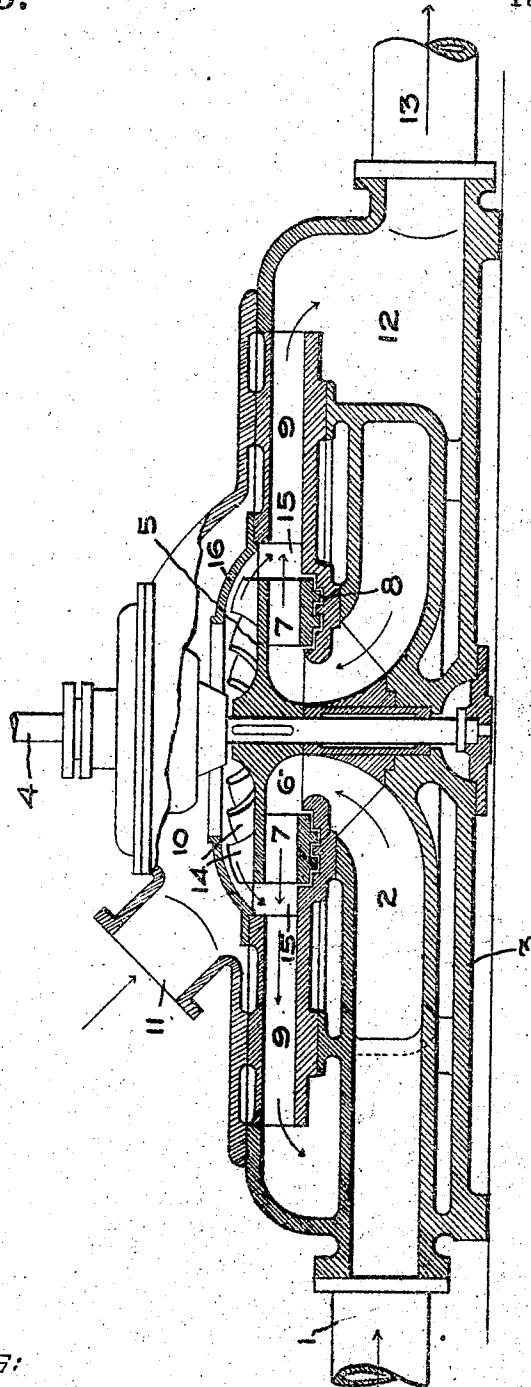


F. J. PETERMÖLLER.
CENTRIFUGAL AIR PUMP.
APPLICATION FILED FEB. 17, 1910.

1,060,935.

Patented May 6, 1913.



WITNESSES:

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CENTRIFUGAL AIR-PUMP.

1,060,935.

Specification of Letters Patent.

Patented May 6, 1913.

Application filed February 17, 1910. Serial No. 544,519.

To all whom it may concern:

Be it known that I, FRANZ JOSEF PETERMÖLLER, a subject of the Emperor of Germany, residing at Berlin, Germany, have invented certain new and useful Improvements in Centrifugal Air-Pumps, of which the following is a specification.

This invention relates to centrifugal air pumps in which a stream of water is thrown from the periphery of a rapidly revolving runner into a concentric stationary directing wheel or annulus containing a plurality of passages in which the air is entrapped and driven outwardly into a suitable conduit. When such a pump has to work against a considerable head, it is difficult to start it, because the water or other assisting medium tends to escape through the opening provided for the entrance of the air in front of the runner or impeller, and so pass off into the air chamber instead of proceeding through the directing wheel or annulus. To overcome this trouble, it has been customary to provide a second pump to assist in the starting, this auxiliary pump serving to remove the column of water opposing the exit of the stream from the runner.

The object of the present invention is to avoid the necessity of using this second pump, and to provide a runner which will automatically prevent the escape of the throwing water into the air chamber.

To this end the invention consists in a runner having a plurality of radial or curved auxiliary buckets on its upper or side surface, located within the air chamber and at the edge of the runner, so that in case the throwing water tries to diverge from its proper path it will be caught by these buckets and thrown back into the directing wheel. Incidentally, these buckets assist the suction effect of the throwing water, so that the pump is rendered more efficient. The accompanying drawing is a diametrical section of a centrifugal pump embodying my invention.

The throwing water is supplied through a pipe 1 which communicates with an annular chamber 2 in the casing 3. This chamber is concentric with the upright driving shaft 4 on which is mounted the circular runner 5, having an annular chamber 6 communicating with the chamber 2, and delivering water to the buckets 7 which are arranged around the

periphery of the runner or impeller. Inter-meshing ribs and grooves 8 in the underside of the runner and the adjacent portion of the casing prevent any leakage of the throwing water back into the chamber 2. Concentric with the runner and at a little distance therefrom is the stationary directing wheel or annulus 9, containing the passages through which the throwing water flows. In these passages the air is compressed by the streams of water. The space between the edge of the runner and the inner edge of this wheel communicates with an air chamber 10 into which the air to be pumped enters through a pipe 11. The mingled air and throwing water escape from the edge of the directing wheel into a chamber 12, from which they are led away by the conduit 13. On the upper surface of the runner is a plurality of radial or curved ribs 14 forming buckets which tend to throw centrifugally any fluid caught by them. So it follows that if any of the throwing water tries to escape from the space 15 between the runner and the directing wheel or annulus and pass up into the air chamber 10, it is instantly thrown back by the buckets 14 and forced to flow through said wheel or annulus. Moreover, these buckets exert an impelling force upon the air as it flows from the chamber 10 to the space 15, which assists in the work of the pump and renders it more efficient. By reason of these auxiliary buckets on the runner sufficient energy is imparted to the throwing water to start the pump even under a considerable head, so that the use of a second or starting pump is unnecessary. The operation can be facilitated by placing a guard 16 over the auxiliary buckets, so as to confine within them the air or water caught between them. The guard is annular, leaving a central opening around the shaft through which the air can enter from the upper part of the chamber 10. This arrangement has the advantage that the water acquires a rapid movement before it acts on the air or vapor and hence as the water rushes across the relatively large gap or space between the runner and the annulus 9, it is in a condition to advantageously carry with it the air or vapor received from the chamber 10. It is to be noted that the vanes 14 are so arranged that the air or vapor is given a certain definite velocity before the water is

