L. C. TRENT.

PRESSURE PUMP.

APPLICATION FILED APR. 3, 1907.

905,024. Patented Nov. 24, 1908.

Fig. 2.

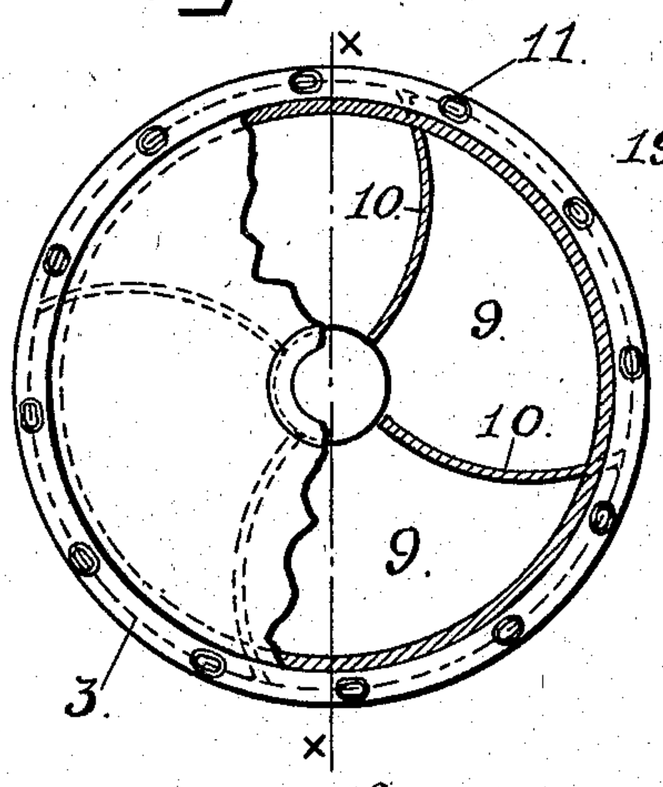

Fig. 1.

WITNESSES

Wm. F. Drew

Wm. F. Booth

INVENTOR

L. C. Trent

BY M. A. Acker

ATTORNEY

UNITED STATES PATENT OFFICE.

LAMARTINE C. TRENT, OF EAST AUBURN, CALIFORNIA.

PRESSURE-PUMP.

No. 905,024. Specification of Letters Patent. Patented Nov. 24, 1908.

Application filed April 3, 1907. Serial No. 366,066.

To all whom it may concern:

Be it known that I, LAMARTINE C. TRENT, a citizen of the United States, residing at East Auburn, in the county of Placer and State of California, have invented certain new and useful Improvements in Pressure-Pumps, of which the following is a specification.

The present invention relates to an improved pressure pump for the raising or lifting of water, slimes, grit and liquids of all kinds, the objects to be attained by the invention being to reduce friction on the wearing parts to a minimum; to dispense with the runners ordinarily employed in connection with pumps of this class; to protect the bearings through the medium of an air cushion under pressure; to reduce the expense attached to the construction of this class of lifting pumps; to increase the mechanical efficiency of such pumps, and finally to provide a pump adapted for the raising of liquids equally as well from deep and shallow wells, thereby producing a pump especially adapted for mine purposes.

To comprehend the invention reference should be had to the accompanying sheet of drawings, wherein—

Figure 1 is a sectional perspective view of the pump, the impeller thereof being sectioned on the line *x*—*x* Fig. 2 of the drawings; and Fig. 2 is a part sectional view of the impeller removed from the pressure chamber of the pump.

In the drawings the numeral 1 is used to designate a suitable casing for the pump, the interior of which constitutes a pressure chamber 2, within which chamber is located and works the impeller 3. This impeller is mounted on the shaft 4, held within the bearing 5 extended from one side of the casing 1. The said impeller 3 is formed with a hollow suction hub 6, which rotates freely within the bearing 7, said bearing communicating with the suction pipe or extension 8.

The interior of the impeller 3 is preferably divided into a series of water receiving compartments 9 by means of the curved radial ribs 10, which ribs guide and direct the water entering the impeller from the suction pipe toward the peripheral discharges 11, arranged in the inclined face wall 12.

