

(No Model.)

A. WEIL.
SWIMMING AND DIVING SUIT.

No. 476,341.

Patented June 7, 1892.

Fig. 1.

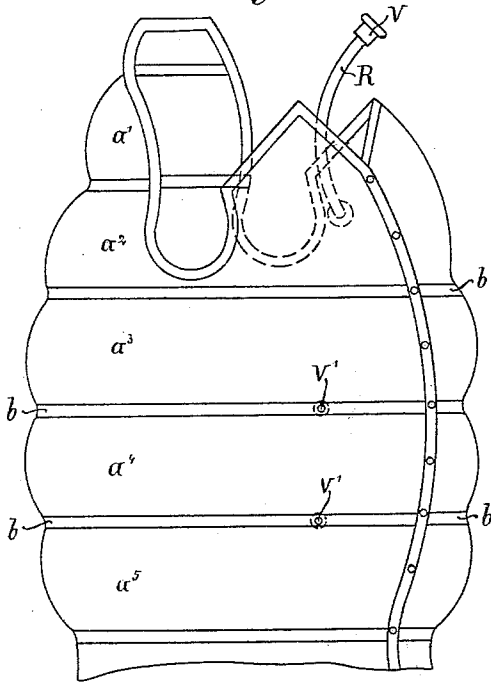


Fig. 5.

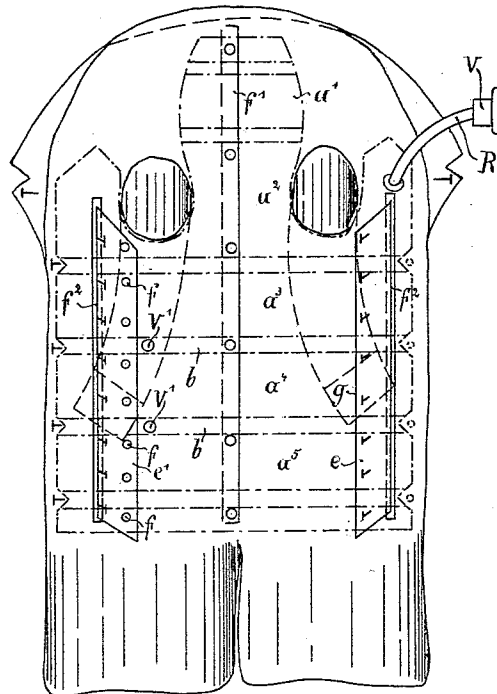


Fig. 2.

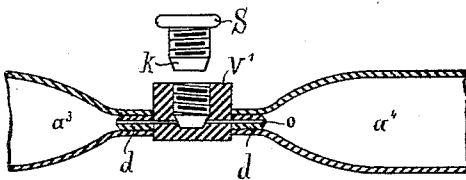


Fig. 3.

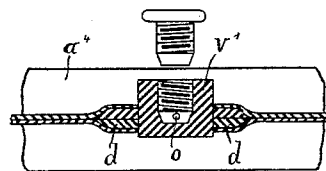
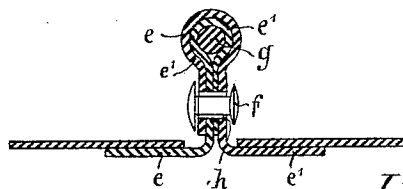


Fig. 4.



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UNITED STATES PATENT OFFICE.

ABRAHAM WEIL, OF BRUNSWICK, GERMANY.

SWIMMING OR DIVING SUIT.

SPECIFICATION forming part of Letters Patent No. 476,341, dated June 7, 1892.

Application filed December 7, 1891. Serial No. 414,328. (No model.)

To all whom it may concern:

Be it known that I, ABRAHAM WEIL, a subject of the Emperor of Germany, and residing at Brunswick, in the German Empire, have invented certain new and useful Improvements in Swimming or Diving Suits, of which the following is a full, clear, and exact description.

