

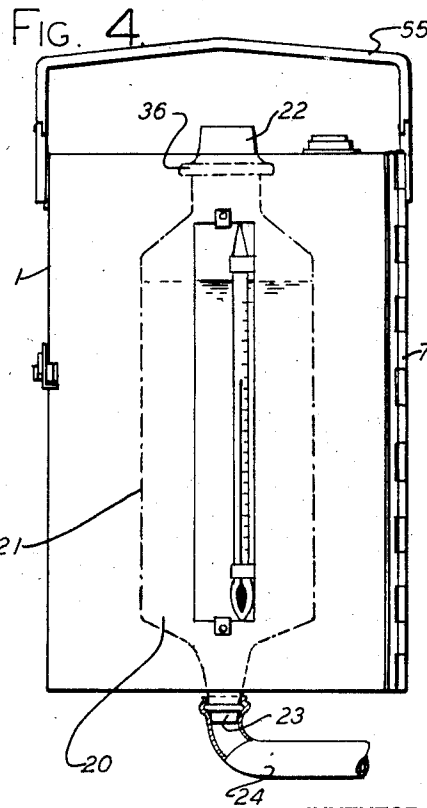
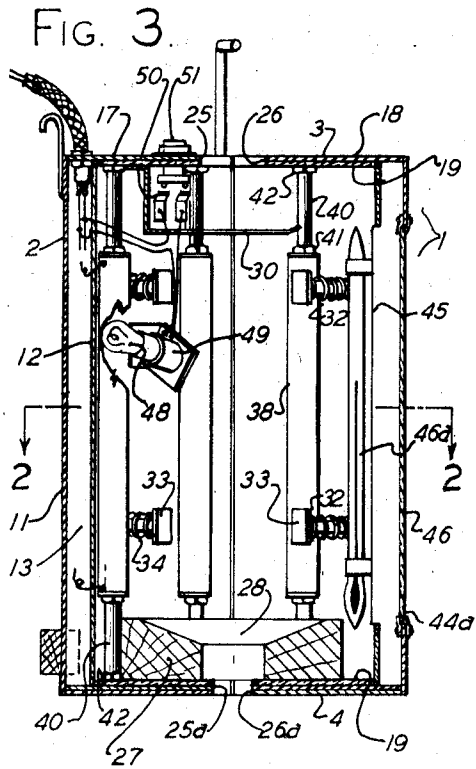
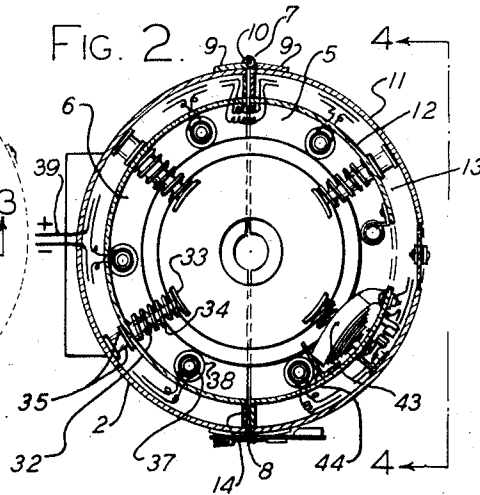
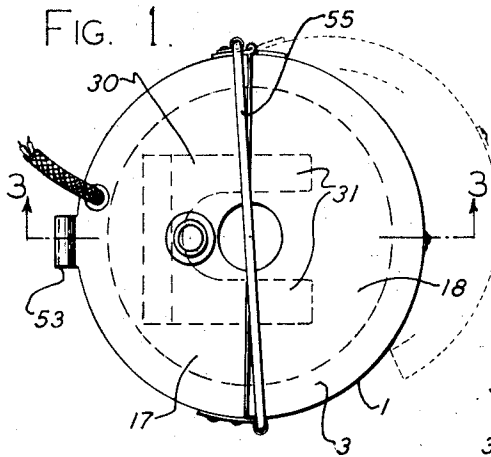
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TEMPERATURE REGULATING DEVICE

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TEMPERATURE REGULATING DEVICE

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6 Claims. (Cl. 128—254)

The present invention relates to a construction for accurately maintaining the temperature of fluids prescribed by physicians for injection into the human system.