On the casing 1 is mounted an air chamber or reservoir 13, which is in the nature of an accumulator, communication being established between said reservoir and the interior of the pressure chamber by means of the outlet opening 14, said opening being covered, although not closed by the baffle plate 15.

The suction pipe 8 of the pump is provided with a valve controlled air inlet pipe 16, which admits air into the suction pipe or extension 8 during the working of the apparatus, the indrawn air entering with the water through the suction hub 6 into the impeller 3. The suction pipe 8 is provided with an inlet 17, for the admission of an initial quantity of water therein for the priming of the pump prior to the starting of the working thereof.

From the air chamber 13 extends the outlet pipe 18, from which branches the air supply pipes 19—19′. These said pipes connect respectively with the port 20 formed in the suction bearing 7, and the chamber 20′ formed in the main bearing 5, and the said pipes lead air under pressure to the bearings for the packing and protecting of the same from water and grit.

The port 20 communicates with a circumferential groove 21 in the face of the suction hub 6, the air entering said groove escaping into the interior of the impeller 3 through the bore 22, which establishes communication between the interior of the impeller and the groove 21. A circulation of air under pressure is thus maintained, through the medium of the branch pipe 19, between the air chamber or reservoir 13, and the impeller. A similar circulation of air under pressure is established at the opposite side of the impeller, as the chamber 20′ is supplied with air under pressure from the reservoir 13 through the medium of the pipe 19′. The air under pressure admitted into the said chamber 20′ escapes through the tap 23 of the bearing 5 into the internal bore 24 in the shaft 4 for the impeller, which bore communicates with the interior of the said impeller. The circulation of air under pressure thus established forming an air packing for the impeller and protecting the bearings thereof and the thrust of the impeller, at the same time maintaining the said impeller in balance. Lubricant is supplied to the bearings of the impeller from the oil cups 26—27, the oil from which cups leads to the bearings through suitable bores. On the shaft 5 the dished washers 28 are located,

the same being preferably of pure rubber and held at an angle to the shaft and in position by means of the spring 28′.

The water entering the impeller is discharged under pressure into the pressure chamber 2 through the peripheral outlets 11, and the water delivered into the said pressure chamber 2 escapes therefrom through the outlet 29, with which outlet connects a discharge pipe not shown. In order that the height of the water within the pressure chamber may be readily determined, there is provided a suitable gage, not shown. To withdraw air under pressure from the chamber 13, a controlled outlet 30 is provided. The impeller is rotated within the pressure chamber at a suitable speed, the same being driven by means of a drive belt working over the pulley 31, mounted on the projecting end of the shaft 4.

The pressure impeller 3 revolving within the pressure chamber 2 at a suitable speed to give the required pressure, the water and air is drawn into the interior thereof through the suction extension 8 and the air inlet 16. The water and air thus entering the impeller is discharged into the pressure chamber 2 through the peripheral outlets 11, the rotation of the impeller being such as to give the required pressure at the nozzles or discharge outlets, the proportion of the impeller being such that the speed of the water will create but a minimum of friction, the discharges of the impeller being so proportioned that there is a continual pressure in the impeller with but a moderate speed of velocity, the only real friction being at the nozzles or discharge outlets 11, and this is only nominal. The water as discharged from the impeller into the pressure chamber, compresses the air confined therein, which, in turn, imparts pressure onto the body of water contained in the said pressure chamber, and forces the same under pressure through the outlet 29 into a suitable discharge pipe. The impeller 3 rotates mainly in confined air, thus avoiding the frictional contact with the water, which would exist did the impeller revolve wholly in a confined body of water, thus making a pump with the minimum of friction in any of its passages. The water enters the impeller through a suction of ample size, and passes through the impeller at a moderate speed and without a high pressure at its periphery, where it is discharged into the pressure chamber.

While the pump will work efficiently where the pressure chamber is approximately filled with water, still it is intended that the impeller shall mainly revolve or run in air, and the supply of air maintained from that carried by the water entering the pressure chamber through the impeller, any deficiency being supplied from the air chamber 13. Inasmuch as a considerable proportion of the air passing into the air chamber will be compressed, the same may be utilized through proper connections for the raising or lifting of water from deep wells to within reach of the suction pipe or extension of the pump, so that the pump will not only have capacity to force liquid under any pressure, but to lift the liquid from any reasonable depth from Artesian, oil, or other wells.

