March 23, 1954 J. K. LA TRELL 2,672,629

SWIMMER'S PROPULSION AID

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Fig. 1.

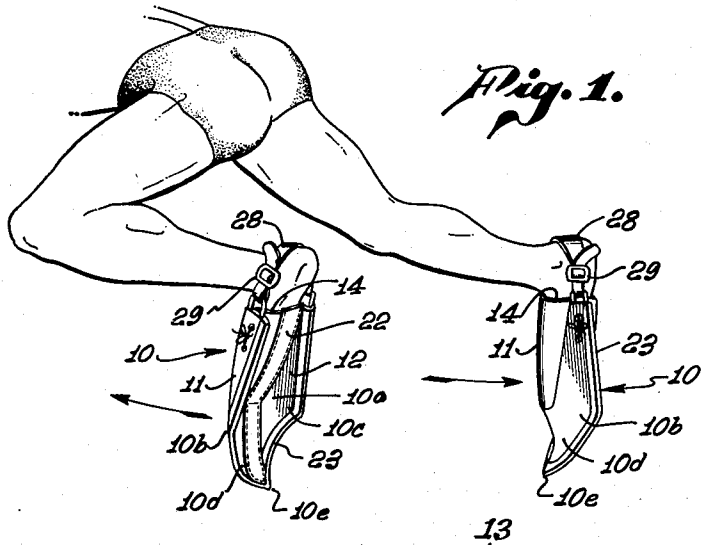
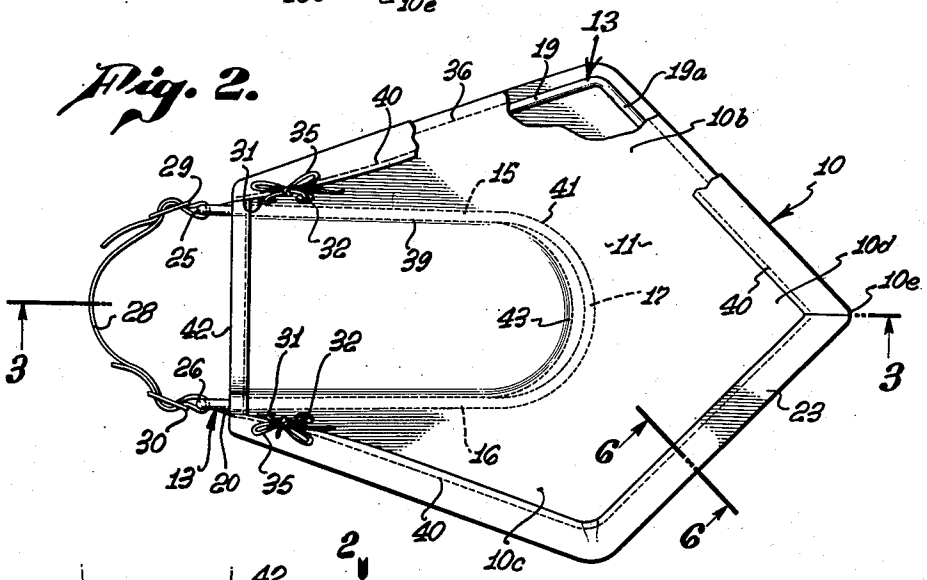
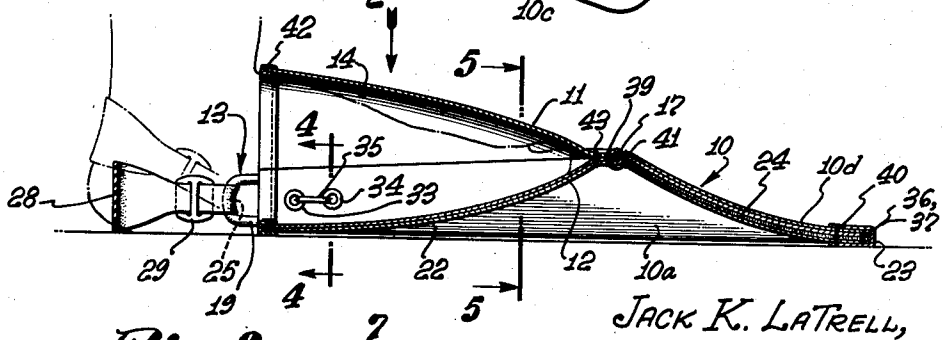


Fig. 2.





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Fig. 3.

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SWIMMER'S PROPULSION AID

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Fig. 5.

