

L. R. ALBERGER, DEC'D.

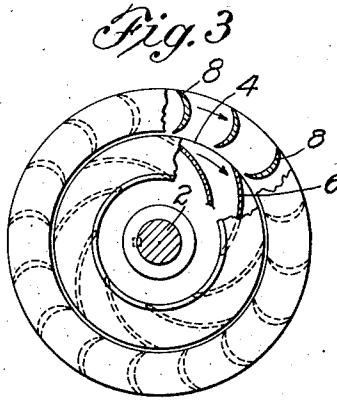
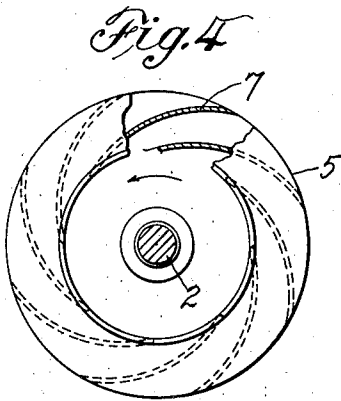
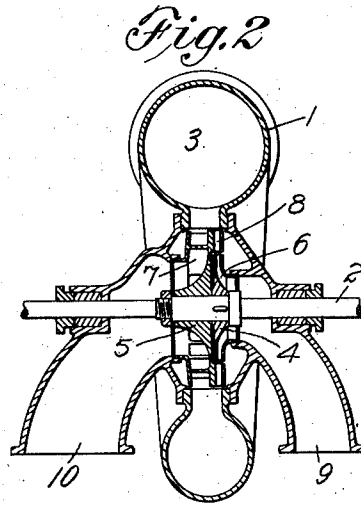
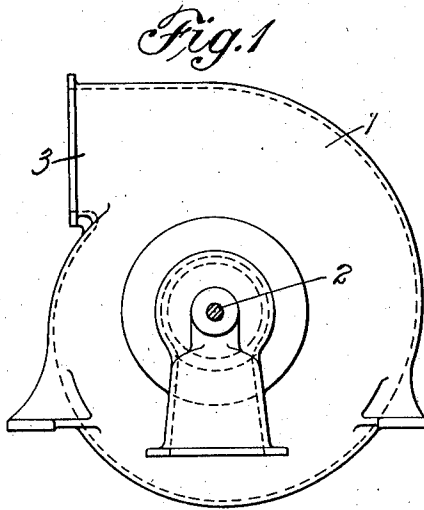
B. D. ALBERGER, S. C. ROSS & A. H. ALBERGER, EXECUTORS.

CENTRIFUGAL OR TURBINE PUMP.

APPLICATION FILED SEPT. 19, 1910.

1,034,184.

Patented July 30, 1912.



*Witnesses*  
*Grant K. Vick Jr.*  
*L. S. Penning.*

*Inventor*  
*Louis R. Alberger,*  
*per Fred W. Wacker.*  
*Atty.*

# UNITED STATES PATENT OFFICE.

LOUIS R. ALBERGER, OF GREENWICH, CONNECTICUT; BLANCHE DODGE ALBERGER AND SCOTT C. ROSS, OF NEW YORK, N. Y., AND ALVAN H. ALBERGER, OF HAMBURG, NEW YORK, EXECUTORS OF SAID LOUIS R. ALBERGER, DECEASED, ASSIGNORS TO ALBERGER CONDENSER COMPANY, A CORPORATION OF NEW YORK.

## CENTRIFUGAL OR TURBINE PUMP.

1,034,184.

Specification of Letters Patent.

Patented July 30, 1912.

Application filed September 19, 1910. Serial No. 582,612.

*To all whom it may concern:*

Be it known that I, LOUIS R. ALBERGER, a citizen of the United States of America, residing at Greenwich, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Centrifugal or Turbine Pumps, of which the following is a specification, reference being had therein to the accompanying drawing.

My present invention relates to new and useful improvements in centrifugal or turbine pumps having novel characteristics and intended chiefly for use with a high speed driving shaft.

The object of the invention is to provide a machine which is compact, simple and efficient, and has a large range of usefulness, and which is particularly adapted to being driven by steam turbines where high rotary speed is desirable for the economical operation of the device.

