No. 675,647. Patented June 4, 1901.

C. H. ANDERSEN & W. R. GRADY.

TRANSFUSER.

(No Model.) (Application filed June 16, 1900.)

Fig. 2.

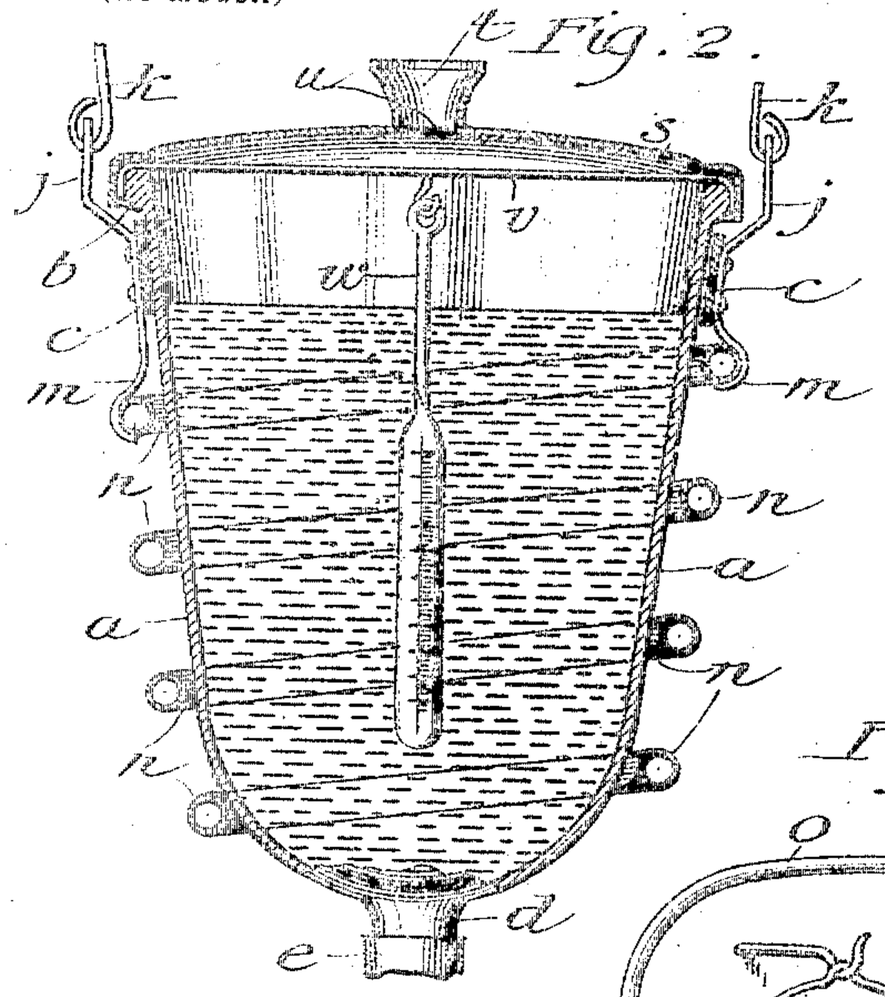


Fig. 1.

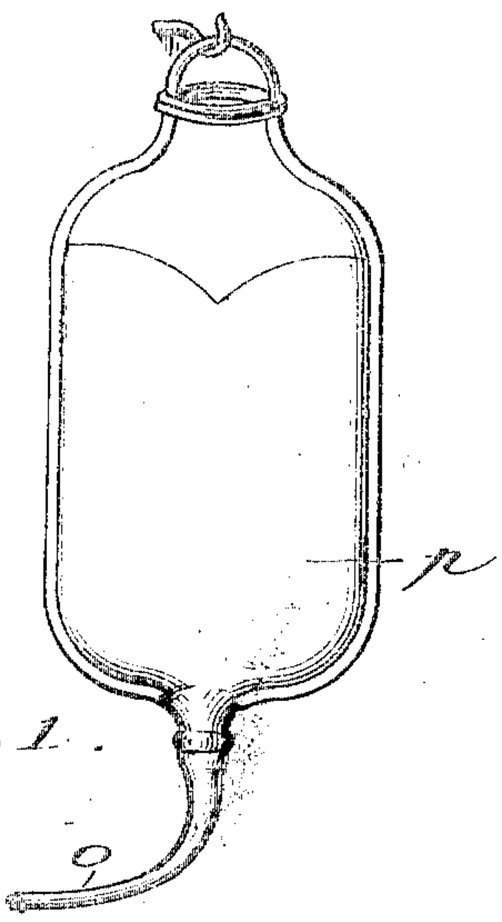


Fig. 3.