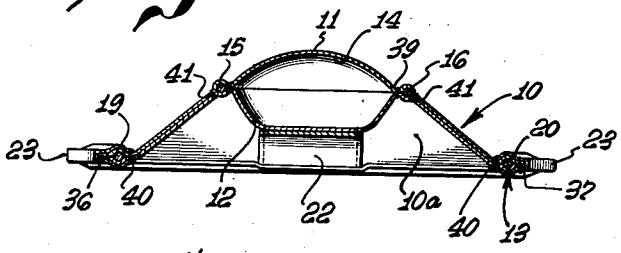


Fig. 6.

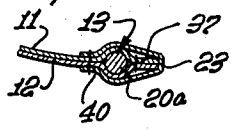


Fig. 4.

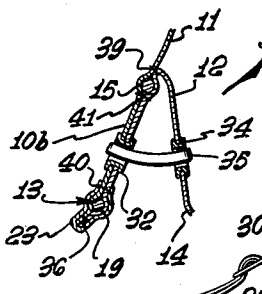


Fig. 7.

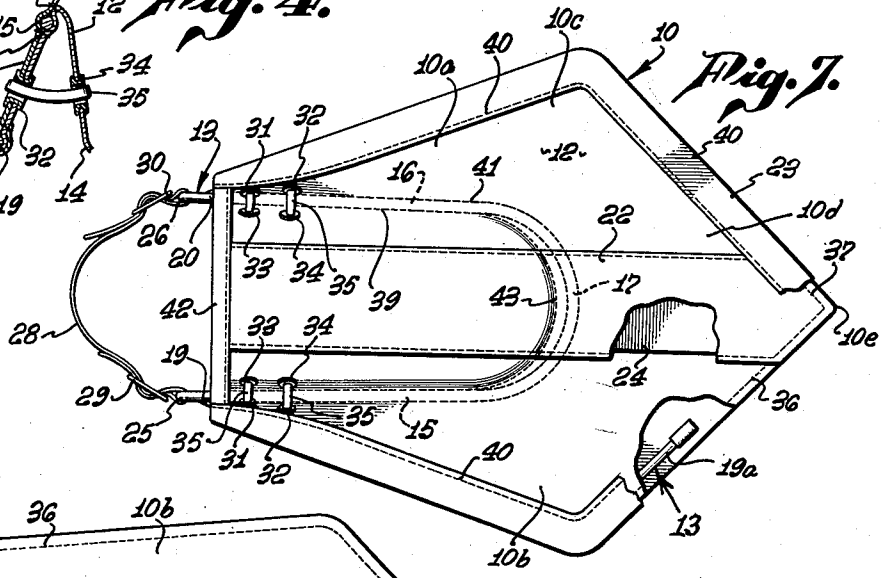
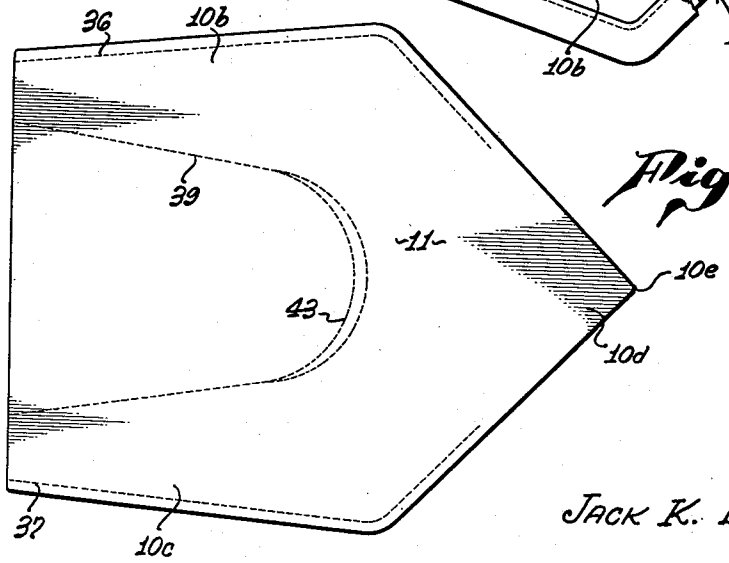


Fig. 8.



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SWIMMER'S PROPULSION AID

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Fig. 9.

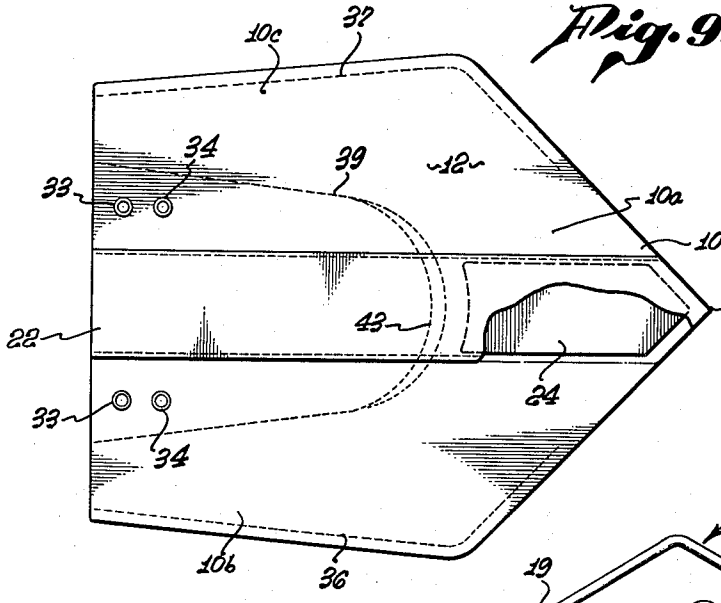


Fig. 10.