5 Many physicians are extensively using this form of therapy at the present time for treating human ailments. Because of the many purposes that this form of therapy can serve, it manifestly has great practical possibilities. It may, 10 for instance, be used for the intravenous injection of fluids such as saline solutions or blood into the blood stream via the veins. Required fluids may by it be inducted into the body by hypodermoclysis, that is by injections through 15 the skin. It can also be directed to the washing of body cavities with suitable detergents and cleansing fluids. Likewise it comprehends the supplying of nourishment to the body by the installation of rectal feedings. There is therefore little wonder that many eminent medical 20 men are employing it more and more in their daily practice.

The widespread adoption of this form of therapy however has been greatly retarded by the 25 means now in general use for regulating and controlling the temperature of the injected fluids. It is perfectly apparent that unless the fluids incorporated into the body are at or substantially at the temperature of the body, the introduction may lead to grave injury to the 30 patient. Thus if the fluid is too cold there is danger of a chill resulting from the injection. On the other hand, the patient's system is liable to overheating, and possible blood coagulation if the temperature of the fluids are immoderately 35 high. Any benefits that may accrue from this mode of treatment can, therefore, only be obtained if care is taken to adjust and retain the temperature of the fluids to the necessary degree.

40 The means now in vogue for controlling the temperature of the fluids is an exceedingly crude one involving the encasing or enclosing of the fluid containing flask in hot water bags. Due to the rate of change of temperature of the 45 bags under atmospheric or normal conditions, one can readily perceive, that it is almost an impossibility to effect an accurate control of the temperature in this way. For instance, due to the fall in temperature of the bags, it necessarily follows that if the bags initially have a 50 temperature sufficient to provide the desired amount of heat to the fluids to be injected, the first fraction injected will be at the optimum temperature while the last will be far too cold. 55 Chilling of the system, as previously pointed

out, may therefore ensue. On the other hand, if the temperature imparted by the bags to the fluid is such that the end fraction of the fluid is at the temperature required, the primary 60 fraction will be at an inordinately high temperature. Nothing but ill effects can result in this case. When it is realized that these injections often last a period of twelve hours or more, one can readily appreciate the great variance that may exist between the temperatures of the 65 initially and finally injected fractions of the fluid.

Attempts have been made to overcome this hazard to the utilization of this form of therapy by employing flasks narrower than standard to 70 contain the fluid, the thought back of these attempts, of course, being to decrease the effective heat radiating and conducting surface by use of the smaller flasks. While this does permit a trifle better heat control, it has the drawback 75 that the flasks must be refilled during the process of injection. This, of course, increases the amount of attention that must be paid to the operation and in addition, increases the danger of injecting bubbles of air with the fluid. It 80 suffices to say that this suggestion has not met with any great success.

It must also be remembered that these injections are seldom carried to completion by the 85 medicos in charge of the injections. Generally the operation is begun by the physician and the completion thereof left to a nurse. It is, therefore, fundamental that the operation should omit any details which must be handled at the discretion of the nurse, for the members of this 90 profession are of varying degrees of intelligence and consequently the safest course to pursue in leaving matters of prime importance in their hands is to reduce the chance of error to a 95 minimum.

It can be appreciated from this that this particular art is in crying need of some simple inexpensive structure which will permit of an automatic temperature regulation of the fluid to be inducted into the body and which is at the 100 same time inexpensive and substantially fool proof. The device according to this invention has for its object the attainment of these ends.

Referring now to the drawing which discloses an embodiment of this device, it will be noted, 105 that

Fig. 1 is a plan view of my construction.

