F. LYTLE.

STEAM TURBINE.

APPLICATION FILED MAY 29, 1912.

1,065,539.

Patented June 24, 1913.

3 SHEETS—SHEET 1.

FIG. 1.

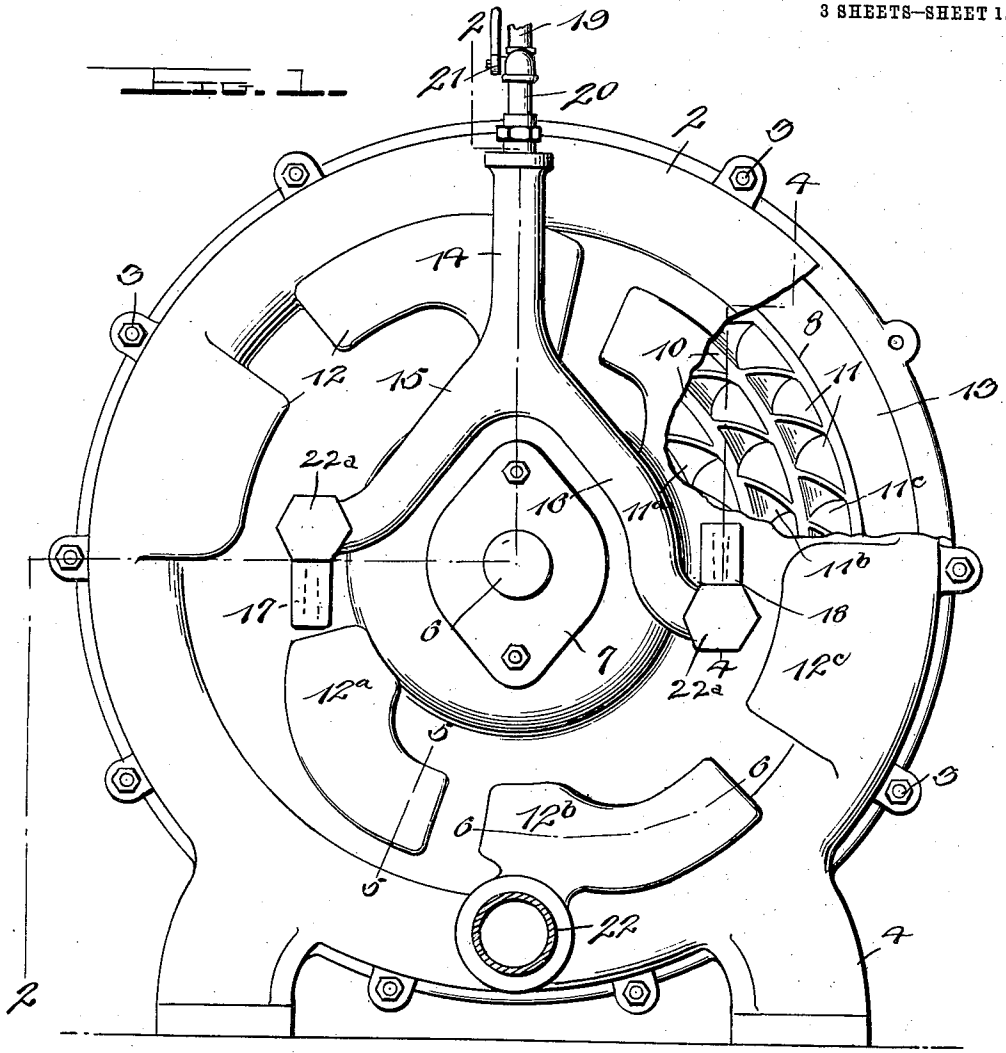
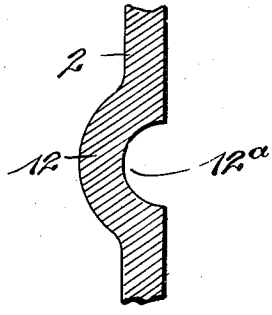


FIG. 5.



Inventor

F. Lytle,

Witnesses

Chas. L. Griesbauer.