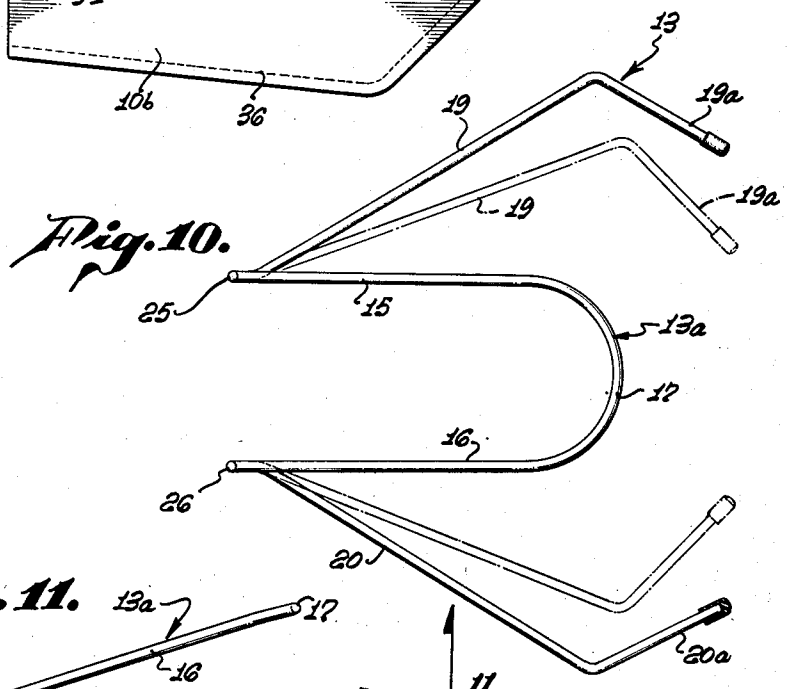
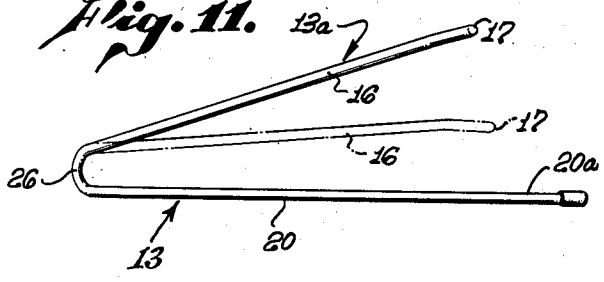


Fig. 11.



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Fig. 12.

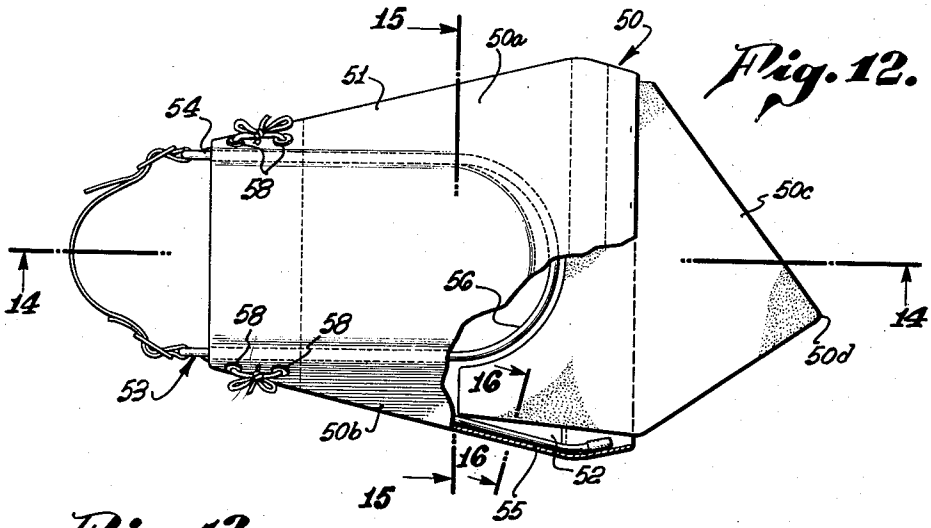


Fig. 13.

