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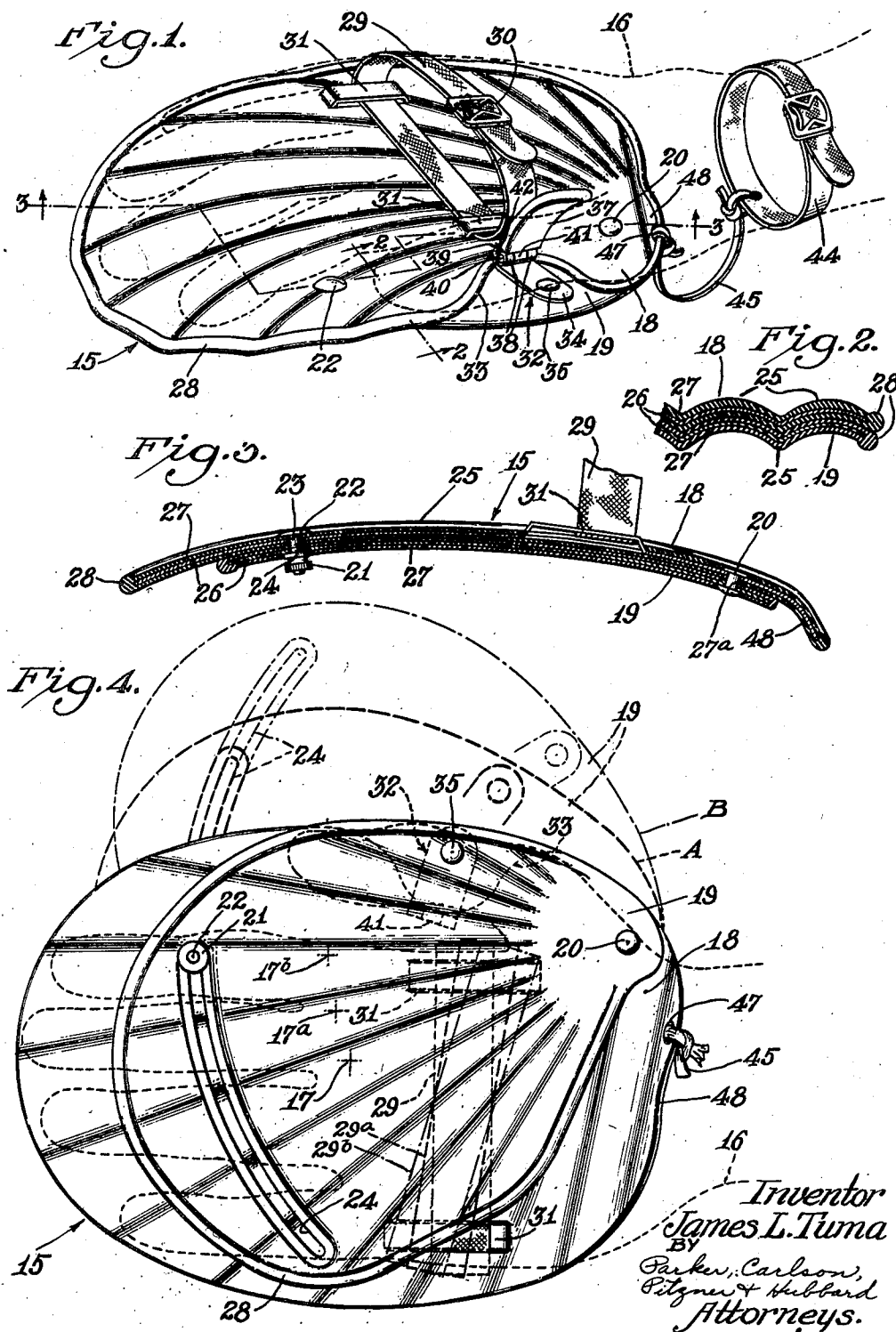
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2,313,979