A. B. Norton.

By Watson E. Coleman.

Attorney

F. LYTLE.

STEAM TURBINE.

APPLICATION FILED MAY 29, 1912.

1,065,539.

Patented June 24, 1913.

3 SHEETS—SHEET 2.

FIG. 2.

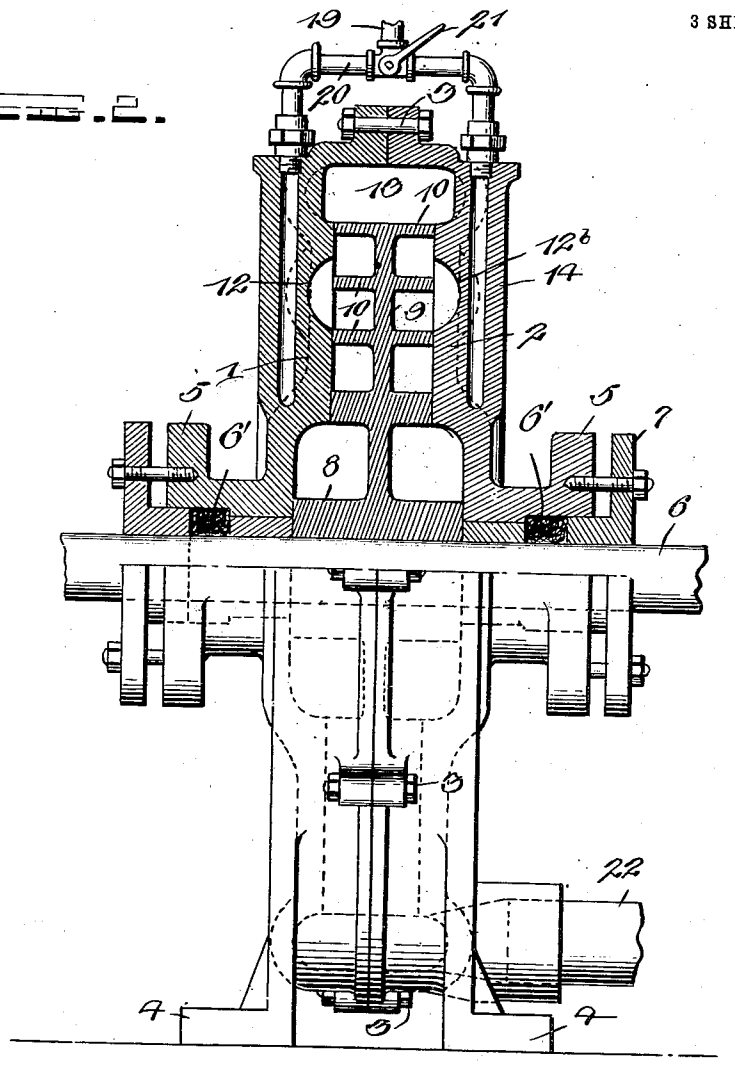
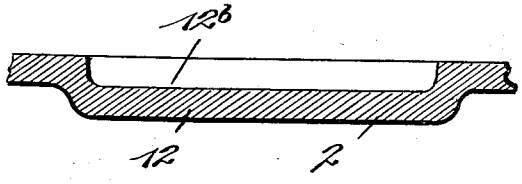


FIG. 5.



Witnesses

Chas. L. Griesbauer.

A. B. Norton.

Inventor

F. Lytle,

By Watson E. Coleman.

Attorney

F. LYTLE.

STEAM TURBINE.

APPLICATION FILED MAY 29, 1912.

1,065,539.

Patented June 24, 1913.

3 SHEETS—SHEET 3.

Fig. 3.