permitted to act on it. This facilitates the pumping action of the water since it avoids the necessity of starting the air from a condition of rest and also avoids any loss incident thereto. By initially separating the throwing water from the air or vapor I am able to impart to each such a velocity as is best adapted to suit the requirements of the particular service. The vanes 14 have the additional function of preventing the throwing water from being forced back into the air chamber.

In accordance with the provisions of the patent statutes, I have described the principle of operation of my invention, together with the apparatus which I now consider to represent the best embodiment thereof; but I desire to have it understood that the apparatus shown is only illustrative, and that the invention can be carried out by other means.

What I claim as new and desire to secure by Letters Patent of the United States, is—

1. In a centrifugal throwing pump, the combination of a casing, a runner within the casing having buckets for imparting velocity to the throwing liquid, an annulus that surrounds the runner and is separated therefrom by a relatively large gap, an air chamber in the casing that is in communication with the gap, and buckets also carried by the runner and arranged in the passage between the chamber and the gap which receive air or vapor from said chamber separate from the liquid supply, impart velocity to said air or vapor and deliver it to the gap before it is acted upon by the liquid issuing from the runner.

2. In a centrifugal throwing pump, the combination of a casing to which the air or vapor and the throwing liquid are admitted by separate conduits, means, including a runner surrounded by a gap, for imparting velocity to the liquid and also for separating the air or vapor from the liquid before they enter the gap, an annulus separated from the periphery of the runner by said gap and having passages which receive the mixture of air or vapor and liquid and in which said air or vapor is compressed by the liquid, a chamber surrounding the annulus which receives the mixture of water and compressed air after it is discharged from said annulus, and conduit means for conveying the air and water from the casing.

3. In a centrifugal throwing pump, the combination of a casing, an air chamber in the casing, a runner to which the throwing liquid alone is admitted on one side and by which velocity is imparted to the liquid, said runner being surrounded by a gap which is in communication with the air chamber, buckets carried by the opposite side of the runner and arranged in the passage between the chamber and the gap which buckets receive

the air or vapor from said chamber unmixed with the throwing liquid and after imparting velocity thereto discharge it into the gap to be acted upon by the liquid issuing from the runner, an annulus between which and the runner said gap is formed, said annulus receiving the mixture of liquid and air or vapor, inlets for the liquid and air or vapor, and conduit means for conveying the liquid and air or vapor from the casing.

4. In a centrifugal throwing pump, the combination of a casing containing an annular inlet chamber for water, and an annular outlet chamber for water and compressed air, inlet and outlet conduits for the chambers, a runner arranged to receive water from the inlet chamber, buckets on the runner that are out of the path of the water and which receive air from a suitable inlet and impart velocity thereto, a stationary annulus provided with passages through which water and air flow and in which the air is compressed by the water, said annulus being separated from the runner by a relatively large gap into which the air is directed by the said buckets and located between the runner and the annular outlet chamber.

5. In a centrifugal throwing pump, the combination of a casing containing inlet and outlet chambers, conduits connected therewith, an air chamber, an inlet therefor, a runner that receives water from the inlet chamber, buckets on the opposite side of the runner from those which act on the water, said buckets receiving air from the air chamber and delivering it to the streams of water after they have been discharged by the runner, an annulus containing passages which receive water from the runner and air from the buckets and in which the air is compressed by the water, said annulus discharging water and compressed air into the outlet chamber.

6. In a centrifugal throwing pump, the combination of a casing containing an inlet and an outlet chamber, conduits therefor, a runner and its shaft located in the inlet chamber, the buckets on the runner receiving water from the chamber, an annulus supported by the casing and surrounding the runner and separated therefrom by a gap, the said annulus discharging into the outlet chamber, a cover for the casing containing an air chamber, buckets on the side of the runner opposite to those acting on the water which receive air from the air chamber, impart velocity thereto and deliver it to the water as it crosses said gap, and a stationary means that cooperates with the last mentioned buckets to direct the air into said gap.

7. In a centrifugal throwing pump, the combination of a casing, substantially parallel chambers in the casing which receive air and throwing water respectively, a runner

arranged between the chambers, an annulus surrounding the runner and provided with outwardly extending passages, passages connecting the water chamber with the inlet of the runner and the air chamber with the gap between the runner and the annulus, a packing to prevent flow along one side of the runner from the gap to the water chamber, and buckets mounted on the runner which propel air from the chamber

toward the gap and prevent the flow of fluid in the opposite direction.

In witness whereof, I have hereunto set my hand this 29 day of Jan. 1910.

J. PETERMÖLLER.

Witnesses:

ERICK N. CERLÉE,
G. CLAUSON.