

Sept. 11, 1923.

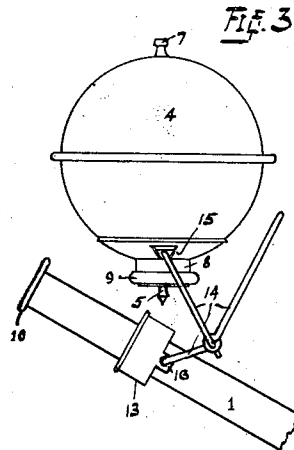
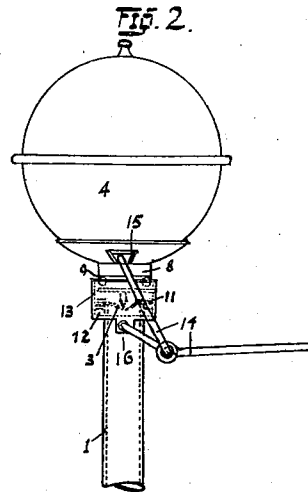
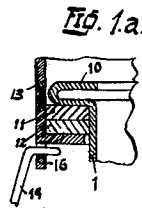
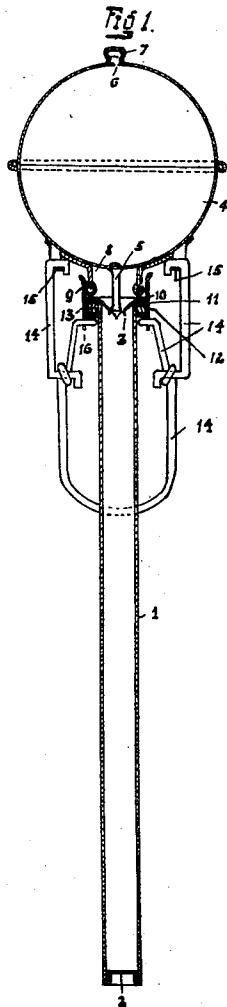
A. F. VON CODELLI

1,467,462

REFRIGERATOR

Filed July 27, 1920

3 Sheets-Sheet 1



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REFRIGERATOR

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3 Sheets-Sheet 2

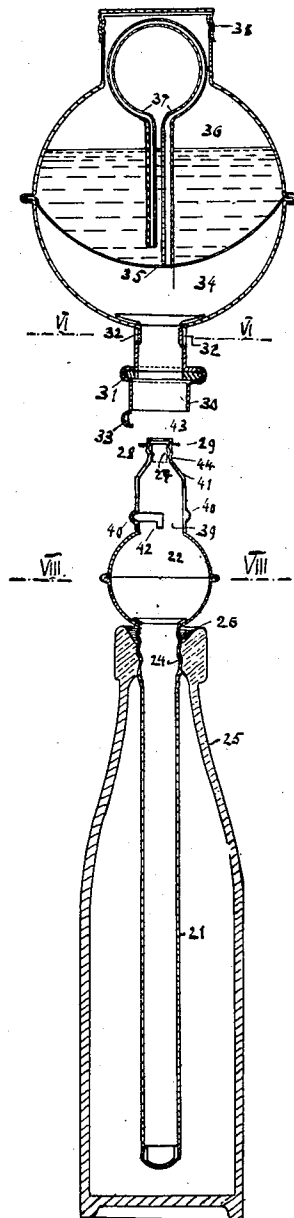


Fig. 4.

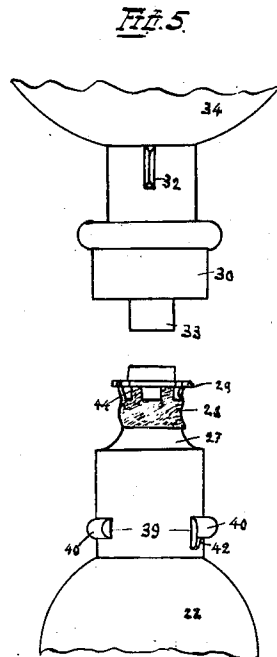


Fig. 5.