SWIMMING APPLIANCE

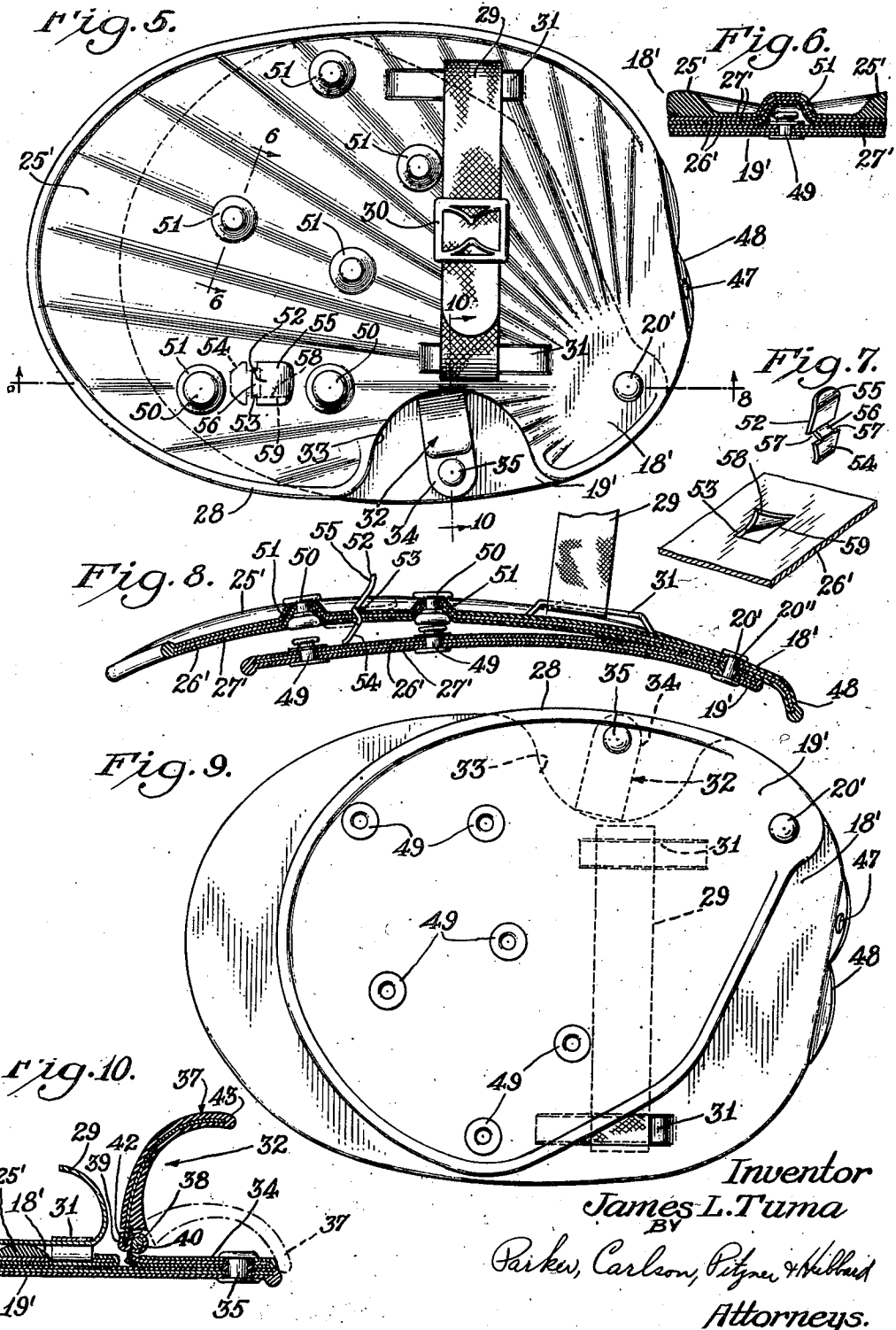
Filed June 19, 1939

2 Sheets-Sheet 1



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2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE

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SWIMMING APPLIANCE

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21 Claims. (Cl. 9—21)

This invention relates to improvements in swimming appliances and more particularly concerns a novel device to be applied to the hand of a swimmer to serve as a paddle blade or artificial web which will aid in attaining greater swimming speed and efficiency.

Prior devices of this character have generally proven unsatisfactory for a number of reasons, perhaps outstanding among which may be mentioned improper proportioning relative to the user's hand, lack of adaptability for different swimming uses, failure to provide adequate precautions against accidental injury from the hard structures of the devices, and generally inadequate arrangement.

It is an object of the present invention to provide a swimming appliance which is properly proportioned with respect to the swimmer's hand to afford maximum swimming aid coupled with proper balance of the propulsive area thereof relative to the muscular center of the hand, whereby the swimmer attains greatly increased capacity for propulsion through the water without undue fatigue or muscular strain, and in any event without placing unequal demand upon the muscles of any portion of the hand.

Another object of the invention is to provide a swimming appliance that is readily adjustable to accommodate variations in the sizes of swimmers' hands as well as to permit alterations in the propulsive area of the appliance for various swimming purposes, thus permitting, for example, an increased propulsive area for distance swimming where a relatively long, powerful stroke is most advantageous, and a reduced propulsive area for short, quick strokes in speed swimming or for stunt maneuvers.

Still another object is to provide novel means for effecting adjustment of such an appliance.

A further object of the invention is to provide a swimming appliance having safety features which will avoid possible injury to the swimmer or others from carelessness, negligence, accident or inexperience in the use or handling of the appliance, as where the appliance comes against an exposed part of a person's body in such a manner and with such force as would ordinarily lead to injury from an unprotected relatively unyielding object.

Yet another object is to provide a swimming appliance which may be freely released from the swimmer's hand either in or out of the water without loss and in such a manner as to permit quick, unassisted replacement of the device upon the hand for use.

A still further object of the invention is to provide a swimming device which embodies a relatively inexpensive and highly efficient working assembly of comparatively light weight but strong and durable construction and which may be produced at low cost.

