A thin, flat, rigid paddle or plate is secured to the palmar surface of each outstretched palm by a broad, thin, tough, impervious inelastic band or hand cover over the back of the hand, not including the digits or wrist. The size is such that the distal joints of the three longest fingers are apt to extend beyond the plate, and the plate reaches proximally almost a third of the distance from wrist to elbow; and it is dynamically balanced at about the center of the palm. The hand cover is broadly fastened to the plate along each side of the palm, adjustably so on one side, by means of a clamp with rows of threaded holes and two screws. An extension of the cover over the thumb base is releasably drawn up to the plate by a cord fastened to the plate and running through a tube along the broad edge of the extension, thereupon running through a hole in the plate and then held tightly by a collar or knot on the cord at a slot in the rim of the plate.

8 Claims, 2 Drawing Figures
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HAND SWIM FINS

This invention relates to fins or paddles fitted on the hands and functioning with or without foot fins to increase the efficiency of swimmers. Many types of aids have been designed for the upper extremities, none of which has endured in widespread use, leaving a need to be met.

I have invented practical hand fins which are cheap, reliable, durable, and easily put on, and removable without help. My invention avoids expensive molds, elastic and unreinforced materials that soon deteriorate, and delicate pivoted parts which soon wear out or get damaged. Function is unreliable if propelling parts are expected to be relatively stiff in some regions and elastic in others so as to cup or bend considerably. Hinged and umbrella-stay or pocketed models are complicated, costly, and easily broken, and may clap open with disturbing abruptness. Forearm "ballooning sails" have problems with turbulence, reliability, and control. An object of my invention is to supply non-buoyant hand fins of low mass which, together with the user's hands and wrists, cut the water well on the back-stroke, while being kept under water effortlessly, free from trapped air interference. Another object is to provide hand fins which do not become overfilled with water. Another object is to provide hand fins dynamically balanced and ideally controllable by the user, taking into account the characteristics of the human anatomy and physiology and hydrodynamics so as to avoid tiresome overuse of weak muscles such as those which fan out the fingers, while drawing upon naturally strong muscles which are easily coordinated for both the power and the recovery stroke. Another object is providing various hand sizes not just by varying fixed dimensions but especially by built-in adjustability.

Another object is supplying hand fins peculiarly although not exclusively adapted to two related advantageous modes of swimming, namely frankly on the back, and secondly on the back but turned partly to one or the other side, especially with extra twisting below the waist, allowing the eyes, nose, and mouth to remain comfortably and pleasantly out of the water while at the same time permitting long forward strokes to be taken by the feet with foot fins as desired. These related swimming styles, in contradistinction to the crawl, are easily mastered, and, except in unusually choppy water, permit constant use of the eyes free from blurring and irritation due to repeated submergence, for a watch of oncoming swells, of birds near at hand, and of other bathers and surfers, while breaths are taken conveniently, precisely when wanted and without positional straining. Another object is freeing of the wrists allowing full pronation for the recovery stroke. Another object is to accurately apply the thin, flat, rigid swimming plate to the palmar side of the extended hand and its digits, thus transmitting power through tissues anatomically capable of bearing strong compressions again and again without trauma to delicate skin and important unprotected structures such as perioseum and nerves. Ulnar fins fastened to sleeves closely fitting the forearm and wrist, for example, are constrictive if slippage is to be avoided, and, even so, the skeletal movements are poorly transmitted to such fins as the skin slips around on the parts beneath. Another object is to supply such fins that the user can propel himself rapidly, with a minimum of strokes per minute, each stroke so powerful that it generates abundant heat, and thus to maintain the core temperature even in cold waters, even if the user is elderly, permitting lengthy swims, weight control, and destruction of harmful accumulations in the body such as cholesterol over an extended portion of the year. Another object is to offer swimmers my hand fins and to suggest a style of swimming with them, so pleasurable that large numbers of people will use them habitually and derive benefit from their employment for exercise.