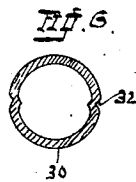


Fig. 6.

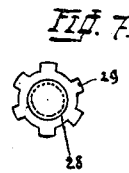


Fig. 7.

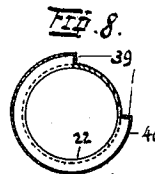


Fig. 8.

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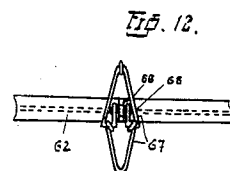
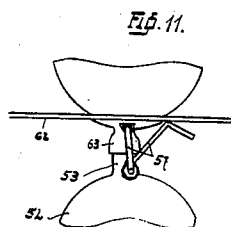
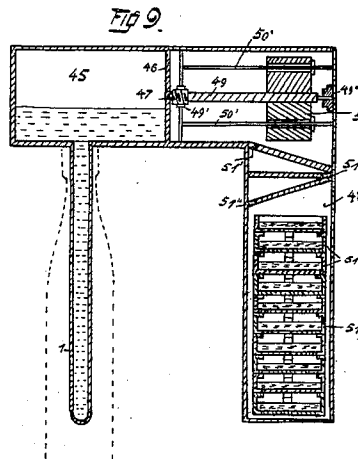
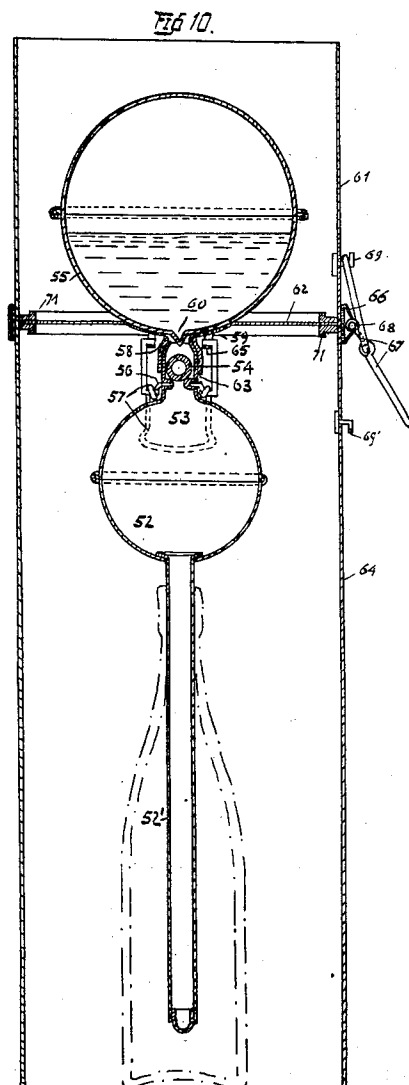
1,467,462

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REFRIGERATOR

Filed July 27, 1920

3 Sheets-Sheet 3



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## UNITED STATES PATENT OFFICE.

ANTON FRIEHER VON CODELLI, OF MOSTE, YUGOSLAVIA.

## REFRIGERATOR.

Application filed July 27, 1920. Serial No. 399,399.

To all whom it may concern:

Be it known that I, ANTON FREIHERR VON CODELLI, a citizen of the Yugo-Slav Kingdom, residing at Moste, Yugoslavia, have invented certain new and useful Improvements in Refrigerators, of which the following is a specification.

My invention relates to refrigerators and more particularly to a comparatively small, easily portable apparatus which can be conveniently operated and is particularly suited for cooling the contents of bottles. In this refrigerator cooling is effected by means of a pipe filled with a liquefied gas and immersed in the liquid to be cooled, the cooling action being produced by the vaporization of the liquefied gas on the pipe being opened by aid of a suitable opener.

If desired, the refrigerator may be combined with means for closing a bottle in such a way that the contents of the bottle may be cooled at any time and anywhere before opening the bottle.

The refrigerator may further be constructed so as to allow the refrigerating medium either to escape into the atmosphere or to be recovered and regenerated.

In the drawings affixed to this specification and forming part thereof, several modifications of a device embodying my invention are illustrated by way of example.