Other objects and advantages will become apparent in the following description and from the accompanying drawings in which:

Figure 1 is a perspective view of a swimming appliance embodying the principles of the invention.

Fig. 2 is a transverse sectional view taken substantially along line 2—2 of Fig. 1.

Fig. 3 is a longitudinal sectional view through the appliance taken substantially along line 3—3 of Fig. 1.

Fig. 4 is an inside face view of the appliance.

Fig. 5 is a back-face view of a slightly modified form of the appliance.

Fig. 6 is a transverse sectional view taken substantially in the plane of line 6—6 of Fig. 5.

Fig. 7 is a fragmental exploded assembly view of the separating device for the appliance shown in Fig. 5.

Fig. 8 is a longitudinal sectional view taken substantially along line 8—8 of Fig. 5.

Fig. 9 is an inside-face view of the appliance shown in Fig. 5.

Fig. 10 is an enlarged sectional view taken substantially in the plane of line 10—10 of Fig. 5.

While the invention is susceptible of various modifications and alternative constructions, I have shown in the drawings and will herein describe in detail, certain preferred embodiments, but it is to be understood that I do not thereby intend to limit the invention to the specific forms disclosed, but intend to cover all modifications and alternative constructions falling within the spirit and scope of the invention as expressed in the appended claims.

Generally speaking, the swimming appliance of the present invention provides a paddle blade or shell which is adapted to be suitably secured flatwise against the inside of a swimmer's hand to increase the water resistance or propulsive area thereof and thus aid in propelling the swimmer through the water. The appliance is adjustable to vary the overall pressure or propulsive area thereof to make it adaptable for different swimming requirements and for accommodating hands of various sizes. Moreover, the relatively rigid or hard parts of the structure are provided with a yieldable coating or buffer which will avoid the danger of injuring

the person of the swimmer or others who might come in contact with the appliance in a manner which would ordinarily have a damaging effect. While in use, the appliance is held firmly in place on the hand, but the hand may be freed easily and quickly when necessary while retaining the appliance in such relation to the hand by means of a wrist anchor that the appliance can be readily replaced upon the hand without special assistance. Such wrist anchor avoids loss when the appliance is removed from the hand in the water.

Referring now to Figs. 1 to 4 of the drawings, a right-hand swimming appliance 15 embodying the present invention is shown as having a generally flattened body of substantially ovate outline which is adapted to be received flatwise against the inside of a swimmer's hand which is indicated generally in Figs. 1 and 4 by the phantom outline 16. I have found that where the pressure center of the appliance, represented by the crossed lines 17 in Fig. 4, substantially coincides with the muscular center of effort of the hand, and the planular dimensions of the appliance are kept fairly close to those of the hand, a balanced and efficient relationship is attained that avoids undue fatiguing or uneven strain or stress upon any portion of the hand during swimming when the appliance is forced face-wise through the water. To this end the length of the appliance is preferably such that it extends from the wrist to not substantially beyond the tips of the fingers, and the width of the appliance is not substantially greater than the width of the hand. In practice it has been found best normally to avoid more than generally one-half inch projection of the appliance beyond either the end or the sides of the hand, and any such projection should preferably be uniform all around the hand. A left-hand unit (not shown) is constructed identically except for the necessary rearrangement of parts to accommodate the left hand, and in practice the swimmer will use one of the units on each hand. Moreover, the appliance 15 may be constructed for any general hand size ranges, as for example, juvenile, ladies' and men's sizes.

According to the present invention the appliance 15 is preferably constructed for adjustment as to width and for this purpose the body thereof comprises a pair of generally elongated plate members 18 and 19 which are connected in overlapping relation by means of a suitable pivot member 20 such as a rivet passing through the plates adjacent to the wrist ends thereof. The plate 18 which may be referred to as the back-plate, is preferably the larger of the two and is adapted to be received by the inside of the hand substantially as indicated in Fig. 1. The other plate 19 may be termed the fore-plate and is of smaller area than the back-plate 18, being adapted to lie against the inside face of the back-plate and generally within the peripheral outline thereof. Both plates may be slightly arcuate in shape longitudinally to conform generally to the normal, comfortable arc of the inside of the hand while swimming.

To increase the effective propulsive area of the appliance it is merely necessary to spread the plates apart fanwise into any of a plurality of selective positions of adjustment substantially as indicated in Fig. 4 which shows in dash outline A an intermediate adjusted relationship, and in dot-dash outline B the fully spread rela-

tionship of the plates. Such spreading of the plates will also serve in certain cases to accommodate the appliance to a larger than normal hand of the class for which the appliance has been designed. Preferably, the spreading of the plates will carry the fore-plate 19 beyond the thumb side of the back-plate 18 so that the thumb bearing against the protracted portion of the fore-plate 19 will maintain proper balance between the increased propulsive area of the appliance and the muscles of the hand. It may also be noted in this connection that the shape of the fore-plate 19 is designed to maintain, in any adjusted condition of the plates, as nearly as practicable a balanced relationship with respect to the hand both as to weight and propulsive area. Moreover, the plate-connecting pivot 20 is preferably located near the thumb side of the appliance so that not only the finger portion but also the palm portion of the propulsive area of the appliance will be modified by relative planular shifting of the plates 18 and 19. In any event, the arrangement of the plates is preferably such that in the spread adjustments thereof the center of the aggregate propulsive area follows and in all instances substantially coincides with the muscular center of the hand which is proportionally spread or adjusted in its position to maintain adequate purchase upon the spread plates. The shifted center of the appliance in each of the adjusted conditions A and B of the plates is shown in Fig. 4 at 17^a and 17^b, respectively.