Attempts to use high speed turbines to drive slow speed impellers have resulted in very wasteful use of steam which practically prohibits their operation, while steam turbines built of special diameters that will operate with good steam economy at the slow speed required by the slow speed impeller of a low lift pump are prohibitive in first cost. Therefore, my present combination of elements utilizes the high speed turbine in a most effective and simple manner.

The invention consists essentially in a multiplicity of impellers, commonly two, the water discharged from one acting upon the other and driving it at a slower speed, so that in this way, the high speed of the drive shaft and the corresponding high speed of the first impeller actuated thereby is reduced in the second impeller, so that the latter will deliver the proper quantity of water against the final pumping head to absorb the power imparted to it by the discharge from the high speed impeller, and the invention moreover comprises numerous details and peculiarities in the construction, arrangement and combination of parts substantially as will be hereinafter described and claimed.

In the accompanying drawing illustrating my invention, Figure 1 is a side elevation of my improved centrifugal or turbine

pump. Fig. 2 is a cross sectional view of the same. Fig. 3 is a right hand side elevation of the two impellers, certain parts being broken away in order to expose the construction and relative location of the vanes of these impellers. Fig. 4 is a left hand side elevation of the fluid-actuated impeller with a certain portion thereof broken away in order to disclose the construction and location of the vanes.

Similar characters of reference designate corresponding parts throughout the different figures of the drawing.

1 denotes a casing of a centrifugal or turbine pump which may be of any suitable and ordinary construction, having the general volute form which characterizes casings of pumps of this description, said casing having a discharge 3.

2 denotes a pump shaft driven by a steam turbine, belt, or any other means (not shown), said driving power being applied to either end thereof. On this shaft are two impellers, one of which 4, is the smaller of the two, and is mounted rigidly on the shaft 2, while the other, 5, is the larger of the two, and is supported loosely on shaft 2 so that it can revolve freely thereon. The casing 1 is provided with a suction pipe 9 for the impeller 4, and with another suction pipe 10 for the impeller 5. The impeller 4 is provided with a series of vanes or blades 6, the position and curvature of which are clearly indicated in the side view in Fig. 3. The loosely mounted impeller 5 is provided with a series of vanes 7, the position and curvature of which are clearly seen by reference to the other side elevation depicted in Fig. 4. This loosely mounted impeller 5 is furthermore provided with a second series of vanes 8 on the other side of the impeller opposite to where the vanes 7 are located, said series of vanes 8 being clearly shown in Fig. 3 and being located in a peripheral series around the high speed impeller 4, where they will receive the discharge from the impeller 4 in such a manner as to cause a rotation of the loosely mounted impeller 5. It will thus be seen that the high speed shaft 2 of the steam turbine or other motor will actuate the impeller 4 which is fixedly secured thereon at a very high rate of speed, and the revolution of said impeller will

draw the water through the suction pipe 9, and it will be discharged from between the vanes 6 of the impeller 4. The water thus discharged acts against the series of vanes 8 arranged as stated around vanes 6, and thereby revolves the loosely-mounted impeller 5 which draws water through the suction 10. The water discharged by the vanes 6 against the vanes 8 passes on into the volute casing 1, and there unites with the water which is being pumped directly by the impeller 5, and its vanes 7 into the same casing. Thus, it will be seen that I provide a very simple and efficient combination. The first impeller, which I termed the high speed impeller because it is driven at the same rate of speed as the actuating shaft, serves to rotate the second impeller which revolves more slowly, and which does most of the pumping. The fact that the two impellers are located upon the same shaft, one being rigid thereon, and one being loose, and that the one rigidly affixed drives the loose impeller, so that there is a united action and one impeller drives the other, gives substantially the same general arrangement and effect as if only one impeller were being used with the added advantage of a reduction in the speed of the high speed impeller so that a proper speed is arrived at for carrying on economical pumping in a device of the character I am describing.

My invention aims principally to economically pump relatively large quantities of water against low heads by means of a high speed impeller. A requirement of 20,000 gallons of water per minute or upward against a head of 10 or 20 feet or thereabout at a speed of from 1,500 to 2,000 revolutions per minute would offer an example of the conditions to which I am referring, and which my invention is offered to meet and provide for. It has been found that attempts to pump water under these conditions have resulted in a very inefficient and unsatisfactory pumping, the obvious cause being that the impeller must have a larger diameter than it should have for the head to be pumped against. The present invention obviates this difficulty to a very great degree.

