G. W. JOHNSTON.

APPARATUS FOR COMPRESSING AIR.

APPLICATION FILED SEPT. 29, 1919.

1,420,845. Patented June 27, 1922.

2 SHEETS—SHEET 1.

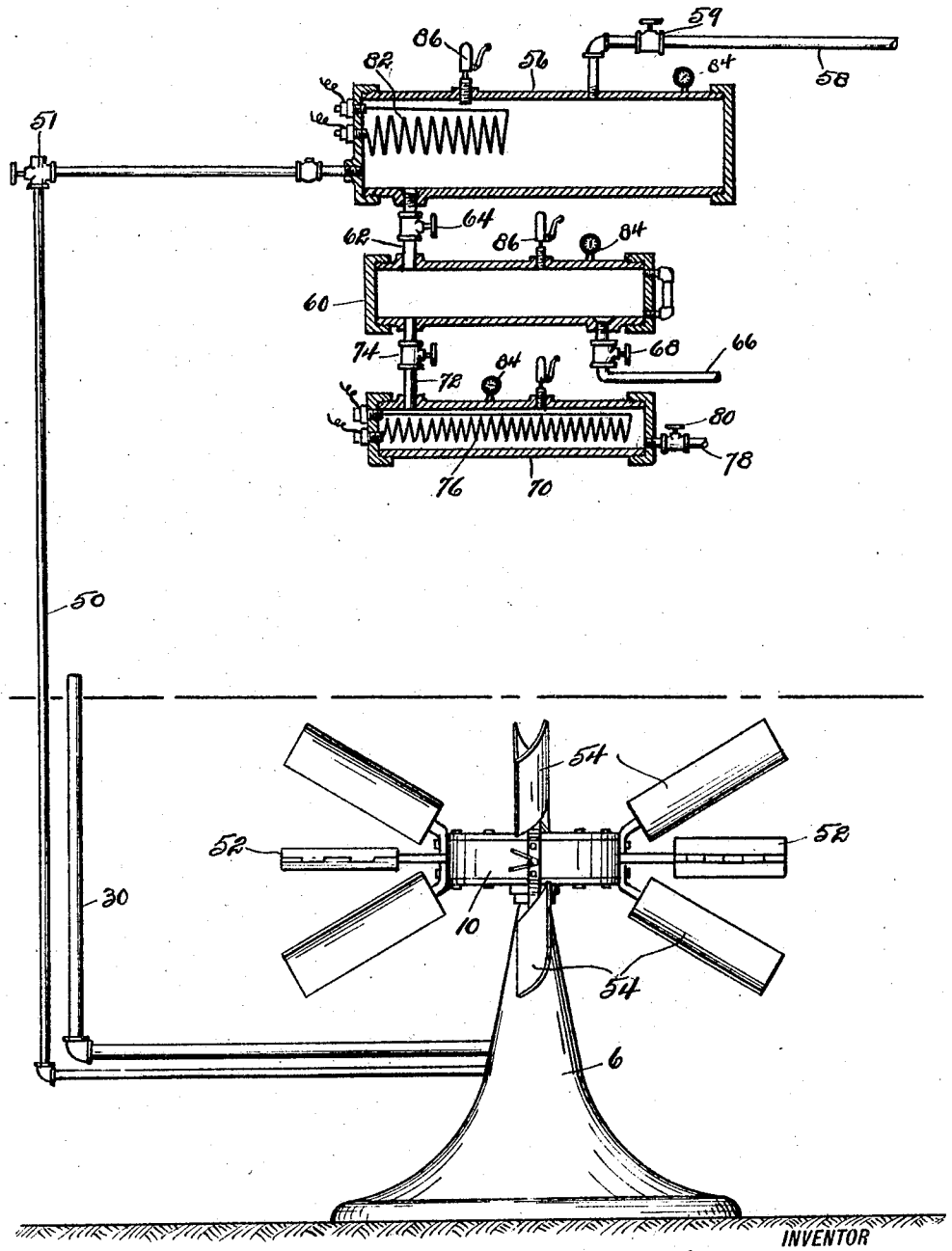


Fig 1.

Witness:

R. E. Hamilton

INVENTOR

Geo. W. Johnston,

BY

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G. W. JOHNSTON.

