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(54) **Clothing for aquatic sports.**

(57) There is provided a two-piece dry suit formed of closed-cell expanded rubber for aquatic sports use comprising a trouser portion (11) 11 and a body portion. The trouser portion (11) 11 has ankle seals 12 and terminates in an upper edge (13) 13 at waist level and has adjacent the upper edge (13) 13 a thin and flexible sealing flange 14 extending completely around the waist.

The body portion comprises a torso portion (1) 1 terminating in a neck seal 4, and arm portions (2) 2 terminating in wrist seals 3. The torso portion (1) 11 terminates in a lower edge (5) 5 adapted to overlap the upper edge (13) 13 of the trouser portion (11) and having a thin and flexible sealing flange 6 adapted to be rolled together with the sealing flange 14 to form a seal between the trouser portion (11) and the body portion. It is particularly advantageous if the sealing flange 14 is secured to the inner face of the trouser portion (11) at a location spaced below the upper edge (13) 13 so as to form a marginal flap 13a which covers the rolled up sealing flanges. Similarly, the sealing flange 6 is preferably secured to the inner face of the body portion above the lower edge (5) 5 so as to form a marginal flap 5a which covers the rolled up sealing flanges and the flap 13a. The trouser portion (11) and body portion are held together by press fasteners 21 and 22, and a further flap 23 inside the seals provides thermal insulation for the body.

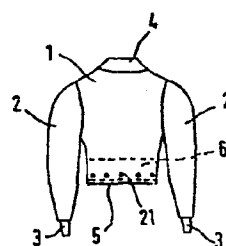


FIG. 6.

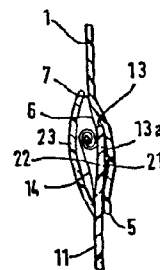


FIG. 9.

CLOTHING FOR AQUATIC SPORTS

This invention relates to clothing for aquatic sports. The clothing in accordance with the invention is particularly designed for use in wind-surfing, but may also find application in other aquatic sports or activities where the participant is not normally in the water, but may perforce spend some time wholly or partially immersed.

Wind-surfing is a comparatively new sport, and the specialised clothing and other equipment required for its successful pursuit is still being developed. Many wind-surfers, particularly at the novice stage, use a conventional wet suit, which is essentially a suit of foamed closed-cell rubber or rubber-like material which is close fitting and not sealed so that a thin layer of water is normally entrapped between the wearer and the suit. In use as a diving suit, this is reasonably acceptable, but when wind-surfing in any but warm conditions, there is a considerable chilling effect, so a wet suit has only limited benefit for wind-surfing.

Accordingly, in order to be able to wind-surf in a wider variety of climatic conditions, many practitioners have taken to using dry suits of various types. Patent Application GB-A-2110069 shows one commercially successful form of dry suit, which is essentially a one-piece suit of closed-cell foam material having sleeves of a thinner and more flexible breathable material. A one-piece of this nature needs to have a long closure fastener, usually a waterproof sliding clasp fastener, and this is an expensive item which makes the whole suit comparatively expensive.

Patent application GB-A-2125681 describes a two-piece suit consisting of a conventional leg and body garment (or Long John), but sealed at the ankles and an upper garment with sleeves and

- 2 -

sealed at the neck and wrists. The garments are sealably joined at or near the waist by co-operating flexible rubber seals which are rolled together. The leg and body garment is a full Long John, and when worn in combination with the upper garment, it may be uncomfortably warm, in view of the use of two layers of foam material. Also, the Long John uses a lot of the comparatively expensive foam material and is not a very economic garment to cut from stock foam material, in view of its length, which leads to a considerable amount of off-cut material being left over during a bulk cutting programme. A particular disadvantage of the use of a Long John garment is that the waist level seal necessarily has to be attached outside the garment, and so is in an exposed position, which may necessitate the provision of bulky, and possibly unsightly and expensive, security arrangements.

