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1,991,784

REFRIGERANT APPLICATOR

Filed July 28, 1932

2 Sheets-Sheet 1

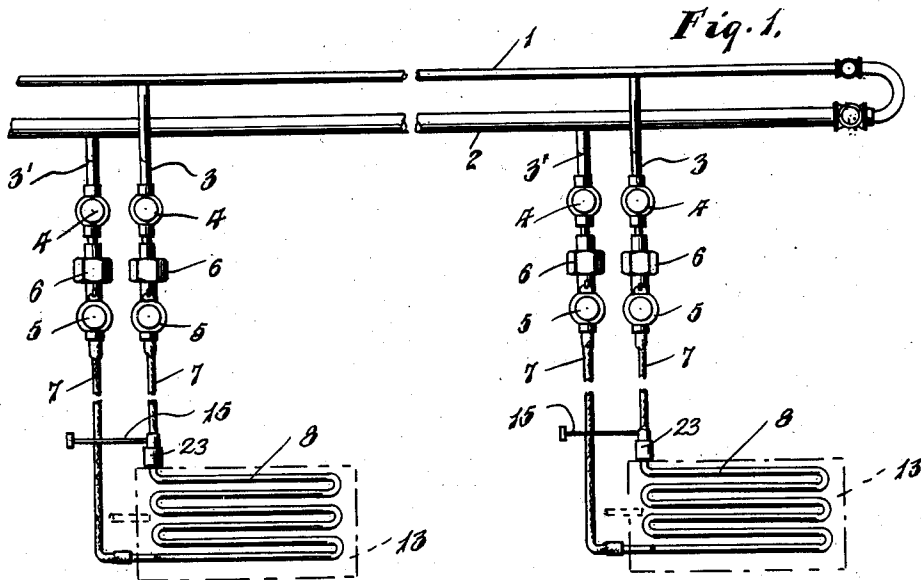


Fig. 2.

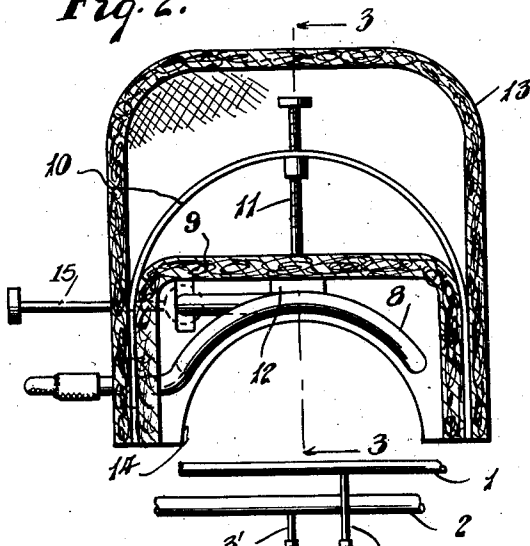


Fig. 3.

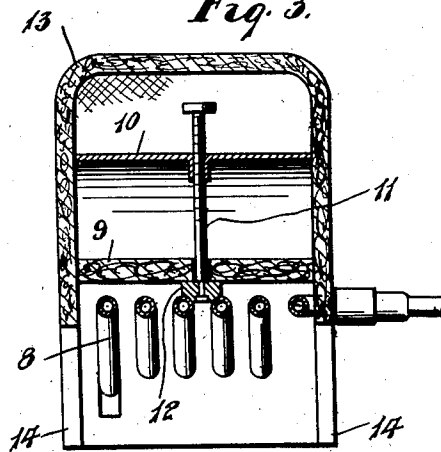
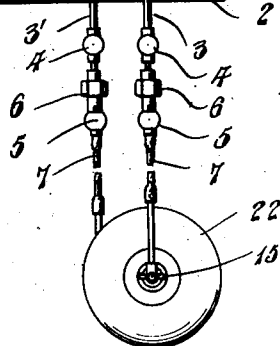


Fig. 4



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Fig. 5.