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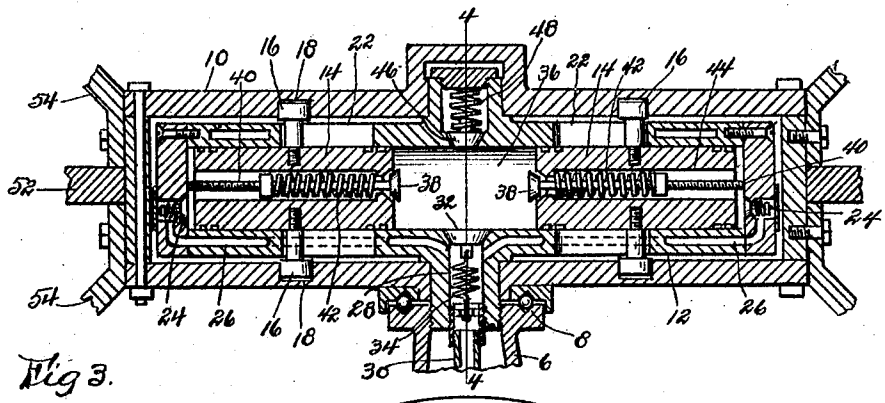


Fig 3.

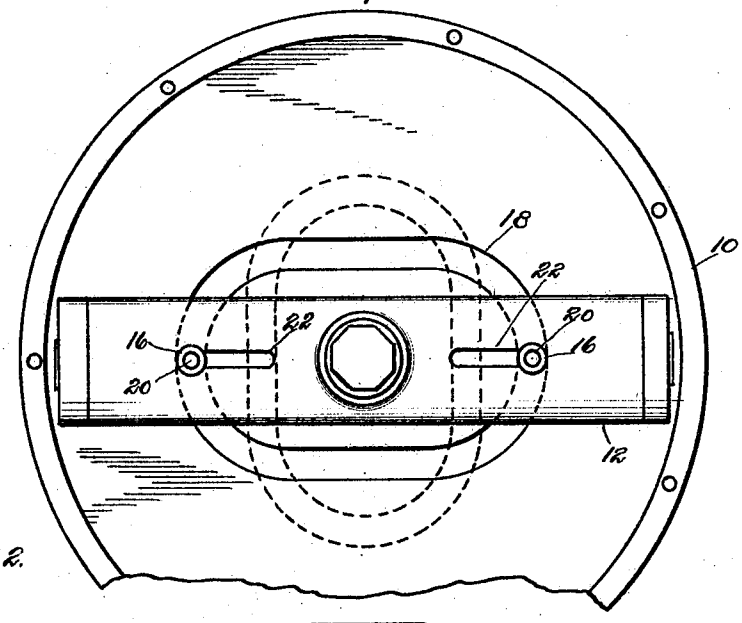


Fig 2.

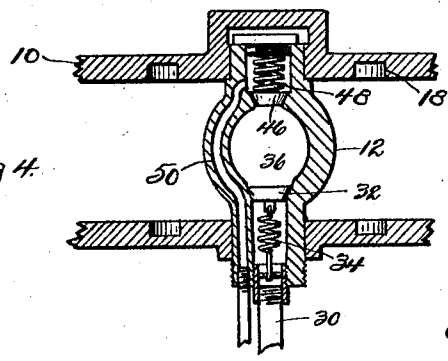


Fig 4.

Witness:

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UNITED STATES PATENT OFFICE.

GEORGE W. JOHNSTON, OF ST. JOSEPH, MISSOURI.

APPARATUS FOR COMPRESSING AIR.

1,420,845. Specification of Letters Patent. Patented June 27, 1922.

Application filed September 29, 1919. Serial No. 327,186.

To all whom it may concern:

Be it known that I, GEORGE W. JOHNSTON, a citizen of the United States, and resident of St. Joseph, county of Buchanan, State of Missouri, have invented a certain new and useful Improvement in Apparatus for Compressing Air, of which the following is a complete specification.

This invention relates to apparatus for compressing air and for treating the same after it has been compressed, and one of the objects in view is to provide an air-compressing apparatus adapted to be operated by either air or water current and to suitably store the compressed air product as it is compressed by said apparatus.

It is further sought to devise an apparatus of this character by the operation of which air is stored at a higher pressure and at a minimum expenditure of power, the compressed air product being designed for power-supply purposes.

