M. B. CRESSWELL.

WATER PURIFIER AND OIL SEPARATOR.

APPLICATION FILED SEPT. 9, 1910.

990,959.

Patented May 2, 1911.

3 SHEETS—SHEET 1.

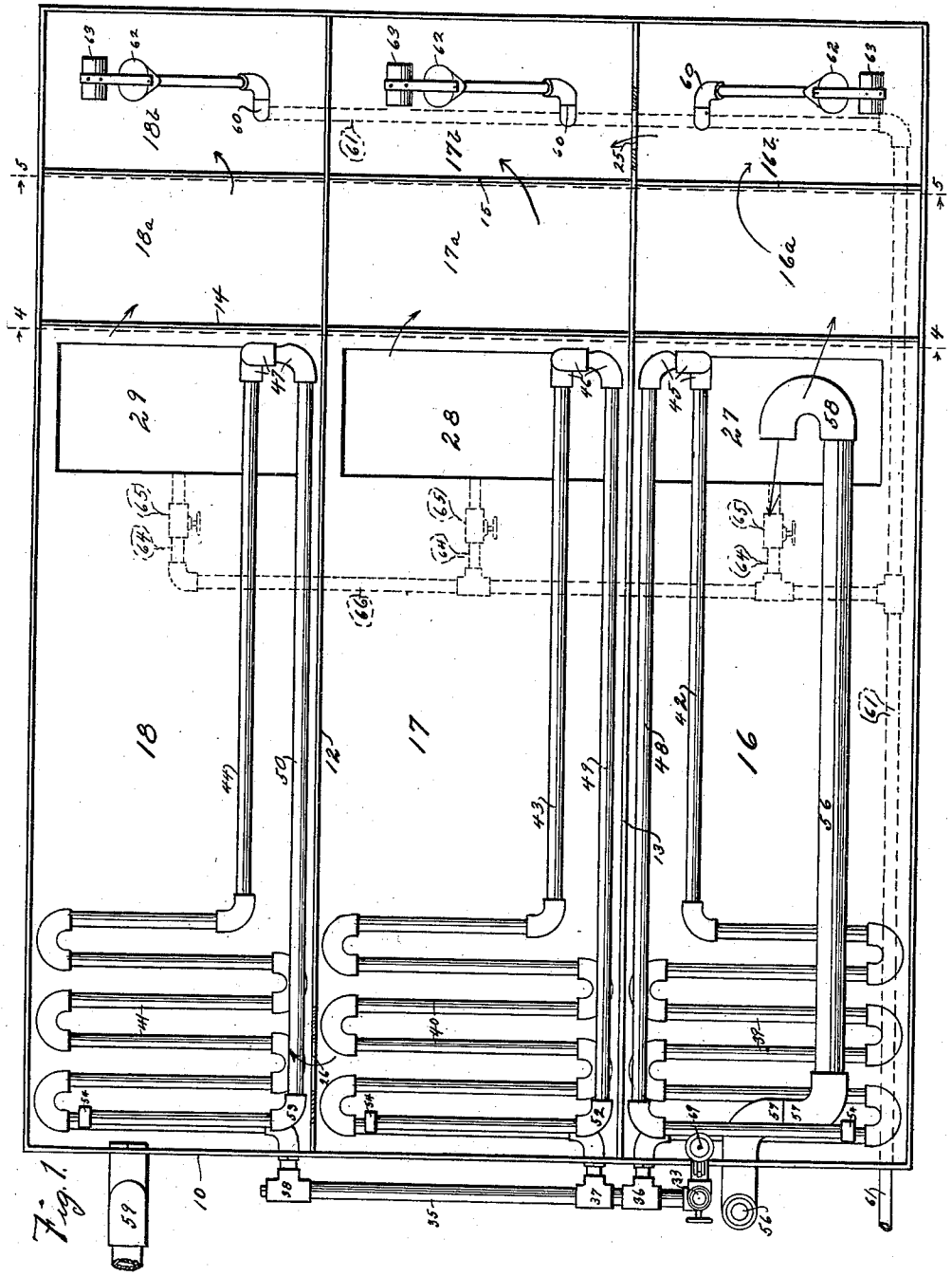

Fig. 1.

