Dec. 12, 1950 J. E. FELDMAN 2,533,444

BATHING CAP

Filed July 20, 1948

Fig. 1

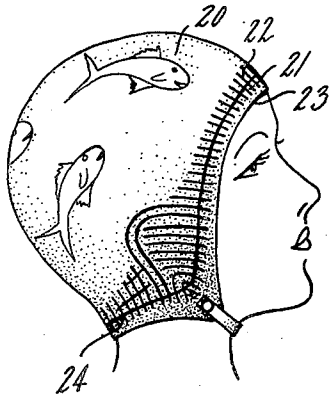


Fig. 2

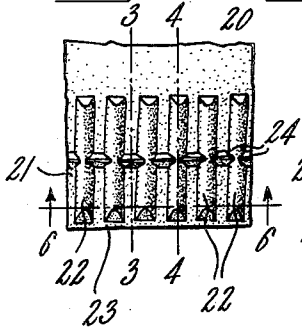


Fig. 3



Fig. 4

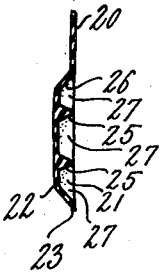


Fig. 7

Fig. 5

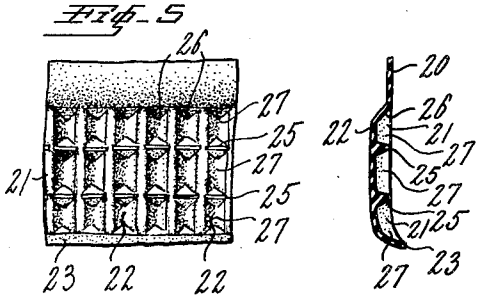


Fig. 6

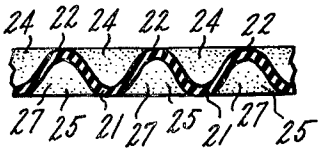


Fig. 9

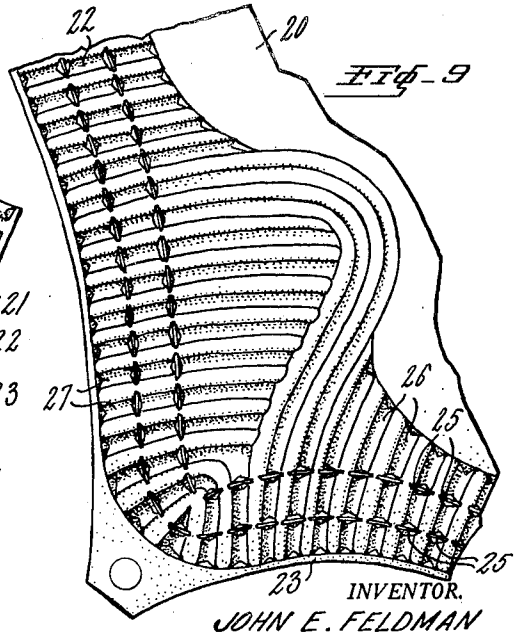
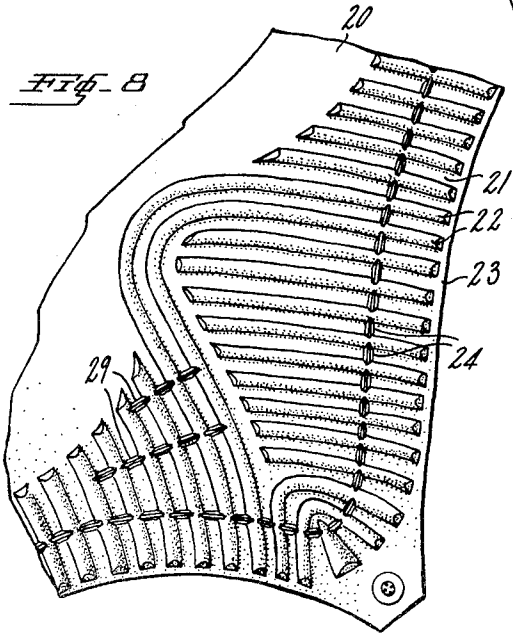