In the drawings—

Fig. 1 is a longitudinal section of one modification,

Fig. 1<sup>a</sup> shows a detail of Fig. 1 on an enlarged scale,

Figs. 2 and 3 are detail views illustrating the operation of the device illustrated in Fig. 1,

Figs. 4 to 8 are sections and detail views, respectively, of a second modification,

Fig. 9 is a section of a third modification,

Fig. 10 is a longitudinal section of a fourth modification,

Figs. 11 and 12 are detail views illustrating the operation of the modification illustrated in Fig. 10.

Referring to Figs. 1 to 3 of the drawings, 1 is a pipe, which may be of iron, coated on its outer surface with a layer of tin or the like. It is permanently closed at one end 2 and, at the other end, provided with a closing disc 3. That portion of the pipe 1 which projects beyond the disc 3, is widened and flanged over the disc 3 when the pipe 1 is being closed so that an annular

flange 10 is formed by means of which the pipe is tightly connected with the opener.

This opener consists of a container 4, preferably heat-insulated, and provided with a connecting sleeve 8, an opening pin 5, an adjustable discharge opening 6 and a nipple 7 to which may be attached a rubber tube. In the lower end of sleeve 8 there is formed an annular groove in which is inserted a ring 9 of rubber or the like. The upper end of sleeve 8 is widened so as to fit accurately on the bottom of the container 4. Two eyes 15 are formed on opposite sides of this widened end, the said eyes serving to hold a wire toggle 14. A holder 13 for the pipe 1 is attached to the short arm of toggle 14 by means of eyes 16. This holder 13 has the form of a sleeve slightly widened at one end and whose other end is flanged inwards with the exception of two lugs in which there are formed the eyes 16. This flange supports a washer 12 which is forced into the holder 13. An annular seal 11 of rubber or the like is placed on the washer, said seal supporting the flange 10 of pipe 1.

Fig. 3 illustrates the position of toggle 14 when the pipe 1 is being inserted in the holder 13. After the pipe 1 has been inserted in the holder 13 until its flange is in contact with the rubber ring 11, the holder 13 is rotated about the axis of the eyes 16 until the sleeve 8 of the opener with the rubber ring 9 can be introduced in the holder 13. (Fig. 2.)

In order to open the pipe 1, the toggle 14 is depressed, thereby causing pin 5 to perforate the disc 3. The point of pin 5 has the form of a double cone and is therefore adapted to produce a hole which is somewhat wider than the diameter of pin 5 so that the vapour, such as ammonia, developed by the refrigerating medium is able to enter the container 4 from which it may be removed by means of the adjustable discharge opening 6 and the nipple 7, to which may be connected a rubber tube as previously explained. The rate of evaporation is regulated by adjusting the discharge opening 6.

The evaporation of the liquefied gas is accompanied by considerable turbulence so that a considerable amount of liquid will be carried up into the container 4. This liquid is retained by the container 4 and will flow back into the pipe 1.

The cooling effect produced by the evaporation of the liquid refrigerating medium is

transmitted to the contents of the bottle through the walls of pipe 1.

Obviously, in the device described the cooling pipe 1 cannot be used more than once. In the modified form illustrated in Figs. 4 to 8 the cooling pipe can be recharged and used again. This device is provided with an opener in which the refrigerating medium is absorbed by suitable means so that the gas can not escape.

Referring to Fig. 4 the device consists of a cooling pipe 21 which is provided at the top with a thread 24 and surrounded by a packing 26, and of a container 22. This container is provided at the top with a threaded tubular extension 27 which is closed by a screw cap 28 having lugs 29 projecting laterally therefrom.

The opener is adapted to open the cap 28 whereby the liquefied gas, such as ammonia, in pipe 21 is caused to evaporate in order to start the cooling operation. A further object of the opener is to hold back any liquid which might be carried up and to return it to the cooling pipe 21, thus completely utilizing the refrigerating medium, and to absorb the vapour by means of an absorbing agent. It is therefore essential that the opener should be provided with a chamber which can be airtightly connected with the cooling pipe 21 before the cap 28 is opened, and further that this chamber should have a small opening, which may be adjustable, for discharging the vapour, and should be able to withstand the pressure of such vapour.

