

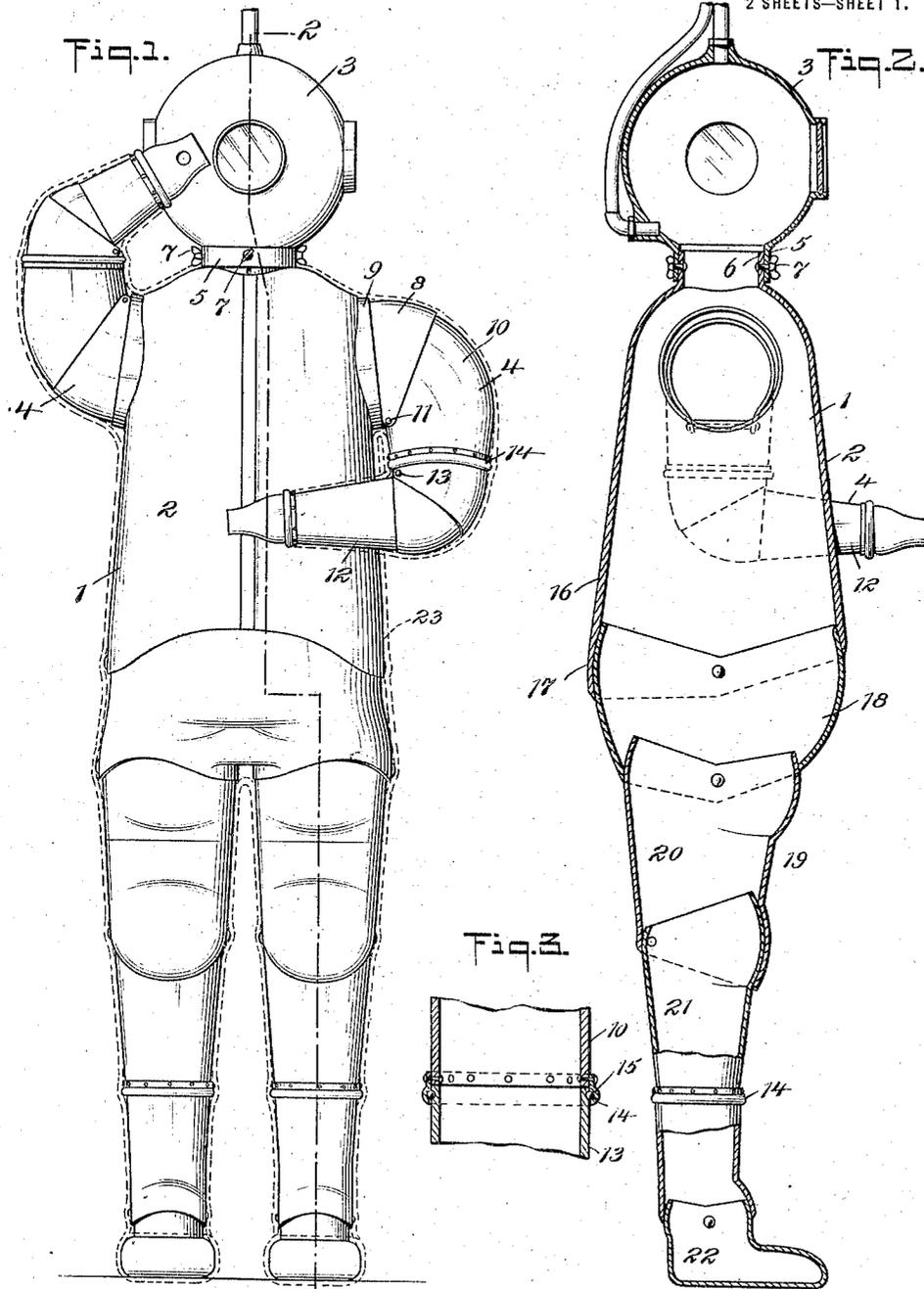
E. NIEHOFF.  
DIVING ARMOR.