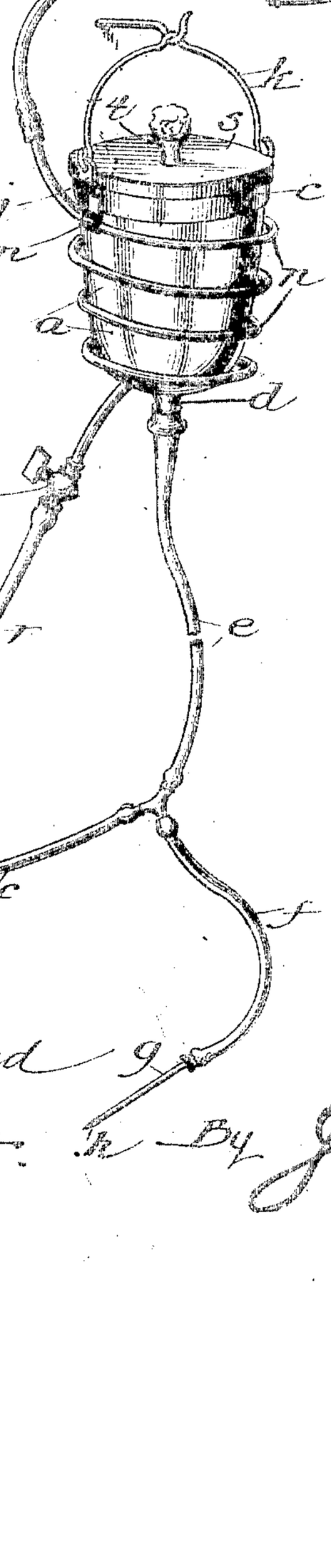
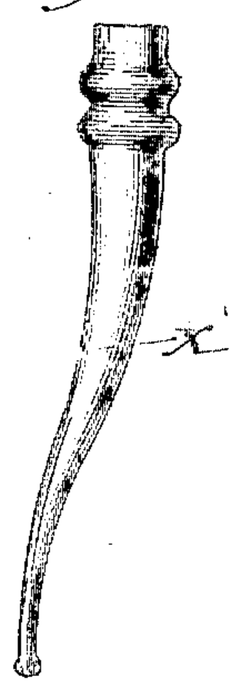


Fig. 4.



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UNITED STATES PATENT OFFICE.

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TRANSFUSER.

SPECIFICATION forming part of Letters Patent No. 675,647, dated June 4, 1901.

Application filed June 16, 1900. Serial No. 20,531. (No model.)

To all whom it may concern:

Be it known that we, CARL H. ANDERSEN and WILLIAM R. GRADY, citizens of the United States, residing in the city of Chicago, county of Cook, and State of Illinois, have invented a new and useful Improvement in Transfusers, of which the following is a specification.

Our invention relates to transfusers for introducing liquid into the blood-passages of the human body; and the objects of our invention are, first, to provide means whereby the temperature of the liquid to be transfused may be maintained constant at any desired degree of heat; second, to provide means whereby the component parts of the apparatus may be disassembled for the purpose of cleansing the same, and, third, to provide the other details hereinafter set forth. We attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a perspective view of the complete apparatus, showing the reservoir for the heating liquid, the vessel for containing the solution to be transfused, the heating-coil, and the other parts of the apparatus. Fig. 2 is a sectional view of the principal parts of the apparatus, taken vertically through the center of the vessel which is designed to contain the solution to be transfused. Figs. 3 and 4 are side views of discharging-points for introducing the solution into the blood, Fig. 3 showing a point adapted to be inserted into the subcutaneous tissue and Fig. 4 showing a point adapted to be inserted into the veins.

Similar letters refer to similar parts throughout the several views.

a represents a vessel, preferably of glass, adapted to contain the liquid to be transfused. This liquid is usually a normal solution of salt in water and for brevity will be herein referred to as the "solution." Said vessel is preferably flaring, so that its upper open extremity is larger in diameter than other portions thereof. At or near the said upper extremity of the vessel *a* is the outwardly-projecting rim or flange *b*, adapted to be engaged by the ring or hoop *c*. The lower extremity of said vessel *a* has the discharging-boss *d* suitably apertured to permit the escape of the solution into the delivery-tube *e*. Said tube *e* is preferably of rubber and remains in connection with said boss *d* by reason of the elasticity of said tube. For the purpose of transfusing at two different places the tube *e* bifurcates into the branches *f f*, which are connected at their extremities to the discharging-points *g g*. Said points are tubular and tapered at their extremities *h h* for facilitating insertion into the subcutaneous tissue of the body.