Fig. 2 is a section on line 2—2 of Fig. 3.

Fig. 3 is a vertical section on line 3—3 of Fig. 1 and 110

Fig. 4 is a front elevation looking in the direction of arrows 4—4 of Fig. 2.

On the drawing:

The device indicated generally by the reference character 1, comprises a heat insulated preferably cylindrical body portion 2, having end closure plates 3 and 4. The body portion 2 is formed in two vertical sections 5 and 6, hingedly secured together at 7 and provided with a conventional latch 8 for retaining the sections in closed position. The hinge connection 7 is of general form involving the usual cooperating hinge sections 9 and hinge pintle 10.

The vertical sections of the body portion comprise arcuate shaped plates 11 and 12 spaced apart to provide a dead air heat insulating space 13 therebetween. The space between the vertical ends of said plates is closed by strips or plugs 14 preferably of a resin composition like bakelite or the like. These plates may be made of various materials, the drawing showing the inner plate 12 of each section as composed of a heat insulation, such as pressed cardboard, pressed paper board, resins such as bakelite, wood or the like and the outer plate 11 of a constructional metallic material such as thin steel, brass, aluminum or the like. It is to be understood, however, that the inner plate may be of metal and the outer plate of a heat insulating material or both plates of a heat insulating medium. These are obvious optional structural characteristics that may be varied to suit the taste or convenience of the designer.

The end closure plates 3 and 4 are also sectioned to provide semi-circular members 17 and 18 each of which is rigidly connected with a contiguous body section so as to swing therewith. These plates are shown as made up of a plurality of plies or thicknesses of sheet material, such as a resin composition, metal or the like, the inner ply or stratum 19, however, being a heat insulating layer of asbestos or the like. The device may also be modified in this aspect thereof since it is patent that the end closure plates may be formed of a single thickness of a heat insulating medium, or the layers making up the plates may be arranged differently than shown as for instance by reversing the positions of the heat conducting and non-conducting portions thereof. Again while the plates are shown composed of contacting and overlying pieces, my invention is sufficiently broad to comprehend the formation of said plates with dead air spaces or partial vacuums as used in the body portion 2.

The fluid containing bottle 20 used in injections of this kind is of standard size and as shown in the drawing (Fig. 4) comprises a substantially cylindrical body portion 21 merging into a funnel like top 22 and a restricted tube like bottom 23 adapted for the connection of a conducting hose or the like 24 which leads to the needle not shown. The height of the sections of my device is consequently adjusted to house the body portion of the flask and to permit the projection of the ends therefrom. To attain this latter objective, the semi-circular closure plate sections are provided at their inner sides with semi-circular cut-out portions 25, 25a and 26, 26a, which cooperate with each other when the container is closed, to provide openings accommodating the projecting ends of the bottle. It is, therefore, unnecessary to remove the bottle during the refilling thereof.

The flask is supported from the bottom of the container by means of an annular wooden

or like member 27 formed in two sections upon which the flask rests. The upper surfaces 28 of the sections are shaped to receive the lower end of the body of the flask while the inner sides of the section are cut away to provide an aperture to permit the end of the flask to project therethrough. A forked bottle supporting member 30, secured to the inner wall of a body section of the container adjacent the upper end thereof and adapted to receive the body of the bottle between the forks 31 is employed to cooperate with said means 27 to facilitate the proper positioning of the bottle. In addition, spring pressed plungers 32, comprising sliding headed pieces 33, coiled springs 34, and tubular retaining elements 35 secured to the outer walls of the container act to bias the flask into proper adjusted relationship to the walls of the container when the container is closed.

It will also be observed that the funnel like top of the flask is provided with a bead 36 thereon. The cutout portions 25 and 26 of the upper closure plate 3 are cut at a slight incline so that when the sections of the container are swung to closed position, the walls defining the cut-out portions will act on the bead to ensure centering of the upper end of the flask and a substantially tight joint at this juncture.