Witnesses
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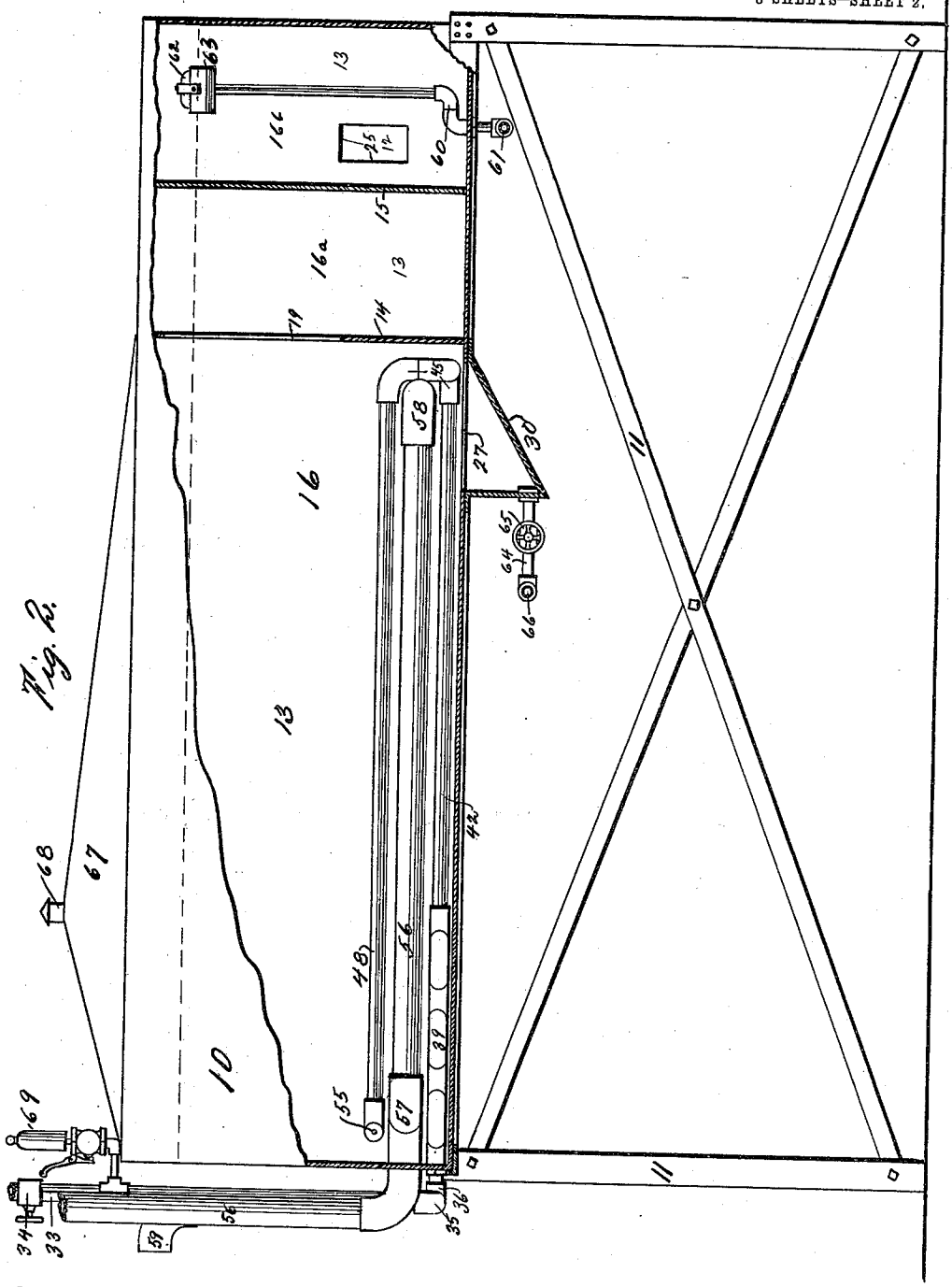

Fig. 2.

