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DIVER'S SUIT.

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1,370,316.

Patented Mar. 1, 1921.

Fig-1-

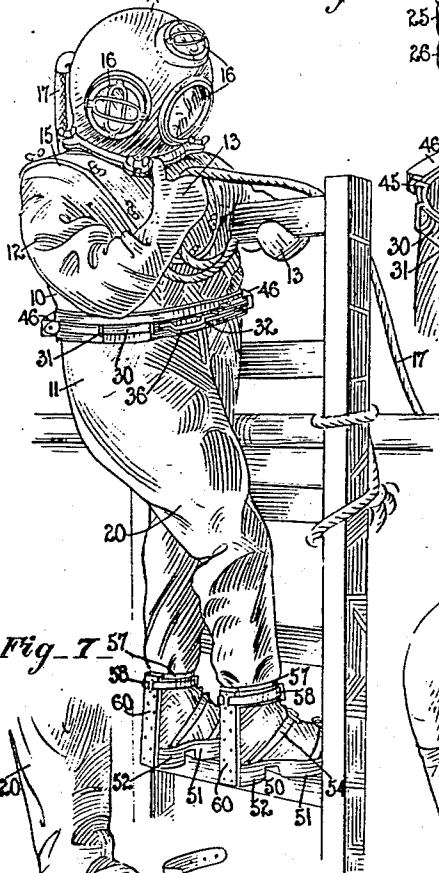


Fig-2-

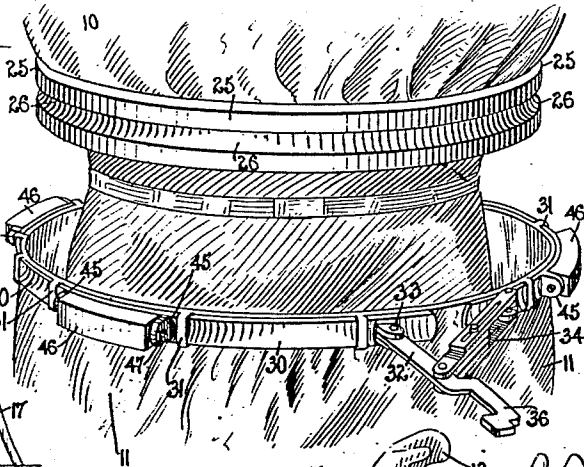


Fig-3-

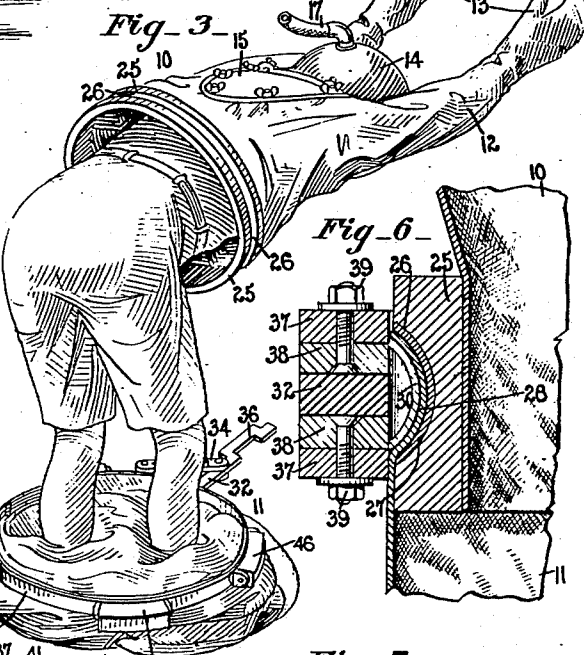


Fig-7-

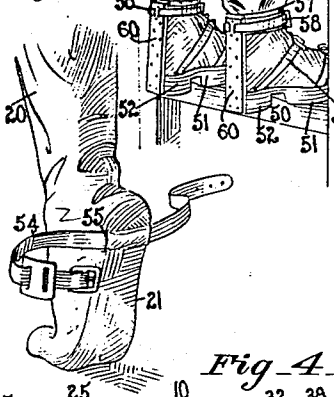


Fig-6-

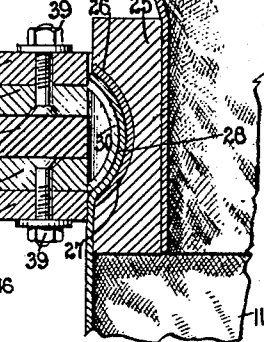


Fig-4-

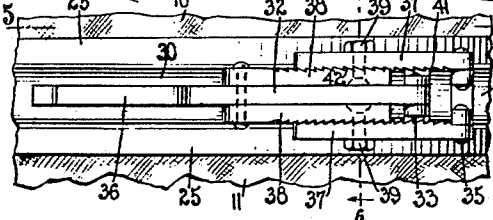


Fig-5-

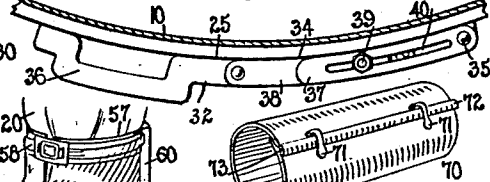


Fig-8-

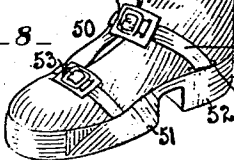
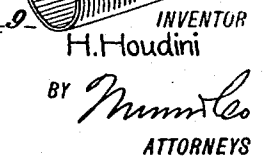


Fig-9-



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# UNITED STATES PATENT OFFICE.

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## DIVER'S SUIT.

1,370,316.

Specification of Letters Patent.

Patented Mar. 1, 1921.

Application filed June 30, 1917. Serial No. 177,971.

*To all whom it may concern:*

Be it known that I, HARRY HOUDINI, a citizen of the United States, and a resident of the city of New York, borough of Brooklyn, in the county of Kings and State of New York, have invented a new and Improved Diver's Suit, of which the following is a full, clear, and exact description.

The invention relates to deep sea diving suits or armors, and its object is to provide a new and improved diver's suit arranged to permit the diver, in case of danger for any cause whatever, to quickly divest himself of the suit while being submerged and to safely escape and reach the surface of the water. Another object is to enable the diver to put on or take off the suit without requiring assistance. Another object is to prevent the diver when submerged from being crushed by the pressure of the surrounding water in case the air supply gives out or the air line becomes fouled for any cause. A further object is to enable the diver to go quickly down to a greater depth and to readily rise therefrom without consuming as much time in effecting a "compressing or a decompressing action" as now required and practised. Other objects will readily appear from the description of the construction and use of the suit as hereinafter set forth.

In order to accomplish the desired result, use is made of upper and lower body sections adapted to incase the diver, and manually controlled connecting means detachably connecting the said body sections with each other, the said connecting means being located exteriorly and being adapted to be closed by the diver prior to submerging and being adapted to be opened by the diver while being submerged. Use is also made of a band of stiff material to hold the pliable material, of which the suit is made, out of crushing contact with the waist and abdomen of the diver.

A practical embodiment of the invention is represented in the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a perspective view of the diver's suit as applied.

Fig. 2 is an enlarged front perspective view of the lower portion of the upper body section and the upper portion of the lower

body section, and the connecting means for detachably connecting the body sections with each other.

Fig. 3 is a perspective view showing the diver in the act of divesting himself of the suit while being submerged;

Fig. 4 is an enlarged front elevation of the connecting means connecting the upper and lower body sections with each other;

Fig. 5 is a sectional plan view of the same;

Fig. 6 is an enlarged cross section of the same on the line 6-6 of Fig. 4;

Fig. 7 is a perspective view of the lower end of one of the trouser legs including the incasing means for the corresponding foot;

Fig. 8 is a front perspective view of one of the shoes in position; and

Fig. 9 is a perspective view of one of the gauntlets for use on the arms and legs.