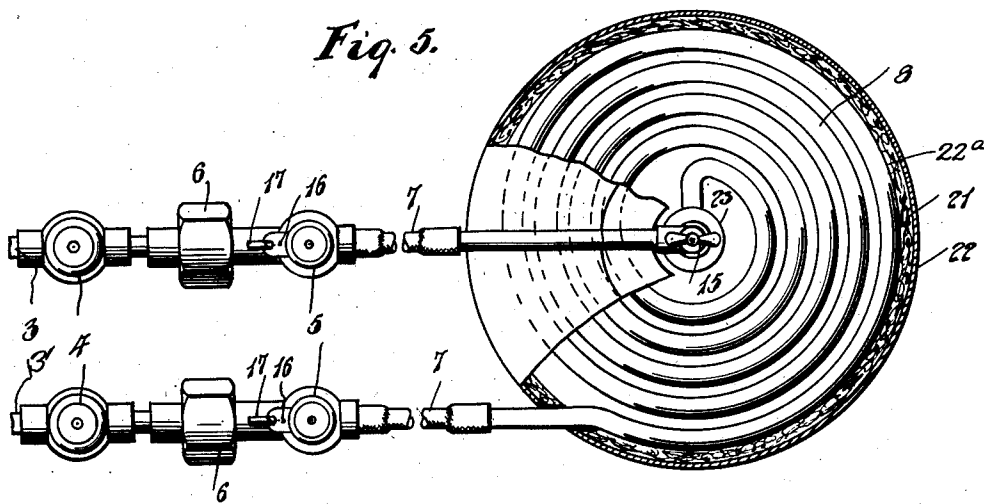


Fig. 6.

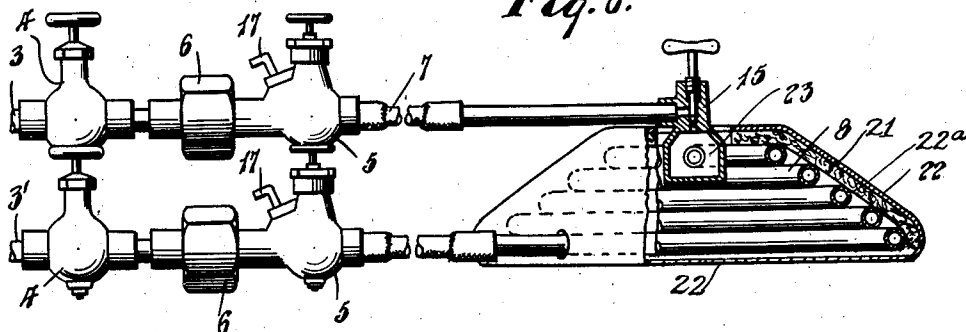
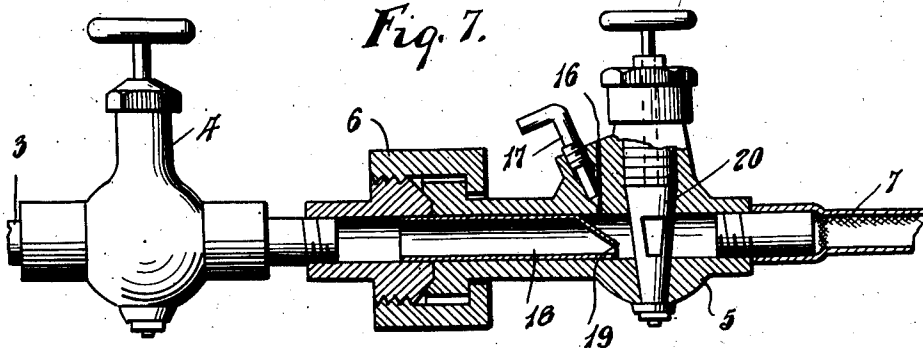


Fig. 7.



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REFRIGERANT APPLICATOR

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Application July 28, 1932, Serial No. 625,396

18 Claims. (Cl. 62—126)

This invention relates to refrigerant applicators and it consists in the novel features hereinafter described and claimed.

5 An object of the invention is to provide an applicator adapted to be used for efficiently applying a refrigerant to desired areas of the anatomy and whereby the parts to which the applications are made are retained at the regular and uniform degree of temperature, which degree may
10 be in accord with predetermined calculation such as the diagnosis of the subject suggests that should be maintained.