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3 SHEETS—SHEET 3.

Fig. 3

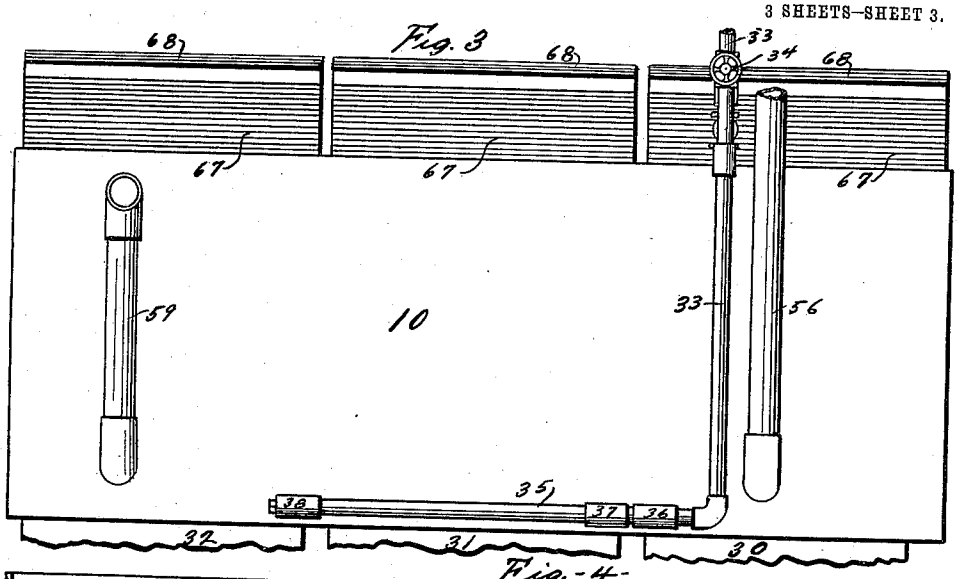


Fig. 4.

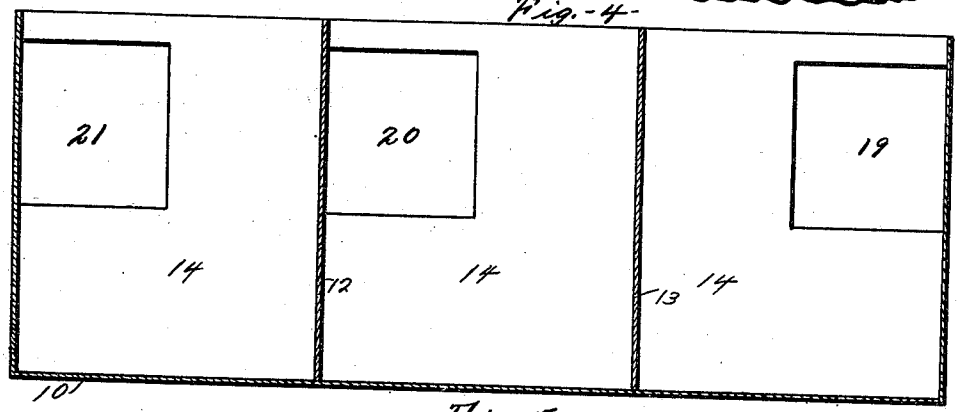
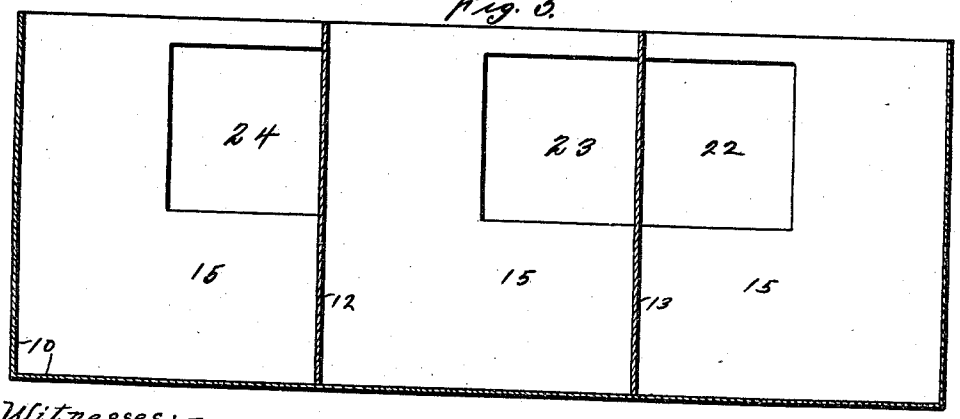