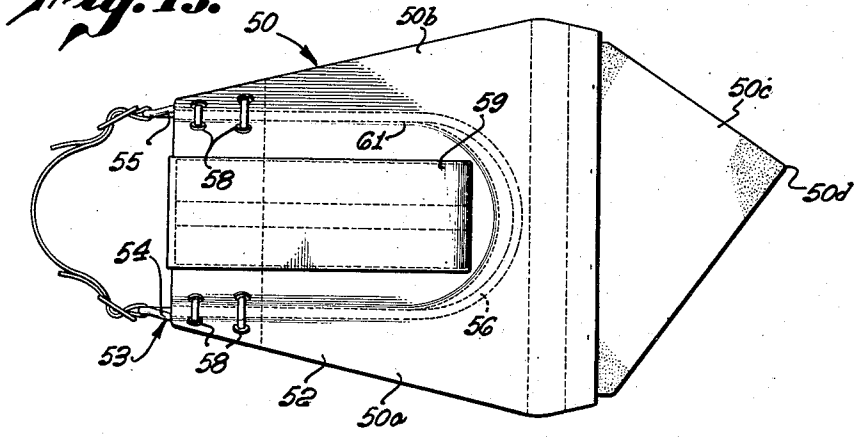
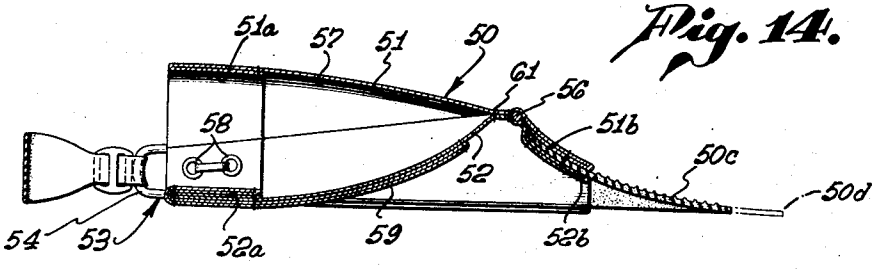


Fig. 14.



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SWIMMER'S PROPULSION AID

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Fig. 15.

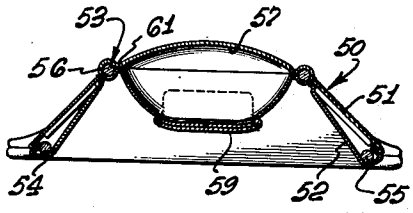


Fig. 16.

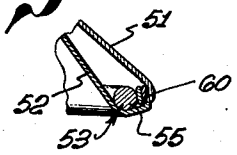


Fig. 17.

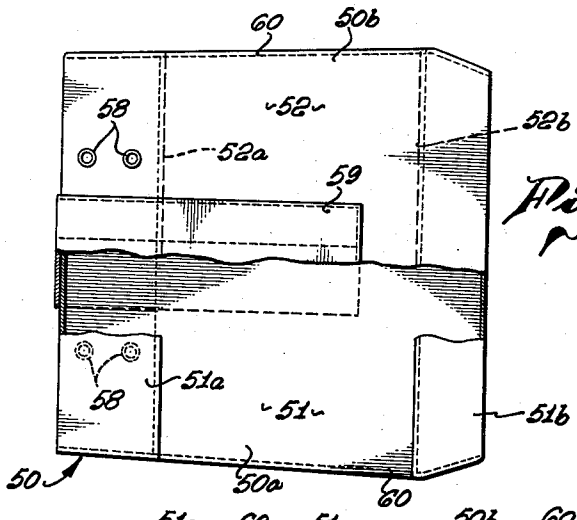


Fig. 19.

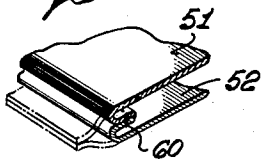
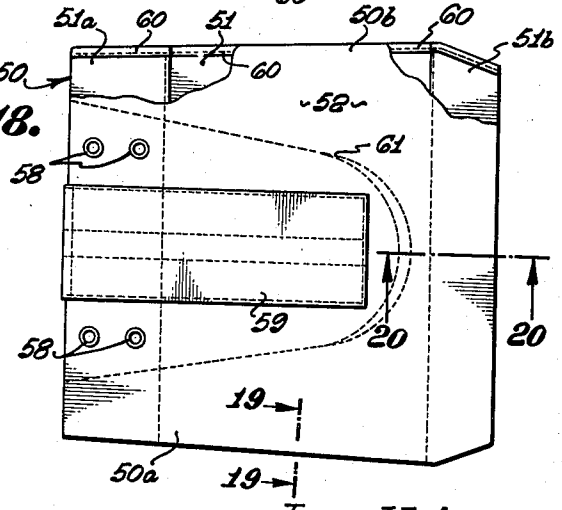


Fig. 18.