The various conditions of adjustment of the appliance may be maintained fixedly by suitable means such as a slot and bolt connection including a knurled thumb nut 21 threaded onto a bolt 22 which in the present instance extends through and is non-rotatably fixed within a perforation 23 in the back-plate 18, the shank of the bolt projecting through an elongated slot 24 in the fore-plate 19. The slot 24 is formed on an arc radially with the pivot 20 so as to form a free way for travel of the bolt 22 between the ends of the slot which serve as limiting stops determining the fully closed and fully spread conditions of the plates. Although not illustrated herein, it may be pointed out that the appliance has also been constructed with the slot 24 in the back-plate 18 and the bolt 22 projecting from the fore-plate 19, such relationship being fully equivalent in the holding function of the contrivance. Thus, when the thumb nut 21 is loosened, the plates can be adjusted and then fixed in the selected adjusted relationship by tightening the thumb nut against the adjacent slot-defining portions of the slotted plate.

Means serving to aid in holding the plates in adjusted relationship may comprise a plurality of mating undulations providing shallow ribs 25 formed in the plates 18 and 19 to intersect the adjustment slot 24. After the securing nut 21 has been tightened the ribs provide an interlock holding the plates against slipping out of adjustment. In the present instance the ribs 25 are formed to extend radially from a center such as the pivot 20 near the wrist end of the appliance and broaden out toward the edges of the plates 18 and 19 roughly in simulation of a sea-scallop shell, thus imparting an attractive appearance to the appliance.

In the preferred construction, the ribs 25 of each of the body plates 18 and 19 are formed in a foundation or core member 26 of suitable sheet metal or other preferred relatively hard material; and a resilient covering 27, such as rubber which

partially or wholly encases the core member, completes and emphasizes the ribbed structure (Figs. 2 and 3). Due to the surface irregularities produced by the ribs 25, those portions of adjustment-holding structure which necessarily project from the faces of the plates, such as the head of the bolt 22 and the nut 21, will tend more or less to blend into the general surface pattern of the appliance and thus avoid objectionable protuberances. Such blending is improved with respect to the nut 21 by channeling the rubber casing 27 around the slot 24. The frictional engagement between the rubber at the interface between the plates when the latter are secured in adjustment aids in holding the plates in adjusted condition. To maintain a suitable separation of the rubber interfaces of the plates adjacent to the pivot so as to assure freedom of pivotal adjustment of the plates, any suitable expedient may be employed, such as abutting spacer flanges 27^a formed integral with the core plate 26 encircling the pivot rivet 20.

By reference to Fig. 2 it will be seen that the ribs 25 are fairly pronounced on the propulsion face as well as the back face of the device, and extend from the forward end to the rear portion of the plate structure. This places a plurality of impedances to the free flow of water along the surfaces of the plate crosswise of the ribs, and results in holding the device against side slip in the water while in use. Thereby maximum propulsive effect is obtained from each swimming stroke, since little if any effort is wasted by side slip.

The rubber casing 27 also serves in the present instance as a resilient protective buffer for avoiding injury to the person of an individual who might be struck by or come in contact with the appliance in such a manner that the unprotected, relatively hard core members 26 might ordinarily cause damage. To this end, the rubber casing is preferably extended substantially beyond the edges of the core members 26 and is formed with a smoothly finished bead 28.

To maintain the appliance 15 upon the hand 16, suitable means such as a strap 29 of fabric or other material in the form of a band, adjustable by means of a buckle 30, is carried by the back-plate 18. In the present instance the strap is threaded loosely through a pair of elongated spaced parallel strap loops 31 which are struck out integrally from the body of the back-plate 18 to project from the back face of the latter rearwardly of the transverse center of such plate. One of the strap loops 31 is located near the little finger edge of the back-plate and the outside spacing of these loops is approximately equivalent to the width of the palm of the hand between the little finger and thumb crotch sides thereof so that the loops will underlie the hand and permit substantially full encircling engagement of the hand by the strap 29 which extends slightly beyond the sides of the loops. In order to permit lateral shifting of the strap 29 in the loops 31 as for accommodating adjustments in the position of the hand when the appliance is adjusted in area, the loops are preferably about twice as long as the width of the strap and are located somewhat out of alignment as shown in Fig. 4, the loop at the little finger side being disposed forwardly a predetermined distance relative to the other loop. Thus, the strap 29 may, for example, be shifted to conform generally with the positions of the hand in the adjusted relations A and B of the fore-plate 19, the corresponding posi-

tion of the strap being shown in Fig. 4 at 29^a and 29^b, respectively. Moreover, the location of the loops 31 is such, longitudinally of the appliance, that the strap 29 will engage across the back of the hand firmly behind the knuckles.

