

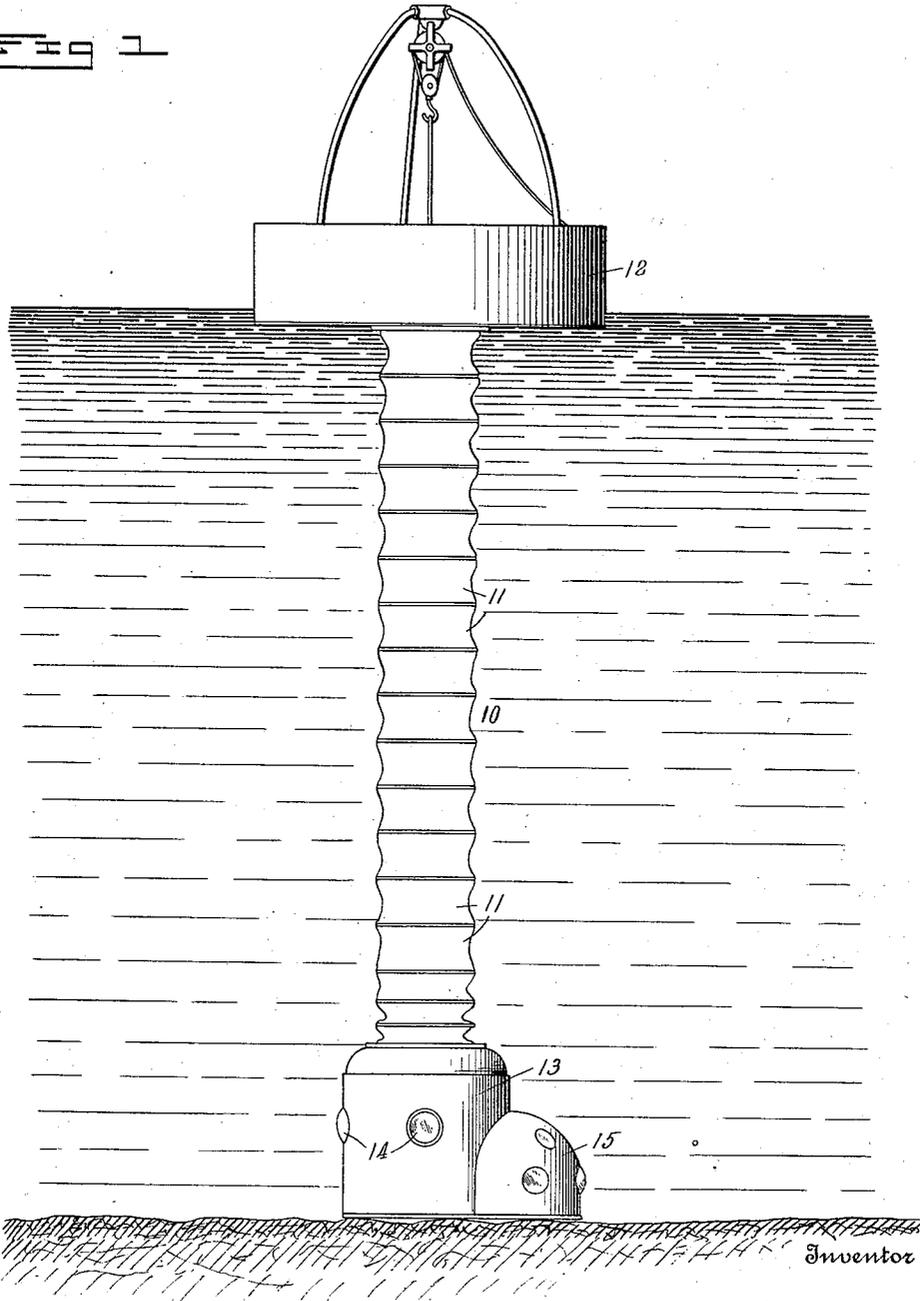
C. WILLIAMSON.
SUBMARINE MINING APPARATUS.
APPLICATION FILED FEB. 7, 1910. RENEWED JULY 12, 1911.

1,017,486.

