

F. J. WILKE.  
ELASTIC FLUID TURBINE.  
APPLICATION FILED FEB. 14, 1913.

1,075,528.

Patented Oct. 14, 1913.

3 SHEETS—SHEET 1.

*Fig. 1*

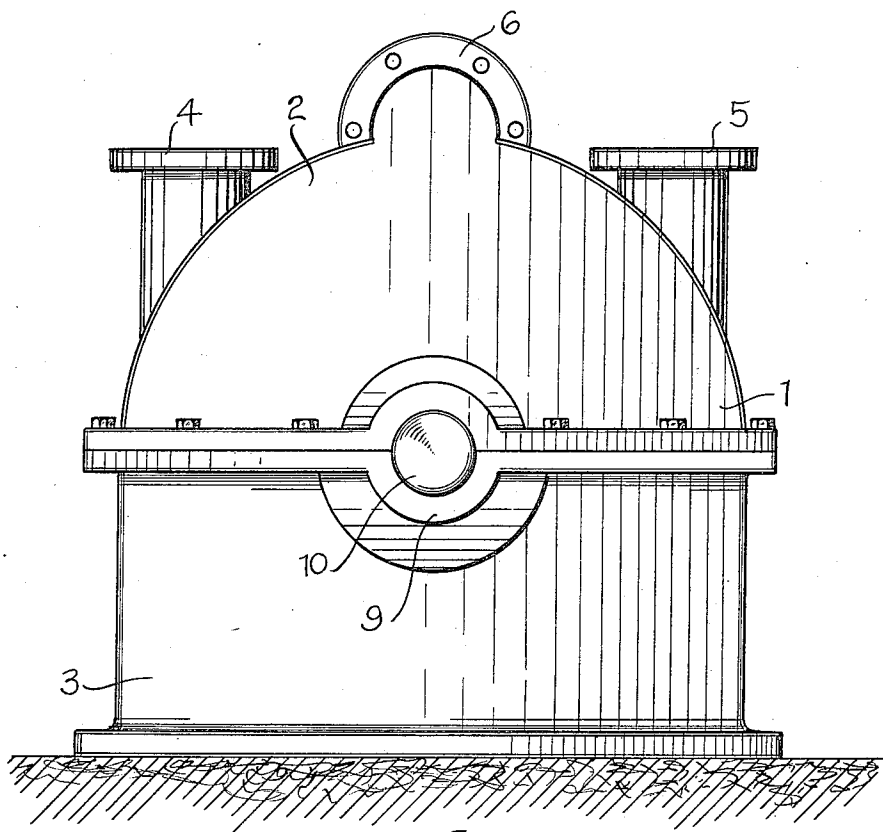
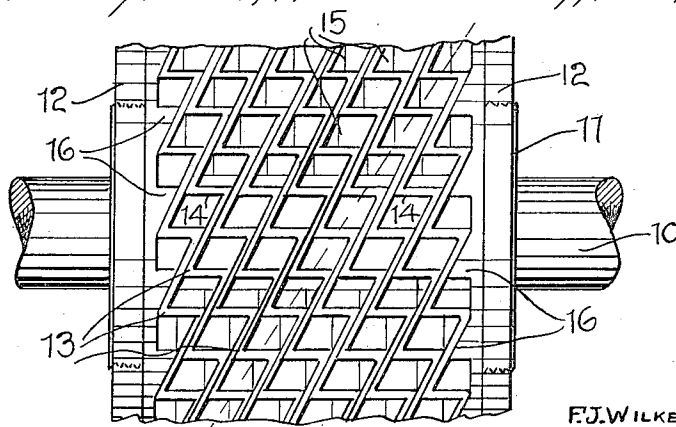