15 In accordance with the invention, there is provided a two-piece dry suit for aquatic sports use comprising a trouser portion and a body portion, the trouser portion being formed of closed-cell expanded rubber or rubber-like material provided with means for prevention of water ingress at the lower end of each leg, the  
20 trouser portion terminating in an upper edge at or slightly above a waist region, and having adjacent the upper edge a thin and flexible sealing flange extending completely around the waist region, the body portion having a torso portion formed of closed-cell expanded rubber or rubber-like material and  
25 terminating in a neck seal, and arm portions, which may also be of closed-cell expanded rubber or rubber-like material, terminating in wrist seals, the torso portion terminating in a lower edge adapted to overlap the upper edge of the trouser portion and having a thin and flexible sealing flange adapted to  
30 be rolled together with the sealing flange on the trouser portion to form a seal between the trouser portion and the body portion.

The use of a trouser portion, as opposed to a Long John, leads to the use of less material and a more economical garment to cut, and it also means that the user is not necessarily tied to

wearing a Long John in all conditions. It is thus possible to use the suit with no underwear or with underwear of a chosen thickness to suit the conditions. It is preferred that the suit be worn with at least a thin vest or T shirt, in order to  
5 minimise contact between the user's skin and the sealing flange and the inside of the body portion. This improves the user's comfort and also eases the donning and doffing of the suit.

Where a Long John may be used alone in warm conditions, it is not possible to provide permanent seals at the ankles, so resort has  
10 to be made to strapping to form a seal. In the present arrangement, it is preferred to have the trouser portion terminating in ankle seals.

It is particularly advantageous if the trouser portion sealing flange is secured to the inner face of the trouser portion at a  
15 location spaced below the upper edge thereof so as to form a marginal flap at the upper edge which covers the rolled up sealing flanges.

Similarly, the body portion sealing flange is preferably secured to the inner face of the body portion at a location spaced above  
20 the lower edge thereof so as to form a marginal flap at the lower edge which covers the rolled up sealing flanges and the flap on the trouser portion.

With such an arrangement, the seals may be cut more generously than in the two-piece suit described above, and this should make  
25 the body garment easier to don and doff than the conventional Long John.

In order to hold the trouser portion and body portion together, the flaps formed by their overlapping edges may be provided with co-operating press studs or like fasteners. The trouser portion  
30 may be used with a vest garment of foam rubber or rubber-like material, and without the body portion if required. Such a vest

- 4 -

garment may be secured with the press studs on the trouser portion. These press studs may be used to secure any of a variety of alternative garments together.

5 In a possible alternative, the body portion may have a crutch extension permanently attached at one end at or near the lower edge and detachably connectable thereto by its other end. Such an extension will normally be detachably secured using hook and loop tapes, such as that sold under the Trade Mark "Velcro". The intention is to prevent the separation of the body and trouser portions, with possible failure of the seal, as well as aesthetic consequences.

For comfort and lubrication, the suit portions may be lined, as is conventional, with a nylon or like fabric.

15 With the seal located inside the suit, there is a possibility of water penetrating beneath the flaps, and being separated from the user of the suit only by the seals. As this may be in the region of the user's kidneys, it is preferred that a further layer of insulation be used beneath the seals, and this may be achieved by means of a band of foam rubber glued or welded to the trouser portion so as to underlie the seal.

The invention will be further described with reference to the accompanying diagrammatic drawings, in which:

Figure 1 is an elevation of a body portion of a suit in accordance with one form of the invention;

25 Figure 2 is an elevation of a trouser portion to go with the body portion of figure 1;

Figures 3 to 5 are sectional views showing successive stages in sealing the two portions together;

Figure 6 is a view similar to figure 1 and showing a modification; and

Figures 7 to 9 are views similar to figures 3 to 5 respectively, and showing further modifications.

- 5 Turning first to Figure 1, this shows a body portion of a two piece suit comprising a torso portion 1 and sleeves 2. These are all made of closed cell expanded rubber or rubber-like material, such as neoprene, and it will be seen that the sleeves terminate in wrist seals 3, and the upper part of the torso portion 1 is  
10 provided with a neck seal 4. The seals 3 and 4 are of thin and flexible rubber, normally known as latex seals.