The inconvenience attending the use of swimming or diving suits (jackets, vests, &c.) consisting of double sheets of material between which air is introduced to swell them—such as have hitherto been used by divers and dock-laborers—is that the air confined between the two layers of material is allowed to circulate throughout the whole swimming suit, so that when the wearer stoops or bends over to the front practically the whole of the air accumulates at the back and similarly by leaning back the air is made to collect at the front. The center of buoyancy of the swimming-suit is thus continually displaced, and hence the movements of the wearer in the water lack freedom and reliability, so that the diver or laborer wearing the suit may only with difficulty carry out his work, such as the repairing of ship-bottoms and the like. This drawback is obviated by the present invention, which consists in dividing the hollow space included between the two layers or sheets of material of which the swimming-jacket is made into a number of sections or air-compartments arranged in succession either longitudinally or preferably crosswise, communication between them being cut off or controlled by air-tight valves, so that each compartment may independently of the others be filled with air. A swimming-jacket made on this system is represented, by way of example, in the accompanying drawings, in which—

Figure 1 is a general view of the jacket in elevation. Figs. 2 and 3 are respectively a longitudinal and a cross-section of one of the valves connecting the air-compartments, and Fig. 4 illustrates a special method of attachment enabling the jacket or the like to be so buttoned as to admit little or no water through the joint. Fig. 5 is a modification.

The material preferably to be employed in the manufacture of swimming-apparel of this description is air and damp proof silk, such as is used for balloons or the like. The pieces

of material are stitched or connected together by strips *b*, attached along the joints or seams by a suitable adhesive substance, and the connection is made in such a manner that all around the body in the transverse direction there forms a series of successive air compartments or chambers *a'* *a*², connected with each other by valves *V'*. On the inner front side of the jacket is provided a flexible tube *R*, communicating with the air-chambers and fitted with a valve *V*, adapted to open when air is to be fed into or discharged from the jacket, but remaining closed while the jacket is in use. The valves *V'* are each secured in the material in such a manner that its projecting rim or flange *d* is tightly held between the two sheets of material at the junctions, so that the perforation *o* alone permits any air to pass from one compartment to the next. By means of a screw-plug *S*, the lower end of which is formed into a conical valve, the said perforation may be wholly or partly closed or opened for such conveyance of air.

In the form of swimming-jacket represented in Fig. 1 two valves *V'* only are shown as being arranged on the front side, so that the connection between the compartments or chambers *a*⁴ *a*⁵ may be cut off or restored, as required, whereas the chambers *a'*, *a*², and *a*³ are permanently connected by small openings (not shown) provided in the junctions *b*. There may, however, be more than two such valves, enabling the chambers to be cut off from the adjacent ones and, if desired, each or any of the chambers to be filled with air or discharged quite independently from each other. Supposing, for example, that it is desired to force air into the chambers *a'*, *a*², and *a*³, while the chambers *a*⁴ and *a*⁵ are to remain empty, all that is necessary (in the present instance) is to close the respective valve *V'* of *a*⁴, so that when air is admitted through the valve *V* it can only enter the three compartments *a'*, *a*², and *a*³, and consequently the buoyancy will be mainly centered in the upper part of the body—i. e., near the shoulders—of the wearer. Again, if it be desired to fill the chambers *a*⁴ and *a*⁵ with air and have none in *a'*, *a*², and *a*³ both the valves *V'* are opened and all compartments are first supplied with air through *V*. Then the valves *V'* are closed, while the valve *V* is left open until all the air

contained in a' , a^2 , and a^3 is exhausted. The center of buoyancy in this case is transferred to the middle portion of the body, and as in filling swimming-apparel of this description with air the invariable rule to be observed is that the compartments should be inflated as tightly as possible, it will in all cases be found that the air is very uniformly distributed around the body and not liable to pass from one side to the other as the wearer moves about in the water. This constitutes the essential advantage of the arrangement herein described, for in the divers' suits hitherto known, owing to the permanent connection between the air-spaces, the body of the diver in the water could not be poised, except by varying the supply of air, so that the diver's suit was at one time more inflated than at another and the buoyancy accordingly increased or diminished, as the case might be, whereas according to this invention the position of the center of buoyancy or "ballast" is changed at will by varying, not the degree of the inflation, but the number of air-chambers inflated all to the same extent—*i. e.*, to perfect tightness—whence the before-mentioned equal distribution of the air round the body so that the wearer, retaining his equilibrium, as he does, under all circumstances, is capable of performing even minute or delicate pieces of work in the water. Besides, according as the wearer wants to occupy a horizontal or vertical position, he may, by admitting air into or discharging it from compartments of his suit situated on a higher or lower level, remove the center of buoyancy either to a higher, to a more central, or to a lower part of his body, while in the divers' suits hitherto employed the buoyancy was always centered in the upper part, so that the wearer could but with difficulty assume a horizontal position.

