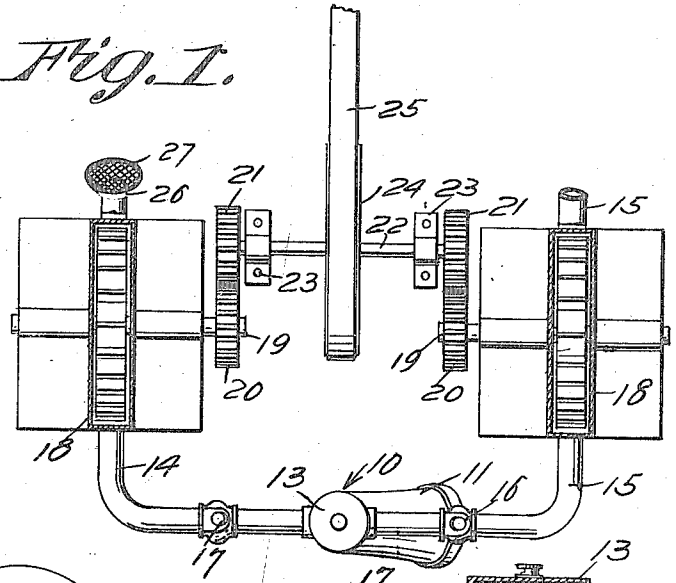
C. C. TUCH.

HYDRAULIC AIR COMPRESSOR AND MOTOR.

APPLICATION FILED DEC. 9, 1916.

1,267,936. Patented May 28, 1918.

Fig. 1.



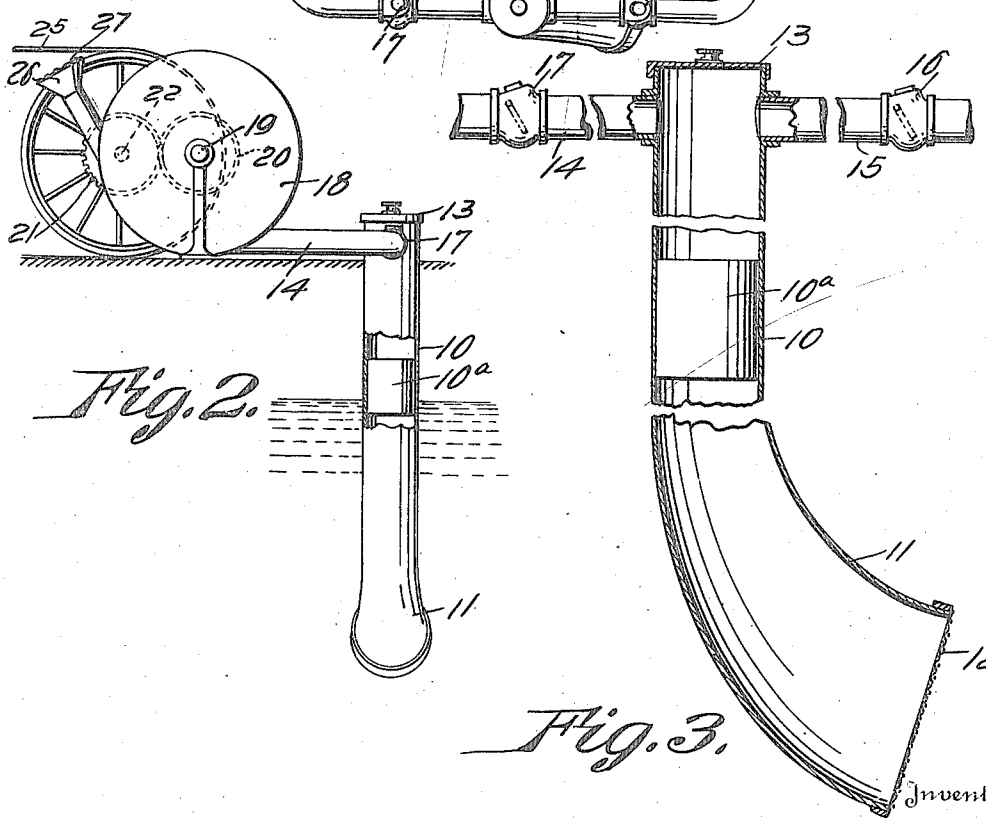




Fig. 2.

Fig. 3.

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# UNITED STATES PATENT OFFICE.

CHRISTIAN CARL TUCH, OF HONOLULU, TERRITORY OF HAWAII.

## HYDRAULIC AIR-COMPRESSOR AND MOTOR.

1,267,936. Specification of Letters Patent. Patented May 28, 1918.

Application filed December 9, 1916. Serial No. 136,026.

*To all whom it may concern:*

Be it known that I, CHRISTIAN C. TUCH, a citizen of the United States, residing at Honolulu, in the Territory of Hawaii, have invented certain useful Improvements in Hydraulic Air-Compressors and Motors, of which the following is a specification, reference being had therein to the accompanying drawing.