Fig. 5.



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UNITED STATES PATENT OFFICE.

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WATER-PURIFIER AND OIL-SEPARATOR.

990,959. Specification of Letters Patent. Patented May 2, 1911.

Application filed September 9, 1910. Serial No. 581,228.

To all whom it may concern:

Be it known that I, MILTON B. CRESSWELL, a citizen of the United States, and resident of Des Moines, Polk county, Iowa, have invented a new and useful Water-Purifier and Oil-Separator, of which the following is a specification.

The object of this invention is to provide improved means for separating oleaginous substance, sediment, and organic matter from water.

A further object of this invention is to provide improved means for separating oleaginous substance, organic matter, impurities and other undesirable ingredients from water during the operation of boiling such water.

My invention consists in the construction, arrangement and combination of elements hereinafter set forth, pointed out in my claim and illustrated by the accompanying drawing, in which—

Figure 1 is a plan of my improved device, the covers being removed. Fig. 2 is a side elevation, partly in section, of the device shown in Fig. 1. Fig. 3 is an end elevation of the same. Fig. 4 is a vertical section on the indicated line 4—4 of Fig. 1. Fig. 5 is a vertical section on the indicated line 5—5 of Fig. 1.

In the construction of the device as shown the numeral 10 designates a tank, preferably rectangular in form and made of sheet metal. The tank 10 preferably is mounted on a suitable frame 11. The tank 10 preferably is divided longitudinally by two partitions 12, 13 and transversely by two partitions 14, 15 thereby forming three comparatively large compartments 16, 17, 18 and six relatively small compartments 16^a, 16^b, 17^a, 17^b, 18^a, 18^b. The partitions 12, 13, 14, 15 are of the same height as the walls of the tank 10. Openings 19, 20, 21 are formed in the partition 14 and afford communication between the chambers 16 and 16^a, 17 and 17^a, 18 and 18^a respectively. Openings 22, 23, 24 are formed in the partition 15 and afford communication between the chambers 16^a and 16^b, 17^a and 17^b, 18^a and 18^b respectively. An opening 25 in the partition 13 affords communication between the compartments 16^b and 17^b. An opening 26 in the partition 12 near the opposite end of the tank 10 from the opening 25 affords communication between the compartments 17 and 18.

For purposes of explanation we will consider the end of the tank where the piping enters through the end wall the forward end or front thereof. In the rear end of the compartments 16, 17, 18 openings 27, 28, 29 are formed in the bottom of the tank 10, each opening being nearly as long as the compartment is wide and its length extending transversely of such compartment. The width of each opening 27, 28, 29 is much less than its length. Sediment pockets or receptacles 30, 31, 32, preferably triangular in cross-section, are rigidly secured to and adjacent the under side of the bottom of the tank 10, directly below the openings 27, 28, 29. It is to be understood that this joint is water tight. A steam pipe 33 leads from a source of steam supply (not shown), is controllable by a valve 34, and supplies live steam to a distributing pipe 35 located near the lower margin of the front wall of the tank 10. The distributing pipe 35 is provided with tees 36, 37, 38 opening toward the front wall of said tank. Steam coils 39, 40, 41 are located in the forward end portions of the compartments 16, 17, 18 respectively and adjacent the bottom thereof. The forward ends of said coils pass through the front wall of the tank 10 and enter the tees 36, 37, 38 respectively. The rear end portions of the coils 39, 40, 41 are connected to heating pipes 42, 43, 44 respectively. The heating pipes 42, 43 extend rearwardly between the median lines of the chambers 16, 17 respectively and the partition 13 and the heating pipe 44 extends rearwardly between the median line of the chamber 18 and the partition 12 to points near the transverse partition 14, and terminate in couplings 45, 46, 47. Heating pipes 48, 49 are located adjacent opposite sides of the partition 13 and a heating pipe 50 adjacent the partition 12 in the chamber 18. The pipes 48, 49, 50 lie in a plane somewhat above the pipes 43, 44 and the steam coils 39, 40, 41. The heating pipes 48, 49, 50 are connected at their rear ends to the couplings 45, 46, 47 and extend forward nearly to the front wall of the tank 10 where they turn, through the ells 51, 52, 53 respectively, and run transversely of the compartments 16, 17, 18 and terminate in caps 54. The caps 54 are formed with central jet openings 55 of common form.