*Fig. 4*



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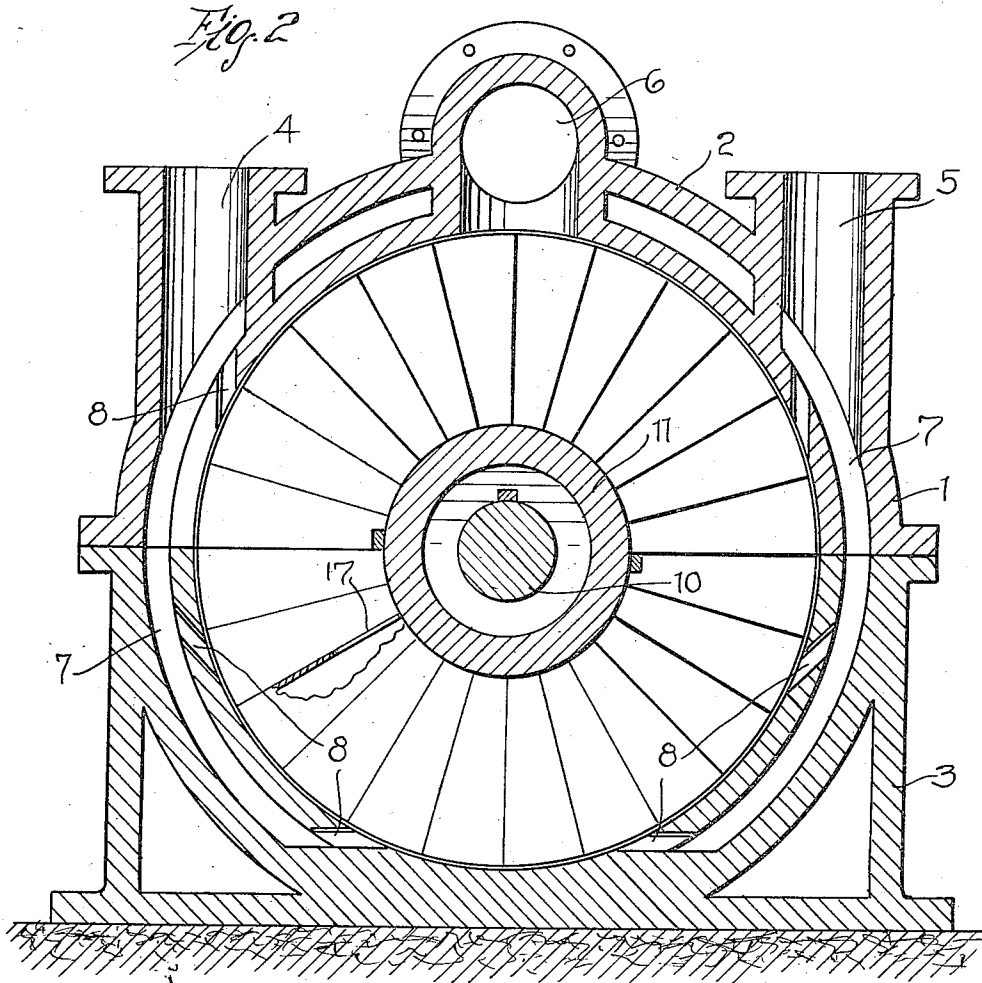
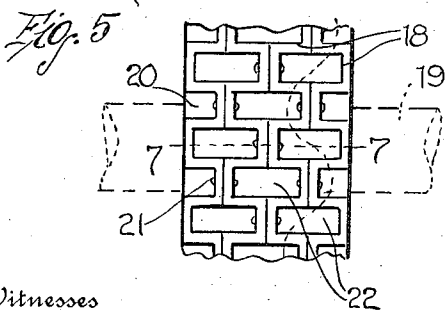
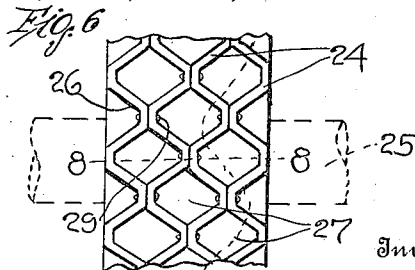
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3 SHEETS—SHEET 2.