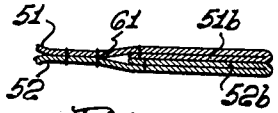


Fig. 20.

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Patented Mar. 23, 1954

2,672,629

UNITED STATES PATENT OFFICE

2,672,629

SWIMMER'S PROPULSION AID

Jack K. La Trell, Glendale, Calif.

Application April 14, 1949, Serial No. 87,537

17 Claims. (Cl. 9—21)

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This invention relates to means to be used by a swimmer as an aid to propelling himself through the water, more particularly to such means to be worn on a swimmer's feet, and to a method of making the same.

It is an object of this invention to provide an improved device for this purpose.

It is another object of this invention to provide such a device which is light, strong and durable, and is comfortable to the wearer.

It is another object of this invention to provide such a device adapted to be fabricated in a simple and economical manner.

It is another object of this invention to provide such a device adapted to be fabricated of readily available sheet material, reenforced in a novel manner.

It is another object of this invention to provide a device of the character described in graduated proportions to accommodate differently sized wearer's feet, and which may be readily adjusted to an intermediate size.

It is another object of this invention to provide a novel method of making a device of the character described.

This invention possesses many other advantages, and has other objects which may be made more easily apparent from a consideration of several embodiments of the invention. For this purpose there are shown two forms in the drawings accompanying and forming part of the present specification. These forms, which illustrate the general principles of the invention, will now be described in detail; but it is to be understood that this detailed description is not to be taken in a limiting sense, since the scope of the invention is best defined by the appended claims.

In the accompanying drawings:

Figure 1 is a perspective view showing a pair of devices incorporating features of the invention, in use by a swimmer;

Figure 2 is a top plan view of one of the devices of Figure 1, seen as looking down on Figure 3, and partly broken away to show the construction;

Figure 3 is a longitudinal section, taken substantially as indicated by line 3—3 of Figure 2;

Figure 4 is a detail section, taken substantially as indicated by line 4—4 of Figure 3;

Figure 5 is a transverse section, taken substantially as indicated by line 5—5 of Figure 3;

Figure 6 is a detail section, taken substanitally as indicated by line 6—6 of Figure 2;

Figure 7 is a bottom plan view, seen as looking from below in Figure 3, and partly broken away to show the construction;

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Figure 8 is a developed top view of the body at an intermediate stage in its fabrication;

Figure 9 is a corresponding bottom view, partly broken away to show the construction;

Figure 10 is a top plan view of the body frame;

Figure 11 is a side elevation thereof, seen as indicated by the arrow marked 11 of Figure 10;

Figure 12 is a top plan view partly in section of a modified form of the device;

Figure 13 is a bottom plan view thereof;

Figures 14 and 15 are sections taken substantially as indicated by the correspondingly numbered lines of Figure 12;

Figure 16 is a detail section taken substantially as indicated by line 16—16 of Figure 12;

Figure 17 is a delevoped top view, showing the body of the device of Figure 12, at an intermediate stage in its fabrication, partly broken away to show the construction;

Figure 18 is a developed bottom view, showing the said body at another stage in its fabrication; and

Figures 19 and 20 are detail sections, taken substantially as indicated by the correspondingly numbered lines of Figure 18.

Referring to that form of the invention shown in Figures 1 to 11 of the drawings, the device comprises a body or shoe 10 formed of a pair of similarly shaped pieces 11 and 12 of flexible sheet material, which may be rubberized woven fabric, appropriately secured together in superposed relation. A bifurcated frame member 13 of resilient material, such for example as wire of suitable characteristics, secured between the pieces 11 and 12, cooperates therewith to form the foot accommodating pocket 14 as well as maintaining the proper body configuration by tensioning the side and forward body portions to transversely arch the body 10 so that it provides a concave or cupped surface 10-*a* facing in the same direction as the soles of the wearer's feet.

This frame 13 as best shown in Figures 10 and and 11, comprises a central reentrant portion 13-*a* including a pair of generally parallel sections 15 and 16 of the frame joined at their inner ends by a curved section 17 and at their outer ends to the diverging arms 19 and 20 respectively with convergent end portions 19-*a* and 20-*a*.

