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HELMET FOR THERAPEUTIC SCALP TREATMENTS

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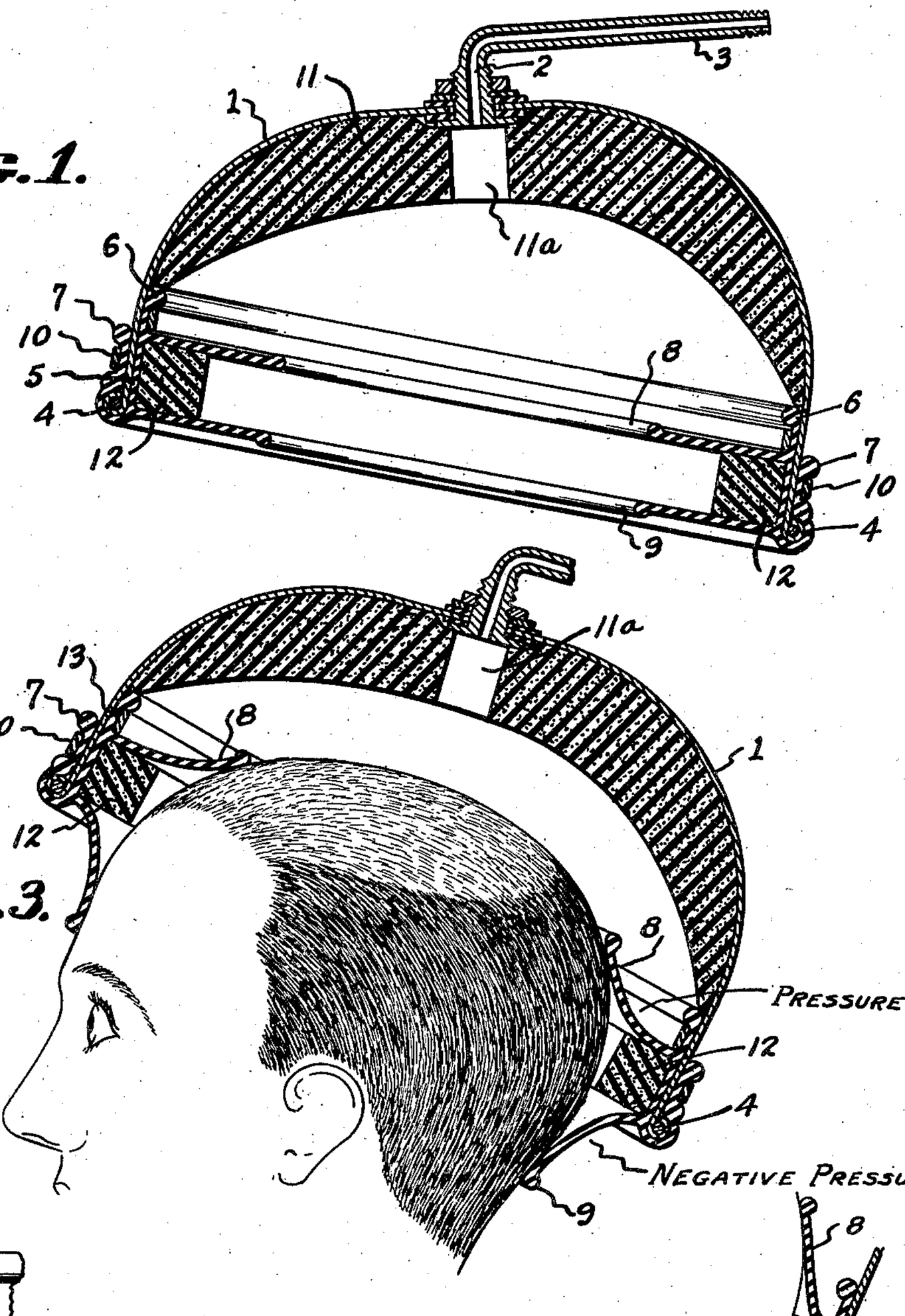

FIG. 1.

FIG. 3.

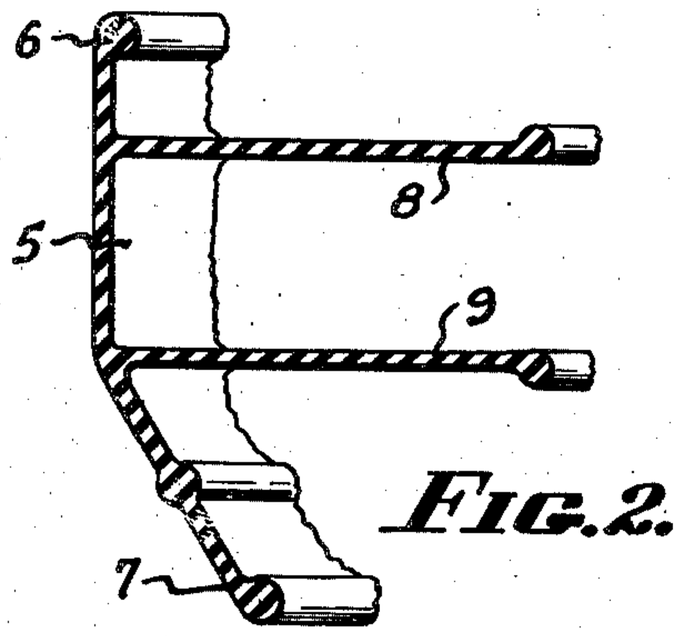

FIG. 2.