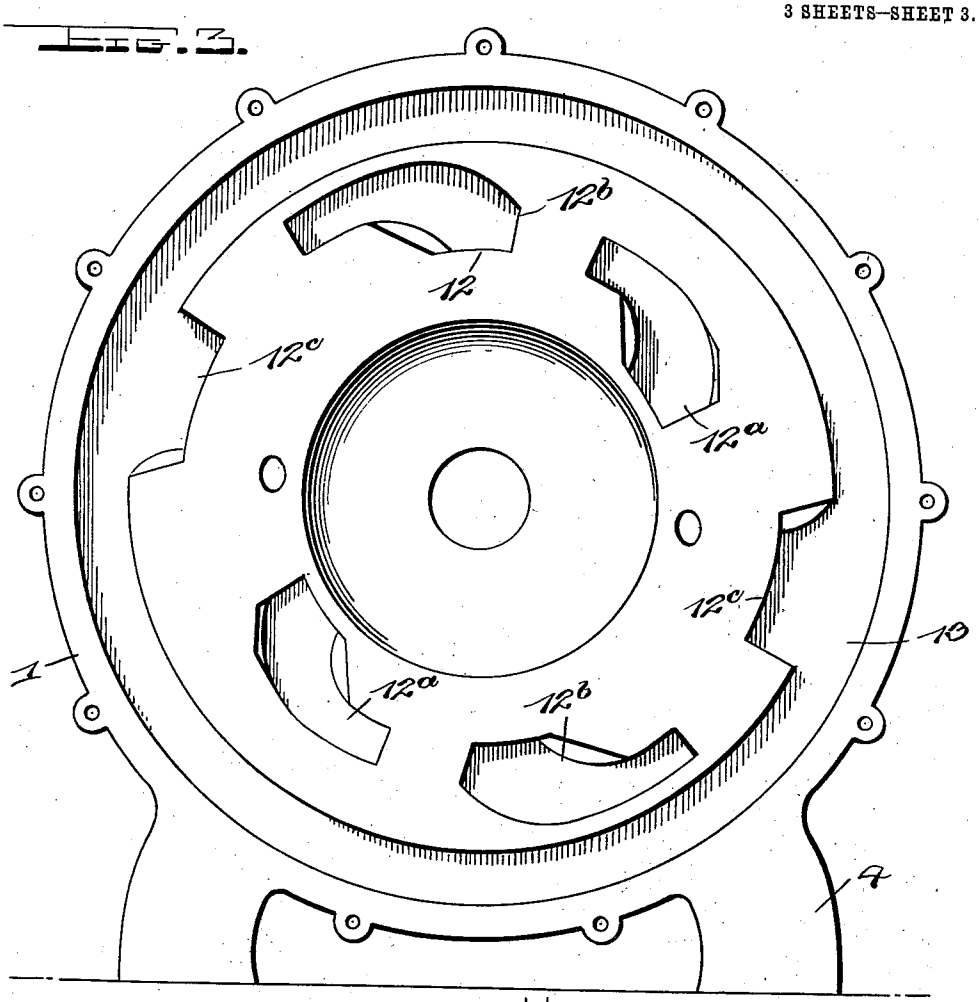
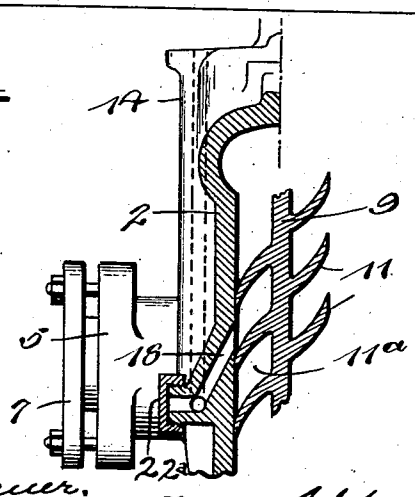


Fig. 4.



Witnesses

Chas. L. Griesbauer.

A. B. Norton.

Inventor

F. Lytle,

By Watson E. Coleman.

Attorney

UNITED STATES PATENT OFFICE.

FREDERICK LYTLE, OF NORTH BEND, OREGON, ASSIGNOR OF ONE-HALF TO GEORGE S. HOLLISTER, OF NORTH BEND, OREGON.

STEAM-TURBINE.

1,065,539. Specification of Letters Patent. Patented June 24, 1913.

Application filed May 29, 1912. Serial No. 700,440.