- The torso portion 1 terminates in a lower edge 5 in the region of the wearer's waist, and a flexible sealing flange 6 is indicated in dotted lines. This sealing flange 6 is anchored by its upper  
15 edge 7 to the inside of the torso portion 1, along a line spaced above the lower edge 5 to define a flap 5a of the torso portion 1.

- Dependent from the rear side of the torso portion 1 there is a crutch extension 8 which is adapted to pass beneath the wearer's  
20 crutch and to be attached to the inside of the torso portion at the front of the flap 5a by means of a strip of tape 9 cooperating with a matching tape on the inside of the front of the torso portion 1 to form a peelable connection.

- The material known under the Trade Mark "Velcro" may be used for  
25 this. Alternatively, or additionally, the connection may be by other forms of releasable fasteners, such as pegs entering keyhole slots.

The crutch extension may be unnecessary in certain self-supporting configurations.

Turning now to Figure 2, there is shown a trouser portion comprising a pair of legs 11, each terminating in an ankle seal 12 of the latex rubber type. The upper edge 13 of the trousersr portion is located in the region of the wearer's waist, and  
5 associated with and anchored just below the upper edge is a further latex seal 14 extending completely round the edge 13 and anchored to it along a line indicated by the reference numeral 15, located somewhat below the upper edge 13 so as to define a flap 13a of the trouser portion.

10 The trouser portion is made of closed-cell foam rubber or rubber-like material.

In order to complete a seal between the two pieces of the suit, namely the trouser portion 11 and the body portion 1, after putting these garments on, the wearer will turn back and  
15 outwardly the upper edge 13 of the trouser portion so that the flap 13a is turned down, and he will pull the seal 14 outside the turned down flap 13a. It is to be noted that the seal 14 terminates in a bead 16. He then turns up the lower part of the body portion 1, i.e. the flap 13a of the torso portion 1, and  
20 extends the seal 6 over the outside of the seal 14 to arrive at the configuration indicated diagrammatically in the sectional view in Figure 3.

He then rolls the two seals together around the bead 16 in an upward motion so as to arrive at the configuration shown in  
25 Figure 4, with the rolled seal located between the torso portion 1 and the trouser portion 11. The upper edge 13 of the trouser portion 11 is then folded back to its normal position so that the flap 13a is outside the rolled together seals, and the lower edge 5 of the body portion is then turned back down so that the flap  
30 5a takes up its position outside the flap 13a, so as to form a double protection over the seals which are rolled together.

This arrangement not only protects the seals in a mechanical

manner to restrain them against unrolling, but also provides a labyrinthine path for water to reach the seal, and thus improves its efficacy.

5 It will be seen that the turned back flap 5a formed by the lower portion of the body portion is somewhat truncated in Figures 3 and 4.

The foam material used for the suit may be of a thinner gauge , e.g. 3 to 4mm, than that used for diving suits, which is normally 6 or 7mm thick.

10 In the body portion shown in figure 6, the crutch portion has been omitted, and a line of press studs 21 has been provided to co-operate with a matching line of studs 22 on the trouser portion, as illustrated in figures 7 to 9.

15 The primary function of these studs 21 and 22 is to hold the body portion and trouser portion together, but they may also be used to secure alternative top garments, such as a foam vest, to the trouser portion.

20 Figures 7 to 9 also show an additional band 23 of foam rubber or rubber-like material which is glued or welded to the trouser portion inside the upper edge flap so as to underlie the seal and provide thermal insulation inside the seal, in case of water penetration between the flaps.

Various modifications may be made within the scope of the invention as defined in the appended claims.



