

Sept. 17, 1929.

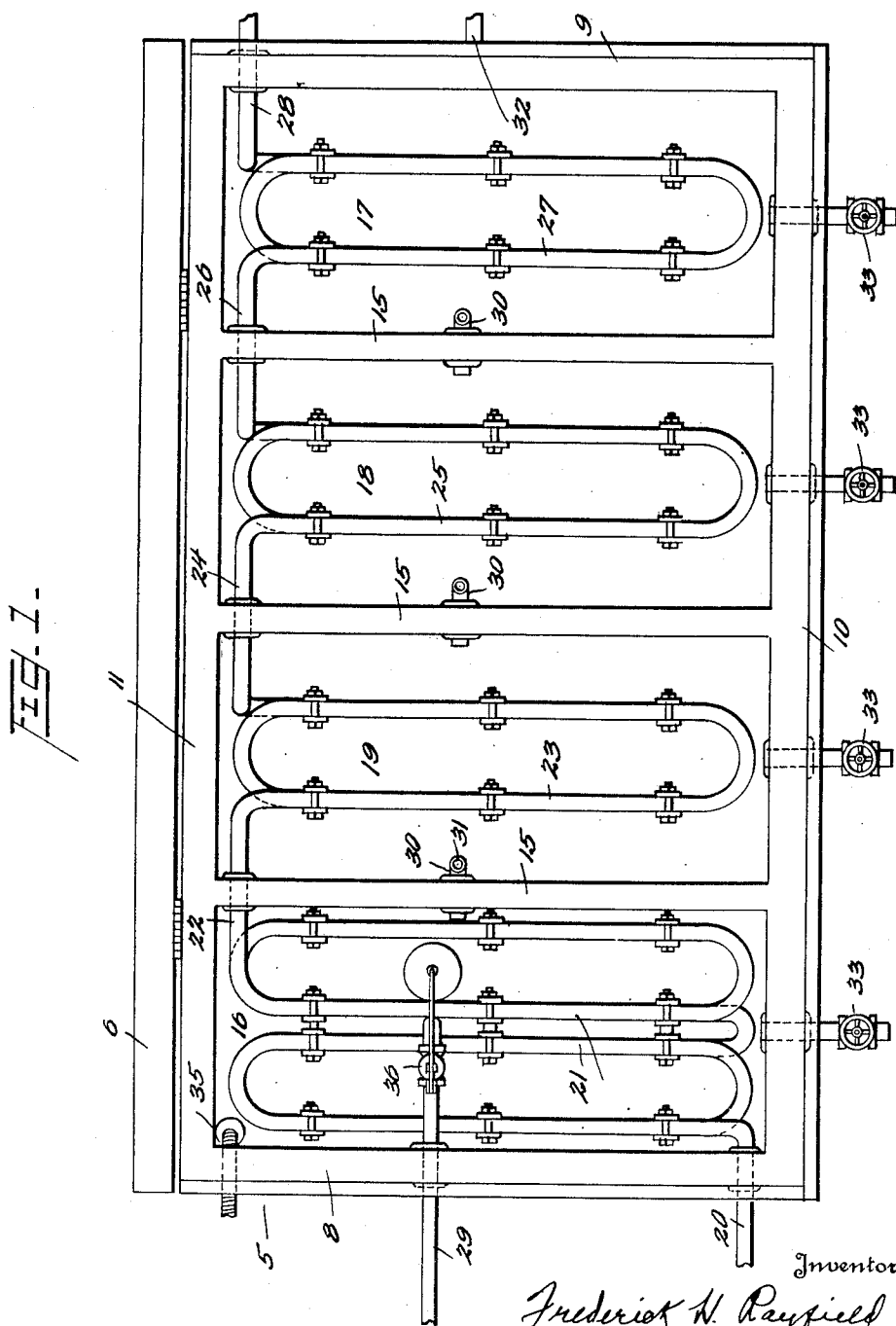
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REFRIGERATING DEVICE