Patented Feb. 13, 1912

3 SHEETS—SHEET 1.

Fig 1



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Fig 5

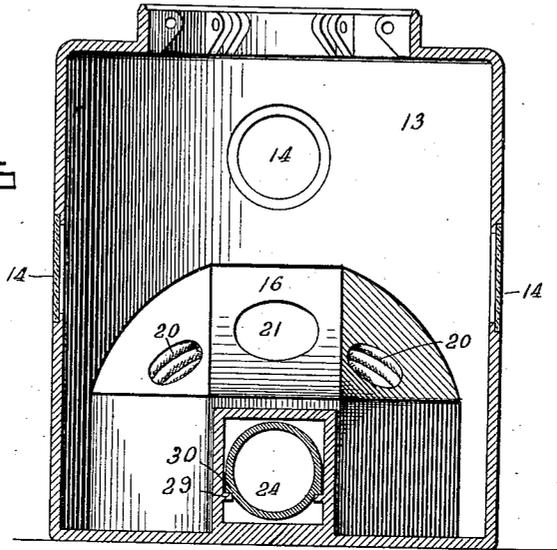
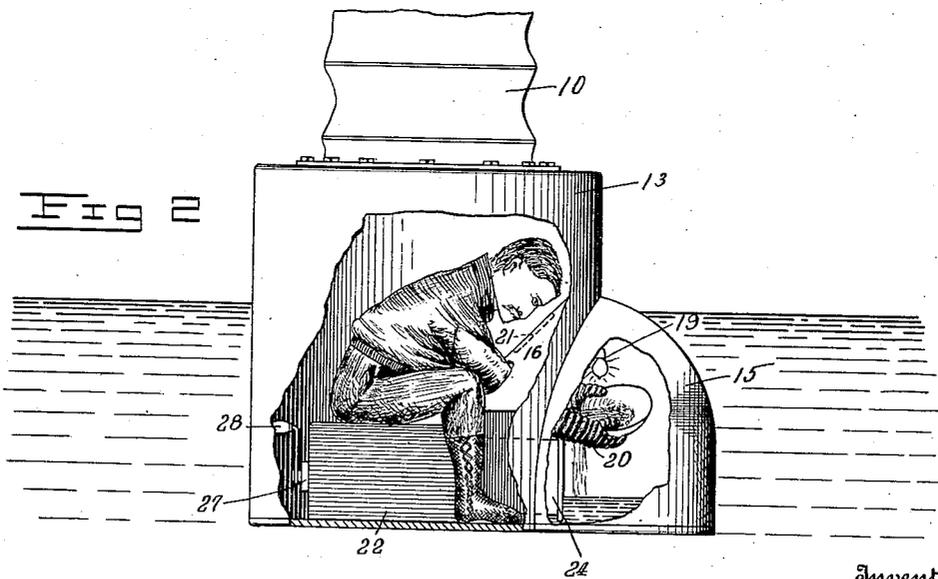


Fig 2



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3 SHEETS—SHEET 3.