The diver's suit in its general construction consists of an upper body section and a lower body section 11, the sections being made of an impervious pliable material such as rubber, waterproof textile material, or the like. The upper body section 10 is in the form of a tubular coat provided with sleeves 12 terminating in integral hand incasing means 13, preferably in the form of mittens, as plainly shown in Figs. 1 and 3. The upper body section 10 is provided with the usual metallic helmet 14 attached to a saddle 15 forming a breastplate, back plate and shoulder portions, and secured to the material forming the body section 10, the said helmet and saddle protecting the head and upper portion of the diver's body in the usual manner. The helmet 14 is provided with the usual windows 16 and is connected with an air supply pipe 17 for supplying air to the interior of the suit for breathing purposes and for sustaining the pressure of the water when the diver is below the surface of the water.

The lower body section 11 is in the form of trousers having legs 20 terminating in integral feet incasing means 21 (see Fig. 7). In order to connect the lower end or waist of the upper body section 10 with the upper end or waist of the lower body section 11, the following arrangement is made: On the lower end of the body section 10 is secured a band 25 of rubber or similar material provided in its outer face with an annular groove 26 into which fits a metallic band 27, segmental or arched in cross section to render

the band exceedingly strong. Onto this band fits the upper or waist portion 28 of the lower body section 11, the said portion being provided exteriorly with a split metallic belt or band 30 convex in cross section to snugly press the upper portion 28 in firm contact with the metallic band 27 with a view to provide an air and watertight joint between the upper and lower body sections and at the same time firmly connect the said body sections with each other. The split belt or band 30 may be riveted, glued or otherwise fastened to the upper portion 28 of the lower body section 11, or held in place by loops 31, as plainly indicated in Figs. 1 and 2. The free ends of the belt 30 are adapted to be drawn together by an exterior means under the control of the diver, the said exterior means being preferably in the form of a lever 32 fulcrumed at 33 on one end of the belt 30 and pivotally connected by a link 34 with the other free end of the belt 30 at 35. The lever 32 is provided with a handle 36 adapted to be taken hold of by the diver for the latter to swing the lever from the open position shown in Figs. 2 and 3 into the closed position shown in Figs. 1, 4 and 5, or vice versa. By the arrangement described the upper portion 28 of the lower body section 11 can be readily placed in register with the arched band 27 while the lever 32 and link 34 are in open position, and the diver by swinging the lever 32 over from the left to the right draws the ends of the belt 30 together thus firmly seating and clamping the upper portion 28 on the band 27. When it is desired to open the belt 30 with a view to disconnect the body sections from each other, it is only necessary for the diver to take hold of the handle 36 of the lever 32 and swing the latter back from the right to the left to unclamp and free the waist 28 from the band 27 to allow of dropping the body section, as shown in Fig. 3. The link 34 is preferably made in sections 37, 38, adjustably connected with each other by bolts 39 held on the sections 38 and engaging slots 40 formed in the sections 37. The opposite faces of the link sections 37, 38 are preferably provided with ratchet teeth 41, 42 to prevent accidental slipping of the sections 37, 38 one on the other. The belt 30 is provided with outwardly extending pairs of lugs 45, each pair containing a weight 46 between them, the weight being fastened in place by screws 47 engaging the lugs 45 and screwing into the ends of the weights 46. By the arrangement described the weights 46 can be interchanged for heavier or lighter weights.

The shoes 50 are provided with weighted soles 51 and similar heels 52, and the shoes are open along the median line of the front from the top to near the forward end, as plainly indicated in Fig. 8. A buckle strap

53 is provided across the top of the front portion of the shoe and a buckle strap 54 is held on the sole of the feet incasing means 21 (see Fig. 7) by passing through slits 55 formed in the sides of the feet incasing means 21 and extending through slits 56 formed in the sides of the shoe 50 at the heel 52 thereof. The outer ends of the buckle strap 54 extend across the shoe over the instep, and the ends of the strap are buckled together, as plainly indicated in Fig. 8. The top of the shoe is provided with a split metallic band 57 around which passes a buckle strap 58 to close the shoe at this upper end without, however, binding on the lower end of the corresponding trouser leg 20 thus allowing the diver to slip his feet and the feet incasing means 21 out of the shoes whenever it is desired to do so, while being submerged or when divesting himself of the suit on board of a vessel or on land. In order to permit the diver to readily slip his feet out of the feet incasing means and out of the shoes, the latter are provided at the backs with stiffening plates 60 secured to the shoes at the heels 52, the backs of the shoes and the metallic bands 57 thus preventing the rear portions of the shoes from collapsing onto the back of the diver's feet and thus holding the diver's feet against slipping out of the shoes. It will be noticed that the weight of the soles 51 and the heels 52 of the shoes may be decreased to a considerable extent, by the provision of the weights 46 on the belt 30 thus enabling the diver to more easily walk about. By providing interchangeable weights 46 the weight of the diver's suit can be increased or diminished according to the depth of the water in which the diver is to go down at the time.