Filed June 9, 1928

2 Sheets-Sheet 1



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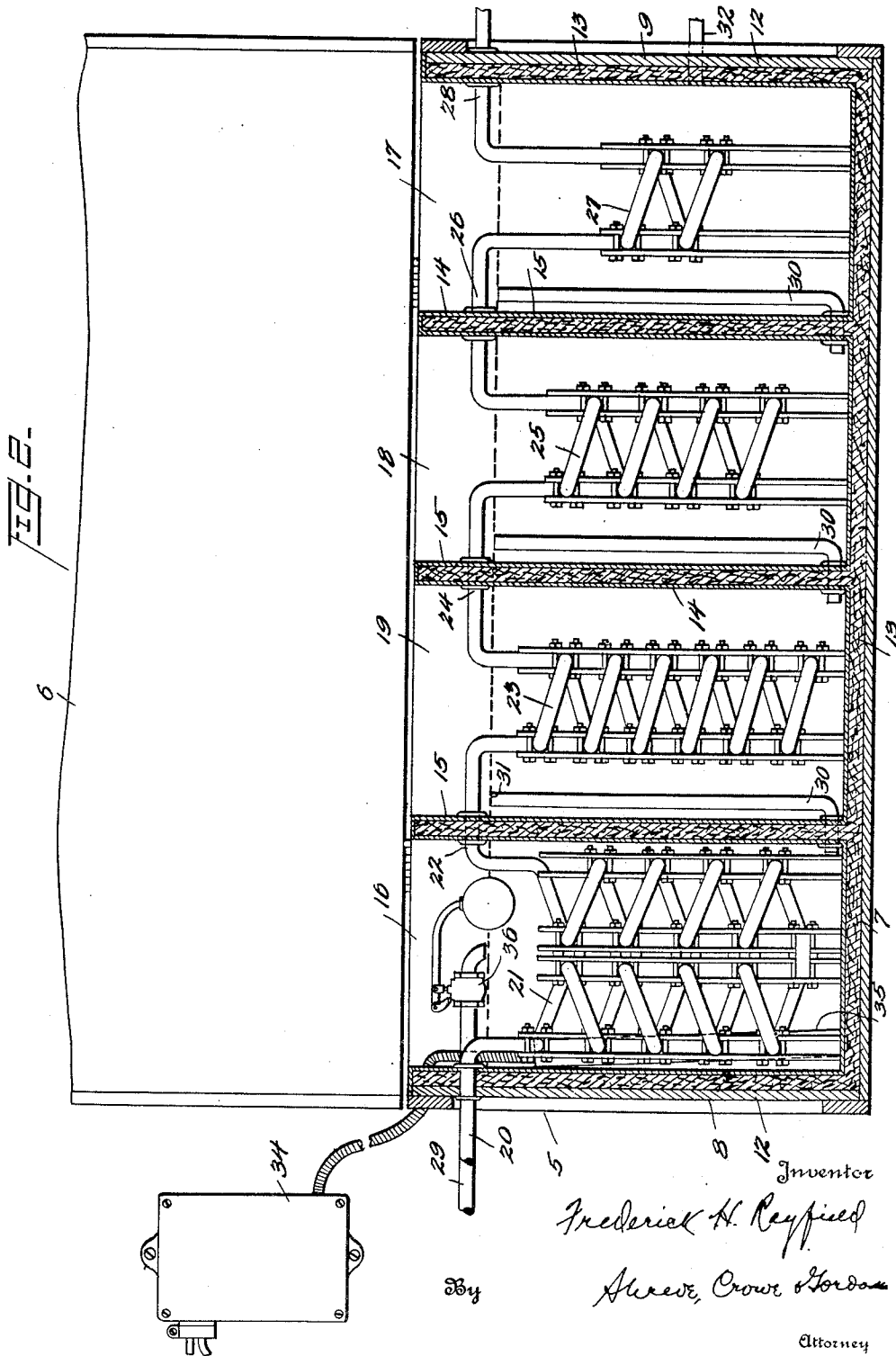
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## UNITED STATES PATENT OFFICE

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## REFRIGERATING DEVICE

Application filed June 9, 1928. Serial No. 284,198.

Generically this invention relates to a refrigerating device, but it is more especially directed to the type employed in connection with the carbonation of beverages such as soft drinks.

A principal object of this invention is the provision of a refrigerating device of this character adapted to effect constant uniform temperature of the water as it is delivered to the carbonator, irrespective of variations in the temperature of the water as it enters said device.

A further important object is the provision of a refrigerating device of this character comprising a plurality of communicating compartments having a refrigerating coil in each compartment, each of said coils being of proportionate length.

A still further object is the provision of a refrigerating device having a plurality of intercommunicating refrigerating compartments, one of said compartments being an inlet compartment, and another an outlet compartment, a refrigerating coil positioned in each compartment, the length of each of the coils diminishing proportionately from the inlet to the outlet compartment, and a thermostat and float valve means associated with the inlet compartment by which the flow of water into the device and operation of refrigerating units is automatically controlled.