When the hand is engaged within the strap 29, the thumb is free to engage a thumb grip indicated generally by the numeral 32 (Figs. 1 and 10), which is preferably mounted upon the back face of the fore-plate 19 in general alignment with the strap 29 and in position to enter the thumb crotch of the hand and receive the inner joint of the thumb. A suitable notch 33 in the adjacent edge of the back-plate 18 accommodates the thumb grip when the plates are in fully collapsed relation.

In the preferred construction, the thumb grip 32 includes a swivelled base member 34 (Figs. 1 and 10) which is pivotally connected to the fore-plate 19 as by a swivel rivet 35. A longitudinally arcuate thumb-receiving member 37 is hingedly connected to the base member so that when the appliance is not in use the thumb grip may be collapsed substantially as shown in broken outline in Fig. 10 and thus avoid any projection that might injure a person accidentally sitting or stepping upon the appliance. As shown, the hinge for the two members may be of substantially the piano type, the base member 34 having a pair of spaced coaxial loops 38 at its inner end terminating in reverse bent, upwardly extending hook-shaped stops 39. A hinge pin 40, extending through the loops 38 and a central hinge loop 41 (Figs. 1 and 5) on the inner end of the thumb-receiving member 37, connects the members together. A pair of heels 42 on the inner end of the thumb-receiving member 37 at opposite sides of the loop 41 are adapted to seat within the hooks of and engage against the respective stops 39 in the fully opened or thumb-receiving relationship of the thumb grip members.

The center of mass of the thumb-receiving member 37 is preferably disposed outwardly relative to the axis of the hinge so that the member 37 will normally tend to fall into the collapsed position. A protective rubber buffer coating 43 on the member 37 will aid in securing the overbalanced relation. Due to the swivel mounting of the thumb grip 32 it will automatically assume the proper position to accommodate the thumb in any condition of adjustment of the plates 18 and 19 as shown in Fig. 4.

If the hand strap 29 is not drawn too tightly, the appliance 15 can be removed from the hand merely by releasing the thumb grip 32 and stretching the hand to disengage and slip it from the strap. At times such removal may have to be effected quickly to free the hand at least momentarily for other uses and under such conditions that attention may not be given to what becomes of the appliance. It is therefore desirable to provide means which will permit entire freedom of the disengaged hand but will retain the appliance on the swimmer's arm and avoid the necessity for holding onto or discarding the appliance in the interim between disengagement and reengagement thereof. To this end, an adjustable fabric wrist band 44 may be removably secured to the swimmer's wrist and attached to the appliance by a suitable flexible connector such as a tape 45 which is tied through an eye 47 in the wrist end of the back plate 18. To maintain the secured end of the tape 45 out of rubbing engagement or interference with the hand or the wrist the eye-containing portion of

the wrist end of the back-plate is formed as an inwardly angled flange 43. This flange 43 also carries the propulsive area of the appliance well back toward the wrist while leaving complete freedom for wrist movement.

The form of the invention shown in Figs. 5 to 9, inclusive, is generally the same as that already described, with the exception that a different type of adjustment-securing means is employed for the adjustable body plates 18' and 19', and that the core member 26' of both the body plates is without undulations, so that the inner faces of the plates appear relatively smooth as shown in Fig. 9, while ribs 25' are formed on the back face of the back-plate 18' only by suitable molding of the rubber coating 27'. To facilitate pivoting of the plates 18' and 19', the core members 26' are spaced apart at the pivot 20' by a washer or spacing ring 20''.

The adjustment-securing means in this form of the invention comprises suitable riveted snap fasteners including male members 49 secured to and projecting from the fore-plate 19' and female members 50 secured to the back-plate 18' to register with and grip the male members. Herein, the snap fasteners are arranged to provide a plurality of adjusted positions, shown as three in number, there being three pairs of longitudinally spaced male members 49 located on the radii of the pivot point 20' of the body plates and equally spaced apart laterally of the appliance with the front and rear members 49 respectively located on common arcs concentric with said pivot point. One pair of the male members 49 is adjacent to the thumb edge of the plate 19' while another pair is adjacent to the opposite or little finger edge and the remaining pair occupies an intermediate position. Only one pair of the female members 50 need be provided on the back-plate 18' and is adapted to register with any of the selective pairs of male members 49. The female members 50 are preferably mounted in such relation adjacent to the thumb edge of the back-plate 18' that in either the intermediate or fully open adjusted positions of the back-plate said thumb edge will clear the adjacent exposed male members.