Fig. 8



INVENTOR.
JOHN E. FELDMAN
BY
Charles C. Willson
ATTORNEY

Patented Dec. 12, 1950 2,533,444

UNITED STATES PATENT OFFICE

2,533,444

BATHING CAP

John E. Feldman, Garfield, N. J., assignor to United States Rubber Company, New York, N. Y., a corporation of New Jersey

Application July 20, 1948, Serial No. 39,663

4 Claims. (Cl. 2—68)

1

This invention relates to bathing caps, and more particularly to a waterproof type of bathing cap having means near the edge to prevent water from entering under the edge of the cap.

Various constructions of bathing caps designed to prevent water from entering under the edge of the cap when the wearer dives below the surface of the water have previously been known. However, the constructions used for this purpose have been characterized by certain defects, one being that the sealing means pressed into the skin of the wearer, so that the caps were uncomfortable, particularly if worn for a substantial length of time.

The principal object of the present invention is to provide an improved construction of the sealing band for bathing caps so that the caps can be worn for long periods of time without discomfort, and will effectively prevent water from entering at any point along the edge of the cap. Further objects and advantages of the invention will be evident from the detailed description set forth below.

The improved bathing cap of this invention has a novel sealing means, comprising a band having convolutions disposed at right angles to the edge of the cap. These convolutions are tied together by means of a rib structure on the inside of the convolutions, running generally in the same direction as the edge of the cap. It is inherent in this band structure, that when the band is subjected to tension, as when the cap is on the head of the wearer, the elastic material comprising the convolutions will offer relatively little resistance to stretching and will simply tend to unfold or straighten out. However, where the convolutions are not completely free to so unfold or straighten out, i. e., at the ribs and at the ends of the convolutions, there will be a greater resistance to stretching. This unequal resistance to stretching causes a "toeing in," or an inward movement of the edge of the cap against the skin of the wearer, as well as an inward movement of the ribs. It will be evident that the inward movement of the edge of the cap will effectively seal the edge against the entrance of water, and the ribs and convolutions will define a series of cup-like depressions on the inside of the cap which will, by suction effect, maintain the band in good sealing contact with the skin of the wearer at all times. Further, it has been found that by providing an additional rib or ribs tying the convolutions together on the outside of the cap and alternately disposed with respect to the inside ribs, the degree of

2

"toeing in" which occurs at the edge of the cap can be limited. When this additional outside rib is present, the edge does not exhibit any undesirable tendency to fold under and spoil the sealing action, and further, the pressure of the edge of the cap and the ribs against the skin of the wearer is not excessive so that the cap can be worn for long periods of time without discomfort.

The structure of the improved bathing cap and the advantages thereof will be more fully understood from the following detailed description and the accompanying drawing; wherein

Fig. 1 shows the bathing cap on the head of the wearer;

Fig. 2 is a side view on a larger scale of a short length of the band of the cap of Fig. 1, viewed from the outside of the cap;

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 2;

Fig. 4 is a sectional view taken on the line 4—4 of Fig. 2;

Fig. 5 is a side view of a short length of the band shown in Fig. 2, viewed from the inside of the cap;

Fig. 6 is a sectional view of the band taken on the line 6—6 of Fig. 2;

Fig. 7 is a sectional view of the band as in Fig. 4, showing how the edge of the band "toes in" when the band is stretched;

Fig. 8 is a view of the ear engaging portion of the band viewed from the outside of the cap, showing how the convolutions are extended in this area to allow for greater stretching; and

Fig. 9 is a view similar to Fig. 8, viewed from the inside of the cap.