My heat regulator is of course specifically constructed as stated for utilization with a standard fluid holding flask. It has been pointed out previously that flasks smaller than standard are now being used in this line of work. My device can obviously be adapted for use with such smaller flasks by the simple inclusion of diaphragms or supplemental closures in the upper and lower ends of the container having apertures of a size to compensate for the smaller extensions of the flask. Such a change is clearly within the purview of my invention.

The elevated temperature within the container and consequently that of the flask contents is secured by means of a plurality of conventional heating coils 37 sheathed in insulation 38 and electrically joined by suitable connections 39 to a source of current not disclosed. The number and size of the coils are adapted to provide sufficient heat to elevate the temperature of the fluid in the flask to that prescribed in a short period of time, say 5 or 10 minutes, and to effectively ensure the maintenance of the working temperature. Preferably the coils are mounted within the container by means of vertical rods 40 secured at one end to the coils by nuts 41 or similar fastening means and at the other end to a container closure plate by virtue of nuts 42. The connection of the rods with the closure plate is loose to provide for limited expansion of the coils.

The electric circuit of the coils includes a thermostat 43 of a known type. Said thermostat is located adjacent the inner wall of the container thus permitting access thereto when desired either for replacing or repairing it. The thermostat is, of course, adjusted to open and close the heating circuit when the temperature within the container becomes too high or too low. In order to prevent the heat from the coil adjacent the thermostat from causing a premature operation of the thermostat, a piece of heat insulating material 44 is inserted between said coil and the thermostat.

Injections of this kind must, of course, be carried out without the admission of air bubbles into the body. It is, therefore, necessary to

note at regular intervals the volume of fluid in the flask and to take precautions when the flask becomes nearly empty to replenish the contents thereof to preclude any possibility of an occurrence of the above mishap.

The contents of the flask in my device can be noted through narrow registering openings 44a and 45 extending substantially the length of the inner and outer walls of a container section. Conduction of heat from the container through said openings is minimized by a glass plate 46 secured over or in the outer opening 44 in any desired manner. I also provide a thermometer 46a secured to the inner wall of a section adjacent the opening 45, visible through the glass plate 46, for measuring the temperature of the container. This, of course, is merely a precautionary measure since when operable the thermostat will regulate the temperature within the desired range.

The temperature shown by the thermometer although the same is outside of the flask moreover is directly indicative of the temperature of the fluid since experiments have shown that there is only a negligible difference between the temperature of the container and fluid.

In order to assist the reading of the thermometer and of more importance the noting of the contents of the flask, means are provided in the container for illuminating the thermometer and flask. This means comprises a small bulb 48, secured to a fitting 49 and connected in a circuit by leads including a switch 50 operated by a push button 51 in the closure plate 3. By merely operating said button 51 the switch 50 is closed whereupon the bulb illuminates the interior of the container thus providing for a facile inspection of the interior thereof.

This device when in use will generally be suspended from a wall or similar support. For this reason, I have included a supporting bracket 53 in the assembly thereof, the bracket being fastened to an outer side wall in any desired manner. Legs of suitable pattern not shown may also be provided for supporting the container in vertical position.

Transportation of the container from place to place is facilitated by a suitable bail 55 pivoted to the upper part of the container side walls.

The operation of this device is apparent from the afordescribed structure. When the device is to be utilized, the sections thereof are swung open and a filled flask inserted therein. Closing of the sections properly positions the flask in the container. A tube is then attached to the lower end of the flask and the current turned on to bring the flask contents to the proper temperature. This temperature is then automatically controlled by the operation of the thermostat which opens and closes the circuit as required.