The fastening of this swimming or diving jacket across the chest may be effected in any suitable manner by means of buttons. As a better means of keeping out water it is, however, suggested to adopt the arrangement illustrated in Fig. 4, which consists in placing strips of india-rubber e e' along the edges, one of which strips e is made to surround a cord g of india-rubber or the like, while the other e' overlaps or envelops the first strip with the cord it contains, a button f , inserted into the narrow extensible opening h , fastening together both the strips e and e' .

The water-proof material of which the suit is made being preferably light, the jacket, for example, may be combined with an ordinary cloth jacket or coat, the diving-jacket being interposed between the cloth and lining. This is illustrated in Fig. 5 of the accompanying drawings. At the back of an ordinary (though preferably water-proof) coat is cut a longitudinal slit f' , adapted to be fastened up by buttons or hooks and eyes. Through this slit the swimming or diving jacket proper is inserted between the stuff and lining when required.

The bands of india-rubber or water-proof cloth attached to the front edge of the diving-jacket, the better to keep out the water, are each, when required, passed through one of the slits f^2 f^2 , provided for the purpose in the front part of the cloth coat. At other times—*i. e.*, when not used in the water—they are left inside and turned back on the lining so as not to be in the way or betray the presence of the swimming or diving jacket underneath the cloth.

In order to render the connection between the swimming and ordinary coats as secure as possible, it is preferred to join both by means of hooks, although in many cases the simple provision of slits in the front part of the swimming-jacket will prove sufficient. These slits, as shown in Fig. 5, may be cut close to the buttons and buttonholes and will permit the ready insertion of the swimming-jacket into the cloth coat in case of need and its easy removal after use.

When it is not desired that the swimming or diving jacket should be detachable from the ordinary jacket, as in the case of permanently-employed dock-laborers or divers, the two articles may be fixed together by a damp-proof adhesive substance, (india-rubber, caseine, or the like.)

The tube R, with the valve V, being the means of filling the swimming-suit with air, projects from the inner upper portion of the jacket and may conveniently be put out of the way into the breast-pocket.

The valves V' , controlling the passage of air from one chamber to the other, are preferably situated on the inside of the jacket. They may, however, especially in the case of divers' suits adapted for permanent use, be arranged externally, so that air may be let in or discharged, as required, even while the wearer is in the water.

The water-proof strips e e' may, when the coat is to be employed for swimming or diving, be passed through the front slits f^2 and fastened together outside by means of buttons. After use these strips may be put back through the same slits f^2 behind the lining, so as not to be in the way.

Water is prevented from entering through the lower part of the swimming-jacket by means of a cord fastened to the cloth coat and adapted by pulling to draw the jacket tightly around the body. Around the breeches, encircled by the said cord, a band or belt of india-rubber from two to three centimeters wide may be fixed by means of a suitable adhesive substance, and the part containing the cord may be fastened to the belt by buttons.

Having now particularly described and ascertained the nature of the said invention and in what manner the same is to be performed, I declare that what I claim is—

1. The herein-described swimming or diving suit, provided with a plurality of independent cells arranged vertically with relation to each other and separated by strips b , the up-

per cells a' a^2 a^3 being normally in open communication with each other and the lower cells a^4 a^5 communicating with each other by means of a valve adapted to be opened or closed, as desired, and an inlet-tube connected to one of said cells, substantially as set forth. 15

2. In a swimming or diving suit, the combination of a plurality of air-cells arranged vertically with relation to each other, the upper cells a' a^2 a^3 being normally in open com-

munication with each other and the lower cells a^4 a^5 provided with valves whereby they may be brought into communication with cell a^3 and with each other, substantially as set forth. 15

In witness whereof I have hereunto set my hand in presence of two witnesses.

ABRAHAM WEIL.

Witnesses:

CARL MOSES,
D. G. SPALDING.