APPLICATION FILED JUNE 10, 1918. RENEWED MAR. 21, 1919.

1,307,921.

Patented June 24, 1919.

2 SHEETS—SHEET 1.



WITNESS

*[Signature]*

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INVENTOR

Ernest Niehoff

BY

*[Signature]*

ATTORNEYS

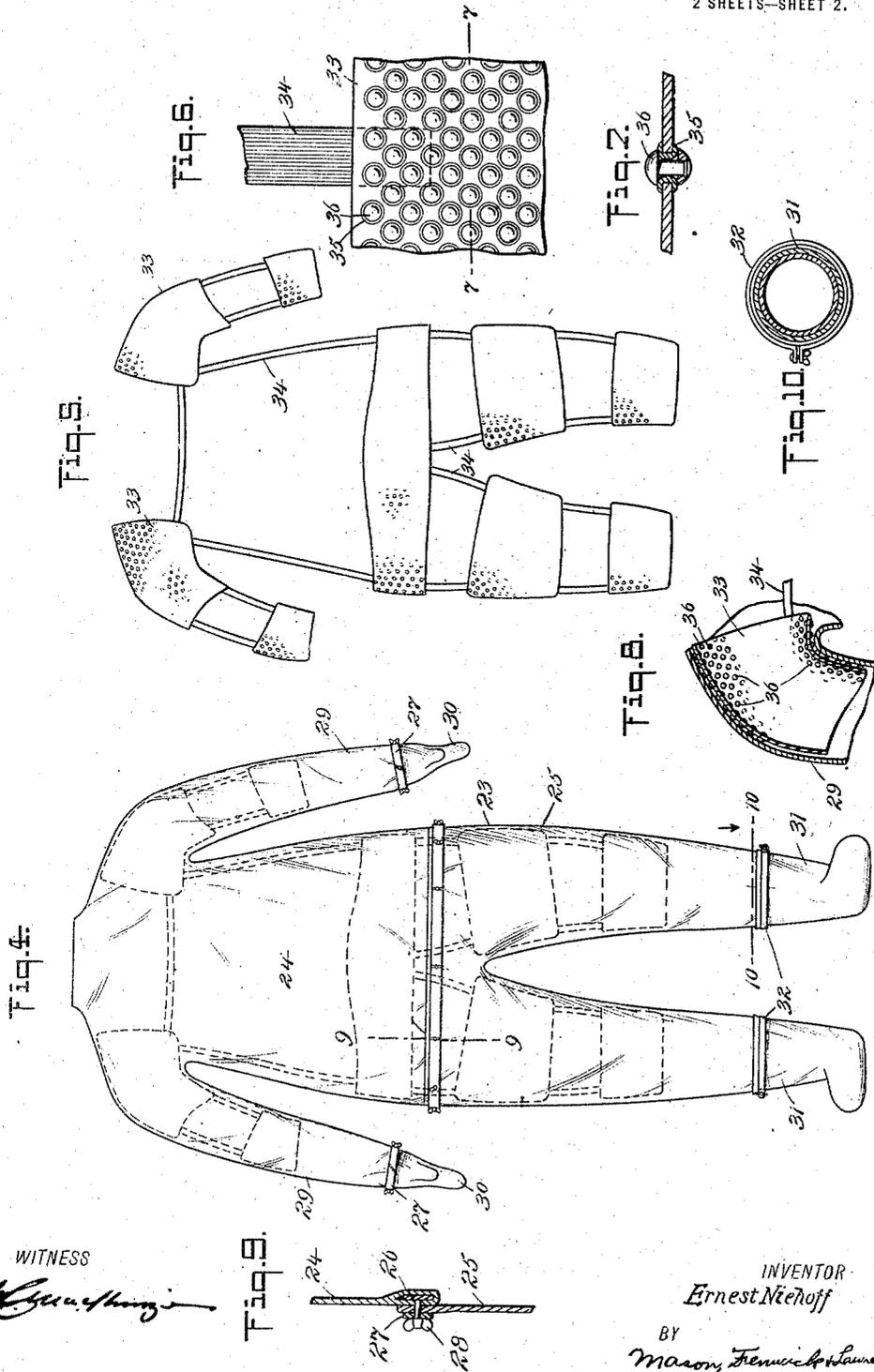
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INVENTOR  
Ernest Niehoff  
BY  
Mason, Fenwick & Lawrence  
ATTORNEYS

