

No. 685,463.

Patented Oct. 29, 1901.

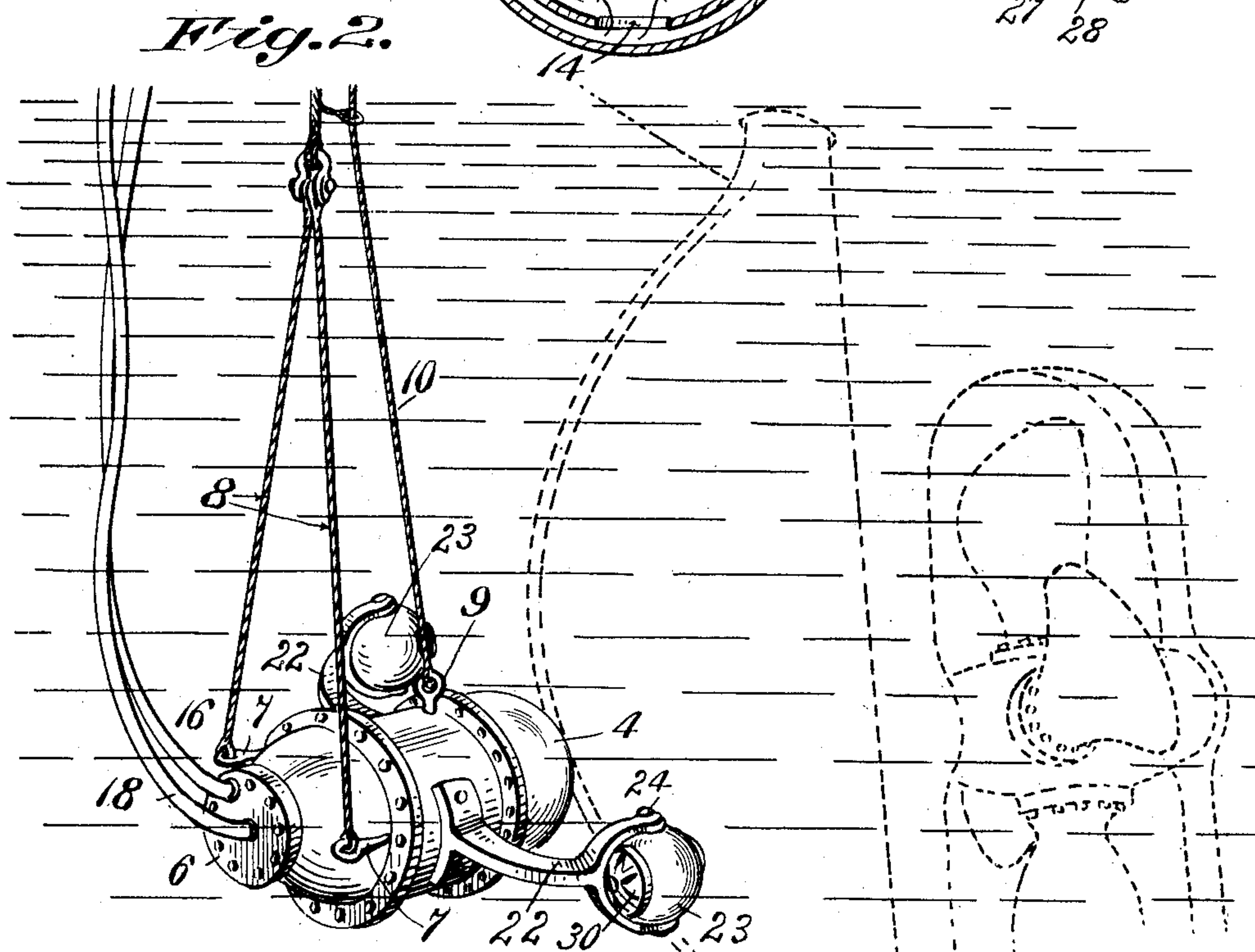
