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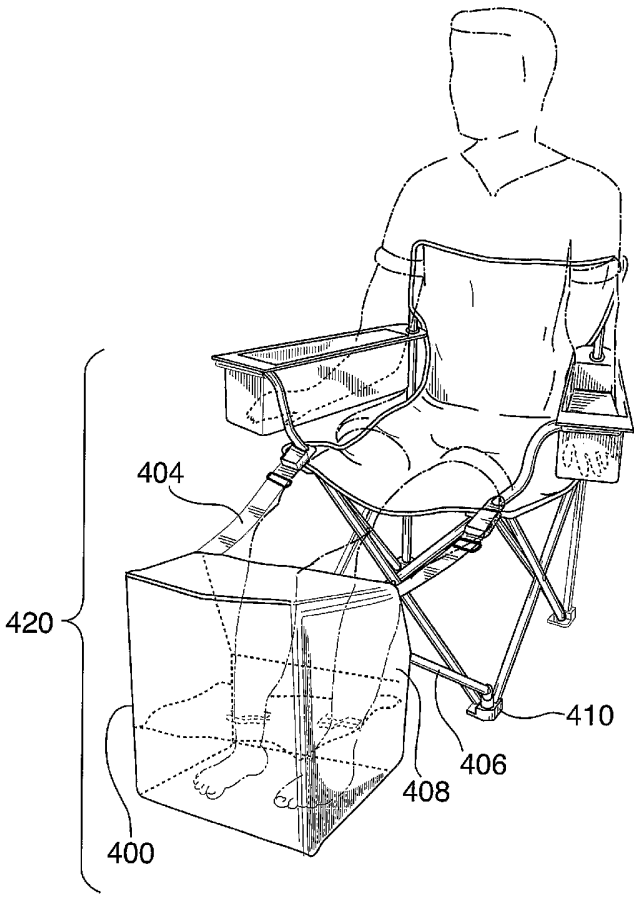
(54) Title: WATER BASINS FOR HEAT STRAIN REDUCTION



(57) Abstract: A chair (10) with water basins (100, 400) for heat strain reduction purpose is disclosed. The chair (10) is provided with built-in or attachable water basins (100, 400) at the armrest level for the user to immerse his forearms and hands in the basins (100) while seating on the chair (10). Another embodiment of the chair (10) provides foot basin (400) module detachably coupled to the chair (10) with or without the hand basins (100), thereby enabling the user to immerse his feet in the water to enjoy the cooling effect. In the event where the user is standing up, the invention also teaches a hand and/or foot pool (500, 504) system so that an individual user or multiple users can immerse their extremities in water to cool off the body core temperature while standing up.

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Declaration under Rule 4.17:

— *as to the identity of the inventor (Rule 4.17(i)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)*

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WATER BASINS FOR HEAT STRAIN REDUCTION

FIELD OF THE INVENTION

This invention relates to a chair equipped with water basins and standing up water pools to enable the user to cool off his extremities in order to reduce heat strain.

BACKGROUND OF THE INVENTION

List of Prior Art Literatures

House, J.R., Holmes, C., and Allsopp, A.J. (1997) Prevention of Heat Strain by Immersing the Hands and Forearms in Water. *J Royal Naval Medical Service 83.1:26-30.*

House, J.R. (1998) Extremity Cooling as a Method for Reducing Heat Strain. *Journal of Defence Science Vol. 3 No. 1.*

Strenuous activities such as those engaged in sports, military or fire fighting actions can quickly elevate a person's body core temperature. Unless the body is suitably cooled off, excessive high body core temperature build up has contributed to heat stroke related fatalities. Traditionally, people who engage in such strenuous activities may wear active cooling garments such as liquid, ice, gas or air cooled vest in order to relieve heat strain. The drawbacks of these garments are many - they are cumbersome and expensive, and cooling garments also increase insulation and, therefore, reduce sweat evaporation. As a result of added weight, these garments may even increase metabolic heat production.

Besides garments, other devices for cooling off body core temperature are not new. Hitherto, there were sun tanning tubs or pools which allow a user to partially immerse in water while sun bathing (see e.g., U.S. Patent Nos. 5,101,823 and D447,807). Likewise, there are

floating pool chairs which permit a user to sit on them while floating in water (see e.g., U.S. Patent No. 6,045,423). Clearly, it is neither realistic nor appropriate for persons who suffer from high heat strain while engaging in vigorous sports, military actions or fire fighting activities to use the sun tanning tubs or pool chairs to cool themselves off.

According to recent studies (House et al. 1997; House 1998), heat strain prevention can be effectively achieved by immersing a person's extremities in water. For instance, House et al. examined the effectiveness of hand immersion in water at different temperatures as a technique for reducing heat strain in test subjects. Four subjects exercised at a moderate work rate whilst wearing fire-fighting clothing in an environmental chamber at 40°C. The subjects reached heat strain safety limits within 45 minutes of commencing work at which point they rested in the heat for 30 minutes while they underwent one of four experimental conditions: without intervention (control); or with their hands immersed in water at 10°C, 20°C or 30°C, respectively. During the control condition without hand immersion the subjects were unable to cool. Immersion of the hands in water lowered body core temperature within ten minutes. These results indicate that hand immersion in water at a temperature of between 10°C and 30° is an efficient means of cooling heat stressed personnel who have been exercising.

In view of the foregoing, it is advantageous to have a chair equipped with one or more water basins for heat strain reduction whereby the user can simply immerse his forearms and hands and, optionally, his feet into the basins filled with cold tap water. Such an inexpensive and convenient chair enables people who engage in strenuous activities to sit down and to submerge their extremities in water for a short period of time to allow their body core temperature to come down.

