Feb. 28, 1939. A. A. HOTE, SR 2,148,694

CARTRIDGE CHEMICAL REFRIGERATOR

Filed Jan. 11, 1936 3 Sheets-Sheet 1

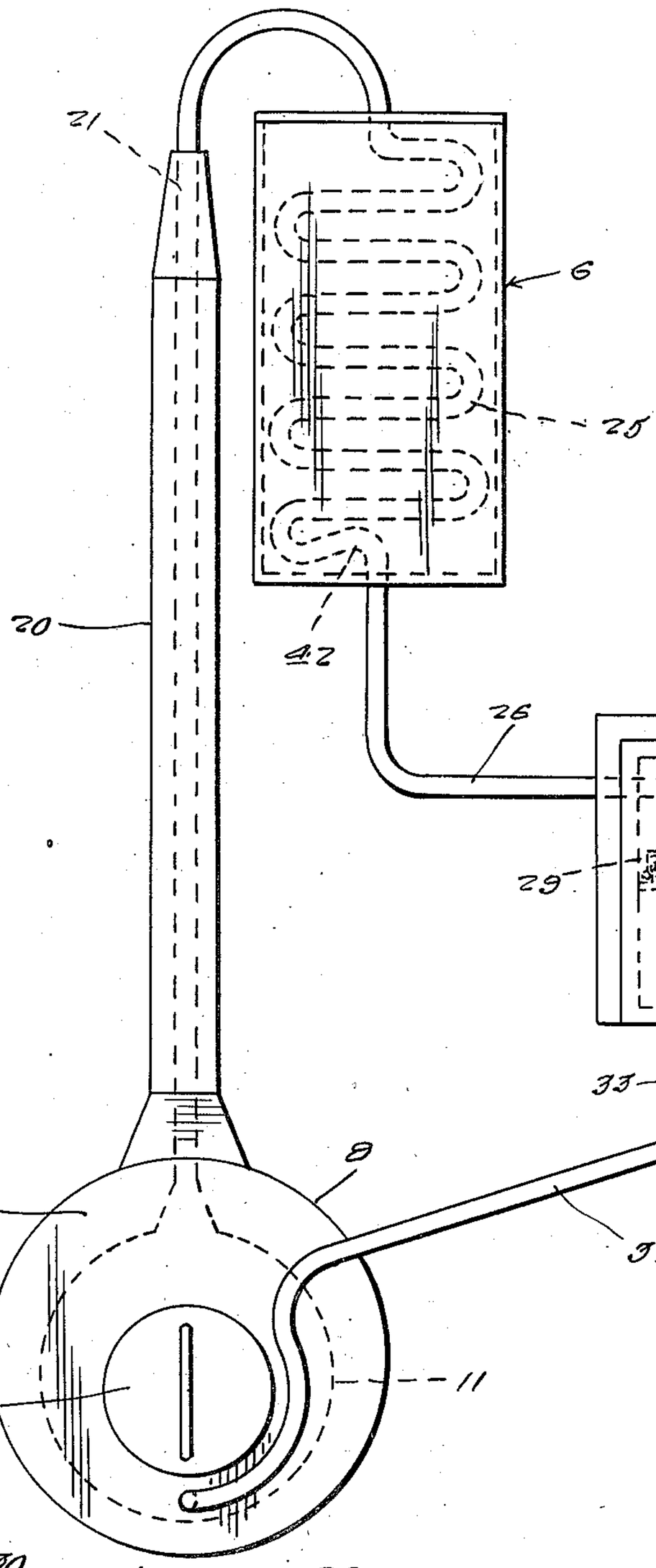

Fig. 1.

Fig. 6.