Still another object is the provision of a refrigerating device of this character having a plurality of refrigerating chambers and means for progressively conducting water from the bottom of one chamber and delivering it to the top of the next chamber.

With these and other objects in view, which will become apparent as the description proceeds, the invention resides in the construction, combination and arrangement of parts, hereinafter more fully described and claimed, and illustrated in the accompanying drawings, in which like characters of reference indicate like parts throughout the several figures, of which:

Fig. 1 is a top plan view of my improved refrigerating device with the cover in open position; and

Fig. 2 is a longitudinal section through the device illustrated in Fig. 1.

In devices of this character with which I am familiar, it has been impossible to deliver water to a carbonator at a uniform temperature under varying operating conditions, in that, either the water would not be cold enough or too cold, and it being impossible to maintain the water at a constant temperature at the outlet end of the device owing to the formation of excessive ice on the coils or on the bottom of the chamber, thereby interfering with the operation of the device and rendering it necessary to shut down in order to thaw or chip away such ice formations; and it was to overcome such deficiencies, and to provide a device capable of cooling and delivering water or other liquids therefrom at a predetermined uniform temperature, irrespective of changes in differential temperature between the water to be cooled as it enters the device and the refrigerating coils, and means for automatically maintaining the water level within the device and controlling the operation of the refrigerating units forming the subject matter of this invention, and which I accomplish by providing a plurality of compartments, each compartment being provided with a refrigerating coil, said coils proportionately diminishing in length from the inlet to the outlet chambers.

In the illustrated embodiment characterizing this invention there is shown a tank 5 comprising lid 6, bottom 7, ends 8 and 9, respectively, and sides 10 and 11 respectively, said elements being formed of an outer layer of wood 12, an inner metal lining, such as galvanized iron 13, and a filling or sheet of cork 14 intermediate 12 and 13, as an insulating medium. While, of course, the tank 5 may be provided with any number of partitions 15 formed of any suitable material, and having a lining of metal forming a continuation of lining 13, in the present instance, three partitions are employed, forming an inlet or normal water compartment 16, and an outlet or cold water compartment 17, and intermediate compartments 18 and 19.

A pipe 20 for conducting ammonia or other refrigerant from a suitable source of supply

extends through end 8 and comprises a coil 21 positioned within chamber 16 and then extends through partitions 15 as at 22, constituting coil 23 in chamber 19 and thence into chamber or compartment 18, as at 24, constituting coil 25 therein, and therefrom into chamber 17 as at 26, constituting coil 27, and thence through end 9, as at 28, back to compressor or source of supply not shown.

It will be observed that coil 21 has a greater number of coil lengths, and therefore a greater refrigerating capacity, than coil 23, and similarly coil 25 is formed proportionately shorter in coil length than coil 23, and coil 27 than coil 25; in other words, each of the coils beginning at coil 21, is proportionately shorter and of less refrigerating capacity than the preceeding coil through each of the chambers to coil 27 in outlet chamber 17, the temperature of the water thus being graduated downwardly from inlet chamber 16 to outlet chamber 17 where it reaches the proper temperature.

The water or other liquid to be cooled enters chamber 16 through inlet pipe 29, and is cooled by coil 21, and it is then delivered from the bottom of chamber 16 through overflow pipe 30 extending through partition 15, and thence upwardly to a point spaced from the top of the tank as at 31, a similar overflow pipe 30 is positioned in each of the partitions 15 so that the water or other liquid to be cooled flows from the bottom of one compartment and is delivered at the top of the succeeding compartment. It will thus be seen that by this manner of circulating the water or other liquid through the various compartments a relative temperature differential may be maintained substantially constant within the respective compartments, irrespective of the flow of water or other liquid at a normal temperature into chamber 16, thereby through the proportionate refrigerating units successively ratioed in direct proportion to the temperatures of the water in the respective chambers, and to the thickness of ice accumulation on the refrigerating units, it is possible to discharge the water from outlet 32 at a substantially constant predetermined temperature without the accumulation of excessive ice upon the coils or the interior of the tank as is now prevalent. Also, though the outlet pipe 32 may be positioned at any desired point, it has been found preferable to position the same at a point substantially central of the end 9, from which point the cooled water is delivered directly to the carbonator or to any desired container.

Of course it is to be understood that the device is not limited to any particular number of compartments or respectively proportioned coil lengths, but for purposes of illustration in a tank such as described, adapted to contain approximately 400 gallons divided into four compartments, it has been

found preferable to employ approximately 54 feet of coil in compartment 16, 32 feet in compartment 19, 14 feet in compartment 18, and 6 feet in compartment 17, the diameter of the coil pipe being 1 inch.

