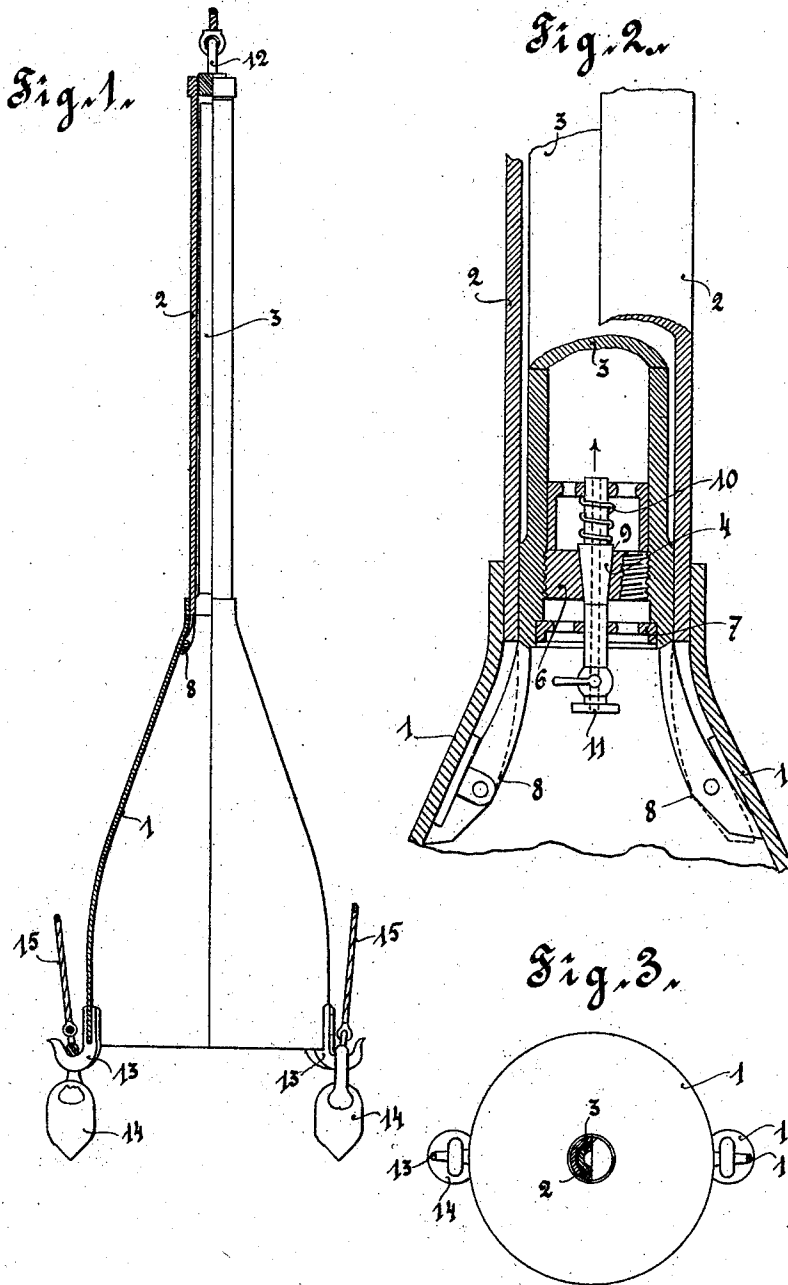


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 APPARATUS FOR THE PRODUCTION OF COMPRESSED AIR.
 APPLICATION FILED APR. 1, 1910.

986,577.

Patented Mar. 14, 1911.



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APPARATUS FOR THE PRODUCTION OF COMPRESSED AIR.

986,577.

Specification of Letters Patent. Patented Mar. 14, 1911.

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To all whom it may concern:

Be it known that I, MICHAIL KIRILLOWITCH KIRILLOFF, a subject of the Emperor of Russia, residing at Bakou, in the Empire of Russia, have invented a new and useful Improvement in and Relating to Apparatus for the Production of Compressed Air, of which the following is a specification.

In consequence of many technical imperfections of a purely practical nature the production of compressed air by means of pumps is a somewhat expensive process, primarily due to the complicated character of the apparatus required, while the method of compression is, moreover, open to objection in that it is only with great difficulty a really high degree of compression can be obtained.

This invention relates to a new process for the compression of air by means of water pressure exerted thereon, the air being contained in a receptacle lowered into the water; and also an apparatus for carrying out the process and to means for lowering the apparatus into the water and again raising it therefrom.

The apparatus to which this invention relates, on account of its simplicity of construction and great efficiency enables the compression of air, even to a pressure of a thousand atmospheres, to be cheaply and expeditiously effected.

The accompanying drawings illustrate, by way of example, one constructional form of apparatus for carrying this invention into practice, Figure 1 being a side view of the apparatus partially in longitudinal section; Fig. 2 a longitudinal section of part of the apparatus, drawn to an enlarged scale, and Fig. 3 is a top plan thereof to the scale of Fig. 2.

