

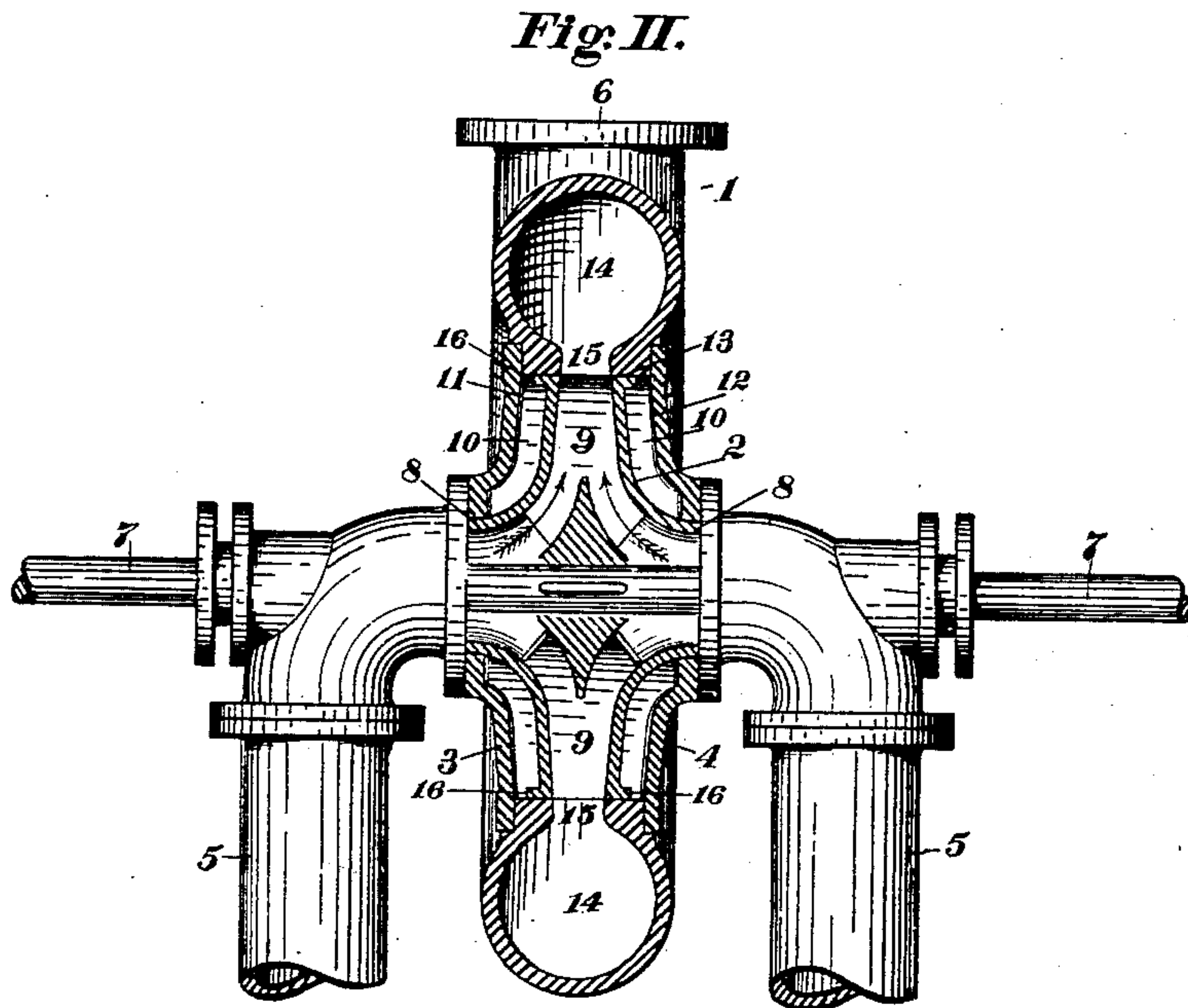
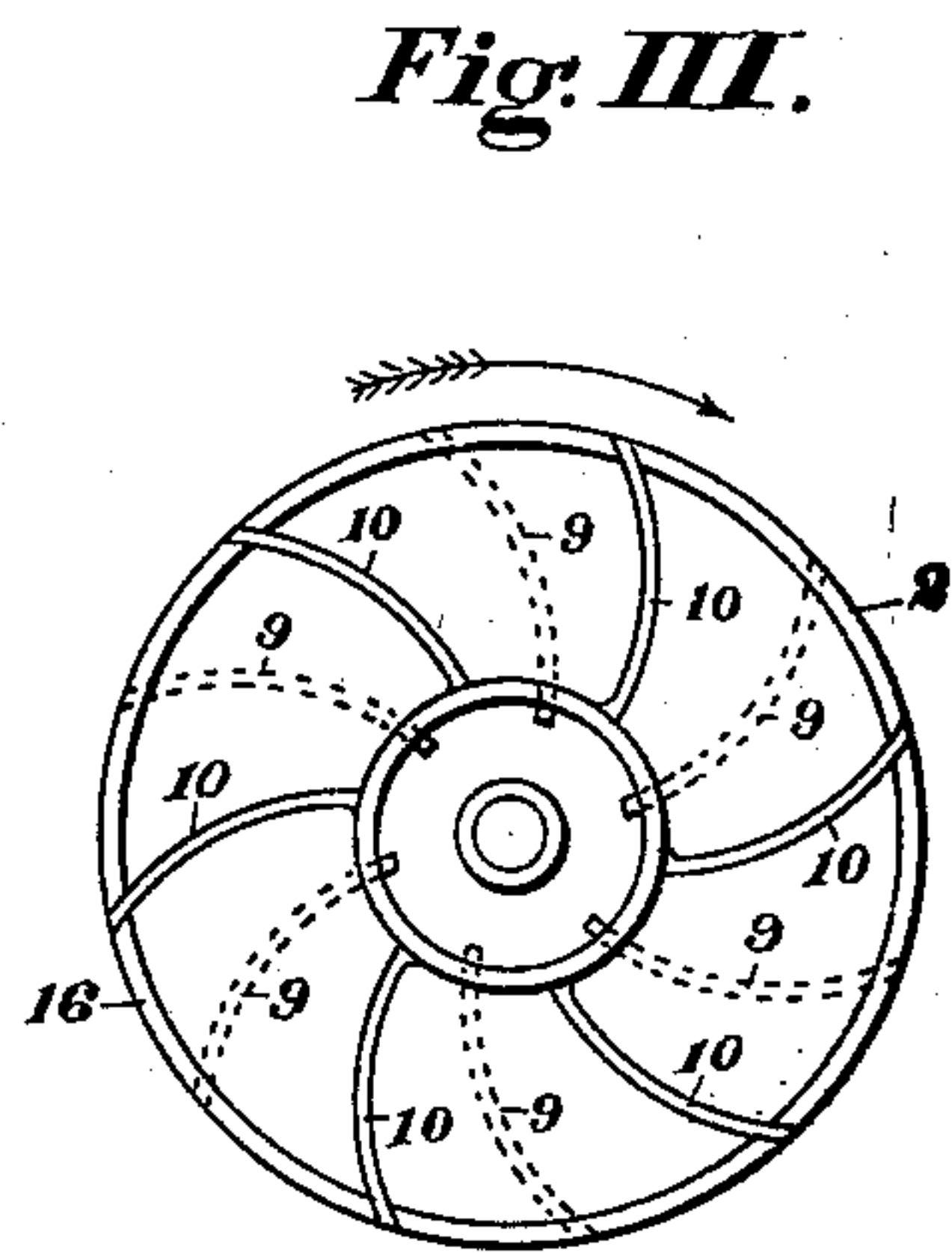