The ring *c*, above mentioned, is adapted to encircle the vessel *a* immediately beneath the flange *b* thereon, and thereby support the same. The straps *j j* are riveted or otherwise secured to the ring *c* at diametrically opposite points thereon and are apertured, so as to be engaged by the hooked extremities of the bail *k*, thereby affording means for a pivotal connection with said bail. Said straps *j* extend below said ring *c* and terminate in the hooks *m m*, which are adapted to engage the upper turn of the heating-coil *n*. Said straps *j* are to a certain extent flexible and yield upon pressure, so as to spring away from the release said coil *n*.

The coil *n* consists of a metal tube bent approximately in the form of a helix and conforming in general to the shape of the vessel *a*. Said coil makes close contact with said vessel, or nearly so, in order that the heat of the coil may be readily transferred thereto. To the upper extremity of the coil *n* there is connected a tube *o*, leading from the supply-reservoir *p*. The form of reservoir here shown consists of a rubber bag adapted to contain hot water; but any vessel for supplying heated liquid to the coil *n* may be substituted therefor with substantially the same result.

The lower extremity of the coil *n* is provided with a waste-cock *q* and is connected to the water pipe or tube *r*, through which the heating liquid is carried away from the coil *n*. By means of said cock *q* the flow of liquid through the coil may be regulated, resulting in the regulation of the heat of the coil, and consequently of the solution within the vessel *a*, for if the cock *q* is so set as to permit a great flow of water the temperature of the coil will be raised to the temperature of the water in the reservoir *p*, or nearly so; but if a small

amount only of heated water is permitted to flow through said coil the loss of heat from said coil by radiation will be so great, compared to the amount of heat received from the water, that said coil will become comparatively cool. It is obvious that if the flow were completely checked the temperature of the coil *n* would fall to approximately the temperature of the surrounding atmosphere. It is evident that the cock *q* may with the same result be placed at any point in the coil *n* or tubes connected thereto.

By the construction of the parts here shown the coil *n* may be disconnected from the ring *c*, and the vessel *a* may also be removed from said ring, thereby facilitating cleansing of the parts, particularly of said vessel.

The vessel *a* is closed by means of the removable cover *s*, which fits over the flange *b* and makes a practically air-tight joint therewith. Said cover *s* is provided with the funnel-shaped opening *t*, across the mouth of which extends the metallic sieve *u*. Said opening *s* is adapted to receive a small quantity of surgeons' cotton, which acts as a filter to purify the air entering the vessel *a*, said cotton resting upon the sieve *u*, above mentioned.

The bar *v* is adapted to extend across the top of the vessel *a* and support a thermometer *w* for indicating the temperature of the solution.

In the operation of the apparatus the reservoir *p* is supplied with water at a temperature equal to or greater than the temperature at which it is desired to maintain the solution to be transfused. The vessel *a* is filled with the solution for transfusion and the parts assembled as above described, the reservoir *p* being so arranged that water will flow therefrom to and through the coil *n*. The heated water passing through the coil *n* imparts its heat to the latter, and the heat of the coil is transmitted through the side of the vessel *a* to the solution contained therein. By regulating the flow of water through the coil by means of the cock *q* the temperature of the solution in the vessel *a* is governed. When the solution is at the proper temperature, the extremities *h h* of the points *g g* are inserted into the tissues or veins of the body and the solution is allowed to flow thereinto.

By maintaining a sufficient supply of heated water in the reservoir *p* and regulating the flow through the coil *n* the temperature of the solution may be maintained constant even though the temperature of the water in said reservoir should vary considerably.

The point *x* (shown in Fig. 4) is designed for use when the solution is to be transfused into the veins, and consists, preferably, of glass. The method of operation when employing this last-mentioned point is substantially the same as the method of operation above described.

It is obvious that the number of points in use at any time is immaterial in so far as the principle of operation of our apparatus is concerned.

What we claim as new, and desire to secure by Letters Patent, is—

1. In a transfuser, the combination of a vessel for containing the liquid for transfusion, a detachable ring or hoop for encircling and supporting said vessel, means for suspending said ring or hoop, and a coiled tube adapted to be detachably suspended from said ring or hoop and encircle said vessel.

2. In a transfuser, the combination of a vessel for containing the liquid for transfusion, a detachable ring or hoop for encircling and supporting said vessel, a coiled tube suspended from said ring or hoop and inclosing said vessel, means for controllably transfusing the liquid from said vessel into the blood-passages, and a cover for said vessel provided with a filter for removing impurities from the air entering said vessel during transfusion.

3. In a transfuser, the combination of a vessel for containing the liquid for transfusion, means for transfusing the liquid from said vessel into the blood-passages, a tube coiled to conform approximately to the exterior surface of said vessel, a ring or hoop removably supporting said vessel, means for suspending said ring or hoop, hooks on said ring or hoop for detachably suspending said coil in proximity to and around said vessel, and means for controllably supplying liquid to said coil.

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