In order to permit the plates 18' and 19' to approach closely together after the snap fasteners have been secured, the female members 50 are preferably secured within inwardly opening hollow nodes 51 which project from the back face of the back-plate 18, there also being additional pairs of the nodes 51 to receive the unengaged projecting pairs of male members 49 at the interface between the secured plates (Figs. 5 and 6). Preferably, the nodes 51 and the prominences of the ribs 25 are generally related to project from the back face of the plate 18' approximately equally so as to cover up the protuberance of the nodes and blend them harmoniously into the shell-simulating surface of the appliance.

Due to the strong holding qualities of the snap fasteners and the closely adjoining relationship of the plates, it is difficult to effect unaided separation of the snap fasteners without injury to the relatively thin body plates 18' and 19' of the appliance. Novel means is therefore provided for effecting such separation easily, quickly and without danger of damaging any of the structure, herein comprising a manipulable device including means located between the interface of the plates and adapted by a simple manipulation exteriorly of the plates to apply a separating force therebetween axially of the snap fasteners. Herein, a

generally flat, stamped metal lever 52 is provided which extends swingably partially between the plates 18' and 19' through a suitable slot 53 formed in the back-plate 18' intermediate the female members 50 of the snap fasteners. Dividing the lever 52 into an inner or separator portion 54 and a slightly larger outer or handle portion 55 is a transverse angularly bent fulcrum portion 56 of a width to offset the separator and handle portions sufficiently to accommodate the thickness of the associated area of the back-plate 18' and permit the separator and handle portions to lie inactively against the respective faces of the back-plate.

A simple expedient for maintaining the lever in assembled relation with the back-plate consists in forming the slot 53 shorter than the width of the lever so that the plate areas adjacent the ends of the slot may be straddled by the opposed shoulders defining locating notches 57 formed in opposite sides of the lever at the end of the fulcrum portion 56 thereof. In assembling the lever 52 with the back-plate 18', the separator portion 54 is inserted into an enlargement of the slot 53 effected by bending a triangular flap 58 (Fig. 7) out of the plane of the back-plate along a slit 59 running a suitable distance inwardly from one end of the slot, the flap being returned into the plane of the back-plate at the conclusion of the assembly operation to lock the lever in swingable operative position.

The separator portion 54 of the lever is thin enough to lie within a narrow clearance between the plates and is preferably of generally spade shape, having the inner extremity rounded off where it engages the fore-plate 19'. While inactive, the handle portion 55 lies within the plane of the adjacent nodes 51 from which position it may be digitally raised to actuate the device, the outer extremity of the handle being preferably turned up to facilitate the digital engagement.

When the snap fasteners are to be separated to permit the fanwise adjustment of the plates 18' and 19', the handle 55 of the separating lever is raised from its reclining position to swing the lever about its fulcrum. By this action the extremity of the separator is caused to bear against the fore-plate 19' and the shoulders of the separator to bear forcibly in the opposite direction against the inside of the back plate, substantially as shown in full outline in Fig. 8, to force the plates apart such a distance that the fasteners will be caused to snap apart. It may be noted that the angle of the fulcrum portion 56 of the lever and the width of the notches 57 are such that in the fully extended condition of the lever, the separator 54 and the handle 55 will be at a diagonal angle short of attaining a perpendicular relation to the separated plates. Due to this diagonal position of the lever and the overbalanced construction thereof, the lever will tend when released to return promptly to inactive position as shown in broken outline in Fig. 8 and thus permit free relative adjustment movement of the plates and resecuring of the snap fasteners in the selected adjusted position.

From the foregoing it will be apparent that the present invention provides a new and improved swimming appliance which is properly balanced and proportioned with relation to the swimmer's hand to attain utmost efficiency in swimming power without muscular strain or undue fatigue. By the novel adjustable relationship of the body plates of the appliance, various conditions may be adequately met as to swim-

mers' hand sizes and preferred propulsive area of the device. Substantial aid and convenience in attaining and maintaining various selective adjusted relationships of the plates of the appliance are assured by the novel securing means provided therefor. Moreover, the resiliently buffered construction of the device assures safety from personal injury to the user as well as others since there are no exposed parts which might if unprotected prove damaging under certain circumstances such as being struck thereby. Another desirable feature is the anchorage of the appliance to the swimmer's wrist so that the hand may be freely released without discarding the appliance. Furthermore, the appliance is of strong and durable construction and may be produced at low cost.

I claim as my invention:

1. A swimming appliance comprising, in combination, a body structure including a pair of overlapped plates adapted for adjustment to vary the propulsive area of the appliance, means for securing said plates in selected relative positions of fixed adjustment to determine the propulsive area of the appliance, and means for preventing slippage of said plates after they have been secured in any such adjusted positions.

2. A swimming appliance of the character described comprising, in combination, a body structure including a pair of overlapping plates adapted to be spread apart to vary the propulsive area of the body, means for securing the plates in adjusted relationship, and a plurality of longitudinal interfitting ribs on the opposed faces of said plates providing an interlock in the secured condition of the plates to prevent accidental spreading of the latter.