A water inlet pipe 56 enters the front wall of the tank 10 into the compartment 16, offsets through couplings 57, and extends rearwardly between the median line of the

chamber 16 and the side wall of the tank 10, being somewhat nearer the median line and in a plane between the steam coil 39 and the heating pipe 48, and terminates in a return 58. A water outlet pipe 59 enters the front wall of the tank 10 into the compartment 18 on about the same relative plane as the inlet pipe 56.

Couplings 60 are mounted on and extend through the bottoms of the compartments 16^b, 17^b, 18^b and connect to a common pipe 61 which extends transversely of and beneath the rear end portion of the tank 10 to a point near one side thereof, thence longitudinally and inclined slightly downwardly toward the forward end, and thence to a sewer or other waste receptacle. Skimmers 62^a are swiveled to the couplings 60 and are provided with floats 63 which maintain said skimmers in their proper relations with the surface of the water. Pipes 64, controllable by valves 65, lead from the front walls at the bottoms of the sediment pockets 30, 31, 32 to a common pipe 66 which connects to the pipe 61 and provides an outlet from the sediment pockets to the sewer or waste receptacle. The compartments 16, 17, 18 are provided with covers 67, said covers being formed with perpendicular sides and sloping top. The tops slope from each end upward and terminate in ventilating caps 68 which are located much nearer the forward ends of the compartments. A whistle 69 is supplied from the steam pipe 33 and is connected by common means to a float in a storage tank (not shown). It is the function of the whistle 69 to automatically signal the operator when the water goes below a certain level.