In certain anatomical treatments it is necessary to apply a refrigerating agent as for example upon the head, abdomen, spine and the limbs. Heretofore ice has been commonly used in such applications, the ice being enclosed in bags. This method is deficient in that the parts are maintained cool for a short period of time
20 only owing to the fact that the ice melts. Therefore, the ice must be removed at frequent intervals. It is an object of the present invention to provide apparatus for applying a cooling agent which will maintain the parts at a uniform temperature for an indefinite period of time.

In the accompanying drawings:

Figure 1 is a plan view of one form of arrangement of the refrigerant applying apparatus.

30 Figure 2 is a transverse sectional view through one of the units of the applicator.

Figure 3 is a similar view cut on a plane at a right angle to that upon which Figure 2 is cut.

Figure 4 is a fragmentary plan view of a modified form of the applicator.

35 Figure 5 is an enlarged plan view of the form of the applicator as shown in Figure 4 with parts broken away and parts shown in section.

40 Figure 6 is an edge elevational view of the applicator as shown in Figure 5 with parts broken away and parts shown in section.

Figure 7 is a detailed longitudinal sectional view of a valve used in conjunction with the applicator.

In the form of the invention as illustrated in
45 Figures 1 to 3 inclusive the same consists of parallel feed and return pipes 1 and 2 through which the refrigerant is passed to the applicators and returned to the source of supply. As shown in Figure 1 of the drawings, the applicators are in
50 the form of a group or battery in order that they may be applied to different areas of the anatomy or to different subjects and at the same time connected with feed and return pipes serving in common to all of the applicators.

55 It will be noted that the return pipe 2 is of

substantially greater diameter than the supply pipe owing to the fact that the refrigerant is supplied to the applicators in liquid form and is returned to the generator in the form of gas after having been expanded in the lines passing from the supply pipe to the return pipe, which lines include expansion chambers and applicators, as will be hereinafter described. Leading from the supply pipe 1 are offtake pipes 3, 3 leading to applicator members, and leading from the applicators to the pipe 2 are return pipes 3', 3'. Each of the pipes 3, 3 and 3', 3' is provided with a control valve 4''. Valve casings 5 are connected with the valves 4 by means of couplings 6 of conventional form. Sections of flexible hose 7 are connected at one end with the valve casings 5 and the said hose sections are also connected with ends of a manifold or coil of pipe 8. The flexible hose serve the purpose of conveying the refrigerant to and from the applicator, while permitting the applicator to be freely moved about as may be required. All of the external pipes of the system are preferably covered with insulating material. The hose should be of a material to resist pressure as well as corrosion caused by the liquid, and are accordingly preferably composed of specially rolled metallic flexible tubing rather than of rubber. The tubing in the return lines should be perfectly insulated to prevent condensation, and preferably covered with one or two layers of insulating material, as felt, which in turn are covered with layers of moisture-proof material, as rubber. As shown in Figures 2 and 3, the coil or manifold 8 is curved or arched in order that it may be disposed over a portion of the anatomy in close proximity thereto and at the same time spaced therefrom. The coil or manifold 8 is located under a housing 9 of felt or other suitable insulating material and an arch member 10 is disposed over the housing. An adjusting screw 11 is threaded through the arch and passes through the housing 9. The lower end of the screw 11 is swivelled in a block or bar 12 which in turn is attached to the intermediate portion of the coil or manifold 8. It is apparent that by turning the screw 11 the coil or manifold 8 may be adjusted vertically in order to position the same at a desired distance from the area of the anatomy to which the application is made. A hood 13 is disposed over the housing and the arch and is provided at its ends with openings 14 which may receive parts of the anatomy of the subject adjacent the area to which the refrigerating agent is applied. Each coil or manifold 8 is provided

with a needle valve 15 which controls the flow of the cooling agent to the coil or manifold.

It is apparent that the apparatus described may be used to advantage for applying a refrigerating agent to several areas of a subject or the different coils or manifolds may be applied to different subjects or patients and thus a number of anatomical areas may be treated simultaneously from the same system of feed and return pipes.