I have made several tests with a device of the kind herein described and have found that by its use it is possible to maintain the temperature of the fluid in the flask without the variance of more than one-half of a degree over a period of twelve hours. Further by means of it the desired temperature of the fluid has been obtained in the short space of 5 to 10 minutes, the initial temperature of the fluid in this case being that of ordinary tap water. It is thus palpable that this device involves a very decided improvement over those now in general use for regulating the temperature of fluids to be incorporated in the

body. It is also evident that the device since its operation is entirely automatic reduces the possibility of careless errors to a minimum. That is to say, the device, because of its particular construction is substantially fool proof.

Various changes can, of course, be made in my device without departing from the scope or spirit of my invention and it is consequently to be understood that I do not intend to be limited to the device specifically disclosed herein except as necessitated by the prior art and appended claims.

I claim:—

1. A device for maintaining the temperature of fluids to be injected into the human body comprising a container having spaced double walls circumscribing and heat insulating the interior containing space, said container being formed in two vertical sections, hingedly secured together, semi-circular plates on each section extending inwardly from said double walls and forming upper and lower closure plates for said containing space, a plurality of electrical heating units in said container for heating said space, means in said container for supporting in vertical position from said lower closure plate a standard fluid holding bottle having extended tubular ends, said semi-circular closure plates having cut-out portions at their inner sides in line with the vertical axis of said space cooperating when the said container sections are closed to provide circular apertures for accommodating said ends of said flask.

2. A device for maintaining the temperature of fluids to be injected into the human body comprising a heat insulated container formed in two vertical sections hingedly secured together, each section comprising a pair of arcuate shaped walls spaced apart to provide a dead air space therebetween, semi-circular heat insulated closure plates for each container section rigidly secured to a contiguous container section so as to swing therewith, a heat insulating block in the bottom of said container for supporting in vertical position a standard fluid containing flask having an extended funnel top and tubular bottom, each semi-circular closure plate having cut-out portions in the inner sides thereof adapted to coact when the container sections are closed to accommodate the extended ends of said flask and electrical heating units in said container.

3. A device for maintaining the temperature of fluids to be injected into the human body comprising a heat insulated container formed in two vertical sections hingedly secured together, each section comprising a pair of arcuate shaped walls spaced apart to provide a dead air space therebetween, semi-circular heat insulated closure plates for each container section rigidly secured to a contiguous container section so as to swing therewith, a heat insulating block in the bottom of said container for supporting in vertical position a standard fluid containing flask having an extended funnel top and tubular bottom, each semi-circular closure plate having cut-out portions in the inner sides thereof adapted to coact when the container sections are closed to accommodate the extended ends of said flask, electrical heating units in said container controlled by a thermostat and spring pressed plungers on the inner container wall adapted to act against the body of said flask to bias said flask to its proper position in said container.

4. A device as in claim 3 wherein the walls

of one container section have registering openings for viewing the contents of the flask.

- 5 A device for maintaining the temperature of fluids adapted to be injected into the human body comprising a heat insulated container formed with a pair of vertical semi-circular sections hingedly secured together, each section being formed from spaced arcuate shaped walls, at least one of which is of heat insulating material, having a dead air space therebetween, semi-circular heat insulated closure plates for each section, an annular heat insulated member in the bottom of said container formed in two sections for supporting in vertical position a standard fluid containing flask having an extended funnel top and tubular bottom, the upper surface of said annular member being formed to accommodate said flask, said closure plates being provided with cut-out portions on their inner sides which cooperate when the container sections

are closed to provide apertures for the reception of the extended ends of the flask, electrical heating units in said container controlled by a thermostat, spring pressed plungers on the inner wall of the container sections for acting against the body of the flask to properly position it in the container, the walls of one container section having registering openings for viewing the interior of the container, a glass plate closing the aperture in the outer wall, and means in the container for illuminating the interior of the same to facilitate a notation of the contents of the flask.

6. A device as in claim 5 wherein a thermometer is arranged adjacent the opening in the inner container wall and the apertures in the closure plates are cut at an incline to ensure a tight joint with the extended ends of the flask.

HAROLD GOLDSTEIN. 95

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