In order to prevent the air within the diver's suit from inflating the hand inclosing means 13 and the feet inclosing means 21, use is made of gauntlets 70 of a stiff material and split lengthwise to permit conveniently placing the gauntlets exteriorly in position on the body sections 10 and 11 at the forearms and the lower portions of the legs adjacent the shoes 50. The gauntlets are provided with closing means 71 for drawing the gauntlets tightly shut on the arms and legs to prevent the air from reaching the inclosing means 13 and 21. The closing means 71 are preferably in the form of snap levers extending over an exterior grooved flange 72 formed on one side of the gauntlet 70 and fitting onto a correspondingly shaped ridge 73 formed on the other side of the gauntlet, as plainly indicated in Fig. 9. By the arrangement described the diver can readily open the fastening devices 71 to divest himself of the gauntlets either when being submerged or when on land.

It is understood that the usual means for

raising and lowering the diver and the means for signaling purposes are of the usual construction.

The upper and lower body portions while in separated condition are donned separately, that is, the lower body portion 11 is preferably donned first with the lever 32 in open position, and then the diver slips the upper body portion over his head until the saddle 15 rests on his shoulders and the head extends within the helmet 14, then the diver draws up the lower body portion until the waistband 30 registers with the waistband 27 of the upper body portion, and then the diver swings the lever 32 into closed position to firmly seat the band 30 on the band 27 and thereby form a tight joint, as above described. It will be noticed that the helmet and saddle need not be detached at all from the upper body portion unless for any special reason it is desired to do so. The gauntlets 70 can be subsequently placed in position but the shoes are preferably put on prior to donning the upper body section 10.

From the foregoing it will be seen that by the arrangement described the diver himself can readily don the suit when on land or on board of a marine vessel without assistance from other persons, and when the diver is submerged and becomes jammed at the bottom of the ocean or river or that the air supply gives out, it is only necessary for the diver to swing the lever 32 into open position to allow the lower body section 11 to drop down (see Fig. 3) and step out, and then to divest himself of the upper body section by bending over with outstretched hands and quickly pulling back the upper body to free himself of the upper body section 10 aided by the resistance of the water which rushes into the said body section. The diver can now rise to the surface of the water completely free of the suit. By actual tests it has been proved that not only a diver but an inexperienced person when submerged can escape from the suit in less than 45 seconds. It will further be noticed that by having the strong metallic band 27 and the belt 30 at the waist, and which parts form part of the connecting means for connecting the body sections 10 and 11 with each other, a protecting means is provided for protecting the waist and abdominal portion of the diver against the pressure of the surrounding water and consequently less air pressure within the suit is required. Thus by reduction in air pressure the usual time consumed in effecting the "compressing or decompressing action" is reduced to a minimum. By providing the metallic band and belt the danger of the "squeeze" either in the diver falling down or being blown up is reduced to a minimum. By weighting the suit at the connecting means between the

upper and lower body sections this weight is supported from the shoulders of the diver and a correspondingly lighter weight can be used on the shoes.

It is understood that when the diver is incased in the suit and submerged with the sections connected with each other then escape of air from within the suit and inflow of water from without is completely prevented.

It is further expressly understood that as soon as the upper and lower body sections 10 and 11 are disconnected from each other while the diver is submerged most of the air escapes from within the suit sections and the surrounding water in volume rushes into the sections to exert a displacing action on the suit sections, thus aiding the diver to quickly extract and free himself from the sections.

It is further understood that the improvements described apply equally well to a self-contained diving suit without a supply of air from above.