While there have been invented chairs with cooler or refrigerating functions (see e.g., U.S. Patent Nos. 4,719,764, 5,628,544 and 6,106,058), a chair equipped with water basins for

heat strain reduction was simply not thought of before. The closest art are U.S. Patent No. 5,722,596, which teaches a mist-emitting lounge chair and U.S. Patent No. 5,387,181, which discloses a lounge chair with a trough underneath for water circulation in order to emanate sounds simulating those of a running brook and, at the same time, to emit mist and negative ions into the air to concoct a "stress-relieving environment". However, sitting on one of these mist-discharging chairs does not help a user to lower his body core temperature to any significant degree. In addition, the need to wear proper clothing also renders these chairs impractical for users engaging in military or fire fighting activities.

SUMMARY OF THE INVENTION

It is an object of the present invention to solve the aforementioned problems by providing a chair equipped with built-in or attachable water basins for a user to reduce his body core temperature by simply immersing his forearms and hands into the water-filled basins.

According to one aspect of the invention, it provides a heat strain reduction chair with one or two water basins attached at the armrest level of the chair.

It is another object of the present invention to provide a water basin positioned in front or near the legs of a chair to enable a user to immerse his feet in the water-filled basin to decrease his body core temperature. According to another aspect of the invention, it provides a heat strain reduction chair with a water basin for a user's feet to be immersed therein.

It is yet another object of the present invention to provide a stand-up feet and/or arm heat strain reduction water pools for individual or multiple users to immerse their feet and/or arms in the pools to decrease their body core temperature. According to still another aspect of the invention, it provides a stand-up heat strain reduction pool system comprising a hand immersion

pool and a foot immersion pool wherein the dimension of the foot pool is substantively larger than the hand immersion pool.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1a is a perspective view of a conventional prior art folding lounge chair.

Figure 1b shows a perspective view of a preferred embodiment of the instant invention.

Figure 2a is a perspective rear-side view of a preferred embodiment of a water basin for horizontal immersion.

Figure 2b is a perspective front-side view of a preferred embodiment of a water basin for horizontal immersion.

Figure 2c shows a perspective front-side view of another embodiment of a water basin for horizontal immersion.

Figure 2d shows a horizontal water basin with a disposable plastic lining.

Figure 2e shows a "pin-and-plate" securing means for a detachable horizontal water basin.

Figure 3 is a perspective side view showing a chair with water basins for vertical immersion.

Figure 4a shows a perspective view of another embodiment of the instant invention incorporating a heat strain reduction water basin for a user's feet with a user sitting thereon and the user's feet immersed in the water basins.

Figure 4b is a top partial-sectional view of the chair and foot basin shown in Figure 4a.

Figure 5a shows a stand-up heat strain reduction water pool for hand immersion by users standing up.

Figure 5b shows stand-up heat strain reduction water pools for both hand and feet immersion by users standing up.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention incorporates the concept of a water basin or basins built into or attached onto a portable folding lounge chair in order to allow a user to cool off his body core temperature by immersing his extremities in the water basins while the user sits down. The basins can be long and shallow, thus enabling a user to rest and immerse his forearms and hands substantially horizontally inside the basins. Alternatively, the basins can be short and deep to allow a user to simply drop and immerse his hands and forearms vertically inside the basins. The present invention also discloses a stand-up heat strain reduction water pool system for single or multiple users to immerse their arms and hands and, optionally, their feet in the pool filled with water.

Figure 1a shows a conventional prior art folding lounge chair.

A heat strain reduction chair **10** with two forearm and hand water basins according to the present invention is shown in Figure 1b. The chair **200** is a typical folding lounge chair as shown in Figure 1a with front crossed legs **206**, rear crossed legs **208**, side crossed legs **210** and rear leg side support poles **202**. In addition, there is a water basin support pole **214** extending from the front crossed legs **206** through an opening in the chair seat upwardly and then horizontally parallel to the front plane of the chair.

The horizontal portion of the water basin support pole **214** and the rear leg side support pole **202** cooperate together to allow the water basin **100** to be mounted on chair **200** as shown in Figure 1b. Figures 2a and 2b illustrate this mounting set up. The horizontal water basin **100** has two ends, namely the distal end **102** for detachably mounted on the horizontal portion of support pole **214**, and the proximate end **104** for slidably engaging onto the rear leg side support pole **202** through passage holes **106** provided at the proximate end. Distal end **102** can be mounted to

support pole **214** by conventional means, such as by using Velcro™ flap **112** as shown in Figure 2b, or by sliding sleeve **114** onto support pole **214** as shown in Figure 2c.

A water fill up faucet **108** is optionally provided to water basin **100** with a flexible water hose **110** connected thereto. Preferably, faucet **108** and water hose **110** are at the proximate end **104**. If desired, the user can connect water hose **110** to the water supply main and fill up the basin with household tap water. As discussed above, researches have shown that immersing a user's extremities in room temperature water can advantageously lower the body core temperature.

For hygienic reason, Figure 2d shows a disposable plastic liner **116** being inserted into water basin **100** for holding water. After use, the basin can be emptied and a new liner inserted therein for the next user.

The present invention also provides a detachable water basin for heat strain reduction. Figure 2e illustrates the detachable mounting mechanism by a "pin-and-plate" locking means provided at the proximate end **104** of the basin **100**. The securing means is comprised of a pair of downward pin **118** positioned on both sides of a U-shaped notch **120**. Plate **122** is slidably inserted into the rear leg side support pole **202** through pole mounting ring **124** and locked in position by tightening screw **126**. Once securely fastened, the U-shaped notch **120** of the basin is placed against pole **202** while holes **118'** on plate **122** couple with pins **118** on the underside of the water basin **100**. To detach the water basin, the user simply lifts pins **118** from plate **122** and releases the Velcro™ flap at the distal end from horizontal support pole **214**.