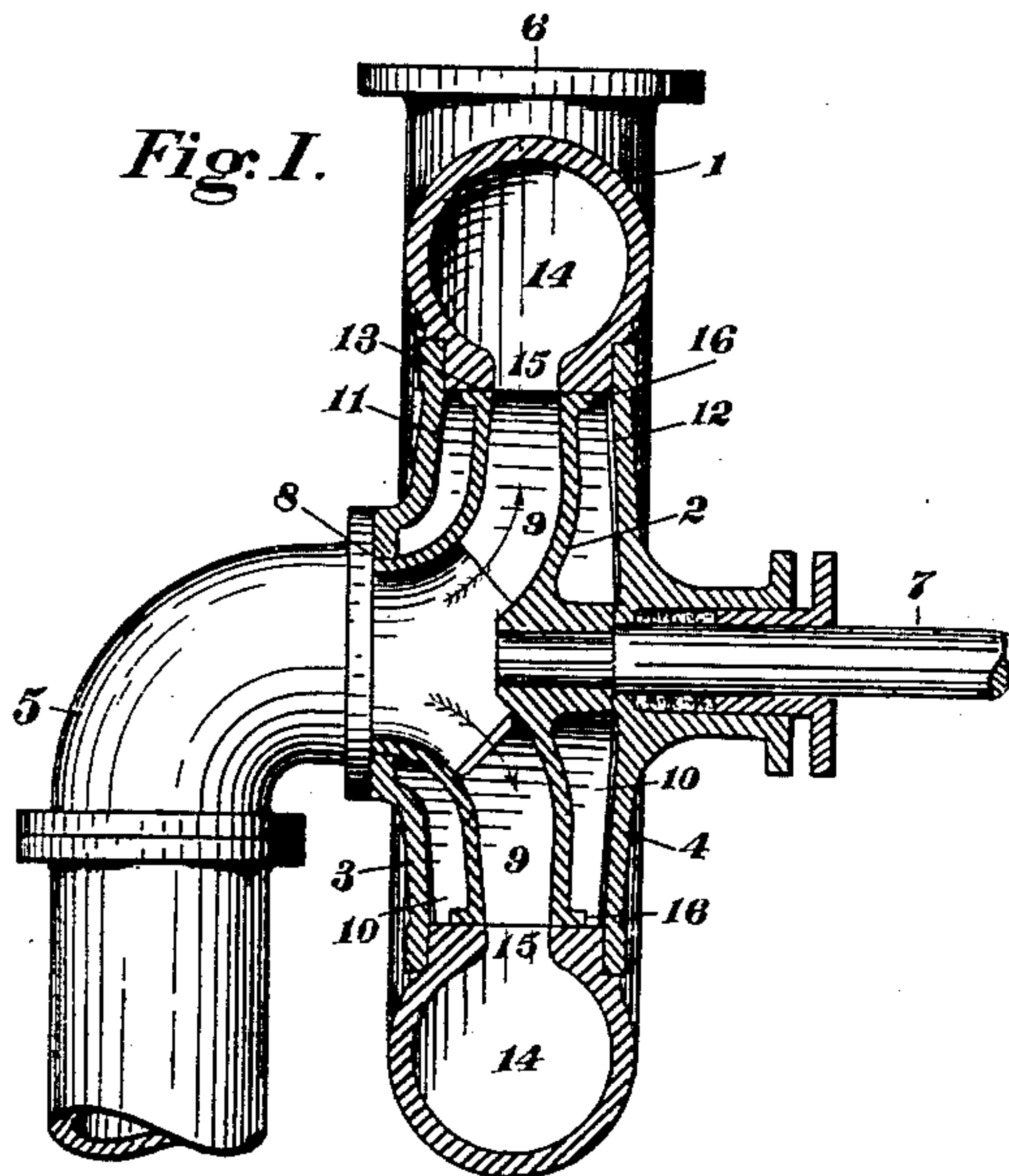
No. 677,103.