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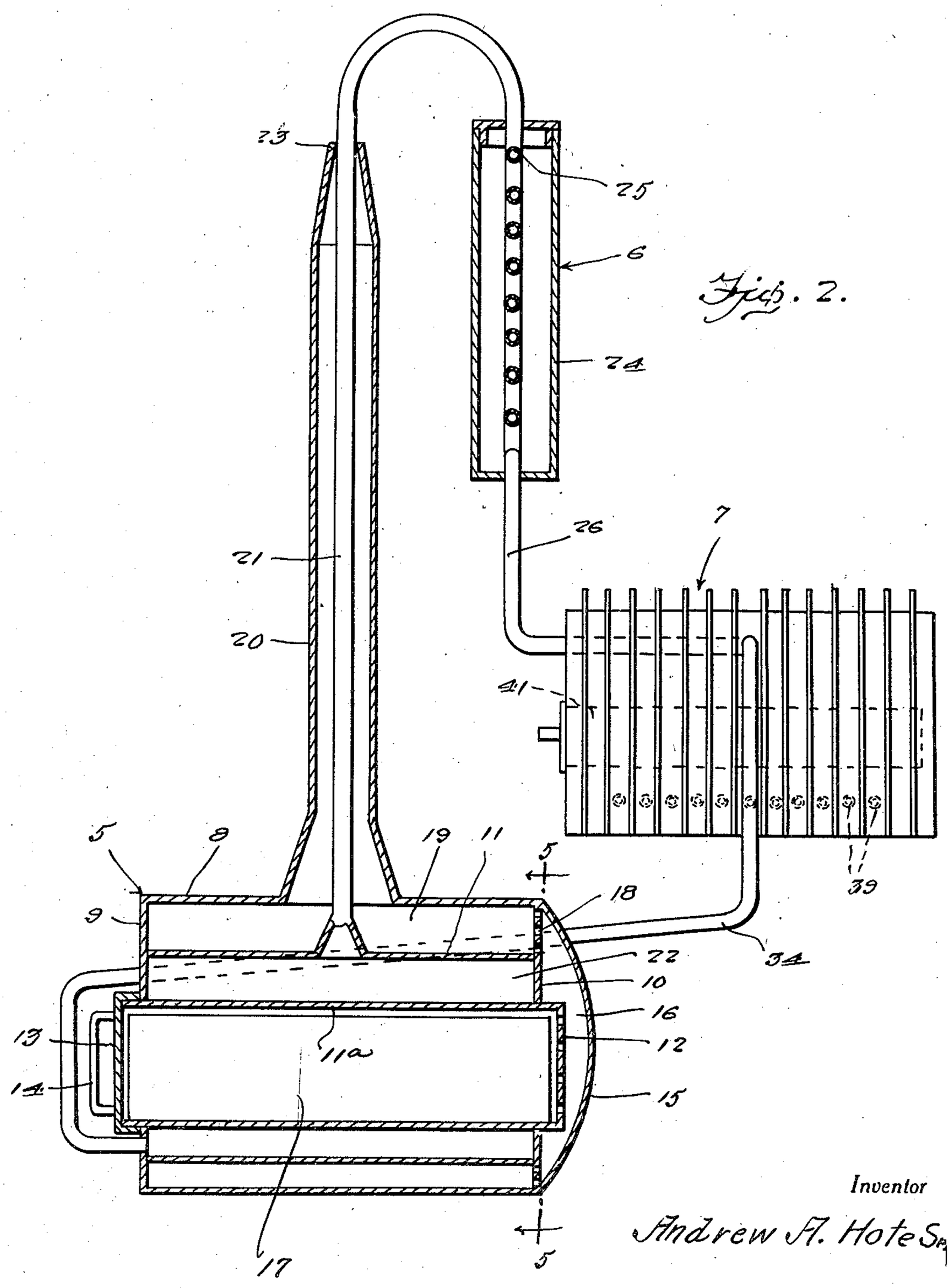

Fig. 2.

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Fig. 3.