Figure 3 illustrates another embodiment of the water basins being mounted to a folding lounge chair. Instead of a long and shallow basin discussed earlier, this embodiment provides for a short and deep basin for vertical immersion of a user's forearm and hand. The structural set up of this vertical basin **300** resembles the horizontal basin. As is in the case of the horizontal basin,

there is provided a side water basin support pole **214** extending from the front crossed legs **206** through an opening in the chair seat upwardly and then horizontally along the front plane of the chair. Distal end **302** of the vertical basin **300** is detachably mounted to support pole **214** by a sliding sleeve (as shown) or a Velcro™ flap (not shown). Since the proximate-distal distance of the opening of vertical basin **300** is much shorter, a substantially flat portion of basin material is provided to connect the basin opening to the mounting flap at the distal end **302** which mounts to the horizontal portion of the support pole **214**. At the proximate end **304**, the slidably coupling arrangement is the same as those with the horizontal basin. The depth of the vertical basin may vary, as long as it can accommodate the length of a user's arm and hand. Optionally, the vertical basin may extend the depth all the way to ground level (as shown). In a preferred embodiment, vertical basin **300** is provided with water fill-up faucet (not shown) and host **310**, and water release faucet **308**.

Another embodiment of the chair of the present invention provides for a rigid frame substantially defining the dimension of the opening of the horizontal or vertical water basin (not shown). The frame is demountably attached to the support pole **214** at the distal end and rear leg side pole **202** at the proximate end. The rigid frame suitably receives a disposable plastic pouch which becomes a temporary water basin for users to immerse their hands and forearms.

Researches have shown that a person's body core temperature decreases more rapidly if both extremities were immersed in water as opposed to only immersing a person's hands or feet. Accordingly, another embodiment of the present invention provides a heat strain reduction chair equipped with water basins for both hands and feet. Figures 4a illustrates a perspective view of such a chair and Figure 4b shows a top partial-sectional view with a user immersing his feet in the foot basin of the present invention. As can be seen from Figure 4a, the "arm & foot" chair

combines the inventive feature of the arm and hand basin chair discussed earlier with a foot basin attachment module **420** engaged thereto.

Referring to Figures 4a and 4b, foot basin attachment module **420** is comprised of a pair of chair foot basin crossed extension poles **406**, extending from each corner of the front pole connector **410**. The outward apex of the crossed extension pole **406** is extended to the opposite top distal end of the foot basin **400** (not shown). The general structure of foot basin **400** is defined by a rectangular pouch with an opening **408** on the proximate side facing the user's feet. The bottom side of foot basin **400** rests on the ground. A pair of fastening straps **404** secures the top proximate end of basin **400** to the top of the front crossed legs. When in use, a user sits on the chair and extends his feet forward into the water-filled foot basin **400** through opening **408**. In so doing, the user rests his immersed feet on the ground.

Optionally, water release/fill up faucet and flexible hose can be provided (not shown) to the foot basin to ease use and operation.

Foot basin attachment module **420** can be detached from the hand basin chair by releasing fastening straps **404**, which are furnished with a lockable means, such as a lug or hook, and by dislodging the foot basin crossed extension poles **406** from the front pole connector **410**.

The support poles and legs of the heat strain reduction chair of the present invention are tubular and can be made of conventional materials such as aluminium, steel, fibre reinforced plastic or other such suitable materials. The water basin can be made of waterproof fabric, nylon, plastic, fibre reinforced plastic or any suitable flexible and collapsible materials. When not in use, the chair, together with the basins, can be folded up for easy storage.

For greater stability and to avoid toppling, anchoring means can optionally be used to secure the chair of the present invention to the ground. Suitable anchoring means include fastening pegs, water-filled mooring devices and the like.

There may be occasions in which a group of users may wish to benefit from heat strain reduction, e.g., after a game of sport or team activity. Accordingly, the present invention also provides for a stand-up heat strain reduction pool system. Figure 5a illustrates a stand-up hand pool for immersing the users' hands whereas Figure 5b illustrates a stand-up hand and foot pool.

Referring to Figure 5a, hand pool **500** is supported by base **506**. The base is, in turn, supported by conventional anchoring means. Suitable anchoring means (not shown) are cement blocks, water-filled mooring containers or embedment in the ground.

In the case of hand and foot pools shown in Figure 5b, there is provided a hand pool **500** supported by base **506**. The base of **506** abuts and is contiguous with foot pool **504** which sits on the ground. In order that the users can stand in the foot pool **504** and immerse their hands around the hand pool **500**, the dimension of the foot pool **504** is measurably larger than the dimension of the hand pool **500**. Once again, water-fill up faucet **502** and **508** and flexible water hose **510** are optionally provided to the pools. Clearly, the heat strain reduction pool of the present invention is not confined to circular shape. In fact, such a pool can take any shape as long as it enables the users to immerse their hands and/or feet therein.

As in the case of the horizontal basin, disposable plastic liner may be inserted into the vertical water basin or the foot basin for holding water in order to maintain hygienic use of the basin. After use, the basin can be emptied and replaced with a new liner. Disposal liner can be used for the hand and foot pools as well.

Since it is beneficial to enjoy the heat strain reduction chair in the shade, the present invention also provides a chair equipped with a collapsible umbrella similar to those used with beach chairs attached thereon (not shown).