With these general objects in view, the invention will now be described with reference to the accompanying drawing illustrating one suitable form of the embodiment of the improvement, after which the novel features therein will be set forth in the appended claims.

In the drawing—

Figure 1 is a view in elevation showing an apparatus constructed in accordance with the present invention;

Figure 2 is a broken plan view of the power wheel, with the top and vanes removed;

Figure 3 is a section, taken on the line 3—3 of Figure 2; and

Figure 4 is an enlarged detailed section on the line 4—4 of Figure 3.

Referring to the drawings in detail, these illustrate the improved apparatus as comprising a base or foundation 6, adapted to be supported for example upon the bed of a water course or, if desired, in position for operation of the device by wind power. This foundation is provided with a ball-bearing structure 8 at its top for journaling a power wheel which comprises a cylindrical housing 10, rotating about a central cylinder structure, embodying a cylinder 12 with oppositely moving pistons 14 therein, having rollers 16 moving in grooves or raceways 18 on the interior facing of the housing 10, the pins 20 carrying said rollers operating in guide slots 22 formed in the cylinder walls. Each of the opposite ends of the cylinder is provided with an air inlet valve 24 controlling the admission of air from an air duct 26, which communicates with the central air passage 28 arranged in the axis of the wheel, an air duct 30 being arranged to conduit air to this passage 28 through the base 6 from any suitable point, preferably a point near the level of the water surface where the power wheel is operated in water submerged relation as illustrated in Figure 1. A check valve 32, controlled by a tension spring 34, is also provided for admitting air from the passage 28 to an air-compressing chamber 36 between the inner faces of the pistons 14. Each piston 14 is further provided with a check valve 38, having an axial stem 40, and compression spring 42 for controlling the inward passage of air through the axial passage 44 in each piston into the central chamber 36. The stems 40 of the valves 38 are sufficiently long to engage the heads of the cylinders at the outward limit of movement of the pistons for the purpose of opening said valves 38, as in Figure 3. Opposite the valve 32 is positioned a check valve 46 actuated by a compression spring 48, said valve regulating the discharge of the compressed air from the chamber 36 to a conduit 50 by which the compressed air is led off to any suitable point for its use.

The housing 10 is provided with a series of propelling vanes, some of which are of hinge blade collapsible form, extending radially outward, as illustrated at 52, Figure 1; while others are of curved blade form, arranged at upwardly and downwardly extending angular relation on opposite sides of the hinge blades, as illustrated at 54. It is evident, of course, that if desired the vanes could be removed and the housing rotated by belt power if such a change be found expedient at any time.

In Figure 1, I illustrate the air conduit 50, as equipped with a regulating valve 51, and discharging into a reservoir 56 for storage purposes, from which the product may be drawn off as desired by way of a discharge pipe 58, fitted with the regulating valve 59. To the bottom of said reservoir 56 is connected a second storage tank 60, by means of a pipe 62, controlled by a valve 64, for the purpose of allowing the liquid com-

ponents of the contents of the reservoir 56 to drain off and become stored in said tank 60, the latter being provided with an outlet pipe 66, fitted with a valve 68. A third tank 70, is further provided for re-heating purposes, being connected with the tank 60 by means of a pipe 72, fitted with a valve 74, said tank 70 being also provided with an electrical heating coil 76 for heating the contents of said tank; also with a discharge pipe 78 and a valve 80. Under certain circumstances the reservoir 56 may also be equipped with a heating coil 82, and the several storage compartments described are also provided with suitable pressure gauges 84, and release valves 86.

In the operation of the apparatus the power wheel is rotated by force transmitted thereto through the medium of currents moving in practically any direction, as by currents moving either horizontally, upwardly or downwardly, so that the wheel is actuated not only by the usual current flow, as of a stream, but also by the rise and fall of the water due to tides, winds, and the like. The rotation of the wheel actuates the pistons through the medium of the described connections, the approaching movement of the pistons drawing air in past the valves 24, and the separating movement of the pistons first compressing the air between the pistons and the cylinder heads, the strength of the springs 42 being sufficient to withstand both the vacuum action in the chamber 36, and the compressing force at the outer ends of the cylinder, until the valves 38 are opened by engagement of the stems 40 with the cylinder heads, whereupon the air is discharged into the central air chamber 36. The approaching movement of the pistons now finally compresses the air in said chamber and discharges the same past the valve 46, into the conduit 50, after which the same operation is repeated indefinitely.