# UNITED STATES PATENT OFFICE.

ERNEST NIEHOFF, OF BROOKLYN, NEW YORK.

## DIVING-ARMOR.

1,307,921.

Specification of Letters Patent. Patented June 24, 1919.

Application filed June 10, 1918, Serial No. 239,195. Renewed March 21, 1919. Serial No. 234,177.

*To all whom it may concern:*

Be it known that I, ERNEST NIEHOFF, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Diving-Armor; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to diving armor, and has for its principal object to construct a device of this character which comprises a jointed metallic suit and a flexible waterproof inclosing suit, with means between the suits for preventing the water-pressure on the flexible suit from interfering with the action of the joints; to produce an improved anti-friction fabric for interposition with respect to the suits mentioned, and a harness for maintaining sheets of this fabric in place; and to improve the construction generally so as to provide a great amplitude of movement and provide against any possible leakage.

To the accomplishment of the recited objects, the preferred embodiment of my invention resides in that construction and arrangement of parts hereinafter described, shown in the accompanying drawings, and embraced within the scope of the appended claims.

In said drawings,

Figure 1 is a front elevation of the metallic suit, and

Fig. 2 is a vertical section view taken along lines 2—2 of Fig. 1.

Fig. 3 is a detail fragmentary section of one of the joints.

Fig. 4 is a front elevation of the flexible suit, the anti-friction harness being indicated by dotted lines.

Fig. 5 is a front elevation of the anti-friction harness.

Fig. 6 is an enlarged detail view showing the arrangement of the anti-friction element.

Fig. 7 is a transverse section taken along line 7—7 of Fig. 6.

Fig. 8 is a fragmentary sectional elevation illustrating the position of the arm-pit joint with respect to the adjacent portion of the flexible suit.

Fig. 9 is a sectional view taken along line 9—9 of Fig. 4, and

Fig. 10 is a transverse sectional view taken along line 10—10 of Fig. 4.

My invention comprises three essential separate and distinct portions, an outer flexible suit, an intermediate anti-friction harness and an inner metallic suit.

As shown in Figs. 1 and 2 of the drawings, the metallic suit 1 comprises a body portion 2, carrying a helmet 3 and arms 4. The helmet is of conventional type, and is provided with a depending annular flange 5 which fits over a correspondingly shaped flange 6 extending vertically from the body 2, one or more thumb screws as 7 projecting through the two flanges and serving to complete the connection at this point. Each arm 4 consists of an upper section 8 rotatively mounted relatively to the annular extension 9 of the body 2, ball bearings preferably being provided at the junction of section 8 and collar 9 of body 2. A section 10 is pivoted at 11 to the lower terminal of section 8 and the fore-arm section 12 is pivoted at 13 to the section 10. In order to provide for movement of the fore-arm section in a horizontal plane, the same is preferably split and the adjacent edges thereof surrounded by a flange 14, between which latter and the lower portion of section 10 a race-way is formed for the reception of ball bearings 15, as clearly exhibited in Fig. 3 of the drawings. Otherwise, the different sections of the arm are adapted to be moved telescopically with respect to each other. The smaller extremity of the body portion 2, as at 16, is somewhat thickened, while the extreme end 17 is reduced in thickness and slightly rounded to serve as a socket for the portion 18 which constitutes the main connection between the body and the leg 19. Primarily, each leg is formed of three sections 20, 21, and 22, although the last mentioned section may be more aptly styled as the foot-section. Each of the sections is joined to the adjacent section by means of what may be termed a ball and socket connection, and in addition, section 21 is recessed mid-way of its length, and provided with anti-friction bearings 15 in the same manner as explained in connection with the arm 4 of the metallic suit.