In my new pumping mechanism which I am now describing, consisting of a high speed rotating shaft and two impellers, one connected to the shaft and operating at the same speed, I am able to discharge water under a velocity greater than that necessary to deliver to the head required, causing this water to impinge against the power vanes of the second or slow speed impeller, which results in causing the latter to rotate, and by means of its own pump vanes pump water at a proper and economical speed against the head required. Of course, the two quantities or volumes of water which are pumped

by the two impellers are discharged separately, but are joined together in a united flow of water in the volute casing through which this flow runs to the discharge. The water discharged by the high speed impeller loses a portion of its velocity as it gives power to the power or driving vanes of the slow speed impeller, and is finally discharged to the volute casing at just enough velocity to overcome the head against which both impellers ultimately pump. It must be obvious that the high speed impeller should be so designed as to have a capacity and a velocity of discharge sufficient to impart power to the slow speed impeller, and cause the latter to rotate and pump water just as if it were rigidly connected to a slow speed shaft. The diameter of the slow speed impeller and its general design should be such as to enable it to deliver a quantity of water against the final pumping head of such a nature that it will absorb the power imparted to it by the discharge from the high speed impeller.

In the operation of my improved centrifugal or turbine pump, the function of the various parts and the way in which they contribute to produce the desired results will be readily understood. It is manifest moreover, that many modifications may be made in the exact construction without departing from the invention, for instance, the shaft of each impeller may be so made that the two shafts will be distinct from each other, and kept entirely separate from each other and supported by individual bearings or various other devices which may be adopted to accomplish the same result. The impellers moreover may be made of the double suction type and instead of the simple centrifugal pump construction, pumps having diffusion vanes between the impellers and discharge casing may be employed, the vanes may be differently shaped and arranged, and the relative position of the parts may be changed within quite wide limits without varying from the spirit or intent of the invention which is to be judged and determined by the language and scope of the claims. Therefore, I consider my invention broadly new and covering an important and valuable feature of enabling a high speed impeller to introduce fluid to a lower speed impeller, and cause the latter to perform economical pumping, while at the same time, the two impellers are kept in a compact, effective and simple combination.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a centrifugal or turbine pump, the combination of a casing, a high speed shaft, a primary impeller on said shaft and driven thereby, a secondary impeller having vanes

on which the discharge of the first impeller acts, said latter impeller being supported loosely and revolubly on the same shaft as the primary impeller.

5 2. In a centrifugal or turbine pump, the combination of a casing, a drive shaft, a high-speed impeller on said shaft having a series of vanes, a suction through which said impeller draws fluid, a second impeller  
10 alongside of the first, and having a series of power vanes at one side receiving fluid from the first impeller, and having also a series of pumping vanes on the other side for drawing water from the suction.

15 3. In a centrifugal or turbine pump, the combination of a casing, a high-speed shaft, a high-speed impeller on said shaft, having a series of vanes, a suction connected with said casing, a second impeller alongside of  
20 the first, and having a series of power vanes receiving fluid from the first impeller.

4. In a centrifugal or turbine pump, the combination of a casing, a drive shaft, a primary impeller on said shaft, having a  
25 series of vanes, a second impeller loose on the same shaft alongside of the first impeller, said second impeller having a series of power vanes at one side receiving fluid from the first impeller, and having also a  
30 series of pumping vanes on the other side.

5. In a centrifugal or turbine pump, the combination of a casing, a series of im-

pellers, one of which draws water from one part of the suction, and another of which draws water from another part of the suc- 35  
tion, means whereby the discharge from both impellers is united in a common flow in the casing, and means whereby the discharge from a part of the impellers causes the remainder to receive power for pump- 40  
ing.

6. In a centrifugal or turbine pump, the combination with a casing having discharge and suction portions, of a high-speed shaft, an impeller thereon, a second impeller actu- 45  
ated by fluid introduced thereinto by the first impeller, and located loosely on the same shaft as and alongside of the first impeller, said second impeller having power vanes, and also pumping vanes. 50

7. In a centrifugal or turbine pump, the combination of an impeller running at a high speed, a second impeller having thereon a series of power vanes, and having also a series of pumping vanes, said second im- 55  
peller being driven by the discharge from the first impeller.

In testimony whereof I affix my signature in presence of two witnesses.

LOUIS R. ALBERGER.

Witnesses:

D. H. CHESTER,  
ROSANNA H. FOSTER.