The air supply is taken preferably from a point near the surface of the water, as shown, where I find the air to be apparently richer in certain desired constituents valuable for power purposes, such as oxygen and nitrogen compounds. The energy stored in the tank 56 may be drawn off for use direct through the pipe 58, the liquid settling in the tank 56 being allowed to pass into the tank 60 for use under emergency conditions, at which time the supply may be drawn into the tank 70, and reheated by the means shown, after which the supply may be taken out through the pipe 78, or allowed to pass back up into the tank 56 by way of the circulating valves 64 and 74. The coil 82 is provided for re-heating purposes under certain conditions where its use may be found expedient.

While I have illustrated and described what I now regard as the preferred form of construction, I desire to reserve the right to make such formal changes for modification as may fairly fall within the scope of the appended claims.

What I claim is:

1. An air-compressing apparatus comprising a power wheel composed of a rotating housing, a fixed cylinder within said housing provided with a piston reciprocated by the rotation of said housing, said cylinder providing air chambers at both ends of said piston, means for conducting air to the chamber at one end of said piston, said piston having a valved passage admitting the air under pressure from said last chamber to the chamber at the other end of the piston, and a check valve controlling the passage of air from said last-mentioned chamber.

2. An air-compressing apparatus comprising a power wheel composed of a rotating housing, a fixed cylinder within said housing provided with a pair of oppositely moving pistons reciprocated by the rotation of said housing, said cylinder having an outer air chamber opposite the outer face of each of said pistons, and said housing providing an inner air chamber between said pistons, means for conducting air to said outer chambers, said pistons having valved passages admitting the air under pressure from said outer chambers to said inner chamber, and a check valve controlling the passage of air from said inner chamber.

3. An air-compressing apparatus comprising a power wheel composed of a rotating housing provided with curved vanes extending outward at various upward and downward angles for receiving a driving force from both upward and downward movements of the propelling medium, and a fixed cylinder within said housing provided with an air-compressing piston operated by the rotation of said housing.

4. An air-compressing apparatus comprising a power wheel composed of a rotating housing, a fixed cylinder within said housing provided with a piston reciprocated by the rotation of said housing, said cylinder having air chambers at both ends of said piston provided with check valves controlling the passage of air into said chambers, said piston having a valved passage admitting air under pressure from one of said chambers to the other of said chambers, and a check valve controlling the passage of air from said last-mentioned chamber.

5. An air-compressing apparatus comprising a power wheel composed of a rotating housing, a fixed cylinder within said housing provided with a piston reciprocated by the rotation of said housing, said cylinder having air chambers at both ends of said piston provided with check valves controlling the passage of air into said cham-

bers, said piston having a passage admitting air under pressure from one of said chambers to the other of said chambers, a check valve controlling the passage of air from said last-mentioned chamber, and a check valve controlling said piston passage and operated to open said passage as the piston reaches the limit of its movement in one direction.

6. An air-compressing apparatus comprising a power wheel composed of a rotating housing, a fixed cylinder within said housing provided with a pair of oppositely moving pistons reciprocated by the rotation of said housing, said cylinder having an outer air chamber at the outer face of each of said pistons, and said housing providing an inner air chamber between said pistons, means for conducting air to said inner and outer chambers, check valves controlling the admission of air to said chambers, said pistons having valved passages admitting air under pressure from said outer chambers to said inner chamber, and a check valve controlling the passage of air from said inner chamber.

7. An air-compressing apparatus comprising a power wheel composed of a rotating housing, a fixed cylinder within said housing provided with a pair of oppositely moving pistons reciprocated by the rotation of said housing, said cylinder having an outer air chamber opposite the outer face of each of said pistons, and said housing providing an inner air chamber between said pistons, means for conducting air to said inner and outer chambers, check valves controlling the admission of air to said chambers, said pistons having passages admitting air under pressure from said outer chambers to said inner chamber, a check valve controlling the outlet of air from said inner chamber, and valves controlling said piston passages and operated to open said passages as said pistons respectively reach the outer limits of their movement.

In witness whereof I affix my signature.

GEORGE W. JOHNSTON.