Sept. 4, 1923. 1,467,246

G. HILGER

REFRIGERATING APPARATUS AND METHOD FOR SODA FOUNTAINS

Filed April 22, 1920 2 Sheets-Sheet 1

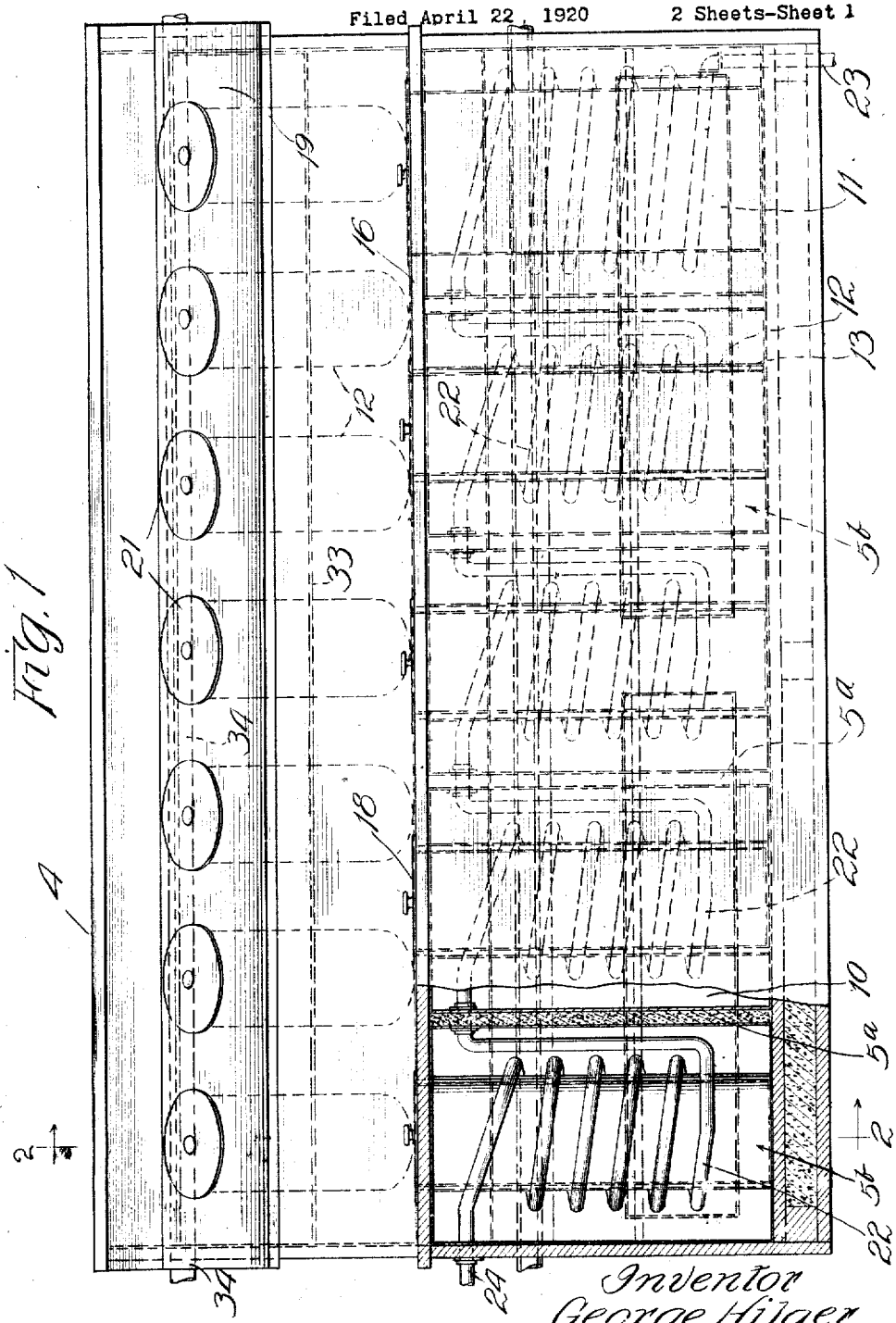


Fig. 1

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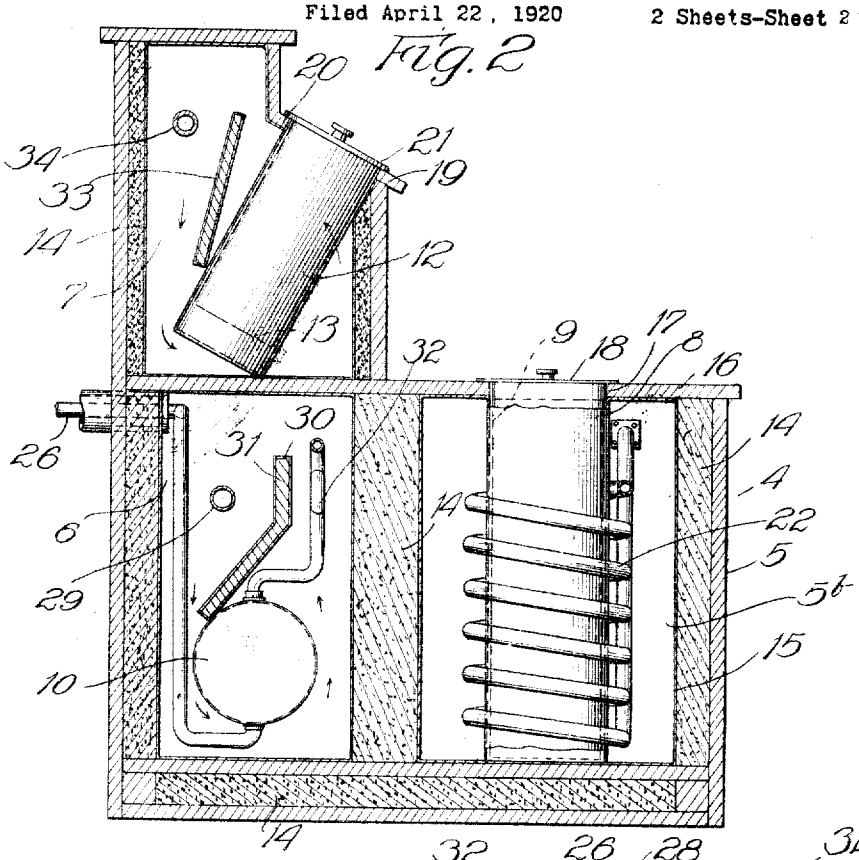
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Fig. 2