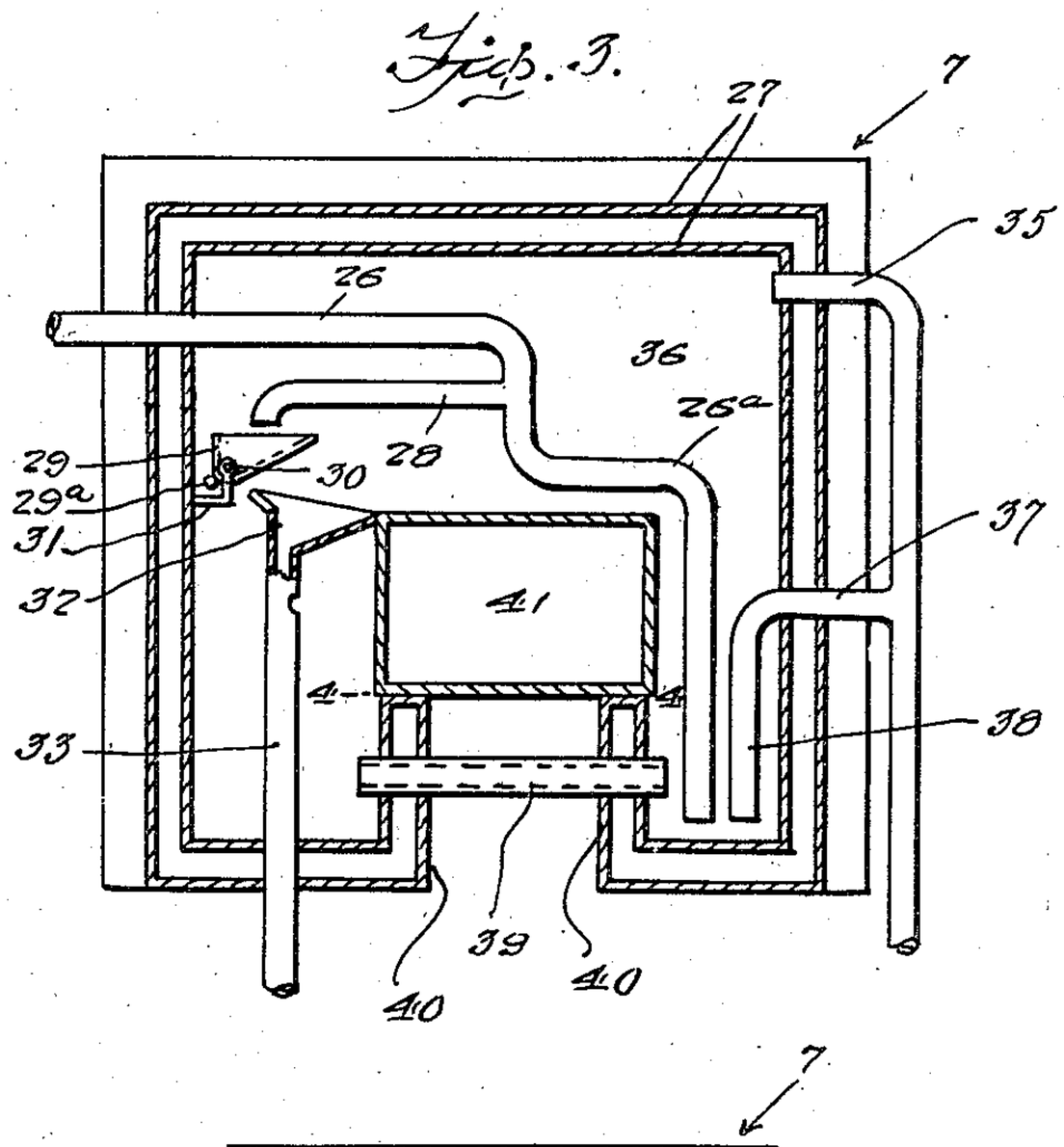
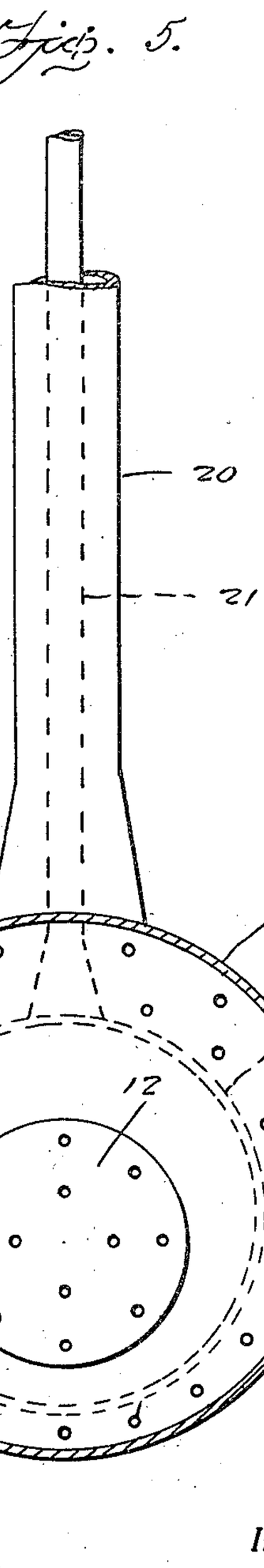


Fig. 5.