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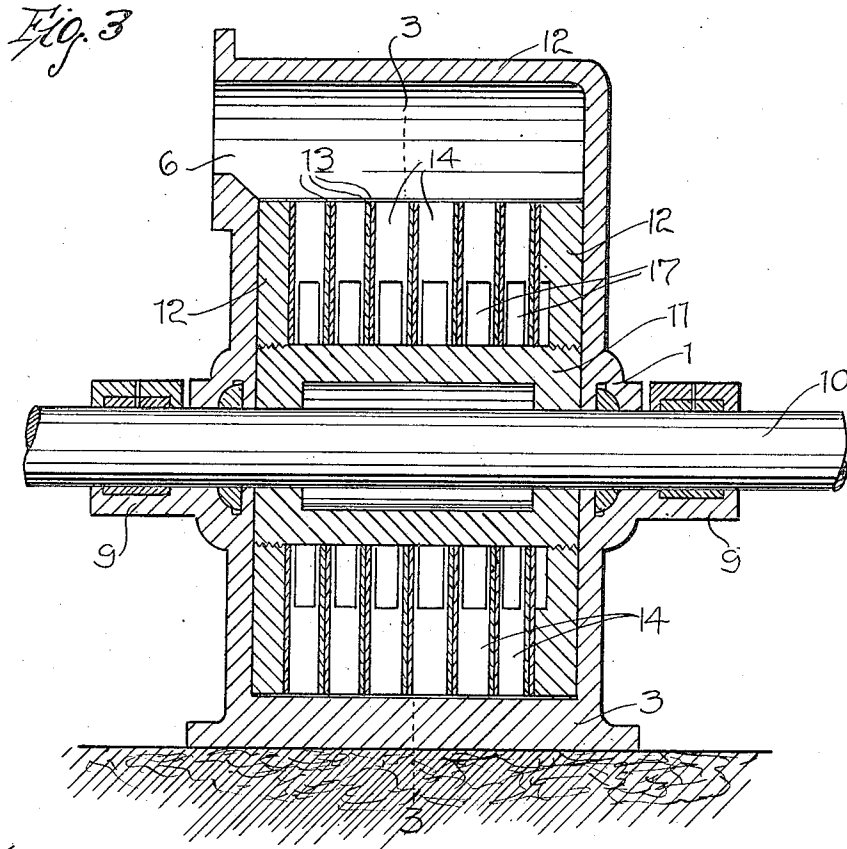
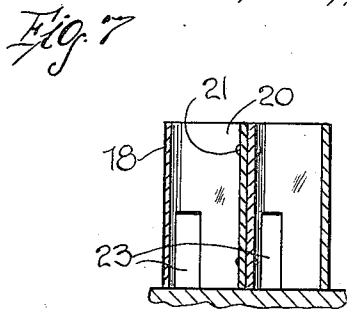
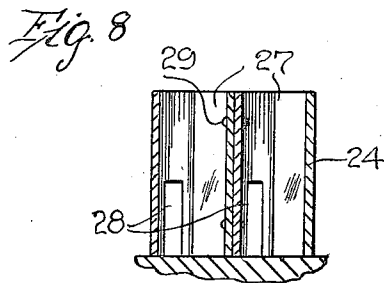
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3 SHEETS—SHEET 3.



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# UNITED STATES PATENT OFFICE.

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ELASTIC-FLUID TURBINE.

1,075,528.

Specification of Letters Patent.

Patented Oct. 14, 1913.

Application filed February 14, 1913. Serial No. 748,496.

*To all whom it may concern:*

Be it known that I, FRANK J. WILKE, a citizen of the United States, residing at Little Rock, in the county of Pulaski and State of Arkansas, have invented certain new and useful Improvements in Elastic-Fluid Turbines, of which the following is a specification, reference being had to the accompanying drawings.

10 This invention relates to new and useful improvements in elastic fluid turbines and more particularly to an improvement on my own Patent Number 1,049,185, issued December 31st, 1912, and my object is to provide a simple and efficient turbine which is capable of being reversed in its operation.

15 In addition to the objects contained in my previous patent, a further object is to provide a rotor for this turbine in which the vanes thereof receive direct impact, thereby obtaining a maximum amount of power from a minimum amount of fluid.

20 Still another object of the invention resides in providing a rotor composed of a plurality of disks, each of which is offset radially and arranged to abut the adjacent disks to provide numerous radial pockets or the like and still another object of the invention resides in providing an exhaust opening in each of the offsets on each of the disks, said offsets providing communication between the aforesaid pockets.