CLAIMS

1. A two-piece dry suit for aquatic sports use comprising a trouser portion (11) and a body portion, the trouser portion (11) being formed of closed-cell expanded rubber or rubber-like material provided with means for prevention of water ingress at the lower end of each leg, the body portion having a torso portion (1) formed of closed-cell expanded rubber or rubber-like material and terminating in a neck seal (4), and arm portions (2) terminating in wrist seals (4), characterised in that the trouser portion (11) terminates in an upper edge (13) at or slightly above a waist region, and has adjacent the said upper edge (13) a thin and flexible sealing flange (14) extending completely around the waist region, and in that the torso portion (1) terminates in a lower edge (5) adapted to overlap the upper edge (13) of the trouser portion (11) and having a thin and flexible sealing flange (6) adapted to be rolled together with the sealing flange (14) on the trouser portion (11) to form a seal between the trouser portion (11) and the body portion.
2. A suit as claimed in claim 1, characterised in that the trouser portion (11) terminates in ankle seals (12).
3. A suit as claimed in claim 1 or 2, characterised in that the trouser portion (11) sealing flange (14) is secured to the inner face of the trouser portion (11).
4. A suit as claimed in claim 3, characterised in that the sealing flange (14) is secured to the trouser portion (11) at a location spaced below the upper edge (13) thereof so as to form a marginal flap (13a) at the upper edge (13) which covers the rolled up sealing flanges (6, 14).

- 9 -

5. A suit as claimed in any of the preceding claims, characterised in that the body portion sealing flange (6) is secured to the inner face of the body portion.

5 6. A suit as claimed in claim 5, characterised in that the body portion sealing flange (6) is secured to the torso portion (1) at a location spaced above the lower edge (5) thereof so as to form a marginal flap (5a) at the lower edge (5) which covers the rolled up sealing flanges (6,14).

10 7. A suit as claimed in claim 6 (as dependent on claim 4), characterised in that the flap (5a) on the torso portion (1) covers the flap (13a) on the trouser portion (11).

15 8. A suit as claimed in claims 4, 5 and 7 or in claim 7, characterised in that the flaps (5a,13a) on the body portion and the trouser portion (11) are provided with co-operating fastening means (21,22) to hold the trouser portion (11) and the body portion together.

9. A suit as claimed in any of claims 4 to 8, characterised in that a layer (23) of insulating material is provided between the seals (14,6) and the user's body.

20 10. A suit as claimed in claim 9, characterised in that the said layer is in the form of a band (23) of foamed rubber or rubber-like material attached to the trouser portion (11) so as to underlie the seal (14) thereon.

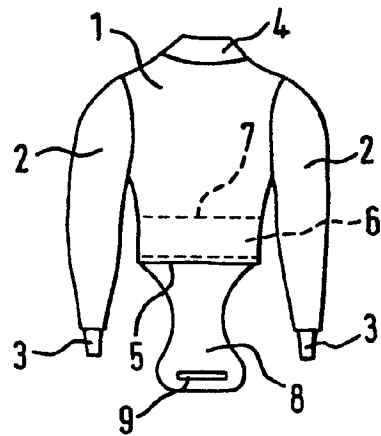


FIG. 1.

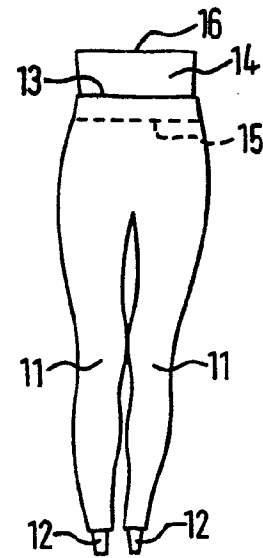


FIG. 2.

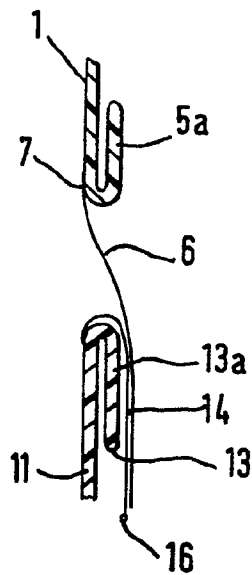


FIG. 3.