Patented June 25, 1901.

J. RICHARDS.  
CENTRIFUGAL PUMP.

(Application filed Apr. 29, 1901.)

(No Model.)



WITNESSES:  
*P. H. Lander,*  
*Elmer Wickes.*

INVENTOR:  
*John Richards*  
BY  
*Henry H. Bates,*  
ATTORNEY.



# UNITED STATES PATENT OFFICE.

JOHN RICHARDS, OF SAN FRANCISCO, CALIFORNIA.

## CENTRIFUGAL PUMP.

SPECIFICATION forming part of Letters Patent No. 677,103, dated June 25, 1901.

Application filed April 29, 1901. Serial No. 58,038. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN RICHARDS, a citizen of the United States of America, residing at San Francisco, county of San Francisco, and State of California, have invented certain new and useful Improvements in Centrifugal Pumps; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to centrifugal pumps having incased impellers and to certain improvements therein whereby the pressure on the outside and inside of such impellers is equalized and other desirable results are attained.

My improvement consists in providing vanes on the inside and outside of such impellers, the latter being inclosed in chambers at the sides of the impellers, operating in water that is fixed, except as to its rotation, and is not in communication with the fluid being impelled through the pump by action of the interior vanes of the impellers.

The objects of my invention are to put the inside and outsides of the incased impellers in equilibrium in so far as relates to water-pressure and to avoid lateral thrust thereon; also, to provide at each side of the impeller a body of water, fixed or stationary, except as to its revolution, thus preventing the entry into these side chambers of impure water, sand, or grit, and consequently avoiding scour and wear of the main inclosing case and of the inlet nozzle or nozzles of the impellers.