25 A still further object of the invention resides in providing a device which is extremely simple and durable in construction, inexpensive to manufacture and one which will be very efficient and useful in operation.

30 With these and other objects in view, the invention consists in the novel features of construction, combination and arrangement of parts as will be hereinafter referred to and more particularly pointed out in the specification and claims.

35 In the accompanying drawings forming a part of this application, Figure 1 is a side elevation of my improved turbine. Fig. 2 is a vertical longitudinal section thereof through with parts broken away to show the exhaust openings in certain of the offsets of the rotor. Fig. 3 is a vertical central transverse section through Fig. 2. Fig. 4 is a fragmentary plan view of the rotor. Fig. 5 is a similar view of a slightly modified form of rotor. Fig. 6 is a similar view

of a still further modified form of rotor. Fig. 7 is a section as seen on line 7—7, of Fig. 5; and Fig. 8 is a similar view as seen on line 8—8, of Fig. 6.

40 In describing my invention, I shall refer to the drawings in which similar reference characters designate corresponding parts throughout the several views and in which 1 indicates a casing formed of the upper and lower sections 2 and 3 respectively, said upper section being provided with the oppositely arranged inlet conduits 4 and 5 and a central exhaust conduit 6. It will here be stated that the device is adapted for use in connection with steam, water, air or other elastic fluids and the inlet conduits 4 and 5 communicate with an annular steam, water or air space 7 formed in the sections 2 and 3, said space partially surrounding the hollow space within the casing and communicating with the latter at various points therearound, as shown at 8.

45 Mounted in the bearings 9 formed in the sides of the casing 1, and extending transversely through the axial center of the latter, is a shaft 10 and mounted on this shaft to fit snugly between the faces of this casing, is a hub or the like 11. This hub forms an axial portion for the improved rotor carried on the shaft 10 and the same is threaded at its ends, while a pair of end disks 12 are also provided, the latter being provided with central threaded openings engaged with the threaded ends of said hub. Also mounted on the hub-like member 11, between the end disks 12, in spaced relation to one another, are a plurality of disk members 13, each of which is radially offset throughout its face to provide the radial shoulders or vanes 14. Thus portions of the disk between the adjacent shoulders or vanes 14, are inclined with respect to the imaginary vertical plane of the face of the disk, as it was prior to its being offset and in arranging the disk on the shaft 9, the vanes or shoulders of one disk alternate the vanes of the adjacent disks and the aforesaid inclined portions of the disk are brought into contact to fit flatly against one another, as clearly shown in Fig. 4 of the drawings. By so arranging these disks, a complete rotor is formed, in which are provided numerous radial pockets 15, the vanes or shoulders 14 of the adjacent disks being arranged to align with one another, thereby providing a

plurality of radial walls between the end disks 12, and in order to retain these disks in such position, the inner faces of said end disks 12 are also offset coincident to the inclination of the portions of the adjacent disks 13, as shown at 16. If desired, other means may also be provided for securing the respective disks to one another. Each vane or shoulder 14 in each of the disks is provided at its inner end with an exhaust opening 17 and if the path of the fluid be traced through the openings of these various vanes, the same will take the course as indicated by the dotted lines in Fig. 4 of the drawings.

In practice, assuming that the one inlet 4 is closed, should it be desired to operate the turbine, steam, water or air, under pressure, is introduced through the inlet conduit 5, which fluid will pass to the surrounding channel 7, in the casing and through the communicating ports 8, into the space therein inclosed. The fluid, as it is directed through the communicating ports 8, will be directed with full impact against the radial vanes or shoulders 14 of the disks, which make up the rotor and the impact will be sufficiently great to cause said rotor on the shaft 10 to be revolved.

It might here be stated that the vanes of each disk are formed by offsetting the disk in a plane at right angles to the vertical plane of the face of the disk prior to its being offset, which permits the fluid, as the same passes through the communicating ports 8, to have direct and full impact against the faces of said vanes, thereby giving the greatest amount of power possible. This direct impact is shown by the arrows directed toward the vanes in Fig. 4 of the drawings. As the fluid contacts with the vanes and causes the rotor to be revolved, the same will be directed in the pockets toward the inner ends thereof, where it will be exhausted through the openings 17 for expansion in the adjacent pockets and as the rotor is caused to revolve, the exhaust fluids will be directed toward the outlet conduit 6, where the same is conducted to any desired receptacle (not shown).