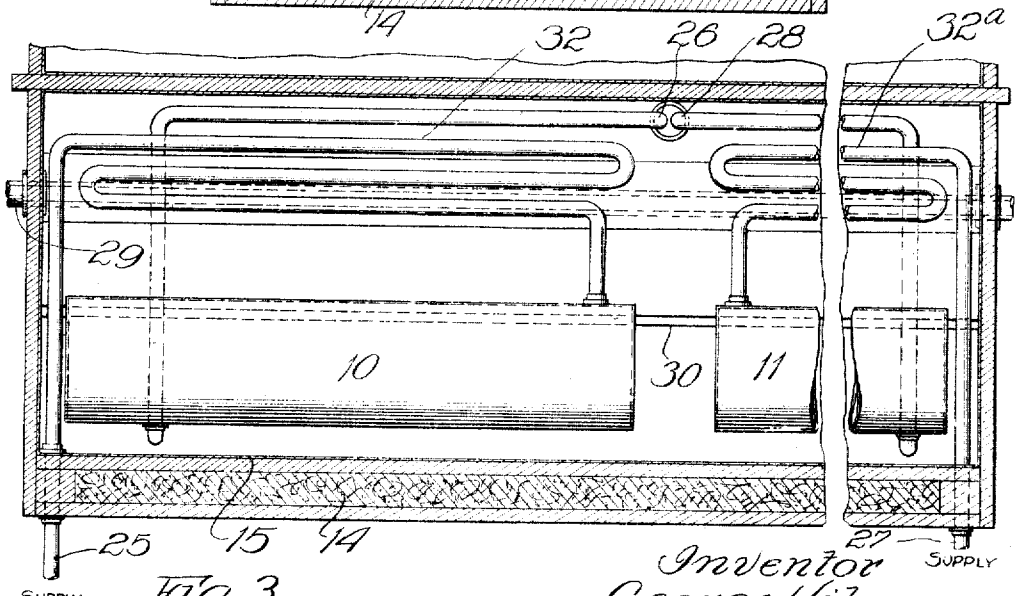


Fig. 3

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UNITED STATES PATENT OFFICE.

GEORGE HILGER, OF CHICAGO, ILLINOIS.

REFRIGERATING APPARATUS AND METHOD FOR SODA FOUNTAINS.

Application filed April 22, 1920. Serial No. 375,698.