As shown by Figures 8 and 9, the pocket 14 as defined by the lines of stitching 39 on the body pieces 11 and 12, to be described hereinafter, has a width somewhat greater than that defined by the pocket forming arms 15 and 16 of the frame 13, thus providing substantial fullness to the pocket 14 of the completed body 10, as shown by

Figures 3 and 5. Further, the body 10 has side portions 10–*b* and 10–*c* on opposite sides of the pocket 14 as well as a portion 10–*d* forwardly therefrom. The edges of the portion 10–*d* converge forwardly to an apex 10–*e*. The frame 13 is secured within the body 10 between the pieces 11 and 12 so that the arms 19 and 20 are confined respectively adjacent the outer edges 10–*b* and 10–*c*, sections 15, 16 and 17 being confined about the perimeter of the pocket 14. As just pointed out, the body pieces 11 and 12 are so proportioned as to provide substantial fulness of material between the frame sections 15 and 16 to form the pocket 14. On the other hand, the pieces 11 and 12 are so proportioned that the frame arms 19, 20 and sections 15, 16 are confined under tension by the body portions 10–*b* and 10–*c*, arms 19, 20 being flexed inwardly, and sections 15, 16, 17 downwardly from their initially formed configuration shown by the full lines of Figures 10 and 11, to that indicated by the broken lines. In this way the body is resiliently maintained transversely arched.

The frame 13 renders the body 10 quite resistant to flexing, particularly in a longitudinal direction, but as clearly shown in Figure 7, the arms 19 and 20 terminate some distance short of the apex 10–*e* of the body 10 so that the outer end of the forward portion 10–*d* is unrestrained thereby. However, as will be pointed out shortly hereinafter, means are provided for restricting the flexing of this forward portion 10–*d*.

Since the swimmer will, in general, do considerable walking while wearing the devices, it is desirable to protect the lower faces thereof from abrasion particularly since the surfaces walked on will usually comprise highly abrasive materials such as sand, sharp rocks, etc. For this purpose, a wear strip or sole 22 is provided on the bottom of the foot accommodating pocket 14, it being understood that when the user's weight rests on the device the frame 13 will flex, allowing the body 10 to flatten out so that the underside of the pocket 14 rests on the ground.

To protect the outer edge portions of the body from such abrasion a binding tape 23 is provided about the edges of the body 10 (see Figure 6). That portion of the sole 22 ahead of the frame cross piece 17 serves to accommodate a resilient stiffener 24 which may be of a suitable plastic, for restricting flexure of the forward portion 10–*d* as previously discussed. The resistance to flexure of this portion 10–*d* may be readily altered by using different thicknesses and/or materials for the stiffener 24.

As clearly shown in Figure 3 and 11, the arms 19 and 20 of the frame 13 are joined in spaced relation to the sections 15 and 16 respectively by short upwardly extending arms 25 and 26 which are positioned just behind the body 10. An elastic strap 28 is adjustably secured at its opposite ends respectively to arms 25 and 26 as by the aid of buckles 29 and 30, and is adapted to extend about the heel of the wearer to retain the foot in pocket 14, as shown in Figure 3.

Means are provided for adjusting the width of the outer end of the pocket 14 to accommodate the user's foot (see particularly Figures 4 and 7). Thus, a pair of eyeletted openings 31 and 32 are provided in each of the body side portions 10–*b* and 10–*c* adjacent the rear end thereof, and a similar pair of openings 33 and 34 are provided in the lower body piece 12 within the pocket 14 and adjacent the edge thereof. A lacing or cord 35 is roved through the adjacent pairs of eyelets 31, 32 and 33, 34, appropriately tensioned and tied (see Figure 2). By altering the tension in the lacings 35, the effective size of the pocket 14 may be varied.

In constructing the device, sheet material is cut or otherwise formed to provide a pair of pieces, as 11 and 12, Figures 8 and 9 respectively, having the general configuration of the completed body 10 but wider across the rear end, as previously discussed. That piece, Figure 9, which is to form the bottom piece 12, then has the central sole or wear piece 22 attached by rows of stitching respectively along the longitudinal edges and the inner pairs of openings 33 and 34 are formed. The pieces 11 and 12 are then joined in superposed relation by rows of stitching 36 and 37 extending respectively along the opposite edges of the pieces from the rear and terminating a short distance from the apex 10–*e* leaving an opening through which the frame 13 may be inserted. The pieces 11 and 12 are also joined in their central areas by a line of stitching 39 having the pattern of the frame sections 15, 16, 17 but spaced somewhat further apart, as previously discussed. This line of stitching 39 serves as a stop to position the frame 13, the resulting fullness of the material when the frame 13 is in place forming the pocket 14.

After the frame 13 has been inserted, the exterior pairs of eyeletted openings 31, 32 are formed and the stiffener 24 is inserted. The lines of stitching 36 and 37 are then completed to the apex 10–*e* and the binding tape 23 applied. The stitching 40, which secures the tape 23, extends along the inside of the frame arms 19 and 20, and thus cooperates with the stitching 36 and 37 to hold the lower portion of the frame 13 in place. Similarly, a row of stitching 41 is provided exteriorly of the frame sections 15, 16, 17 which cooperates with the stitching 39 to hold the reentrant portion 13–*a* of the frame 13 in place. If desired, binding tape 42 may be provided on the rear edges of the body pieces 11 and 12.