3. A swimming appliance comprising, in combination, a flattened body comprising a pair of overlapping plates adapted for planular adjustment to vary the propulsive area of the body, means for securing the plates in various positions of relative adjustment, said means including portions thereof protruding from the face of one of said plates, and a series of ribs on said face providing a pattern into which said protruding portions tend to blend.

4. A swimming appliance comprising, in combination, a propulsion body structure comprising a pair of overlapping relatively adjustable plates, and snap fastener means carried by said plates for securing said plates in a plurality of selected positions of relative adjustment.

5. A swimming appliance comprising, in combination, a pair of overlapping plates, a snap fastener for securing said plates in face-to-face relationship, one of said plates having a slot therein, a plate-separating lever projecting partially through said slot having locating means engageable with the opposite faces of said one plate adjacent to said slot, an angular fulcrum portion dividing said lever into an inner separator portion and an outer offset handle portion and being engageable with an edge defining said slot, the offset relationship of said separator and handle portions being sufficient to accommodate the thickness of the adjacent part of said one plate and enable said portions to lie inactively against the inside and outside faces respectively of such plate, said separator portion being shaped to engage the opposed faces of both of said plates to force the latter apart when said handle portion is manipulated to swing the lever out of the inactive position about the fulcrum.

6. A combination including a pair of separable

plates, a snap fastener for holding said plates together in close face-to-face relationship, one of said plates having an opening therethrough adjacent to said snap fastener, and a separating device extending through said opening including means to be manipulated for actuating the device and means between the plates adjacent to the snap fastener for forcing the plates apart to release the snap fastener when said manipulating means is actuated.

7. A combination including a pair of separable plates, a snap fastener securing said plates in close face-to-face relationship, and a separator between said plates including a part exposed for manipulation to actuate the separator and force said plates apart by pressure exerted axially of said snap fastener for releasing the latter.

8. A swimming appliance comprising, in combination, a propulsion plate structure, means for connecting said plate structure to a swimmer's hand, and a thumb grip on said plate structure comprising a pivoted thumb-engaging member adapted when engaged by the thumb to be held in projecting relation to the plate structure and when out of thumb engagement to lie in a collapsed position close to the plate structure.

9. A swimming appliance of the character described comprising, in combination, a body member adapted to rest against the palm of a swimmer's hand and including a fore-plate and a back-plate connected together pivotally for relative fanwise adjustment to modify the area of the body member, means for holding said plates relatively fixedly in selected adjusted relation, a strap to engage behind the hand, and means loosely attaching said strap to said back plate to permit limited shifting movement of the entire strap in a front to rear direction relative to the back plate to accommodate adjustments in the position of the hand when the area of said body is adjusted.

10. In combination in a swimming appliance of the character described, a body plate structure, a strap extending across the plate structure for holding the latter against the palm of the swimmer's hand, and a pair of loop members at the respective opposite sides of the back of the plate structure having the strap engaging loosely therethrough for connecting said strap in place, said loop members being longer than the width of said strap to permit lateral shifting of the strap lengthwise of the loop members.

11. A swimming appliance comprising, in combination, a body structure including a pair of overlapping plates pivotally connected adjacent to the wrist end of the structure for planular adjustment fanwise to vary the propulsive area of the body, and slot and bolt means adjacent to the finger end of the body structure for securing said plates in various positions of relative adjustment, the slot of said means extending on the radius of the adjustment pivot of the plate.

12. In combination in a swimming appliance of the character described, a pair of overlapping plates forming a body structure, longitudinal interfitting ribs on said plates, and means for connecting said plates releasably together permitting relative adjustment thereof to control the propulsive area of the body structure comprising a slot extending across the ribs of one plate and a fastening member carried by the other plate and extending through said slot, said ribs tending to hold the plates against accidental

spreading when the connecting means is fast and holds the plates together.

13. A swimming appliance of the character described, comprising, in combination, a back-plate dimensioned longitudinally and transversely not substantially greater than the hand of a swimmer of a general class with the thumb and finger closed, the center of the propulsive area of said back-plate substantially coinciding with the center of muscular effort of the hand lying palmwise against the back-plate, a fore-plate dimensioned to lie in substantially entirely overlapped relation to said back-plate, means connecting said plates together pivotally adjacent to the wrist end of the appliance and near the thumb side of the plates in such a manner that as the plates are spread fanwise toward the thumb side of the appliance, whereby to increase the propulsion area, the shifted center of the enlarged propulsion area will substantially coincide with the center of muscular effort of the hand as the thumb and fingers are spread over the enlarged area, and means spaced from the forward end of the plate for connecting the plates relatively fixedly together against one another in any of a plurality of selective positions of adjustment.

14. A swimming appliance of the character described comprising, in combination, a body structure adapted to be received against the palm of a swimmer's hand and including a back-plate and a fore-plate, means pivotally connecting said plates together adjacent the wrist end of the body structure for fanwise adjustment to modify the propulsive area of the body structure, a thumb grip carried by the thumb side of said fore-plate and having a swivel mounting enabling swinging thereof to conform to adjustments of the thumb position as the plates are adjusted, a hand engaging strap carried by the back-plate, and attachment means on said back plate loosely engaged by the strap, said strap being freely shiftable on said attachment means within a limited range longitudinally of the body structure to accommodate adjustments in position of the hand for the different adjusted positions of the plates.