The present invention relates to an improved apparatus for compressing air by the inflow or outflow of the waves, and has for an object to provide a mechanism of this character wherein a motor may be driven by the action of the improved apparatus in compressing the air.

It is a further aim of the present invention to provide an air cylinder of peculiar construction adapted for submersion in the ocean, or the like and which is provided with a weighted buoyant piston adapted to rise and fall in the cylinder with the surface level of the ocean and to alternately draw air into the cylinder and displace the same.

The above and other objects and advantages of this invention will be more particularly brought out in the following specific description of the present preferred embodiment of this invention, the same being illustrated in the accompanying drawing, wherein,

Figure 1 is a top plan view of the improved device partly in section.

Fig. 2 is a side elevation of the same partly in section.

Fig. 3 is an enlarged vertical section of the air cylinder.

Referring to this drawing, 10 designates a cylinder of tubular form and of considerable length, the lower end thereof being open and flared as at 11 to provide a bell or mouth to receive water in the lower end of the cylinder when said lower end is submerged. Preferably, a guard screen 12 is placed over the lower end of the bell 11. The cylinder 10 is closed at its upper end by a preferably detachable cap 13, and is provided in its opposite sides with intake and outlet pipes 14 and 15, the pipes being provided respectively with check valves 17 and 16 to control the one-way passage of air therethrough.

The pipes 14 and 15 are provided in their lengths, and outwardly of the check valves 17 and 16, with turbines 18 arranged in spaced apart relation and preferably having the shafts 19 thereof arranged in longitudinal alinement. The shafts 19, which are turned by the motors of the turbines, have upon their inner adjacent ends pinions 20 which mesh with gears 21 mounted on an arbor 22 journaled in suitable bearings 23. The bearings 23 are spaced apart, and located between the same is a large pulley 24 adapted to be driven by the turbines 18. The turbines 18 are of such character that the inlet of air through the pipe 14 turns the adjacent turbine in a direction to rotate the pulley 24 in one direction, and the opposite turbine which is interposed in the outlet pipe 15, is adapted to turn in a direction to rotate said pulley in the same direction. Thus the pulley 24 is driven by the turbine and the intake and exhaust of air from the cylinder 10 maintains the pulley 24 at substantially a constant speed of rotation. A belt 25 or the like engages the pulley 24 and may be extended to any suitable mechanism to be driven by the air motor. The pipe 15 extends beyond the turbine 18 interposed therein and is adapted for connection with a supply tank or the like for the storage for further use of the compressed air.

As the tide of a body of water rises and falls, the piston $10^a$ is raised and lowered so as to displace the air in the cylinder 10 and force it outwardly through the pipe 15 and pass the check valve 16. As the piston $10^a$ drops it draws in air through the pipe 14 through the check valve 17, the opposite check valve 16 being closed at this time.

The air intake pipe 14 is provided, beyond the adjacent turbine 18, with a flaring mouth 26 to receive air, the mouth preferably having a screen 27 thereacross to prevent the entrance of dust or other foreign substance which impedes the action of the turbines, and which collect in the cylinder 10.

It is of course understood that various changes and modifications may be made in the above specifically set forth construction and adaption of same to various uses to which it may be applied and to accommodate the apparatus to varying conditions found in its installation.

What is claimed is:

1. In a device as specified, in combination, a vertically disposed cylinder having its lower end curved and flared and open and adapted to be submerged in a body of water,

a guard screen connected to the lower open end, a cap connected to the upper end of the cylinder closing the same, a buoyant piston operating in the cylinder and adapted to rise and fall with the surface level of the water, an air intake pipe connected to the cylinder to admit air upon downward movement of the piston, and an outlet pipe connected to the cylinder and adapted to permit the escape of air when displaced in the cylinder by the piston.

2. In a device as specified, in combination with a cylinder having communication with a body of water, and a buoyant piston mounted in the cylinder and adapted to rise and fall therein with the change of the surface level of the water, a turbine connected to the cylinder adapted to be actuated by the inflow of air to the cylinder upon the lowering of the piston, a second turbine connected to the cylinder adapted to be actuated by air ejected from the cylinder by the rise of the piston, a gearing connecting said turbines and adapted to transmit power from the same.

3. In a device as specified, in combination, a vertical cylinder open at its lower end and adapted to be submerged in a body of water, a buoyant piston mounted in the cylinder and adapted to rise and fall with the surface level of the water, intake and outlet pipes leading into and from the cylinder, inlet and outlet check valves located respectively in said pipes, a turbine in each pipe, a pinion mounted on the shaft of each turbine, a countershaft, gears on the countershaft meshing with said gears on the turbine shaft, and a pulley on said countershaft adapted to be turned by the rotation of said turbines.

In testimony whereof I affix my signature.

CHRISTIAN CARL TUCH.

**Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."**