Each valve casing 5 is provided with a vent 16 which is controlled by a needle valve 17. Therefore the refrigerating agent may be bled from the valve casing when desired and also air may be permitted to escape from the valve casing as the refrigerating agent enters, thus preventing trapping of undesirable elements. A reducing sleeve 18 is located in each valve casing 5 and is provided with a nozzle-shaped end 19 through which the cooling agent may pass and which will have a tendency to speed up the movement of the same. The passage way through the valve casing 5 is controlled by a valve head 20 of conventional form.

In the form of the invention as illustrated in Figures 5 and 6 the pipe 8 is in the form of a coil, the convolutions of which are disposed one above the other so that the structure is in the general form of a cone-shaped head. The coil 8 is surrounded by an envelope 21 of felt or similar insulating material and the said envelope is encased within a receptacle 22 of said rubber or similar flexible material. A portion of this flexible casing extends over the mouth portion of the applicator and entirely closes the refrigerating chamber outlined by the coils 8. Likewise it will be noted that an inner casing or sheet 22a, of material similar to the outer casing 22, is interposed between the coil 8 and the insulation 21. The valve casing 15 is provided with an expansion chamber 23 through which the refrigerating agent is passed from the hose to the coil. The applicator head as shown in Figs. 5 and 6 is particularly adapted to be applied to the head of a patient by reason of the shape of the coils 8, or the coils may be made in other forms as indicated in Figs. 2 and 3 to conform to other portions of the human anatomy. To illustrate, when the head shown in Fig. 6 is applied to the human body the portion of the flexible sheet 22 which extends over the mouth portion of the applicator will fit snugly over the part to which the device is applied, and the refrigerating agent is thus permitted to perform its curative effect.

In operation, any suitable and well-known refrigerant which will supply cold by evaporation, such as sulphur dioxide or methyl chloride, may be supplied in liquid form from a compressor (not shown) through the supply line 1, whence it passes through the offtake passages 3, 3 to applicators which may be at various locations and of various forms in order to fit the various parts of the anatomy according to the requirements of hospital use. The flow of the liquid refrigerant may be controlled by the valves located within the passage 3, 3. Prior to entering each applicator the liquid passes through the expansion chamber 23, wherein evaporation takes place, the rate of which, and consequently the degree of cold supplied to the applicator, may be regulated by means of the control valve, 15. The coil within each applicator is insulated on top by means of felt or the like, to prevent radiation and dissipation of cold to the surrounding atmosphere, while the rubber casing prevents access

of moisture from the surrounding atmosphere or from the body of the patient, thus preventing the accumulation of condensed moisture upon the coil. The applicator may be moved to any desired position, owing to the flexibility of the connecting pipes 7, and the rubber covering 22 which extends over the mouth of the applicator as well as over the head thereof is sufficiently resilient to adapt itself to the shape of the part to which the applicator is applied. The chamber occupied by the cooling coils 8 furnishes the desired therapeutic effect, the degree of which may be regulated according to the requirements of the particular case. Any number of applicators may be simultaneously supplied from a single source of refrigerant, as for example, a number of hospital rooms may be equipped from a central generating system. At the same time the degree of cold to each individual applicator may be regulated according to the requirements of each case undergoing treatment by the use of the control valve 15 which regulates the degree of expansion to the particular applicator, without affecting the other applicators.

After the refrigerant has performed its function it passes out of the applicator in gaseous form through passage 3', and thence through return pipe 2 to the compressor where it is again converted into a liquid and passed out through the supply line 1. Preferably the gas lines are insulated to prevent radiation of cold, this being unnecessary in the case of the liquid lines.

Having thus fully described what is now considered to be the preferred embodiment of our invention, it will be understood that various modifications other than those specifically mentioned herein may be resorted to within the scope of the appended claims.

What is claimed is:

1. A refrigerant applicator comprising a coil, a control valve at the entrance end of the coil, flexible hose sections connected with the ends of the coil, coupling valves connected with the hose sections and each of said coupling valves having a valve controlled vent.
2. A refrigerant applicator comprising a coil, a control valve at the entrance end of the coil, flexible hose sections connected with the ends of the coil, coupling valves connected with the hose sections, each of said coupling valves having a valve controlled vent and a reducing sleeve located within each coupling valve.
3. A refrigerant applicator comprising a coil having a control valve at the entrance end thereof, means for connecting the ends of the coil with supply and return pipes, a housing disposed over the coil, and means for adjusting the coil with relation to the housing.
4. A refrigerant applicator comprising a coil having a control valve at the entrance end thereof, means for connecting the ends of the coil with supply and return pipes, a housing disposed over the coil, means for adjusting the coil with relation to the housing, and a hood disposed over the housing and provided with ends having openings located beyond the edges of the coil.
5. A refrigerant applicator comprising a coil having a control valve at its entrance end, means for connecting the coil with supply and return pipes, a housing disposed over the coil, an arch member disposed over the housing, a screw threaded through the arch member and swivelled to the coil and a hood disposed over the housing and provided at its ends with openings located beyond the edges of the coil.

6. In a refrigeration system, a refrigerant applicator adapted to be applied to a portion of the human anatomy, comprising a coil communicating with refrigerant supply and return pipes, an expansion chamber located within the applicator and associated with the coil, and a moisture-proof casing surrounding the applicator.

7. A refrigerant applicator comprising a head provided with a mouth portion adapted to be applied to a portion of the human anatomy, a conical coil for refrigerant mounted within the head, and an outer flexible rubber casing surrounding the head and having a portion extending over the mouth of the applicator.

8. An applicator as set forth in claim 7, wherein insulating material is interposed between the coils and the outer casing within the head to prevent radiation of cold.

9. A refrigeration applicator comprising a hollow head enclosing a refrigeration chamber and having a mouth portion adapted to be applied to a portion of the human anatomy, a refrigeration coil within the head outlining the refrigeration chamber, and a rubber sheet extending across the mouth portion of the applicator and closing said chamber air and moisture tight.

10. An applicator as set forth in claim 9, wherein an expansion chamber is associated with the refrigeration coil, and means for regulating the degree of expansion of the refrigerant according to the therapeutic effect desired.

11. An applicator as set forth in claim 9, wherein the coil is insulated from the atmosphere except at said mouth portion.

12. An applicator as set forth in claim 9, in which the rubber sheet forms a portion of a moisture-proof casing surrounding the head of the applicator.

13. A refrigeration applicator comprising a hollow head enclosing a refrigeration chamber having a mouth adapted to be applied to a portion of the human anatomy, a refrigeration coil outlining the refrigeration chamber, a flexible and moisture-proof sheet extending across the mouth portion of the applicator and closing said chamber air and moisture tight, and an expansion chamber associated with the coil and located within the head of the applicator.

14. A refrigeration applicator comprising a hollow head enclosing a refrigeration chamber

having a mouth adapted to be applied to a portion of the human anatomy, a refrigeration coil outlining the refrigeration chamber, a flexible and moisture-proof sheet extending across the mouth portion of the applicator and closing said chamber air and moisture tight, an expansion chamber associated with the coil and located within the head of the applicator, and means for regulating the degree of expansion of the refrigerant according to the therapeutic effect desired.

15. A refrigerant applicator comprising a head provided with a mouth portion adapted to be applied to a portion of the human anatomy, a conical coil for refrigerant mounted within the head, and an outer flexible and moisture-proof casing surrounding the head and having a portion extending over the mouth of the applicator.

16. A refrigeration applicator comprising a hollow head enclosing a refrigeration chamber and having a mouth portion adapted to be applied to a portion of the human anatomy, a refrigeration coil within the head outlining the refrigeration chamber, and a flexible and moisture-proof sheet extending across the mouth portion of the applicator and closing said chamber air and moisture tight.

17. In a refrigeration system for therapeutic purposes, a plurality of individually movable and individually controlled applicators supplied from a central source of refrigerant, each applicator comprising a coil shaped to conform to a portion of the human anatomy, a manually operable expansion control valve at the entrance end of the coil, said valve having an expansion chamber connected with the end of the coil, and flexible hose sections connected with the ends of the coil.

18. In a refrigeration system for therapeutic purposes, a plurality of individually movable and individually controlled applicators supplied from a central source of refrigerant, each applicator comprising a coil shaped to conform to a portion of the human anatomy, a manually operable expansion control valve at the entrance end of the coil, flexible hose sections connected with the ends of the coil, the control valve having an expansion chamber connected with the coil, and an envelope of moisture-proof material incasing the coil.

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