Advantages of my hand fins become apparent as their manner of use is described. Typically the swimmer faces upward. For the back stroke, the wrists are pro nated and the humeri are rotated so that the palms face downward. Both upper extremities are abducted simultaneously by contraction of the strong deltoid and trapezius muscles. For the power stroke, both palms are turned footward and brought close to the thighs forcefully with the elbows straight. The wrists are entirely free, and are altered in position at will to get the proper angle on the fins for best propulsion and guiding, which does not require marked flexion of the wrists. The strong flexors of the wrists and fingers are involved in the power stroke, functioning well because the center of dynamic balance of the fins is well placed, near the center of the palm, not out too far. The digits may be shifted about for comfort but are not required to be spread apart forcefully by the thin, easily tilted intrinsic muscles of the hand, the interossei, as when webs must be held open. The plates need not be cut away for the forearms as in methods depending on marked flexion of the wrists, thus rigidity is obtained with a saving of material, and weight and inertia are lessened. For the propulsive stroke, abundant muscles are available: the pectoralis major, latissimus dorsi, teres major and minor, coracobrachialis, short head of the biceps, and long head of the triceps. Almost the identical muscles are used, and in the same way, as for the crawl, except that in the latter the body is rolled and the extremities are adducted one at a time, the hands plunging deeply.

To get propulsion on the back stroke is not practical due to the weakness of the extensors of the wrist and fingers and need for overuse of the deltoids, nor can sufficient supination of the wrists be achieved.

As shown in the drawing, the hands, wrists, and fins during the recovery stroke present a thin streamlined edge to the water relatively flowing by, the plate being flat and thin, the hand cover sloping smoothly fore and aft, the digits following one behind another, and the wrist region moving edge-on, leaving a flow-space next the plate. My invention overcomes the problem of the grasping bar with its turbulence about the fist. Full proportion is allowed, yet power also, the proximal margins of the plates extending almost one-third the way from the wrists to the elbows, and the edge does not rub the skin. The distal joints of the index, middle, and ring fingers extend beyond the distal margins and may be used for pulling on the cord and fastening the second hand. Besides being adjustable so as to fit most adults, the fins can be made in sizes for exceptionally large and small hands. Once adjustment results in a fit, readjustments are unnecessary. These hand fins are quite durable; prompt flushing off of sea water even without drying protects against corrosion.

The accompanying drawing is a useful aid in connection with the description of the presently preferred embodiment.

FIG. 1 is a view of the hand side of my invention.
FIG. 2 is a side perspective view showing the right hand and corresponding fin in their ulnar aspect. The propelling member or paddle, called here the plate is a rigid thin planar sheet of generally rounded shape, bearing a plurality of small holes of selected sizes and locations, also a slot, all for attachment of the hand cover in a special way as hereinafter described.