To all whom it may concern:

Be it known that I, GEORGE HILGER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Refrigerating Apparatus and Methods for Soda Fountains, of which the following is a specification.

The invention relates to refrigerating or cooling apparatus for soda fountains and the like, and has for its general aim the provision of a system which is economical, sanitary and otherwise of a very efficient character.

More specifically, one object of the invention is to provide in such an apparatus permanent receptacles for receiving ice cream cans, flavoring containers and the like, which receptacles are subjected to the action of a cooling medium but adapted to maintain the containers therein clean and dry.

A further object of the invention is to provide improved means for cooling the liquids to be dispensed, including the carbonated water, the drinking water and the flavoring liquids.

A further object of the invention is to provide an improved method of cooling the ice cream receptacles so as to maintain the contents of the receptacles at the proper temperature and hence the proper degree of hardness as determined by the order in or temperature at which they are served or dispensed.

The invention resides primarily in providing a soda fountain or other refrigerating device with separate chambers which are singly accessible for the storage or dispensing of food products, and the provision of means operable intermittently to simultaneously refrigerate said chambers, said means serving to obtain and substantially maintain any desirable range of temperatures in said chambers, or an unequal amount of refrigeration in said chambers, or both. The refrigeration can be varied to conform to the requirements of the individual chambers.

The refrigeration of the chambers is obtained by the use of cooling media, such as brine, and the variation of refrigeration in said chambers is obtained by regulating the densities of the brine solutions in the separate chambers, and properly controlling the cooling of these solutions by a single agent. The provision of means which operates to produce the required refrigeration in each of the chambers simultaneously for a predetermined period of time is highly convenient and economical of time and energy.

It is well known that if salt solutions having different densities below that of the cryohydrate are cooled, crystals of pure ice will begin to form at different temperatures corresponding to the densities of the brine, and that more crystals of pure ice will continue to separate out of solution as the temperature is lowered until the cryohydric point is reached. Thus in brine composed of 10%, 15% and 20% salt, pure ice will begin to form at temperatures of plus 18° F., 11° F., and 0° F., respectively. Since the amounts of pure ice that can be formed before the solidification of the cryohydrates vary inversely with the densities of the brine, it is obvious that more pure ice will separate out of a weak salt solution than out of a strong salt solution. In my invention this principle is utilized by providing weaker brines for the particular chambers whose refrigerating requirements are greatest, or whose temperatures are to be maintained at the highest points.

The specific heats of water, brine and ice are relatively small as compared with the heat of fusion of ice, and consequently if the refrigerant for the brine, preferably ammonia, passes through the system until a certain amount of slush ice is formed, a variable amount of refrigeration in the different chambers is obtained. Thus the temperatures will vary with the densities and will not change rapidly or very much while the ice melts. After most of the ice is melted, the ammonia can again be turned on. By regulating the flow of ammonia through the chambers which are in series, the amount of ice which is formed in each chamber can be made the same, in which condition the chambers will be maintained at different temperatures but with approximately the same amount of refrigeration.

The objects of the invention thus set forth together with other and ancillary advantages may be attained by the construction and arrangement illustrated in the accompanying drawings forming part hereof, in which Figure 1 is a front elevation of a storage or supply case for soda fountains equipped with my invention, a portion of

the casing being broken away to show structural features. Fig. 2 is a vertical transverse sectional view taken on line 2—2 of Fig. 1. Fig. 3 is a fragmentary longitudinal section through the case showing details of construction.

Generally stated, the apparatus herein shown comprises a casing 4 constructed to provide a forward lower chamber or compartment 5, a rear lower chamber 6, and a rear upper chamber 7. The compartment 5 is divided into a plurality of chambers 5^b each having therein a permanent receptacle 8 for ice cream cans 9 or other containers for solid matter to be maintained in a frozen state. In the chamber 6 are provided a tank 10 for carbonated water and a tank 11 for drinking water. The chamber 7 is provided with a plurality of permanent receptacles 12 generally similar to the receptacles 8 of the chambers 5^b but adapted to receive containers 13 for fruit juices, extracts, and other flavoring liquids.

The compartment 5 and chambers 6 and 7 are suitably insulated from each other and from the outer atmosphere by means of cork 14 or other preferred insulating material, and each of the chambers is provided with an inner metallic lining 15 to render the chambers liquid-tight. As shown in Fig. 1, the compartment 5 is divided by partitions 5^a into a plurality of separate chambers 5^b one for each of the receptacles 8. The forward portion 16 of the top wall of the casing 4, which forms the upper wall of the compartment 5 is provided with a plurality of openings 17, one for each chamber 5^b, closed by means of covers 18; and the upper rear portion of the casing in which is formed the chamber 7, has a forwardly and downwardly inclined wall 19 in its upper forward portion having a plurality of openings 20 therein adapted to be closed by covers 21.