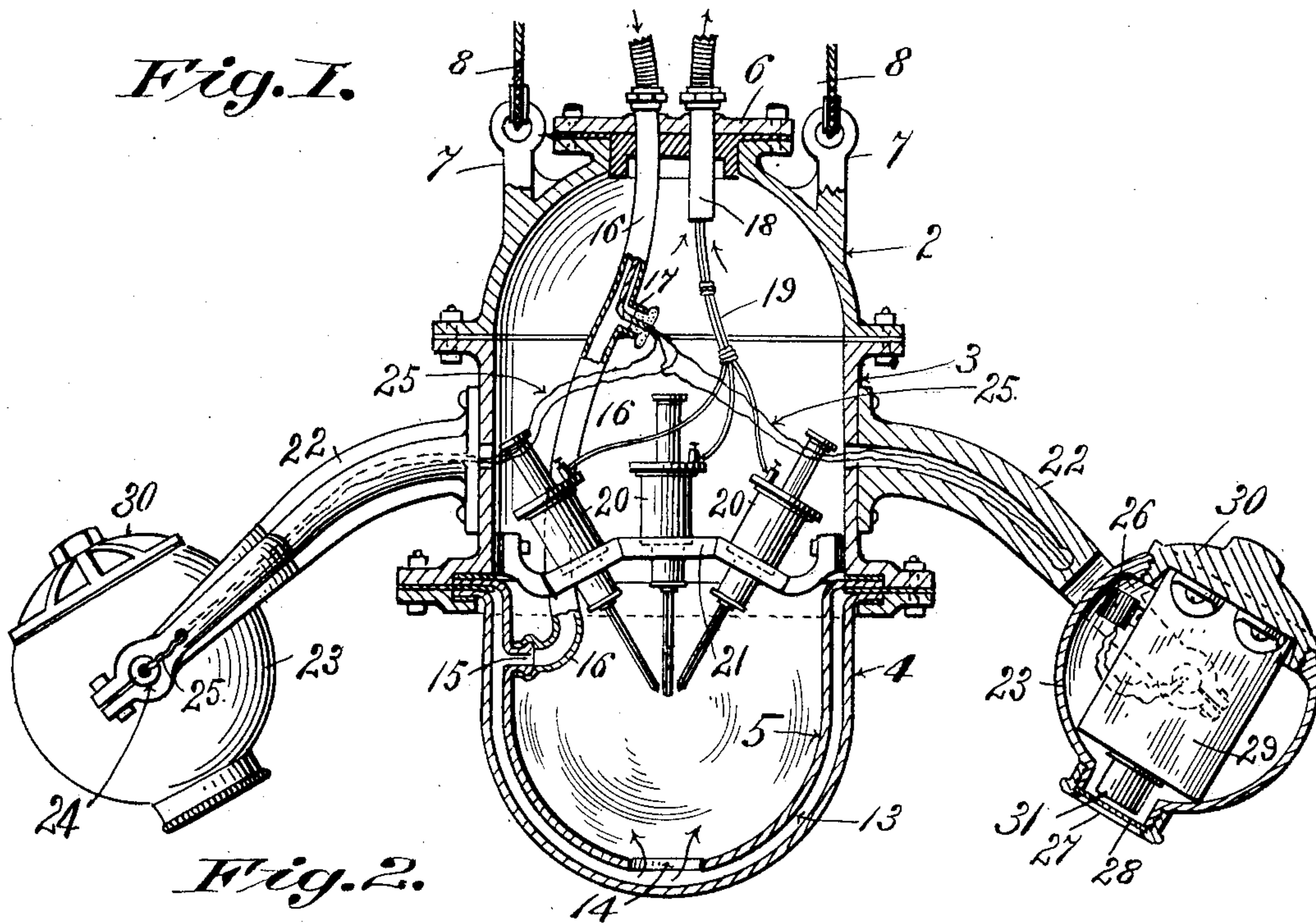
L. E. WALKINS.