To all whom it may concern:

Be it known that I, FREDERICK LYTLE, a citizen of the United States, residing at North Bend, in the county of Coos and State of Oregon, have invented certain new and useful Improvements in Steam-Turbines, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to new and useful improvements in steam turbines and more particularly to the type known as combined flow and reaction impact and has for its object to provide an improved device of this character, the operation of which may be readily and quickly reversed by the mere disposition of a valve to a predetermined position.

A further object of the invention resides in providing means whereby the steam may be expanded a number of times before finally passing to the exhaust chamber, thereby giving the greatest possible power to the rotor, and a further object resides in the provision of a plurality of pockets or cavities formed in the side faces or plates of the casing, which pockets approximately radiate from the axial center of the side plates to the periphery thereof.

A still further object of the invention resides in providing two sets of the aforesaid pockets, the pockets of each set coöperating with one another to aid in the expansion of the steam and a still further object resides in the provision of a rotor having vanes formed thereon arranged in series.

Still another object resides in providing both faces of the rotor with vanes arranged in series, the vanes on the one face being disposed opposed to those on the other face thereof, whereby the rotor may be operated in opposite directions.

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.

With these and numerous 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.

In the accompanying drawings forming a part of this application, Figure 1 is a side elevation partly in section of my improved turbine. Fig. 2 is a vertical transverse section therethrough as seen on line 2—2, Fig. 1. Fig. 3 is an inner side elevation of the one side plates of the casing of the device. Fig. 4 is a vertical transverse section through the device as seen on line 4—4, Fig. 1. Fig. 5 is a fragmentary transverse section through the device as seen on line 5—5, Fig. 1; and Fig. 6 is a similar view as seen on line 6—6. Fig. 1.

In describing my invention, I shall refer to the drawing in which similar reference characters designate corresponding parts throughout the several views and in which—

1 and 2 indicate the side plates or castings which, when secured together by means of the bolts 3, form the casing for my improved turbine, said plates having formed thereon the supporting legs 4 and formed on the outer faces of the plates 1 and 2, at the axial center thereof, are the bearings 5. Extending through the casing formed by the side plates 1 and 2 is a central shaft 6 which is rotatably held in the bearings 5, while a packing 6′ is held in place by the stuffing box glands 7 and mounted on this shaft 6 in any desired manner, is the hub of a rotor 8. This rotor is designed to provide a central partition wall or the like 9 on each face of which are provided a trio of annular flanges 10, which flanges form substantial concentric rings or the like, the outer edges of which are adapted to fit snugly against the inner walls of the side plates 1 and 2. The outer flange on the disk-like partition wall 9 form a rim for the rotor and arranged between the various ring portions or annular flanges 10 are the spiral vanes 11. These vanes, forming cup like members between the ring portions or flanges 10, are arranged at regular intervals throughout the circular course formed by the flanges or rings 10, so that these vanes may be said to be arranged in series and the vanes on the one face of the central partition wall 9 are disposed opposite to those on the other face thereof, whereby the rotor may be revolved in opposite directions. For the sake of convenience in describing the operation of the device, the inner series of vanes will be referred to as 11^a, the intermediate series 11^b and the outer series 11^c.

The inner walls of the side plates 1 and 2 are each provided with two sets of arcuate

pockets 12, there being three pockets in each set, namely 12^a, 12^b and 12^c, the pockets 12^a being designed to coöperate with the series 11^a and 11^b of the rotor and the pockets 12^b coöperating with the series 11^b and 11^c of the rotor while the pockets 12^c are adapted to coöperate with the series 11^c and the exhaust channel 13 surrounding the rotor 8. The pockets in each set are spaced from one another, the same being disposed in a line radiating from the axial center of the plates to the periphery thereof and the corresponding pockets of each set are disposed at diametrically opposite points on the plates.