To carry out this invention, in practice I construct centrifugal pumps as shown in the drawings herewith, forming a part of this specification, in which drawings—

Figure I is a section of a centrifugal pump through its axis, water being admitted at one side of the impeller. Fig. II is a similar section through a similar pump in which water is admitted at each side of the impeller, and Fig. III a side view of one of the impellers removed from the pump-casing.

I am aware that inclosed impellers for centrifugal pumps have been made with interior and exterior vanes, but not in the manner or for the purposes herein set forth and explained—that is, to provide at each side of such incased

closed chambers at its sides and does not flow or revolves continually with the impeller in impellers a stratum or facing of water that or circulate because separated from the main body of the fluid being pumped and passing through the interior of the impeller.

Referring to the drawings, 1 is the main casing, which can be annular or of volute form, as the purposes of the pump may require.

2 is the impeller; 3 and 4, the side plates; 5, the suction-pipes, and 6 the discharge-nozzles.

7 is the shaft or pump-spindle, and 8 suction or inlet nozzles of the impellers, made either single or double, as shown in Figs. I and II.

The interior vanes 9 are of the usual form, (indicated by dotted lines in Fig. III,) and 10 represents the exterior or side vanes that fit closely around the interior of the closed chambers 11 and 12 at the sides of the impeller 2 and have no communication with the interior of the impeller or with the fluid passing there-through except through the running joint at 13, between the impeller 2 and the casing 1. These vanes can be of any number or form that will cause rotation of the water contained in the chambers 11 and 12.

When the vanes 9 and 10 have the same radius and centrifugal effect, it will be seen that there will be no force to cause flow either way through the joint at 13. So the water contained in the chambers 11 and 12 will remain fixed, except as to its rotation, and these chambers will remain practically out of communication with the fluid passing through the interior of the impeller 2 and out into the discharge-chamber 14 through the throatway 15. By such construction it will be seen that in pumping impure fluids or those containing silt, sand, gritty material, or any kind of solids these will not enter the chambers 11 and 12 and side plates 3 and 4, and the exterior of the nozzles 8 will also be preserved from abrasive scour and wear.

It is not necessary that the exterior vanes 10 have at their tips a width equal to that of the chambers 11 and 12, so a rib or rim can be formed around the impellers 2 to brace and stiffen the same, also to more effectually prevent communication between



the chambers 11 and 12 and the interior of the impellers. Such construction is preferable, but is not essential to the operation of my invention. Such pumps are usually  
5 charged with pure water, whatever their working purpose may be, and when started if the chambers 11 and 12 are not filled in charging the pump the greater pressure within the impellers soon forces through the joint at 13  
10 enough fluid to fill their chambers and expel the air therefrom, after which an equilibrium of pressure being established there is no longer any tendency of the fluid to pass either way through the joint at 13, and the pure  
15 water in the chambers 11 and 12 remains fixed in respect to flow, constituting what may be called a "fluid facing" for the sides of the impellers. It is obvious that the pressure produced by centrifugal action in the interior  
20 of the impeller 2 and in the chambers 11 and 12 increases alike from the inlet-ways outward and is most intense at the periphery, so that a slight difference in the radius of the vanes 9 and 10 will affect the equilibrium

and cause the escape of some fluid outward 25 or inward through the joint 13. Such variation of the length or radius of the vanes 9 and 10 can be employed, if necessary, to cause more or less pressure in either of the chambers 11 or 12 and a lateral thrust on the 30 impeller accordingly.

Having thus explained the nature and objects of my invention and the manner of applying the same, what I claim as new, and desire to secure by Letters Patent, is— 35

In a centrifugal pump, a main casing, an incased impeller therein having interior and exterior vanes, and closed chambers at each side of the impeller in which the exterior vanes revolve, in the manner substantially 40 as and for the purposes specified.

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

JOHN RICHARDS.

Witnesses:

ALFRED A. ENQUIST,  
ELMER WICKES.

It is hereby certified that in Letters Patent No. 677,103, granted June 25, 1901, upon the application of John Richards, of San Francisco, California, for an improvement in "Centrifugal Pumps," an error appears in the printed specification requiring correction as follows: Lines 53 and 55, page 1, should be transposed; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 30th day of July, A. D., 1901.

[SEAL.]

F. L. CAMPBELL.

*Assistant Secretary of the Interior.*

Countersigned:

E. B. MOORE,

*Acting Commissioner of Patents.*