APPARATUS FOR SUBMARINE PHOTOGRAPHY.

(Application filed June 18, 1900.)

(No Model.)

2 Sheets—Sheet 1.



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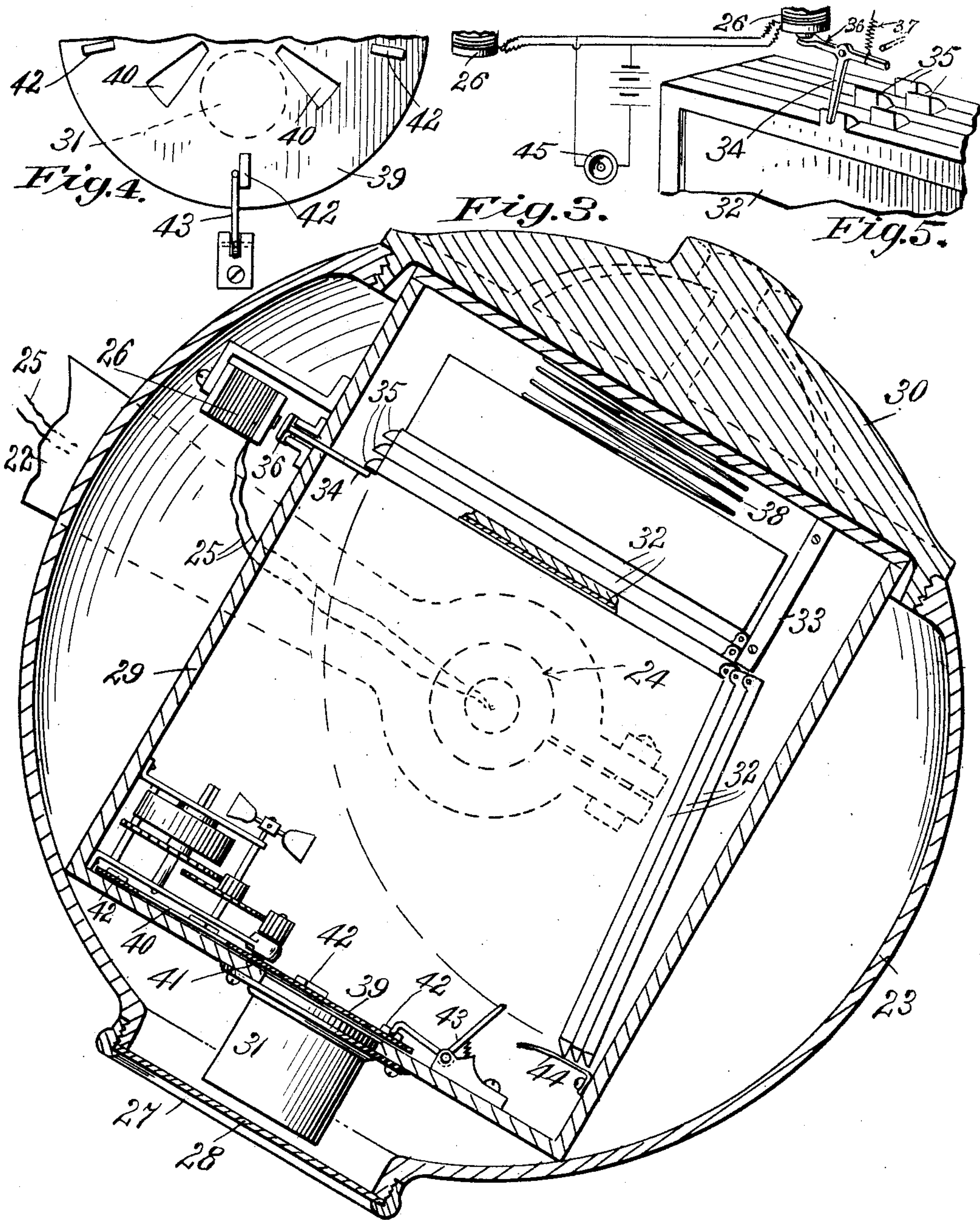
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2 Sheets—Sheet 2.