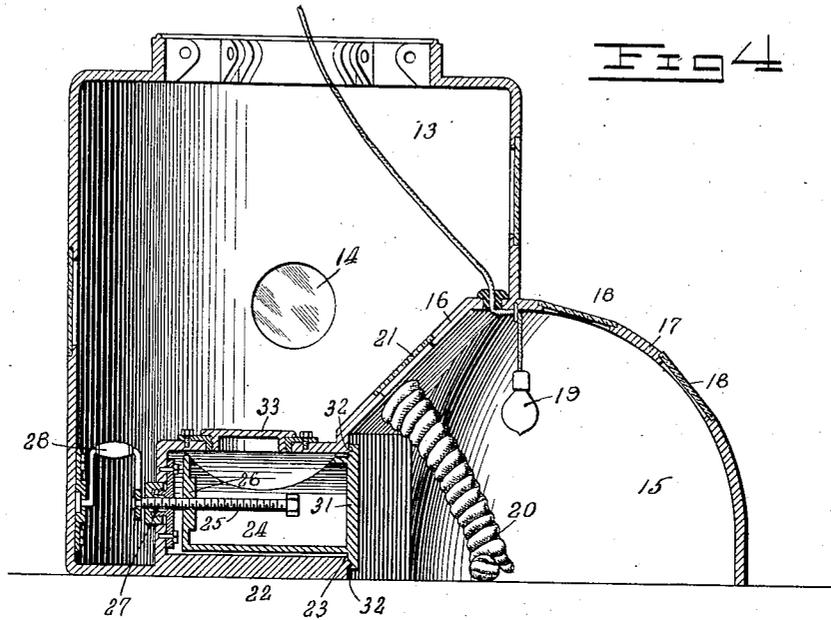


Fig 4

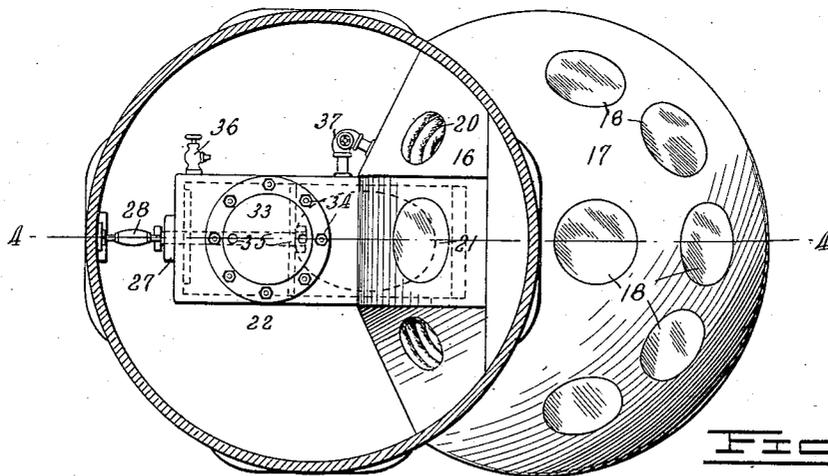


Fig 3

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UNITED STATES PATENT OFFICE.

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SUBMARINE MINING APPARATUS.

1,017,486.

Specification of Letters Patent. Patented Feb. 13, 1912.

Application filed February 7, 1910, Serial No. 542,598. Renewed July 12, 1911. Serial No. 638,213.

To all whom it may concern:

Be it known that I, CHARLES WILLIAMSON, a citizen of the United States, residing at Norfolk, in the county of Norfolk and State of Virginia, have invented new and useful Improvements in Submarine Mining Apparatus, of which the following is a specification.

My invention relates to that type of submarine mining apparatus in which use is made of a caisson for the accommodation of miners, and has especially to do with apparatus suited for placer mining in the bottoms of streams and other bodies of water. In most instances the caissons used for this purpose are what are known as pneumatic caissons, the caissons being in the form of a diving bell with an open bottom end, and means being provided to maintain air within the caisson under such pressure that water is forced out of the bottom and only enough is allowed to remain to form a good seal at the working depth.

This apparatus is subjected to disadvantages in that operators of more than ordinary physical strength are required to do efficient work in the compressed atmosphere. Difficulty also arises in the use of this form of apparatus due to the fact that the operators have free access to the product being mined and have to be strictly guarded and searched as do miners of valuable products in all large mines. Apparatus of this type is also somewhat inconvenient to manipulate at various depths, and considerable inconvenience is caused, and time is lost on account of the fact that miners have to be admitted to the caisson through airlocks and the caisson has to be drawn up to the surface of the water until the gate of the lock is above water in case a special shaft is not provided. Provision of a special shaft of rigid construction renders the apparatus bulky and unadapted for ready use at various depths.

It is the object of my invention to overcome these difficulties and to produce an apparatus which is simple and comparatively inexpensive and will operate under varied conditions of actual service most efficiently at all times.

In the accomplishment of my invention I make use of two caissons associated together, one a low pressure operating caisson and the other a high pressure working caisson, and

provide means whereby operations may be carried on in the working chamber by operators in the operating chamber. The caisson of low pressure which I make use of is of the flexible and collapsible type, such that it may be readily moved laterally, or extended and collapsed longitudinally. This caisson I open at its upper end to the atmosphere and close at its lower end. Miners entering are therefore able to work at atmospheric pressure. The working chamber of high pressure is of the pneumatic caisson type and is preferably comparatively small and located at the lower end of the low pressure caisson. I also provide a special lock between the working chamber and the operating chamber, so that the products mined can be removed from the working chamber to the lock by the miner, but they cannot be taken from it by him, the lock being so constructed that only authorized persons have access thereto. The products mined are thus absolutely safe, and there is no danger of theft. Owing to the fact that a collapsible caisson is used as a low pressure caisson, the apparatus is most easily moved from place to place and manipulated at various depths, the apparatus being simply attached to a suitable float.