In Fig. 5, I have shown a slightly modified form of rotor, wherein a plurality of disks 18 are provided and mounted on the shaft 19, each disk being offset radially on opposite faces thereof to provide the radial channels or slots 20. The slots or channels formed on opposite faces of each disk alternate one another and the side walls thereof are parallel to one another and offset at right angles to the base of the same. The disks are arranged on the shaft 19 so that the base portions of the opposed slots or channels of one disk about the base portions of the channels of the adjacent disks and these abutting base portions are riveted or otherwise secured together, as shown at 21.

By so securing the disks the same are held in this position and a plurality of radial pockets 22 are formed, the same being arranged in staggered relation to one another. The one wall of each channel or slot 20 of each disk is provided at its inner end with an exhaust opening 23, similar to the opening 17 in the first mentioned form of the device and when these disks are brought together so that the pockets 22 are formed, each pocket is provided on opposite walls at the opposed ends thereof with a pair of exhaust openings. If the path of the fluid is traced through the exhaust openings of these pockets, the same will take a course as shown in dotted lines in Fig. 5. As the construction of a device with this form of rotor is otherwise the same as the one hereabove described, further showing and description thereof will not be given.

In Fig. 6, I have shown a still further modified form of the invention, wherein a plurality of disks 24 are mounted on the shaft 25, each disk being radially offset on opposite faces thereof to provide the radial channels 26. The channels formed on the one face of each disk alternate the channels formed on the opposite face thereof and the walls of these radial channels or slots tend to converge toward their inner or lower edges, the same terminating in a base portion. The disks 24 are so arranged on the shaft 25 as to permit the base portions of the aforesaid channel-ways 26 to contact and fit flatly against one another, thus providing numerous radial pockets 27, which appear somewhat diamond shaped in cross section. One wall of each channel-way 26 in each of the disks is provided with an exhaust opening 28, so that when these disks are brought together in the manner described, each pocket formed is provided on a pair of opposite walls with a pair of such openings and the path of the fluid through these openings may be traced from the dotted lines indicating the course of the same, as shown in Fig. 6. The base portions of the channel-ways which are brought to fit flatly against one another, are preferably secured together by riveting or the like, as shown at 29, thus retaining the disks in their desired positions with respect to one another. As the construction of a device equipped with this form of rotor is otherwise the same as the form hereabove described, further showing and description thereof will be omitted.

From the foregoing it will be seen that I have provided a simple, inexpensive and efficient means for carrying out the objects of the invention and while I have particularly described the elements best adapted to perform the functions set forth, it is obvious that various changes in form, proportion and in the minor details of construction may

be resorted to without departing from the spirit or sacrificing any of the principles of the invention.

Having thus described this invention, what I claim is:—

1. In an elastic fluid turbine, the combination with a casing having a pair of inlet openings at opposite ends thereof, and an outlet opening disposed intermediate the same, said casing being also provided with arcuate spaces communicating respectively with said inlet openings, said spaces also having communication with the main compartment at regular intervals therearound; of a rotor mounted within the main compartment of the casing having a plurality of radial vanes formed thereon to conduct the pressure toward the axial center of the rotor, the inner ends of said radial vanes being provided with exhaust openings.

2. A rotor of the class described comprising a core member, a plurality of disks mounted thereon, said disks being radially

offset to provide vanes and the vanes of adjacent disks engaged with one another to provide a plurality of radial pockets, said vanes forming the walls of said pockets being provided with exhaust openings at their inner ends.

3. A rotor of the class described comprising a core member, a plurality of disks arranged thereon, each of said disks being radially offset and the portions of adjacent disks intermediate the offsets engaged with one another, to form a plurality of radial pockets, the opposed walls of said pockets being provided with exhaust openings at their inner ends, and means to retain the disks in proper relation to one another.

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

FRANK J. WILKE.

Witnesses:

SHELBY ENGLAND,  
LEOYAR ENGLAND.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."