From the foregoing it will be seen that each of the arms 4 may be rotated as an entirety in a vertical plane; that the fore-arm section 12 may be rotated in a horizontal plane, and that otherwise the different sections comprising the arm may be moved to any desired position, each foot-section 22 may be adjusted in either a vertical or a horizontal plane, in accordance with the particular requirements.

The flexible suit 23, as exhibited in Fig. 4 of the drawings, is intended to be worn over the metallic suit 1. It comprises two main portions, a body portion 24 and leg portion 25. At the lower edge of the body portion 24 is a band 26 and a similar band 27 is carried by the upper edge of the leg portion 25. A thumb screw 28 passes through the two edges and the two bands and forms a seal at this junction, as clearly shown in Fig. 9 of the drawings. Similar devices are arranged between the lower edges of the sleeves 29 of the body and gloves 30, as well as between the adjacent edges of the legs 25 and boots 31 over a concentric clamping ring 32.

Between the outer flexible suit 23 and the metallic suit 2, is interposed a harness, which as will be found upon inspection of Fig. 5, comprises a plurality of tubular elements 33, connected together by means of tape, strips or the like 34. Each tubular section is preferably formed of canvas or similar material with any desired number of eyelets as 35 extending therethrough, each eyelet containing a double-headed rivet, stud or the like 36, the idea being that the tubular elements are to occupy positions surrounding the joints of the body and limbs of the diver, and that the studs 36 will serve as spacing devices between the outer flexible garment or suit 24 and the inner metallic suit, thereby preventing the pressure of the water on the outer flexible suit from being transmitted to and interfering with the normal ease of action of the joints of the metallic suit.

What is claimed is:

1. A diving armor comprising a jointed metallic suit, a water-proof flexible suit inclosing it, a helmet projecting from the metal suit through the flexible suit, and a flexible element between the two suits and having anti-friction means disposed around the joints of the metal suit.
2. A diving armor comprising a metallic

suit, joints formed therein, a flexible suit located over the metallic suit, and a fabric provided with anti-friction means located between the suits and around the joints. 60

3. A diving armor comprising a metallic suit provided with a joint, a flexible suit surrounding the joint, a flexible device located between the joint and the flexible suit, and anti-friction means carried by the device and adapted to engage both the metallic joint and the flexible suit surrounding the same. 65

4. A diving armor comprising a metallic suit provided with joints, a flexible suit surrounding the metal suit, a flexible fabric located between the suits and around the joints of the former suit, and anti-friction spacing elements carried by the fabric and adapted to engage both suits, for the purpose set forth. 70 75

5. In a diving armor, the combination with a metallic suit, joints therein, a helmet, and a water-proof suit inclosing the metallic suit excepting the helmet; of a flexible anti-friction element interposed between the two suits and composed of members surrounding the joints of the metal suit, and a harness consisting of straps connecting said members, for the purpose set forth. 80

6. An anti-friction fabric for diving armor adapted to lie between the joints of a metallic suit and a flexible inclosing suit, the same comprising a flexible layer provided with perforations, and anti-friction means anchored in the perforations. 85 90

7. A diving dress comprising an outer flexible suit, an inner metallic suit, and a harness fitted about the joints of said metallic suit, said harness comprising flexible material and means for spacing the same with respect to said outer and inner suits. 95

8. A harness for diving armor consisting of a plurality of tubular sections joined together, each section including a plurality of spacing devices. 100

9. A harness adapted to be worn between an outer flexible suit and an inner metallic suit, said harness comprising flexible material fitted about the joints of said metallic suit and means for maintaining it in spaced relation with respect to the other suit. 105

In testimony whereof I affix my signature in presence of two witnesses.

ERNEST NIEHOFF.

Witnesses:

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WILLIAM GOLDEN.