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# UNITED STATES PATENT OFFICE.

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## APPARATUS FOR SUBMARINE PHOTOGRAPHY.

SPECIFICATION forming part of Letters Patent No. 685,463, dated October 29, 1901.

Application filed June 18, 1900. Serial No. 20,709. (No model.)

*To all whom it may concern:*

Be it known that I, LOUIS E. WALKINS, a citizen of the United States of America, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Apparatus for Submarine Photography, of which the following is a specification.

This invention relates to apparatus for use in submarine photography, the object being to provide an improved device of this class by means of which objects at great depths of water may be clearly photographed and their positions and conditions be satisfactorily determined; and the invention consists in constructing and arranging in a device of this class means for containing one or more electric lamps, whereby the forms of objects near to or surrounding the devices may be clearly developed for the purpose of photographing the same, and suitable photographic cameras supported therein in proximity to said lamps, whereby said objects may be photographed, and electrical connections between said devices and a ship or other craft on the water thereabove or elsewhere, through which persons at a distance from the said lighting and photographing devices may operate the same, and means for supporting and adjusting said device in different positions in the water.

In the drawings forming part of this specification, Figure 1 is a plan view, partly in section, of an apparatus for photographing submarine objects embodying this invention. Fig. 2 shows in perspective the apparatus suspended in operative position beneath the water. Fig. 3 is an enlarged sectional view of one of the cameras and the chamber in which it is inclosed. Fig. 4 is a detail view of a part of the shutter-operating devices. Fig. 5 is a perspective view of a portion of the plate-releasing devices.

In the drawings, 2, 3, 4, and 5 indicate different sections of the main case of the device, 2 and 3 indicating the upper sections, made of suitable metal, and 4 the lower section, of glass, within which is a second glass section 5. Said uppermost section 2 has an opening through its upper end which is closed by a removable cap 6, which is bolted to the upper end of said section 2, as shown, and has open-

ings therethrough for air and electrical connections with the interior of said case, as below described. Said section 2 is also provided with fixed eyebolts 7 7, projecting therefrom, to which ropes or chains 8 8 are connected, whereby the device is supported and manipulated as to varying positions. In Fig. 2 a third eyebolt 9 is shown on one side of said case, which provides for a third supporting rope or chain 10, whereby the device is supported for operation in the position shown in said Fig. 2.

The aforesaid inner glass section 5 is of such dimension that an air-space 13 is provided between it and the section 4, and communication between said air-space 13 and the interior of said section 5 is had through an opening 14 in the bottom thereof. An inwardly-projecting nozzle 15 is provided on said section 5, with which the end of an air-conducting hose 16 is connected, as shown in Fig. 1, said hose or conduit passing through and being hermetically sealed in said cap 6 and of sufficient internal diameter to permit of carrying certain electric conductors, below described, for a certain distance therethrough without interfering with its air-conducting capacity, said conductors passing out through a side nozzle 17 thereon, as shown, in which they are tightly packed. A second hose or conduit 18 passes through said cap 6 and serves as a protecting-conduit for a group of electric conductors 19, which connect with the electric-arc lamps 20, which, as shown in Fig. 1, are arranged to illuminate the interior of said inner glass section 5. Said hose 18 also serves as a conduit, whereby air may be exhausted from the interior of the apparatus, as desired. The hose or conduit 16 is connected to a suitable pump, whereby accumulations of air in any desired quantity may be supplied for the purpose of maintaining proper combustion in said electric-arc lamps 20, which lamps are supported on a bridge 21, extending transversely of the case-section 3. Suitable connections for these lamps enter the case through the conduit 18.