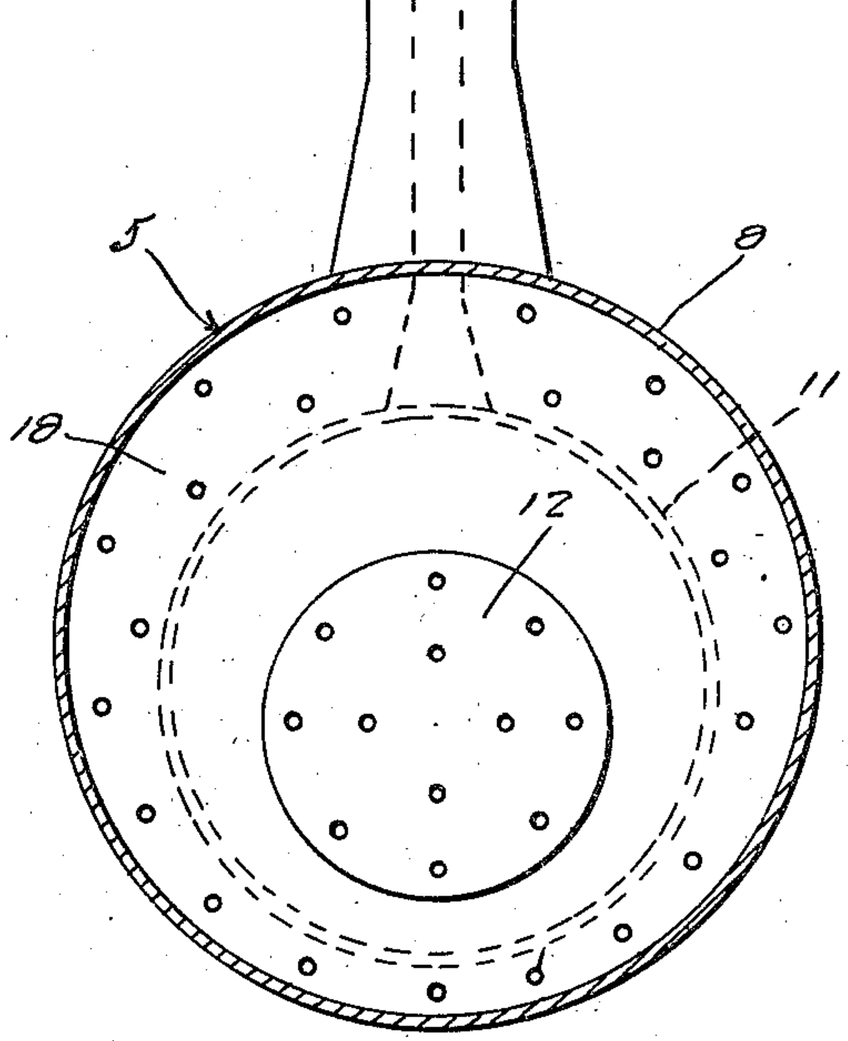


Fig. 4.

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UNITED STATES PATENT OFFICE

2,148,694

CARTRIDGE CHEMICAL REFRIGERATOR

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Application January 11, 1936, Serial No. 58,732

4 Claims. (Cl. 62—118)

This invention appertains to new and useful improvements in refrigeration and more particularly to refrigeration of the cartridge chemical type.

The principal object of the present invention is to provide a refrigeration unit or system wherein cartridge chemical type is used for supplying the necessary heat for affecting the refrigerant.

Another important object of the invention is to provide a simple and ecomonical refrigerating unit which can be used anywhere, either city, rural or country, inasmuch, as no electricity, gas, oil or flame of any description is necessary for its use. It can be used on portable conveyances of every type of description. In brief summary this invention is world wide, as even where electricity, or gas, is at the disposal of the public, this invention will eliminate the use of such in its operation.

Other important objects and advantages of the invention will become apparent to the reader of the following specification.

Figure 1 represents a diagrammatic view showing the different features of the system in elevation.

Figure 2 represents a diagrammatic view showing the heat generating and condensing coil in section.

Figure 3 represents a fragmentary detailed sectional view of the freezing unit.

Figure 4 is a fragmentary horizontal sectional view taken substantially on line **4**—**4** of Figure 3.

Figure 5 represents a sectional view taken substantially on the line **5**—**5** of Figure 2.