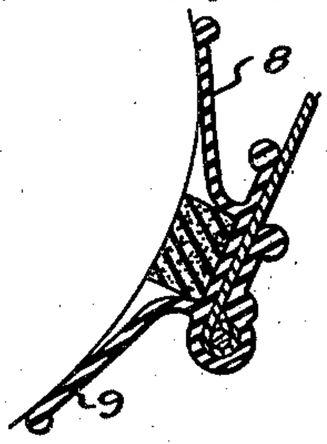

FIG. 4.

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HELMET FOR THERAPEUTIC SCALP TREATMENTS

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7 Claims. (Cl. 128—300)

Our invention relates to helmets within which pressures and negative pressure may be induced.

In the Cueto application, Serial No. 48,883 filed Nov. 8, 1935, there is described a treatment of alternating pressures and negative pressures, the purpose of which is to induce, where the hair follicles are not dead, a renewed growth of hair on the scalp. Our helmet is particularly adapted for use with such apparatus, as the treatment requires.

In the art various types of helmets have been suggested for use with therapeutic devices. In the Beaubien Patent #861,349 of July 30, 1907, a helmet is provided connected with means for exhausting the air from the helmet and the helmet has an inflatable tube secured to its rim and extending inwardly therefrom, and means is provided for inflating the tube. While such a helmet is not so inoperable as to completely lack utility, we have found that where the scalp of a patient is alternately exposed to pressure and negative pressure, such a helmet as that disclosed in the Beaubien patent either does not form an effective seal or if the tube is sufficiently inflated to fit firmly on the head of a patient, it will form a constrictive band which cuts off the circulation of blood in the superficial network of blood vessels which directly makes one of the purposes of the treatment ineffectual. Further such a construction has no wide range of adjustability for fitting a wide range of head sizes.

It is the object of our invention to provide a helmet provided with means, the sealing effect of which against the head is substantially proportionate to the pressure or negative pressure induced within the helmet. It is a further object to provide a helmet having a wide range of adjustability for applications to the heads of patients which vary materially in size and shape.

The above objects and other objects to which reference will be made in the ensuing disclosure, we accomplish by that construction of which we have shown a preferred embodiment.

Referring to the drawing:

Fig. 1 is a sectional view of the helmet.

Fig. 2 is a fragmentary sectional view of the helmet sealing band.

Fig. 3 is a sectional view showing the position of the helmet on the head of a patient.

Fig. 4 is a fragmentary sectional view showing the position of the sealing flaps adjusted to fit a person with a larger head.

The helmet is preferably formed of some light weight metal which can be drawn or formed into a hood member 1 having a combined inlet and exit passage 2 formed in a stem 3 which may be attached by means of a flexible tube to the pumping apparatus. So as to preserve the form of the hood a bead 4 is crimped around the annular open edge of the hood.

Referring to Fig. 2 a molded rubber ring 5 may be formed with annular extensions 6 at one edge and 7 at the other. Spaced diaphragms 8 and 9 extend inwardly from the ring which, as will be described, form the seal effected by the negative or positive pressure within the helmet.

In mounting the ring 5 on the rim of the helmet, we have devised a preferred mounting in which the annular extension 7 is bent back over the bead 4. Preferably a resilient band 10 may then be inserted within the channel of the extension 7 as indicated in Figs. 1 and 3. We have found that such a construction satisfactorily secures the band in position on the helmet, although other modifications may be employed to accomplish this purpose.

Referring to Fig. 3, the annular flexible diaphragms 8 and 9 are shown in the position they will assume when the helmet is positioned on the head. The friction of the head against the diaphragm 8 will cause it to assume a concave formation which withstands pressure against it during the pressure cycle.

The flexible annular diaphragm 9 is drawn down in a concave formation by manual adjustment. When it is in position as shown in Fig. 3, it resists negative pressure in the same manner that the diaphragm 8 resists positive pressure within the helmet.

Such an arrangement further furnishes a sealing device which is expansible to fit different sized heads. In Fig. 4 a section of the helmet is shown in which the diaphragms 8 and 9 are merely spread farther apart to accommodate a larger sized head. The principle of sealing however is the same.

It is one of the features of this seal that the pressure against the head is not along a predetermined line as the seal alternates back and forth during the alternate cycles of positive and negative pressure. Thus the tightening of a particular line drawn around the head which restricts the even flow of blood in the blood vessels is prevented.

We have further found it desirable to mount a sponge rubber ring 12 between the diaphragms 8 and 9 and a metal ring 13 may be installed in the channel on the projection 6.