The opener as shown in the drawing carries a sleeve 30 with an annular groove adapted to receive a rubber ring 31. The sleeve 30 further has two lugs 32 projecting on its inner side and a hook shaped lug 33 at its lower end. The opener is provided with a chamber 34 adapted to receive the vapour and liquid from the pipe 21, a water container 36 above said chamber and a pipe 37 connected with the chamber 34 by an opening 35. The water container 36 is closed by a cap 38.

The opener is placed on the refrigerator in such a position that the hook shaped lug 33 extends intermediate the end faces 39 of an annular projection 40 formed on the container 22, (Figs. 5 and 8). By slightly depressing and turning the opener, the lugs 32 are inserted between two of the lugs 29 of cap 28, whereupon the opener is further depressed until the hook shaped lug 33 is able to engage the projection 40. At the same time, ring 31 is tightly pressed onto the surface 41 of the container 22 (Fig. 4.) Finally, the opener is rotated until the hook shaped lug 33 engages a check 42 on the annular projection 40, (Fig. 5). The rotation causes the cap 28 to be raised by its threaded to such an extent that a tightening

washer 43 which is inserted in an annular groove of the cap 28, is released and vapour from pipe 21 is able to escape through the slots 44 formed between the lugs 29 of cap 28 (Fig. 5). The vapour entering the opener would throw it off, were it not held by the lug 33 and the projection 40. The check 42 prevents further rotation of the opener which would cause the lug 33 to be disengaged from projection 40. The opener can be removed only after the cap 28 has been closed again by rotating the opener in opposite direction.

The vapour rises into the chamber 34, where it separates from the liquid carried along by it, and through the small opening 35 and pipe 37 into the absorbing liquid in the container 36.

The liquid carried up into the chamber 34 is rapidly forced back into the cooling pipe 21 by the excess pressure which is produced in the chamber 34 by the heat of absorption in the container 36.

Other means may be provided for opening the cooling pipe 21, but all such means must in any case provide for a gas tight connection between the opener and the cooling pipe.

In Figs. 9 to 12, a refrigerator of particularly simple construction is illustrated in which a recovery of the refrigerating medium is effected in a very simple way.

This is achieved by inserting between the vaporizing and absorption chambers which are connected by a single opening, a closing device which may be opened and closed at will; thus allowing to operate the refrigerator at the desired moment without any loss of cooling medium.

The device illustrated in Fig. 9 is provided with a vaporizing chamber 45, said chamber having a tubular extension 1 adapted to be inserted in a bottle as indicated in dotted lines. This extension is filled with a liquefied gas such as ammonia.

The vaporizing chamber 45 is separated from the absorption chamber 48 by means of a vertical partition 46 in which there is arranged a valve 47. In the upper portion of the absorption chamber 48 which is in line with the vaporizing chamber 45, the spindle 49 of valve 47 is held in two bearings 49', 49''. Bearing 49' is provided with a thread of moderate pitch. When the spindle 49 is rotated, this thread will cause it to be displaced axially and the valve 47 to be operated. The spindle is rotated by means of a nut 50 having a steep thread and being guided and held against rotation by two rods 50' which extend in parallel to spindle 49. When a blow is exerted on the right hand wall of the apparatus the inertia of the nut 50 causes it to move to the right, whereas, when the blow is exerted from the left, the nut is displaced to the left. In

either case the movement of the nut causes a rotation of the valve spindle 49, to take place, so that the valve 47 is opened or closed.

5 In the vertical portion of the absorption chamber 48 which is partly filled with a gas absorbing liquid a plurality of trays 51 are arranged. Some clearance is left between  
10 the trays 51 and the wall of the chamber so that the absorbing liquid is distributed over the entire absorption chamber when the apparatus is placed in a horizontal position, that is at right angles to the normal position shown in Fig. 9. When this is the case,  
15 all the vessels 51 are immersed to an equal extent in the absorbing liquid. When the apparatus is abruptly returned into its normal position, the liquid will be equally distributed over all the vessels 51 and offer  
20 therein a large total surface for the absorption of the vapour.