The bathing cap shown in the drawing may be considered as having the head enclosing portion 20 and the head embracing elastic sealing band 21. The sealing band has outwardly projecting convolutions 22 formed in relief by distorting the elastic band material, preferably without adding any stock. These convolutions extend nearly to the edge 23 of the cap and are disposed at right angles to the edge.

Referring to the detailed outside view of the sealing band shown in Fig. 2 and the sectional view Fig. 3, it is seen that the convolutions 22 are tied together on the outside surface by the outside rib 24, which runs crosswise of the convolutions.

Referring to the corresponding inside view of the band Fig. 5, and the sectional view Fig. 4, the convolutions are also tied together on the inside of the cap by the double row of inside ribs 25

which are alternately disposed with respect to the outside rib.

Referring to Fig. 6, which is a sectional view of the band along its length, i. e., along the line 6—6 of Fig. 2, the manner in which the elastic band material 21 is distorted to form the outwardly projecting convolutions 22 is clearly seen, as well as the manner in which the convolutions are tied together on the outside by the rib 24 and on the inside by the ribs 25. Fig. 6 also shows clearly the generally sinusoidal or corrugated form which is characteristic of the convoluted sealing band. In this connection it should be noted that the corrugated structure tends to decrease the resistance of the band to stretching. This is in contrast to certain prior art constructions wherein ribs or ridges of thicker cross-section than the main body of the band are disposed at right angles to the edge of the cap.

Considering now the manner in which the band structure exerts sealing action, it will be evident that when the band is subject to tension along its length, as on the head of the wearer, the elastic material comprising the convolutions 22 will offer relatively little resistance to stretching and will simply tend to unfold or straighten out. However, in the structure of this invention there are certain points at which the convolutions are not completely free to so unfold or straighten out, i. e., at the inside ribs 25 and at each end of the convolutions, namely, in the area of the edge 23 and in the area 26 where the convolutions meet the head enclosing portion 20. This unequal resistance to stretching causes a "toeing in," or an inward movement of the edge of the cap against the skin of the wearer. This inward movement of the edge is shown in Fig. 7 which is a sectional view of the band as in Fig. 4 when subjected to tension in a lengthwise direction. At the same time, there occurs an inward movement of the inside ribs, which, together with the inner edges of the convolutions, form cup-like pockets or depressions 27 against the skin of the wearer. When the cap is put on the head, some of the air is expelled from these pockets, so that they tend to remain firmly in contact with the skin of the wearer by suction effect. This suction effect, together with the "toeing in" action of the edge of the cap, causes the band to be maintained in good sealing contact with the skin of the wearer at all times.

The tendency of the edge of the band to move inwardly against the skin causes the sealing band to maintain good contact with the skin of the wearer even in the hollow or indentation where the jaw joins the neck. Previously known designs of waterproof cap have generally given poor sealing in this area, and have required a special thickening of the sealing means in this area. Such an expedient has not always been satisfactory, since it causes discomfort, and the exact location of this hollow between the jaw and the neck varies in different persons.

The outside rib 24, which is an essential feature of the construction, acts to limit the "toeing in" action of the edge of the cap so that the edge does not exhibit an undesirable tendency to fold under and spoil the sealing action. This outside rib also acts to limit the inward pressure of the edge and inside ribs against the skin of the wearer, so that the cap can be worn for long periods of time without discomfort even though the sealing action is positive.

Figs. 8 and 9 are outside and inside views, respectively, of the manner in which it is preferred

to modify the structure of the band in the neighborhood of the ears. The convolutions 22 are extended up over the region of the ears so that the cap can readily expand in this area to accommodate the ears comfortably, without affecting the seal of the edge below the ears. It is advantageous to provide additional outside ribs 29 immediately behind the upper part of the ears to stiffen the convolutions and prevent the cap from becoming too loose in this area.