The hand is held positioned palmar side against the corresponding plate 1, left or right, by a member called here the hand cover 2, formed from a thin, tough, flexible, nonelastic, impervious piece of sheeting such as cloth-reinforced neoprene. In use, the hand cover arches over the four finger metacarpals, forming a tunnel, and is fixed broadly to the plate just beyond both borders of the hand. In the presently preferred embodiment, the extension 3 of the hand cover over and beside the index metacarpal, called here for brevity the index extension, is doubled back on itself for reinforcement and fixed permanently to the plate by some known means or as here described, and the fold is cemented and stitched or stapled. I prefer to enclose a very slender rigid tube 4 through which I run a slender soft brass wire doubled on itself 5 and drawn tightly through tiny holes 6 in the plate. The hand tunnel is adjustable at one edge of the other so as to fit hands of many sizes. With permanent fixation chosen for the index extension in the presently preferred model, I make the fifth metacarpal extension 7 adjustable by having it long, and with two spaced rows of holes 8 for receiving screws 9 inserted through two spaced holes in the plate. A rigid strip 10 called here the clamp is fashioned with a row of threaded holes 11 near either end, fitting these screws and arranged so that the long fifth metacarpal extension may be placed between the clamp and plate and held there by the tightening of the screws. The hand cover is releasably attached to the plate, also, by its broad extension over the thumb base called here the thumb metacarpal extension 12, reinforced much as is the index extension, but enclosing a rigid tube 13 large enough to accommodate a stout cord 14 used for drawing it down to the plate for the swim and securing the hand in ideal fashion, positively, accurately, and nonconstrictively. The digits and wrist are not fastened to the plate. In this preferred arrangement, the cord bears a terminal knot or collar 15 which restrains it as it passes through a snug hole in the plate lateral to the proximal joint of the thumb. The cord is threaded through the tube, then through a second hole 16 in the plate near the wrist and then slipped through a slot 17 in the plate's edge where a second knot or collar retains the cord drawn tightly enough to secure the fin on the hand. The cord is left redundant, bearing a third knot or collar so as to furnish a hold for its manipulation. The cord is durable as here used, yet easily replaceable from standard stock obtainable locally. The selected length is cut after a short strip of ⅛ inch clear plastic tape 19 has been wrapped tightly around it first, so the cut divides the wrapping, making threading without fraying possible. The initial fastening of the cord to the plate may be by known means, not requiring a knot or hole. If the adjustment must be long enough to allow the index extension, the thumb metacarpal extension is made adjustable by the supplying of 2 rows of holes for the cord rather than just 2 holes. The rows are spaced apart a little more than the length of the tube and are aligned at right angles to its long axis.

It may be seen that a number of modifications of this basic design may be made which will retain its practical advantages. The screws and clamp means for adjustable attachment to the plate may be applied to any one of the hand cover extensions or to the index extension and one other. Attachments of the index and thumb metacarpal extensions to the plate may be permanent if the cord loop releasable means with two rows of holes already described is applied to the fifth metacarpal extension. The cord loop means can be employed to work any one, two, or three of the extensions and it can be made adjustable for hand sizes by provision of two rows of holes properly placed rather than just two holes. A single cord can operate any two or all three hand cover extensions. Any cord may be releasably attached to the plate by insertion at two nodes near its ends in two rim slots. If the nodes consist of knots, users can easily readjust the lengths of the effective loops if they are or become too long.

Understanding of my invention is inadequate when it is viewed as an entity standing alone, but is possible, rather, when the hand fins and the wearer with his special anatomical and physiological qualities are studied together and in relation to hydrodynamics. Then the significance of the structural peculiarities of the fins, and of where and how they are fastened becomes apparent. In like manner, the structures of a harness are explainable only through reference to the anatomy and physiology of the draft animal, the particulars of the vehicle drawn, and the principles of physics. The ancient horse collar and many modifications greatly reduced pulling efficiency by causing choking, until at last after many centuries of use, a new design eliminated the fault.

The present invention, of course, may be carried out in other specific ways than those herein set forth without departing from the spirit and essential characteristics of the 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 are intended to be embraced herein.

Desiring to secure Letters of Patent of the United States, and having described my invention, I claim:

1. Paired swim fins fitting left and right hands of the user comprising in the case of each hand an attachment of an essentially rigid thin planar plate of appropriate size and generally rounded shape, and a hand cover, releasable at one or more of its attachments to said plate, of such construction as to hold the hand, palmar surface against the plate, said combination obtaining for the power stroke a dynamic balance centered at about the center of the palm and presenting with the hand when moved through the water on the back stroke, ulnar edge leading, low resistance because of the thinness and flatness of the plate, the streamlining of the hand cover, and the alignment of the digits behind one another; said combination being non-buoyant and of low mass; said combination fastening only to the body of the hand and not to the digits or wrist so as not to hamper movement of anatomical parts especially pronation of the hand, nor style particularly swimming on the back; said combination further being of graded sizes to fit various hand sizes and muscular powers, or otherwise said combination being of graded sizes to fit various hand sizes and muscular powers and also with
structure offering adjustment means for fitting a variety of shapes and sizes of hands.