Extending vertically on each side of the casing formed by the plates 1 and 2 is a steam inlet pipe 14 which is forked at its lower end to provide the branch inlets 15 and 16, which latter inlets communicate with the inclined inlet channels 17 and 18 respectively formed in the faces of each side plate. The channel 17 is inclined downwardly, while the channel 18 is inclined upwardly and the same are arranged to communicate directly with the inner series of vanes 11^a on the rotor 8. The vertical steam inlet pipes 14 disposed on opposite sides of the casing are connected to a main inlet pipe 19 by means of the branches 20 and at the junction of these branches 20 with the main pipe 19, is disposed a three-way manually operated valve 21. This valve, it will be seen, may be readily operated to allow the steam to enter through the pipe on the one side or the other of the casing, thereby permitting the rotor to be correspondingly revolved in one direction or the other and at the lower point of the casing is an exhaust outlet 22 which communicates with the exhaust chamber 13. The channels 17 and 18, at their junction respectively with the branch inlets 15 and 16, form substantial nozzles and are adapted to communicate with the atmosphere, the same being so constructed for convenience. These nozzle portions, however, are externally threaded and engaged with caps or plugs 22^a.

In operation, the valve 21 is first turned to allow the steam to enter the inlet pipe which will permit the rotor being revolved in the desired direction. As the steam enters the pipe 14, the same passes through the branches 15 and 16, where it is conducted through the respective oppositely inclined channels 17 and 18 to the inner series of vanes 11^a on the rotor 8. The pressure of the steam will, of course, cause the rotor to be slightly revolved and upon the slight revolution of said rotor, the steam held within the inner series of vanes will pass to the pockets 12^a, where it expands and is conducted to the intermediate series of vanes 11^b Through expansion, of course, the steam will attain greater power which will be correspondingly transmitted to said rotor and upon the continued revolution of the rotor, the steam in the intermediate series of vanes will be conducted to the intermediate vanes 12^b, where said steam is again expanded and then conducted to the outer series of vanes 11^c. From the outer series of vanes, the steam is conducted to the outer pockets 12^c from where it is finally conducted to the exhaust chamber 13. Through this triple expansion of steam, it will be appreciated that a maximum amount of power will be transmitted to the rotor, and the shaft 6, carrying the rotor, may be connected with any desired apparatus for the operation thereof. Should it be desired, however, to operate the turbine in a reverse direction, it will only be necessary to reverse the direction of the valve 21, thereby allowing the steam to pass to the inlet pipe on the opposite side of the casing.

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 most well 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. It will further be seen that the use of oil as a lubricant for this device is eliminated, whereby when steam is used as a means of power, the same may be returned to the boiler entirely free from oil. This is obviously an important advantage.

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

1. A turbine of the class described comprising a casing, having a pair of inlet ports in each face thereof, and disposed in opposite directions, said casing being also provided with an outlet port adjacent the outer periphery thereof, the faces of said casing being each provided with a plurality of arcuate pockets arranged in sets thereon and disposed in a line of substantial radiation from the axial center of the casing, a rotor mounted within the casing having a plurality of spirally designed vanes formed thereon, said vanes being arranged in circular series on said rotor, each series of vanes being adapted to coöperate with a particular pocket on each set formed on the faces of the casing and the inner series of vanes being also adapted for direct coöperation with the inlet ports formed on said casing, and means to supply an elastic fluid to said inlet ports.

2. A turbine of the class described comprising a casing having a plurality of pockets formed in the faces thereof arranged in sets thereon, each face of said casing being also provided with upwardly and down-

wardly inclined channels extending completely therethrough on opposite sides of the axial center thereof said inclined channels having removable caps on their outer ends, a rotor mounted within the casing having a plurality of spirally designed vanes thereon, said vanes being arranged in concentric circular series and each series being adapted to coöperate with a pocket of each set formed in the faces of said casing, the inner series of vanes communicating directly with said inclined channels, and means to supply an elastic fluid to said inclined channels.

3. A turbine of the class described comprising a casing having inlet and outlet ports thereon, a rotor mounted within the casing provided with a plurality of spirally designed vanes, said vanes being arranged in concentric circular series thereon and each series being adapted to coöperate respectively with one pocket of each set thereof, the vanes of each series being arranged alternate of the vanes of the adjacent series, and means to supply an elastic fluid to the inlet ports of the casing.

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

FREDERICK LYTLE.

Witnesses:
FRED HOLLISTER,
JNO. H. GREVES