It should be noted that in this improved bathing cap construction there are no inwardly extending projections on the inside of the band to dig into the skin of the wearer and cause discomfort. Thus, the convolutions 22 on the band extend outward from the band, and the inner edges of the convolutions and the inner edges of the ribs 25 are in the same plane as the inner face of the head enclosing portion 20, and the inside of the edge 23. This important feature of the present construction, which is most evident in Fig. 4, together with the unique sealing action above described, is more conducive to comfort than are known constructions for bathing caps of the waterproof type.

It will be evident to those skilled in the art that the particular embodiment of the invention which has been described in detail may be modified in various particulars without departing from the spirit of the invention. Thus, the convolutions may have curved shapes instead of being straight, and the inner and outer ribs may vary in number and may have curved or other shapes, as desired. Likewise, the cross-sectional shape of the convolutions or ribs may be varied as desired. The essential requirement of the construction is that the convolutions be tied together, i. e. ribbed, in such a manner that the difference in resistance of the convolutions to stretching in the tied and untied areas causes the edge of the cap to turn inward, without turning all the way under and without causing the edge of the cap or the ribs to press into the skin excessively.

The bathing caps may be made by any suitable known method, such as by molding in a press in a suitably shaped mold which has been cut out to impart the desired convoluted and ribbed structure, or by placing the unvulcanized rubber cap on a form having the desired rib construction and vulcanizing the cap while air is exhausted from the interior thereof.

Having thus described my invention, what I claim and desire to protect by Letters Patent is:

1. A waterproof bathing cap having a head enclosing portion and a head embracing elastic sealing band, said band having near its edge but in spaced relation thereto a series of convolutions that form hollow ribs disposed approximately at right angles to said edge, and a row of ribs extending transversely of said hollow ribs at some distance from the ends of the hollow ribs and at the inner face of the band to restrict the straightening out of the convolutions, whereby when the cap is worn and the band is stretched about the head its edge will be under greater tension than the convolutions and will therefore pull inwardly against the skin of the wearer in water-sealing contact therewith.

2. A waterproof bathing cap having a head enclosing portion and a head embracing elastic sealing band, said band having near its edge but in spaced relation thereto a series of convolutions that form hollow ribs disposed approximately at right angles to said edge, the band also having two rows of ribs spaced apart and extending

transversely of said hollow ribs at the inner face of the band to restrict the straightening out of these convolutions, and a row of ribs extending transversely of said hollow ribs at the outer face of the band and about midway between said inner rows, whereby when the band is stretched about the head its edge will be under greater tension than the convolutions and will therefore pull inwardly against the skin of the wearer in water-sealing contact therewith.

3. A waterproof bathing cap having a head enclosing portion and a head embracing elastic sealing band, said band having near its edge but in spaced relation thereto a series of convolutions that form hollow ribs disposed approximately at right angles to said edge, the band also having two rows of ribs spaced apart and extending transversely of said hollow ribs at the inner face of the band to restrict the straightening out of these convolutions, and a row of ribs extending transversely of the hollow ribs at the outer face of the band; the inner edge of the convolutions, the inner edge of the inside ribs, and the inner surface of the edge of the cap all being disposed in substantially the same plane, whereby when the band is stretched about the head its edge will be under greater tension than the convolutions and will therefore pull inwardly against the

skin of the wearer in water-sealing contact therewith.

4. A waterproof bathing cap having a head enclosing portion and a head embracing elastic sealing band, said band having near its edge but in spaced relation thereto convolutions that form hollow ribs disposed at approximately right angles to said edge, the band also having two sets of solid ribs extending transversely of said hollow ribs in the form of two spaced rows at the inner face of the band to restrict the straightening out of these convolutions, and a similar row of solid ribs extending transversely of the hollow ribs at the outer face of the band, whereby when the band is stretched about the head its edge will be under greater tension than the convolutions and will therefore pull inwardly against the skin of the wearer in water-sealing contact therewith.

JOHN E. FELDMAN.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,353,403	Howland	July 11, 1944
2,354,916	Hurt	Aug. 1, 1944