In order to prevent the absorbing liquid from entering the horizontal portion of chamber 48 when the device is in its horizontal position, and valve 47 is open, partitions are provided at the point where the two portions of chamber 48 are connected. In the present example, a vertical partition 51' and two inclined partitions 51'' are provided.  
30 These partitions, which may be of any convenient number, shape or arrangement, are provided with small openings placed in staggered relation. The operation of this device is as follows:

35 The valve 47 is opened by exerting on the casing a blow in parallel to the axis of the spindle 49 and the extension 1 of the chamber 45 is inserted in a bottle or other vessel containing the liquid to be cooled. The liquefied gas in the extension 1 is now vaporized, and cools the liquid. The vapour is absorbed by the absorbing liquid in the vessels 51. When it is desired to use the device again, the absorption chamber 48 is heated  
45 thus causing the vapour to be expelled from the absorbing liquid, whereupon it is cooled in the vaporizing chamber 45 under pressure. After the vapour has been liquefied, valve 47 is closed and the device can be used  
50 again.

In the modification illustrated in Figs. 10 to 12, the refrigerator is provided with a globular container 52, connected to a short pipe 53 enclosing a valve 54. This container 52 forms the vaporizing chamber. From it a pipe 52' is suspended, which is adapted to be inserted in a bottle or other vessel. An absorption chamber 55 partly filled with water is removably connected  
60 with the vaporizing chamber 52 by means of a wire toggle 57 pivoted at 56. This toggle is maintained in raised position by the pressure exerted by the annular seal 58. In the position illustrated in Fig. 11, the toggle 57 is in contact with the wall of the

absorption chamber 55, the seal 58 is only slightly compressed and valve 54 rests on its seat provided that there is an excess pressure in the vaporizing chamber 52, the chamber being thus closed.

In the position of the toggle 57 illustrated in Fig. 10, it engages the wall of the vaporizing chamber 52, the seal 58 is strongly compressed and the valve 54 is raised from its seat by the projection 59 of the absorption chamber 55. The vaporizing chamber 52 is now open. The projection 59 has a small opening 60 which is so narrow that the liquid in the absorption chamber 55 is retained in that chamber though valve 54 is open. The vaporizing chamber 52' is now connected with the absorption chamber 55. By depressing toggle 57 until it engages the wall of the vaporizing chamber 52, the cooling action is started. The vapour from the liquefied gas in pipe 52 enters the absorption chamber 55 through the opening 60, but the absorbing liquid cannot flow into the vaporizing chamber 52 on account of the excess pressure in the vaporizing chamber. The vapour rising in the water contained in the chamber 55 is subdivided into very fine bubbles so that the absorption and vaporization of the refrigerating medium are greatly accelerated. In order to cool the absorption chamber 55 it is surrounded by a removable casing 61 which is filled with cooling water. There is further fixed to the chamber 55 a plate 62 which is provided in its center with a connecting sleeve 63 which is placed over the pipe 53 of the vaporizing chamber 52. This plate 62 is, flanged on either side, this flange forming a support for the casing 61 already referred to and another removable casing 64. Eyes 65 are fixed to the plate 62 in which there are carried the ends of the toggle 57. The plate 62 is, provided at its circumference with three eyes 66, which are equidistant from one another and support wire toggles 67 by means of pins 68. The toggles 67 are adapted to engage hooks 69 on casing 61 or hooks 69' on casing 64, so as to connect one of these casings with the plate 62. A rubber ring 71 is inserted between the plate 62 and the casings 61 and 64 so as to form a tight connection. The casing 64 forms, on the one hand, a support for the entire device and on the other hand a cooling chamber. It may be provided with a lagging (not shown) of insulating material and used as an ice box.

When it is desired to stop the operation of the apparatus, the toggle 57 is returned into its upper position whereupon the valve 54 is closed by the excess pressure in the vaporizing chamber 52.