It will be observed that the removal of the band 10 permits the ring 5 to be removed from

the helmet so that the portion of the ring which fits against the head of a person receiving treatment may readily be removed so that it can be sterilized. Were the attachment of the ring more permanent, considerable difficulty might be encountered in removing it for sterilization.

The type of sealing diaphragms which we employ is such that the higher the positive pressure in the helmet, the more the diaphragm **8** is pressed against the head. The greater the negative pressure during the vacuum cycle the tighter the diaphragm **9** is pressed against the head. Thus the seal provided is substantially proportionate to the positive or negative pressure within the helmet and the efficiency of the seal is proportionate to the requirement of efficiency.

Preferably, the air connection to the helmet enters at the top; and since upon the suction portion of the cycle of operation the helmet draws down over the head, it is highly desirable to cushion any contact of the helmet with the head, and at the same time to avoid any hard or unequal pressure on the head. In order to provide for this, we insert into the top of the helmet prior to assembling the head gripping member thereon, a large sponge rubber pad which fills the entire top of the helmet except where it is occupied by the said member. This pad, being of sponge rubber, will permit of the application of pressure and suction to the head within the helmet, and will also engage the top of the head continuously instead of in a localized area when the helmet draws down for each suction stroke. To assist in rapid evacuation and rapid inflow of air under pressure, a hole is made as indicated at **11***a* in that portion of the pad which lies over the air opening.

The diaphragm **8** does not interfere with the suction being applied over all that portion of the head which projects through the diaphragm **9**; and during the pressure stroke when the diaphragm **8** seals against the head, the helmet is in the act of rising so that the pressure of the diaphragm itself against the head is not as great as it would be otherwise. So, also, during the suction stroke the diaphragm **8** does not impose any sealing contact as noted, and the diaphragm **9** is relaxed somewhat, due to the fact that the helmet draws down over the head.

The usual treatment with the helmet lasts for thirty minutes, and it is apparent that comfort and elimination of excessive constriction is a highly important attribute of such an apparatus.

To facilitate the understanding of the claims which follow, the flexible flaps **8** and **9** are referred to as annular diaphragms to distinguish from stiff annular flanges as proposed for example in the French Patent No. 587,421 to Bibard.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent, is:

1. In combination with a metallic helmet adapted to move, during use, up and down on the head and having an air inlet through which compressed gas is forced into the helmet and negative pressure induced in said helmet by exhaustion through said inlet, a rubber head-engaging element having spaced annular diaphragms, one to be fastened about the head and the other to rest on the head and above the first, and a cushioning element mounted between the said diaphragms.

2. In combination with a metallic helmet adapted to move, during use, up and down on the head and having an air inlet through which compressed gas is forced into the helmet and negative pressure induced in said helmet by exhaustion through said inlet, a rubber head-engaging element having spaced annular diaphragms, one to be fastened about the head and the other to rest on the head and above the first, a cushioning element mounted between the said diaphragms, and a porous cushioning element filling the helmet above the said upper diaphragm.

3. In combination with a metallic helmet adapted to move, during use, up and down on the head and having an air inlet through which compressed gas is forced into the helmet and negative pressure induced in said helmet by exhaustion through said inlet, a rubber head-engaging element having spaced annular diaphragms, one to be fastened about the head and the other to rest on the head and above the first, a cushioning element mounted between the said diaphragms, and a porous cushioning element filling the helmet above the said upper diaphragm, and a hole through the said porous element communicating with the air inlet therein.

4. In combination with a metallic helmet adapted to move up and down on the head and having an air inlet through which compressed gas is forced into the helmet and negative pressure induced in said helmet by exhaustion through said inlet; a rubber head-engaging element having spaced annular diaphragms, one to be fastened about the head and the other to rest on the head and above the first, and a porous cushioning element filling the helmet above the said upper diaphragm.

5. In combination with a metallic helmet adapted to move up and down on the head and having an air inlet through which compressed gas is forced into the helmet and negative pressure induced in said helmet by exhaustion through said inlet; a rubber head-engaging element having spaced annular diaphragms, one to be fastened about the head and the other to rest on the head and above the first, a porous cushioning element filling the helmet above the said upper diaphragm, and a hole through the said porous element communicating with the air inlet therein.

6. In combination with a helmet of sufficient stiffness not to be collapsed by negative pressure therein, sealing means to seal said helmet on the head of a wearer, said sealing means comprising a member removable from the helmet for sterilization and which engages the head in one plane during cycles of negative pressure within the helmet and which engages the head in another plane during cycles of positive pressure thereby permitting the helmet to move up and down on the head during cycles of pressure and negative pressure within the helmet.

7. In combination with a helmet of sufficient stiffness not to be collapsed by negative pressure therein, sealing means to seal said helmet on the head of a wearer and to permit movement of the helmet down on the head during intermittent cycles of negative pressure induced in said helmet, said means comprising a flexible member removable from said helmet for sterilization and comprising a diaphragm forming a vacuum seal in a plane extending around the wearer's head spaced from the plane in which said helmet is secured about the head during intervals when the vacuum is broken within the helmet.

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