Each compartment is provided adjacent its bottom with drain cocks 33, for a purpose well understood.

A suitable thermostat 34 for controlling the refrigerating units according to a predetermined temperature, is suitably located adjacent the tank with the thermostat element 35 positioned centrally within the compartment 16, and a suitable float valve mechanism 36 is connected to the inlet 29 within compartment 16 to maintain the desired water level therein, and being of conventional design, further description is thought to be unnecessary.

When water is removed from compartment 17 through outlet pipe 32, resulting in the lowering of the level of water in compartment 17, which allows water to flow through overflow pipe 30 which in turn lowers level of water in compartment 18, which allows water to flow through pipe 30 which in turn lowers level of water in compartment 19, which allows water to flow through pipe 30 which in turn lowers level of water in compartment 16 which in turn lowers float connected to valve 36, same 36 opens and admits normal temperature water into compartment 16 through inlet pipe 29. The result is that the normal temperature water comes in contact with the thermostat element 34 which reacts and starts the refrigerating unit or units and said units continue to operate throughout the period water is being removed from outlet compartment 17, or until water in compartment 16 is reduced in temperature to the predetermined low setting of the thermostat, at which time it is shut down as above outlined.

Although in practice I have found that the form of my invention illustrated in the accompanying drawings and referred to in the above description as the preferred embodiment, is the most efficient and practical; yet realizing the conditions concurrent with the adoption of my invention will necessarily vary, I desire to emphasize that various minor changes in details of construction, proportion and arrangement of parts, may be resorted to within the scope of the appended claims without departing from or sacrificing any of the principles of this invention.

Having thus described my invention, what I desire protected by Letters Patent is as set forth in the following claims:

1. A refrigerating device including a tank for containing a liquid to be cooled and comprising a plurality of compartments, the compartment at one end of the device having an inlet and the compartment at the other end an outlet, a refrigerating coil positioned in

each of said compartments proportionately diminishing in length from the inlet to the outlet compartments, means for successively conducting the liquid to be acted on from the bottom of one compartment to the top of the adjacent compartment.

2. A refrigerating device including a tank for containing a liquid to be cooled having a plurality of partitions adapted to form a plurality of compartments, an inlet opening in one end of the device and an outlet opening in the other, a refrigerating coil positioned in each of said compartments proportionately diminishing in length from the inlet to the outlet openings, means positioned in each of the partitions for successively conducting the liquid from the bottom of one compartment to the top of the adjacent compartment.

3. A refrigerating device including a tank for containing a liquid to be cooled having a plurality of partitions adapted to form a plurality of compartments, an inlet opening in one end of the device and an outlet opening in the other, a refrigerating coil positioned in each of said compartments proportionately diminishing in length from the inlet to the outlet openings, means positioned in each of the partitions for successively conducting the liquid from the bottom of one compartment to the top of the adjacent compartment, means for automatically controlling the refrigerating coils within a predetermined temperature range, and additional means for automatically controlling the flow of liquid into the device.

4. A refrigerating device for containing a liquid, including a tank of predetermined liquid capacity having inlet and outlet openings and comprising a plurality of compartments, a refrigerating coil positioned within each compartment, said coils proportionately diminishing in refrigerating capacity from the inlet to the outlet openings according to the liquid capacity of the tank.

5. A refrigerating device including a tank of predetermined dimensions for containing a liquid, having inlet and outlet openings and comprising a plurality of communicating compartments, a refrigerating coil positioned within each compartment, each of said coils proportionately diminishing in refrigerating capacity from the inlet to the outlet openings according to the dimensions of the tank.

6. A refrigerating device including a tank of predetermined dimensions for containing a liquid to be cooled and comprising a plurality of compartments, the compartment at one end of the device having an inlet and the compartment at the other end an outlet, a refrigerating coil positioned in each of said compartments proportionately decreased in refrigerating capacity from the inlet to the outlet compartments according to the dimensions of the tank, and means for conducting the liquid from one compartment to the other.

7. A refrigerating device including a tank of predetermined dimensions for containing a liquid to be cooled, having a plurality of partitions adapted to form a plurality of compartments, an inlet opening in one end of the device and an outlet opening in the other, a refrigerating coil positioned within each of said compartments proportionately diminishing in refrigerating capacity from the inlet to the outlet openings according to the dimensions of the tank, means associated with each of the partitions for successively conducting the liquid from the bottom of one compartment to the top of the adjacent compartment.

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