The particular form of lamp employed is immaterial. In the drawings three lamps are shown or, more properly, two lamps, each having a positive electrode, and a third lamp ar-



ranged between the other two having a negative electrode, the arc being formed between each of the positive electrodes and the negative electrode. Thus but three conducting-  
 5 wires 19 are required—one, negative, to the central lamp and the other two, positive, to the two outside lamps.

On each side of the upper section 3 of the case are two oppositely-located arms 22, whose  
 10 outer extremities are forked and adapted to receive two circular cases 23, provided with trunnions 24 and having a swinging motion between the said forked extremities of the arm 22. These latter have a tubular rib run-  
 15 ning lengthwise thereof and communicating with the interior of the case-section 3, and through this tubular rib the wires 25 extend to a point near one of the trunnions 24, from whence they pass out thereof and enter said  
 20 trunnion axially and are carried through to the interior of the case 23 and are connected with the electromagnet 26 (see Fig. 3) within said case. At the point where said wires leave the tubular rib of the arm 22 and at the  
 25 point where they enter the trunnion the hole in both of these members is carefully sealed to prevent the ingress of water, and of course the wire is insulated. These wires 25 extend up through the hose or conduit 16 to some  
 30 point above the water from whence the device is to be operated and are there connected with the common key and a battery, whereby the circuit may be closed, as desired. The electric conductors 19 are likewise provided  
 35 with a suitable switch, whereby light within the casing 5 may be turned on or off, as desired.

In Fig. 3 of the drawings is clearly shown the devices whereby a number of photographic  
 40 plates may be operated and exposed at will. The casing 23, in which the camera is contained, is preferably made of metal, having one open end 27, over which there is secured in any desired manner a plate of glass 28.  
 45 Diametrically opposite said opening 27 is a larger opening, through which the camera-box 29 is introduced. A cap 30 serves to close this last-named opening hermetically.

When the camera is in position in the cas-  
 50 ing, its lens 31 will lie directly back of the glass plate 28 and in a position concentric with the open end 27 of the casing 23. The photographic plates which are to be exposed may be supported within the camera-box and  
 55 operated in any desirable manner which will permit their exposure one at a time by the making and breaking of an electric circuit at a point more or less distant from said camera. A very acceptable and convenient means for  
 60 performing this operation is shown in Figs. 3, 4, and 5, in which a series of plate-holding frames 32 are shown hinged together at their lower ends and are supported on cleats 33 within the camera-box at their lower or hinged  
 65 ends, and the upper end of the foremost holder of the bunch is engaged by a swinging lever 34. The upper edges of said plate-holders are

each provided with a projection 35, (see Fig. 4,) which projections are alternately set off slightly each side of the center of the frame. 70  
 The electromagnet 26 is adapted to operate on one end of a cross-bar 36 on the top of the lever 34, and a spring 37 is secured to the other end of this bar. When the current is broken, the magnet 26 will release said cross- 75  
 bar 36, and the spring 37 will cause it to operate transversely out of engagement with the projection 35, with which it is engaged, and to swing into the path of movement of the projection on the next succeeding plate. 80

The plate-holding frame is pressed forward by a spring 38, and the action of this spring causes the foremost plate in the frame to swing on its hinged base and describe a quar- 85  
 ter-circle, as shown in Fig. 3, and as one plate swings around its successor is pressed forward until it occupies the same plane.

The lens is provided with a shutter 39. (Shown in operative position in said Fig. 3, and a portion thereof in plan view in Fig. 4.) 90  
 This shutter is provided with a series of slots 40, radially arranged, and it is hung on a pivot 41 in such position that when it is rotated said slots will pass by the lens-opening in the box. Secured to the pivot 41 of said 95  
 shutter 39 is a pinion engaging with a clock-frame of gears, and on the shutter between the slots 40 are a series of stops 42. An elbow-lever 43 is supported within the box in  
 100 such position that one end thereof is adapted to engage the stops 42 on the shutter and the opposite end thereof to lie within the path of one of the plate-holders as it swings from its position of exposure over to one side of the 105  
 case, as described. A support 44 for the ends of the plates which have been exposed and swung to one side is provided to prevent said plates from sliding forward and throwing the unexposed plates out of line.