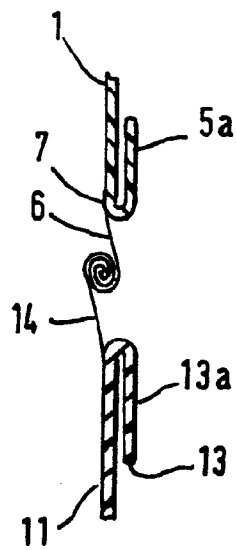


FIG. 4.

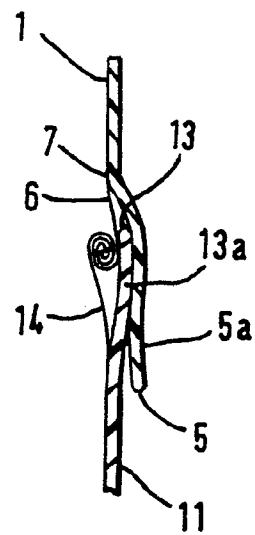


FIG. 5.

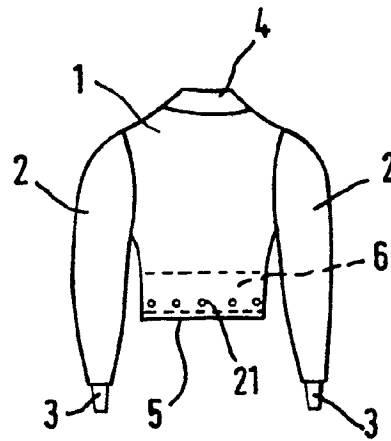


FIG. 6.

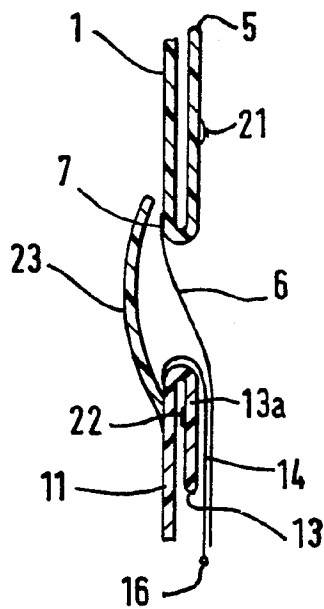


FIG. 7.

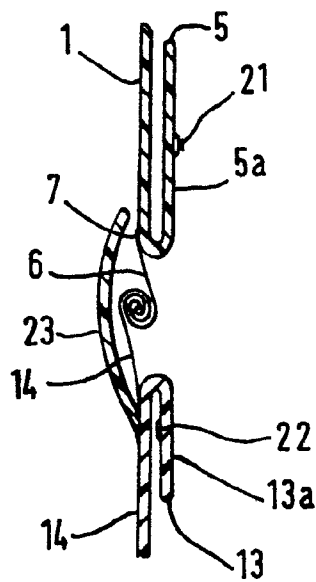


FIG. 8.

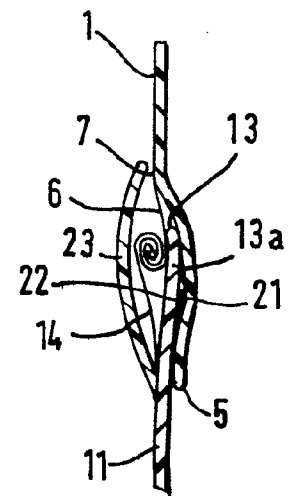


FIG. 9.



European Patent  
Office

# EUROPEAN SEARCH REPORT

0181717

Application number

EP 85 30 7640

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
P,X	EP-A-0 124 259 (MUSTO & HYDE ACCESSORIES LTD.) * Page 3, lines 11-37; page 4; claims; figures *	1,2,5,6	A 41 D 13/00 B 63 C 9/08
A	---	7-9	
A,D	EP-A-0 104 745 (A. TILLBROOK) * Page 8, lines 14-28; pages 9-11; figures * -----	1,5-7,9,10	
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			A 41 D A 62 B B 63 C
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 03-02-1986	Examiner GARNIER F.M.A.C.
<b>CATEGORY OF CITED DOCUMENTS</b>			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	