In case a diver is down say to a high pressure and it would be dangerous for him to come up quickly without recompression, another diver may take a helmet down to the diver in distress to allow the latter to escape from the suit, insert his head into the extra helmet and be gradually brought to the surface.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:—

1. A diver's suit, comprising upper and lower body sections having air-tight and water-tight incasing means adapted to incase the diver against the escape of air from within the suit and against inflow of water when submerged, the sections having their adjacent ends in overlapping relation, the lower section having means to allow the diver when submerged to step out of the lower section, and the upper section having means to allow the diver when submerged to draw the upper portion of his body out of this upper section, and instantaneously operable releasing and automatic separable means at the said overlapping ends to connect the said ends with each other to form an air and water-tight joint between the said overlapping ends, the said means having exterior actuating devices under the control of the incased diver to permit the latter when submerged to open the joint and separate the overlapping ends to allow the diver to extract himself when submerged aided by the inrush of the surrounding water in volume to exert a displacing action on the suit sections.

2. A diver's suit, comprising an upper body section of pliable material and including incasing means for the arms and hands, and a helmet having the usual air supply, a

lower body section having legs and shoes attached to the legs, the waist of the said upper body section and the waist of the said lower body section having coacting means forming an air and water-tight separable joint the said upper body section having means to allow the diver to draw the upper portion of his body including the arms and hands out of the upper body section when submerged, and the said lower body section having its legs and shoes provided with means to allow the diver, when submerged, to step out of the said lower body section, and exterior controlling means on the said joint to normally hold the joint closed against the inflow of water, the said controlling means having an actuating member under the control of the diver to permit the diver when submerged to open the joint and separate the waists to allow the sections to separate and the water to rush into the sections to aid the diver in divesting himself of the said sections.

3. A diver's suit, comprising an upper body section of pliable material and including incasing means for the arms and hands and a helmet having the usual air supply, a lower body section having legs and shoes attached to the legs, the waist of the said upper body section and the waist of the said lower body section having coacting means forming an air and water-tight separable joint, the upper body section having means to allow of being shed over the head of the diver, and the lower body section having means to allow the diver, when submerged, to step out of the lower body section, and exterior controlling means on the said joint to normally hold the joint closed against the inflow of water, said controlling means having an actuating member under the control of the diver to permit the diver when submerged to open the joint and separate the waists to allow the sections to separate and the water to rush into the sections to aid the diver in divesting himself of the said sections.

4. A diver's suit, comprising sections adapted to incase the diver against the escape of air within the suit and against inflow of water when submerged, and manually releasing and automatically separable means allowing the said sections to be released and automatically separating one from the other to allow the diver to extract himself when submerged aided by the in-

rush of the surrounding water in volume to exert a displacing action on the suit sections.

5. A diver's suit, comprising a coat provided with a helmet and sleeves terminating in hand incasing means, trousers having legs terminating in feet incasing means, bands of stiff material at the waists of the said coat and trousers and adapted to overlie each other, and manually controlled means to move the bands out of overlying relation to allow the coat and trousers to separate automatically and permit the diver to extract himself when submerged aided by the inrush of the surrounding water in volume to exert a displacing action on the said coat and trousers.

6. A diver's suit, comprising a coat provided with a helmet and sleeves terminating in hand incasing means, trousers having legs terminating in shoes having means to permit the diver to withdraw the feet while the shoes are attached to the legs, and manually controlled exterior connecting and releasing means connecting the waists of the coat and trousers to form an air and water-tight joint and capable of being opened by the diver when submerged to allow automatic separation of the coat and trousers.

7. A diver's suit, comprising upper and lower body sections provided at the waists with bands adapted to overlie one the other, one of the bands being annular and the other being split, a lever at one end of the said split band, and a link connecting the other end of the said split band with the said lever.

8. A diver's suit, comprising an upper body section provided exteriorly at the waist with an annular band of a stiff material, a lower body section having an open or split band fitting the said band exteriorly, a lever at one end of the said split band, and a link on the other end of the split band to permit of drawing the split band tight on the annular band or releasing it therefrom.

9. A diver's suit, comprising an upper body section provided exteriorly at the waist with an annular band of a stiff material, a lower body section having an open or split end fitting the said band exteriorly, a lever at one end of the split band to permit of drawing the split band tight on the annular band or releasing it therefrom, the links being made in sections adjustably fastened together.

HARRY HOUDINI.