, as for instance granulated coke. Chambers 12, at opposite ends of the case, are provided for the reception of impure and filtered water, respectively. One of the chambers, 12, is preferably provided with a wash-out 13 at its lower end, and communicates at its upper end through a pipe 14 with the pipe 1. A valve 15 controls the supply of water from the pipe 14 into its chamber 12.

16 indicates a cooling-chamber, which, through a pipe 17, receives the water discharged from the filtered water-chamber 12. 18 indicates a valve controlling the flow of water through the pipe 17.

19 and 20 indicate cleaning pipes communicating through a common pipe 21 with the pipe 17. The pipes 19 and 20 are controlled by valves 22 and 23. The steam and water pipes 19 and 20, also valves 22 and 23, are intended for sterilizing and cleaning the filter in an opposite direction from that in which the water passes through the filter, so as to loosen and wash-out the matter arrested by the filtering medium. The filtered water entering the cooling chamber 16 is conducted through a pipe 24 back to the pipe 1. A valve 25 controls the flow through the pipe 24.

26 indicates a valve located between the pipes 14 and 24, and adapted to interrupt the flow of water through the pipe 1 and direct it through the pipe 14, the filter-case 11, the pipe 17, the cooling chamber 16, and the pipe 24, back to the pipe 1. When, therefore, the valve 26 is closed, the water following the course just described enters the pipe 1 in a filtered condition, and is thence pumped up into the tank 4, ready for general use.

27 indicates a pipe communicating with the tank 4 and discharging into a sterilizer, as for example a boiler 28, the flow of water through it being controlled by a valve 29.

The boiler is heated by suitable means, as for example a coil of steam pipe 30 communicating with a boiler, not shown. The steam-pipe discharges into an automatic steam-trap 31, as for example a float-valve trap, illustrated.

32 indicates a valve for shutting off steam from the trap.

33 indicates a boiler wash-out.

34 indicates a pipe adapted to convey water from the interior of the boiler around the steam coil into a coil 35 contained in the cooling chamber. A valve 36 controls the flow of the hot water into the cooling chamber coil.

37 indicates a pipe for conveying the cooled water to a decolorizing chamber 38. This pipe is controlled by valve 39. A steam-pipe 40 communicating with a source of steam, not illustrated, controlled by a valve 41, prefer-

ably communicates with the pipe 37. This steam-pipe is designed as a means of blowing out and cleansing the decolorizer, reservoir, and valve-controlled pipe 51 and its connections. For that purpose I employ a valve 42 below the junction of the pipe 40 with the pipe 37.

The decolorizing chamber is preferably constructed substantially after the manner of the filter—that is to say, with compartments 43 and 44, respectively, at its opposite ends, and an intermediate compartment 45 for containing any suitable decolorizing material, as for example animal charcoal. A wash-out 46 is also preferably provided in it. The decolorizer communicates with a suitable reservoir 47, as through a pipe 48 controlled by a valve 49. The valve 49 is intended for stopping the flow when the reservoir is to be disconnected and repaired, for example, or for other certain purposes; but for the proper operation of the apparatus I provide a float-valve 50, which automatically shuts off the supply of water to the reservoir 47 when the water in that reservoir is on a certain level. If, therefore, a sufficient quantity of water is supplied to this reservoir the float-valve will shut off the flow through the apparatus and interrupt its operation until such time as more water is required in the reservoir. A valve-controlled pipe 51 delivers the water in its pure state.

The several parts of the apparatus are shown on different levels, which are supposed to be floor, ground, and wall lines, respectively.

When my apparatus is in operation the valves 15 and 25, which are closed when water is being pumped elsewhere than to the tank 4, or through pipe 7 to boiler, not shown, are opened and the valve 26 is closed; then, as above indicated, the flow of water passes through the pipe 14 into the filter, and thence in its filtered state passes through the pipe 17 into the cooling chamber 16, whence, passing back into the pipe 1, it is pumped up into the tank 4. Thence, through the pipe 27, it is conducted into the boiler 28, where it is boiled, as by the steam pipe 30, and is thence conducted into the coil 35. The water circulates through the numerous turns of the coil, and by the time it is delivered to the pipe 37 it is reduced from the boiling temperature to the temperature of the surrounding water in the cooling chamber 16. It is therefore delivered into the decolorizer in a cooled state, whence it is discharged filtered, sterilized, and decolorized into the reservoir 47.

My apparatus consists substantially of enlarged sections of the delivery pipe, comprehending the several apparatus for thoroughly purifying it. It should be observed in this connection that in my apparatus water is delivered into the filter in a cooled state; and that before it is delivered to the decolorizer it is reduced to substantially the same tem-

perature. In this way the best results are obtained.