Figure 6 is an enlarged view of the dump trap.

Referring to the drawings wherein like numerals designate like parts, it can be seen that numeral **5** generally refers to the heat generating unit while numeral **6** generally refers to the condensing unit. Numeral **7** generally refers to the freezing unit.

Numeral **8** is the casing of the heat generating unit which is provided with the end walls **9**—**10**. A cylindrical partition **11** is arranged inside of the casing **8** in spaced relation to the side wall thereof and in spaced relation to the cartridge receiving box **11***a* which extends entirely through the casing **8** and through the end walls **9**—**10** thereof, terminating in one end in the perforated plate **12** and having a slip type cover **13** at its opposite end provided with a handle **14**.

A dome head **15** extends over the end portion **10** of the casing **8** to form the by-pass **16** so that the gas emanating from the cartridge or chemical cake **17** passes through the openings in the end plate **12** and through the openings **18** in the end wall **10** to reach the chamber **19**. As will be seen the members **11** and **11***a* form an annular chamber **22** for receiving the refrigerant which is preferably ammonia placed in the proper amount of pure water and this solution is highly heated by the hot gases from the cartridge **17** as the solution chamber **22** is located between the cartridge box **11***a* and the chamber **19** and one end is covered by the dome **15** so that the hot gases contact the inner and outer circumferences of the chamber **22** and the rear end thereof. The stack **20** extends upwardly from the casing **8** and its lower end is in communication with the chamber **19** and a tube **21** is in communication with the refrigerant chamber **22** and passes upwardly through the stack, the upper end of the stack being pressed against the tube as shown at **23**. Thus the portion of the tube **21** within the stack is also heated by the gases from the cartridge. After leaving the stack the tube **21** is bent in the form of a gooseneck and the discharge end of this gooseneck is connected with the condenser coil **25**.

Numeral **24** represents a casing containing the condensing coil **25**, the pipe **21** connecting to the upper end of this coil while the pipe **26** extends from the lower end of the coil and enters the double wall housing **27** of the freezing unit generally referred to by numeral **7**. The coil **25** is submerged in a cooling medium in the casing **24** which, of course, causes the refrigerant in vaporous form to turn to liquid. As is shown in Figure 3, the pipe **26** inside of the unit **7** has a lateral branch **28** overlying the automatic dump trap **29** which is provided with knife edge trunnions **30**, Figure 6, engaged in the loops **29'** on the bracket **31**. The back end of the trap **29** is provided with a counterbalance weight **29***a*. When the liquid runs into this automatic dump trap it flows backward to the rear of the trap. This continues until same becomes overbalanced. When this happens the trap automatically dumps all of the liquid. When the trap starts to go downward the greater amount of liquid that is retained in the rear rushes forward and in turn this weight of the liquid holds the trap down until it is empty. When empty it automatically rights itself to its proper position to be filled again, as shown in Figure 3. This continues as long as there is too much heat in the chemical chamber. The dump trap **29** alluded to is disposed in the evaporator, Figure 3, and it performs its function very quickly—i. e., cools the absorber to its proper temperature in a few minutes and by so doing affords an even temperature as is desirable. This trap is for the sole purpose of cooling the refrigerant.

The pipe for returning the refrigerant from the unit 7 to the chamber 22 of unit 8 is shown at 34 and this pipe has a branch 35 extending into the upper portion of the chamber 36 and another branch 37 which extends into and depends as at 38 toward the bottom of the chamber 36. The pipe 26 has an extension 26*a* which also depends and terminates adjacent the pipe 38. By-pass tubes 39 extend across the upturned portions 40—40 of the wall 27 so that a refrigerant can circulate around the freezing chamber 41.

It will be noted, that the lower portion of the coil 25 is provided with a bent up portion 42. The purpose of this backwardly bent portion 42 is to furnish a trap for holding three to five ounces of refrigerant and by doing this the trap stops vapor from rising back into the condensing coil.