An additional row of stitching 43 is provided across the inner end of the pocket 14 and serves to prevent injury to the user's toes by providing a cushion, which prevents them striking the end section 17 of the frame 13.

In use, one of the devices is mounted on each of the user's feet, the pocket 14 accommodating the fore part of the foot, the strap 28 retaining the device in place on the foot. The transverse curvature of the body 10 will cause the device to strongly resist rearward or downward movement of the feet so that a force substantially greater than that caused by movement in the reverse direction will be exerted, urging the swimmer ahead or upwardly as the case may be. This force is substantially augmented by the forward extension 10–*d*.

The modified form of the invention shown by Figures 12 to 20 is quite similar to the device just described. Thus, it comprises a body 50 formed of two pieces of flexible sheet material 51 and 52 secured in superposed relation and confining between them, a resilient frame 53 having diverging arms 54 and 55 and reentrant central portion 56. The central portion 56 cooperates with the body pieces to form a foot accommodating pocket 57, the arms 54 and 55 tensioning the body side portions 50–*a* and 50–*b*, and maintaining the body transversely curved as before. In this case the forward portion 50–*c* of the body is formed by a separate piece of resilient sheet material, such for example as cor-

rugated rubber of suitable thickness, secured between the body pieces 51 and 52. The edges of this portion converge forwardly to an apex 50–*d* which is offset from the center line of the body. Thus, the device is for use on the right or left foot in accordance with the position of the apex 50–*d* with respect to the center line.

That portion of the portion 50–*d* immediately adjacent the body 50 is similarly transversely curved, so that the resistance to flexure of the the portion 50–*d* when the user is making a propelling stroke is greater than in a return or idling stroke.

The method of making this form of the device is quite similar to that of the preceding form, in that the two body pieces 51 and 52 are secured together along their opposite side edges and in a central pocket forming zone so that the frame 53 may be inserted through an open end of the body 50, as before. However, in this case the body pieces 51 and 52 are initially secured together along their side edges with the wrong side out, as shown in Figure 17, and then turned right side out for the succeeding steps, as shown in Figure 18. In this way, no raw edges of the material or the stitching is exposed and the need of a binding tape is avoided. Furthermore, the pieces 51 and 52 may have hems or integral facings formed on their transverse edges.

Thus, referring to Figure 17 the body top piece 51 has the hems 51–*a*, 51–*b* respectively at its opposite ends, secured by lines of transverse stitching before the pieces are brought together. This piece is shown as broken away so that the bottom piece 52 is partly visible. This piece 52 also has the hems 52–*a*, 52–*b* turned and stitched, the eyeletted openings 58 formed and the sole or wear piece 59 attached, before attachment to the top piece 51. The partly finished pieces 51 and 52 are superposed and secured together by stitching 60 along their side edges, the resulting body 50 being turned inside out so that the facings and stitching are inside, see Figures 19 and 20, and the sole 59 outside. The stitching 61 to define the pocket 57 is then applied, the frame 53 inserted through the open end of the body 50 opposite the pocket 57 and the structure completed in a manner similar to that previously discussed.

I claim:

1. In a swimmer's aid: a body comprising a pair of superposed layers of sheet material; a resilient frame secured between said layers and having a central reentrant portion cooperating therewith to form a foot accommodating pocket; said body having extensions on opposite sides of said pocket; means joining said layers along their optside edges; resilient members attached to said layers adjacent said edges and cooperating with said central portion to tension said body extensions; said body having a wear piece on the bottom exterior of said pocket; and a strip secured to said body and embracing said edges.

2. In a swimmer's aid: a body of flexible material; and a frame having a central reentrant portion cooperating with said body to form a foot engaging pocket; said body having side portions; said frame including resilient arms engaging said side portions and cooperating with said reentrant portion to tension said side portions.

3. In a swimmer's aid: a body of flexible material having a foot accommodating pocket and portions on opposite sides thereof; and a resilient frame secured to said body and providing a central portion defining the perimeter of said pocket; said frame having side arms cooperating with said central portion to engage and tension said side portions of said body.

4. In a swimmer's aid: a body of flexible material; and a resilient frame secured in said body; said frame having a central reentrant portion cooperating with said body to form a foot accommodating pocket; said body having portions on opposite sides of said pocket; said frame including a pair of diverging arms cooperating with said reentrant portion and extending along and engaging margins of said side portions to tension said side portions.

5. In a swimmer's aid: a body of flexible material having a foot accommodating pocket and portions on opposite sides of said pocket; a resilient frame secured in said body and having a central portion engaging said body between said side portions; said frame having side arms disposed in a different plane than said central portion and cooperating with said central portion to engage and tension said side portions of said body; and means connected with said frame for retaining the user's foot in said pocket.