2. The product of claim 1 wherein the hand cover is broadly attached to said plate beside both the index metacarpal and fifth metacarpal forming a short streamlined tunnel capable of being adjusted for hand size at either or both sides, said hand cover additionally broadly and releasably attached to said plate by its extension over the thumb metacarpal region and manipulatable by the user without help.

3. The product of claim 1 wherein any permanent fixation of the hand cover is by a slender wire which may be doubled, running through small holes in the plate and through a very slender rigid tube cemented into a turned back and cemented and stitched or stapled edge of an extension of said hand cover.

4. The product of claim 1 wherein the hand cover is made from a thin sheet of cloth-reinforced neoprene.

5. The product of claim 1 wherein a hand cover extension over the index metacarpal is permanently fixed to the plate and wherein an extension over the fifth metacarpal is fastened beside the ulnar border of the hand by being placed adjustably beneath a clamp having a plurality of rows of threaded holes, said clamp capable of being set tightly against the plate by the turning of a plurality of screws, each screw fitting in a selected hole in a different row, said hand cover extension being provided with rows of perforations for said screws, and said plate with a plurality of holes for the screws.

6. The product of claim 1 wherein in the preferred embodiment including a hand cover extension over the thumb metacarpal region which is releasably held drawn down toward the plate by a length of stout cord fastened to the plate by being given a terminal knot or added collar and threaded through a snug hole in the plate, thereupon being threaded through a slender rigid tube cemented into a turned back and cemented and stitched or stapled edge of said hand cover extension, thereupon passing through a hole in the plate and then slipped through a slot in the plate's edge where a knot or added collar restrains the cord drawn tightly enough to releasably hold said extension without slack and secure the hand, said cord extending redundantly further and bearing another knot or added collar for making manipulation easy.

7. The product of claim 1 wherein a stout cord threaded through a slender rigid tube cemented into the turned back and cemented and stitched or stapled edge of an extension of the hand cover for drawing said extension releasably toward said plate when pulled upon and thus securing the hand; wherein said cord is fixed to the plate at a selected point and passes through a hole in the plate or else passes through two holes in the plate; wherein cord means comprising at least one cord is disposed so as to draw up separate hand cover extensions or a single cord may be threaded through a plurality of holes in said plate so as to draw up at least two of said extensions, said cord being fixed to said plate and held for the swim at one or more points along its length by a knot or added collar catching at a slot in the plate's edge; wherein any extension bearing a loop of cord in its tube can be made adjustable for hand sizes by two rows of holes in said plate through a selected two of which said loop passes, said rows of holes appropriately located at right angles to the long axis of said tube and spaced apart a little more than the length of the tube; and wherein beyond where said cord is to be caught in a slot in the plate's edge it extends redundantly and bears a knot or added collar near its terminus as an aid to its manipulation.

8. The product of claim 1 wherein said hand cover includes three extensions for providing adjustment for hand sizes and releasably securing the hand to the plate; wherein said extension include a fifth metacarpal extension, an index metacarpal extension, and a thumb metacarpal extension; wherein at least one of said extensions is permanently fixed; wherein at least one other of the extensions is fastened to the plate by being placed adjustably beneath a clamp having a plurality of rows of threaded holes, said clamp capable of being set tightly against the plate by the turning of a plurality of screws, each fitted in a selected hole in a different row, said hand cover provided with rows of perforations for the screws, and said plate with a plurality of holes for the screws; wherein a loop of a stout cord is threaded through a slender rigid tube cemented into a turned back and cemented and stitched or stapled edge of the remaining one of said extensions and is passed through two selected holes of two rows of holes in the plate appropriately located at right angles to the long axis of said tube and spaced apart a little more than the length of the tube; wherein one end of said cord is held to the plate at the hole by a knot or added collar and the remaining cord beyond the loop may be drawn upon and held taut at a slot in the edge of said plate by a knot or added collar and extending redundantly farther bears a knot or added collar for ease of manipulation, thus affording both adjustment for hand sizes and releasable securing of the hand to said plate.

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