15. A swimming appliance comprising, in combination, a body plate structure adapted to be received against the palm of a swimmer's hand and having longitudinal and transverse dimensions closely approximating the outline of the closed hand so as to avoid substantial extension beyond any part of the hand whereby the center of the propulsion area of the structure is substantially coincident with the center of muscular effort of the hand, a strap for holding the plate structure in palm contact, means on said plate structure for connecting said strap thereto in a location to engage across the back of the hand and including a connecting member close to the little finger edge of the plate structure and a second connecting member spaced inwardly from the thumb edge of the plate structure adjacent to the position assumed by the thumb crotch of the hand, and a thumb grip carried by the thumb margin of the plate structure in alignment with said strap transversely of the plate structure in substantially the position normally taken by the thumb when the hand is in centered and balanced relation on the plate structure, said thumb grip being wholly open on the side away from said strap so that the thumb can be released therefrom instantly as for removing the hand from the appliance.

16. A swimming appliance of the character

described comprising, in combination, a body structure including a pair of overlapping plates adapted to be received against the inside of a swimmer's hand and adapted to be spread apart adjustably to vary the propulsive area of the structure, and releasable means for securing said plates fixedly against one another in various selected relative positions of adjustment to determine said propulsive area, said means upon being released from the plate securing relationship allowing the plates to be readjusted by relative movement in their planes to alter said propulsive area.

17. A swimming appliance of the character described comprising, in combination, a propulsion structure to be held in a swimmer's hand including a fore-plate and an overlapping back-plate pivotally connected together adjacent to the wrist ends thereof for fanwise adjustment to modify the effective propulsive area of the structure, releasable means for securing said plates relatively fixedly in various positions of such adjustment, means on said back plate for engaging the swimmer's hand to hold the appliance against the latter, a thumb grip including a portion for engagement by the thumb of said hand and a base resting against the fore-plate, and swivel pivot means securing said thumb grip base onto the fore-plate in such relation to said hand engaging and holding means that when the hand is fully in position therein the thumb may naturally engage said engagement portion of the thumb grip, said swivel pivot permitting the thumb grip to swing into a proper thumb receiving position relative to said hand engaging and holding means automatically upon engagement by the thumb in any adjusted relationship of the plates.

18. In combination in a swimming appliance of the character described, a body comprising a pair of overlapping plates dimensioned for substantial registration to provide a propulsive area not substantially greater than the area of one of the plates alone, a pivotal connection for the plates adjacent to one end of the body adapting the plates to be spread apart fanwise so that the second plate projects laterally partially beyond said one plate for increasing the propulsive area of the body in proportion to the area of the projecting portion of the second plate, and releasable means on said plates adjacent to the opposite end of the body for securing the plates fixedly together in face to face abutment against fanwise movement from any adjusted relation.

19. A swimming appliance comprising, in combination, a propulsion plate structure, and means for holding said plate structure to a swimmer's hand including a thumb grip comprising a base on the plate structure and a thumb-engaging member pivotally connected to said base, said member having its center of weight located laterally of the pivotal axis so that the normal tendency of the member when out of thumb engagement in an upwardly facing condition of the plate structure and the base is to tip over and assume a collapsed position overlying the base.

20. A swimming appliance of the character described comprising, in combination, a body comprising a pair of plates arranged to fit against the palm of a swimmer's hand and including a fore-plate and an overlapping back-plate pivotally connected together at a point adjacent to the wrist ends of the plates, said fore-plate being dimensioned to lie in retracted condition substantially entirely inside the edges of said back plate and being adapted to be extended laterally

beyond the thumb side of the back-plate to increase the effective propulsive area of the body, means on said plates for securing the fore-plate against the back-plate in retracted position or in selected positions of extended adjustment, means 5 for holding the body against the palm of the swimmer's hand including a thumb grip on the thumb side of the rear face of said fore-plate, and means for pivotally connecting said thumb grip to the back face of the fore-plate so as to 10 permit swivelling of the thumb grip to accommodate the thumb properly in any adjusted position of the fore-plate, said back-plate having a notch at the thumb side thereof to accommodate said thumb grip in the retracted position of the fore-plate. 15

21. A swimming appliance comprising, in com-

bination, a body plate structure having a broad propulsion face, means carried by said plate structure opposite the propulsion face for holding the plate structure broadside against the palm of the swimmer's hand, the propulsion face of said plate structure having a plurality of ribs extending in a generally front to rear direction from the front to the rear end portions thereof and forming impedances against side slip of the appliance in the water as it is driven through the water in a propulsion stroke, the ridges of the ribs being in substantially the same straight plane projected transversely relative to the front to rear axis of the plate structure, whereby each rib will be 15 equally effective as a side slip impedance.

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