I shall describe one of the specific embodiments of my invention now known to me with reference to the accompanying drawings, and numerous advantageous detailed features will be pointed out, as well as the broad invention outlined above.

The novel features of my invention will thereafter be particularly pointed out in the annexed claims.

Of the drawings, Figure 1 is a general view of my apparatus in use; Fig. 2 is a view of the low pressure operating chamber of my apparatus, with the side wall broken away; Fig. 3 is a plan view of the operating and working chambers; Fig. 4 is a central section on line 4—4 of Fig. 3; and Fig. 5 is a section on line 5—5 of Fig. 4.

10 is the low pressure caisson of my invention which is made of flexible collapsible sections 11 and supported at its upper end from a float 12 of suitable form, a tub-float being shown. Means are provided in connection with the float for raising and lowering the collapsible caisson, and for raising and lowering persons and materials

in it. The weight of the low pressure caisson 10 is preferably approximately equal to the weight of the water displaced by it in its extended condition. Its upper end is preferably open to the atmosphere.

At the lower end of the low pressure caisson 10 is an operating chamber 13 of low pressure closed at its bottom and opening at its top into the caisson 10. This chamber is in effect a continuation of the caisson 10, and if desired the lower end of the caisson might be used as an operating chamber. The weight of this chamber should be such as to insure proper gravitation to the bottom of a body of water in which the mining is to be done, and this weight may be made up entirely of the structural weight, or structural weight and weight in addition to structural weight, suitably placed in or about the chamber. This chamber is provided with observation lights 14 in its side walls.

Associated with the low pressure operating chamber is the high pressure chamber or pneumatic caisson 15, located in this embodiment on one side of the operating chamber 13. The walls of the working chamber are formed in part of the bottom wall 16 of the low pressure caisson and in part by a wall 17 projected from the side of the chamber 13. Lights 18 are provided in the outer wall 17 so that such natural light as may pass through the body of water may be used to light the working chamber. Rather than depend entirely upon this source of light, however, I provide an artificial light 19, which is preferably an electric light supplied with power from a convenient source. Likewise I may provide electric lights in the operating chamber 13 in case sufficient light does not come through the main caisson 10.

Attached to the wall of the working chamber 15 which separates the chamber from the operating chamber are flexible arms and mittens 20 which project into the working chamber from the operating chamber. It will be noted that these arms and mittens are symmetrically located with respect to the center line of the operating chamber 13. They are located a proper distance apart for the accommodation of the two arms of the operator. Above the flexible arms a proper distance is a light 21 through which the operator may observe the work he carries on within the working chamber. As many of these devices may be provided as are necessary, a sufficient number for several operators to work at once being easily provided in a larger apparatus.

Immediately below the flexible arms and mittens, and in symmetrical alinement with them and with the observation light 21 is a special form of lock 22 designed by me for use as a part of this mining apparatus. The casing of this lock is reentrant from the opening 23 into the working chamber 15. In

it is located a transfer 24 for the mined products in the shape of a drawer or cache, this drawer is reciprocable into and out of the casing of the lock by a screw-threaded rod 25 threaded into the head 26 of the drawer and passed out of the casing through a stuffing-box 27. Outside of the casing it is operably connected and fixed to a crank 28. By turning the crank the transfer drawer may be moved back and forth from the lock to the working chamber. Guide-ways 29, shown in Fig. 5, co-act with projections 30 on the transfer to keep the transfer from rotating and preserve its upright position. On its outer end the transfer 24 carries inner gate 31 of the lock, this gate being firmly seated on the seat 32 whenever the transfer is drawn fully into the casing and closing the lock air and water tight at that end. The upper or outer gate of the lock is on top of the casing and is in the form of a cap 33 screw-threaded into the casing and provided with a lock 34 for preventing its removal by unauthorized parties. This locking may be accomplished by the provision of a special form of cap which can be removed only by special form of tool, as for instance by the provision of a cap with spanner wrench socket 35 of special form. A valve 36 is provided in the casing communicating with the operating chamber for equalizing air caught in the lock, and a valve conduit 37 is provided between the working chamber and the lock casing for the equalizing of pressure on opposite sides of the gate 31 when it is desired to open the gate.