It is clear that the inventive concept of this heat strain reduction chair is not limited to folding lounge chairs. Any conventional lounge chairs, whether foldable or not, and other chairs,

such as director's chair and wheel chair (not shown), can incorporate the present inventive concept and provide for suitable water basins for either arm and hand only and/or arm and hand and foot immersion. Thus, the embodiments depicted herein are intended to be merely illustrative and not restrictive in any sense.

It is further understood that the present invention may be carried out in other specific way than those herein set forth without departing from the spirit and essential characteristics of such invention. The present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive, and all changes coming within the meaning and equivalency range of the appended claims are intended to be embraced therein.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A heat strain reduction chair with one or two water basins attached at the armrest level of said chair.

2. The heat strain reduction chair of claim 1, wherein said water basin is substantially long and shallow.

3. The heat strain reduction chair of claim 1, wherein said water basin is substantially short and deep.

4. The heat strain reduction chair of claim 1, wherein said water basin has a distal end for mounting onto a horizontal support means and a proximate end with means for slidably engaging to a rear leg side support pole of the chair.

5. The heat strain reduction chair of claim 4, wherein said horizontal support means is a pole extending from a front crossed leg of the chair.

6. The heat strain reduction chair of claim 1, wherein said water basin is provided with a water faucet.

7. The heat strain reduction chair of claim 6, wherein a hose is connected to said water faucet.

8. The heat strain reduction chair of claim 1, wherein said water basin is detachably mounted on said chair.

9. The heat strain reduction chair of claim 8, wherein said detachably mounted water basin is comprised of a "pin and plate" locking arrangement, said arrangement co-operating between a proximate end of the water basin and a rear leg side support pole of said chair.

10. A heat strain reduction chair with a water basin for a user's feet to be immersed therein.

11. The heat strain reduction chair of claim 10, wherein said water basin is detachably engaged to said chair by a pair of crossed extension poles and fastening straps extending from the chair to said basin.

12. The heat strain reduction chair of claim 11, wherein said water basin has a top distal end for receiving said pair of crossed extension poles and a top proximal end for engaging said fastening straps.

13. The heat strain reduction chair of claim 1 or 10, wherein said water basin is made of waterproof fabric, nylon, plastic, fibre reinforced plastic or any suitable flexible and collapsible materials.

14. The heat strain reduction chair of claim 1 or 10, further comprising a mountable and collapsible umbrella thereon.

15. The heat strain reduction chair of claim 1 or 10, wherein said chair is foldable.

16. The heat strain reduction chair of claim 1 or 10, wherein said chair is a director's chair or a wheel chair.

17. The heat strain reduction chair of claim 1or 10, wherein a disposable plastic liner is used to hold water in said basin.

18. The heat strain reduction chair of claim 1 or 10, wherein said water basin is formed by inserting a plastic pouch into a rigid frame, said frame substantially defines the dimension of the opening of said basin and is demountably attached to said chair.

19. A stand-up heat strain reduction pool system comprising a hand immersion pool supported by a pool-supporting base.

20. A stand-up heat strain reduction pool system comprising a hand immersion pool and a foot immersion pool wherein the dimension of said foot pool is substantively larger than the hand immersion pool.

21. The stand-up heat strain reduction pool system of claim 20, where said hand and foot immersion pools are circular in shape.

22. The stand-up heat strain reduction pool system of claim 20, where said hand and foot immersion pools are provided with water faucets.

23. The stand-up heat strain reduction pool system of claim 22, wherein a hose is connected to said water faucets.

24 The stand-up heat strain reduction pool system of claim 19 or 20, wherein a disposable plastic liner is used to hold water in said pool.

