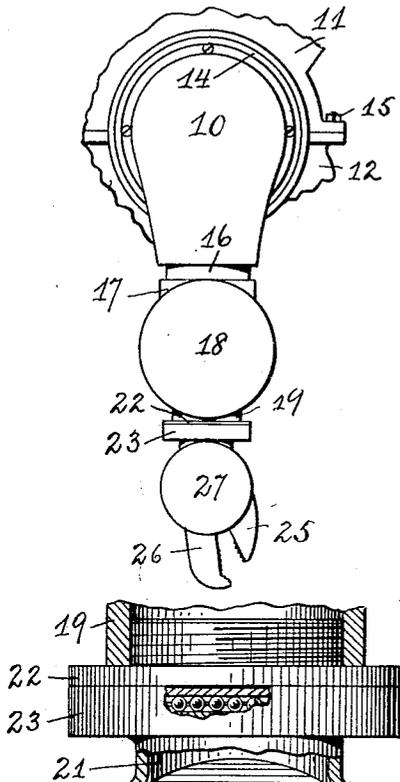


W. S. BOYD.  
 SUBMARINE ARMOR.  
 APPLICATION FILED FEB. 11, 1916.

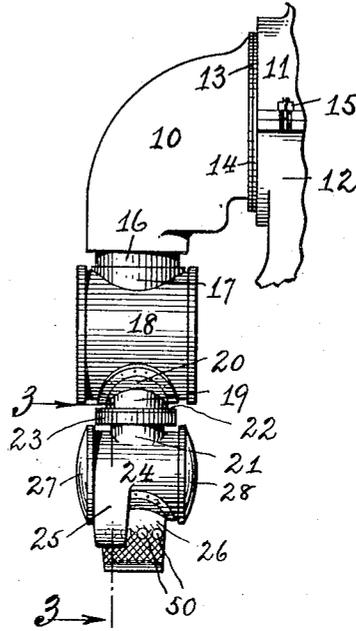
1,198,611.

Patented Sept. 19, 1916.

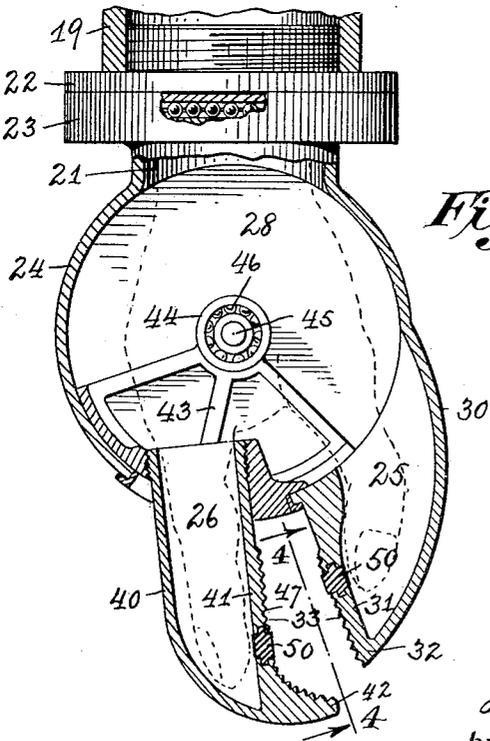
*Fig. 1.*



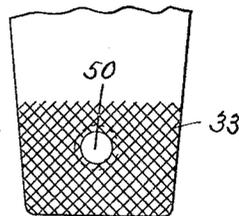
*Fig. 2.*



*Fig. 3.*



*Fig. 4.*



William S. Boyd Inventor:  
 by William R. Baird  
 his Atty

# UNITED STATES PATENT OFFICE.

WILLIAM S. BOYD, OF GREATKILLS, NEW YORK.

## SUBMARINE ARMOR.

1,198,611.

Specification of Letters Patent. Patented Sept. 19, 1916.

Application filed February 11, 1916. Serial No. 77,588.

*To all whom it may concern:*

Be it known that I, WILLIAM S. BOYD, a citizen of the United States, residing at Greatkills, in the county of Richmond and State of New York, have invented certain new and useful Improvements in Submarine Armor, of which the following is a specification.

This invention relates to submarine armor for the use of divers, and particularly to that class of armor which is composed of sections of rigid material united by water-tight joints, and especially to those portions of the armor adapted to inclose and protect the hand of the operator.

An example of the kind of armor referred to is to be found in Letters Patent of the United States No. 989,530, issued April 11th, 1911, to C. E. MacDuffee, and the invention which is the subject matter of this application may be considered in a general sense as an improvement upon the device described in that patent. In that device, the means provided for the operator to employ in grasping an object consists of a pair of tongs terminating in inwardly turned hook members projecting from a sleeve and adapted to be oscillated on a common pivot by means of a longitudinal handle passing through the end of and into the sleeve and adapted to be moved longitudinally by the hand of the operator.