The heat produced by the cartridge 17 will vaporize the refrigerant in chamber 22 and the vapor will pass up the tube 21 and the vapors in the major portion of the tube 21 are kept at a relatively high temperature by means of the gases in the stack 20. Then as the vapors pass through the gooseneck at the upper end of the tube 21 and as this gooseneck is exposed to the atmosphere there is a sudden change in temperature of the vapors so that whatever water is mixed with the vapors will drop back through the tube 21 and return to the chamber 22. Then the vapors pass through the condenser coils 25 which changes the vapors into liquid and this liquid flows through the pipe 26 and the part 26*a* into the bottom of the chamber 36 and as the liquid rises in the chamber 36 it passes through the tubes 39 and this liquid, of course, absorbs the heat from articles placed in the chamber 41. The liquid will continue to rise in the chamber 36 until it reaches the horizontal part 37 of the branch 38 when the liquid will start to flow through this branch into the pipe 34 and back to the chamber 22. Any vapor in the chamber 36 will pass through the pipes 35 and 34 to the chamber 22. Thus the pipes 34, 35 and 37 return the liquid and vapor from the chamber 36 back to the absorber chamber 22 and the pipe or branch 37 maintains the liquid in chamber 36 at the proper level during the boiling period. This pipe 37 also acts as a purger of any water passing into the chamber 36, if this water has not been removed by the gooseneck of pipe 21. Of course, the refrigerant is much lighter than the water so that the water will collect in the bottom of the chamber 36 and then when the liquid starts to flow through the pipe 37 this water will be removed from chamber 36 and returned to the chamber 22.

If the refrigerant is overheated in chamber 22 it will flow into pipe 26 faster than it can escape from the outlet end of the part 26*a* of the pipe 26 and thus some of the liquid will pass through the branch 28 and drop into the dump trap 29. When the trap is full it will automatically dump the liquid into the spout 32 at the upper end of pipe 33 which extends downwardly and joins the return pipe 34. The liquid flowing into the dump trap 29 has, of course, been cooled by passing through the condenser 6 and it is also cooled by the low temperature in the chamber 36 so that this cool liquid being dumped at intervals into the pipe 33 will enter the chamber 22 in a cooled state and thus reduce the temperature of the refrigerant in chamber 22.

While the foregoing specification sets forth the invention in specific terms, it is to be understood that numerous changes in the shape, size and materials may be resorted to without departing from the spirit or scope of the invention as claimed hereinafter.

Having described the invention, what I claim as new is:

1. In an apparatus for the purpose described, a heat generating unit, a condensing unit, a freezing unit, a conduit between the condensing unit and the interior of the freezing unit, conduit means between the interior of the freezing unit and the heat generating unit, and a dump trap in the freezing unit arranged to receive refrigerant from the first-named conduit when too much refrigerant passes through the conduit, said trap when filled dumping the refrigerant into the said conduit means for the return thereof to the heat generating unit.

2. In a refrigerating system of the absorption type, a chamber forming member for the refrigerant, a second chamber forming member located in the first member and containing a heat generating chemical cartridge for heating the refrigerant, a third chamber forming member surrounding the first chamber forming member, and means for connecting the interior of the third chamber forming member with the cartridge containing chamber.

3. In a refrigerating system of the absorption type, a chamber forming member containing the refrigerant, a chamber forming member passing through the first member and containing heat generating chemicals, a third chamber forming member surrounding the first member, means for placing the chamber formed by the third member in communication with the chemical chamber, a tube in communication with the refrigerant chamber and extending upwardly therefrom and a stack extending upwardly from the third chamber forming member and in communication therewith and enclosing the major portion of the tube, the upper end of the stack contacting a portion of the tube, the upper end of the tube being bent into a gooseneck above the stack.

4. In a refrigerating system of the absorption type, a refrigerant container, heating means for the same, a tube extending upwardly from the chamber for receiving the vapors therefrom, a stack surrounding a portion of the tube and in communication with the heating means for receiving some of the heat therefrom, the upper end of the stack being in contact with a portion of the tube, said tube where it leaves the stack being bent to provide a gooseneck, condenser means for receiving the vapors from the gooseneck, a freezing unit including a chamber, a conduit for leading the liquid from the condensing means into the bottom of the chamber, a return pipe leading to the refrigerant chamber and having a branch connected therewith and entering the chamber, that part of the branch within the chamber having a downturned part extending to a point close to the bottom of the chamber, a second branch connected to the return pipe and in communication with the top of the chamber, a pipe horizontally arranged and connected with a downwardly extending portion of the conduit in the freezing chamber, a dump trap for receiving the liquid flowing through the pipe and a pipe receiving the liquid from the trap and conveying it to the return pipe.

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