The described pump will be found useful in mines, where the pressure or weight of the water may be relieved from pump columns by using compressed air supplied to the columns by the pump, so that in emergencies a pump designed for a low pressure may safely deliver water from a height requiring double the pressure by any other form of pump. As the pump is complete within itself, an auxiliary air compressor is not required in pumping at great depth.

The described pump may be successfully utilized for the collecting and compressing of gases from gas and oil wells, and oil and gases from wells carrying such liquids, and for various other purposes.

While the curved ribs 10 are mainly designed to strengthen the impeller and to keep the water from revolving and slipping within the interior thereof, they will also operate to guide, and crowd the water toward the discharge outlets of the impeller, so as to augment to a certain extent the pressure of the water in the pressure chamber of the pump.

Having thus described the invention and the working thereof, what is claimed as new and desired to be protected by Letters Patent is—

1. In a pump of the described character, the combination with the pressure chamber thereof, of an impeller revolubly mounted therein, of a suction inlet for the admission of liquid into the impeller, of a series of peripheral outlets to the impeller for the discharge of liquid therefrom into the pressure chamber, of a drive shaft to which the impeller is secured, of an air reservoir secured to the casing of the pump and communicating with the pressure chamber of the casing, of means for admitting air into the impeller with the liquid drawn therein, and of connections between the air reservoir and the bearings of the impeller for admitting air thereto under pressure so as to provide an air cushion for the said bearings.

2. In a pump of the described character, the combination with the pressure chamber thereof, of an impeller provided with a series of peripheral outlets revolubly mounted within the said pressure chamber, of a suction inlet for the impeller, of a series of curved radial ribs which divide the interior of the impeller into compartments and grad-

ually guide the liquid entering therein toward the discharge outlets thereof, of an air reservoir communicating with the pressure chamber, of means whereby air is admitted into the impeller with the liquid drawn therein, and of connections for supplying air under pressure from the said reservoir to the bearings of the impeller so as to provide an air cushion therefor.

3. In a pump for the described purpose, the combination with the pressure chamber thereof, of an impeller revolubly mounted therein, of a series of peripheral discharge outlets in the impeller, of a suction inlet for the said impeller, of a valve controlled air inlet communication with the suction inlet, of a drive shaft to which the impeller is secured within the pressure chamber, a bearing for said shaft, of an air reservoir communicating with the pressure chamber of the pump, of connections leading from the said reservoir to the bearings of the impeller for supplying air thereto under pressure, of a series of curved radial ribs within the impeller and which divides the interior thereof into compartments and gradually guides the liquid delivered therein toward the discharge outlets, and of an outlet leading from the pressure chamber of the pump.

4. A pump comprising a pressure chamber, means for supplying water and air to said pressure chamber, said means including an impeller revolubly mounted and means for establishing a circulation of air from the pressure chamber through the bearings of the impeller and back to the pressure chamber.

5. A pump comprising a pressure chamber, means for supplying water and air to the pressure chamber including an impeller suitably supported to revolve, an outlet for the pressure chamber and means for permitting a circulation of air from the pressure chamber through the bearings of the impeller to the interior of the impeller.

6. A pump comprising a pressure chamber, means for supplying water and air to said pressure chamber, said means including an impeller revolubly mounted and means for establishing a circulation of air from the pressure chamber through the bearings of the impeller and back to the pressure chamber and a shield to protect the air exit of the pressure chamber.

7. A pump comprising a pressure chamber, means for supplying water and air to said pressure chamber, said means including an impeller revolubly mounted and means for establishing a circulation of air from the pressure chamber through the bearings of the impeller and back to the pressure chamber, and a protecting baffle for the air exit of the pressure chamber.

8. A pump comprising a pressure chamber, means for supplying water and air to said pressure chamber, said means including an impeller mounted for movement, and a conduit for providing a circulation of air from the pressure chamber to the bearings of the impeller and a reservoir included in said conduit.

9. A pump comprising a pressure chamber, means including an impeller for supplying water and air to the pressure chamber and an air reservoir in communication with the pressure chamber and provided with a controlled outlet.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

LAMARTINE C. TRENT.

Witnesses:

N. A. ACKER,

WM. F. BOOTH.