FIG. 1a
PRIOR ART

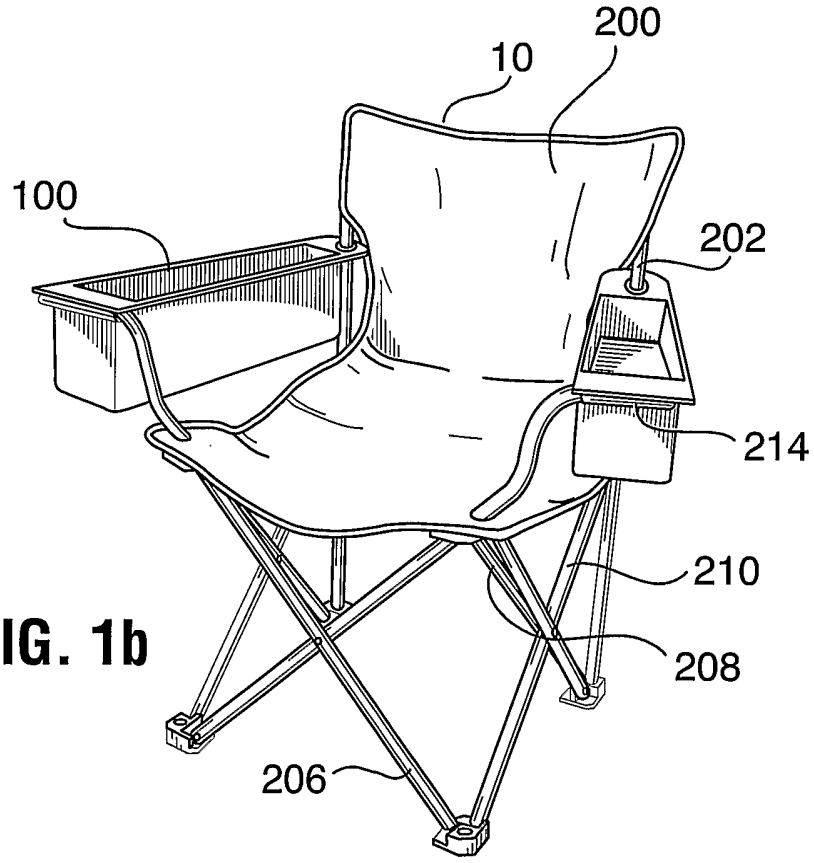

FIG. 1b

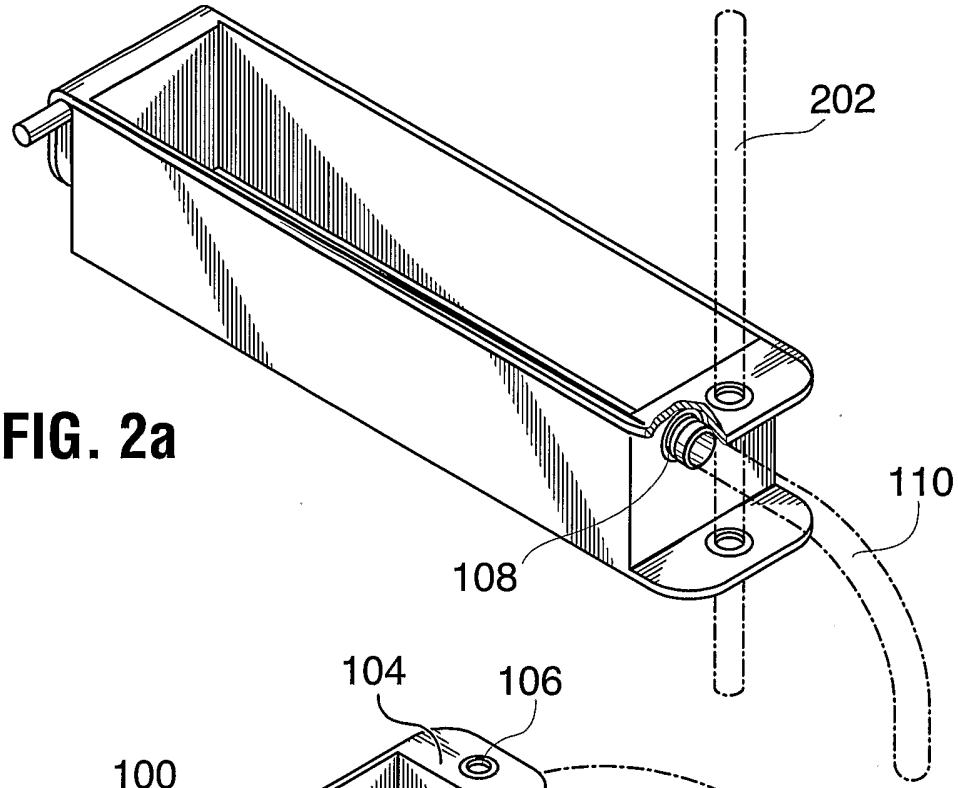

FIG. 2a

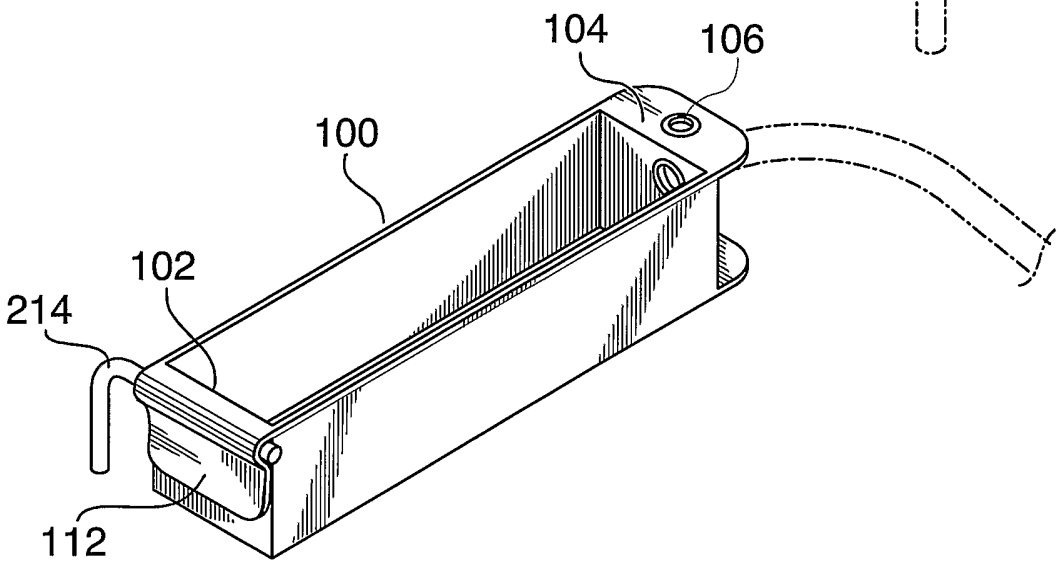

FIG. 2b

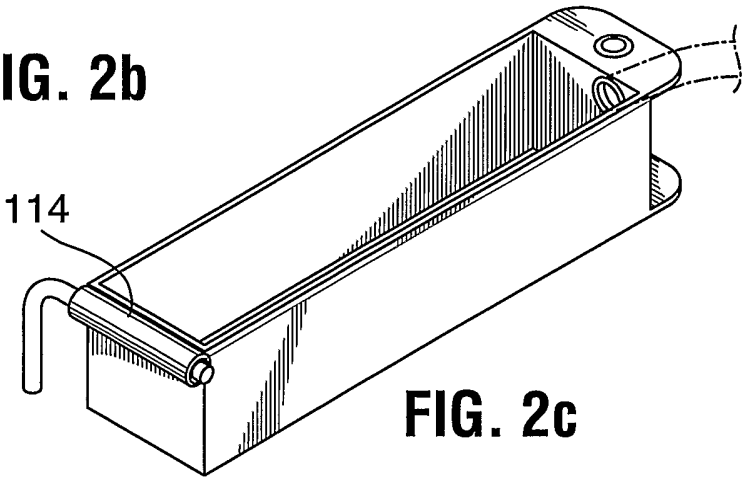

FIG. 2c

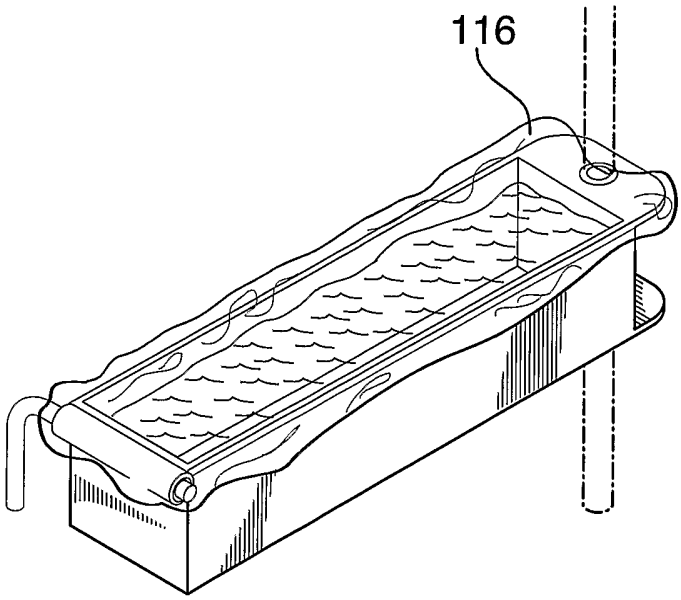

FIG. 2d

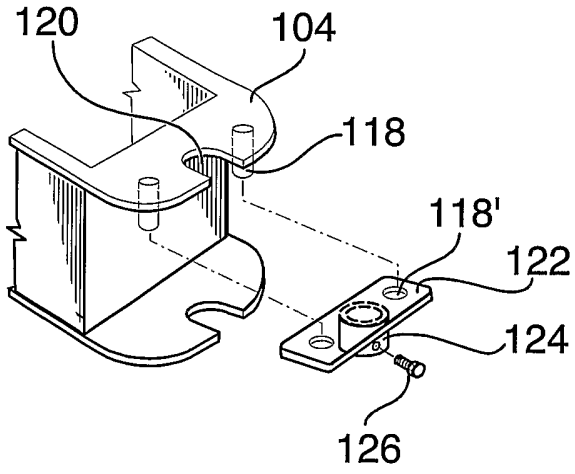

FIG. 2e

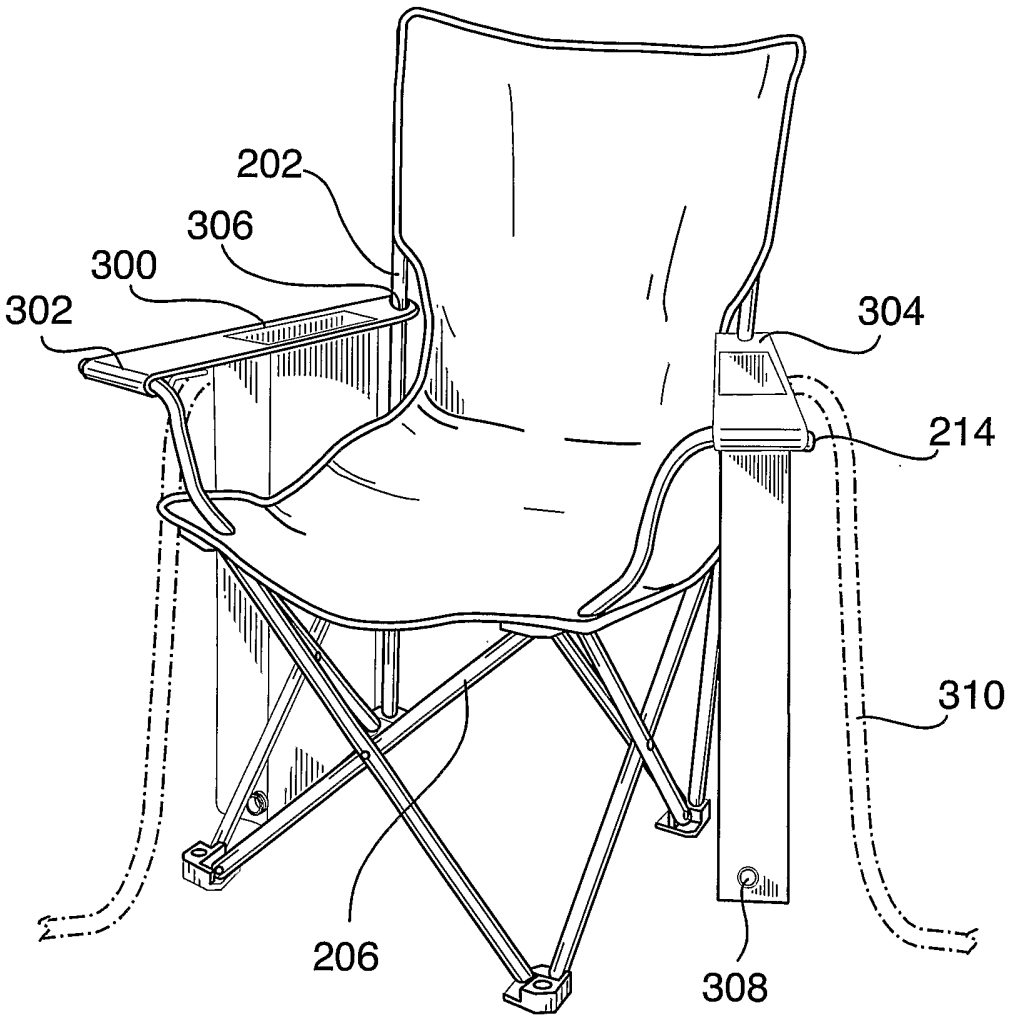

FIG 3

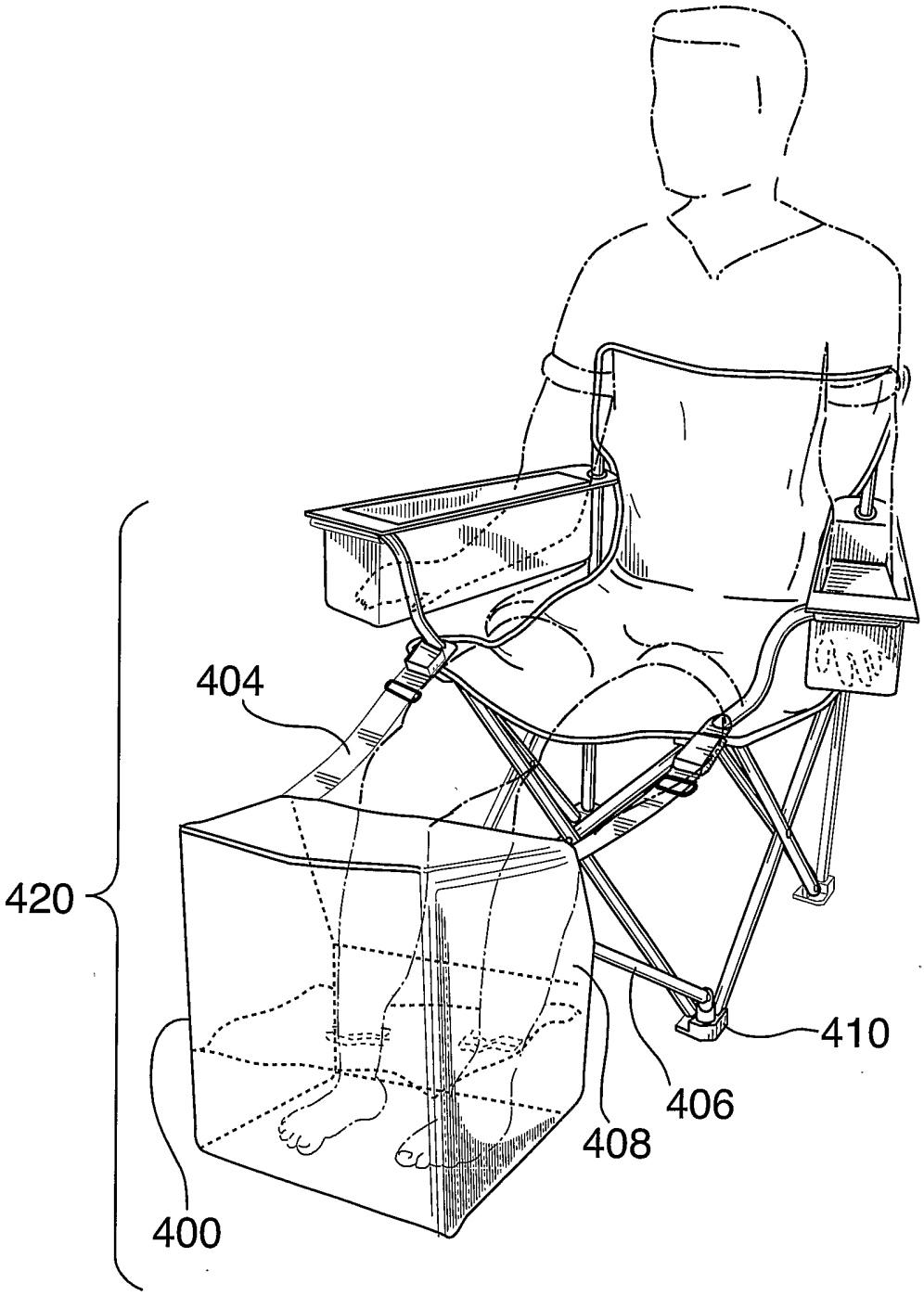