6. In a swimmer's aid: a body having a portion adapted for engaging the foot; said body including portions extending on opposite sides of the foot as well as forwardly therefrom; and resilient means including pairs of opposed members disposed one above the other and in laterally spaced relation to one another for engaging and maintaining a part of said foot engaging portion and a part of said forwardly extending portion transversely arched.

7. In a swimmer's aid: a body of flexible sheet material adapted to be mounted on the foot and to extend on opposite sides of the foot as well as forwardly therefrom; and a resilient frame opposing deformation of said body; said frame including portions in different planes engaged with and extended along marginal and intermediate portions of said body and terminating at a point spaced from the forward end portion of said body to permit flexing of said forward end portion.

8. In a swimmer's aid: a body adapted for mounting on the foot; said body extending on opposite sides of the foot and having a flexible forward portion; a resilient member for imparting limited resistance to flexure of said forward portion; means securing said member on said forward portion; and a frame having portions in different planes secured to said body.

9. In a swimmer's aid: a body adapted for mounting on the user's foot comprising a pair of superposed layers of flexible material; a frame having resilient members disposed in different planes between said layers for resiliently maintaining a predetermined configuration of said body with portions of said layers spaced apart to receive the foot; and means securing other portions of said layers together and extending about said frame for securing the frame in the body.

10. In a swimmer's aid: a body comprising a pair of superposed layers of flexible material; a resilient frame interposed between said layers and having a central reentrant portion cooperating with said layers to form a foot accommodating pocket; portions of said layers extending on opposite sides of said pocket as well as forwardly therefrom; a pair of diverging arms secured to and extending along margins of said side portions; said arms cooperating with said central portion to tension said side portions as well as

a part of said forward portion; and means securing said layers and said frame in assembled relation.

11. In a swimmer's aid: a body of flexible material; a resilient frame having a central reentrant portion cooperating with said body to form a foot accommodating pocket; said body having portions extending on opposite sides of said pocket as well as forwardly therefrom; said frame including a pair of diverging arms attached to said body; said arms extending from the rear of said frame and cooperating with said central portion to maintain the extended portions of the body tensioned; the rear of said frame having spaced portions projecting from the body; and means extending between and joined to said projecting portions of said frame for engaging the user's heel to retain the user's foot in said pocket.

12. In a swimmer's aid: a body of flexible sheet material having a rearwardly opening pocket for accommodating the fore part of the foot; heel engaging means for retaining said foot in said pocket; said body having portions extending on opposite sides of the pocket as well as a forward portion; and a resilient frame extending along and secured to opposite sides of said pocket as well as along and in contact with said side portions of said body for maintaining said side portions in extended position and transversely arched.

13. In a swimmer's aid: a body of flexible sheet material; and a resilient bifurcated frame having a portion defining a rearwardly directed opening cooperating with the body to form a foot accommodating pocket intermediate side edges of the body; said frame including arms extending forwardly from said opening beneath the plane of said portion of the frame and engaging portions of the body on opposite sides of said pocket for maintaining the body in extended configuration.

14. In a swimmer's aid: a body of flexible sheet material; and a resilient bifurcated frame having a portion defining a rearwardly directed opening cooperating with the body to form a foot accommodating pocket intermediate opposite marginal portions of the body; said frame including resilient arms joined to said portion of said frame; said arms extending below the plane of said portion of the frame and engaging portions of said body on opposite sides of said pocket.

15. In a swimmer's aid: a body comprising a pair of superposed layers of sheet material; a resilient frame secured between said layers and having a central reentrant portion cooperating therewith to form a foot accommodating pocket; said body having portions on opposite sides of said pocket; means joining said layers along their outer edges; resilient members on said frame secured to said side portions and cooperating with said central portion of the frame to tension said side portions of the body; a wear piece on the exterior of said pocket; and means defining said outer edges and protecting said joining means from external abrasion.

16. In a swimmer's aid: a body comprising a pair of superposed layers of sheet material; a resilient frame secured between said layers and having a central reentrant portion cooperating therewith to form a foot accommodating pocket; said body having portions on opposite sides of said pocket; means joining said layers along their outer edges; said frame having resilient members attached to said layers adjacent said edges and cooperating with said central portion to tension said side portions of said body; said body having a wear piece on the exterior of said pocket; and a strip secured to said body embracing said edges.

17. In a swimmer's aid: a body of flexible material adapted to be mounted on a foot of a swimmer; side portions on said body; and a frame having a portion engaging said body and cooperating therewith to form a foot-receiving pocket; said frame including resilient arms disposed below the plane of said portion of said frame engaging and tensioning said side portions.

JACK K. LA TRELL.

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