In carrying out my invention I employ a bottomless funnel-shaped reservoir 1 connected at its upper end with an elongated or tubular portion 2 that is closed in at the top and contains a concentric receptacle 3 that is also closed at its top, and is furnished at its lower end with a perforated annular disk 7 through the center of which slides the spindle of a valve 4. Into the lower end of the receptacle 3, there is screwed a plug 6 in which there is provided a valve seat 9 while its perforated upper end serves as a guide for the spindle of the valve 4. This valve 4 is under the action of a helical spring 10, or it may be a gravity fall valve,

and is provided with a longitudinal passage 11 and with a manometer and cock 5. At the lower end of the receptacle 3 there are arranged pivoted catches 8 which serve to retain the receptacle 3 within the part 2, and said part is provided at its top with a ring 12 by means of which it can be suspended from a rope while being lowered into the water. The lower edge of the reservoir 1 is furnished with hooks 13, to each of which there can be tied a weight, either solid, or filled with small shot

The action of the apparatus is as follows:— From the deck of a vessel or any other suitable place the apparatus, suspended from a rope, is by means of a crane, lowered into the water or into the ocean to the desired depth; the weights 14 being first attached to the hooks 13 and having ropes 15 secured to them, and the cock 5 being meanwhile kept closed. The air contained in the reservoir will be compressed by the pressure of the water to an extent corresponding with the depth to which the apparatus is submerged, and as the apparatus is still farther lowered the pressure will be increased to such an extent that the water will fill up a part of the reservoir, and the air contained therein, in consequence of its excess of pressure over that of the air in the receptacle 3, passing through the apertures of the disk 7, lifting the valve 4 and penetrating into the receptacle 3. After the apparatus has been lowered to the requisite depth the reservoir 1 is freed from the weights 14 by the raising of the ropes 15 and the entire apparatus is then again raised by means of the crane. While the apparatus is being raised the pressure of the water on the air beneath it in the reservoir gradually becomes less, with the result that the air expands, and, the pressure of the compressed air in the receptacle 3 being greater than the pressure of the air beneath the reservoir, the valve 4 closes upon its seat 9, this closing of the valve being brought about by the action of the air in the receptacle 3 which has been compressed to an extent corresponding to the depth to which the apparatus was finally lowered. It is therefore obvious that the degree of compression obtained depends on the depth to which the apparatus has been lowered, that is to say, in the deeper portions of the Atlantic or the Pacific Ocean it is possible by means of this apparatus to compress air to from 800 to 1000 atmospheres, while in the Indian

Ocean the compression will only be from about 200 to 400 atmospheres.

To facilitate the raising of the apparatus from a great depth there is attached to the other end of the rope employed a similar apparatus, equilibrium being by this means obtained. Before raising the apparatus to the surface of the water it is necessary that it should be caused by pressure upon the edges of the reservoir to assume an oblique position by which means air is allowed to enter the reservoir and to expel therefrom the column of water which has remained therein in consequence of the difference of air pressure. If preferred a special cock may for this purpose be arranged in the wall of the reservoir. The compressed air in the receptacle is withdrawn through the passage 11 by means of the cock 5.

The receptacle can be made detachable from the remainder of the apparatus, if desired, this arrangement facilitating its transport to the place where the compressed air is to be used.

What I claim as my invention and desire to secure by Letters Patent, is:—

1. The combination, in apparatus for the production of compressed air, of a bottomless bell, a tubular extension connected at the upper end thereof, a closing cap for the upper end of said tubular extension, and a concentrically arranged receptacle within the aforesaid tubular extension fitted at its lower end with a valve for effecting communication between the bottomless bell and said concentric receptacle, substantially as set forth.

2. In apparatus for the production of compressed air, the combination of a bottomless bell, a tubular extension connected thereto, a concentric receptacle within said extension, a perforated disk fitted in the lower end of said receptacle, a valve seat fitted within said receptacle and a valve for effecting communication between the bot-

tomless bell and the interior of the aforesaid receptacle, substantially as described and for the purposes specified.

3. In apparatus for the production of compressed air, the combination of a bottomless bell, a tubular extension connected thereto, a concentric receptacle within said extension, a valve seat and valve closing in said extension, an axial passage through the valve spindle under the control of a cock, and pivoted catches within the aforesaid bell for keeping the concentric receptacle in place, all substantially as described and for the purposes specified.

4. In apparatus for the production of compressed air, the combination of a bottomless bell, a tubular extension connected thereto, a concentric receptacle within said extension fitted at its lower end with a valve, pivoted catches attached within the bell, and hooks at the lower edge of said bell for receiving detachable weights, substantially as described and for the purpose specified.

5. In apparatus for the production of compressed air, the combination of a concentric receptacle, a valve seat screwed therein and fitted with a perforated extension, a spring pressed valve fitted into said seat and having a tubular spindle, a cock in said spindle, a manometer in connection therewith, and a perforated disk fitted in the end of the receptacle, said perforated extension and perforated disk constituting guides for the aforesaid tubular valve spindle, all substantially as described and for the purpose specified.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

MICHAEL KIRILLOWITCH KIRILLOFF.

Witnesses:

A. RANALD McDONELL,
LEWIS ABRAMOVITCH.