The permanent receptacles 8 for the ice cream and like containers are arranged within the chambers 5^b and are secured in position each with its open end registering with an opening in the wall 16. Similarly a receptacle 12 is provided for each of the openings 20 in the wall 19^a of the upper rear portion of the casing, the receptacles being secured in a relatively inclined position as shown in Fig. 2.

The chambers 5^b are preferably maintained at the proper degree of temperature to maintain frozen the ice cream or other product within the receptacles 8 at the temperature, found to be most desirable in practice. In this connection I prefer to employ coils 22, one surrounding each of the receptacles 8 and connected together in series. The end coils, at the opposite ends of the casing, are provided respectively with an inlet 23 and an outlet 24 for a suitable refrigerant such as liquid ammonia in the process of volatilizing into ammonia vapor which is conducted by way of the coils through the body of a cooling medium, such as brine, contained in the chambers 5^b.

It frequently happens that in soda fountains or other refrigerating devices certain receptacles are opened and closed more frequently than others, and that a variable amount of refrigeration in the different containers will be required. This variation in refrigeration is obtained by varying the densities of the brine in the individual chambers 5^b, and by circulating the ammonia refrigerant through the brine for a definite period of time. By properly controlling the time and rate of flow of the ammonia, different amounts of ice in the chambers can be obtained. If the flow of ammonia is relatively fast, a variable amount of refrigeration in the chambers will result. If the flow, however, is sufficiently slow the same amounts of ice at different temperatures may be formed in each chamber. The last condition may be desirable where the products to be dispensed must be stored at different temperatures. The change of temperature in the chambers while the ice melts is relatively small as compared to a corresponding change which would obtain in a liquid under similar conditions. It will be obvious that a variable amount of refrigeration at variable temperatures can be obtained by using an intermediate rate of flow of the ammonia, and that a close approximation to a constant temperature in each container can be obtained by turning on the ammonia frequently.

Since the coils in the several chambers are connected in series, a single valve (not shown) is capable of controlling all of them.

The tanks 10 and 11 in the chamber 6 each communicates with a suitable source of supply, and each is connected with suitable discharge or dispensing means (not shown) in the fountain. Thus the tank 10 is provided with an inlet 25 leading from a storage tank (not shown) and an outlet 26 leading to the dispenser; and the tank 11 has an inlet 27 communicating with a suitable source of water supply and an outlet 28 leading to the fountain. Said tanks are disposed in horizontal position in the lower portion of the chamber 6 so as to be immersed in the water or other cooling medium which is contained in the chamber. The water is cooled by means of a pipe 29 extending longitudinally through the chamber, in the upper portion thereof, and arranged to conduct a cooling agent or refrigerant through the body of the cooling medium. Preferably the cooling medium is in this instance plain water so that ice will be produced at 32 degrees Fahrenheit, and the

arrangement may be such that in the given length of time during which the refrigerant is conducted through the system, ice will be produced in sufficiently large quantities to provide refrigeration for this portion of the apparatus commensurate with that provided for the chambers 5^b.

For the purpose of inducing a circulation of the cooling medium in the chamber, I provide between each of the tanks 10 and 11 on the one hand and the pipe 29 on the other hand a baffle member 30 extending longitudinally of the chamber and suitably secured at its opposite ends to the end walls of the chamber. This baffle is preferably made hollow and filled with an insulating material 31, such as cork. Interposed between the inlets 25 and 27 and the respective tanks are coils 32 and 32^a arranged in the chamber upon the side of the baffle 30 opposite the pipe 29. The baffle is preferably angular in shape so as to provide an upper portion spaced a substantial distance from the pipe 29 and a lower rearwardly inclined portion extending over the top of the tanks. The result of this construction, it will be seen, is that the liquid, as it becomes cooled in the proximity of the pipe 29, descends to the lower portion of the chamber 6 in the direction of the arrows in Fig. 2, and as it mingles with the liquid in the bottom portion of the chamber it finds its way around the bottom of the tank and then rises in the forward portion of the chamber into contact with or near the coils 32 and 32^a through which the incoming liquids flowing to the tanks pass. Since such liquids in the coils 32 and 32^a are of a relatively high temperature, it will be seen that a constant circulation of the water in the chamber around the baffle 30 and the tanks 10 and 11 is produced. Preferably the outlet pipes leading from the tanks 10 and 11 are arranged in the rear portion of the chamber so as to pass upwardly and longitudinally through the cooler zone thereof.