The object of the present invention is to provide an armor of the general character described with a hand section which will permit the operator to use his hands in a natural, though limited, manner; will enable him to grasp objects over a much wider area than can be done through the use of opposing tong points, and will also enable him to some extent to utilize his sense of feeling when the members of the hand section are brought in contact with other objects.

In the drawings, in which there is illustrated an apparatus embodying the invention, Figure 1 is a side elevation of a shoulder, arm, elbow and hand section united to each other by movable, suitably packed, water-proof joints; Fig. 2 is a front elevation of the same; Fig. 3 is an enlarged section on the plane of the line 3—3 in Fig. 2; and Fig. 4 is a side elevation of the inner side of the thumb piece.

In the drawings, 10 is a shoulder section of suitable size and material, secured to a head section 11 and chest section 12 by ver-

tical members 13 and 14 forming a joint and adapted to permit of a swinging movement of the shoulder section in a vertical plane. The head section and chest section are united together by means indicated at 15 and form part of the main body of the armor which is not shown and which is not relevant to the present invention. Depending from the shoulder section is a cylindrical sleeve forming the upper member of an arm section the lower member of which is a similar sleeve 17 projecting upwardly from and rigidly connected with an elbow section indicated at 18. The members 16 and 17 are connected together by a horizontal water-proof joint, so that the elbow section may have a slight horizontal movement with respect to the shoulder section.

Depending from the elbow section is the upper member 19 of the forearm section, which member is connected to the elbow section by a segmental flange 20 so arranged that it can have a swinging movement with respect to the elbow section. It is connected to the lower member 21 of the forearm section by means of cooperating annular flanges 22 and 23.

The hand section proper comprises a cylindrical body 24 from which the forearm member 21 projects upwardly and from which a thumb piece generally indicated at 25 and a finger piece generally indicated at 26 project downwardly. The sides of the cylindrical body 24 are closed by plates 27 and 28, which are made slightly concave in order to afford greater resistance to pressure.

The thumb piece in the form of device shown is made integral with the cylindrical body 24 and forms a projection thereof having an outer member 30 and an inner member 31 coming together at a point indicated at 32.

The finger piece is movable with respect to the cylindrical member 24 and forms a projection thereof and has an outer member 40, an inner member 41, and an inwardly extending tip 42 forming a pocket into which the fingers of the wearer easily slip. This pocket is secured in any suitable manner to a segmental frame indicated at 43 and which is provided with a central hub 44 adapted to oscillate around a bearing 45 with which the cylinder 24 is provided, intermediate rollers indicated at 46 lessening the friction. By this device the finger piece

26 which passes through a suitable aperture in the lower part of the cylinder 24 may be given an oscillatory movement with respect to the thumb piece, so that objects may be grasped between the thumb piece and finger piece by the movement of the fingers of the operator somewhat in the same manner as objects are grasped by the claws of a lobster, which the device in a general sense resembles, and this function is facilitated by roughening or scoring the inward and opposing surfaces of the thumb and finger piece as indicated at 33 and 47 respectively.

In each of the inner walls of the thumb piece and finger piece, there are inserted one or more soft, flexible members indicated at 50, and which are preferably made of tough, thick, soft rubber. These may be secured in place in any suitable manner. In the form illustrated, they are forced under great pressure into apertures in the walls provided to receive them. The purpose of these members is to afford a means for permitting the operator by a sense of touch communicated to his thumb and fingers through them to ascertain the presence of an object brought into contact therewith.

I claim:

1. In a device of the character described, a metallic hand section including a finger

piece and a thumb piece, one or both provided with inserts of soft material in their opposing surfaces for rendering the hand section more sensible to touch.

2. In a device of the character described, a metallic hand section including a finger piece and a thumb piece, one or both provided with inserts of soft material in their opposing surfaces adjacent the tips thereof for rendering the hand section more sensible to touch.

3. In a device of the character described, a metallic hand section including a finger piece and a thumb piece, one of said pieces provided with a series of alining inserts of soft material for rendering the hand section more sensible to touch.

4. In a device of the character described, a hand section comprising a cylindrical body provided with an opening, a segmental frame having a hub portion formed integral therewith, said frame and hub portion arranged to be oscillated within said cylindrical body, a finger piece secured to said frame and adapted to pass through the opening in the cylindrical body, and a thumb piece on said body adapted to cooperate with the finger piece.

In testimony whereof I affix my signature.

WILLIAM S. BOYD.