FIG. 4a

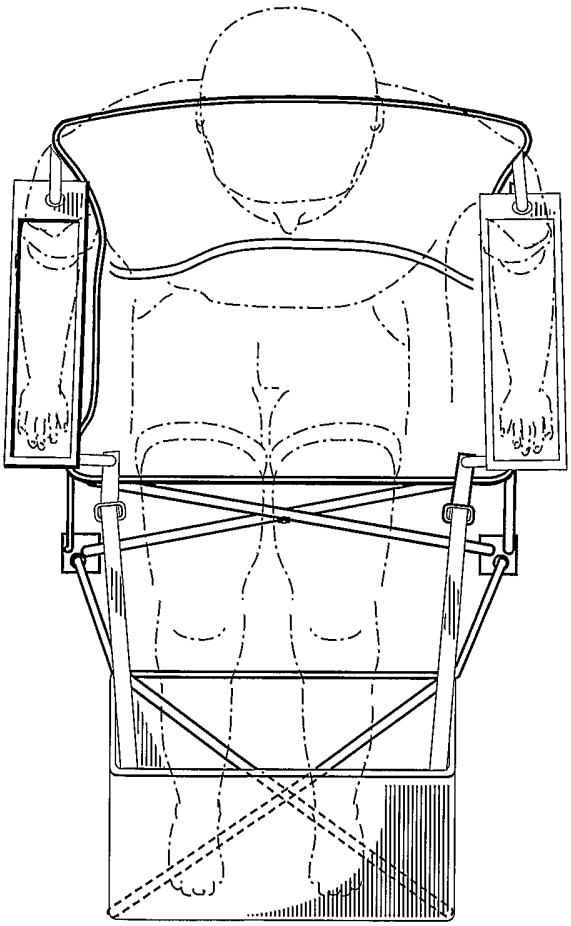

FIG. 4b

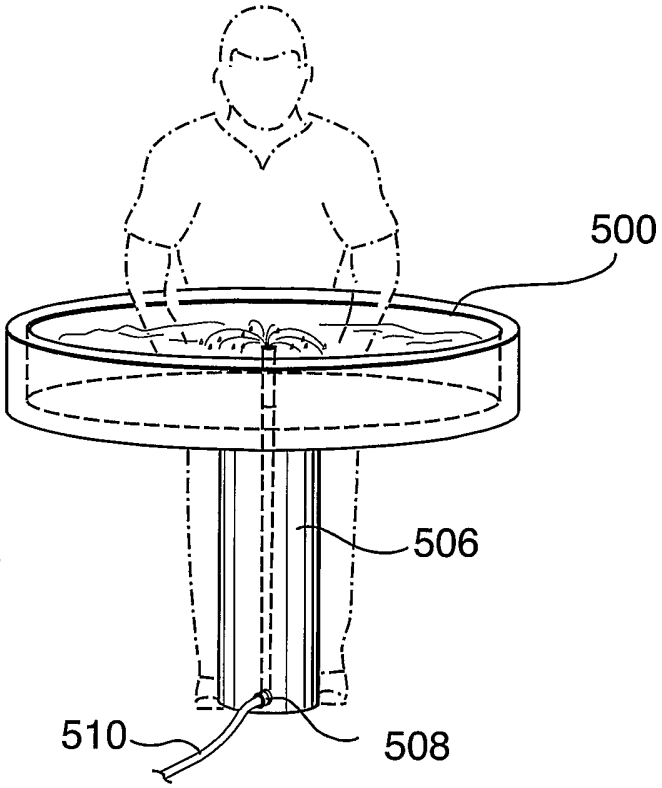

FIG.5a

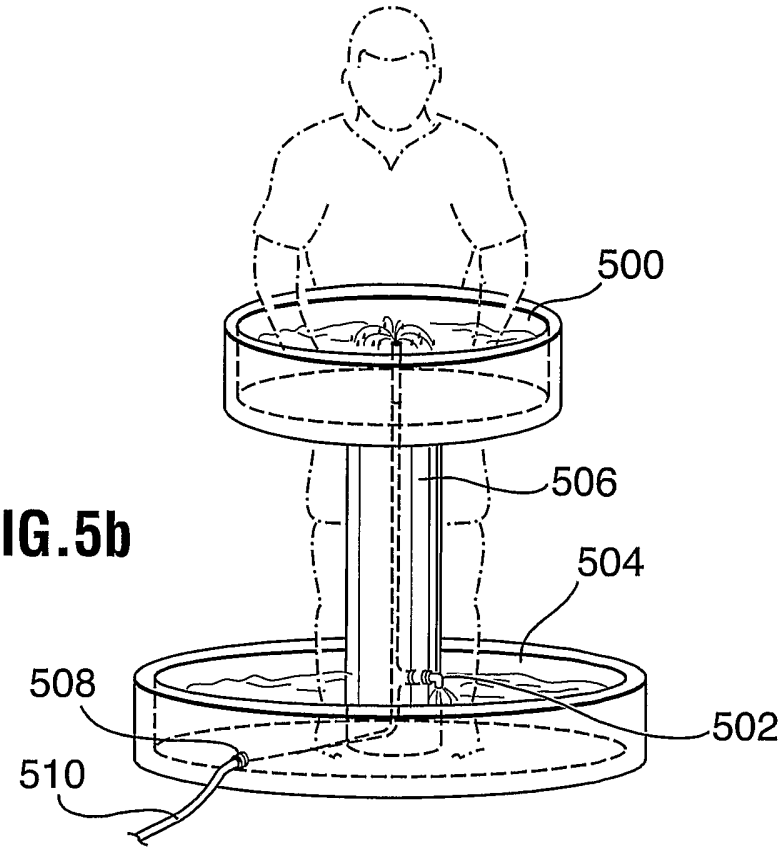

FIG.5b

INTERNATIONAL SEARCH REPORT

International Application No
PCT/CA 03/01609

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A47C7/74 A61H35/00 A61F7/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A47C A61F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 224 640 C (STIX) 25 July 1910 (1910-07-25) page 1, lines 1-62; figures 1,2	128
X	US 5 241 958 A (NOELDNER DAVID R) 7 September 1993 (1993-09-07) column 4, lines 43-50; figures 1-5	12
X	US 6 106 058 A (TOPELKO ROY J ET AL) 22 August 2000 (2000-08-22) cited in the application column 3, lines 30-39; figure 6	13
X	DE 34 06 157 A (ROSTALSKI HEINRICH) 22 August 1985 (1985-08-22) pages 9-13; figures 1-3	13192023

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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Date of the actual completion of the international search	Date of mailing of the international search report
8 March 2004	17/03/2004

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Vollering, J

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