A similar circulation of the cooling water in the chamber 7 is effected by an insulated baffle 33 vertically disposed between the permanent receptacles 12 for the flavoring containers and a refrigerant conductor 34 extending longitudinally through the chamber 7 in the upper portion thereof. In this instance, the circulation of the water in the chamber is accelerated by the relatively high temperature of the receptacles 12 near their upper portions which are secured in the wall 19 of the casing.

It will be seen that I have produced a cooling apparatus for soda fountains and the like, of a highly efficient and practical character. By the use of the permanent receptacles 8 and 12 the containers for the ice cream flavoring material and the like, which must necessarily be removed from time to time, are kept clean and dry so that the unsanitary condition usually experienced due to the particles of ice or water adhering to the receptacles when withdrawn from the case, is eliminated. The invention furthermore provides a unique method whereby the temperature of the receptacles in which the containers are enclosed may be regulated as desired whether for preservation or dispensing, and the cooling is effected with the highest efficiency. Moreover, the induced circulation of the cooling water in the chambers 6 and 7 enables the cooling of the contents of the tanks 10 and 11 to be accomplished in an economical and otherwise efficient manner.

It is to be understood that while the invention is illustrated and described with considerable particularity, it is contemplated that various changes may be made in construction and arrangement without departing from the spirit and scope of the invention as expressed in the following claims.

I claim as my invention:

1. A soda fountain having a plurality of separate chambers having freezing media of different densities, the density of each medium being predetermined to conform to the refrigerating requirements in the chamber in which it is contained, a receptacle in each of said chambers having a cross sectional area substantially less than the cross sectional area of the chamber, and coils encircling each of said receptacles and connected in series, said coils being adapted to conduct a refrigerant through the body of the freezing medium in each of the chambers whereby to produce in a given length of time an amount of refrigeration in each of the chambers depending upon the density of the freezing medium therein.

2. A soda fountain having a plurality of separate chambers each having freezing media of different densities, the density of each medium being predetermined to conform to the refrigerating requirements in the chamber in which it is contained, a receptacle in each of said chambers having a cross-sectional area substantially less than the cross-sectional area of the chamber, and means adapted to conduct a refrigerant through the body of the freezing medium in each of the chambers whereby to produce in a given length of time in each of the chambers an amount of refrigeration depending upon the density of the freezing medium therein.

3. A soda fountain comprising an elongated case divided transversely thereof into a plurality of separate chambers, a receptacle in each of said chambers having its outer wall spaced a substantial distance from the inner wall of its chamber, the sep-

arate chambers having freezing media of different predetermined densities, and means for conducting a refrigerant successively through the body of the freezing medium in each of the chambers and around the receptacles therein.

4. A soda fountain having an elongated chamber, a water tank located in the lower portion of the chamber and having an inlet in its upper portion, a supply pipe connected with said inlet and having interposed therein a coil located near the upper portion of the chamber, means for conducting a refrigerant through the upper portion of the chamber and through the body of a freezing medium contained therein, and an insulated baffle disposed between said coil and said conducting means.

5. The method of simultaneously refrigerating a plurality of storage chambers in accordance with the individual requirements of the different chambers for a predetermined period, which consists in varying the density of freezing media contained in said chambers in accordance with the refrigerating requirements of the individual chambers for said predetermined period and conducting a refrigerant successively through said chambers for a limited period.

6. The method of preserving food products and the like which consists in providing brine of different densities in different containers, successively conducting a refrigerant through said brines, and controlling the time and rate of flow of said refrigerant, whereby the amount of ice formed in each chamber and the temperatures at which it begins to form in the different chambers are controlled.

7. The method of preserving food products and the like which consists in providing brine of different densities in a plurality of chambers, passing a refrigerant through said brine for a limited period of time and controlling the flow of said refrigerant through said brine to obtain a variable amount of refrigeration in said chambers.

8. The method of preserving food products and the like which consists in providing a cooling medium of different density in each of a plurality of chambers, said media being capable of throwing out ice at different temperatures determined by their densities, passing a refrigerant through said media to cool the latter, and controlling the flow of said refrigerant to control the temperature and the amount of ice deposited in each chamber.

In testimony whereof, I have hereunto set my hand.

GEORGE HILGER.