The operation of the camera whereby suc- 110  
 cessive plates may be exposed is as follows: The apparatus having been placed in a suitable position and the lights having been turned on, the key 45 (see Fig. 5) may be pressed to complete the electric current in 115  
 which the electromagnets 26 are located. This will cause one end of the cross-bar 36, which constitutes the armature-core of said magnet, to be drawn toward the latter, thus releasing a plate-holder from the restraint of 120  
 the swinging lever 34, and the plate-holder so released is swung to one side, as described, leaving the next succeeding plate-holder in proper position for exposure. Now as the plate-holder just released swings over to the 125  
 position at the side of the camera-box, as shown in Fig. 3, it trips the elbow-lever 43, releasing the spring-operating shutter 39, which is swung on its axis just a distance equal to the space between two of the stops 130  
 42 on the shutter, the elbow-lever 43 flying back again as soon as it is tripped by the plate-holder into the path of movement described by said stop 42. This operation of



the shutter will expose the plate by the passage of one of the slots 40 over the lens-opening, and this exposed plate is retained in its position by the swinging lever 34 until it is desired to expose another, to accomplish which the key 45 is released and the circuit is broken. Then the spring 37, attached to the said cross-bar 36, will serve to pull the swinging lever 34 away from the projection 35 on the holder of the plate last exposed, which plate will in turn swing off to one side and operate the shutter. This operation may be repeated as many times as the number of plates will permit.

By means of the above-described apparatus an examination of a ship's hull below the water-line may be made at sea, if desired, by swinging the device over the side of the ship, as shown in Fig. 2, or by suspending it from the eyebolts 7 alone, as shown in Fig. 1, the apparatus may be employed for examining the bottom of a channel or the bottom of the sea at any depth at which the pressure of the water will not be too great for the casing of the apparatus to withstand, and as this can all be made of cylindrical form it may be made to withstand a very great pressure, and thus render it available for the accurate exploration of the bottom at depths much greater than that at which a diver or even a diving-bell can operate.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. In a submarine photographic apparatus, a transparent casing, an electric-arc light therein, a conduit for conveying air into said casing, and a second conduit for conveying air therefrom, a second hermetically-sealed casing supported on an arm secured to said first-named casing, means for adjusting said second casing relative to the first, a camera in said second casing, a transparent port in the latter, electrically-controlled means for operating the shutter of said camera, line-

wires for the shutter-operating means, and line-wires for the arc-light entering said first-named casing respectively through said conduits, and a passage through said support for said second casing, through which said line-wires for the shutter-operating means may enter said second casing, substantially as described.

2. In a submarine photographic apparatus, a hermetically-sealed casing consisting of an upper portion of metal and a lower spherical-shaped transparent portion having a double wall, provided with an opening through the inner wall thereof at or near the lower end of said lower portion, a conduit connected with the space between the two walls of said transparent portion of the casing for the admission of air therebetween, a second conduit entering the casing through the upper portion thereof for conveying air therefrom, a camera supported on said casing; electrically-controlled means for operating the camera-shutter, line-wires for the shutter-operating means, and line-wires for the arc-light adapted to enter said casing through said two conduits, respectively, substantially as described.

3. An apparatus for photographing submarine objects comprising a transparent casing, an electric-arc light therein, means for supplying air to said light for maintaining the same, combined with one or more hermetically-sealed camera-containing casings; glass-covered ports in said casings, arms attached to said transparent casing on which said first-named casings are adjustably supported, cameras in said casings on said arms, and means for operating said cameras from a point remote therefrom; to expose photographic plates therein through said ports, substantially as described.

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