As thus organized the operation of my invention is as follows: The apparatus is positioned over the point where the mining is to be done, and the operating and working chambers lowered to the bottom. A quantity of air is caught in the chamber 15 in the original lowering and remains there under a pressure depending upon the depth of the chamber. When the chamber is on the bottom there are a few inches of water in the bottom as shown in Fig. 2. Placer mining then may be carried on by an operator using the flexible mittens 20 from the chamber 13, as shown in Fig. 2, the operator being seated above the lock 22, and the washing can be done right in the chamber, the valuable products being removed from the pans and sieves and placed in the transfer 24, which transfer 24 is moved out into the chamber 15 for this purpose, as shown in full lines in Fig. 2. Mining may be continuously carried on in this manner for considerable periods of time, the apparatus being moved from place to place, this movement and adjustment for the various depths being most readily accomplished by the float and the flexible collapsible low pressure caisson. When the work is finished, or when it is desired to collect

the products mined, the transfer drawer or cache 24 is moved inwardly by the operating crank 28, thus closing the gate 31 of the lock and shutting out the high pressure air.

5 An authorized person can then unlock the gate 33 and remove the contents from the transfer.

Clearly I have accomplished all the objects of my invention.

10 Submarine mining may be carried on by the use of this apparatus by operators in air at atmospheric pressure. The work is done in clear air by good light and in a depth of water convenient rather than inconvenient
15 in that the washing of the product may be done in this water in the working chamber. The product secured is safe from all hands save those authorized to receive it.

20 The apparatus is simple and easily handled, the weights of the parts being so proportioned that they are properly buoyed up by the water, and withal the construction is mechanically convenient, and the operation most efficient.

25 What I claim is:

1. A submarine mining apparatus comprising an operating chamber at atmospheric pressure, a work chamber at high pressure associated therewith, means for operating in the work chamber from the operating chamber, a movable receptacle for receiving the products mined, and means for moving said receptacle into and out of said work chamber.

35 2. In a submarine mining apparatus, a pneumatic caisson, means whereby operations may be carried on within the caisson from without the same, and a receptacle movable into and out of said caisson for receiving the products mined.

40 3. In an apparatus of the character described, in combination, a working chamber, a lock communicating with the same, and a receptacle in said chamber, said receptacle being directly connected in operative relation to one gate of said lock.

4. In an apparatus of the character described, in combination, a working chamber, a lock mounted in the wall of and communicating with the same, and a transfer operatively associated with said lock.

5. In an apparatus of the character described, a working chamber, a lock associated therewith, a transfer movable in said
55 lock, and a lock gate associated with said transfer.

6. In an apparatus of the character described, a working chamber, a lock associated therewith, a transfer movable in said
60 lock, and a lock gate associated with said transfer.

7. In an apparatus of the character described, a working chamber, a lock mounted in the wall of said chamber and communicating with the same, a transfer movable in

said lock, a seat on the wall of said lock, and a lock gate carried by said transfer and cooperating with said seat.

8. In an apparatus of the character described, a working chamber, a lock communicating with the same, a transfer movable
70 in said lock, and guides for said transfer within said lock which prevent rotary movement of said transfer.

9. In an apparatus of the character described, a working chamber, a lock communicating with said chamber, a receptacle movable into and out of said lock, and means comprising guide ways for keeping said receptacle upright during its movement and
80 which prevent rotary movement thereof.

10. In an apparatus of the character described, a low pressure caisson, a relatively high pressure working chamber associated therewith and divided therefrom by a wall,
85 a reëntrant casing in said wall, and means forming with said casing an airlock.

11. In an apparatus of the character described, a working chamber, a horizontal airlock communicating with the same, a gate
90 on one end of said lock, and a gate on top of said lock.

12. In an apparatus of the character described, a pneumatic caisson, a lock communicating therewith, a transfer movable
95 into and out of said lock, and a rotatable screw arranged longitudinally of the lock for operating said transfer.