The several valves controlling the flow of water through the pipes connecting the filter, the cooler, the boiler, and the decolorizer, are in practice generally employed for the purpose of using the cleaning pipes specified, and which will be readily understood from an inspection of the drawings without more specific description.

I do not desire to limit myself to the details of construction herein shown and described, but reserve to myself the right to change, modify or vary them at will within the scope of my invention.

What I claim is—

1. In an apparatus for purifying water, the combination with a supply-pipe and tank, of a filter, a cooling chamber adapted to receive water from the filter, pipes connecting the supply-pipe with the filter and with the cooling chamber, and means whereby the water may be passed through the filter into and through the cooling chamber and thence to the tank, a boiler communicating with said tank, a coil within the cooling chamber communicating with the boiler, a decolorizer communicating with said coil, a reservoir communicating with said decolorizer, and a steam coil within said boiler, whereby the filtered water, after acting as the cooling medium by circulation around the coil in the cooling chamber, is boiled by circulating around the steam coil in the boiler and is cooled by passing through the coil in the cooling chamber, substantially as and for the purpose specified.

2. The combination with a supply-pipe, filter and cooling chamber, of pipes connecting the opposite ends, respectively, of said filter with the supply-pipe and with the bottom of the cooling chamber, a pipe connecting the top of said cooling chamber with said supply-pipe, and a coil communicating with the boiler and entering the cooling chamber at its top, whereby the circulation of the water within the coil, and that within the chamber, will be in opposite directions, substantially as and for the purpose specified.

3. In an apparatus for purifying water, the combination with a supply pipe, of a filter and cooler, pipes connecting the opposite ends, respectively, of said filter with said supply-pipe and the lower end of said cooling chamber, a pipe connecting the upper end of said cooling chamber with said supply-pipe, a tank connected to said supply-pipe, a boiler containing a steam coil connected to said tank, a coil within said cooling chamber connected to said boiler, a decolorizer connected to said coil, a reservoir connected to said decolorizer, and a valve in the supply-pipe between the connections of said supply-pipe with the filter and cooling chamber whereby when the valve is closed the water will circulate through the entire apparatus, but when the valve is open will pass to the tank, boiler, decolorizer and

finally the reservoir, when it is desired, as for use in cooking, to merely boil and decolorize the water, substantially as and for the purpose specified.

5 4. In an apparatus for purifying water, the combination with a supply-pipe, filter and cooling chamber, pipes connecting the opposite ends, respectively, of said filter, with the supply-pipe and the lower end of said cooling
10 chamber, a pipe connecting the upper end of said cooling chamber with the supply-pipe, a boiler operatively connected at its lower end with said supply-pipe, a coil within said cooling chamber entering at the upper end thereof
15 and connected to the upper end of the boiler, a pipe adapted to convey the water from the opposite end of said coil, and a steam coil within said boiler, entering at its upper end whereby water is adapted to circulate from
20 the bottom to the top of said boiler around the steam coil and in an opposite direction to the circulation of the steam therein, and to circulate through the coil in the cooling chamber in an opposite direction to the circulation
25 of the cooling medium therein, substantially as and for the purpose specified.

5 5. In an apparatus for purifying water, the combination with a supply-pipe, filter, cooling chamber and boiler operatively connected, of
30 a coil within said cooling chamber communicating with said boiler, a decolorizer connected at its opposite ends to said coil and to a reservoir by means of valve controlled pipes, of a valve controlled steam pipe communicat-

ing with the pipe connecting the coil with the decolorizer, and a wash-out at the opposite end of said decolorizer, whereby the circulation of the water through said decolorizer may be prevented and a jet of steam passed therethrough in a direction opposite to the
40 usual flow of water, substantially as and for the purpose specified.

6. The combination with a supply-pipe, filter, cooling chamber, tank, boiler, decolorizer, and reservoir operatively connected, of a
45 valve adapted to regulate the flow of water into the reservoir, and adapted to be operated by the level of the water in said reservoir, whereby the lowering of the level of the water
50 by drawing off a portion of the same for use automatically causes the circulation of the water through the cooling chamber for the purpose of cooling the advanced current passing through the cooling chamber in the opposite direction to supply the reservoir, said
55 advanced current having been boiled previous to its entrance into said cooling chamber, and whereby, by the raising of the level, the circulation through the entire apparatus is suspended, substantially as and for the purpose
60 specified.

In testimony of all which I have hereunto subscribed my name.

JOSEPH H. McDONALD.

Witnesses:

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ALEXANDER GILKINSON.