When it is desired to use the device again, the absorption chamber 55 is heated and the vaporizing chamber 52 is cooled so that the

vapour is expelled from the water in chamber 55 and is liquefied again in the vaporizing chamber 52. The casing 61 is removed from and the casing 64 placed in position on the plate 62, and the toggles 67 are attached to lugs 69'. The apparatus is now turned upside down so that the absorption chamber 55 is below the vaporizing chamber 52 and the absorption chamber 55 is placed in boiling water up to its middle. During this operation the toggle 57 must engage the absorption chamber 55. Valve 54 is loose on its seat and allows the vapour to enter the vaporizing chamber 52 where it is liquefied by contact with the cold walls and is thus prevented from flowing back into the absorption chamber 55. When the process is completed, the absorption chamber 55 is abruptly cooled by placing it in cold water. This reduces the pressure in the absorption chamber and the valve 54 is forced tightly on its seat; so that the apparatus can now be returned to its normal position.

When this has been repeated several times, some water is likely to get into the vaporizing chamber 52 and must be removed. To this end, after the vaporization has been completed, the apparatus is turned upside down and the vaporizing chamber 52 is slightly heated. By the pressure generated thereby the water is forced into the absorption chamber 55.

In order to regenerate the refrigerating medium the cooling jacket 61 is removed and the cylinder 64 is placed tightly on the plate 62 and fixed thereto by inserting the toggle 67 in hooks 69'. The apparatus is now turned upside down so as to carry the absorption chamber into the lowermost position, this chamber being now placed up to the flange is a kettle. While regeneration is going on, the toggle 57, should be applied against the absorption chamber, the valve resting loosely on its seat and allowing the gas escaping from the absorption chamber under increased pressure to enter the vaporizing chamber, there to be liquefied in contact with the cold walls of this chamber, whereby it is prevented from flowing back into the absorption chamber. After regeneration has taken place, the absorption chamber is cooled down quickly by dipping it in cold water, whereby the pressure in the absorption chamber will be diminished and the valve will be pressed tightly on its seat, thus allowing the apparatus to be returned to its normal position.

When it is desired to produce ice by means of the refrigerator, the pipe 52 is placed in the water to be congelated. When a block of ice has formed on the pipe, it is removed by slightly heating the absorption chamber

55, valve 54 being open, so that part of the heated absorbing medium gets into the cooling pipe 52, whereupon the block of ice is disengaged therefrom.

I wish it to be understood that I do not desire to be limited to the exact details of construction shown and described, for obvious modifications will occur to a person skilled in the art.

I claim:

1. In a refrigerating device for liquids in combination, a closed narrow tube adapted for insertion in a narrow-neck bottle and serving as container for the refrigerating medium, an expansion vessel adapted to be connected with said tube, means for effecting an airtight connection between said expansion vessel and said tube and means for opening the end of said tube adjacent said expansion vessel as the airtight connection is being established.

2. In a refrigerating device for liquids in combination, a closed narrow tube adapted for insertion in a narrow-neck bottle and serving as container for the refrigerating medium, the upper part of said tube being enlarged to form a reflux vessel, an expansion vessel adapted to be connected with said tube, means for effecting an airtight connection between said expansion vessel and said tube and means for opening the end of said tube adjacent said expansion vessel as the airtight connection is being established.

3. In a refrigerating device for liquids in combination, a closed narrow tube, adapted for insertion in a narrow-neck bottle and serving as container for the refrigerating medium, an expansion vessel adapted to be connected with said tube, means for effecting an airtight connection between said expansion vessel and said tube and means for opening the end of said tube adjacent said expansion vessel as the airtight connection is being established, and for closing it again as the airtight connection is interrupted.

4. In a refrigerating device for liquids in combination a closed narrow tube adapted for insertion in a narrow-neck bottle and serving as container for the refrigerating medium, an expansion vessel adapted to be connected with said tube, means for effecting an airtight connection between said expansion vessel and said tube and means comprising a valve for opening the end of said tube adjacent said expansion vessel as the airtight connection is being established.

In testimony whereof I affix my signature in presence of two witnesses.

ANTON FREIHERR v. CORDELLI.

Witness:

M. SCHMIDT.