In the practical operation of this device water, such as distilled water used in the manufacture of artificial ice, is admitted into the compartment 16 through the pipe 56 and return 58. The water flows through the opening 19 into the compartment 16^a, through the opening 22 into the compartment 16^b, through the opening 25 into the compartment 17^b, through the opening 23 into the compartment 17^a, through the opening 20 into the compartment 17, through the opening 26 into the compartment 18, through the opening 21 into the compartment 18^a and through the opening 24 into the compartment 18^b. When the water has reached the desired level the valve 34 is opened and steam is admitted to the distributing pipe 35 and thence to the steam coils 39, 40, 41 and the heating pipes 42, 43, 44, 48, 49, 50. The arrangement of the steam coils 39, 40, 41 and the forward ends of the heating pipes 48, 49, 50, together with such exhaust steam as comes through the jet openings 55 in the caps 54, tends to create an intense boiling of the water in the forward portions of the compartments 16, 17, 18. The heating pipes 42—48, 43—49, 44—50 tend to create a boiling of the water directly over them, but not so intense as the boiling in the extreme forward ends of their respective compartments. The boiling in the forward ends creates quite a perceptible current or circulation of the water rearwardly at the top and forwardly adjacent the bottom. The current flows rearwardly in the compartment 16 through the upper part of the opening 19 into the compartment 16^a and thence through the opening 22 into the compartment 16^b. It is well here to call attention to the staggered relation of the openings 19—22, 20—23, 21—24. This arrangement tends to break the rapid flow of the current and causes the water to rest comparatively quietly in the chambers 16^b, 17^b and 18^b. As there are no steam coils or heating pipes in the compartments 16^a, 16^b the water is permitted to cool and drop and return as an undercurrent through the lower part of the opening 22, through the chamber 16^a, through the lower part of the opening 19 and across the opening 27 into the sediment chamber 30, back to the forward end of the compartment 16 to be again boiled and sent rearwardly as above described. The purpose of the heating pipes 42, 48 in slightly boiling the water above them is to create a slight countercurrent transversely of the compartment, which tends to direct the floating impurities toward the opening 19. The operation in the compartments 17, 17^a, 17^b and in the compartments 18, 18^a, 18^b is exactly the same as in the compartments 16, 16^a, 16^b above described. I wish to call attention here to the location of the openings 19, 20, 21, 22, 23, 24, which have their lower margins considerably above the bottom of the tank 10. This provides a quiet body of comparatively cool water in the lowermost portions of the compartments 16^a, 16^b, 17^a, 17^b, 18^a and 18^b over which the returning currents must ride, thus raising them so that they must flow just beneath the upper currents. This enables the under currents to catch the particles of sediment which have been set free in the process of boiling and are carried back by the upper currents until they begin to cool and are precipitated. The under currents carry these particles back to the sediment pockets, as they drop over the lower edges of the holes 19, 20, 21 in the partition 14 downward and forward across the openings 27, 28, 29 into said sediment pockets 30, 31, 32. The valves 65 normally are closed and are opened only when necessary to drain the sediment out of the pockets 30, 31, 32. Oil or other impurities lighter than water will be carried back by the upper current and skimmed off by the skimmers 62. Whatever volatile matter may be in the water will be evaporated during the process of boiling

and will be carried off with the escaping steam through the ventilators 68 in the covers 67. It has been found by experiment that the greater part of the sediment will be deposited in the sediment pockets 30, 31, 32 as the water passes downwardly and forwardly through the openings 19, 20, 21. The remainder will be deposited on the bottoms of the compartments and may be cleaned out by hand at long intervals.

Upon starting the machine the water will be no purer in one compartment than in another, but after the amount of water necessary to fill two-thirds of the machine has been drawn off through the pipe 59 the water in the compartments 17, 17^a, 17^b will have been purified to a certain extent in the compartments 16, 16^a, 16^b, and it is the function of the compartments 17, 17^a, 17^b to further purify such water or take out what impurities have been left therein after the first operation. The water reaching the compartments 18, 18^a, 18^b will have passed through two cleansing operations and be very nearly pure upon entering the compartments 18, 18^a, 18^b, and it is the function of said compartments to remove any remaining impurities, if any there be. In cases where the water does not contain a very great percentage of impurities one operation may be sufficient and then a machine embodying only the compartments 16, 16^a, 16^b could be employed; while if two operations were necessary the machine should contain the compartments 16, 16^a, 16^b, 17, 17^a, 17^b. In very extreme cases it may be necessary to increase the operations beyond three by one or more, and in that event a machine embodying a correspondingly increased number of compartments should be employed, and I do not wish to be understood as limiting myself to any specific number of operations or compartments.

I claim as my invention—

An apparatus of the class described, comprising a tank formed with one or more main compartments, communication between said compartments, each of said compartments being very much longer than its width and being subdivided at one end by partitions with openings therein for communication, said partitions forming small sub-chambers one of which contains a skimmer mounted to automatically adjust itself to the level of the water, steam coils and heating pipes mounted in the end opposite to the end containing the sub-chambers and arranged to give a severe boiling in the extreme end opposite the sub-chambers and a less severe boiling along one side nearly to the first sub-chamber, sediment pockets communicating with and depending from the bottom of the main chambers, drainage means connecting the skimmers to the sewer or other waste receptacle, valvularly controlled drainage means connecting the sediment pockets to sewer or waste receptacle, and supply pipes for the steam coils and heating pipes, the whole apparatus equipped with a water supply pipe discharging reversely over the steam coils of one main compartment and a water discharge pipe leading from one compartment.

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