13. In an apparatus of the character described, an airlock comprising a body casing, an outer gate, an inner gate, a transfer movable into and out of said airlock,
100 and means for operating said transfer without disturbing said outer gate.

14. In an apparatus of the character described, a pneumatic caisson, a lock communicating therewith, a transfer movable into and out of said caisson from said lock, and non-removable from said caisson and
105 lock, and means for moving said transfer from without said caisson.

15. A lock comprising a main body casing, inner and outer gates, a transfer movable into and out of said lock, and means comprising a rotatable rod connected with
115 said transfer and passing through said casing for operating said transfer.

16. A lock comprising a cylindrical main body casing, inner and outer gates, and means for operating the inner gate from
120 without the casing comprising a rotatable member arranged longitudinally of the casing.

17. In an apparatus of the character described, a working chamber, an operating chamber associated therewith, a lock between said chambers, said lock having inner and outer gates, and means whereby each of said gates may be operated from the operating chamber.
125

18. In a submarine mining apparatus, a working chamber and operating chamber, said chambers being divided by a wall, a lock between said chambers, the casing of which projects from said wall, and an operator's seat above said lock.

19. In a submarine mining apparatus, a working chamber, an operating chamber, said chambers being divided by a wall, a lock between said chambers, the casing of which projects from said wall, an operator's seat above said lock, and operating members projecting into said working chamber from above said seat.

20. In a submarine apparatus, a working chamber, an operating chamber, said chambers being divided by a wall, a lock between said chambers, the casing of which projects from said wall, an operator's seat above said lock, operating members projecting into said working chamber above said seat, and an observation light above said operating members.

21. In a submarine apparatus, an operating chamber, a working chamber associated therewith, a lock between the chambers, two gates connected with said lock, and means for locking one of them against opening movement.

22. In a submarine apparatus, an operating chamber, a working chamber, a lock between said chambers, inner and outer gates on said lock, and means for locking the outer gate.

23. In a submarine mining apparatus, a working chamber, a lock communicating therewith, a receptacle for receiving mined products, means for withdrawing said receptacle from said chamber into said lock, and means for preventing ready access to said receptacle from without the chamber.

24. In an apparatus of the character described, a work chamber, means whereby said work may be carried on inside the chamber from without the chamber, means associated with said chamber for receiving products from said chamber, means for removing said receiving means from the chamber, and means associated with said chamber for preventing access to the removed receiving means.

25. In an apparatus of the character described, a working chamber, means for doing work within the chamber from without, a receptacle for receiving products from within the chamber, means for removing said re-

ceptacle from the chamber, and means for preventing access to the removed receptacle by unauthorized parties.

26. In an apparatus of the character described, an operating chamber, a work chamber, a horizontal air lock therebetween, and a drawer reciprocable into and out of said work chamber from said lock.

27. In an apparatus of the character described, an operating chamber, a work chamber, a horizontal cylindrical air lock, a cylindrical drawer reciprocable into and out of said work chamber from said lock, and means connected with the walls of said lock for positioning said drawer within the lock.

28. An apparatus of the character described comprising an operating chamber at atmospheric pressure, a work chamber at relatively high pressure associated therewith, flexible arms and mittens projecting from the operating chamber into the work chamber whereby operations may be carried on within the work chamber from the operating chamber, a movable receptacle for receiving the products from the work chamber, and means for moving said receptacle into and out of said work chamber.

29. A submarine mining apparatus comprising an operating chamber at atmospheric pressure, a work chamber at relatively high pressure associated therewith, means for operating in the work chamber from the operating chamber, an air lock, a receptacle movable into and out of said lock from said work chamber, and means in the operating chamber for moving said receptacle.

30. A submarine mining apparatus comprising an operating chamber at atmospheric pressure, a work chamber at relatively high pressure associated therewith, means for operating in the work chamber from the operating chamber, an air lock, a receptacle movable into and out of said lock from said work chamber, means in the operating chamber for moving said receptacle, and means for locking the outer one of the gates of said air lock.

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

CHARLES WILLIAMSON.

Witnesses:

J. S. OAKES,
LOUISE FOX.